

REPORT

DRAFT Environmental and Social Impact Assessment

Laldia Container Terminal Project

Client:	Laldia Container Terminal Ltd.
Reference:	BK4589-HAS-ES-XX-RP-EV-0001
Status:	S0/P01.01
Date:	12 October 2026

Laldia Container Terminal Limited

APM TERMINALS Lifting Global Trade

Haskoning Enhancing Society Together

IWM Water, Environment, Climate & ICT

Mr. Masud Iqbal Md. Shamim
Director (Environmental Clearance)
Department of Environment
Paribesh Bhaban, E-16, Agargaon, Sher-e-Bangla Nagar
Dhaka 1207
Bangladesh

Subject: Submission of Draft Environmental and Social Impact Assessment (ESIA) Report of the Laldia Container Terminal for Site Clearance Certificate

12 October 2026
Our ref: PE-LCT-DOE-00

Laldia Container Terminal Limited
Gulshan Centre Point, 20th Floor
House# 23-26, Road # 90,
Gulshan 02 Dhaka-1212,
Bangladesh

apmterminals.com

Dear Sir,

We hereby submit the Draft Environmental and Social Impact Assessment (ESIA) Report of the Laldia Container Terminal Limited (LCTL) following the Terms of Reference (ToR) approved by the Department of Environment (DOE) on **07th October 2026.**

The Draft ESIA report has been prepared in accordance with Schedule 11 of the Environment Conservation Rules 2023 (ECR 2023).

We look forward to receiving your approval of the ESIA report and Site Clearance Certificate (SCC) in favor of the Laldia Container Terminal Ltd. DoE's continued support towards enabling the timely and successful implementation of this nationally significant project is appreciated.

Thank you.

Yours faithfully
Laldia Container Terminal Limited



Romesh David
Chief Executive Officer

cc:
Director, DoE, Chattogram Metropolitan Office
Director General office, DoE H/Q, Dhaka

Enclosure:
1. Approval Letter of Terms of Reference for ESIA study
2. Draft ESIA report for Laldia Container Terminal Project
3. Online Application for Site Clearance Certificate (SCC)
4. Form 3: Application for Site Clearance Certificate (SCC)
5. Form-6: Commitment Letter

ফরম-৬

ঘোষণাপত্র

[বিধি ১৬ এর উপ-বিধি (৪) দ্রষ্টব্য]

আমি এই মর্মে ঘোষণা করিতেছি যে, আমার জ্ঞাতসারে পরিবেশগত ব্যবস্থাপনা পরিকল্পনা এবং পরিবীক্ষণ কর্মসূচি প্রণয়ন করা হইয়াছে। পরিবেশগত ব্যবস্থাপনা পরিকল্পনায় উল্লিখিত সকল কার্যক্রম/পদক্ষেপ/পরিকল্পনা এবং পরিবীক্ষণ কর্মসূচি যথাযথভাবে বাস্তবায়নের জন্য আমি দায়ী থাকিব।

শিল্প প্রতিষ্ঠান/প্রকল্পের নাম: Laldia Container Terminal Project

শিল্প প্রতিষ্ঠান/প্রকল্পের ঠিকানা: Gulshan Centre Point, 20th Floor, House# 23-26, Road # 90, Gulshan 02 Dhaka-1212, Bangladesh

উদ্যোক্তার স্বাক্ষর

(সীলমোহরসহ)

নাম: Romesh David

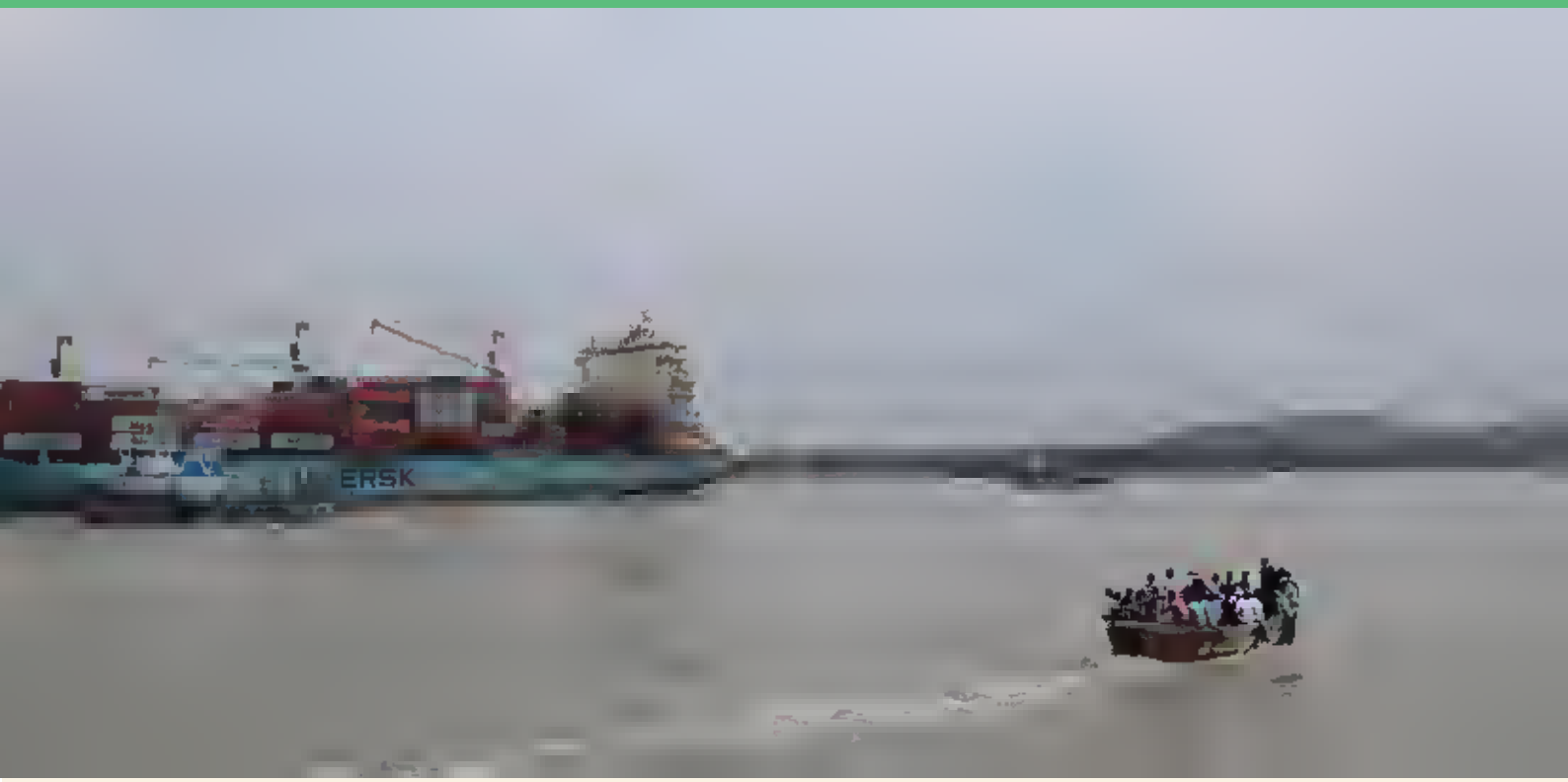
ঠিকানা: Gulshan Centre Point, 20th Floor, House# 23-26, Road # 90, Gulshan 02 Dhaka-1212, Bangladesh

ফোন: 01335182626

ফ্যাক্স:

তারিখ: 12.10.2026

ই-মেইল: Romes.david@apmterminals.com



REPORT

DRAFT Environmental and Social Impact Assessment

Laldia Container Terminal Project

Client:	Laldia Container Terminal Ltd.
Reference:	BK4589-HAS-ES-XX-RP-EV-0001
Status:	S0/P01.01
Date:	12 October 2026

APM TERMINALS
Lifting Global Trade

Haskoning
Enhancing Society Together

IWM
Water Environment, Climate & ICT

HASKONING NEDERLAND B.V.

Jonkerbosplein 52
6534 AB Nijmegen
Netherlands
Water & Maritime
Trade register number: 56515154

Phone: +31 88 348 70 00
Email: info@haskoning.com
Website: haskoning.com

Document title:	DRAFT Environmental and Social Impact Assessment
Subtitle:	Laldia Container Terminal Project
Reference:	BK4589-HAS-ES-XX-RP-EV-0001
Your reference	Click or tap here to enter text.
Status:	S0/P01.01
Date:	12 October 2026
Project name:	ESIA Report
Project number:	BK4589
Author(s):	ESIA Team
Drafted by:	ESIA Team
Checked by:	MH
Date:	09 October.2026
Approved by:	JdJ
Date:	12 October 2026
Classification:	Project related

Unless otherwise agreed with the Client, no part of this document may be reproduced or made public or used for any purpose other than that for which the document was produced. Haskoning Nederland B.V. accepts no responsibility or liability whatsoever for this document other than towards the Client.

Please note: this document contains personal data of employees of Haskoning Nederland B.V.. Before publication or any other way of disclosing, this report needs to be anonymized, unless anonymisation of this document is prohibited by legislation. This document may have been prepared with the assistance of artificial intelligence (AI); all AI-generated content has been reviewed and validated by our experts.

Table of Contents

1	**Executive Summary**	**1**
1.1	Project Background	1
1.2	Policy, legal and administrative framework	2
1.3	Project description	3
1.4	Baseline environmental conditions	10
1.4.1	Physical environment	10
1.4.2	Biological environment	12
1.4.3	Social environment	14
1.5	Valued Environmental Components (VECs)	16
1.6	Predicted impacts	17
1.6.1	Pre-Construction Phase	18
1.6.2	Construction Phase	18
1.6.3	Operation	19
1.7	Environmental and Social Management Plan (ESMP)	22
1.7.1	Key mitigation measures	22
1.7.2	Monitoring plan	58
1.7.3	Residual impacts	86
1.7.4	Institutional arrangements	86
1.7.5	Grievance Redress mechanism	86
1.8	Consultation and Disclosure	87
1.9	Recommendations	88
2	**General Information**	**89**
2.1	Background of the Project	89
2.2	Project Proponent	89
2.3	Consulting Firm's Information	90
3	**Project Description and Options**	**94**
3.1	Rationale, Objective, and Benefits	94
3.2	Description of the Project	94
3.2.1	Requirement of Land	94
3.2.2	Project Location and Surrounding Environment	96
3.2.3	Project Components	101
3.2.3.1	Introduction	101
3.2.3.2	Container Terminal	101
3.2.3.3	Buildings	105
3.2.3.4	Quay Wall	105
3.2.3.5	Dredging, Reclamation and Landfill	105
3.2.3.6	Berthing area and Block C	105
3.2.3.7	Drainage channel	111
3.2.3.8	Ground Improvement and Surcharge	113
3.2.3.9	Overview of import and export of sediment materials	114
3.2.3.10	Road Traffic, Truck Parking and River Transport	115
3.2.3.11	Nautical Components	119
3.2.3.12	Stormwater drainage	120
3.2.3.13	Associated Facilities	123
3.2.4	Project Activities and Implementation Period	126
3.2.4.1	Pre-construction	127

3.2.4.2	Construction	127
3.2.4.3	Operation and maintenance	131
3.2.4.4	Project Implementation Schedule	133
3.2.5	Requirement of Resources	135
3.2.5.1	Labour Requirements and Facilities	135
3.2.5.2	Utilities	136
3.2.6	Pollution Potentials	142
3.3	Analysis of Alternatives	142
3.3.1	No-project alternative	142
3.3.2	Justification of Discarding Other Options	143
3.3.2.1	Project location alternatives	144
3.3.2.2	Reclamation or deck-on-piles for the yard	144
3.3.2.3	Drainage channel alternatives	146
3.3.2.4	Ground improvement methods	148
4	**Legal, Policy and Administration Framework**	**151**
4.1	Introduction	151
4.2	Relevant National Legislations and Policies in Bangladesh	151
4.2.1	Overview of Policies, Laws, Rules and Regulations	151
4.2.2	Administrative Framework in Bangladesh	156
4.2.3	Compliance with ESIA Approval Framework	158
4.2.4	Regional and International Treaties/Guidelines	158
5	**Existing Environmental Conditions**	**161**
5.1	Physical Environment	165
5.1.1	Topography	165
5.1.2	Geology and Geomorphology	167
5.1.3	Soil	171
5.1.4	Water Resources, Hydrology and Flooding	173
5.1.5	Meteorology	179
5.1.5.1	Rainfall	181
5.1.5.2	Temperature	181
5.1.5.3	Relative Humidity	182
5.1.5.4	Ambient Pressure	183
5.1.5.5	Evaporation	184
5.1.5.6	Sunshine Hours	184
5.1.5.7	Wind Speed and Direction	185
5.1.6	Climate Change	186
5.1.6.1	Temperature	187
5.1.6.2	Rainfall	188
5.1.6.3	Wind and tropical cyclones	189
5.1.6.4	Sea level rise	190
5.1.7	Environmental Quality	190
5.1.7.1	Surface Water Quality	191
5.1.7.2	Ground Water Quality	199
5.1.7.3	Ambient Air Quality	206
5.1.7.4	Ambient Noise Level	210
5.1.7.5	Soil Quality	213
5.1.7.6	Riverbed Sediment Quality	221
5.1.7.7	Existing Sources of Pollution	229
5.2	Biological Environment	229

5.2.1	Ecological Resources	229
5.2.1.1	Terrestrial Ecology	229
5.2.1.2	Flora	232
5.2.1.3	Fauna	243
5.2.1.4	Avifauna	245
5.2.2	Aquatic Ecology	254
5.2.2.1	Flora	257
5.2.2.2	Fauna	257
5.2.3	Endemic, Endangered and threatened species	266
5.2.4	Ecologically Critical Areas and Protected Areas	269
5.3	Land Use	272
5.3.1	Present Land Use	272
5.3.2	Proposed Land Use	274
5.4	Socio-economic Environment	274
5.4.1	Population Distribution and Demography	277
5.4.1.1	Households and Population	277
5.4.1.2	Respondent Background	278
5.4.1.3	Vulnerable groups	279
5.4.1.4	Previous land use of blocks A, B and C	279
5.4.1.5	Households and Population of Sample Households	280
5.4.2	Economic Activities	286
5.4.2.1	Dependency Ratio	286
5.4.2.2	Main Source of Livelihood	288
5.4.2.3	Occupation	291
5.4.2.4	Monthly Income of the Households	294
5.4.2.5	Monthly Expenditure of the Households	295
5.4.2.6	Poverty Level	296
5.4.3	Physical Infrastructure and Services	297
5.4.3.1	Current road infrastructure and traffic	297
5.4.3.2	River Traffic	303
5.4.3.3	Type of Main Dwelling	307
5.4.3.4	Electricity Connection of Households	311
5.4.3.5	Population owning a Mobile Phone	312
5.4.3.6	Internet Users	313
5.4.4	Gender	313
5.4.5	Social and Cultural Amenities	319
5.4.6	Public Health	322
5.4.6.1	Source of water for drinking water	322
5.4.6.2	Source of Water for Domestic Uses	323
5.4.6.3	Toilet Facilities of Households	324
5.4.6.4	Protein Intake	326
5.4.6.5	Common Diseases	327
5.5	Maps, Graphs and Figures	328
5.6	Recent Photographs of the Project Locations and Surroundings	328
5.7	Location of The Project	331
6	**Stakeholder Consultations**	**335**
6.1	Overview	335
6.2	Methodology	336
6.2.1	Stakeholder Identification	336

6.2.2	Consultation Methods	336
6.2.3	Information Disclosure	337
6.2.4	Documentation and Integration	338
6.3	Stakeholder Classification	338
6.4	Consultation Sessions	339
6.4.1	Community / Public Consultation Meetings	341
6.4.2	Focus Group Discussions (FGDs)	343
6.5	Suggestions from Consultation Sessions	344
6.5.1	Issues Raised from Public Consultation Meetings	344
6.5.2	Issues Raised from FGDs Sessions	347
6.6	List of Participants	348
6.7	Photographs	348
7	**Valued Environmental Components (VECs)**	**353**
7.1	Introduction, overview and sensitivity of VECs	353
7.2	Drainage Hydrology	354
7.3	River morphology	355
7.4	Water and Sediment Quality	355
7.5	Ambient Noise Levels	355
7.6	Ambient Air Quality	356
7.7	Tidal Mudflats	356
7.8	Mangrove Ecosystems	356
7.9	Dolphins	357
7.10	Fisheries Resources	357
7.11	Avifauna and Migratory Birds	357
7.12	River Crossing Commuters and Operators	358
7.13	Road Traffic	358
7.14	River Traffic	359
7.15	Livelihood, Health and Safety of Communities	359
7.16	Construction and Operation Workers	359
8	**Impact Prediction and Evaluation**	**360**
8.1	Methodology	360
8.1.1	Magnitude Criteria	360
8.1.2	Evaluation of Impact Significance	361
8.2	Project activities	361
8.3	Project Impacts	362
8.3.1	Introduction	362
8.3.2	Impacts on Drainage Hydrology	362
8.3.3	Impacts on River Morphology	370
8.3.4	Impacts on Water and Sediment Quality	374
8.3.5	Impacts on Ambient Noise Levels	382
8.3.6	Impacts on Ambient Air Quality	386
8.3.7	Impacts on Tidal Mudflats	389
8.3.8	Impacts on Mangrove Ecosystem	390
8.3.9	Impacts on Dolphins	391
8.3.10	Impacts on Fisheries Resources	392
8.3.11	Impacts on Avifauna and Migratory Birds	394
8.3.12	Impacts on River crossing commuters and operators	395
8.3.13	Impacts on Road Traffic	396
8.3.14	Impacts on River Traffic	399
8.3.15	Impacts on Livelihoods and Community Health & Safety	401

8.3.16 Other Impacts on Livelihoods 405
8.3.17 Construction and Operation Workers 408
8.4 Evaluation of Impacts 409
8.5 Cumulative impacts assessment 417
8.5.1 Overview 417
8.5.2 Identification of VECs for the CIA 417
8.5.3 Identification of Surrounding Activities and Potential Impacts 418
8.5.4 Management of Cumulative Impacts 424
9 Environmental and Social Mitigation and Enhancement Measures 426
9.1 Key impacts and related measures 426
9.1.1 Joining Block-B and Block-C over the existing drainage channel (Khal No. 14) may cause upstream drainage congestion during monsoon 426
9.1.2 Piling will generate underwater noise which impacts dolphins 428
9.1.3 Residual impact from past physical and economic displacement of households from the project site 431
9.1.4 Loss of river crossing boat operations at *Ghat 14* 432
9.2 Budget for Implementing the Mitigation Plan 435
10 Environmental and Social Monitoring Programme 436
10.1 Plan for Monitoring of Implementation of the Mitigation Measures (Pre-Construction, Construction and Operation Periods) 436
10.2 Plan for Monitoring of the Project Impacts 436
10.3 Location of Mitigation Measures and Monitoring Site (Indicator Map and Photographs) 436
10.4 Monitoring reporting 436
10.4.1 Monthly compliance reports 436
10.4.2 Quarterly compliance reports 437
10.5 Budget for Implementation of Environmental Monitoring Program 437
10.6 Methods and Schedule for Results review or Annual Auditing 437
11 Environmental and social management plan 439
11.1 Overview 439
11.2 Environmental impacts and mitigation measures 439
11.3 Environmental surveillance, monitoring and auditing 513
11.4 Contingency Plan 514
11.4.1 Assessment of Emergency Resilience of the Project 514
11.4.2 Contingency Plan for Emergency Management 515
11.4.3 Abnormal and Emergency Situations Covered 515
11.4.4 Procedures and Measures to be Adopted in an Emergency 517
11.4.5 Safety Arrangements for Working Staff and the General Public 518
11.4.6 Organisations and Persons to be Contacted and Informed 519
11.4.7 Safety Awareness and Educational Programmes 520
11.4.8 Monitoring and Review 520
11.5 Waste and waste water management 521
11.6 Biodiversity Management 521
11.7 Labour management 521
11.8 Gender 522
11.9 Organization structure 522
11.9.1 Environmental, health and safety organization 522
11.9.2 Implementation and oversight structure 524
11.10 Training 524
11.11 Stakeholder engagement and grievance mechanism 526

11.12 Budget implications 526
11.12.1 Budget for implementation of measures 526
11.12.2 Budget for implementing the environmental monitoring program 530
11.13 Methods and schedule for results review or auditing 533
12 Conclusion and Recommendations 534
12.1 Conclusions 534
12.2 Recommendations 535
13 References 537
Annex A – Approved ToR from DoE dxl
Annex B1 – Survey: Lab certificates dxlii
Annex B2 – Survey: Air / Noise quality certificates 619
Annex B3 – SE and social survey: List of participants in meetings / FGDs 622
Annex B4 – SE and social survey: Stakeholder Engagement Log 636
Annex B5 – SE and social survey : Social survey questionnaire 659
Annex C1 – Specialist Study: Air quality 670
Annex C2 – Specialist Study: Ambient noise 671
Annex C3 – Specialist Study: Flood model set-up 672
Annex C4 – Specialist Study: Sediment plume model 673
Annex C5 – Specialist Study: Oil spill model 674
Annex C6 – Specialist Study: Morphological changes modelling 675
Annex D – Dredging Management Plan 676
Annex E – Land Possession Certificate of CPA 677
Annex F1 – Waste Management Plan 678
Annex F2 – Oil and Chemical Spillage Management Plan 679
Annex F3 – Ballast Water Management Plan 688

List of Tables

Table 1-1: Preconstruction phase summarised ESMP table 23
Table 1-2: Construction phase summarised ESMP table 26
Table 1-3: Operation phase summarised ESMP table 43
Table 1-4: Monitoring during pre-construction phase 59
Table 1-5: Monitoring during construction phase 61
Table 1-6: Monitoring during operation phase 74
Table 2-1: Study team composition 90
Table 3-1: Overview of sediment material volumes required for LCTP 114
Table 3-2: Estimated trips (inbound and outbound) of barges related to the import and export of sediment materials 116
Table 4-1: Summary of applicable environmental, social regulations of GoB 151
Table 4-2: Institutional Framework in Bangladesh in the environmental sector 156
Table 4-3: International Treaties, Conventions and Protocol 158
Table 5-1: Existing Regulator Details within Project Influence Area of LCT 179

Table 5-2: Test results of surface water samples collected from Karnaphuli River inside project influence area 193
Table 5-3: Test results of surface water samples collected from project influence area during monsoon 2025 197
Table 5-4: Analysis results of groundwater samples collected from project influence area (Dry season 2026) 201
Table 5-5: Groundwater analysis results 204
Table 5-6: Ambient Air Quality Parameters in Project Area (April-May 2026) 208
Table 5-7: Noise Levels in Project Influence Area, all units are in dB 210
Table 5-8: Analysis Results of Soil Samples Collected from Project Area (Dry Season 2026) 216
Table 5-9: Soil analysis result for monsoon season 220
Table 5-10: Analysis results of sediment samples collected from project influence area 223
Table 5-11: Analysis results of sediment samples collected from project influence area (monsoon 2025) 228
Table 5-12: Flora Species List found within the AoI with Local Names, Habit and IUCN Status. 236
Table 5-13: Bird species recorded in the project AoI during the observational surveys in February, March, and April 2026. 245
Table 5-14: List of fish and shrimp/prawn species identified in project influence area 261
Table 5-15: Species of Conservation Concern Confirmed within the Project AoI and their National and Global Conservation Status 268
Table 5-16: Designated natural areas 270
Table 5-17: Distribution of Household and Population 277
Table 5-18: Respondents by Age and Sex 278
Table 5-19: Distribution of Household and Population of Sample Households 280
Table 5-20: Distribution of the Head of the Households by Sex 281
Table 5-21: Distribution of Population by Age Group and Sex of the Study Area in Percentage 282
Table 5-22: Distribution of Population Aged 12 Years and Above by Sex, Marital Status in Percentage 282
Table 5-23: Distribution of Population by Religion in Percentage 284
Table 5-24: Educational Status of Household Members (7 Years and Above) by Sex in Percentage 284
Table 5-25: Number of Dependent and Probable Workforce and Dependency Ratio 287
Table 5-26: Sources of Main Livelihood in Percentage (Source: Socio-economic survey April 2026) 288
Table 5-27: Occupation of the Head of the Household in Percentage 291
Table 5-28: Occupation of the of the Household Members (15 Years and Above) in Percentage 293

Table 5-29: Average Monthly Income of the Households 294
Table 5-30: Average Monthly Expenditure of the Households in Percentage 295
Table 5-31: Average Monthly Income of the Households 297
Table 5-32: Level of Service 302
Table 5-33: Pedestrian permeability 303
Table 5-34: River Crossing Boats at Ghat No. 14 - Day-wise River Crossing Boat Movements at Ghat No. 14 (Survey: 7–8 May 2026) 305
Table 5-35: Type of Structure Used for Living of Household Members 311
Table 5-36: Source of Electricity in the Households 312
Table 5-37: Population Having Mobile Phone Account (15 Years and above) in Percentage 312
Table 5-38: Internet Users (15 Years and above) 313
Table 5-39: Household size distribution per gender as head. 314
Table 5-40: Names of the religious amenities near the project AoI. 321
Table 5-41: Main Source of Drinking Water 322
Table 5-42: Source of Water for Domestic Uses in Percentage 323
Table 5-43: Ownership of the Tube-Well Used by the Household Members in Percentage 324
Table 5-44: Toilet Facilities in Percentage 325
Table 5-45: Ownership of Latrine by the Household 326
Table 5-46: Protein Intake per Week in Percentage 327
Table 5-47: Comon Diseases of the Study Area (experienced in the last 6 Months) 327
Table 5-48: Lattitude and longitude of the project sites 331
Table 6-1: Schedule of Public Consultation Meetings 341
Table 6-2: Schedule of Focus Group Discussions 343
Table 7-1: Criteria for the sensitivity of a VEC 353
Table 7-2: VECs and their sensitivities 354
Table 8-1: Criteria for Determining Impact Magnitude 361
Table 8-2: Impact evaluation matrix 361
Table 8-3: Receiver Noise level Output for Operation phase 385
Table 8-4: Estimated number of affected assets 404
Table 8-5: Potential impacts of pre-construction activities on the environmental and social components 410
Table 8-6: Potential impacts of construction activities on the environmental and social components 411
Table 8-7: Valued Environmental and Social Component (VECs) for the CIA 417
Table 8-8: List of developments included in the CIA and potential impacts on the VECs 420
Table 11-1: Environmental and Social Mitigation Measures during Pre-construction Phase 440
Table 11-2: Environmental and Social Mitigation Measures during Construction Phase 443

Table 11-3: Environmental and Social Mitigation Measures during Operation Phase 470
Table 11-4: Environmental and Social Monitoring Plan during Pre-construction Phase 485
Table 11-5: Environmental and Social Monitoring Plan during Construction Phase 487
Table 11-6: Environmental and Social Monitoring Plan during Operation Phase 502
Table 11-7: Contingency planning requirements and where they are addressed 515
Table 11-8: Contingency Plan 515
Table 11-9: Escalation of emergencies 518
Table 11-10: Safety arrangements 518
Table 11-11: Organisations to be contacted during and after an emergency 519
Table 11-12: Safety awareness and education programmes 520
Table 11-13: LCT/APMT Project E&S Management Structure 522
Table 11-14: Main Civil Works & Building Contractors E&S Staff 524
Table 11-15: FIDIC Engineer & Construction Supervisor Consultants E&S Staff 524
Table 11-16: Costs associated with implementation of mitigation measures 528
Table 11-17: Costs associated with monitoring activities 531

List of Figures

Figure 1-1: Location of Laldia Terminal 1
Figure 1-2: Location of the Laldia Container Terminal Project (LCTP) as well as the other container terminals, within Bangladesh (left) and the Port of Chattogram (right) 4
Figure 1-3: Location of Block A, B, and C, including berthing area (source: Asset Design Drawings APM-056-01A-08 rev. 1) 5
Figure 1-4: Container terminal layout (source: Asset Design Drawing APM-056-SK10 rev. 1) 7
Figure 3-1: Location of the Laldia Container Terminal Project (LCTP) as well as the other container terminals, within Bangladesh (left) and the Port of Chattogram (right). 96
Figure 3-2: Project site layout showing Blocks A, B, and C of the LCTP (source: ESIA team) 97
Figure 3-3: Left: Block C; right: riverside at Block C with existing flood wall and mudflat (source: ESIA team, March 2026) 98
Figure 3-4: Left: drainage channel and ferry jetty (seen from Block C, southern side of the channel). Right: ferry and jetty seen from Block B (northern side of the channel) (source: ESIA team, March 2026) 98
Figure 3-5: Left: pavement on Block B, right: Block A (source: ESIA team, March 2026) 99
Figure 3-6: Location of Block A, B, and C, including berthing area (source: Asset Design Drawings APM-056-01A-08 rev. 1) 100
Figure 3-7: Throughput scenarios (source: Technical Feasibility Study LCTP, November 2025) 102
Figure 3-8: Container terminal layout (source: Asset Design Drawing APM-056-SK10 rev. 1) 104

Figure 3-9: Location of Char Bakalia sediment disposal site 107
Figure 3-10: Terminal layout indicating deck-on-piles and area for reclamation (source: Asset Design Drawings APM-056-01A-12 rev. 2) 108
Figure 3-11: Extent of reclamation and deck on piles 109
Figure 3-12: Cross-section of the conceptual dredging and reclamation, and envisioned deck on piles (source: APM Terminals, January 2026) 110
Figure 3-13: Dredging design plan view. Red line indicates the suggested project boundary (source: Asset Design Drawings APM-056-03A-01 rev. 2) 110
Figure 3-14: Proposed inclusion of the existing drainage channel into the LCTP design (source: Asset Design Drawings APM-056-01A-12 rev. 3) 112
Figure 3-15: Existing drainage channel between Block B and Block C. Top left: culvert under the road, top right: channel arriving from roadside to the sluice gate, with pumping station building, bottom left: sluice gate, bottom right: channel from sluice gate to the river (source: ESIA team, March 2026) 113
Figure 3-16: Road traffic movements expected during construction (source: Asset Design Drawings APM-056-01A-04 rev. 2) 117
Figure 3-17: Cross-section of the Container Terminal at Block C including crane dimensions (source: Asset Design Drawings APM-056-01A-14 rev. 1) 118
Figure 3-18: Envisioned turning of the vessel (HR Wallingford, 2024) 119
Figure 3-19: Design vessel (P&O Kobe) (HR Wallingford, 2024) 120
Figure 3-20: Proposed drainage (Block C) through elevation differences and indicative drains on-site (source: Asset Design Drawings APM-056-01A013 rev. 2) 121
Figure 3-21: Northern side of Block C and Block B including drainage layout (source: drawing APM-056-06B-01 rev. 3) 122
Figure 3-22: Halishahar electricity substation and possible routes to the LCTP (source: ESIA team) 124
Figure 3-23: Left: Cutter Suction Dredger (CSD). Right: CSD at Karnaphuli river (photo taken spring 2026) 128
Figure 3-24: Example of piles under a deck-on-piles 128
Figure 3-25: Installation of Prefabricated Vertical Drains (PVDs) (Turukmane, 2019) 129
Figure 3-26: Example of a box culvert (Specialty Precast, 2025) 129
Figure 3-27: Terminal lighting mast example (AEC Illuminazione, n.d.) 130
Figure 3-28: Left: Ship to Shore (STS) crane example. Right: Rubber Tyred Gantry Crane example (Lledo, n.d.); (Liebherr, n.d.) 131
Figure 3-29: Project Implementation Schedule 134
Figure 3-30: Estimated water demand for the LCTP during construction and operation (source: (LCT Ltd. , 2025) 137
Figure 3-31: Electricity consumption estimates for LCTP during operations (LCT Ltd. , 2025) 138
Figure 3-32: Halishahar electricity substation and possible routes to the LCTP (source: ESIA team) 140

Figure 3-33: Left: landfill and a box culvert (source: Asset Design Drawings APM-056-01A-12 rev. 3). Right: landfill with culvert upstream of the sluice gate with a suspended deck downstream of the sluice gate (blue area) (source: Asset Design Drawings APM-056-01A-12 rev. 2) 147
Figure 5-1: Area of Influence of the project 164
Figure 5-2: Digital Elevation Model (DEM) of the LCTP area of influence (elevation given in meter) 166
Figure 5-3: Geological map of Bangladesh (Source: U.S. Department of the Interior, U.S. Geological Survey) 168
Figure 5-4: Simplified tectonic map of the (a) Bengal Basin, (b) CTFB, (c) variation of Topographic elevation of CTFB, and (d) geologic layers within CTFB (Hossain et al., 2026) 169
Figure 5-5: Seismic zone map of Bangladesh (Source: BNBC 2020) 171
Figure 5-6: Soil map of Bangladesh (Source: Soil Resources Development Institute) 172
Figure 5-7: Karnaphuli River and River basin 174
Figure 5-8: Water level hydrograph of Karnaphuli River at Sadarghat (Source: Bangladesh Inland Water Transport Authority (BIWTA)) 175
Figure 5-9: Seasonal variation of water level of Karnaphuli river at Sadarghat (Source: Bangladesh Inland Water Transport Authority (BIWTA)) 175
Figure 5-10: Tidal cycle from 18 to 20 April 2026 at Khal 18 (water level in ISLWL) (source: (CPA, 2026)) 176
Figure 5-11: Drainage map of the area near LCT sites 178
Figure 5-12: BMD station locations near the LCTP site location 180
Figure 5-13: Monthly Maximum Rainfall at Aambagan and Patenga 181
Figure 5-14: Variation of Average Monthly Maximum & Average Monthly Minimum temperature at Aambagan 182
Figure 5-15: Variation of Average Monthly Maximum & Average Monthly Minimum temperature at Patenga 182
Figure 5-16: Average Monthly Humidity at Aambagan and Patenga 183
Figure 5-17:Sea level Pressure and Station Level Pressure at Aambagan and Patenga 183
Figure 5-18:Cloud Cover at Aambagan and Patenga 184
Figure 5-19: Sunshine Duration at Aambagan and Patenga 185
Figure 5-20: Average Wind Speed at Aambagan and Patenga 186
Figure 5-21: Wind Rose Plot at Aambagan (left) and Patenga (right) 186
Figure 5-22: Projected increase in maximum daily temperatures (for 50, and 100-year return period) for RCP4.5 and RCP8.5 in Chattogram 187
Figure 5-23: Projected increase in number of hot days (above 35 and 39 degrees) for RCP4.5 and RCP8.5 in Chattogram 188
Figure 5-24: Projected increase in 1-day and 5-day maximum precipitation for a 50 and 100-year return period for RCP4.5 and RCP8.5 189

Figure 5-25: Sea level rise that is taken into account based on IPCC AR6 190
Figure 5-26: Surface water sampling locations (Dry season 2026) 192
Figure 5-27: Surface water sampling locations (monsoon 2025) 197
Figure 5-28: Groundwater sampling locations 200
Figure 5-29: Groundwater sampling locations for the Monsoon season 204
Figure 5-30: Locations of measuring air quality and noise 207
Figure 5-31: Linear relationship between the noise level (day time), noise level (night time) and BD standard 212
Figure 5-32: Soil sampling locations 215
Figure 5-33: Soil analysis monsoon season 219
Figure 5-34: Riverbed sediment sampling locations 222
Figure 5-35:Sediment analyses for monsoon season 227
Figure 5-36: Ecological survey transects 231
Figure 5-37: Vegetation between Block A and the Karnaphuli River (source: CARINAM, April 2026) 232
Figure 5-38: Mangroves (Avicennia alba) adjacent to Block B (source: ESIA team, April 2026) 233
Figure 5-39: Vegetation in the drainage channel between Block B and C (source: ESIA team, April 2026) 233
Figure 5-40: Left: cleared vegetation at Block C. Right: treeline at the roadside just outside Block C (source: ESIA team, February 2026) 234
Figure 5-41: Vegetation at the Majher Char area (source: CARINAM, March 2026) 234
Figure 5-42: Vegetation in the KEPZ and adjoining areas of Badalpura (source: CARINAM, February 2026) 235
Figure 5-43: Faunal species observed in the project area (CARINAM, March 2026) 244
Figure 5-44: Photos of bird species observed in the project AoI (CARINAM, Feb-Mar-Apr 2026) 253
Figure 5-45: Benthic sampling survey sites 255
Figure 5-46: Sites surveyed during the fisheries and aquatic resources survey 256
Figure 5-47: Ganges dolphin mother with calf, sighted on 9th June 2026 near the Gupta bend (source: CARINAM, June 2026) 258
Figure 5-48: Irrawaddy Dolphin (Orcaella brevirostris) (cGanga and NMCG, 2021) 260
Figure 5-49: Photos of fish species found in the project area 264
Figure 5-50: Designated natural areas around Chattogram 270
Figure 5-51: Designated natural areas near the project site 271
Figure 5-52: Land use map based on current situation with wards layer overlay (source: combined OSM and ESA landcover data) 273

Figure 5-53: Spatial boundary levels used for the secondary data collection (Census boundaries) and the primary data collection (Approximate survey location points). (Bangladesh Bureau of Statistics, 2022) 276
Figure 5-54: Spatial boundary levels used for the secondary data collection (Ward boundaries) and the primary data collection (Approximate survey location points). 277
Figure 5-55: Head of the Household by Sex (Socio-economic survey, April 2026). 281
Figure 5-56: Shops Near the Ferry Ghat (source: ESIA team) 286
Figure 5-57: Comparison between dependent population and probable workforce. 287
Figure 5-58: Comparison between dependent population and probable workforce. 287
Figure 5-59: Main Source of Livelihood (socio-economic survey April 2026). 289
Figure 5-60: Source of Livelihood (in counts) based on socio-economic survey April 2026. 290
Figure 5-61: Occupation of the households' head per gender (Socio-economic survey April 2026) 293
Figure 5-62: Monthly Income in Percentage (source: socio-economic survey April 2026) 295
Figure 5-63: Main road structure surrounding LTCP – including junction type at main junctions. *RiRo = Right-in, Right-out 298
Figure 5-64: Airport Road design with 2 lanes in each direction and a central median (Streetview, 2024) 299
Figure 5-65: Traffic volumes in vehicles/day. 301
Figure 5-66: Survey locations and current river crossing boat landing stations near LCT. Survey locations were at Ghat no 14 – Boat Landing Station and at Ghat no 15 – Boat Landing Station. 304
Figure 5-67: Ghat 14 top left and right (between block B and C), Ghat 15 bottom left, and CUFL Ghat (Opposite to Ghat No 15) bottom right 306
Figure 5-68: Estimate movement of mechanized vessels 306
Figure 5-69: Estimated movement of inland/coastal vessel 307
Figure 5-70: Type of Structure for main dwelling 307
Figure 5-71: Example of a Semi Pucca structure 308
Figure 5-72: Example of a Pucca structure 308
Figure 5-73: Example of a tin made structure (floor paved) 309
Figure 5-74: Example of a tin made structure (floor unpaved) 309
Figure 5-75: Example of a thatched structure 310
Figure 5-76: Example of a wooden house 310
Figure 5-77: People living in the household, separated by male and female headed households. 314
Figure 5-78: Highest level of education followed by male and female headed households. 315
Figure 5-79: Highest level of education followed by household members of male and female headed households. 316
Figure 5-80: Main sources of income per household. 317

Figure 5-81: Total monthly income of household 318
Figure 5-82: Landownership per household head 318
Figure 5-83: Religious amenities near the project AoI, see table below for corresponding names. 320
Figure 5-84: Toilet facilities 325
Figure 5-85 Recent Photographs of the Project Locations and its Surroundings 331
Figure 5-86: Location map of the study area showing the project sites and the AoI 333
Figure 6-1: Locations of public consultations 340
Figure 6-2: Photographs of the Community Consultation Meetings 342
Figure 6-3: Community meeting at Fulchori Para, Government Primary School on 23 April 2026 349
Figure 6-4: Community Meeting at 41 Ward Commissioner's Office, Patenga, Chattogram on 23 April 2026 349
Figure 6-5: Community meeting at Dhakkin Patenga High School, Port area on left bank (opposite bank of proposed sites) of Karnaphuli River on 25 April 2025 349
Figure 6-6: FGD Meeting with adolescent girls on 08 April 2026 350
Figure 6-7: FGD with Boatmen group, at Ghat No.15, on 09 April 2026 350
Figure 6-8: FGD with Ferry Ghat Workers 350
Figure 6-9: FGDs with religious leaders on 09 April 2026 351
Figure 6-10: FGDs with truck drivers on 09 April 2026 351
Figure 6-11: FGDs with local women on 09 April 2026 351
Figure 6-12: FGDs with local businessman on 09 April 2026 352
Figure 6-13: FGDs with local fishermen on 21 April 2026 352
Figure 8-1: Drainage canals and regulators in project catchment. 1 = Khal 12, 2 = Khal 14, 3 = Khal 15. 365
Figure 8-2: Zoom-in Khal 14 drainage system. 1 & 3 = Khal 14 drainage channel, 2 = sluice gate and pumping station, 4 = existing culvert, 5 = upstream channel. 367
Figure 8-3: Longitudinal water-level profile for Khal 14 and upstream channels, showing the backwater effect upstream of the existing culvert. 367
Figure 8-4: Pluvial flood model results showing pre-project and post-project conditions for a RCP5-8.5 rainfall event with a return period of 20 years in 2030 and 2050 369
Figure 8-5: The bed level at the start (left) and end (right) with **coarse silt** transport during one season month for proposed design. (monsoon season on the top and dry season on the bottom) 371
Figure 8-6: Sedimentation (red) and erosion (blue) after one month of **coarse silt** transport during monsoon (left) and dry (right) conditions starting for the proposed design. 372
Figure 8-7: Bed level change with proposed design after one month **coarse silt** transport during dry (blue) or monsoon (red) conditions at cross section A-B 372

Figure 8-8: Sedimentation (red) and erosion (blue) after one month of **fine silt** transport during monsoon (left) and dry (right) conditions starting with the original bathymetry. 373
Figure 8-9: Bed level change of the original bathymetry after one month fine silt transport during dry (blue) or monsoon (red) conditions at cross section A-B. 373
Figure 8-10: Plume dispersion across the depth High Flow Calm Wind Condition 376
Figure 8-11: Statistical Maximum of Plume Dispersion in High Flow Calm Wind Condition 376
Figure 8-12: Plume dispersion across the depth Low Flow Calm Wind Condition 377
Figure 8-13: Statistical Maximum of Plume Dispersion in Low Flow Calm Wind Condition 378
Figure 8-14: Maximum suspended total mass including all fractions of heavy oil plume for three (3) scenarios 379
Figure 8-15: Maximum sedimented total mass including all fractions of heavy oil plume for three (3) scenarios 380
Figure 8-16: Maximum suspended total mass including all fractions of diesel oil plume for three (3) scenarios 380
Figure 8-17: Maximum suspended (upper panel) and sedimented (lower panel) total mass including all fractions of lubricant oil plume for three (3) scenarios 381
Figure 8-18: Maximum Noise Contour Maps in construction phase during daytime (left) and nighttime (right) 384
Figure 8-19: Maximum Noise Contour Maps in operation phase during daytime (left) and nighttime (right) 384
Figure 8-20: NO2 1-hour average 387
Figure 8-21: NO2 24-hour average 388
Figure 8-22: NO2 Annual average 388
Figure 8-23: SO2 1-hour average 389
Figure 8-24: Traffic volumes in vehicles/day (rounded on nearest 100 vehicles) 398
Figure 8-25: Activities drainage channel (source: ESIA team) 401
Figure 8-26: Bus stop in front of Block C (source: ESIA) 402
Figure 8-27: Fishing activities in front of Block C. 403
Figure 8-28: Open space used by workers from Incontrade for playing cricket and small gardens. 403
Figure 8-29: CPA mooring buoy and vessels in front of Block C. 404
Figure 8-30: Trucks near the mosque close to Block A 406
Figure 8-31: Residential housing blocks across the road from Block C 407
Figure 8-32: Developments within the study area of CIA 419
Figure 9-1: Suggestion for new river crossing pathways 434

Acronyms

ADD	Acoustic Deterrent Device
AIA	Aspect Impact Analysis
AoI	Area of Influence
APCR'2022	Air Pollution Control Rules 2022
APMT	APM Terminals
AR6	Sixth Assessment Report
B.S.S	Bachelor of Social Science
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BD	Bangladesh
BEPZA	Bangladesh Export Processing Zones Authority
BESS	Battery Energy Storage System
BGD	Bangladesh
BIWTA	Bangladesh Inland Water Transport Authority
BMD	Bangladesh Meteorological Department
BNBC	Bangladesh National Building Code
BOD5	Biochemical Oxygen Demand (5 day)
BPDB	Bangladesh Power Development Board
BRTC/BUET	Bureau of Research, Testing & Consultation / Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CA	Concession Agreement
CAAB	Civil Aviation Authority of Bangladesh
CAT	Convention against Torture
CCC	Chittagong City Corporation
CCC	Chattogram City Corporation
CCRMP	Climate Change Risk Management Plan
CCT	Chittagong Container Terminal
CCTV	Closed Circuit Television
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CHS	Community Health and Safety
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
COD	Chemical Oxygen Demand
CPA	Chittagong Port Authority
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
CSC	Construction Supervision Consultant
CSD	Cutter Suction Dredger
CTFB	Chittagong Tripura Fold Belt
CUFL	Chittagong Urea Fertilizer Limited
CWASA	Chattogram Water Supply and Sewerage Authority
D&C	Design and Construct
DC	Deputy Commissioner
DEM	Digital Elevation Model
DMP	Dredging Management Plan

DO	Dissolved Oxygen
DoE	Department of Environment
DU	University of Dhaka
E&S	Environmental and Social
EC	Electrical Conductivity
ECA	Environmental Conservation Act
ECA	Ecologically Critical Area
ECC	Environmental Clearance Certificate
ECH	Empty Container Handler
ECR	Environmental Conservation Rules
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EN	Endangered
eRTG	Electrically powered Remote-Controlled Rail Mounted Gantry / electric Rubber Tyred Gantry
ESHS	Environment, Safety, Health and Security
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FD	Forest Department
FGD	Focus Group Discussion
FIDIC	Fédération Internationale Des Ingénieurs-Conseils
GBVH	Gender Based Violence and Harassment
GCB	General Cargo Berths
GHG	Greenhouse Gas
GHGMP	Greenhouse Gas Management Plan
GM	Grievance Mechanism
GoB	Government of Bangladesh
GRM	Grievance Redress Mechanism
GW	Groundwater
HAT	Highest Astronomical Tide
HAZOP	Hazard and Operability Study
HFO	Heavy Fuel Oil
HIRA	Hazard Identification and Risk Assessment
HR	Human Resources
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
ICCPR	International Covenant on Civil and Political Rights
ICERD	International Convention on the Elimination of All Forms of Racial Discrimination
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICRMW	International Convention on the Protection of the Rights of Migrant Workers
ICT	Information and Communication Technology
IEA	Independent External Assessor
IFC	International Finance Corporation
IMO	International Maritime Organization
IOSEA	Indian Ocean and Southeast Asia
IP	Initial Proposal
IPCC	Intergovernmental Panel on Climate Change

ISLWL	Indian Spring Low Water Level
ISPS	International Ship and Port Facility Security
IT	Information Technology
IUCN	International Union for Conservation of Nature
IWM	Institute of Water Modelling
JNCC	Joint Nature Conservation Committee
KAFCO	Karnaphuli Fertilizer Company Limited
KAFCO	Karnaphuli Fertilizer Company
KDDL	Karnaphuli Dry Dock Limited
KEPZ	Korean Export Processing Zone
L10/50/90	Sound Level Exceeded 10/50/90% of the Time
LC	Least Concern
LCT Ltd.	Laldia Container Terminal Limited
LCTP	Laldia Container Terminal Project
Leq	Equivalent Continuous Sound Level
Lmax	Maximum Sound Level
Lmin	Minimum Sound Level
LOA	Length Overall
LOTO	Lockout/Tagout
LRP	Livelihood Restoration Plan
MCC	Motor Control Centre
MFSMU	Marine Fisheries Survey Management Unit
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Mammal Observers
MoEFCC	Ministry of Environment, Forest and Climate Change
MoLE	Ministry of Labour and Employment
MoS	Ministry of Shipping
MoU	Memorandum of Understanding
MoWR	Ministry of Water Resources
MSL	Mean Sea Level
NAPA	National Adaptation Programme of Action
NBSAP	National Biodiversity Strategy and Action Plan
NCT	New Mooring Container Terminal
NE	Not Evaluated
NPCR	Noise Pollution Control Rules
NT	Near Threatened
NTU	Nephelometric Turbidity Unit
NYS	Not Yet Set
O&M	Operation and Maintenance
OCR	Optical Character Recognition
OHS	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbon
PAM	Passive Acoustic Monitoring
PAPs	Project Affected Persons
PHC	Prestressed High strength Concrete
PM_{10}	Particulate Matter ≤ 10 micrometres
$PM_{2.5}$	Particulate Matter ≤ 2.5 micrometres
PPE	Personal Protective Equipment
PPP	Public Private Partnership
PVD	Prefabricated Vertical Drain
PWD	Public Works Department

QRA	Quantitative Risk Assessment
RAP	Resettlement Action Plan
RC	Reinforced Concrete
RCP4.5	Representative Concentration Pathway 4.5
RCP8.5	Representative Concentration Pathway 8.5
RHD	Roads and Highways Department
RMG	Ready Made Garment
SAP	Social Assistance Program
SAP	Social Assistance Programme
SCC	Site Clearance Certificate
SCP	Sand Compaction Pile
SCY	South Container Yard
SEA-SH	Sexual Exploitation and Abuse and Sexual Harassment
SELss	Sound Exposure Level Single Strike
SEZ	Special Economic Zone
SPM	Suspended Particulate Matter
SRDI	Soil Resources Development Institute
SSC	Suspended Sediment Concentration
STP	Sewage Treatment Plant
STS	Ship to shore
SW1/2/3/4/5/6	Surface Water Sample 1/2/3/4/5/6
TDS	Total Dissolved Solids
TEU	Twenty-Foot Equivalent Unit
THC	Total Hydrocarbon
TiP	Trafficking in Person
TOC	Total Organic Carbon
ToR	Terms of Reference
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTs	Tractor Trailers
UNCCD	United Nations Convention to Combat Desertification
UNCLOS	United Nations Convention on the Law of the Sea
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VEC	Valued Environmental Component
VHF	Very High Frequency
VPSHR	Voluntary Principles on Security and Human Rights
VU	Vulnerable
WWTP	Wastewater Treatment Plant

1 Executive Summary

1.1 Project Background

The Laldia Container Terminal Project (LCTP, or the Project) is a strategic initiative to address port congestion challenges in Chattogram by expanding container handling capacity and improving operational efficiency at the Port of Chattogram. Located at Laldia Char along the west bank of the Karnaphuli River in Chattogram, the terminal will add approximately 0.8 million Twenty-Foot Equivalent Unit (TEU) per year of new handling capacity. This will relieve pressure on existing terminals, reduce congestion and vessel waiting times, and strengthen maritime logistics performance to support Bangladesh's trade competitiveness and regional connectivity.

The terminal is being developed under a Public-Private Partnership (PPP) between the Chittagong Port Authority (CPA) and Laldia Container Terminal Ltd. (LCT Ltd.), a joint venture between APM Terminals (APMT) and QNS Container Services Ltd. (QNS Ltd.). A 30-year concession agreement (CA) for the design, financing, construction, operation and maintenance of the terminal was signed on 17 November 2025, representing one of the largest PPP investments in Bangladesh's port sector. LCT Ltd.'s involvement brings international expertise in container-terminal management, digital optimisation, energy-efficient operations and global best practice in port safety and reliability, supporting the long-term modernisation of the Port of Chattogram.



Figure 1-1: Location of Laldia Terminal

1.2 Policy, legal and administrative framework

The Environmental and Social Impact Assessment (ESIA) for the Laldia Container Terminal (LCTP) has been prepared in accordance with the applicable legal, policy and administrative requirements of Bangladesh. The framework establishes the environmental, social, labour, health and safety, biodiversity, water management and climate resilience obligations relevant to the development of the LCTP and identifies the regulatory authorities responsible for oversight and approvals.

The principal environmental legislation governing the Project includes the Bangladesh Environmental Conservation Act (1995, as amended), the Environment Conservation Rules (ECR) 2023, the National Environmental Policy 2018, the Biodiversity Act 2017, the Bangladesh Water Act 2013, the Bangladesh Labour Act 2006 and associated Labour Rules, the Noise Pollution Control Rules 2025, the Wildlife (Conservation and Security) Act 2012, and various fisheries, climate change and disaster management regulations. These instruments establish requirements related to environmental protection, pollution prevention, biodiversity conservation, water resource management, occupational health and safety, labour welfare, climate resilience and environmental permitting.

Under the ECR 2023, projects are categorised according to their potential environmental impacts. The proposed LCTP has been classified as a “Red Category” project due to its scale and nature. As a result, the Project is required to prepare and submit a comprehensive ESIA and Environmental and Social Management Plan (ESMP), based on Department of Environment (DoE) approved Terms of Reference, to obtain a Site Clearance Certificate (SCC) for construction and an Environmental Clearance Certificate (ECC) for operation. Periodic renewal of the ECC will also be required.

A number of national institutions play key roles in the Project’s permitting, regulation and oversight. The DoE, under the Ministry of Environment, Forest and Climate Change (MoEFCC), is the lead authority responsible for ESIA review and environmental clearance. Other relevant authorities include the Bangladesh Water Development Board (BWDB) for drainage and water infrastructure, the Chittagong Port Authority (CPA) for port development and operations, the Bangladesh Inland Water Transport Authority (BIWTA) for inland waterways, Chattogram Water Supply and Sewerage Authority (CWASA) for water and wastewater services, and local government institutions for community coordination and municipal services.

The legal review identified several regulations that are particularly relevant to the Project because of its location within the Karnaphuli River estuary and coastal environment. These include requirements for protection of water quality, biodiversity, fisheries resources, drainage systems, noise management, climate adaptation, disaster preparedness and worker welfare. Compliance with these requirements will be integrated into project design, construction planning, operational management and environmental and social monitoring programmes.

Bangladesh is also a signatory to numerous international conventions, treaties and protocols relevant to the Project. These include MARPOL, the Ballast Water Management Convention, the Convention on Biological Diversity, the Ramsar Convention, the Convention on Migratory Species, UNFCCC, UNCLOS, Basel Convention and various international human rights and labour-related conventions. These commitments provide an additional framework for managing marine pollution, biodiversity conservation, climate change, hazardous waste, navigation safety, labour standards and stakeholder rights. The Project will incorporate measures to align with these international obligations alongside national regulatory requirements.

Overall, the LCTP can be developed within the applicable regulatory framework provided that all required permits and approvals are obtained and that the Project implements the mitigation, monitoring and management measures identified through the ESIA and ESMP. Compliance with national legislation, regulatory conditions and relevant international commitments will form a key component of environmental and social performance throughout the Project lifecycle.

1.3 Project description

The LCTP is a new container terminal that will be developed on the western bank of the Karnaphuli River in Patenga, Chattogram. The Project is located approximately 9 km downstream of the existing container terminals of Chattogram Port and approximately 3.5 km upstream of the Bay of Bengal (see Figure 1-2).

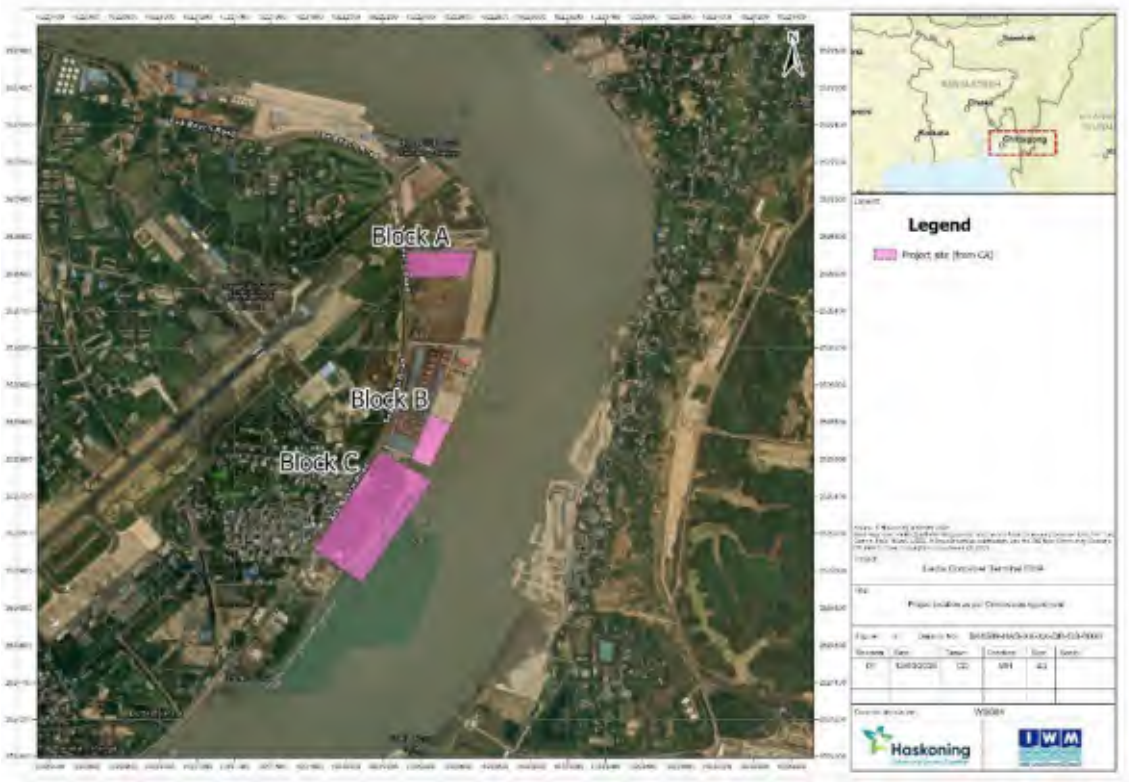


Figure 1-2: Location of the Laldia Container Terminal Project (LCTP) as well as the other container terminals, within Bangladesh (left) and the Port of Chattogram (right)

The LCTP will occupy three land parcels, referred to as Block A, Block B and Block C (Figure 1-2 and Figure 1-3).

- Block C (12.95 ha) will form the main terminal area and accommodate the quay, container yard, terminal buildings and operational facilities.
- Block B (2.89 ha) will support terminal operations by providing additional storage space, including empty-container storage.
- Block A (4.05 ha) will function as a truck waiting and processing area before vehicles enter the terminal. The area has capacity for more than 240 trucks.

Blocks B and C will be physically connected to enable container movement between the two operational areas. The Project is located on land allocated by the Chittagong Port Authority (CPA) under a concession agreement with Laldia Container Terminal Ltd. (LCT Ltd.).

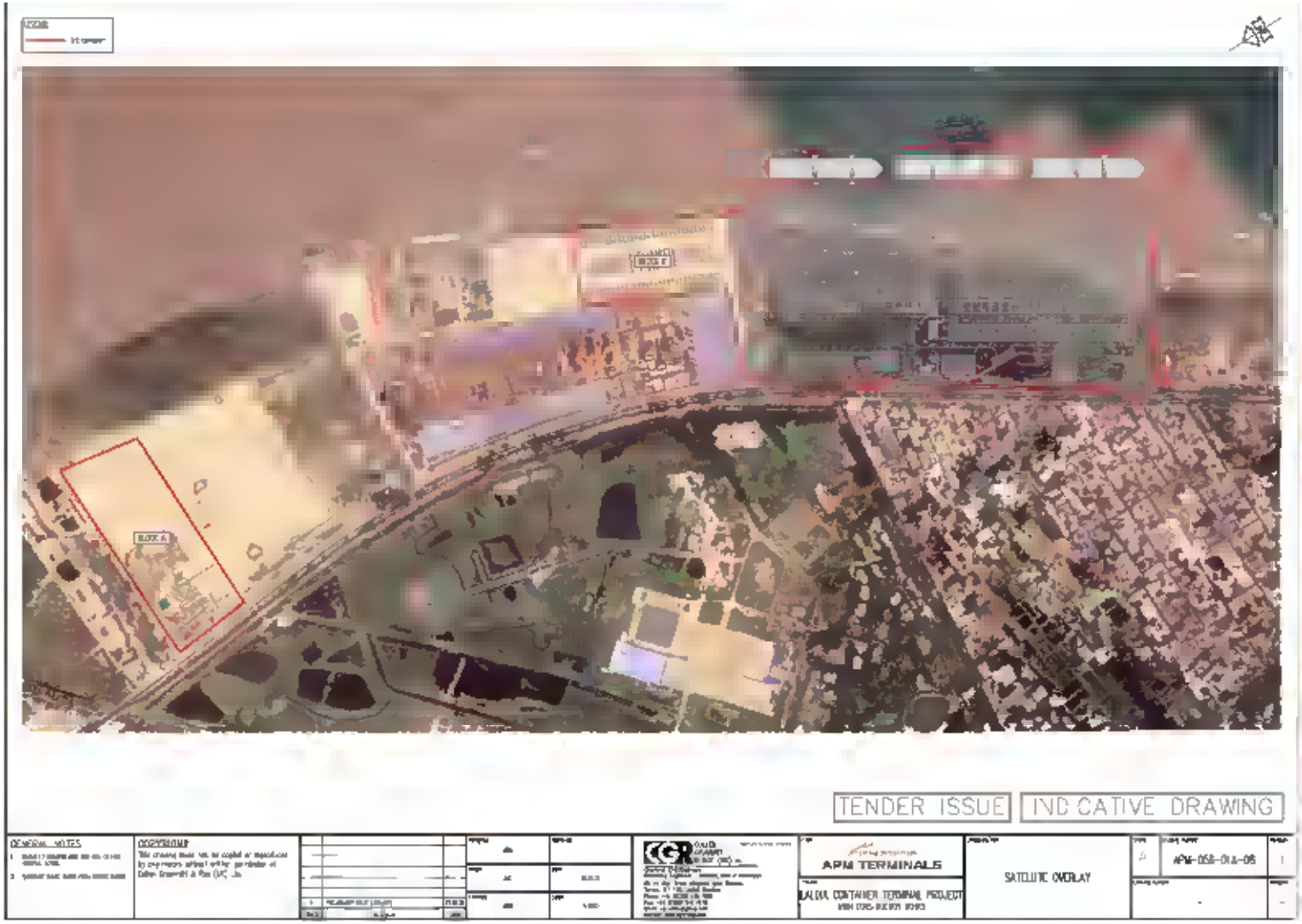


Figure 1-3: Location of Block A, B, and C, including berthing area (source: Asset Design Drawings APM-056-01A-08 rev. 1)

Project components

The Project will include the construction and operation of a modern container terminal capable of handling large international container vessels. The terminal has been designed with an ultimate capacity of approximately 1.4 million TEU1 per year, although the expected throughput under the concession scenario is approximately 800,000 TEU per year.

The main Project components include:

- A riverside docking area where container ships can safely arrive and transfer cargo;
- Areas for storing containers before onward transport;
- Large cranes and other equipment used to move containers between ships, storage areas and trucks;
- Areas for storing empty containers;
- Truck waiting, parking and processing facilities;
- Customs, administration and operational buildings;
- Maintenance workshops;
- Water supply, drainage and electricity infrastructure;
- Security, safety and firefighting facilities.

The terminal will also make use of modern technologies such as automatic vehicle entry systems, container tracking systems and digital cargo management tools to improve operational efficiency.

[1] ***TEU (Twenty-foot Equivalent Unit)*** *is an international unit used to measure container cargo. One TEU is equivalent to one standard 20-foot shipping container*

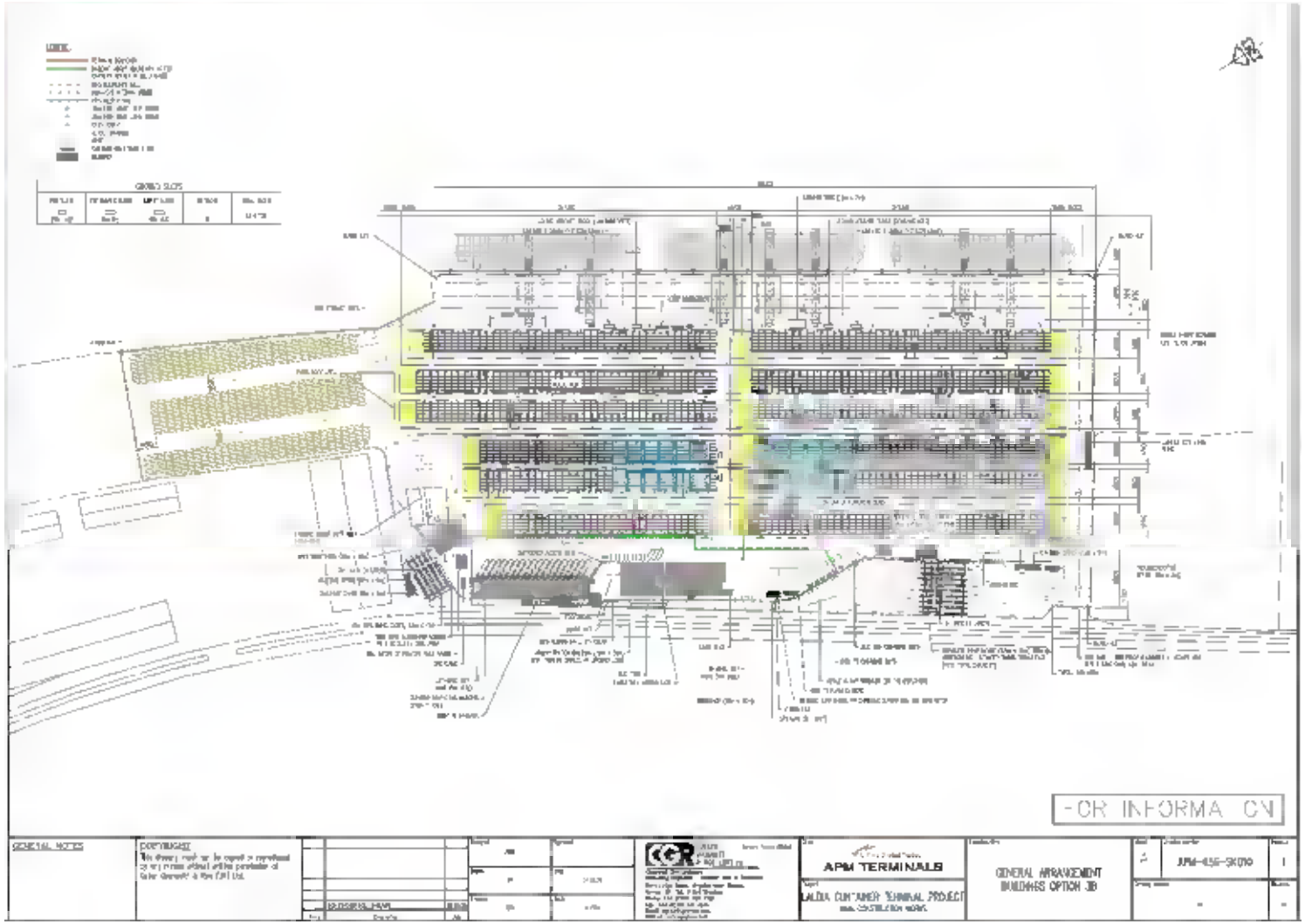


Figure 1-4: Container terminal layout (source: Asset Design Drawing APM-056-SK10 rev. 1)

The Project includes activities that will take place during the following stages of development.

Pre-construction phase

The pre-construction phase includes activities required before physical construction begins. These activities include site investigations, environmental and social studies, stakeholder consultation, permitting, detailed design, procurement, contractor mobilisation and preparation of management plans.

Construction phase

The construction phase includes all activities required to develop the terminal and associated infrastructure. The main activities include:

- Site preparation and ground clearance;
- Removal of unsuitable surface materials and sediments;
- Dredging of part of the Karnaphuli River to create sufficient water depth for ships;
- Raising and preparing land for terminal development;
- Construction of the riverside docking area and berthing facilities;
- Construction of roads, drainage systems, buildings and utility infrastructure;
- Installation of cranes, cargo-handling equipment and operational facilities.

Approximately 400,000 m³ of sediment will be dredged from the riverbed in front of the terminal and transported to the Char Bakalia area for beneficial reuse. The Project will require approximately 1.0 million m³ of imported fill and surcharge material to raise and prepare the site for development. Construction materials will primarily be transported by river. Approximately 2,000 barge movements will be required to import fill material, while approximately 1,800 barge movements will be required to export dredged and excavated materials.

Operation and maintenance phase

The terminal will operate continuously throughout the year, 24 hours per day and 7 days per week. Operational activities include:

- Arrival and departure of container vessels;
- Loading and unloading of cargo;
- Storage and transfer of containers;
- Truck movements to and from the terminal;
- Equipment operation and maintenance;
- Maintenance of buildings, utilities and drainage systems;
- Waste and wastewater management;
- Maintenance dredging of the berthing area.

Depending on cargo volumes, the terminal is expected to generate between approximately 1,000 and 2,800 truck movements per day and receive between approximately 200 and 400 container

vessel calls[2] per year. The operational life of the terminal is expected to extend over several decades.

Labour requirements

The Project is expected to create significant employment opportunities during both construction and operation. During construction, the workforce is expected to reach approximately 2,000 workers during peak periods. Once operational, the terminal is expected to provide employment for approximately 1,000 people in areas such as cargo handling, equipment maintenance, administration, logistics, security and management. The Project is also expected to support local businesses through increased demand for transport services, construction materials, equipment, accommodation, food supply and other supporting services.

Water supply

Total water demand is expected to range between approximately 260–320 m³/day during peak construction and 70–90 m³/day during operation, excluding dedicated firefighting reserves. During construction, water will be supplied through licensed water tankers until the Chattogram Water Supply and Sewerage Authority (CWASA) mains connection to the project site is established, which is expected by fourth quarter of 2027. During operation, potable and industrial water are expected to be supplied through the CWASA network. Water will be used for drinking, sanitation, cleaning and firefighting purposes. Water storage facilities, including underground storage tanks, will be constructed within the terminal to ensure a reliable water supply.

Wastewater management

Domestic wastewater will be managed through on-site septic and holding tanks, transported by tanker truck to authorised treatment facilities until the CWASA Wastewater Treatment Plant becomes operational, which is expected in 2030. Until then, LCT will install an on-site package sewage treatment plant as an interim measure.

Stormwater generated within the terminal will be collected through a dedicated drainage network connected to the existing drainage system. Oil-water separation systems will be installed to prevent oily runoff from entering the Karnaphuli River. The Project will also investigate opportunities to reuse treated wastewater for suitable non-potable purposes, such as landscape irrigation or dust suppression.

Power supply

The terminal will operate primarily on electricity supplied through the national power grid via a new connection to the Halishahar electricity substation. Total electricity consumption during operation is estimated at approximately 18,000 MWh per year, equivalent to an average daily demand of approximately 49,000 kWh per day. To improve energy efficiency and reduce greenhouse gas emissions, the Project includes approximately 1.0 MW of rooftop solar photovoltaic panels

[2] *A vessel call refers to a ship's visit to a port or terminal*

supported by battery energy storage systems. Backup diesel generators will be available to maintain critical operations during power outages. Most container-handling equipment, including yard cranes and terminal vehicles, will be electrically powered.

Waste management

Waste generated within the terminal will be separated at source to maximise opportunities for reuse and recycling. Recyclable materials will be transferred to authorised recycling facilities, while non-recyclable and hazardous wastes will be managed through licensed waste contractors and disposal facilities. The terminal is not intended to receive or treat waste generated by visiting vessels.

1.4 Baseline environmental conditions

The baseline assessment defines existing conditions within the project's Area of Influence (AoI) (which is based on an initial 5 km buffer around the project site and may extend further if any impacts reach further than 5 km) and provides the reference point against which potential project impacts are assessed. AoI is considered to be the areas within 5 km radius from the project area as per the guidelines set in the Environmental Conservation Rules, 2023 (ECR, 2023) of Bangladesh. The area directly affected by construction and operational activities as well as indirect, induced or secondary impacts associated with the Project is selected as the AoI. The study considers physical, biological and socio-environmental characteristics within and around the project site, drawing on both field surveys and secondary data sources.

1.4.1 Physical environment

Topography and Landforms

The Project area is located within the Karnaphuli River estuary and is characterised by low-lying, predominantly flat terrain consisting of reclaimed land, tidal mudflats and drainage channels. Elevations are generally low, with limited topographic variation across the site.

Geology and Soils

The area is underlain by recent alluvial and estuarine sediments associated with the Karnaphuli River system. Soil conditions are dominated by soft, compressible silts and clays with moderate geotechnical constraints requiring ground improvement for large-scale infrastructure development. The region is also located within a seismically active zone of Bangladesh.

Hydrology and Flood Risk

Hydrological conditions are strongly influenced by the Karnaphuli River, tidal fluctuations, monsoon rainfall and water releases from the upstream Kaptai Dam. Drainage is managed through a network of channels, sluice gates and pumping stations, including the *Khal 14* drainage channel between Block B and C, that drains the nearby community and part of the airport. The

area is susceptible to local waterlogging during periods of intense rainfall coinciding with high tides.

Climate and Meteorology

The Project area experiences a tropical monsoon climate with high temperatures, high humidity and pronounced wet and dry seasons. Most rainfall occurs during the monsoon period (June–September), while the coastal location exposes the area to cyclones, storm surges and other extreme weather events.

Climate Change

Climate change projections indicate increasing temperatures, more intense rainfall events, sea-level rise and potentially stronger cyclonic activity. Combined with ongoing land subsidence in the Chattogram region, these factors may increase future risks related to flooding, storm surges and coastal inundation.

Surface Water Quality

Surface waters within the Karnaphuli estuary are characterised by naturally high suspended sediment concentrations and tidal influence. Baseline conditions were assessed through dry-season sampling undertaken in April 2026 at six locations, supplemented by monsoon-season data from 2025. Most parameters complied with ECR 2023 standards for coastal waters suitable for fisheries. However, TSS exceeded the standard of 50 mg/L at all locations (176-706 mg/L), nitrate exceeded the standard of 0.8 mg/L at four locations (up to 12.1 mg/L), and arsenic slightly exceeded the standard at one location (3.3 µg/L at SW6). Hydrocarbons were not detected or occurred at negligible concentrations.

Groundwater Quality

Groundwater quality reflects the coastal-estuarine setting, with elevated salinity recorded in some locations. Localised exceedances of certain parameters (e.g. Arsenic) were identified, although groundwater is not considered a primary water source for the Project.

Air Quality

Ambient air quality was assessed through primary monitoring conducted at six locations within the Project Area of Influence between April and May 2026, representing pre-monsoon conditions. All measured parameters complied with the applicable APCR 2022 24-hour ambient air quality standards. The results indicate generally good baseline air quality, although the dataset is representative only of pre-monsoon conditions. Existing emissions are primarily associated with road traffic, industrial activities, shipping and port operations within the wider Chattogram area.

Noise Environment

Ambient noise levels were assessed through 24-hour monitoring at six locations within the Project Area of Influence during four monitoring rounds in April-May 2026. Daytime equivalent noise levels

(Leq) ranged from 65.6 to 74.9 dB(A), exceeding the applicable mixed-zone standard of 60 dB(A) at all locations. Nighttime Leq levels ranged from 60.7 to 68.4 dB(A), exceeding the applicable standard of 50 dB(A) at all locations. The highest noise levels were recorded near to major transport and aviation activities at the airport. The results indicate an elevated baseline noise environment influenced by road traffic, port operations and airport-related activities.

Soil and Sediment Quality

Soil and sediment quality was assessed through primary sampling conducted during the dry season (April 2026) and supplemented by monsoon-season surveys undertaken in September 2025. In soils, most parameters were below the Dutch Soil Quality Standards (Background Values and Intervention Values) and all results were below Dutch Intervention Values. Localised exceedances of background values were identified for copper at one location (53 mg/kg compared with a background value of 40 mg/kg), nickel at two locations (up to 38 mg/kg compared with 35 mg/kg), and PCB-7 at one location (0.076 mg/kg compared with a background value of 0.02 mg/kg). Sediment quality showed no exceedances of Dutch background or intervention values, with metals, hydrocarbons, PCBs and PAHs generally occurring at low concentrations. Overall, the results suggest that environmental quality is typical of a developed port and industrial area.

Existing Sources of Pollution

Existing environmental pressures arise from urban runoff, wastewater discharges, industrial activities, navigation and port operations within the Karnaphuli estuary. These activities contribute to the current baseline environmental conditions observed within the study area.

Land Use and Land Cover

The project site and surrounding area are predominantly industrial, commercial and transport-related, reflecting their strategic role within the Port of Chattogram. Other surrounding land uses include airport facilities, residential areas, drainage channels and limited agricultural land.

Overall, the physical environment is characteristic of a highly modified urban-estuarine setting influenced by riverine, tidal and coastal processes, with existing industrial and port activities already shaping baseline environmental conditions. The area's key physical sensitivities relate to flooding, drainage, climate change, sediment dynamics and coastal hazards.

1.4.2 Biological environment

Designated natural areas and areas with ecological value

There are no nationally protected areas, Ramsar Sites, Key Biodiversity Areas (KBAs), Important Bird Areas (IBAs) or other internationally designated biodiversity areas within the Project footprint or the immediate AoI. Several areas of ecological importance do occur within the wider surroundings of the Project and provide important habitat for wildlife, including migratory birds, estuarine species and terrestrial fauna. The Patenga Beach KBA and IBA is the nearest designated biodiversity area, located approximately 6 km southwest of the Project site. The area

comprises sandy beaches, intertidal habitats and aquaculture ponds that provide feeding and resting habitat for resident and migratory bird species. The KEPZ natural area, located directly across the Karnaphuli River and approximately 1 km southeast of the Project site, is not a formally protected area but contains a substantial network of forests, water bodies and green spaces. The area supports a relatively high diversity of flora and fauna compared with the highly modified habitats within and around the Project site and is known to attract a variety of resident and migratory bird species. Within the Karnaphuli estuary, the Majher Char mudflat area, located approximately 4 km southwest of the Project site, consists of extensive intertidal mudflats that provide important feeding habitat for resident and migratory waterbirds. Surveys undertaken as part of the ESIA identified mudflats and adjacent coastal habitats such as Majher Char as among the most ecologically valuable habitats in the local area due to their importance as migratory stopover and wintering habitat.

Terrestrial Ecology

Terrestrial ecology surveys undertaken between February and April 2026, supplemented by previous studies and secondary literature, indicate that the Project footprint is highly modified by existing industrial, port and transport infrastructure. Vegetation within Blocks A, B and C is limited to grasses, scrub, scattered trees, wetland vegetation and small areas of mangrove vegetation associated with riverbanks and drainage channels. No endemic plant species were recorded and the flora species identified are common and widespread in Bangladesh. The wider AoI supports a greater diversity of habitats, including wetlands, mangrove-associated vegetation, mudflats, beaches and mixed vegetation areas at Shahmirpur, Badalpura, Majher Char, Parki Beach and the KEPZ area. These habitats support a variety of terrestrial and semi-aquatic fauna and provide important feeding, resting and breeding habitat for birds. A total of 167 bird species were recorded during the baseline surveys, including 125 resident species and 42 migratory species. Bird diversity was highest in the Majher Char and Parki Beach areas, which support important migratory bird habitat. One globally Endangered species, the Great Knot (Calidris tenuirostris), was recorded within the wider AoI.

Aquatic Ecology

The Karnaphuli River and its associated tidal channels, wetlands, mudflats and adjacent coastal waters are the principal aquatic habitats within the Project AoI. Within the Project footprint, aquatic habitats are largely limited to the river margin, a drainage channel between Blocks B and C, small areas of tidal mudflat and some mangrove vegetation, and the adjacent estuarine waters of the Karnaphuli River. Aquatic flora recorded during the surveys consisted primarily of common wetland and estuarine species, including floating macrophytes and mangrove-associated vegetation. The mangroves are present in the drainage channel and all along the edge of Block B. Fish and fisheries surveys identified 48 fish and shrimp/prawn species associated with freshwater, estuarine and marine environments. The assemblage is dominated by estuarine and coastal species, reflecting the transitional nature of the Karnaphuli estuary. Benthic surveys

identified communities characteristic of estuarine soft-bottom habitats, including polychaete worms, molluscs and crustaceans. The tidal mudflats and estuarine habitats provide important ecological functions, including nutrient cycling, fish nursery habitat, and feeding areas for birds and aquatic fauna. Marine turtles occur within the wider coastal environment of the Bay of Bengal, and several deceased Olive Ridley Turtles (Lepidochelys olivacea), VU in Bangladesh3, were observed during beach surveys. However, no evidence of nesting activity was recorded and no suitable seagrass foraging habitat was identified within the Project AoI.

Marine mammal surveys confirmed the presence of the Endangered Ganges River Dolphin (Platanista gangetica) within the Karnaphuli River, with 20–30 individuals observed daily during dedicated surveys, including mother-calf pairs. These species represent important ecological receptors due to their conservation status and sensitivity to underwater noise and vessel-related disturbance.

1.4.3 Social environment

Social Profile and Population

The Project Area of Influence (AoI) is a densely populated area containing approximately 402,400 people in 93,600 households, with an average household size of 4.3 persons. The population is relatively balanced by gender and characterized by a young demographic profile, with the largest portion belonging to the 15–44 years age group (53%), followed by the 45–64 years (14%). Overall, nearly three-fifths (29%) of the population is below 15 years of age. e. The area's location within the Chattogram economic region contributes to high population density and inward migration.

A household survey covering 577 households (2,575 people) confirmed similar demographic characteristics. Most survey respondents were household heads and economically active adults aged 26-65 years, reflecting prevailing local social structures.

Several vulnerable groups were identified within the AoI, including female-headed households, low-income households, residents of non-durable housing, elderly persons, children and youth, people with disabilities or chronic illnesses, and households lacking adequate water and sanitation services.

The population is predominantly Muslim (92%), with Hindu communities forming the principal minority group. In terms of education, the population is predominantly concentrated in the primary and secondary levels of education. Overall, 30% of the population has attained education up to Class I–V, while 29% has completed education up to Class VI–IX. About 13% completed Secondary School Certificate (SSC) or equivalent, 10% High School Certificate (HSC) or equivalent and 7% have achieved graduate or above-level education. No Ethnic People was identified during the social survey, and their presence within the direct AoI appears limited.

[3] RL-549.3-003-v.4.pdf

Livelihoods and Economic Activities

Livelihoods within the Project Area of Influence are primarily based on business and trade, service-sector employment, transport, fisheries, port-related activities, and informal urban economic activities. Business[4] represents the largest source of household income (31% of surveyed households), followed by services (24%) and transport (13%). Fishing remains an important traditional livelihood for some riverbank communities, particularly in Karnaphuli, where activities are concentrated along the Karnaphuli River and largely rely on small-scale, traditional fishing methods. The occupational structure reflects the area's strong economic links to port operations, transport services, trade, and wage-based employment. The study area is characterized by predominantly low- to middle-income households, with approximately 55% of surveyed households estimated to live below or near the national poverty line.

Water, Sanitation and Health

Most households obtain drinking water from tube wells, and only a limited share of the population uses piped water. Within the AoI, the piped water is not suitable for drinking as it is contaminated. The largest share of the population in the AoI use private toilet facilities (safe disposal with flushing/pouring water). Toilet facilities are mainly privately owned in Ward No. 40 & 41 (CCC) and Karnaphuli. In Anowara, toilet facilities are mainly jointly owned.

Common diseases in study area are mainly waterborne diseases, respiratory problems, skin diseases, fever, diarrhoea, dengue, typhoid, jaundice, gastric problems, and seasonal flu. Due to the area’s coastal and riverine setting, poor drainage, waterlogging, dense settlement, and possible sanitation challenges, water- and vector-borne diseases may occur more frequently. In terms of protein uptake, the largest share of the populations eat fish/meat/egg between 1-4 times a week.

Road Network and Traffic

The road network surrounding the LCTP is centred on a major northeast-southwest corridor formed by Airport Road and VIP Road, which provides the primary connection to the wider road network. According to the 2026 Traffic Survey, most traffic currently travels from the northeast towards the southern part of the network. While Airport Road runs along the edge of the urban area northeast of the airport and mainly serves as an access route with limited pedestrian crossing demand, VIP Road southwest of the airport divides urban areas containing residential and community facilities on both sides. As a result, this section experiences higher pedestrian crossing demand and functions as the area's main traffic artery, with priority over connecting side roads. Road traffic counts conducted in April 2026 at Airport Road and VIP Road indicate moderate traffic volumes for a 2×2 lane road. The morning peak hour (08:00–09:00) recorded approximately 900 vehicles/hour, while the evening peak hour (17:00–18:00) reached around 1,140 vehicles/hour.

[4] *Business refers to any income-generating commercial activity operated by an individual or household in the study area. This includes, but not limited to, tea stalls, grocery shops, fish sellers, vegetable sellers, fruit vendors, roadside food stalls, mobile phone recharge, accessories shops, mobile money, hardware shops, small restaurants, etc.*

The highest traffic volume was observed between 18:30 and 19:30, with approximately 1,320 vehicles/hour.

River Transport

A river traffic survey conducted in May 2026, supported by stakeholder consultations and secondary data review, identified Ghat No. 14 (Balur Tal) as the main river-crossing point near the proposed terminal. The crossing network, including Ghats 14 and 15 and CUFL Ghat, generates frequent cross-river movements and serves approximately 3,000 passengers per day. Survey results recorded up to 308 daily boat movements and more than 4,000 passengers, with activity concentrated during morning and evening commuter peaks. River traffic is demand-driven and varies throughout the week, while commercial vessel movements are influenced by tidal windows and port operations. These patterns create periods of increased navigation interaction and form the baseline for the project's river traffic and navigation risk assessment.

Housing and Utilities

The social survey indicated that semi-pucca and tin-made structures are the dominant types of housing in the study area, reflecting mixed structures conditions. The relatively higher share of pucca houses in CCC indicates better housing quality as pucca houses are in general more durable, while the dominance of tin-made houses in Karnaphuli suggests comparatively less quality housing conditions.

Gender

Women and female-headed households represent a potentially vulnerable group within the Project AoI. Although the population is broadly gender-balanced, female-headed households account for approximately 7% of surveyed households and generally exhibit lower levels of education, lower household incomes, and lower rates of land and housing ownership than male-headed households. Stakeholder consultations indicated that women face constraints in accessing economic opportunities and participating in decision-making processes. Concerns were also raised regarding community safety, harassment, and gender-based violence, particularly in relation to labour influx.

1.5 Valued Environmental Components (VECs)

The Valued Environmental Components (VECs) are the identified components that may be affected by the proposed LCTP. VECs were selected based on their environmental, ecological, social, economic and regulatory importance, as well as their sensitivity to project-related changes. Sensitivity ratings were assigned according to the capacity of each receptor to absorb change and the extent to which impacts can be mitigated.

A total of 15 VECs were identified across the physical, biological and social environments:

Physical VECs include:

- Drainage hydrology
- River morphology
- Water and sediment quality
- Ambient noise
- Ambient air quality

Biological VECs comprise:

- Tidal mudflats
- Mangrove ecosystems
- Dolphins
- Fisheries resources

Avifauna and Migratory birds Social VECs include:

- River-crossing commuters and operators
- Road traffic
- River traffic
- Community livelihoods, health and safety
- Construction and operation workers

The assessment highlights several high-sensitivity receptors. These include drainage hydrology, due to the critical role of *Khal No. 14* in managing stormwater and existing flood risks; dolphins, because the Ganges River Dolphin is an endangered species highly dependent on underwater acoustic conditions; river-crossing commuters and operators, who rely heavily on *Ghat 14* for daily transportation and income generation; community livelihoods, health and safety; and construction and operation workers, who may be directly exposed to occupational hazards throughout the project lifecycle.

Most remaining environmental receptors were assigned a medium sensitivity, reflecting their ecological or socioeconomic importance combined with a moderate capacity to adapt to change. These include river morphology, water and sediment quality, air quality, noise levels, tidal mudflats, mangrove ecosystems, fisheries resources and river traffic. Avifauna and migratory birds, as well as road traffic, were considered to have low sensitivity because of their relatively greater ability to adapt to localised disturbances and the availability of alternative habitats or transport capacity.

1.6 Predicted impacts

Impacts are assessed based on the sensitivity of VECs and the magnitude of the predicted changes resulting from project activities. It also includes a cumulative impact assessment (CIA) that considers interactions between the project and other existing and planned developments in the Karnaphuli River area. This chapter includes the major impacts per phase: pre-construction, construction and operation.

1.6.1 Pre-Construction Phase

Livelihood, Health and Safety of Communities

The most significant pre-construction impact relates to economic displacement. Several informal and semi-formal livelihood activities, including small shops, restaurants, fishers using the mudflat area, workers' facilities and users of areas required for utilities and drainage works may lose access to their current locations. While physical resettlement has been avoided, the disruption of income-generating activities represents a social impact.

A second issue is the legacy impact of past displacement associated with the project area. Historical resettlement and livelihood impacts continue to affect communities and remain a significant social concern requiring dedicated compensation measures.

River Crossing Commuters and Operators

Closure and relocation of the existing Ghat 14 river crossing is one of the most important pre-construction impacts. River-crossing operators and users will need to shift to alternative routes and facilities. This may lead to increased travel times, additional transport costs and inconvenience for daily commuters who rely on the crossing for access to work, education and services.

1.6.2 Construction Phase

Drainage Hydrology

The most important physical impact during construction concerns the modification of *Khal 14*, where Block B and Block C will be joined through a landfill and the placement of a culvert underneath. The alteration poses the risk that the culvert gets clogged more easily and it reduces the retention capacity that the current channel has. Additionally, maintenance access will be more difficult through the terminal deck with operations ongoing.

Ambient Noise

Construction activities such as piling, ground improvement, heavy equipment operation and vehicle movements will generate high noise levels. These activities are expected to create nuisance and potentially affect the health and wellbeing of nearby residents, making noise one of the major construction-phase impacts.

Tidal Mudflats

A permanent loss of tidal mudflat habitat will occur due to the partial reclamation of Block C. This habitat currently supports benthic organisms and serves as an ecological resource for fish and birds. The impact is irreversible and therefore considered one of the key ecological impacts of the project.

Dolphins

The endangered Ganges River Dolphin is among the most sensitive ecological receptors identified in the ESIA. The Ganges Dolphin, confined in the Karnaphuli River ecosystem and almost solely depending on its echolocation. Construction activities, particularly piling, but also dredging and vessel movements, will generate underwater noise that may disturb dolphin behaviour, feeding and movement patterns that in the worst-case scenario can lead to mortality. This is considered one of the most significant ecological impacts of the Project.

There are also a risk of vessel strikes, whereby construction vessels could collide with dolphins moving through the project area.

Fisheries Resources

Dredging, piling and construction vessel traffic may increase turbidity, underwater noise and habitat disturbance, potentially affecting fish migration and fisheries productivity. Most fisheries resources are adapted to the highly disturbed environment, however, migratory fish species such as the Hilsa may be impacted if their navigation is disturbed during migration periods. These impacts are particularly relevant because of the ecological and economic importance of fisheries within the Karnaphuli River system.

Livelihood, Health and Safety of Communities

One of the main social impacts during construction will be labour influx. The arrival of a large external workforce may place pressure on housing, food supplies, public services, transport systems, waste management and local infrastructure (Table 1-2). Increased movements of trucks and heavy equipment also create significant community health and safety risks, particularly for pedestrians, cyclists and other road users.

Another concern is the potential impact on vulnerable groups, including women, children, elderly people and persons with disabilities, who may face increased safety and security risks associated with labour influx and increased traffic.

The construction phase is expected to generate temporary employment opportunities for local skilled, semi-skilled and unskilled workers, providing a valuable source of income and contributing to local economic development. In addition, the Project is likely to create business and supply chain opportunities for local transport providers, suppliers, contractors and small enterprises, while stimulating demand for local services, shops, rental housing and other commercial activities. Participation in construction activities may also help local workers enhance their technical skills and practical experience, supporting longer-term livelihood benefits.

1.6.3 Operation

Water and Sediment Quality

The terminal berth will function as a sediment trap, resulting in continuous sediment accumulation. As a consequence, regular maintenance dredging will be required throughout the life of the terminal, including the transport and disposal of the materials. This is the most significant long-

term physical impact identified during operation and may also result in localized and temporary impacts on water and sediment quality, including increased turbidity, sediment resuspension and the potential redistribution of sediment-bound contaminants in the dredging and disposal areas.

Ambient Noise

Operational activities such as container handling, crane operations, truck movements and vessel traffic will generate continuous noise. Nearby communities may experience long-term nuisance and disturbance from these activities, making operational noise one of the key community impacts.

Dolphins

During operation, dolphins will continue to be exposed to underwater noise from maintenance dredging and vessel traffic. Increased vessel movements also create an ongoing collision risk with dolphins in the Karnaphuli River. These remain among the most important ecological concerns during the operational phase due to the conservation status of these species.

Fisheries Resources

Maintenance dredging and related sediment plumes may affect fish migration routes, feeding and breeding behaviour through increased turbidity and underwater disturbance. Continued vessel movements and dredging operations may also influence fisheries resources over the long term.

River Traffic

A key operational impact is the increase in large vessel movements associated with the container terminal. The manoeuvring and berthing of container ships may create navigational conflicts, congestion and safety risks for ferries, fishing boats and other small river users.

Livelihood, Health and Safety of Communities

Operational activities introduce potential community health and safety risks, including fires, hazardous cargo incidents and emergency situations associated with terminal activities. Although unlikely, such events could have serious consequences for surrounding communities.

Communities may also perceive or experience impacts associated with increased demand for water and electricity, particularly if terminal operations place pressure on existing utility systems.

Long-term visual impacts, noise and lighting from terminal operations are expected to affect nearby residents throughout the operational period.

During operation, the Project is expected to generate long-term employment opportunities and support local livelihoods through sustained demand for goods, services, transport and maintenance activities. The operation of the terminal is also expected to stimulate the local supply chain and associated businesses, contributing to income generation and broader economic development in the area.

Construction and Operation Workers

The most significant worker-related impacts during operation are occupational health and safety risks associated with heavy equipment, hazardous materials and working in a port environment. Workers are also expected to experience long-term exposure to elevated noise levels generated by cranes, container handling activities, trucks and vessels. Another emerging issue is heat stress, caused by extensive paved areas, container stacks, high humidity and elevated temperatures within the terminal environment.

Cumulative Impacts

The Project is being developed within a highly industrialised and rapidly expanding port and logistics corridor on the Karnaphuli River, where numerous existing and planned port terminals, industrial facilities, shipping operations, dredging programmes and transport developments are already present. As a result, cumulative impacts represent an important consideration.

The most significant cumulative physical impacts are associated with air quality, noise, water quality, river morphology and drainage hydrology. Combined emissions from existing and planned terminals, industrial developments, vessel traffic and road transport may further increase pollutant concentrations and environmental nuisance levels. Concurrent dredging activities and river modifications may also contribute to cumulative changes in sediment transport patterns, water quality and navigational conditions.

Cumulative ecological impacts may arise from the combined loss and degradation of aquatic habitats, repeated dredging, increasing underwater noise, higher vessel traffic densities and ongoing pressures on fisheries resources and dolphin populations. Individual projects may have limited impacts in isolation; however, collectively they may increase stress on sensitive ecological receptors and reduce habitat availability within the Karnaphuli River system.

From a social perspective, multiple concurrent developments may collectively increase pressure on local infrastructure, transport networks and communities. Additional truck traffic, vessel movements, industrial activities and workforce influxes may contribute to cumulative road and river safety risks, community disturbance, livelihood pressures and demands on public services. Effective management of these cumulative impacts will require coordination among project developers, terminal operators, government authorities and other stakeholders operating within the wider Karnaphuli River area.

Overall, prior to mitigation, the key risks identified for the Project relate to air quality, noise, drainage management, long-term sedimentation and dredging requirements, impacts on dolphins and fisheries resources, livelihood displacement associated with Ghat-14 and other affected activities, community health and safety risks, and the cumulative effects of multiple port and industrial developments within the Karnaphuli River corridor.

1.7 Environmental and Social Management Plan (ESMP)

The Environmental Social Management Plan (ESMP) translates the ESIA findings into a practical framework for managing environmental and social impacts throughout the pre-construction, construction and operation phases of the LCTP. The ESMP is based on mitigation hierarchy and defines measures to avoid, minimise, manage and monitor impacts identified in the impact assessment. The Contractor and Operator will be responsible for implementing the ESMP through a suite of environmental and social management plans, while continuous monitoring and adaptive management will be used to verify effectiveness and support corrective actions where required.

1.7.1 Key mitigation measures

The ESMP includes project-specific mitigation measures for key environmental and social risks identified in the ESIA. Table 1-1, Table 1-2, and Table 1-3 below present the major impacts for the different VECs that have been identified. Particular attention is given to the below critical issues:

- Drainage hydrology (*Khal No. 14*): Hydraulic modelling, culvert design optimisation, maintenance access provisions, sediment management, protection of sluice gate operations and separate stormwater drainage systems are proposed to prevent increased flooding and waterlogging.
- Dolphin protection: Low-noise piling techniques shall be used staying below the 145 dB SELss threshold, a Marine Mammal Mitigation Protocol (MMMP) will be developed and implemented, underwater noise monitoring shall be conducted, exclusion zones need to be implemented, each vessel should have a marine mammal observer and passive acoustic monitoring and adaptive management measures will be put into place to protect the endangered Ganges River dolphins.
- Historical displacement impacts: A Social Assistance Program (SAP) will address residual impacts associated with previous settlement clearances through livelihood restoration, vulnerability support, socio-economic assessments, stakeholder engagement and grievance management.
- *Ghat 14* closure: the measures will include alternative river crossing arrangements, support for affected commuters and operators, improved facilities at *Ghats 12* and *15*, and coordination with local authorities to minimise livelihood and mobility impacts, with particular attention to ferry users and operators.

In addition, a comprehensive set of management plans will guide air quality, biodiversity, climate resilience, community health and safety, dredging, emergency response, labour conditions, pollution prevention, traffic management, waste management and water quality management.

Table 1-1: Preconstruction phase summarised ESMP table

Category	VEC	Impact / Risks on VEC	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
Physical environment	Drainage hydrology	Demolition debris, removed topsoil may enter the water in the *khal* and block the drainage function	Moderate	The contractor shall maintain the drainage channel and sluice gate in a continuously unobstructed condition by preserving full hydraulic capacity, prohibiting storage of construction materials or waste within the drainage corridor, and installing appropriate containment and sediment-control measures to prevent rainfall runoff from transporting debris into the channel.	Negligible	Contractor
				The contractor shall inspect the drainage channel, sluice gate, and associated infrastructure regularly and after storm events. Any debris, sediment accumulation, blockage, damage or condition that may restrict drainage performance shall be removed or rectified promptly. Where inspections identify restricted flow, sediment accumulation, blockage, flooding, ponding or drainage congestion attributable to construction activities, the Contractor shall investigate the cause and implement corrective actions		Contractor
	Water and sediment quality	Demolition waste may adversely affect river water and sediment quality if not properly managed, disposed of, or reused	Minor	Ensure that demolition debris is removed from active work areas on a daily basis, segregated and transferred to designated waste storage or consolidation areas. Debris shall be managed, recycled, reused or disposed of at approved waste management facilities at a frequency sufficient to prevent accumulation, maintain good housekeeping standards and prevent pollution of drainage channels, watercourses and the surrounding environment.	Negligible	Contractor
				Provide bunding around areas where liquid waste may be generated to prevent leaking into river system.		Contractor
				Ensure that appropriate clean-up materials are always available on site and that workers are familiar with their use.		Contractor
				Any spillages to be cleaned up immediately.		Contractor
	Ambient Air Quality	Dust emissions generated by demolition activities associated with the preconstruction phase of the project, have the potential to cause nuisance	Minor	Implement a Dust Management Plan for demolition activities incorporating water spraying, speed restrictions, covered loads, wheel washing, stockpile management, and housekeeping to minimise dust generation and off-site migration. Dust suppression measures shall be maintained throughout demolition works and adjusted in response to site conditions, weather conditions, monitoring results and observed dust emissions.	Minor	Contractor
				Conduct PM_{10} monitoring at site boundaries and nearby sensitive receptors, and implement corrective actions where concentrations reach 25% of the Bangladesh 24-hour ambient air quality standard (37.5 µg/m³) or indicate a risk of exceeding the Bangladesh 24-hour PM_{10} standard of 150 µg/m³. Monitoring, corrective actions and community complaints shall be recorded and reported monthly.		Contractor
Social environment	Livelihood, health and safety of communities	Economic displacement of Shops, Restaurants, Waste Segregation Activities and Workers' Sheds before start of construction.	Major	**Applicable for all economic displacement impacts for different groups and locations as given below** Avoid economic displacement as much as possible in the design and location of the components of the project (such as with associated facilities like the routing of electricity supply, even though the LCTP may not have any direct management control over the implementation of these associated facilities).	Moderate	LCT Ltd.
				Applicable for all economic displacement impacts for different groups and locations as given below Establish and maintain a grievance mechanism for economically displaced persons to record, track, investigate, and resolve concerns related to relocation, compensation, business interruption with defined response timeframes, documented outcomes, and regular monitoring of grievance resolution effectiveness.		LCT Ltd.
				Applicable for all economic displacement impacts for different groups and locations as given below Provide compensation and reasonable support for demonstrable and verified relocation costs, temporary business interruption, and proven loss of income directly attributable to Project activities, including assistance to re-establish businesses or alternative income-generating activities where required. Compensation should be in accordance with applicable Bangladesh legal requirements and established local practice for economic displacement.		LCT Ltd.
				In addition, communicate the cut-off date clearly and in a timely manner to affected persons. Develop and implement a Business Relocation Support Plan to facilitate relocation of affected businesses and activities, provide reasonable assistance to re-establish operations at alternative locations, and compensate demonstrable relocation costs and temporary business interruption losses where applicable.		LCT Ltd.
		Economic displacement of Artisanal Fishers and Fishing Structures at Block C and in the drainage channel before start of construction.	Major	Identify and engage affected fishers prior to displacement, establish alternative fishing access or relocation arrangements where feasible, and provide compensation for demonstrable temporary losses directly attributable to Project activities.	Moderate	LCT Ltd.

Category	VEC	Impact / Risks on VEC	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		Relocation of mooring buoy in front of Block C and associated Economic displacement of CPA Mooring Buoy and Associated Vessel Uses before start of construction.	Moderate	Coordinate with CPA and affected users to relocate the mooring buoy to a CPA-approved alternative location prior to construction activities affecting the existing buoy location. Prior to relocation, undertake an HSSE assessment of the proposed location to confirm its suitability with respect to navigational safety, marine operations, environmental protection and emergency response requirements. Ensure that the relocated buoy maintains operational functionality and continuity of vessel operations, bunkering activities, navigational safety and emergency access requirements.	Minor	CPA
		Economic displacement caused by Utility Routing (Electricity, Water and Sewer Connections) before start of construction. Physical displacement is avoided.	Major	Avoid economic displacement as much as possible in the design and location of the components of the project (such as with associated facilities like the routing of electricity supply, even though the LCTP may not have any direct management control over the implementation of these associated facilities).	Moderate	Contractors for the water supply and electricity cabling works and LCT Ltd.
				Minimise economic displacement through routing optimisation during detailed design, undertake stakeholder consultation once alignments are confirmed, and provide appropriate compensation and relocation assistance for any demonstrable temporary economic losses caused by utility installation works.		Contractors for the water supply and electricity cabling works and LCT Ltd.
				For temporary impacts associated with utility installation works, and where avoidance is not possible, affected people be given the option to return to the same location after construction or relocate nearby, and be able to retrieve and move all their assets.		Contractors for the water supply and electricity cabling works and LCT Ltd.
		Access to the blocks is restricted with additional (temporary) fencing and security personnel, affecting leisure activities on the blocks (e.g. playing cricket, kiting, enjoying the river view) for both the local community and workers at Incontrade.	Moderate	Allow Block B to be accessible to communities until construction activities commence in the area. Engage the communities at least 2 weeks before closure of the Block to manage expectations. The road north of Incontrade can continue to provide access to the northern part of Block B until such time when it will be closed for a third-party activity north of Block B use.	Minor	Contractor
				Engage with Incontrade and its workers to understand the importance of the existing leisure area and vegetable gardens to worker wellbeing and food supply, and where the loss of access results in a demonstrable impact, identify and provide suitable alternative locations for recreation and community gardening, or alternative measures agreed with affected workers.		Contractor and LCT Ltd.
				In collaboration with the Chattogram City Corporation (CCC) and relevant local organisations, identify and provide access to suitable alternative recreational facilities for community members and support the organisation of sports and social activities (e.g., cricket and football) to maintain opportunities for recreation, social interaction, and community wellbeing.		Contractor and LCT Ltd.
		Job opportunities in security and fencing/wall construction	Moderate	Optimize local employment opportunities for security, fencing and wall construction activities by requiring contractors to source unskilled and semi-skilled workers from Chattogram wherever suitably qualified workers are available, while giving preference to workers from communities within the Project Area of Influence (AoI).	Moderate	Contactor and LCT Ltd.
		Residual impact from past physical and economic displacement of households from the project site	Major	Formulate and implement the retrospective Social Assistance Programme (SAP) to mitigate the impacts from past displacements.	Moderate	LCT Ltd.
Social environment	River crossing commuters and operators	Relocation of river crossing boat operations from *Ghat* no. 14 to other *ghats*	Major	Coordinate with Chattogram City Corporation (CCC), Chittagong Port Authority (CPA), boat operators and affected users to identify and implement suitable alternative river crossing arrangements following the closure of *Ghat* No. 14. Preference should be given to relocating services to *Ghats* No. 12 and 15 with connections to the existing landing points on the eastern bank to maintain or improve river crossing connectivity.	Moderate	LCT Ltd.
				In consultation with the CCC, CPA and local communities, improve infrastructure and passenger facilities at *Ghats* 12 and 15, including safe access, waiting areas, lighting, weather protection and community spaces that allow residents and commuters to continue enjoying access to and views of the Karnaphuli River following the closure of *Ghat* 14.		LCT Ltd.
				Provide compensation and transition support to boat operators and other parties adversely affected by the relocation of river crossing operations. Compensation shall be based on demonstrated and verifiable actual financial losses attributable to the relocation, including loss of income and additional operating costs in accordance with applicable legal requirements. The compensation and support shall be designed to ensure that the relocation does not require ferry operators to increase passenger fares solely as a result of Project-related increases in travel distance, operating costs or other relocation-related expenses. Normal fare adjustments driven by inflation, market conditions, fuel price fluctuations, regulatory changes or other factors unrelated to the Project may continue to occur.		LCT Ltd.

Category	VEC	Impact / Risks on VEC	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		River crossing commuters using *Ghat* no. 14 need to use other *ghats* leading to longer travel times and potential increase in fares	Major	Coordinate with CCC and relevant transport providers to improve public transport access to *Ghats* No. 12 and 15, including suitably located bus stops, rickshaw stands and safe drop-off/pick-up areas to minimise additional travel time and inconvenience for river crossing users.	Moderate	LCT Ltd.
				Upgrade pedestrian access and crossing facilities at the entrances to *Ghats* No. 12 and 15, including appropriate signage, lighting, traffic calming measures, marked pedestrian crossings and other road safety measures to reduce the risk of traffic accidents for river crossing users.		LCT Ltd.
				Coordinate with CCC and river crossing operators to provide safe, accessible and efficient replacement river crossing services, including consideration of vessels with improved safety features, reduced waiting times and enhanced accessibility for persons with disabilities, older persons, and other vulnerable users.		LCT Ltd.
	Construction and Operation workers	Occupational health and safety risks for workers for wall and fence construction	Moderate	Implement and maintain a contractor HSSE management programme for wall and fence construction activities that requires contractors to develop and implement HSSE procedures, safe work method statements, training, supervision and incident reporting processes.	Minor	Contractor and LCT Ltd.
		Contractor is not sufficiently equipped and experienced to manage E&S risks	Major	Include relevant HSSE considerations in contractor selection and evaluation processes, taking into account the contractor's experience, resources and demonstrated capability to manage HSSE risks associated with construction activities in environments with environmental and social sensitivities. Require contractors to maintain adequate HSSE competence and resources commensurate with the nature, scale and complexity of the works and include appropriate HSSE requirements and obligations within construction contracts.	Minor	LCT Ltd.
				Construction contracts shall include appropriate HSSE requirements, obligations, performance expectations, reporting requirements and provisions for monitoring and managing HSSE risks associated with the works, including implementation of applicable commitments, mitigation measures and management plans arising from the ESIA and associated project environmental and social management documentation.		Contractor and LCT Ltd.
All	All VECs	The preparation of the detailed design and the method statements provide an important opportunity to incorporate the outcomes of the update of the ESIA into the project development to avoid, mitigate or enhance impacts and risks identified.	Moderate	Establish a process for coordination between the LCT Ltd. technical and HSSE teams, the appointed FIDIC Engineer and the Contractor's engineering design team to ensure that applicable ESIA commitments, mitigation measures and management plans are incorporated into the detailed design, construction planning and method statements.	Major	Contractor and LCT Ltd.

Table 1-2: Construction phase summarised ESMP table

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
Physical environment	Drainage hydrology	Joining Block-B and Block-C over the existing drainage channel (Khal No. 14) may cause upstream drainage congestion during monsoon.	Major	The proposed *Khal* 14 culvert, fill placement and associated drainage infrastructure shall be subject to hydraulic and flood modelling to demonstrate that the works do not increase upstream water levels, flooding frequency, ponding, drainage congestion or conveyance restrictions during monsoon and other representative design storm events. The modelling shall compare existing and proposed conditions and demonstrate that the proposed design maintains or improves drainage performance relative to the existing situation. Where modelling identifies any increase in upstream water levels, flooding, waterlogging, ponding, drainage congestion or flow restrictions, the design shall be revised and re-modelled until compliance is demonstrated. LCT Ltd. shall continue consultation with the Bangladesh Water Development Board (BWDB) during the design development and review process. The Contractor shall install and maintain automated water level monitoring equipment upstream of the regulator/culvert to verify actual water level conditions during construction and operation and to support validation of the hydraulic modelling assumptions. Monitoring results shall be reviewed against baseline conditions and model predictions. Where monitoring identifies water levels or drainage conditions materially worse than those predicted, the cause shall be investigated and appropriate corrective measures implemented.	Minor	LCT Ltd/.PMSC
				Confirm through hydraulic modelling that the proposed *Khal* 14 crossing, culvert and associated works do not increase upstream water levels, flooding frequency or drainage congestion relative to baseline conditions. The hydraulic modelling shall assess the effects of the proposed works under representative rainfall, monsoon and design flood events and compare existing and proposed drainage conditions. Where modelling identifies any increase in upstream water levels, flooding, ponding, surcharge conditions, drainage congestion or flow restrictions, the design shall be optimised and re-modelled before construction to demonstrate that the adverse effect has been eliminated or reduced to an acceptable level. The Contractor shall undertake routine inspections of upstream drainage channels, culverts and accessible manholes to identify drainage restrictions and verify drainage performance assumptions used in the hydraulic modelling. The Contractor shall inspect for sediment accumulation, debris build-up, standing water, overtopping, backwater effects and other evidence of restricted flow and undertake maintenance or corrective actions where required. Where inspections identify persistent ponding, elevated upstream water levels or evidence of drainage congestion attributable to the *Khal* 14 crossing or associated culverts, the Contractor shall undertake further hydraulic assessment and implement corrective measures.		LCT Ltd. and Contractor
		Maintenance and operational access by the regulator/pump operator will be restricted during construction	Moderate	Include manholes in the culvert design that are accessible through the terminal deck for regular inspections. The design needs to be approved by the Bangladesh Water Development Board before any construction works start.	Minor	Contractor
				The culvert design shall provide safe access for routine inspection, maintenance and cleaning. Terminal operations shall cooperate with and facilitate authorised inspection and maintenance activities, including implementing appropriate traffic management and work controls to ensure the safety of maintenance personnel		LCT Ltd.
				The Contractor shall ensure that the sluice gate, pumping station, regulator structure and all associated access routes remain accessible at all times to authorised operations and maintenance personnel for inspection, operation, maintenance, cleaning and emergency response activities. Where construction activities have the potential to restrict access, the Contractor shall implement temporary access arrangements, traffic management measures and work controls to maintain safe and uninterrupted access throughout the construction period. Any temporary access restrictions shall be communicated in advance to the facility operator and shall not prevent operation of the drainage infrastructure during rainfall, flood or emergency events.		LCT Ltd.
	River morphology	Dredging and land reclamation will cause localised changes to flow patterns and sediment transport, resulting in minor erosion and sedimentation in the vicinity of the project area. These changes	Minor	The Contractor shall prepare and implement a Dredging and Reclamation Method Statement that is aligned with the approved Project Dredging Management Plan and permit conditions. The Method Statement shall describe the proposed dredging methodology, dredging sequence, equipment selection, sediment handling and disposal arrangements, measures to manage sediment plumes and erosion/sedimentation effects, environmental monitoring requirements and adaptive management actions to be implemented if monitoring identifies effects beyond those predicted in the ESIA. The Contractor shall undertake hydrographic bathymetric surveys of the approved dredging area before commencement of capital dredging and following completion of capital dredging. The Contractor shall conduct surveys using appropriately calibrated hydrographic survey equipment operated by a suitably qualified survey contractor. Survey data shall be processed to generate bathymetric charts, contour plots and digital terrain models and shall be compared against the approved dredging design levels and tolerances.	Minor	Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
		are expected to remain limited in extent and will not affect the overall morphological stability of the Karnaphuli River.		The Contractor shall retain all survey data, maps, models and survey reports and shall document any deviations from the approved design. Where surveys identify over-dredging, under-dredging or other deviations from the approved design, the Contractor shall investigate the cause and implement corrective actions where required.		
				The Contractor shall undertake and document visual riverbank condition inspections at monitoring locations located 500 m upstream and 500 m downstream of the construction area on the same riverbank as the Project works, or at alternative locations agreed with LCT Ltd where access or site conditions make these locations unsuitable. The Contractor shall install permanent survey markers or beacons at each monitoring location to enable inspections and photographic records to be undertaken consistently from the same locations and viewing directions throughout the construction period. The Contractor shall establish baseline conditions before commencement of dredging and construction activities through photographic documentation of the monitoring locations. Visual inspections shall be undertaken by a suitably qualified environmental representative from shoreline and, where appropriate, vessel-based vantage points. Geo-referenced photographic records shall be obtained during each inspection using a GPS-enabled camera, tablet or mobile device and compared against baseline conditions and previous monitoring records. Where safe and permitted, drone surveys should be undertaken to supplement visual inspections and provide aerial documentation of riverbank condition and sediment deposition patterns. The Contractor shall maintain inspection records, photographic evidence and supporting documentation and include the results in monthly environmental monitoring reports. Where monitoring identifies significant Project-related riverbank erosion, bank instability, sediment deposition, sand bar formation or navigation obstructions, the Contractor shall investigate the cause and implement appropriate corrective measures.		Contractor
				Undertake hydrographic surveys following completion of capital dredging and thereafter as required to verify predicted sedimentation rates and identify unexpected deposition or erosion.		Contractor
	Water and sediment quality	Site preparation, reclamation and ground improvement may result in runoff of sediments causing locally higher turbidity levels in the river locally	Minor	Runoff from earthworks, exposed soil surfaces and other sediment-generating construction activities shall be directed through appropriately sized sediment control measures, such as settlement ponds, sediment basins or equivalent treatment systems, where required by the drainage design and site conditions. These controls shall be designed, operated and maintained to reduce flow velocities and promote settlement of suspended sediments prior to discharge to the drainage system or Karnaphuli River. Accumulated sediment shall be inspected regularly and removed as necessary to maintain the design treatment capacity.	Minor	Contractor
				Runoff from earthworks, exposed soil surfaces and other sediment-generating construction activities shall be directed through appropriately sized sediment control measures, including settlement ponds, sediment basins or equivalent treatment systems, where required by the drainage design and site conditions. The Contractor shall design, operate and maintain sediment control measures to reduce flow velocities and promote settlement of suspended sediments before discharge to the site drainage system, *Khal* 14 drainage channel or the Karnaphuli River. The Contractor shall inspect sediment control measures regularly and remove accumulated sediment as necessary to maintain the design storage volume and treatment capacity. The Contractor shall maintain all drainage channels, settlement structures, conveyance systems and discharge points in an effective operating condition throughout the construction period. Where water quality monitoring identifies deterioration attributable to construction runoff, the Contractor shall inspect sediment and erosion control measures, identify the cause and implement corrective actions without delay. The Contractor shall maintain records of inspections, maintenance, sediment removal activities, monitoring results and corrective actions and include these in environmental monitoring reports.		Contractor
		Untreated sewage spill may enter the river	Minor	The Contractor shall comply with the Laldia Container Terminal Waste Management Plan and implement waste management measures consistent with its requirements. The Contractor shall minimise waste generation, segregate waste at source, store waste in designated areas and ensure that waste is collected, transported, recycled, treated and disposed of through appropriately licensed and authorised facilities. The Contractor shall use only waste disposal and treatment facilities holding the required permits, licences and approvals. The Contractor shall maintain records demonstrating lawful waste transport, treatment and disposal and shall retain copies of all waste manifests, permits, licences and disposal receipts. Where monitoring identifies deterioration in water quality attributable to dredged material storage or disposal activities, the Contractor shall investigate the cause and implement corrective actions.	Negligible	Contractor and LCT Ltd.

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				LCT Ltd. shall undertake due diligence reviews and periodic audits of waste contractors and waste management facilities. Where temporary sanitation, wastewater collection or treatment systems are required for construction activities, the Contractor shall install, operate and maintain such systems and ensure that treated effluent and sludge comply with the applicable requirements of the Environment Conservation Rules (ECR) 2023 before discharge or disposal. The Contractor shall collect, contain, convey and treat sewage through appropriately designed, constructed and maintained sanitation and wastewater infrastructure. Sewage collection, storage and treatment systems shall be routinely inspected and maintained to prevent leaks, overflows and unauthorised discharges. Any sewage spill, overflow or system failure shall be immediately contained, cleaned up and reported. The Contractor shall investigate the cause and implement corrective actions to prevent recurrence.		Contractor
				The Contractor shall implement the sewage collection, storage, treatment and disposal requirements of the Laldia Container Terminal Waste Management Plan and maintain records demonstrating compliance. The Contractor shall monitor and maintain records of sewage collection, storage, transport, treatment and disposal activities to verify that sewage is managed through approved facilities and in accordance with applicable regulatory requirements. Any deficiencies, spills, overflows or non-compliances identified during monitoring shall be investigated and corrective actions implemented promptly.		Contractor
		The construction materials on the land area may be washed away with surface runoff and deteriorate water quality of drainage canal and the Karnaphuli River	Minor	The Contractor shall store construction materials in designated storage areas located and managed to prevent materials, sediments, contaminants or runoff from entering water bodies, drainage channels or stormwater systems. Storage areas shall be maintained in a stable condition and appropriate containment or cover shall be provided where there is a risk of material loss, erosion, leakage or pollution.	Negligible	Contractor
				The Contractor shall cover, contain or otherwise protect stockpiles of soil, sand, aggregate and other fine materials susceptible to wind or water erosion to prevent off-site migration and sediment release. The Contractor shall install, inspect and maintain silt fences, sediment traps and temporary drainage controls, where required based on the location and nature of the works, to control sediment runoff and prevent the discharge of sediment-laden water to drainage systems, water bodies and adjacent areas.		Contractor
				The Contractor shall submit the proposed erosion and sediment control measures, including the location and design of silt fences, sediment traps, temporary drainage controls and other sediment management measures, to the Engineer for review and approval prior to installation. Following approval, the Contractor shall install, inspect and maintain the approved controls throughout the construction period and repair, replace or upgrade any controls that are damaged, ineffective or no longer suitable for the prevailing site conditions.		Contractor
				The Contractor shall maintain good housekeeping standards across all work areas, including the prompt collection of waste, removal of surplus materials and proper storage of construction materials. Any spilled soil, aggregate, chemicals, fuels, cement, concrete or other materials shall be contained and cleaned up immediately and contaminated materials shall be collected and disposed of in accordance with the Laldia Container Terminal Waste Management Plan		Contractor
				The Contractor shall implement stormwater and erosion control measures to prevent sediments, construction materials and other pollutants from being transported by surface runoff into the drainage canal or the Karnaphuli River in line with Stormwater Management Plan. Measures shall include appropriate drainage controls, stabilisation or covering of stockpiles, designated material storage areas, inspection of runoff control measures after rainfall events and prompt rectification of any failures. Monitoring and management requirements shall be incorporated into the Contractor's Stormwater and Erosion Control Method Statement.		Contractor
		Capital dredging will resuspend sediments and alter water quality parameters.	Moderate	The Contractor shall implement dredging activities in accordance with the Laldia Container Terminal Dredging Management Plan and all applicable permit conditions. The Contractor shall prepare and implement an Adaptive Dredging and Reclamation Method Statement that describes the proposed dredging methodology, equipment, sequencing of works, dredged material handling procedures, environmental controls, monitoring arrangements and corrective actions. The Method Statement shall be consistent with the requirements of the approved Dredging Management Plan. Prior to commencement of dredging and reclamation activities, the Contractor shall submit a Dredging and Reclamation Method Statement to the Engineer for review and approval. The Contractor shall undertake dredging activities in a manner that minimises sediment resuspension, sediment plume generation and deterioration of water quality. Where monitoring indicates unexpected deterioration in water quality attributable to dredging activities, the Contractor shall investigate the cause and implement corrective actions, which may include modification of dredging methods, sequencing of works, dredging intensity or other operational controls.	Minor	Contractor
				Prior to commencement of dredging campaign, the Contractor shall verify the chemical and physical characteristics of the sediments to be dredged in accordance with the project Dredging Management Plan and applicable regulatory requirements. The assessment shall confirm the suitability of the dredged material for the proposed reuse, beneficial use, transport and disposal option and shall be submitted to LCT Ltd. and the relevant authorities, as required, prior to commencement of dredging activities.		Contractor
				Implement the Dredging Management Plan and associated environmental controls to minimise adverse effects on fisheries resources, including: limiting the duration and footprint of dredging activities where practicable;		Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				scheduling dredging to avoid sensitive fish breeding and migration periods where reasonably practicable and supported by Fisheries Department guidance; monitoring turbidity and suspended sediment concentrations during dredging and comparing results with model predictions; implementing adaptive management measures where monitoring indicates impacts materially greater than predicted; maintaining communication with local fishing communities and the Department of Fisheries throughout dredging activities; investigating and responding to fisheries-related grievances through the Project grievance mechanism; and implementing spill prevention and pollution control measures to prevent deterioration of water quality. If monitoring indicates sediment concentrations substantially exceeding model predictions, unexpected fish mortality, significant fisheries grievances or evidence of project-related impacts on fisheries resources, the Contractor shall review dredging methods and implement corrective actions, including modification of dredging operations, equipment, sequencing or temporary suspension of activities where necessary.		
		Spills and leaks of fuel, grease, lubricants and other hazardous substances from equipment/ dredgers into surface or groundwater from construction and dredging equipment	Moderate	The Contractor shall ensure that all construction plant, dredging equipment and vehicles are maintained in accordance with the manufacturer's specifications and kept in a clean and serviceable condition. Equipment shall be routinely inspected for leaks, damage and signs of deterioration, with particular attention given to fuel systems, hydraulic systems, hoses, fittings and other components containing oils or fluids. Any leaks or defects shall be repaired promptly and defective equipment shall not be operated until repairs have been completed. Fuel storage tanks and temporary storage areas for fuels, lubricating oils, hydraulic fluids and other hazardous liquids shall be provided with secondary containment of sufficient capacity to contain potential spills and prevent releases to soil, surface water and drainage systems.	Minor	Contractor
				The Contractor shall undertake a risk assessment to identify locations where fuels, lubricants, hydraulic fluids and other hazardous substances are stored, transferred, used or refuelled. Based on the findings of the assessment, appropriate secondary containment shall be provided at locations where spills or leaks may occur. Spill response equipment and materials appropriate to the types and volumes of hazardous substances present shall be maintained at strategic locations identified through the risk assessment and shall be readily accessible at all times. Personnel responsible for handling hazardous substances or responding to spill incidents shall receive appropriate training in spill prevention, containment, clean-up and reporting procedures. All spills shall be contained and cleaned up promptly using appropriate spill response equipment and contaminated materials shall be managed and disposed of in accordance with the Laldia Container Terminal Waste Management Plan.		Contractor
				The Contractor shall develop and implement a Spill Prevention and Response Procedure that clearly defines roles, responsibilities, reporting requirements and response actions for spills and leaks of fuels, lubricants, hydraulic fluids and other hazardous substances. The Contractor shall undertake a spill risk assessment to identify locations where hazardous substances are stored, transferred, handled or used and shall provide appropriate spill response equipment and materials at these locations. Personnel responsible for handling hazardous substances or responding to spills shall be trained in spill prevention, containment, clean-up and reporting procedures. Spill response equipment shall be readily available at all times and all spills and leaks shall be contained, cleaned up and reported promptly.		Contractor
				The Contractor shall prepare and implement a Pollution Prevention and Control Method Statement describing the measures to prevent, detect, contain and respond to spills and leaks of fuel, oils, lubricants, chemicals and other hazardous substances associated with construction and dredging activities. The Method Statement shall include requirements for fuel storage, secondary containment, equipment inspection and maintenance, refuelling activities, spill response equipment, spill reporting, personnel training and corrective actions. The Contractor shall inspect construction plant, dredging equipment, fuel storage areas and transfer locations regularly and promptly repair any leaks or defects identified. Appropriately sized spill response equipment shall be available at all fuel storage locations, refuelling areas, vessels, dredgers and other locations where hazardous substances are stored or handled. Any spill or leak shall be immediately contained, cleaned up, reported and investigated. The Contractor shall implement corrective actions to prevent recurrence.		Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				The Contractor shall prepare and implement a Hazardous Materials Management Method Statement describing the procedures for the procurement, transport, storage, handling, use and disposal of fuels, oils, lubricants, chemicals and other hazardous materials required for the Works. The Method Statement shall identify hazardous materials used on site, storage requirements, secondary containment measures, inspection requirements, spill prevention controls, refuelling procedures, waste handling requirements, emergency response arrangements and corrective actions. Hazardous materials shall be stored in designated areas with appropriate secondary containment and protection from rainfall, flooding and unauthorised access. The Contractor shall maintain an inventory of hazardous materials on site and keep current Safety Data Sheets (SDS) available for all hazardous substances. The Contractor shall inspect hazardous material storage areas routinely and immediately rectify any deficiencies identified. Any leak, spill or unauthorised release of hazardous materials shall be immediately contained, cleaned up, reported and investigated. The Contractor shall implement corrective actions to prevent recurrence.		Contractor
		Disposal of dredged materials may affect water quality in other locations, such as Char Bakalia	Moderate	The Contractor shall manage, transport, reuse and dispose of dredged material in accordance with the Dredging and Dredged Material Management Policy 2025, applicable permit conditions and the Dredging Management Plan. The proposed reuse or disposal location shall be submitted to CPA and other relevant authorities, as required, for review and approval prior to commencement of dredging activities. The Contractor shall maintain records of dredged material volumes, transport routes and final reuse or disposal locations.	Minor	Contractor
				The Contractor shall undertake a documented assessment of opportunities for the beneficial reuse of dredged material prior to commencement of dredging activities and include the assessment within the Dredging and Reclamation Method Statement. The assessment shall evaluate the suitability of dredged material for beneficial reuse having regard to geotechnical characteristics, material quality, engineering requirements, Project demands, environmental and social considerations, regulatory requirements and permitting constraints. Where the assessment demonstrates that dredged material is suitable for beneficial reuse and all necessary approvals can be obtained, the Contractor shall maximise beneficial reuse opportunities to the extent practicable before considering disposal. The Contractor shall provide clear justification within the Dredging and Reclamation Method Statement for any dredged material that is not proposed for beneficial reuse. Dredged material that is demonstrated to be unsuitable for beneficial reuse, or for which beneficial reuse is not reasonably practicable, shall be transported, handled, stored, reused or disposed of only at approved locations and in accordance with applicable permit conditions, regulatory requirements and the approved Dredging and Reclamation Method Statement.		Contractor
				Prior to commencement of the capital dredging campaign, the Contractor shall verify the physical and chemical characteristics of the sediments to be dredged in accordance with the Dredging Management Plan and applicable regulatory requirements. The assessment shall confirm the suitability of the dredged material for the proposed reuse, beneficial use, transport or disposal option and shall be submitted to LCT Ltd., CPA and other relevant authorities, as required, prior to commencement of dredging activities.		Contractor
				The Contractor shall remove vegetation, roots, debris and any waste materials from the Block C site prior to earthworks and reclamation activities. Cleared vegetation, debris and waste shall be managed and disposed of in accordance with the Laldia Container Terminal Waste Management Plan. Suitable uncontaminated soil materials may be reused within the Project, where practicable and technically suitable.		Contractor
				The Contractor shall dispose of dredged material only at reuse or disposal locations approved by CPA and other relevant authorities, as required. Prior to commencement of dredging activities, the Contractor shall demonstrate that the proposed disposal or reuse location is suitable for the volume and characteristics of the dredged material and is managed in accordance with the Dredging Management Plan and applicable regulatory requirements. Records of dredged material quantities, transport and final disposal or reuse locations shall be maintained.		Contractor
	Ambient air quality	Emissions (SOX, NOX, CO, PM2.5) from vessels, vehicles, various types of construction equipment, and generators will impact air quality	Minor	The Contractor shall minimise air emissions from vessels, vehicles, construction plant, equipment and generators through appropriate equipment selection, preventive maintenance and efficient operation. The Contractor shall ensure that plant and equipment is maintained in accordance with manufacturer specifications and promptly repair equipment generating excessive exhaust emissions. The Contractor shall minimise idling of vehicles, generators and construction equipment when not in active use. The Contractor shall implement measures to reduce fuel consumption and associated emissions, including efficient work planning, optimisation of vehicle and vessel movements and avoidance of unnecessary equipment operation. The Contractor shall prepare and implement an Air Emissions Control Method Statement describing the procedures for equipment maintenance, emission inspections, management of excessive smoke emissions, idling controls, fuel management, monitoring requirements and corrective actions. The Contractor shall undertake continuous real-time monitoring of $PM_{2.5}$ and PM_{10} concentrations using calibrated ambient air quality monitoring equipment at designated monitoring locations. The Contractor shall conduct daily visual inspections for excessive exhaust emissions from vehicles, vessels, generators and construction equipment. The Contractor shall inspect equipment maintenance records, emission inspection records and idling control records to verify compliance with	Minor	Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				the requirements of the Air Emissions Control Method Statement. The Contractor shall review, record and investigate all air quality complaints and grievances. Where monitoring identifies elevated particulate concentrations, visible emissions or complaints attributable to construction activities, the Contractor shall investigate the cause and implement corrective actions to reduce emissions and prevent recurrence.		
				The Contractor shall maintain vehicles, construction plant, generators and dredging equipment in accordance with the manufacturer's specifications and shall not operate equipment that emits excessive visible exhaust emissions. Operators shall be trained to identify and report abnormal emissions, equipment defects and maintenance requirements. Engines shall be switched off when not in use, where safe and practical to do so, and unnecessary idling shall be minimised. Equipment identified as having emission-related defects shall be repaired promptly or removed from service until repairs have been completed.		Contractor
				Drivers and equipment operators shall be trained in fuel-efficient operating practices, including reducing unnecessary idling, avoiding excessive acceleration and ensuring vehicles and equipment are operated in accordance with the manufacturer's specifications to minimise fuel consumption and exhaust emissions.		Contractor
		Dust emissions generated by construction activities have the potential to cause nuisance	Moderate	The Contractor shall minimise dust generation from site clearance, vegetation clearing, earthworks, material handling, stockpiles, haul roads and vehicle movements. The Contractor shall minimise disturbance of exposed soil surfaces and limit vegetation clearing, earthworks, material handling activities and the extent of exposed soil to the minimum area required for the Works. The Contractor shall implement dust control measures, including enforcing speed limits on unpaved roads and construction areas, covering or otherwise securing vehicles transporting soil, sand, aggregate and other friable materials and controlling vehicle movements on unpaved surfaces. The Contractor shall implement dust suppression measures, including watering of exposed surfaces, stockpiles and haul roads, where visible dust emissions are observed or where activities have the potential to cause nuisance at sensitive receptors. The Contractor shall promptly clean up spilled materials and maintain good housekeeping practices to minimise dust generation. Where monitoring or inspections identify excessive dust emissions or dust nuisance beyond the site boundary, the Contractor shall investigate the cause and implement corrective actions.	Minor	Contractor
				The Contractor shall monitor site conditions and implement enhanced dust suppression measures during periods when weather conditions or construction activities increase the potential for dust generation. Such measures may include water spraying, covering stockpiles, reducing exposed working areas, covering transported materials and controlling vehicle movements on unpaved surfaces.		Contractor
				The Contractor shall minimise the volume and duration of stockpiling of soil, sand, rock and other friable materials to that required for the works. Stockpiles shall be kept to the minimum practicable height and footprint and protected using appropriate dust control measures, such as water spraying, covering or surface stabilisation, where there is a risk of dust generation.		Contractor
				The Contractor shall locate stockpiles away from water bodies, drainage channels, stormwater inlets and overland drainage paths and shall minimise the height, footprint and duration of stockpiling to that required for the works. Stockpiles shall be stabilised and managed to prevent wind erosion, sediment runoff and dust generation through the use of appropriate controls such as covering, water spraying, surface stabilisation, perimeter sediment controls and diversion of clean surface water away from the stockpile. Stockpiles shall be inspected regularly and following significant rainfall events, and any deficiencies shall be rectified promptly.		Contractor
		Greenhouse Gas (GHG) emissions from construction equipment and generators will affect global climate	Minor	The Contractor shall minimise greenhouse gas emissions from construction activities by maintaining plant, vehicles, generators, vessels and dredging equipment in accordance with manufacturer specifications, minimising unnecessary idling, implementing fuel-efficient operating practices and optimising work planning, material transport and equipment utilisation to reduce fuel consumption. The Contractor shall monitor fuel consumption associated with construction activities and investigate opportunities to improve fuel efficiency and reduce greenhouse gas emissions where practicable. Where excessive fuel consumption or abnormal equipment performance is identified, the Contractor shall investigate the cause and implement corrective actions.	Minor	Contractor
				The Contractor shall maintain records of fuel consumption for major construction plant, generators, vehicles and dredging equipment and shall report this information to the Engineer.		Contractor
	Ambient noise levels	Different types of construction activities (e.g. piling, ground improvement, construction machinery operations, vehicle	Major	The Contractor shall minimise noise emissions from piling, ground improvement works, construction plant, generators, vehicles and other construction activities through appropriate work planning, equipment maintenance and implementation of noise control measures. The Contractor shall maintain construction equipment, generators and vehicles in accordance with manufacturer specifications and promptly repair equipment generating abnormal or excessive noise. The Contractor shall locate stationary noise-generating equipment, including generators, compressors and pumps, as far as practicable from nearby residential areas and shall utilise acoustic enclosures, mufflers, silencers or other manufacturer-approved noise attenuation devices where supplied with the equipment.	Moderate	Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
		movements etc.) will cause high level noise which cause nuisance and health risks to the neighbouring communities		The Contractor shall restrict high-noise construction activities, including piling and ground improvement works, to approved construction working hours and shall avoid simultaneous operation of multiple major noise-generating activities in close proximity to residential areas where this can reasonably be achieved through work planning. The Contractor shall provide advance notification to affected communities of planned piling, ground improvement works and other temporary high-noise construction activities. The Contractor shall investigate all substantiated community complaints related to construction noise, identify the source of the noise and implement corrective actions where Project activities are determined to be the cause. Where monitoring identifies Project-related noise levels that exceed applicable Project criteria or where repeated noise-related complaints are received, the Contractor shall investigate the cause and implement additional noise control measures.		
				The Contractor shall maintain construction plant, vehicles, generators and equipment in accordance with the manufacturer's specifications to minimise unnecessary noise emissions. The Contractor shall plan and manage construction activities to reduce prolonged or unnecessary operation of noisy equipment, minimise simultaneous operation of multiple high-noise plant where practicable and switch off equipment when not in use, where safe and practical to do so. Particularly noisy activities shall, where practicable, be scheduled to avoid night-time periods and times of known community sensitivity, such as religious observances and other community events. Equipment identified as defective or generating abnormal noise shall be repaired promptly or removed from service until repairs have been completed.		Contractor
				Prior to commencement of piling works, the Contractor shall evaluate the proposed piling methodology and identify opportunities to reduce underwater noise, vibration and other environmental impacts where technically feasible and compatible with the design requirements. The selected piling methodology shall be justified in the Piling Method Statement and submitted to the Engineer for review and approval prior to commencement of piling activities.		Contractor
				Prior to commencement of ground improvement works, the Contractor shall assess the potential noise, and vibration impacts of the proposed ground improvement methodology on nearby communities, structures and sensitive receptors. Where dynamic compaction is proposed, the Contractor shall implement appropriate controls, including work planning, equipment management, monitoring and community notification, to minimise noise and vibration impacts.		Contractor
				The Contractor shall establish a pre-construction noise and vibration baseline at sensitive community receptors identified in consultation with LCT Ltd. and the Engineer. Based on the baseline findings, the Contractor shall implement a noise and vibration monitoring programme throughout the construction period at agreed monitoring locations representative of the nearest affected communities and other sensitive receptors. Monitoring results shall be reviewed regularly to assess the effectiveness of mitigation measures and, where monitoring identifies Project-related increases above baseline conditions or generates substantiated community complaints, the Contractor shall investigate the cause and implement appropriate corrective actions to reduce noise and vibration impacts.		Contractor
Ecological environment	Tidal mudflat	The tidal mudflat in front of Block-C and the benthic habitats living there will be lost.	Moderate	LCT Ltd. shall minimise the footprint of reclamation and permanent infrastructure within the tidal mudflat area to the extent practicable through optimisation of the project layout and construction methodology.	Moderate	LCT Ltd.
				The Contractor shall confine all reclamation, dredging, construction activities, equipment movements and material storage to the approved construction footprint and shall not disturb mudflat areas outside the areas authorised for the works. Temporary work areas shall be limited to the minimum extent required for construction and any unnecessary disturbance of adjacent mudflat habitat shall be avoided.		Contractor
				LCT Ltd. Shall evaluate the biodiversity values of the tidal mudflat. In addition, a Critical Habitat Assessment shall be completed. The results should show the ecological value of the affected tidal mudflat habitat and the significance of Project-related habitat loss. Based on that, biodiversity mitigation measures shall be developed and implemented in accordance with the mitigation hierarchy, irrespective of whether the habitat is determined to qualify as Critical Habitat. Where residual biodiversity impacts remain after implementation of avoidance and minimisation measures, LCT Ltd. shall identify and implement appropriate conservation, restoration, enhancement and/or biodiversity offset measures commensurate with the significance of the residual impact		LCT Ltd.

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				Recognising that permanent loss of tidal mudflat habitat and associated benthic communities is unavoidable as a result of the Project, LCT Ltd. shall evaluate the technical, ecological, regulatory and practical feasibility of achieving no net loss of biodiversity through habitat conservation, restoration, enhancement or biodiversity offset measures within the Karnaphuli River system. Subject to the outcome of these assessments, collaborate with relevant authorities and conservation organisations to identify suitable opportunities for tidal mudflat conservation, restoration and/or creation and implement appropriate measures to address residual impacts, including defined objectives, implementation arrangements, monitoring requirements and performance criteria.		LCT Ltd.
	Mangrove ecosystems	The mangrove trees present in the drainage channel will be removed during the site clearing and permanently lost	Minor	LCT Ltd. shall minimise the removal of mangrove trees and mangrove habitat through optimisation of the final design, site layout and construction methodology. Only mangrove trees that cannot reasonably be avoided shall be removed.	Minor	LCT Ltd.
				LCT Ltd. shall evaluate the biodiversity value of the mangrove trees to be removed. In addition, a Critical Habitat Assessment shall be completed. The results should show the ecological value of the mangrove habitat and the significance of Project-related habitat loss. Based on that, biodiversity mitigation measures shall be developed and implemented in accordance with the mitigation hierarchy, irrespective of whether the habitat is determined to qualify as Critical Habitat. Where residual biodiversity impacts remain after implementation of avoidance and minimisation measures, LCT Ltd. shall identify and implement appropriate conservation, restoration, enhancement and/or biodiversity offset measures commensurate with the significance of the residual impact		LCT Ltd.
				Recognising that permanent loss of some mangrove habitat is unavoidable, LCT Ltd. shall evaluate opportunities for mangrove conservation, restoration, enhancement and/or biodiversity offsets within the Karnaphuli River system. The assessment shall consider ecological suitability, technical feasibility, regulatory requirements, long-term management arrangements and measurable biodiversity outcomes. Subject to the outcome of these assessments, collaborate with relevant authorities and conservation organisations to identify suitable opportunities for mangrove conservation, restoration and/or creation and implement appropriate measures to address residual impacts, including defined objectives, implementation arrangements, monitoring requirements and performance criteria.		LCT Ltd.
		The construction activities may affect the mangroves in front (riverside) of Block-B	Minor	The Contractor shall demarcate and protect all mangrove habitat located in front of Block B and adjacent to construction work areas prior to commencement of works. Construction materials, waste, temporary facilities, equipment, vehicle movements and construction activities shall be confined to designated work areas and shall not encroach into mangrove habitat. No storage, refuelling, maintenance activities, waste disposal, vegetation clearance or unauthorised access shall occur within or adjacent to protected mangrove areas. The Contractor shall routinely inspect mangrove protection measures and promptly rectify any damage, encroachment or non-compliance. The Contractor shall ensure that construction activities do not result in physical damage, vegetation loss, excessive sediment deposition, erosion or deterioration of retained mangrove habitat.	Minor	Contractor
				The Contractor shall protect mangrove habitat located on the riverside of Block B from direct damage resulting from construction activities, vehicle movements, material storage, waste disposal, sediment deposition and accidental spills. The Contractor shall clearly demarcate mangrove protection areas before commencement of construction activities and shall prohibit unnecessary access, vegetation clearance, material stockpiling and equipment operation within these areas. The Contractor shall implement erosion, sediment and pollution control measures to prevent adverse effects on adjacent mangrove habitat. Where construction activities result in damage to mangrove vegetation or habitat, the Contractor shall investigate the cause and implement corrective actions to prevent further impacts.		LCT Ltd.
				The Contractor shall demarcate and protect mangrove areas adjacent to Block B prior to commencement of works. Construction activities, equipment movements, material storage and temporary works shall be planned and undertaken in a manner that avoids direct disturbance, damage or encroachment into mangrove habitat. Where works are required adjacent to mangrove areas, the Contractor shall implement appropriate protection measures and maintain a clearly defined exclusion zone between construction activities and the mangroves.		Contractor
				The Contractor shall minimise disturbance to natural habitats by confining construction activities to the approved Project footprint. Any temporary disturbance to habitats outside permanent Project infrastructure shall be reinstated following completion of the works, where practicable, to restore pre-construction habitat conditions.		LCT Ltd.
	Fisheries	Piling, dredging, vessel movement may pose	Moderate	The Contractor shall plan, sequence and execute dredging activities in an efficient manner to minimise the duration and spatial extent of disturbance to aquatic habitats, water quality and other sensitive receptors.	Minor	Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
		risk for water contamination and underwater noise generation which may impact fisheries resources including the ability of migratory fish species to navigate through the Karnaphuli River. There is a risk of Increase in turbidity, suspended materials due to dredging and piling activities		Dredging activities shall be scheduled to avoid fisheries-sensitive migration, spawning and juvenile dispersal periods for Hilsa and Indian major carp, to the extent technically feasible and operationally practicable. Dredging activities shall, where technically feasible and operationally practicable, be scheduled to minimise overlap with periods during which migratory fish species are expected to move through the Karnaphuli River and Project Area. Particular consideration shall be given to the principal Hilsa migration period (July-September) and periods when eggs, larvae and juveniles of Indian major carps may be transported through the Karnaphuli-Halda system (approximately April-July). Where practicable, dredging shall also avoid the annual Government of Bangladesh Hilsa brood-stock protection period. Dredging during these periods shall be avoided, unless the contractor demonstrates that dredging during these periods cannot reasonably be avoided due to navigational safety, operational necessity or other overriding operational constraints. Where dredging is required during any fisheries-sensitive period, the Contractor shall implement turbidity monitoring, sediment plume monitoring, fisheries stakeholder engagement and adaptive management measures in accordance with the Biodiversity Management Plan and Dredging Management Plan.		
				Where dredging activities are undertaken during identified fisheries-sensitive migration periods, the Contractor shall implement a turbidity and sediment plume monitoring programme to verify that dredging-induced turbidity and sediment plume do not create a barrier to fish migration[5]. The objective for this monitoring is to ensure that fish migration behaviour is not adversely significantly affected by project activities (including dredging, placement or disposal of dredged material and reclamation activity) such that it would affect the population numbers and spawning behaviour further up the estuary or affect the migration of juveniles back down the estuary and out to sea. The key species for the estuary are considered to be Hilsa (important as a commercial species for many of the local communities along the estuary) and Indian major carp (important as a food source for the Gangetic dolphin). Consultation with the local fisherfolk may result in additional species also considered to be important. The thresholds would apply during all periods of migration both up and down the estuary, with the migration of the juveniles out to sea being more important as they will be more sensitive to suspended sediment levels. The Contractor shall establish ambient turbidity conditions at representative reference locations that are not influenced by Project-related activities. Where turbidity exceeds 10% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations, the Contractor shall investigate the cause. If the exceedance is considered to be due to project activities, then management actions should be taken to ensure that the turbidity levels do not rise to the threshold level. If monitoring identifies turbidity levels exceeding 20% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations and the exceedance is attributable to Project-related activities, the Contractor shall implement additional corrective actions to reduce turbidity inducing activities to ensure that the levels return to below the threshold within eight hours of the exceedance. The Contractor shall undertake regular consultation with fishermen and fishing communities via an appropriately qualified local fisheries consultant, throughout the turbidity inducing activities related to the project to verify the continued occurrence and movement of migratory fish species through the Project area. Where monitoring, consultations or grievances indicate potential disruption to fish migration attributable to Project activities, the Contractor shall investigate the cause and implement adaptive management measures. Should it be clear that fish are still migrating through the turbidity plumes caused by the project and there have been exceedances of the threshold then the thresholds (intensity and/or duration) could be adjusted with agreement of the fisheries consultant (in consultation with the fisherfolk). Available satellite imagery shall be used, where practicable, to support interpretation of sediment plume behaviour and verification of monitoring results		Contractor
				Engage with fishermen, fishing communities and relevant authorities throughout dredging and marine construction activities to identify and address Project-related fisheries concerns. Fisheries-related grievances, complaints and observations shall be recorded, investigated and reviewed alongside water quality and sediment plume monitoring results. Where investigations identify Project-related impacts on fisheries resources or fish migration, corrective actions and adaptive management measures shall be implemented and communicate the outcome of investigations to affected stakeholders.		LCT Ltd.
				The Contractor shall implement spill prevention, pollution control and underwater noise mitigation measures specified in the Biodiversity Management Plan, Dredging Management Plan. Construction vessels, dredgers, piling equipment and associated marine plant shall be inspected and maintained to minimise underwater noise generation and prevent releases of fuels, oils, lubricants and other hazardous substances to the aquatic environment. All spills and pollution incidents shall be reported, investigated and addressed through corrective actions. Where monitoring, fisheries observations, consultation findings or grievances indicate Project-related impacts on fisheries resources attributable to underwater noise, pollution incidents or marine construction activities, the Contractor shall investigate the cause and implement additional mitigation measures.		Contractor

[5] *It is acknowledged that the species using the estuary are adapted to high levels of turbidity given the nature of the estuary and that there are several other factors that would affect turbidity levels (including changes due to seasonal characteristics (monsoon conditions) and anthropogenic factors (maintenance dredging and vessel movements)). This results in several difficulties with setting triggers and thresholds that would be appropriate and effective. The monitoring strategy should therefore be implemented as an adaptive monitoring and management strategy to take account of the findings of the monitoring, other activities within the estuary and consultation with local fisherfolk (via a local fisheries consultant).*

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
		Habitat degradation of benthic species (fish feed) and some fishes due to capital dredging activities	Moderate	The Contractor shall confine dredging activities to the approved dredging footprint and shall plan and execute dredging works in a manner that minimises unnecessary disturbance of the riverbed and the generation of suspended sediments. The Contractor shall implement the water quality monitoring requirements of the approved Dredging Management Plan and, where monitoring indicates that dredging activities are generating excessive sediment mobilisation or that mitigation measures are not performing effectively, shall modify dredging methods or operating practices to reduce environmental impacts.	Minor	Contractor
	Dolphins	Piling, dredging and vessel movements cause underwater noise that affects the dolphins	Major	The Contractor shall appoint suitably qualified underwater acoustics and marine fauna specialists to develop and implement an underwater noise and dolphin monitoring programme during piling activities. The programme shall integrate underwater noise monitoring and passive acoustic monitoring (PAM) to assess underwater sound levels and dolphin occurrence and behaviour. Monitoring shall be undertaken at two locations: one monitoring station located near Block C and a second representative location selected by the appointed specialists. The second location shall provide comparison with conditions outside the area of highest underwater noise exposure and shall take account of tidal movements and dolphin habitat use. The underwater acoustics specialist shall determine the appropriate monitoring equipment, deployment methods and survey design. The PAM system(s) shall be capable of recording piling-generated underwater sound for acoustic assessments and detecting dolphin vocalisations within the frequency range relevant to dolphin presence and activity in the Karnaphuli River. The monitoring methodology shall be developed with consideration of local tidal conditions, vessel traffic, navigational constraints, water depth, background noise levels, dolphin movement patterns, and the risk of damage to or loss of monitoring equipment. Prior to the commencement of piling activities, the underwater acoustics specialist shall undertake baseline underwater noise monitoring to characterise existing acoustic conditions within the Project Area and adjacent dolphin habitat. The Contractor shall record the timing, location, duration and operational characteristics of piling activities to enable underwater noise measurements and dolphin observations to be correlated with specific construction activities.	Moderate	Contractor
				The Contractor shall demonstrate, through site-specific underwater noise monitoring, that piling activities do not exceed a single-strike sound exposure level (SELss) of 145 dB at 200 m from the piling source, thereby minimising the potential for disturbance to Ganges River dolphins. The appointed marine mammal specialists shall review underwater noise monitoring results on a regular basis and report findings to LCT Ltd. and the Engineer. Where monitoring identifies exceedance of the underwater noise threshold or evidence of significant disturbance to dolphins or other aquatic fauna, the Contractor shall investigate the cause and implement corrective actions. Additional mitigation measures may include: • Modification of piling methods. • Adjustment of piling sequences. • Restrictions on piling during periods of elevated dolphin presence. • Implementation of underwater noise attenuation measures. • Other measures recommended by the appointed specialists and approved by LCT Ltd. and the Engineer.		Contractor
				Prior to the commencement of piling works, the Contractor shall prepare and implement a Marine Mammal Mitigation Protocol (MMMP) in accordance with the Biodiversity Management Plan. The MMMP shall be approved by a marine mammal expert via LCT Ltd. before piling activities commence. Qualified Marine Mammal Observers (MMOs) shall undertake boat-based visual monitoring during piling activities to identify dolphins and other aquatic fauna within the Project Area. Observations shall include the location, number, distance and direction of animals relative to piling activities, together with any observable behavioural responses. The MMMP shall define: • Underwater noise thresholds. • Exclusion zones. • MMO. • PAM. • Acoustic Deterrent Devices (ADDs), where demonstrated to be appropriate and effective. • Soft-start or ramp-up procedures for piling activities. • Restrictions on piling during tidal conditions associated with increased dolphin presence. • Additional underwater noise mitigation measures demonstrated to reduce disturbance to dolphins. Data collected through MMO observations and PAM shall be used to support implementation of the dolphin monitoring programme and to inform adaptive management throughout the construction phase. The underwater noise mitigation measures have been developed primarily with consideration of the Ganges River dolphin, as it represents the most sensitive receptor in the Project Area of Influence due to its restricted riverine habitat, dependence on echolocation, and limited ability to avoid disturbance compared to more mobile coastal cetaceans. The same mitigation measures shall be applied to Irrawaddy dolphins and are expected to		Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				provide an equivalent or greater level of protection for this species. An adaptive management plan shall be adapted to alter the mitigation measures during construction if deemed over precautionary or under-precautionary. An adaptive management approach shall be implemented throughout construction. Mitigation measures may be refined where monitoring demonstrates that measures are either overly precautionary or insufficient to adequately protect dolphins and other aquatic fauna.		
				Implement measures to avoid and minimise impacts on Ganges River dolphins through the management of underwater noise, dredging activities, vessel movements and water quality. Review and strengthen mitigation measures where construction or operational activities result in unanticipated impacts on dolphins or their habitat.		Contractor
		Piling, dredging, construction vessel movement may pose risk for water quality which may impact dolphins. There is a risk of increase in turbidity, suspended materials due to dredging and piling activities	Major	Adhere to the dredging management plan. The Contractor with the dredging company shall prepare and implement a Dredging Management Plan (DMP) following the Dredge Material Disposal Policy 2025 and in coordination with the CPA.	Moderate	Contractor
		Collision risk of construction vessels with dolphins.	Major	Ensure that somebody on board of the vessel has done a training on marine mammal observing (e.g. from JNCC). The person would be responsible for ensuring that vessels are aware of any dolphins present in an area where a vessel is manoeuvring and can avoid interactions.	Moderate	Contractor
				The Contractor shall ensure that at least one person per shift on dredging and other relevant construction vessels has received appropriate training in aquatic fauna identification, sighting and reporting procedures. The training shall include an understanding of internationally recognised good practice for fauna observation and protection, including relevant principles contained within JNCC guidance and shall incorporate locally relevant training for the Karnaphuli River system. As a minimum, personnel shall be able to identify key aquatic fauna species of conservation importance, including the Ganges River Dolphin, communicate sightings to vessel crews and support the implementation of applicable operational controls to minimise the risk of vessel interactions with aquatic fauna.		LCT Ltd.
				Apply speed limits that reduce the risk of interactions with marine fauna in the AoI of the project (if feasible, limit to 10 km/hr).		Contractor
	Avifauna and migratory birds	Construction activities generating noise, dust, light, may disrupt feeding, resting, nesting, and movement of avifauna and migratory birds near the Project area. Loss of mudflat (see above) will mean a loss of food resources for birds.	Minor	An adaptive monitoring and management plan should be developed to ensure that appropriate actions are taken when necessary and that, at other times where the risk is not present or at a low level, activities can proceed. This reduces the potential for increasing the duration of construction which could then affect other sensitive receptors.	Minor	Contractor
				Use coloured (warmer) lights to avoid effects on nocturnal fauna (e.g. bats).		Contractor
				The adaptive plan should include monitoring for any birds and bats in the area and if they are showing signs of disturbance then action can be taken to reduce the noise levels or install barriers to reduce noise reaching the affected area.		Contractor
				The local area is already subject to high levels of noise from the airport and other activities in the area and measures should be applied where the disturbance is due to the specific activity rather than for all sources of noise.		Contractor
Social environment	Road traffic	Possible minor (temporary) congestions	Minor	Consider waterborne transport where feasible to reduce road traffic impacts.	Minor	Contractor
				Prepare and implement a Traffic Method Statement in line with Project's Traffic Management Plan		Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
Social Environment	River traffic	(as per the traffic study, the road has substantial capacity to conclude that congestions are unlikely to happen, based on the expected traffic increase) and interruptions to the public road traffic due to the movement of vehicles with construction equipment and materials and the installation of electricity cable. Also through buses transporting employees.	Moderate	Provide adequate signage, warning lights, reflective barriers, and flagmen where construction traffic interfaces with the public.	Minor	Contractor
				Integrate the following measures in the contracting phase for the drivers of the vehicles: Ensure the usage of the designated main routes and avoid any unnecessary rerouting into busy communities; Schedule deliveries during off-peak traffic periods and outside school opening and closing and prayer times.		Contractor
				The Contractor shall identify and map sensitive community receptors and social infrastructure located along project access routes, including schools, childcare facilities, clinics, hospitals, religious buildings, markets and other community gathering locations. Traffic management measures shall be implemented to minimise risks and disturbance to these receptors, including the use of designated vehicle routes, speed limits, traffic marshals where required, appropriate signage and coordination with local authorities regarding foreseeable periods of increased community activity where practicable.		Contractor
				Communicate planned large transport movements that may affect local communities or sensitive receptors, including schools, clinics, hospitals, religious buildings and markets, sufficiently in advance to allow appropriate planning and risk mitigation.		Contractor
				Ensure all project vehicle operators receive site-specific training on applicable road traffic regulations, speed limits, safe driving practices, navigational safety requirements and measures to minimise noise, dust and community disturbance. Refresher training shall be provided periodically and when significant traffic-related incidents or non-conformances occur.		Contractor
				Provide awareness training to project workers and where appropriate, local communities on road safety risks associated with construction traffic, including safe use of roads, pedestrian safety, vehicle blind spots, crossing points, speed awareness and measures to reduce the risk of traffic-related incidents.		Contractor
				Switch off vehicle engines, generators, pumps and other mobile or stationary equipment when not in active use, where safe and operationally practicable, to reduce unnecessary fuel consumption, exhaust emissions, noise and disturbance to nearby communities.		Contractor
		The movement of dredgers, sand barges, Piles (RC or PHC) and associated vessels will pose a risk to local river traffic.		Optimise the volume of imported construction materials by maximising the use of suitable locally available sources and minimising transport distances where practicable. Preference shall be given to waterborne transport where technically, environmentally and commercially feasible to reduce road traffic impacts, emissions and community disturbance. The anticipated road and water transport split shall be defined in the Construction Traffic Management Plan and performance monitored through monthly ESMP reporting.		Contractor
				Coordinate barge and vessel movements with relevant port, harbour and navigation authorities and where practicable, schedule transport activities to avoid peak river traffic periods in order to minimise navigational congestion, disruption to river users and associated safety risks.		Contractor
				Install temporary navigation markers, buoys, and warning signs around construction areas.		Contractor
				Prior to sourcing and transporting materials from offsite locations, the Contractor shall review proposed navigation routes to identify navigational constraints, safety risks, sensitive receptors, congestion hotspots, permitting requirements and potential impacts on other river users. Transport routes and logistics arrangements shall be selected and managed to minimise safety, environmental and community impacts, where practicable.		Contractor
				Coordinate vessel movements with CPA in access channel and BIWTA for inland navigation of barges to avoid river bottlenecks		Contractors/ LCT Ltd.
	Livelihood, health and safety of communities	Generation of work opportunities for local skilled/unskilled labour in construction activities as a result of the LCTP development	Moderate	The Contractor shall maximise the use of local labour, suppliers and services where suitable skills, resources and capacity are available within the Project Area of Influence. The Contractor shall monitor and periodically report to LCT Ltd on local employment and local procurement performance against agreed project objectives.	Moderate	Contractors
		Opportunities for local vendors or restaurant/ shop owners to sell food/ goods to the construction workers	Moderate	During the construction and operation period, tremendous opportunities will create for local vendors, restaurant/shop owners to sell foods/goods.	Mode	Contractors

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
		Opportunities for sand traders to buy and sell dredged material from LCTP and supply fill material	Moderate	Due to dredging during construction and channel dredging during operation periods, local dredging companies will get opportunity to dredge the channel following the CPA guidelines. And dredge sands will sell locally to promote local traders and buyers to fill low-lying areas for homesteads and business purposes.	Moderate	Contractors
		Fire or explosion risks from fuel, generators and construction equipment	Major	The Contractor shall develop and implement an Emergency Response Procedure (which shall include scenarios for fire incidents) and coordinate emergency response arrangements with relevant municipal emergency services. Where construction activities present a credible risk to nearby communities, the Contractor shall communicate relevant emergency information to affected stakeholders and conduct periodic emergency response exercises involving relevant responders, as appropriate.	Moderate	Contractor
		Relocation of the pedestrian path and bus stops due to the construction of the entry and out gate affecting walking distance	Moderate	In coordination with CCC and relevant transport authorities, identify and implement suitable permanent bus stop locations and pedestrian connections affected by the construction of the terminal entry and exit gates. The design shall seek to maintain safe and convenient access to community areas, public transport services and river crossings, including connectivity to *Ghats* 12 and 15 where relevant.	Minor	LCT Ltd.
				Where bus stops, pedestrian pathways or access routes are temporarily disrupted by construction activities, provide and maintain safe alternative routes and facilities. Temporary measures shall include appropriate signage, barriers, lighting where necessary and traffic marshals or crossing attendants as required to protect pedestrian safety and maintain community access during the transition period.		Contractor and LCT Ltd.
		Construction and associated transportation may increase noise, dust, vibration, light, waste, wastewater, air emissions (dust, exhaust)	Moderate	See air quality and noise measures above.	Minor	Contractor
				The Contractor shall identify construction activities that present a credible risk of significant impacts to communities, including increased traffic, noise, vibration, dust, access restrictions or safety hazards. Where such risks are identified, the Contractor shall provide advance notification to affected stakeholders through appropriate communication channels and communicate the nature, location, duration and expected impacts of the activity, together with relevant mitigation measures.		Contractor
				The Contractor shall identify activities that present a credible risk of significant noise, vibration, air emissions or community disturbance and, where practicable, schedule such activities to minimise impacts during night-time hours, weekends, public holidays and recognised prayer times. The Contractor shall maintain a forward construction schedule for these activities and provide advance notification to potentially affected communities through appropriate communication channels.		Contractor
				The Contractor shall implement controls to minimise noise, dust, vibration, light spill, exhaust emissions, waste and wastewater impacts on nearby communities, schools, mosques and other sensitive receptors. Controls shall include good housekeeping, preventive maintenance of plant and equipment, dust suppression, management of construction lighting, appropriate scheduling of particularly disruptive activities where practicable and prompt correction of activities generating unnecessary nuisance emissions.		Contractor
				Implementation of the Project grievance mechanism for external stakeholders (including community members and other affected persons) and a differentiated response mechanism for Gender-Based Violence and Harassment (GVBH for specific sexual exploitation, abuse and harassment cases.		LCT Ltd.
				The Contractor shall maintain plant, vehicles and generators in accordance with manufacturer specifications, promptly repair defective equipment, implement dust suppression where visible dust emissions occur, direct construction lighting away from neighbouring communities, segregate and dispose of waste through licensed facilities, and install, operate and maintain temporary wastewater collection and treatment systems. Any effluent discharge or sludge disposal shall comply with the ECR 2023. Where monitoring or inspections identify non-compliance or nuisance impacts, the Contractor shall implement corrective actions.		Contractor
		Labour influx for construction potentially adds pressure on local	Major	Optimise the use of locally available labour where feasible to support local employment and reduce the need for non-local workers.	Moderate	Contractor
				Optimise the use of locally available labour where feasible and implement workforce management measures to minimise potential impacts on local communities, public services, housing, traffic and other local infrastructure arising from Project-related workforce activities.		Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
		infrastructure, housing, food, public services, public transport, waste and wastewater management		The Project shall implement workforce planning and management measures to minimise potential impacts on local communities, public services, housing, traffic and other local infrastructure associated with Project-related workforce activities, including optimising the use of locally available labour where feasible.		Contractor
				The Contractor shall implement the requirements of the Laldia Container Terminal Waste Management Plan and ensure that waste and wastewater generated by the construction workforce are collected, stored, transported, treated and disposed of through authorised facilities with sufficient capacity to receive the waste streams generated by the Project. The Contractor shall provide and maintain adequate waste storage, sanitation and wastewater collection facilities for the construction workforce throughout the construction period. The Contractor shall routinely inspect and maintain waste and wastewater infrastructure to prevent leaks, overflows, uncontrolled discharges and conditions that may result in increased demand on local waste and wastewater services. Where inspections or monitoring identify deficiencies in waste or wastewater management, including inadequate capacity, leaks, overflows, unauthorised disposal or uncontrolled discharges, the Contractor shall investigate the cause and implement corrective actions.		Contractor
		Increased truck traffic and transport activities for construction may result in road and navigational safety risks, and restricted community access.	Major	The Contractor shall assess construction traffic risks associated with the movement of workers, equipment and materials and shall implement appropriate traffic management measures to protect the safety of workers, community members and other road users. The Contractor shall provide advance notice of construction activities that may result in temporary road closures, traffic disruptions or changes to access arrangements for nearby communities and road users.	Moderate	Contractor
				The Contractor shall manage Project-related vehicle parking and holding areas to minimise obstruction of public roads, access routes and neighbouring properties. Construction vehicles shall use designated parking and staging areas where provided and shall not obstruct traffic flow or access to adjacent properties.		Contractor
				The Contractor shall provide road safety training to all project vehicle operators. Training shall highlight local traffic conditions and hazards, including interactions with pedestrians, cyclists, rickshaws, informal transport users and roadside vendors, as well as driving under adverse conditions such as heavy rainfall, flooding, poor visibility and damaged road surfaces. Refresher training shall be provided periodically and following significant traffic incidents.		Contractor
				The Contractor shall prepare a risk assessment based on the construction schedule, anticipated traffic movements and transport routes. Based on the findings of the assessment, the Contractor shall install and maintain traffic signage and wayfinding measures at locations where driver confusion, route deviation, traffic conflicts or safety risks may occur. This shall include, as applicable, signage at key decision points on approach roads, haul routes, site access points, gate entrances, road crossings and other high-risk locations identified by the assessment. The Contractor shall periodically inspect signage and implement corrective actions where monitoring identifies ineffective traffic management, driver confusion or unauthorised vehicle movements.		Contractor
				The Contractor shall prepare a road and river navigation traffic risk assessment based on the construction schedule, anticipated traffic movements and material transport requirements and shall implement appropriate traffic management measures to protect the safety of workers, pedestrians, river users and other road users. Traffic management measures shall be proportionate to the identified risks and shall include the deployment of trained traffic control personnel at site access points, road crossings and other high-risk locations during activities that generate elevated traffic risks, such as abnormal load movements, peak material deliveries, interfaces with public roads, pedestrian crossings or periods of congestion.		Contractor
				The Contractor shall minimise the number of connection points to public roads, where practicable, to reduce traffic conflicts, improve traffic management and minimise risks to road users and nearby communities.		Contractor
				The Contractor shall monitor the condition of public roads used by project traffic and, where project activities contribute to deterioration of the road surface, implement timely maintenance or repair measures in coordination with the relevant authority.		Contractor
				The Contractor shall establish, communicate and enforce speed limits for all project vehicles, with enhanced controls in areas of increased risk, including road crossings, schools, markets, community access points, bus stops and locations with significant pedestrian or roadside activity.		Contractor
				The Contractor shall ensure vehicles are fitted with reversing alarms, cameras and functioning lights. Ensure all vehicles possess valid registration, insurance, and fitness certificates. Secure all loads properly to prevent shifting during transport.		Contractor
				Contractor: The Contractor shall monitor Project-related traffic volumes, traffic generation and traffic conditions on roads used by construction traffic and report the results to LCT Ltd.		Contractor and LCT Ltd.

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				LCT Ltd.: LCT Ltd. shall review the monitoring results against the assumptions and forecasts used in the Traffic Impact Assessment and determine whether additional traffic management or pedestrian safety measures are required, including on the VIP Road.		
				In collaboration with the road authorities, investigate these options if safety in the area decreases: Introduce a priority-controlled layout for the main roads for safety; Introduce zebra crossings at appropriate locations along the VIP Road to provide pedestrians with priority when crossing the road and to improve pedestrian permeability and accessibility across the corridor; Create pedestrian path along VIP Road. Ensure safe road crossings at the *Ghats* with the river crossing facilities, as there will likely be an increase in road crossings at those points with the closure of *Ghat* 14.		LCT Ltd.
		Vulnerable groups, including women, youth, the elderly, and persons with disabilities, may face increased safety and security risks from labour influx, increase in road and river traffic, improper security personnel, displacement of ghat 14.	Major	Implement measures to prevent and respond to Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH), including workforce awareness training, a worker Code of Conduct, effective reporting and grievance mechanisms, investigation and corrective action processes and engagement with relevant support services where required.	Moderate	Contractor
				The Contractor shall maintain safe alternative access to *Ghat* 14 users and implement appropriate road, river and pedestrian safety controls. The Contractor shall ensure Project traffic and vessels do not obstruct public access routes, ferry operations or community landing points. The Contractor shall enforce a Worker Code of Conduct and ensure workers and security personnel interact respectfully with community members. LCT Ltd. shall maintain a community grievance mechanism and provide advance notice of access, traffic and navigation changes.		Contractor and LCT Ltd.
				Implement measures to prevent and address trafficking in persons and forced labour risks, including responsible recruitment practices, prohibition of worker-paid recruitment fees, worker awareness programmes accessible grievance mechanisms, contractor oversight and procedures for reporting, investigating and responding to potential cases.		Contractor
				Implementation of the Project grievance mechanism for external stakeholders (including community members and other affected persons) and a differentiated response mechanism for Gender-Based Violence and Harassment (GVBH for specific sexual exploitation, abuse and harassment		LCT Ltd.
		Risk of tensions between construction workers (due to labour influx) and community members, including women and young girls.	Moderate	The Contractor shall develop, implement and enforce a Worker Code of Conduct (CoC) for all employees, subcontractors and security personnel, setting out required standards of behaviour for interactions with local communities and prohibiting gender-based violence (GBV), sexual exploitation and abuse (SEA), sexual harassment (SH), discrimination and other forms of misconduct. All personnel shall sign the CoC and receive mandatory induction and refresher training on community engagement protocols, community sensitivities, and the prevention and reporting of GBV/SEA/SH risks. The Contractor shall establish procedures for reporting, investigating and addressing breaches of the CoC, including confidential grievance mechanisms accessible to workers and community members. Appropriate disciplinary and corrective actions shall be implemented for non-compliance. LCT Ltd. shall monitor implementation through regular audits and review of training records, signed CoCs, grievances, incidents, investigations and corrective actions, with monitoring focused on compliance outcomes rather than training delivery alone.	Moderate	Contractor
		Construction nuisance (traffic disruption, dust, noise, air emissions) from the development of electricity cable to LCTP	Moderate	The Contractors for the electricity shall prepare a separate HSE plan to manage traffic, air emissions and noise and vibrations and communicate the schedule of the works to the communities.	Moderate	Contractors for electricity supply works
				Implementation of grievance mechanism for external stakeholders (including community members and other affected persons) and specific sexual exploitation, abuse and harassment responsive grievance mechanism.		LCT Ltd.
		Risk of damage to nearby cultural heritage, like mosque near block	Moderate	The Contractor shall prepare a Chance-Find procedure	Minor	Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
		A due to vibrations, dust and nuisance due to noise.		The Contractor shall prepare and implement a noise and vibration method statement		Contractor
				The air emissions and noise and vibrations method statements from the Contractor shall specifically include provisions for cultural heritage. Where required by local regulations or agreed with relevant authorities, schedule high-noise or particularly disruptive construction activities to minimise disturbance during weekends, public holidays and designated prayer times.		Contractor
		Occupational Health & Safety risks from e.g. working over water, at height, with heavy equipment, exposure to hazardous and chemical materials	Major	The Contractor shall prepare and implement work-specific Method Statements for all construction activities with the potential to result in occupational health and safety risks, including working over water, working at height, lifting operations, excavation, confined space entry, hot work, operation of heavy equipment and the storage, handling and use of hazardous substances. The Method Statements shall comply with the APM Terminals HSSE Specification, permit conditions, ESIA commitments and other applicable Project requirements. The Method Statements shall identify activity-specific hazards, applicable control measures, competency requirements, personal protective equipment requirements, inspection requirements, monitoring requirements, emergency response arrangements and corrective actions. Method Statements shall be submitted to the Engineer for review and approval prior to commencement of the relevant activity. The Contractor shall implement the approved Method Statements and ensure that all personnel undertaking the works are trained, competent and comply with their requirements. The Contractor shall undertake routine inspections of work activities, equipment, tools, lifting appliances, work-at-height systems, hazardous substance storage areas and safety controls and shall correct identified deficiencies without delay. All health and safety incidents, including High Potential Incidents (HiPo) and near misses shall be investigated and corrective actions implemented to prevent recurrence.	Minor	Contractor
	Construction and Operation workers	Risk of injuries and loss of lives in case of fire/explosions or other safety incidents during construction	Major	The Contractor shall prepare and implement a Fire Prevention and Emergency Response Method Statement for construction activities with the potential to result in fire, explosion or other major safety incidents. The Method Statement shall comply with the Project Emergency Response Plan, the APM Terminals HSSE Specification, applicable legal requirements and permit conditions. The Method Statement shall identify activity-specific fire and explosion hazards associated with the works, define the fire prevention and control measures to be implemented, specify firefighting and emergency response equipment requirements, establish inspection and maintenance requirements for fire protection equipment, define personnel training requirements, identify emergency response roles and responsibilities and specify incident reporting and corrective action requirements. The Contractor shall provide and maintain appropriate firefighting equipment and emergency response equipment at locations identified through the activity risk assessment. Firefighting equipment shall be readily accessible, clearly identified, routinely inspected and maintained in an operational condition. The Contractor shall ensure that personnel involved in activities presenting fire or explosion risks are trained in the requirements of the Fire Prevention and Emergency Response Method Statement and relevant emergency response arrangements. Emergency drills shall be undertaken periodically to verify the effectiveness of the emergency response arrangements and corrective actions implemented where deficiencies are identified.	Minor	Contractor
		Risk of providing poor wages, labour contracts, working conditions in the hiring of labour to save resources.	Major	The Contractor shall maximise the use of locally available labour where feasible and implement workforce management measures to minimise potential impacts on local communities associated with Project-related employment activities. The Contractor shall ensure that all workers employed by the Contractor, subcontractors and labour providers receive written terms of employment in a language and form they understand before commencing work. The terms of employment shall clearly state, as applicable, the worker's role, wages, working hours, overtime arrangements, rest periods, leave entitlements, benefits, deductions, duration of employment, disciplinary requirements and conditions for termination. The Contractor shall pay workers accurately, in full and within the agreed payment period. Wage rates, benefits, working hours, overtime payments and deductions shall comply with applicable labour legislation, contractual requirements and the communicated terms of employment. The Contractor shall maintain employment contracts, attendance records, working-hour records, payroll records and evidence of wage payments sufficient to demonstrate compliance. Unauthorised or unexplained deductions from workers' wages shall be prohibited.	Minor	Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
All	All VECs			The Contractor shall provide and maintain working conditions and worker welfare facilities that comply with applicable legal requirements, the APM Terminals HSSE Specification and Project requirements. The Contractor shall routinely inspect working conditions and promptly correct deficiencies affecting worker health, safety, welfare or employment rights. Where the Contractor, a subcontractor or a labour provider provides or arranges accommodation for construction workers, the Contractor shall prepare and implement a Worker Accommodation Plan before the accommodation is occupied. The plan shall define the requirements for accommodation capacity, sleeping arrangements, potable water, sanitation, washing facilities, ventilation, lighting, fire safety, emergency arrangements, waste management, security, privacy, maintenance, inspection and grievance management. Worker accommodation shall be inspected before occupation and throughout its use and deficiencies shall be corrected within an agreed timeframe. The Contractor shall establish and maintain an accessible worker engagement and grievance mechanism for all Contractor, subcontractor and labour-provider personnel. Workers shall be informed of the mechanism during induction and shall be able to raise concerns confidentially and without retaliation. The Contractor shall register, investigate and resolve worker grievances within defined timeframes, communicate outcomes to affected workers and maintain records of grievances and corrective actions. Workers shall retain access to other judicial or administrative remedies available under applicable law.		
		Heat stress from increased paved area affecting workers' health and safety	Major	Implement measures to manage climate-related risks to the workforce and project activities, including heat stress prevention and response measures, provision of drinking water, shaded rest areas, work-rest regimes, weather monitoring, worker awareness training and adjustment of work activities during periods of extreme heat or other severe weather conditions.	Minor	Contractor
				The Contractor shall provide and maintain adequate potable drinking water points and shaded rest areas at all active construction work locations, welfare facilities and construction labour camps. Drinking water and rest facilities shall be readily accessible to workers and truck drivers throughout the working day. The Contractor shall routinely inspect and maintain these facilities to ensure they remain available, hygienic and suitable for use throughout the construction period.		Contractor
				The Contractor shall implement heat stress management measures for all personnel working outdoors, including truck drivers waiting to load, unload or access the site. Adequate potable drinking water shall be continuously available at active work areas, rest locations and driver waiting areas. Shaded or cooled rest areas shall be provided at appropriate locations throughout the construction site and at designated truck holding or waiting areas. The Contractor shall implement work-rest regimes, provide heat stress awareness training and adjust work activities where necessary during periods of elevated heat stress risk. Any heat stress-related illness, injury or near miss shall be reported, investigated and corrective actions implemented to prevent recurrence.		Contractor
		Obtain necessary regulatory permits and approvals before starting any construction work and operational activities to ensure that all regulations have been followed, and relevant regulators are informed.	Major	LCT Ltd. shall obtain all applicable regulatory permits, licences, approvals and authorisations required for the construction and operation of the Project prior to commencement of the relevant activities. LCT Ltd. shall establish and maintain a permit register identifying all permit conditions, mitigation requirements, compliance obligations, approval requirements and reporting commitments applicable to the Project. Relevant permit conditions and obligations shall be communicated to Contractors, subcontractors and other responsible parties and incorporated into applicable method statements, procedures and work activities. LCT Ltd. shall monitor compliance with permit conditions throughout the construction period and implement corrective actions where non-compliances or permit breaches are identified.	Major	LCT Ltd.
		E&S impacts in the supply chain for sourcing and transportation of construction material, disposal site for dredged material and solid waste, bunkering of construction vessels	Major	The Contractor shall procure construction materials, manage dredged material reuse or disposal, dispose of solid waste and undertake vessel bunkering activities only through suppliers, contractors and facilities that hold the required licences, permits and approvals. Prior to engagement, the Contractor shall undertake environmental and social due diligence of suppliers and service providers associated with construction material sourcing, dredged material management, waste management and vessel bunkering activities to verify legal compliance and identify material environmental and social risks. The Contractor shall maintain records demonstrating the origin of construction materials, destination of dredged material, waste disposal locations and bunkering arrangements and shall periodically audit high-risk suppliers and service providers. Where environmental, social or legal non-compliances are identified, the Contractor shall implement corrective actions or discontinue use of the supplier or service provider if the deficiencies are not rectified within an agreed timeframe.	Moderate	Contractor
				The Contractor shall preferentially source suitable reclamation material from locations that minimise environmental, social and logistics impacts, where practicable. Where the Contractor proposes to source reclamation material from offshore or seabed borrow areas, the Contractor shall undertake a comprehensive Risk		Contractor

Category	VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party
				Assessment and submit it to LCT for review and approval prior to commencing extraction activities. The assessment shall evaluate potential environmental and social impacts, including effects on marine ecology, biodiversity, fisheries, water quality, sediment transport, navigation, livelihoods, cultural heritage and cumulative impacts, and shall identify appropriate mitigation measures.		
		Contractor is not sufficiently equipped to manage E&S risks	Major	LCT Ltd. shall establish and implement a contractor and subcontractor management system to verify compliance with the APM Terminals HSSE Specification, permit conditions, contractual requirements and ESIA commitments. The system shall include competency and resource assessment during procurement, review of Contractor method statements, inspections, audits, performance monitoring, management of non-conformances and verification of corrective action implementation. LCT Ltd. and the Engineer shall monitor Contractor and subcontractor performance throughout the construction period and require corrective actions where deficiencies in environmental, social, health or safety performance are identified.	Minor	LCT Ltd.
				The Contractor shall prepare work-specific environmental, social, health and safety method statements for all major construction activities with the potential to result in environmental, social, health or safety impacts. The method statements shall comply with the APM Terminals HSSE Specification, applicable regulatory requirements, permit conditions and ESIA commitments and shall identify the activity-specific risks, mitigation measures, monitoring requirements, responsibilities, inspection requirements and corrective actions applicable to the works. Method statements shall be submitted to the Engineer for review and approval prior to commencement of the relevant activity. The Contractor shall implement the approved method statements and ensure that personnel undertaking the works are trained in and comply with their requirements.		Contractor
				The Contractor shall prepare work-specific method statements for all major construction activities that have the potential to result in environmental, social, health or safety impacts. Method statements shall identify the relevant environmental and social risks associated with the activity, define the mitigation and control measures to be implemented, specify monitoring requirements, establish responsibilities and identify corrective actions to be taken where non-compliances or adverse impacts are identified. Method statements shall be consistent with applicable regulatory requirements, permit conditions, ESIA commitments and approved Project management plans and shall be submitted to the Engineer for review and approval prior to commencement of the relevant activity. The Contractor shall implement the approved method statements and ensure that personnel undertaking the works are trained and competent in their requirements.		Contractor

Table 1-3: Operation phase summarised ESMP table

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
Physical environment	Drainage hydrology	Maintenance and operational access by the regulator/pump operator will be restricted during operation resulting from replacement of an open *khal* with a culvert beneath the terminal deck	Moderate	The terminal and culvert design shall incorporate permanent maintenance access arrangements to enable safe inspection, operation and maintenance of the culvert and regulator throughout the operational life of the Project. LCT Ltd. shall demonstrate that maintenance personnel, equipment and materials required for routine and emergency maintenance can safely access all relevant sections of the culvert. Where monitoring identifies water levels materially higher than hydraulic model predictions, prolonged elevated water levels, or evidence of flooding, waterlogging, ponding, drainage congestion or restricted flow upstream of the regulator/culvert, the cause shall be investigated. Appropriate corrective measures shall be implemented. The effectiveness of corrective measures shall be verified through follow-up monitoring.	Minor	Operator/LCT Ltd.
				The terminal operator shall maintain safe and unrestricted access to the existing sluice gate, pumping station, culvert access points and associated drainage infrastructure throughout the operational life of the Project.		Operator /LCT Ltd.
		Replacement of the existing open drainage channel with a culvert beneath the terminal	Major	The terminal and culvert operation shall incorporate measures to minimise the risk of drainage congestion, debris accumulation and restricted flow within the drainage system. Where agreed with BWDB and CCC, LCT Ltd. shall support the evaluation and implementation of appropriate debris management and stormwater attenuation measures, including debris interception structures (e.g. trash screens) and retention or detention facilities upstream of the existing culvert under the Airport Road. LCT	Minor	LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		may increase the risk of restricted drainage, debris accumulation and reduced hydraulic capacity, resulting in waterlogging, flooding and drainage congestion in surrounding communities, particularly during monsoon periods and extreme rainfall events.		Ltd. shall coordinate with BWDB and CCC regarding inspection, operation and maintenance requirements for the drainage system, including arrangements for debris management and drainage performance during the monsoon season.		
	River morphology	The dredged berth pocket will generate ongoing sediment accumulation and a gradual reduction in water depth. As a result, frequent maintenance dredging will be required throughout the operational phase to maintain safe navigation and terminal operations.	Major	Develop and implement a frequent maintenance dredging programme together with CPA to maintain the berth pocket and associated vessel manoeuvring areas at the approved operational design depths required for safe navigation and terminal operations.	Moderate	LCT Ltd.
				Prior to disposal of maintenance dredged material, LCT Ltd. shall assess opportunities for the beneficial reuse of dredged sediment. The suitability of dredged material for beneficial reuse shall be evaluated considering sediment characteristics, environmental requirements, engineering suitability, transport requirements and applicable regulatory approvals.		Operator /LCT Ltd.
				Undertake periodic bathymetric and hydrographic surveys of the berth pocket and associated navigation areas to quantify sedimentation rates, identify areas of accelerated infilling and verify maintenance of the required operational water depths. Survey results shall be reviewed to identify spatial and temporal patterns of sediment accumulation and to optimise the timing, frequency and extent of maintenance dredging activities.		Operator /LCT Ltd.
		Narrowed channel due to the terminal, maintenance dredging, and large vessel movement alter natural flow regimes, wave generation and sediment transport processes, potentially increasing localised erosion and sedimentation in the vicinity of the terminal (including areas on the other side of the river)	Minor	LCT Ltd. shall monitor riverbank stability, channel morphology, erosion and sedimentation patterns within the area potentially influenced by the terminal footprint, maintenance dredging activities and vessel movements. Where project activities are identified to contribute to increased erosion or sedimentation, appropriate corrective measures shall be developed and implemented in consultation with CPA and relevant authorities	Minor	Operator /LCT Ltd.
	Water and sediment quality	Maintenance dredging will resuspend sediments, release contaminants (if present) and alter water quality parameters	Minor	The Operator with the dredging company shall prepare and implement the Dredging Management Plan (DMP) following the Dredge Material Disposal Policy 2025 and in coordination with the CPA. Maintenance dredging shall be planned and undertaken to minimise the resuspension and dispersion of sediments and associated contaminants.	Minor	Operator /LCT Ltd.
		Disposal of dredged materials may affect	Minor	Dredge material disposal according to the Dredging and Dredge Material Disposal Policy 2025 and in coordination with the CPA. Disposal shall be planned and undertaken to minimise the resuspension and dispersion of sediments and associated contaminants.		Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		water quality in other locations, such as Char Bakalia		Prior to disposal of maintenance dredged material, LCT Ltd. shall assess opportunities for beneficial reuse of dredged sediment within the Project or by third parties. Where dredged material is demonstrated to be suitable for beneficial reuse and all required approvals have been obtained, the material shall be made available.		Operator /LCT Ltd.
				Twice a year, LCT Ltd. shall undertake sediment sampling and laboratory analysis to determine the physical and chemical characteristics of material proposed for dredging. The results shall be used to assess the suitability of dredged material for beneficial reuse, transport, treatment or disposal and to identify any management measures required during dredging operations.		Operator /LCT Ltd.
				The maintenance dredger shall only transport dredged material to disposal or reuse facilities that hold all required permits, licences and approvals applicable to the acceptance and management of dredged material. Prior to commencement of disposal activities and annually thereafter, the Operator shall verify and document that the receiving facility maintains environmental and social management systems appropriate to the nature and scale of its activities. LCT Ltd. shall undertake periodic independent audits of selected disposal and reuse facilities to verify compliance with Project requirements. Where audits identify non-compliance, disposal or supply arrangements shall be suspended until corrective actions have been implemented and verified.		CPA and LCT Ltd.
		Domestic waste and wastewater may pollute soil, groundwater and/or surface water if not treated/managed properly	Minor	The Operator shall comply with the LCT Ltd. waste and wastewater management plan describing the methods to reduce, segregate, treat and dispose of waste and wastewater. The Operator shall only use waste treatment and disposal facilities that hold all permits, licences and approvals required to accept and manage the relevant waste streams. LCT Ltd. shall audit the waste facilities. Where audits identify non-compliance, use of the affected facility shall be suspended until corrective actions have been implemented and verified	Minor	Operator /LCT Ltd.
				Prior to connection to the CWASA sewer network, the Operator shall install, operate and maintain temporary wastewater collection, conveyance and treatment systems with sufficient capacity to manage all wastewater generated by terminal operations. The wastewater treatment system shall be operated to achieve compliance with applicable discharge and sludge management requirements of ECR 2023.		Operator /LCT Ltd.
				The Operator shall collect, contain, convey and treat sewage through appropriately designed, constructed, operated and maintained sanitation and wastewater infrastructure. Sewage collection, storage, pumping and treatment systems shall be routinely inspected and maintained to prevent leaks, overflows, blockages and unauthorised discharges. Any sewage spill, overflow, leak or system failure shall be immediately contained, cleaned up and reported.		Operator /LCT Ltd.
		Spills and leaks of fuel, grease and lubricants and other toxic hazardous substances from port equipment, trucks and dredgers and from hazardous cargo.	Moderate	The operator shall ensure that all equipment and vehicles are maintained in accordance with the manufacturer's specifications and kept in a clean and serviceable condition. Equipment shall be routinely inspected for leaks, damage and signs of deterioration, with particular attention given to fuel systems, hydraulic systems, hoses, fittings and other components containing oils or fluids. Ensure that appropriate clean-up equipment is available on site and that all users are familiar with its usage and storage location. Any leaks or defects shall be repaired promptly and defective equipment shall not be operated until repairs have been completed. Fuel storage tanks and temporary storage areas for fuels, lubricating oils, hydraulic fluids and other hazardous liquids shall be provided with secondary containment of sufficient capacity to contain potential spills and prevent releases to soil, surface water and drainage systems.	Minor	Operator /LCT Ltd.
				The Operator shall develop and implement a Pollution Prevention and Control Management Plan covering fuels, lubricants, hydraulic fluids, chemicals, hazardous substances and hazardous cargo handled during terminal operations. The Plan shall define requirements for storage, handling, transfer, inspection, maintenance, spill prevention, housekeeping, incident reporting and corrective actions.		Operator /LCT Ltd.
				The Operator shall prepare and implement a Hazardous Materials Management Plan describing the procedures for the procurement, transport, storage, handling, use and disposal of fuels, oils, lubricants, chemicals and other hazardous materials required for the Works.		Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
				The Plan shall identify hazardous materials used on site, storage requirements, secondary containment measures, inspection requirements, spill prevention controls, refuelling procedures, waste handling requirements, emergency response arrangements and corrective actions. Hazardous materials shall be stored in designated areas with appropriate secondary containment and protection from rainfall, flooding and unauthorised access. The operator shall maintain an inventory of hazardous materials on site and keep current Safety Data Sheets (SDS) available for all hazardous substances. The operator shall inspect hazardous material storage areas routinely and immediately rectify any deficiencies identified. Any leak, spill or unauthorised release of hazardous materials shall be immediately contained, cleaned up, reported and investigated. The Contractor shall implement corrective actions to prevent recurrence.		
				Develop appropriate contingency plan. The Plan shall define spill notification requirements, response procedures, responsibilities, reporting requirements, containment measures and remediation requirements for releases of fuels, oils, lubricants, chemicals and hazardous cargo. Appropriate spill response equipment shall be maintained at locations where hazardous materials are stored, transferred or handled. Personnel involved in handling hazardous substances shall receive training in spill prevention, spill response procedures and use of spill response equipment. All spills, leaks and releases shall be reported, investigated and documented. Corrective actions shall be implemented to prevent recurrence.		Operator /LCT Ltd.
		Risk of oil spill during bunkering of container vessels	Major	Bunkering of vessels shall not be undertaken at the LCTP berth, within the terminal area, or within areas under the operational control of LCT Ltd. The operator shall ensure that bunkering is not undertaken at the Project site.	Minor	Operator /LCT Ltd.
		Discharge of stormwater from the project site including first flush and potential pollutants into the river	Moderate	Waste materials, fuels, oils, lubricants, chemicals and other potentially polluting substances shall be stored, handled and transferred within designated areas designed to prevent releases to stormwater drainage systems and receiving waters. Any spill or leak with the potential to enter the stormwater drainage system shall be contained, cleaned up and reported immediately.	Moderate	Operator /LCT Ltd.
				Stormwater drainage systems serving operational areas with the potential for hydrocarbon contamination shall be fitted with appropriately designed oil-water separators prior to discharge to the receiving environment. Oil-water separators shall be operated, inspected, maintained and cleaned to ensure continued treatment performance. Where inspections or monitoring identify inadequate treatment performance, equipment malfunction, excessive oil accumulation or evidence of contaminated stormwater discharges, the Operator shall investigate the cause and implement corrective actions.		Operator /LCT Ltd.
				The Operator shall prepare a Storm Water Management Plan. The Plan shall identify potential sources of stormwater contamination, including fuel and chemical storage areas, vehicle and equipment maintenance areas, waste management areas, cargo handling areas and other operational activities with the potential to generate contaminated runoff. The Plan shall define stormwater collection, treatment, inspection, maintenance, monitoring, incident response and corrective action requirements.		Operator /LCT Ltd.
	Ambient air quality	Emissions (SOX, NOX, CO, PM2.5 and PM10) from vessels, vehicles, various types of operational equipment, and generators will impact air quality	Moderate	The Operator shall prepare and implement an Air Emissions Management Plan. The Air Emissions Plan shall identify sources of air emissions associated with vessels, trucks, terminal equipment, generators and other operational activities and shall define measures for emissions reduction, equipment maintenance, idling control, monitoring, reporting and corrective actions	Minor	Operator /LCT Ltd.
				The Operator shall inspect, maintain and operate vehicles, generators, cranes, dredging equipment and other combustion-powered equipment in accordance with manufacturer specifications to minimise exhaust emissions. Equipment exhibiting visible excessive exhaust emissions, abnormal engine performance or fuel system leaks shall be removed from service until the defect has been repaired. Unnecessary idling of vehicles and equipment shall be prohibited except where required for operational, safety or equipment-specific reasons. Contractors operating vehicles within the terminal shall comply with the Project's idling and vehicle emissions requirements.		Operator /LCT Ltd.
		Terminal operations will emit GHGs that contribute to climate change effects.	Minor	LCT Ltd. shall evaluate the technical and economic feasibility of installing solar photovoltaic systems on terminal buildings, and other suitable structures during detailed design and operation. Where demonstrated to be technically feasible and operationally compatible, solar photovoltaic systems shall be installed and maintained to reduce reliance on grid electricity and associated greenhouse gas emissions.	Minor	LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		However, as most handling equipment will be electrical, GHG emissions are relatively limited.		The Operator shall prepare and implement a GHG Management Plan. The GHG management plan shall define the methodology for quantifying, monitoring, reporting and managing GHG emissions associated with terminal operations, including electricity consumption, fuel consumption by vehicles and equipment, generators, refrigerants and other significant emission sources. Annual GHG emission calculations, performance and emission reduction initiatives shall be reported internally and externally in accordance with applicable Project reporting requirements.		Operator /LCT Ltd.
	Ambient noise levels	Vessels, different types of container handling cranes, truck, lorries, handling of containers are likely to cause high level noise	Major	The Operator shall prepare and implement a Noise and Vibration Management Plan. The Noise and Vibration Management Plan shall identify operational noise sources, determine appropriate noise thresholds, based on ambient levels, establish noise monitoring requirements, define noise control measures and specify requirements for complaint management, incident investigation and corrective actions. The Operator shall minimise noise emissions from vessels, container handling equipment, cranes, generators, trucks, lorries and other terminal operations through appropriate equipment selection, using low-noise equipment, avoiding old or poorly maintained machinery and implementing regular maintenance programmes for all vehicles and equipment, operational controls and implementation of noise reduction measures. In addition, generators and heavy-duty machinery will be fitted with manufacturer-approved acoustic enclosures to minimise noise emissions	Moderate	Operator /LCT Ltd.
Ecological environment	Fisheries resources	Maintenance dredging may generate sediment plumes that temporarily increase suspended sediment concentrations within fish migration pathways in the Karnaphuli River affecting the ability of migratory fish to detect migration cues and move through the area.	Moderate	LCT Ltd. shall prepare and implement a Biodiversity Management Plan (BMP) covering construction and operation. The BMP shall identify fisheries-sensitive receptors, migratory fish species, migration periods, monitoring requirements, consultation requirements, sediment plume management requirements and adaptive management measures applicable to dredging activities. The BMP shall define procedures for responding to monitoring exceedances, fisheries-related grievances and observations of potential disruption to fish migration.	Minor	LCT Ltd. /LCT Ltd.
				The dredging company shall minimise the duration of each maintenance dredging campaign to the extent reasonably practicable. Dredging activities shall be scheduled to avoid fisheries-sensitive migration, spawning and juvenile dispersal periods for Hilsa and Indian major carp, to the extent technically feasible and operationally practicable. Dredging activities shall, where technically feasible and operationally practicable, be scheduled to minimise overlap with periods during which migratory fish species are expected to move through the Karnaphuli River and Project Area. Particular consideration shall be given to the principal Hilsa migration period (July-September) and periods when eggs, larvae and juveniles of Indian major carps may be transported through the Karnaphuli-Halda system (approximately April-July). Where practicable, dredging shall also avoid the annual Government of Bangladesh Hilsa brood-stock protection period. Dredging during these periods shall be avoided, unless the dredging company demonstrates that dredging during these periods cannot reasonably be avoided due to navigational safety, operational necessity or other overriding operational constraints. Where dredging is required during any fisheries-sensitive period, the Contractor shall implement turbidity monitoring, sediment plume monitoring, fisheries stakeholder engagement and adaptive management measures in accordance with the Biodiversity Management Plan and Dredging Management Plan.		Dredging Contractor /LCT Ltd./CPA
				Where dredging activities are undertaken during identified fisheries-sensitive migration periods, the Operator shall implement a turbidity and sediment plume monitoring programme to verify that dredging-induced turbidity and sediment plume do not create a barrier to fish migration. The objective for this monitoring is to ensure that fish migration behaviour is not adversely significantly affected by project activities (including dredging, placement or disposal of dredged material and reclamation activity) such that it would affect the population numbers and spawning behaviour further up the estuary or affect the migration of juveniles back down the estuary and out to sea. The key species for the estuary are considered to be Hilsa (important as a commercial species for many of the local communities along the estuary) and Indian major carp (important as a food source for the Gangetic dolphin). Consultation with the local fisherfolk may result in additional species also considered to be important. The thresholds would apply during all periods of migration both up and down the estuary, with the migration of the juveniles out to sea being more important as they will be more sensitive to suspended sediment levels. The Operator shall establish ambient turbidity conditions at representative reference locations that are not influenced by Project-related activities. Where turbidity exceeds 10% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations, the Operator shall investigate the cause. If the exceedance is considered to be due to project activities, then management actions should be taken to ensure that the turbidity levels do not rise to the threshold level. If monitoring identifies turbidity levels exceeding 20% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations and the exceedance is attributable to Project-related activities, the Operator shall implement additional corrective actions to reduce turbidity inducing activities to ensure that the levels return to below the threshold within eight hours of the exceedance. The Operator shall undertake regular consultation with fishermen and fishing communities via an appropriately qualified local fisheries consultant, throughout the turbidity inducing activities related to the project to verify the continued occurrence and movement of migratory fish species through the Project area. Where monitoring, consultations or grievances indicate potential disruption to fish migration attributable to Project activities, the Operator shall investigate the cause and implement adaptive management measures. Should it be clear that fish are still migrating through the turbidity plumes caused by the project and there have been exceedances of the threshold then the thresholds (intensity and/or duration) could be adjusted with agreement of the fisheries consultant (in consultation with the fisherfolk).Available satellite imagery shall be used, where practicable, to support interpretation of sediment plume behaviour and verification of monitoring results		Operator /LCT Ltd.
				The Operator shall maintain a mechanism for receiving, recording and responding to fisheries-related grievances, complaints and observations from fishermen and fishing communities. Where investigations indicate that Project activities may be contributing to disruption of fish migration or other fisheries-related impacts, the		LCT Ltd./CPA

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
				Operator shall implement appropriate adaptive management measures and corrective actions and communicate the outcome of the investigation to affected stakeholders		
		Maintenance dredging, container vessel movement generates underwater noise and risk of spills of chemicals/oil which may impact fisheries resources	Moderate	The operator shall implement spill prevention and pollution control measures during maintenance dredging and vessel operations to prevent releases of fuels, oils, lubricants and other hazardous substances to the aquatic environment. Dredging vessels and associated marine equipment shall be inspected and maintained to prevent leaks and spills. Spill response equipment shall be available during dredging activities and all spill incidents shall be reported, investigated and addressed through corrective actions. The Operator shall minimise underwater noise associated with maintenance dredging and vessel movements by maintaining equipment in good working condition, avoiding unnecessary vessel manoeuvring and limiting vessel speeds within operational areas where safe and practicable.	Minor	Dredging Contractor//LCT Ltd./CPA
		Habitat degradation of benthic species (fish feed) and some fishes due to maintenance dredging activities	Moderate	The Operator shall ensure that the dredging company confines dredging activities to the approved dredging footprint and shall plan and execute dredging works in a manner that minimises unnecessary disturbance of the riverbed and the generation of suspended sediments. The dredging company shall implement the water quality monitoring requirements of the approved Dredging Management Plan and, where monitoring indicates that dredging activities are generating excessive sediment mobilisation or that mitigation measures are not performing effectively, shall ensure that dredging methods or operating practices are modified to reduce environmental impacts.	Minor	Operator /LCT Ltd.
	Tidal mudflats	Risk of spills of chemicals/oil which may impact surrounding tidal mudflats	Moderate	Bunkering of vessels shall not be undertaken at the terminal berth, within the terminal area or within areas under the operational control of LCT Ltd. The Operator shall prepare and implement a Pollution Prevention and Control Management Plan. Any spill, leak or release with the potential to affect tidal mudflats, intertidal habitats or other sensitive environmental receptors shall be immediately contained, reported and investigated. Corrective actions shall be implemented to prevent recurrence.	Minor	Operator /LCT Ltd.
	Mangrove ecosystems	Risk of spills of chemicals/oil which may impact mangroves at the project site or at Majher Char downstream of the project area	Moderate	The Operator shall implement the Pollution Prevention and Control Management Plan and Spill Prevention and Response Plan to prevent releases of fuels, oils, lubricants, chemicals and other hazardous substances that may affect mangrove habitats at Majher Char. Any spill or release with the potential to affect mangrove habitats shall be immediately contained, reported and investigated. Appropriate corrective actions shall be implemented and the effectiveness of corrective actions shall be verified through follow-up inspections	Minor	Operator /LCT Ltd.
	Dolphins	Maintenance dredging, vessel movement may pose risk for water pollution and underwater noise generation which may impact dolphins	Major	The Operator shall prepare and implement a Biodiversity Management Plan, Dredging Management Plan and Pollution Prevention and Control Management Plan to minimise underwater noise, suspended sediment generation and contamination of dolphin habitat during maintenance dredging and vessel operations. Dredging vessels and associated marine equipment shall be inspected and maintained to prevent leaks, spills and unnecessary underwater noise generation. Spill response equipment shall be available during maintenance dredging activities and all spills and pollution incidents shall be reported, investigated and addressed through corrective actions. Where monitoring, dolphin observations, fisheries consultations, grievances or pollution incidents indicate potential Project-related impacts on dolphins or dolphin habitat, the Operator shall investigate the cause and implement adaptive management measures.	Moderate	Dredging Contractor//LCT Ltd./CPA
		Risk of collision with vessels	Major	The Operator shall implement vessel operation procedures to minimise the risk of collision with Ganges River dolphins and other aquatic fauna. The operator shall ensure that somebody on board of the vessel has done a training on marine mammal observing (JNCC-aligned training or equivalent, supplemented by local river dolphin identification). The person would be responsible for ensuring that vessels are aware of any dolphins present in an area where a vessel is manoeuvring and can avoid interactions.	Moderate	Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
Social Environment	Avifauna and migratory birds	The terminal operation activities may affect birds due to noise and light pollution	Negligible	The Operator shall provide annual marine mammal awareness raising to all personnel involved in vessel movements. Training shall cover dolphin identification, collision avoidance procedures, reporting requirements, and operational measures to minimise disturbance and injury to marine mammals during vessel movements and manoeuvring activities.	Negligible	Operator /LCT Ltd.
				LCT Ltd. Shall prepare and implement a Biodiversity Management Plan (BMP) n covering construction and operation. The BMP shall define monitoring requirements, adaptive management procedures, reporting requirements and corrective actions for avifauna and bats occurring within the Project Area of Influence.		LCT Ltd./CPA
				Noise impacts and light disturbance shall be reduced by using low-noise equipment, avoiding old or poorly maintained machinery and implementing regular maintenance programmes for all vehicles and equipment and implementing the noise and lighting controls specified in the Biodiversity Management Plan. In addition, generators and heavy-duty machinery will be fitted with insulation or enclosed to minimise noise emissions. Operational lighting shall be directed towards work areas and designed to minimise light spill into adjacent habitats, to the extent practicable		Operator /LCT Ltd.
				An adaptive monitoring and management plan should be followed (given in the Biodiversity Management Plan) to ensure that appropriate actions are taken when necessary and that, at other times where the risk is not present or at a low level, activities can proceed. The adaptive plan should include monitoring for any birds and bats in the area and if they are showing signs of disturbance then action can be taken to reduce the noise levels or light disturbance. The local area is already subject to high levels of noise from the airport and other activities in the area and measures should be applied where the disturbance is due to the specific activity rather than for all sources of noise or light pollution.		Operator /LCT Ltd.
		Possible (temporary) congestion and interruption to the surrounding road traffic due to the entry, exit, and parking of the container trucks and passenger vehicles generated by the terminal	Minor	Minimise impacts on surrounding road users through optimisation of terminal access arrangements and by limiting the number of access and egress points to those required for safe and efficient operation.	Minor	Operator /LCT Ltd.
				The Operator shall prepare and implement a Road Traffic Management Plan for the operational phase. The Plan shall include traffic circulation arrangements, access management measures, parking management measures, traffic safety requirements, stakeholder communication requirements and procedures for responding to traffic-related complaints and incidents. Terminal access, vehicle movements and parking arrangements shall be managed to minimise congestion and disruption to surrounding road users.		Operator /LCT Ltd.
				Prohibit on-street parking associated with terminal activities and provide adequate designated parking and waiting areas within the Project site or other approved locations. Traffic control personnel shall be deployed during the initial operational ramp-up period and during periods of peak traffic demand where required to maintain the safe and efficient movement of vehicles. Where monitoring identifies recurring congestion, traffic-related complaints or traffic safety incidents attributable to Project activities, the Operator shall investigate the cause and implement corrective actions.		Operator /LCT Ltd.
				Ensure all project vehicle operators receive site-specific training on applicable road traffic regulations, speed limits, safe driving practices, navigational safety requirements and measures to minimise noise, dust and community disturbance. Refresher training shall be provided periodically and when significant traffic-related incidents or non-conformances occur. Vehicles accessing the terminal shall comply with applicable roadworthiness and safety requirements, including the maintenance of lights, brakes, seat belts and other safety-critical systems. The Operator shall implement and enforce a maximum vehicle speed limit within the terminal and along designated Project access routes, as defined in the Road Traffic Management Plan.		Operator /LCT Ltd.
				The Operator shall engage with relevant traffic management authorities to coordinate traffic management and road safety measures associated with terminal operations, including the installation and maintenance of appropriate traffic control and directional signage on-site and, where agreed with the relevant authorities, on surrounding public roads.		Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
				Appropriate directional signage shall be installed and maintained to guide vehicles to and from the terminal gates, minimise unnecessary search traffic and support the safe and efficient movement of vehicles. The Operator shall inform local communities and road users of potential traffic impacts and relevant safety precautions. Road safety awareness activities shall be undertaken for nearby communities and schools to promote safe road use and reduce the risk of traffic-related incidents associated with terminal operations.		
	River traffic	Movement, berthing and manoeuvring of container ships may hamper and bring safety risks to existing river traffic and in particular operations at KDDL across the river	Moderate	Coordinate vessel arrivals, departures, and manoeuvring activities with Karnaphuli Dry Dock Limited (KDDL) and CPA to minimize navigation conflicts, vessel interactions and congestion within the constrained navigation corridor between the LCT site and the dry dock facility. Vessel movements shall be planned to minimise interference with existing river traffic and maintain safe navigation within constrained sections of the river. Where monitoring identifies recurring congestion, navigation conflicts, near-miss incidents, vessel queuing or substantiated navigational complaints attributable to terminal operations, the Operator shall investigate the cause and implement corrective actions. Corrective actions may include modification of vessel scheduling arrangements, changes to operational procedures, enhanced communication protocols or additional traffic management measures.	Moderate	Operator /LCT Ltd.
		Vessel manoeuvring simulations indicate that large container vessels turning and berthing at the proposed LCT may temporarily occupy a significant portion of the navigation channel. This may increase vessel interactions and traffic congestion in the vicinity of the berth, resulting in a higher risk of navigational conflicts with passing vessels, tugboats, fishing vessels, and other river users during turning and berthing operations.	Moderate	The Operator shall coordinate with the Chattogram Port Authority (CPA), vessel pilots and other relevant river users during the arrival, departure, turning and berthing of large container vessels. Temporarily restrict or control vessel movements within the immediate vicinity of the LCT during the turning and berthing of large container vessels, where considered necessary by CPA and the vessel pilot. The Operator shall communicate planned vessel movements to relevant stakeholders and maintain appropriate coordination procedures during vessel manoeuvring operations.		Operator /LCT Ltd.
				Consult with CPA to enhance the navigational safety of local vessels, river crossings, and small craft operating in the project area. In coordination with CPA, the Operator shall support the provision and maintenance of appropriate navigational safety measures, which may include navigation lights, channel markers, radar reflectors, communication equipment and other navigation aids considered necessary for safe vessel movements.		Operator and LCT Ltd.
		River crossing boats frequently cross the main navigation channel, creating recurring interactions with commercial vessels transiting along the river. During periods of high traffic activity, these crossing movements may increase the risk of navigational conflicts and vessel interactions within the channel	Moderate	Coordinate with CPA, ferry operators, small craft operators and other relevant river users to minimise navigational conflicts between river crossing vessels and commercial shipping within the Project Area of Influence. In coordination with CPA, the Operator shall support to enhance the navigational safety of local vessels, ferries, and small craft operating in the project area through the support of provision of appropriate navigation aids, including navigation lights, radar reflectors, communication equipment.	Moderate	Operator and LCT Ltd.
				Coordinate with CPA in engagement with small craft operators to promote safe navigation practices and improve awareness of commercial vessel movements within the navigation channel.		Operator and LCT Ltd.
				All vessel interaction incidents, navigational conflicts and near-miss events involving Project-related vessels, ferries, fishing vessels or other river users shall be recorded, investigated and reported. Investigation findings shall be used to identify root causes, monitor trends and improve navigational safety procedures. Where monitoring identifies recurring navigation conflicts, near misses, complaints or other navigational safety concerns, the Operator shall investigate the cause and implement corrective actions. Corrective actions may include revised vessel movement procedures, additional communication measures, enhanced navigation aids or other traffic management measures.		Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		The increased vessel traffic associated with the LCT project may affect the safety, mobility, and livelihoods of communities that depend on the Karnaphuli River. Additional commercial vessel movements may increase navigational conflicts, delays, and restrictions on river access, particularly at key crossing locations such as river crossing *ghats*. These impacts may affect passenger transport, fishing activities, and other river-based livelihoods, while also increasing safety risks for small vessels and river users.	Moderate	LCT Ltd. shall prepare and implement a River Traffic Management Plan for terminal operations. The Plan shall include vessel movement procedures, communication protocols, stakeholder engagement requirements, navigational safety measures and procedures for responding to navigation-related complaints and incidents. LCT Ltd. shall maintain regular communication with ferry operators, fishing communities, and other river users.	Moderate	Operator and LCT Ltd.
				Coordinate with CPA to advance notification of major vessel movements, awareness programmes for local operators, and temporary traffic controls during large vessel manoeuvres should be adopted. Temporary traffic management or navigation control measures shall be implemented during large vessel manoeuvring operations where required by CPA or identified through the River Traffic Management Plan.		Operator and LCT Ltd.
				Project-related navigational risks, vessel movement arrangements and applicable safety measures shall be disclosed to affected communities. Navigation-related complaints, incidents and near-miss events involving commercial vessels, ferries, fishing vessels or other river users shall be recorded, investigated and reported. Investigation findings shall be used to identify root causes, monitor trends and improve navigational safety procedures. Where monitoring identifies recurring navigation conflicts, delays, restrictions on river access, safety concerns or livelihood impacts attributable to Project-related vessel movements, LCT Ltd. shall investigate the cause and implement corrective actions. Corrective actions may include revised vessel scheduling, enhanced communications, additional traffic management measures or other navigational safety controls.		Operator /LCT Ltd.
	Livelihood, health and safety of communities	Increased truck traffic and transport activities associated with terminal operations may increase road safety risks for pedestrians, cyclists, motorists and other road users and may affect access to community facilities, ferry crossings and livelihoods that depend on safe movement within the Area of Influence.	Moderate	Prepare and implement a traffic and road management plan, including community Health & Safety (see above). Integrate the measures during the contracting phase of the transporting companies (see above). The Operator shall monitor traffic generation, traffic volumes, traffic incidents and road safety performance during the operational phase and review the effectiveness of traffic management measures.	Minor	Operator /LCT Ltd.
				The Operator shall provide training and awareness programmes for drivers regarding applicable traffic regulations, speed limits, designated routes, pedestrian safety, safe driving practices and measures to minimise risks to local communities. Road safety awareness programmes shall be undertaken for local communities, schools and other community facilities located within the Area of Influence. Topics shall include safe road use, pedestrian safety, vehicle blind spots, crossing behaviour and risks associated with increased truck traffic.		Operator /LCT Ltd.
				Appropriate directional and traffic safety signage shall be installed and maintained to guide vehicles to and from the terminal, minimise unnecessary traffic movements and improve road safety. Traffic control personnel shall be deployed during periods of peak traffic demand and where monitoring identifies traffic safety concerns associated with terminal operations.		Operator /LCT Ltd.
				Monitor the condition of public roads used by Project-related traffic and, in coordination with the relevant road authorities, incorporate Project-related road wear and pavement deterioration into applicable road maintenance and asset management programmes. Where monitoring identifies material deterioration attributable to Project-related traffic, the Operator shall engage with the relevant authorities regarding appropriate maintenance interventions.		Operator /LCT Ltd.
				Monitor pedestrian movements and road safety conditions along VIP Road and at locations where pedestrians access ferry services and river crossing facilities. In consultation with the relevant road authorities, the Operator shall periodically assess whether additional pedestrian safety measures are required.		Operator /LCT Ltd.
				Monitor and validate actual traffic generation and traffic volumes during the initial operational phase. The results shall be used to assess the accuracy of forecast assumptions and determine whether additional traffic management or road safety measures are required.		Operator /LCT Ltd.
				In collaboration with the road authorities, investigate these options if safety in the area decreases: Introduce a priority-controlled layout for the main roads for safety; Introduce zebra crossings at appropriate locations along the VIP Road to provide pedestrians with priority when crossing the road and to improve pedestrian		Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
				permeability and accessibility across the corridor; Create pedestrian path along VIP Road. Ensure safe road crossings at the Ghats with the river crossing facilities, as there will likely be an increase in road crossings at those points with the closure of Ghat 14		
		Community health & safety risks, including fire or explosion risks from fuel, hazardous cargo, or other operations from operations on the LCTP	Major	The Operator shall prepare a Community Health and Safety Management Plan. The Plan shall identify potential risks to neighbouring communities, river users, commuters and other external stakeholders arising from terminal operations and shall define mitigation measures, monitoring requirements, communication procedures and corrective actions.	Moderate	Operator /LCT Ltd.
				The Operator shall prepare, implement and maintain an Emergency Response Plan. The plan shall be covering credible operational emergency scenarios, including fires, explosions, fuel spills, hazardous cargo incidents, vessel incidents and other events with the potential to affect surrounding communities, river users and the environment. Emergency response procedures shall be periodically tested through drills and exercises. Lessons learned shall be incorporated into updates of the Emergency Response Plan.		Operator /LCT Ltd.
				The Operator shall prepare and implement a Fire Emergency Response Plan addressing prevention, detection, notification, response and evacuation procedures for fire and explosion scenarios associated with terminal operations, fuel storage and handling of hazardous cargo. Fire protection systems, firefighting equipment and emergency response resources shall be inspected, maintained and tested at defined intervals.		Operator /LCT Ltd.
				The Operator shall introduce an Address & General Alarm / Emergency Communications /Mass Notification System – to enable timely notification for neighbouring communities, small craft, fishermen, and commuters in case of safety incidents potentially affecting health and safety in the surrounding area.		Operator /LCT Ltd.
		Noise, visual impact of stacked containers and container vessel and lighting in the night coming from the operations on LCTP	Moderate	The Operator shall implement noise and light management measures to minimise disturbance to neighbouring communities and other sensitive receptors. Noise-generating equipment shall be maintained in good working condition and, where required, fitted with appropriate noise attenuation measures such as acoustic enclosures, silencers, mufflers, vibration isolation systems and noise barriers. Reversing alarms shall be selected and operated to minimise unnecessary noise (for example with hisser-sissers) while maintaining operational safety. Operational lighting shall be directed towards work areas and designed to minimise light spill beyond the terminal boundary. Lighting systems shall be operated only where required for safety and operational purposes and shall incorporate adaptive controls where practicable.	Minor	Operator /LCT Ltd.
				Operator shall consider in the lay-out of the operations, locating components generating emissions (generators, lights, dust, exhaust) away from the neighbouring communities, schools, mosques and other sensitive receptors. The Operator shall maintain and enhance landscape screening and vegetation within the Project area where practicable to reduce visual impacts and improve the appearance of the terminal.		Operator /LCT Ltd.
				Coordinate with CCC and neighbouring communities to develop and implement a community-led wall painting and visual enhancement programme to reduce the visual impacts of terminal infrastructure on nearby residential areas. The design, artwork and implementation approach shall be developed in consultation with affected communities and shall reflect local preferences where practicable. The Operator shall maintain the painted walls and other visual enhancement measures in good condition throughout the operational phase and address deterioration or damage where necessary.		Operator /LCT Ltd.
				Coordinate with CCC and relevant stakeholders to enhance and maintain the vegetation in the central dividing strip of the public road in front of Block C. Vegetation enhancement measures shall aim to improve visual screening of terminal activities and infrastructure, reduce visual disturbance to nearby communities and contribute to improvements in the local streetscape environment. The Operator shall periodically review the effectiveness of vegetation screening and, where practicable, implement additional planting or landscape enhancement measures in consultation with CCC and affected communities.		Operator /LCT Ltd.
				The Operator shall maintain an accessible grievance mechanism for external stakeholders, including neighbouring communities, commuters, river users and other affected persons. The grievance mechanism shall include procedures for receiving, recording, investigating and responding to complaints relating to noise, lighting, visual impacts, traffic and other operational nuisances.		Operator/LCT Ltd.
				Operator shall prepare and implement a communication plan and inform the public regularly on planned activities with expected increase in intensity of the operations, traffic and emissions through the appropriate media.		Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		Improved opportunities for export of products, supporting and improving economic activities at the national level	Major	Monitoring of export and economic development in Bangladesh and enhancing contribution of LCTP to this development	Major	LCT Ltd.
		Employment opportunities for skilled manpower as well as labour force in multiple jobs at the LCTP.	Major	The Operator shall make a Local Content Plan to maximize the use of local workforce, suppliers, and resources in projects while ensuring compliance with regulatory and corporate requirements. Strive for a 50% of employees from the AoI of the project.	Major	Operator /LCT Ltd.
		Opportunities for local vendors or restaurant/ shop owners to sell food/ goods to staff and workers	Major			
		(Perceived) risks of electricity outage and reduced water supply to residents due to LCTP's power and water demand for operating an energy-intensive container terminal, as well as for water consumption for employees.	Major	LCT Ltd. shall coordinate with BPDB and CWASA regarding the electricity and water supply requirements of the Project to support planning and implementation of the associated utility infrastructure. The objective shall be to ensure, to the extent practicable, that Project-related demand for electricity and water does not adversely affect the availability or reliability of supply to surrounding communities. LCT Ltd. shall provide timely information regarding forecast electricity and water demand and shall implement measures to promote efficient use of electricity and water during terminal operations. Where stakeholder engagement, monitoring or information provided by BPDB, CWASA or relevant authorities indicates that Project-related utility demand may be contributing to electricity supply interruptions or reduced water availability for surrounding communities, LCT Ltd. shall engage with the relevant utility providers to investigate the issue and identify appropriate management measures within its sphere of influence.	Moderate	LCT Ltd.
		Radiation and fire risks from overhead electricity cabling between Halishahar substation and LCTP to affect residents living nearby.	Major	LCT Ltd. shall coordinate with BPDB to promote the safe design, operation and maintenance of the electricity transmission infrastructure developed to serve the Project, with the objective of preventing adverse impacts on nearby communities. LCT Ltd. shall engage with BPDB to verify that appropriate safety controls are maintained, including inspection and maintenance programmes, vegetation management, maintenance of safety clearances, access restrictions and emergency response arrangements. LCT Ltd. shall communicate relevant transmission-line safety information to potentially affected communities where appropriate and shall maintain a mechanism for receiving, recording and responding to community grievances and concerns relating to the Project-associated transmission infrastructure. Where grievances, incidents or information provided by BPDB indicate a potential community health or safety impact that may be attributable to the Project-associated transmission infrastructure, LCT Ltd. shall engage with BPDB to investigate the cause and identify appropriate management measures within its sphere of influence.	Minor	Operator and LCT Ltd.
		Vulnerable groups, including women, youth, the elderly, and persons with disabilities, may face increased safety	Major	The Operator shall prepare and implement a Gender Action Plan. The Plan shall include measures to promote equitable access to Project benefits, identify and address risks affecting women and other vulnerable groups and define monitoring and reporting requirements.	Moderate	Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		and security risks from labour influx, increase in road and river traffic, improper security personnel.		The Operator shall prepare and implement a Sexual Exploitation and Abuse Plan and a Gender Based Violence Action Plan. The Plan shall define awareness measures, reporting mechanisms, referral pathways, training requirements, survivor-centred response procedures and corrective actions.		Operator /LCT Ltd.
				The Operator shall prepare and implement a Community health & safety Plan addressing risks associated with labour influx, road traffic, river traffic, interactions between workers and communities, and risks to vulnerable groups including women, youth, the elderly and persons with disabilities.		Operator /LCT Ltd.
				The Operator shall prepare and implement a Security Management Plan, including The Voluntary Principles on Security and Human Rights (VPSHR), The International Ship and Port Facility Security (ISPS) Code and Good Practice Handbook: Use of Security Forces: Assessing and Managing Risks and Impacts (IFC)		Operator /LCT Ltd.
				The Operator shall prepare and implement a Trafficking in Person risk assessment and, where risks are identified, develop and implement appropriate mitigation measures.		Operator /LCT Ltd.
				The Operator shall maintain accessible grievance mechanisms for community members, including confidential reporting channels for GBV, SEAH and trafficking-related concerns. Where monitoring, grievances, incidents or stakeholder engagement indicate Project-related safety, security, GBV, SEAH or trafficking risks affecting vulnerable groups, the Operator shall investigate the cause and implement corrective actions.		Operator/LCT LTd.
		The increased vessel traffic associated with the LCT project may affect the safety, mobility, and livelihoods of communities that depend on the Karnaphuli River. Additional commercial vessel movements may increase navigational conflicts, delays, and restrictions on river access, particularly at key crossing locations near the river crossing ghats. These impacts may affect passenger transport, fishing activities, and other	Moderate	LCT Ltd. shall prepare and implement a River Traffic Management Plan for terminal operations. The Plan shall define vessel movement procedures, communication protocols, traffic management measures, stakeholder engagement requirements, navigational safety measures and procedures for responding to navigation-related complaints and incidents. LCT Ltd. shall maintain regular communication with ferry operators, fishing communities, and other river users regarding Project-related vessel movements and navigational safety issues.	Minor	Operator and LCT Ltd.
				Coordination with CPA to minimise navigational conflicts between commercial vessels, ferry services, fishing vessels and other river users. Where practicable, advance notification of major arrivals, departures and manoeuvring activities shall be provided to ferry operators, fishing communities and other potentially affected river users.		Operator /LCT Ltd.
				Project-related navigational risks, vessel movement arrangements and applicable safety measures and mitigation measures shall be disclosed to affected communities, ferry operators, while incidents and near-miss events should be monitored, investigated, and reported to support the continuous improvement of navigational safety.		Operator /LCT Ltd.
				Navigation-related complaints, incidents and near-miss events involving ferries, fishing vessels, small craft and other river users shall be recorded, investigated and reported. Investigation findings shall be used to identify root causes, monitor trends and improve navigational safety procedures. Where monitoring, stakeholder engagement, complaints or incident investigations identify Project-related impacts on river access, community safety, passenger transport or river-based livelihoods, LCT Ltd. shall investigate the cause and implement corrective actions and adaptive management measures.		Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		river-based livelihoods, while also increasing safety risks for small vessels and river users.				
		Potential conflict between staff and labour coming from outside of project area and communities near the port, which can result in potential conflicts resulting from competition for jobs and services, cultural differences, pressure on local infrastructure, and perceived unequal distribution of project benefits.	Moderate	The Operator shall prepare, implement and enforce a Worker Codes of Conduct to all employees, contractors and subcontractors. The Code of Conduct shall define acceptable including awareness raising on community sensitivities, training prevention and responding to risks of gender-based harassment and sexual exploitation	Minor	Operator /LCT Ltd.
	Construction and Operation workers	Occupational Health & Safety risks from working over water, at height, with heavy equipment, exposure to hazardous and chemical materials.	Moderate	The Operator shall perform a Quantitative Risk Assessment (QRA)/ Hazard and Operability (HAZOP) study for bulk fuel storages & dangerous goods/cargo stored. The findings shall be incorporated into facility design, operational procedures, emergency response arrangements and risk control measures.	Minor	Operator /LCT Ltd.
				The Operator shall prepare an OHS risk assessment and prepare and implement an Occupational Health and Safety (OHS) Management Plan. The Plan shall identify occupational hazards associated with working over water, working at height, lifting operations, vehicle and equipment operation, hazardous materials, confined spaces, electrical systems and emergency situations, and shall define mitigation measures, monitoring requirements, training requirements, emergency response procedures and corrective actions. Safe work procedures, permit-to-work systems, personal protective equipment, competency requirements and task-specific risk assessments shall be implemented for high-risk activities. All occupational health and safety incidents, near misses and non-conformances shall be recorded, investigated and reported. Where investigations identify deficiencies in risk controls, the Operator shall implement corrective actions and review the effectiveness of existing control measures.		Operator /LCT Ltd.
		Opportunity for staff and labour to raise their capacity in working in an environment with good international industry practice E&S management.	Moderate	The Operator shall prepare and implement a Labour Management Plan that is aligned with international good industry practice and includes measures for workforce training, skills development, and awareness of environmental, social, health and safety requirements for terminal operations.	Moderate	Operator /LCT Ltd.
		High noise generated from operational works (from e.g. container handling operations, crane movements, truck traffic, vessel engines, reversing alarms, maintenance activities, loading/unloading and other mechanical	Major	Implement noise control measures, including acoustic enclosures, silencers, mufflers, vibration isolation, and temporary noise barriers or other appropriate noise attenuation measures, and shall maintain equipment in good working condition to minimise noise generation at the source.	Moderate	Operators /LCT Ltd.
				Minimise worker exposure to high noise levels through task planning, job rotation, restricted access to high-noise areas, and scheduling of noisy activities where practicable.		Operators /LCT Ltd.
				Provide and enforce the use of appropriately rated hearing protection (earplugs, earmuffs, or dual protection where required) n areas where occupational noise exposure may exceed applicable exposure limits.		Operators /LCT Ltd.
				Conduct workplace noise monitoring and personal exposure monitoring to verify compliance with occupational exposure limits and identify areas requiring additional controls. Where monitoring identifies exceedance of applicable occupational noise exposure limits or indicates that existing controls are not effectively reducing noise exposure, the Operator shall investigate the cause and implement additional mitigation measures.		Operators /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		equipment operating continuously within the terminal) especially in Block-C may have health impacts on the workers as well as the truck drivers		Implement a hearing conservation programme, including baseline and periodic audiometric testing for workers routinely exposed to high noise levels.		Operators /LCT Ltd.
				Train workers on noise hazards, the correct use and maintenance of hearing protection, and the importance of reporting excessive noise or defective equipment.		Operator /LCT Ltd.
				Truck drivers and other visitors entering designated high-noise areas shall be informed of applicable noise hazards and required control measures, including the use of hearing protection where required and compliance with posted safety signage and traffic controls.		Operator /LCT Ltd.
		Pressure on freshwater availability from e.g. salinity intrusion or inadequate quality/treatment and potential restricted water supply for LCTP	Moderate	Develop and implement a multi-source water supply strategy comprising primary, supplementary and contingency water sources to maintain a reliable water supply for terminal operations and worker welfare during periods of reduced supply, salinity intrusion or deterioration in source water quality. (e.g. reuse of treated wastewater).	Minor	Operator /LCT Ltd.
				Provide and maintain adequate on-site water storage capacity for the terminal (indicatively 2–5 days of demand) to buffer temporary supply interruptions and maintain continuity of essential operations and worker welfare facilities.		Operator /LCT Ltd.
				Integrate rainwater harvesting systems, where practicable, to supplement water supply for suitable non-potable applications on the terminal.		Operator /LCT Ltd.
				Integrate treated wastewater reuse for non-potable applications on the terminal, where technically feasible and consistent with applicable regulatory requirements.		LCT Ltd.
				Include on-site polishing treatment (e.g. filtration and disinfection) to address potential deterioration in the quality of water supplied to the terminal and ensure water intended for human consumption complies with applicable standards.		LCT Ltd.
		Heat stress from increased paved area and steel containers can affect worker health. Heat stress is exacerbated through the extensive paved container yards, asphalt roads, concrete surfaces, steel containers, limited shading, and high temperatures/humidity during terminal operations.	Major	Prepare and implement a Climate Change Risk Management Plan (CCRMP) including heat protocols. Where monitoring identifies recurring heat stress incidents, heat-related illnesses or ineffective heat controls, the Operator shall investigate the cause and implement additional mitigation measures.	Minor	Operator /LCT Ltd.
				Provide sufficient shaded resting areas, drinking water points, protective clothing (hats) and shall implement work-rest arrangements during periods of elevated heat stress..		Operator /LCT Ltd.
				In Block A, create a shaded area by building a canopy above the trucks, where possible, taking height restrictions into account. Additionally, incorporate solar panels and rainwater harvesting (see above).		Operator /LCT Ltd.
				The Operator shall incorporate vegetation, landscaping and other passive cooling measures, where practicable, to reduce heat accumulation within the terminal and improve thermal comfort in working areas.		Operator /LCT Ltd.
				The Operator shall provide access to air-conditioned or otherwise cooled recovery areas for personnel experiencing heat stress symptoms and shall implement procedures for the identification, reporting and management of heat-related illness.		Operator /LCT Ltd.
All	All VECs	E&S impacts in the supply chain for water and electricity supply, wastewater treatment, truck fuelling, vessel bunkering, solid waste	Major	The Operator shall prepare and implement a Supply Chain Management system in place, including environmental, social, labour, health and safety requirements for suppliers, contractors and service providers associated with terminal operations.. The Operator shall undertake environmental and social due diligence and audit the key suppliers in their E&S performance. Where audits, incidents, grievances or regulatory actions identify significant environmental, social, labour or health and safety non-compliances within the supply chain that may be linked to Project activities, the Operator shall investigate the issue and implement appropriate corrective actions within its sphere of influence.	Moderate	Operator /LCT Ltd.

Category	VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party
		disposal, lashers organisation				
		Contractors in the operation phase may not be sufficiently equipped to manage E&S risks	Major	LCT Ltd. shall prepare and implement a Contractor/Subcontractor Management System in place, that defines environmental, social, health and safety requirements applicable to all contractors and subcontractors engaged during terminal operations.	Moderate	LCT Ltd.
				Contractors shall prepare activity-specific method statements and operational procedures for major operational activities in accordance with applicable legal requirements and Project standards. Method statements shall identify environmental, social, health and safety risks and define the control measures, monitoring requirements, responsibilities and corrective actions applicable to the activity. Method statements shall be reviewed and approved by LCT Ltd. prior to commencement of the relevant activity and shall be updated where significant changes occur in operational practices, equipment or risk profiles.	Moderate	Operator /LCT Ltd.

1.7.2 Monitoring plan

An extensive environmental and social monitoring programme will be implemented during construction and operation to verify compliance, assess trends and evaluate mitigation effectiveness. Monitoring covers all key VECs, which are presented in the following tables.

Table 1-4: Monitoring during pre-construction phase

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
Physical environment	Drainage hydrology	High	Water level measured using automated water level monitoring equipment.	Upstream of the Khal 14 regulator.	Continuous monitoring at 10-minute intervals during pre-construction. Monitoring data reviewed and reported monthly indicating possible water level increases caused by obstructions.	Contractor	BWDB / LCT Ltd.
			Visual inspection of the drainage condition, indicating: • Evidence of drainage congestion. • Evidence of ponding and standing water. • Sediment accumulation. • Debris accumulation or blockage. • Evidence of backwater effects and restricted flow. • Flooding frequency and extent.	Culverts (inspected via manholes), drainage channels and drainage infrastructure; upstream drainage areas of the crossing.	Inspection of drainage channel to identify possible obstructions conducted monthly during construction with weekly inspections during the monsoon period (July to September). Inspections should also be done within 24 to 48 hours following significant rainfall events.	Contractor	BWDB / LCT Ltd.
	Ambient Air Quality	Medium	PM_{10} concentration Evidence of compliance with equipment maintenance requirements Evidence of compliance with vehicle, vessel and equipment idling controls Community Health and Safety Inc register	PM_{10}: Block A, Block C and the nearest residential receptor opposite Block C. (Same locations as the baselines)	Continuous PM_{10} concentration measurements Monthly for review of maintenance records, emission inspection records and idling control records	Contractor	LCT Ltd.
Social environment	Livelihood, health and safety of communities	High	Livelihood parameters (e.g. income, expenses, employment) of Persons affected by economic displacement		1 month after economic displacement and then every half year for 3 years	LCT Ltd.	-
			Number of grievances received and resolved		Monthly	LCT Ltd.	-
			Compliance with the approved Relocation Plan Percentage of economically displaced persons/businesses receiving compensation for verified relocation costs and documented periods of project-related business interruption prior to displacement		Monthly during relocation activities	LCT Ltd.	-
			Number of eligible affected fishermen receiving compensation or relocation arrangements Loss or increase in income of fishing activities of affected fishermen that can be related to project activities		1 month after economic displacement and then every half year for 3 years	LCT Ltd.	-
			Compliance with the approved Relocation Plan Livelihood parameters (e.g. income, expenses, employment) of Persons affected by economic displacement		Monthly during relocation activities	LCT Ltd.	-
			Visual inspection on health and safety issues and monitor CHS incidents Visual inspection to ensure dust suppression measures are in place Visual inspection whether fuel and other flammable materials are stored safely Monitor contractor compliance through regular internal employment, reporting, monitoring and audits.	Inside the terminal sites, including dust suppression areas and fuel/flammable material storage areas at the project site.	Daily CHS inspections Monthly review of inspection findings, complaints and corrective actions	Contractor	LCT Ltd
			Monitoring as specified in the SAP	As defined in the SAP.	Defined in SAP	LCT Ltd.	-

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
	Construction and Operation workers	High	Number of grievances from workers registered	Terminal sites and workforce locations	Monthly	LCT Ltd.	-
			Monitoring if personal protective equipment is used during work	Work areas inside the terminal sites	Daily	Contractor	LCT Ltd.
			Monitor contractor HSSE performance through inspections, audits and corrective action	Contractor work areas inside the terminal sites	Monthly	LCT Ltd.	-

Table 1-5: Monitoring during construction phase

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
Physical environment	Drainage hydrology	High	Water level measured using automated water level monitoring equipment, including peak water levels during rainfall and monsoon events, duration of elevated water levels, evidence of flooding, waterlogging, ponding or drainage congestion, and comparison of monitored water levels with hydraulic model predictions and baseline conditions. The monitoring should indicate: • Evidence of drainage congestion. • Evidence of ponding and standing water. • Surcharge conditions. • Sediment and/or debris accumulation or blockage • Evidence of backwater effects and restricted flow • Flooding frequency and extent • Changes in drainage conditions compared with baseline conditions	Upstream of the Khal 14 regulator/culvert. Upstream drainage channels, manholes, culverts and drainage infrastructure; upstream drainage areas of the crossing.	• Continuous water level monitoring at 10-minute intervals during construction. • Continuous water level monitoring at 10-minute intervals throughout the first monsoon season following completion of the Khal 14 culvert and associated drainage works. • Water level monitoring data reviewed and reported monthly. • Inspection of drainage channel to identify possible obstructions conducted monthly during construction with weekly inspections during the monsoon period (July to September). Inspections should also be done within 24 to 48 hours following significant rainfall events. • Comparison of monitored water levels against baseline conditions and hydraulic model predictions undertaken monthly and following significant rainfall, flood or high-water events. • Drainage channel inspections following completion of the Khal 14 crossing and associated drainage works and during the first monsoon season following completion of the works	Contractor	BWDB, LCT Ltd/CPA.
	River morphology	Medium	• Pre and post dredging bathymetries • Dredged channel dimensions compared with the approved dredging design. • Dredged bed elevations compared with the approved dredging design. • Evidence of over or under dredging. • Evidence of unplanned changes in riverbed morphology	Approved dredging area (pre- and post-dredging bathymetry and riverbed levels).	• Once immediately before commencement of capital dredging. • Once immediately following completion of capital dredging.	Contractor	LCT Ltd/CPA.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			• Evidence of riverbank erosion, including undercutting, scour, slumping and loss of bank material. • Evidence of riverbank instability, including cracks, exposed roots, vegetation loss and changes in bank profile. • Sediment accumulation and deposition along riverbanks. • Formation, enlargement or migration of sand bars. • Observable changes in riverbank condition compared with baseline conditions. • Evidence of sediment deposition that may affect drainage, adjacent land uses, infrastructure or navigation channels.	Riverbanks and nearshore areas within the dredging Area of Influence, including sand bars.	• Prior to commencement of dredging to establish baseline conditions. • Weekly during active dredging operations. • Within 48 hours following significant storm, flood or high-flow events. • Upon completion of dredging activities. • Monthly during the monsoon and post-monsoon period (June to November) where active dredging is not taking place.	Contractor	LCT Ltd./CPA
	Water and sediment quality	Medium	• Turbidity (NTU) and Total Suspended Solids (TSS) in receiving waters. • Visual evidence of sediment plumes, water discolouration or sediment deposition. • Evidence of erosion, overtopping, bypassing or failure of sediment control measures. • Condition, sediment accumulation and remaining treatment capacity of settlement ponds, sediment basins and other sediment control measures.	Receiving waters upstream and downstream of active discharge locations. Settlement ponds, sediment basins and other sediment control measures on site.	• Once prior to commencement of major earthworks, reclamation and ground improvement activities to confirm baseline conditions. • Weekly during periods when earthworks, fill placement, ground improvement or other sediment-generating activities are underway. • Within 24 hours following any heavy rainfall event that results in site runoff. • Following any failure, overtopping, bypassing or significant malfunction of a sediment control measure. • Following any significant uncontrolled runoff event or community complaint related to discoloured water or sedimentation. • Upon completion of major earthworks and reclamation activities	Contractor	LCT Ltd./CPA
			• **Physical water quality parameters:** temperature, turbidity, salinity, electrical conductivity (EC), total dissolved solids (TDS) and total suspended solids (TSS). • **Chemical water quality parameters:** pH, nitrate, sulphate, phosphate, arsenic (As) and oil and grease. • **Water quality indicator parameters:** dissolved oxygen (DO), biochemical oxygen demand (BOD_5) and chemical oxygen demand (COD).	The same six baseline measurement locations	• Once before commencement of capital dredging to establish baseline conditions. • Every two weeks during capital dredging activities. • For turbidity (NTU and TSS) see frequency at fisheries resources VEC	Contractor	LCT Ltd./CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			Sediment quality (same parameters as measured as part of baseline measurements)	The same six baseline measurement locations.	Once before the commencement of capital dredging	Contractor	LCT Ltd./CSC
	Ambient air quality	Medium	$PM_{2.5}$ and PM_{10} concentration	Block A, Block C and the nearest residential receptor opposite Block C. (same locations as the baselines)	• Continuous throughout the construction period for $PM_{2.5}$ and PM_{10} monitoring. • Daily during active construction for visual inspections of exhaust emissions. • Monthly for review of maintenance records, emission inspection records and idling control records	Contractor	LCT Ltd./CSC
			• Number and nature of air quality complaints and grievances potentially related to construction activities • Evidence of excessive exhaust smoke emissions from vehicles, vessels, generators and construction equipment • Evidence of compliance with equipment maintenance requirements • Evidence of compliance with vehicle, vessel and equipment idling controls	Construction site, vehicles, vessels, generators and construction equipment.			
			• Evidence of dust deposition. • Number of dust-related complaints or grievances received. • Condition and effectiveness of dust suppression measures. • Compliance with vehicle speed limits. • Compliance with requirements for covering loads during transport	Construction site, haul roads and unpaved roads.	• Daily visual inspections during earthworks, site clearance and other dust-generating activities. • Weekly inspection of dust suppression measures and haul roads. • Following periods of strong winds or dust complaints. • Monthly review of dust-related complaints, inspection findings and corrective actions.	Contractor	LCT Ltd../CSC
			• Fuel consumption by construction plant, vehicles, generators, vessels and dredging equipment • Estimated greenhouse gas emissions associated with construction activities, calculated from recorded fuel consumption. • Evidence of excessive idling, unnecessary equipment operation or abnormal fuel consumption	Construction site and dredging area (plant, vehicles, generators, vessels and dredging equipment).	• Fuel consumption records maintained continuously throughout the construction period. • Monthly calculation and review of greenhouse gas emissions. • Monthly review of fuel efficiency performance and corrective actions.	Contractor	LCT Ltd../CSC
	Ambient noise levels	Medium	Equivalent continuous sound level (LAeq), Maximum sound level (LAmax) and Maximum A-weighted fast response sound level (LAFmax).	Block B, Block C and the residential area opposite Block C.	• Continuous noise monitoring at Block B, Block C and the residential area opposite Block C throughout major construction activities. • Continuous monitoring during piling, ground improvement works and other high-noise activities. • Monthly review of monitoring results, complaints and corrective actions.	Contractor	LCT Ltd../CSC
			• Number of noise-related complaints or grievances received. • Compliance with approved working hours for high-noise activities. • Evidence of implementation and effectiveness of noise-control measures.	Project sites and the residential area opposite Block C.			

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					• Additional monitoring following substantiated community complaints regarding construction noise.		
Ecological environment	Tidal mudflat	Medium	• Abundance, density and species composition of benthic macroinvertebrate communities. • Species richness and diversity of benthic macroinvertebrate communities. • Physical sediment quality parameters: particle size distribution and total organic carbon (TOC). • Area of tidal mudflat permanently affected relative to the approved Project footprint. • Evidence of disturbance to mudflat habitat outside the approved construction footprint • Completion of the evaluation of biodiversity value and the Critical Habitat Assessment and implementation of any resulting mitigation, restoration, enhancement and/or offset requirements.	Two monitoring locations within the remaining mudflat habitat in the Project Area of Influence. Mudflat habitat outside the approved construction footprint.	Annually during February/March throughout the construction period. Monitoring shall be undertaken during February/March to maintain consistency with the baseline surveys and to allow comparison of benthic community composition, abundance and diversity under comparable seasonal conditions. This monitoring period also coincides with the period when mudflat habitats support overwintering and migratory shorebirds that depend on benthic organisms as a food source and occurs prior to the onset of monsoon-driven changes in hydrology, sediment transport and estuarine conditions.	Contractor	LCT Ltd../CSC
	Mangrove ecosystems	Medium	• Area (ha) of existing mangrove habitat present. • Area (ha) of mangrove habitat retained. • Area (ha) of mangrove habitat permanently affected. • Condition of the retained mangrove habitat, including evidence of vegetation stress, die-back, erosion, sediment deposition, physical damage, changes in canopy condition and changes in the extent of mangrove habitat. • Evidence of Project-related deterioration of retained mangrove habitat. • Number and outcomes of consultations with relevant government authorities, conservation organisations and other stakeholders.	Mangrove habitat along the Block B riverbank protection wall. Block C reclamation area and the area between Blocks B and C.	• Once prior to commencement of construction for establishment of baseline mangrove extent and condition along the Block B riverbank protection wall and within the mangrove habitat located between Blocks B and C. • **Quarterly construction monitoring** = existing Block B mangroves and the impact area between Blocks B and C. Quarterly during construction to monitor the extent, condition and retention of mangrove habitat along the Block B riverbank protection wall and to verify that disturbance outside approved impact areas has not occurred. Quarterly during construction to monitor the extent of mangrove habitat loss within the approved construction footprint in Block C and the area between Blocks B and C.	Contractor	LCT Ltd../CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					• **Six-monthly and annual ecological monitoring** = only applies if a future compensation/restoration site is identified following the CHA and feasibility assessment. Every six months during the first three years following implementation of mangrove conservation, restoration, enhancement or offset measures at the approved compensation site(s). • As required during development of compensatory measures for consultation with government authorities, conservation organisations and other stakeholders. • Once prior to implementation of any approved mangrove conservation, restoration, enhancement or offset measures at the selected compensation site(s) to establish baseline ecological conditions. • Annually thereafter at the approved compensation site(s) until the approved objectives, performance criteria and success criteria have been achieved. • Following any incident, spill, storm event, unauthorised encroachment or damage affecting the mangrove habitat. • Upon completion of construction activities.		
			• Completion of an evaluation of the biodiversity value of the mangrove trees. Additionally, where an off-site conservation, restoration, enhancement, creation or biodiversity offset site is determined to be required, appropriate and feasible based on the outcome of these assessments, the specific monitoring parameters, performance criteria, success criteria and monitoring frequency shall be defined as part of the feasibility assessment and any subsequent approved management, restoration or offset strategy. • Completion of the feasibility assessment evaluating options for achieving no net loss of biodiversity.	Mangrove habitat at Block B and between Blocks B and C; potential conservation, restoration or offset sites within the Karnaphuli River system, where appropriate.	Once prior to commencement of construction.	Contractor	LCT Ltd../CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			• Evidence that the technical, ecological, regulatory and practical feasibility of mangrove conservation, restoration, enhancement and/or biodiversity offset measures has been evaluated.				
			• Number of fisheries-related complaints or grievances received. • Number of fishermen reporting disruption to fishing activities attributable to Project activities. • Areas and duration of restricted access to fishing grounds resulting from Project activities.	Affected fishing communities and fishing grounds subject to restricted access.	• Quarterly consultation with affected fishermen throughout the construction period. • Additional consultation following significant complaints, incidents or changes in dredging or piling activities.	LCT Ltd/./CSC.	CPA
	Fisheries resources	Medium	If dredging activities are conducted during fisheries sensitive periods as given in the ESMP: • Ambient turbidity (NTU). • Site-specific relationship between turbidity (NTU) and Total Suspended Solids (TSS) • Turbidity (NTU) and estimated TSS • Percentage increase in turbidity relative to ambient conditions. • Occurrence of turbidity levels exceeding the 10% trigger level (with reports of management actions taken and their effectiveness to reduce the levels below the trigger). • Occurrence of turbidity levels exceeding the 20% threshold level (with reports of management actions taken to reduce the levels below the threshold). • Width of unaffected river corridor available for fish movement. • Spatial extent of the sediment plume. • Evidence of continued occurrence and movement of migratory fish species based on consultation with fishermen and fishing communities. Information obtained through these consultations shall be used to identify potential disruption to fish migration, trigger investigation where concerns are raised, and support adaptive management measures. Sources of information shall include, but not be limited to: ○ Reports from fishermen (through the fisheries consultant) indicating fish migratory movements and any other sources of potential disruption to fish migration, to be established prior to commencement of any turbidity inducing activities. ○ Reports from fishermen (through the fisheries consultant) on the success or issues with fish migration during and after project activities that could interfere with migration. ○ Records of consultations with the Fisheries Department regarding observed impacts on fisheries resources attributable to Project activities.	Within 100 m of the active dredging location at mid water depth at three locations across the river width. Reference locations outside the influence of dredging. Upstream and downstream monitoring locations across the width of the estuary.	• Once prior to the first dredging activity, establish the site-specific relationship between turbidity (NTU) and TSS • Continuous real-time NTU measurements during active dredging and reclamation activities • Daily review of data during active dredging • Daily review of satellite imagery where available • Following any significant spill, dredging incident or abnormal monitoring result. • Once following completion of capital dredging. • Weekly consultation of fishermen during active dredging activities • Consultation with the Fisheries Department annually during construction and following any significant fisheries-related complaint, incident or observed impact. • Investigation of turbidity increasing sources following any exceedance of the 10% trigger level and undertaking measures to reduce turbidity levels if the monitoring shows that there is an exceedance of the values across the width of the estuary. • Implementation of increased corrective actions (over and above those implemented following exceedance of the 10% trigger) to reduce turbidity	Contractor	LCT Ltd../CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					immediately following confirmation of a Project-related exceedance of the 20% trigger level across the width of the estuary at either the upstream or downstream monitoring locations. Should there still be an exceedance using the 20% trigger then the project related activity should cease unless it can be shown that the threshold level is too sensitive and that fish are still migrating through the estuary (following discussion with local fisherfolk). • Review of available satellite imagery throughout the dredging period as imagery becomes available to confirm that the surface plume is indicating that the plume is remaining within the boundaries of the predicted modelling (accepting that the image will only show the surface plume and not the plume within the water column). • Additional consultations where monitoring or observations indicate potential disruption of fish migration.		
	Dolphins	High	• **Underwater noise parameters:** peak sound pressure level, root mean square sound pressure level, single-strike sound exposure level and cumulative sound exposure level. • Compliance with the underwater noise threshold of 145 dB SELss. • Dolphin acoustic detections recorded through Passive Acoustic Monitoring. • Presence, number, distribution, location, distance and direction of movement of dolphins relative to piling activities. • Observable changes in dolphin behaviour, including changes in movement, surfacing, foraging or avoidance patterns during piling. • Presence of other aquatic fauna. • Piling activity type, location, duration and timing associated with each underwater noise measurement or dolphin observation. • Number and nature of underwater noise threshold exceedances or significant dolphin disturbance events.	Two PAM monitoring locations. Piling area; underwater noise threshold assessed at 200 m from the piling source.	• Baseline underwater noise monitoring before commencement of piling. • Targeted PAM and MMO monitoring during piling activities and periods of highest underwater noise generation. • Continuous underwater noise recording during monitored piling periods where the selected equipment and deployment method allow. • MMO surveys prior to commencement of piling each day and throughout monitored piling periods in accordance	Contractor	LCT Ltd./CSC.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					with the Marine Mammal Mitigation Protocol. • Additional monitoring following any underwater noise threshold exceedance, significant dolphin disturbance event or change in piling method. • Monitoring upon completion of piling to confirm post-piling acoustic conditions.		
	Avifauna and migratory birds	Low	• Bird abundance, species richness and species composition. • Presence and abundance of migratory, resident, threatened and conservation-priority bird species. • Bird habitat use, including feeding, roosting and nesting activity. ○ Evidence of disturbance attributable to construction activities.	Three representative bird habitats within the Project Area of Influence.	One day at each habitat during each month of Feb-Apr; this will be carried out once every year during construction	Contractor	LCT Ltd./CSC.
	Road traffic	Low	Road traffic survey (same as baseline survey) Traffic composition by vehicle type. Peak-hour traffic volumes. Average daily traffic (ADT) Evidence of Project-related changes in traffic volumes, traffic composition or congestion relative to baseline conditions	Two road traffic survey locations (same as baseline survey).	• Six times in every year (for 24-hour) at intense traffic moments: • Each monitoring round shall include ○ One weekday ○ One weekend	Contractor	LCT Ltd../CSC
	River traffic	Medium	Counting two-way river traffic volume, vessel size & type Vessel size and vessel type. Peak-hour river traffic movements. Evidence of Project-related changes in river traffic volumes, vessel composition or navigation activity relative to baseline conditions.	Ghat–15.	• Six times in every year (for 24-hour) at intense traffic moments • Each monitoring round shall include ○ One weekday ○ One weekend	Contractor	LCT Ltd../CSC
Social Environment	Livelihood, health and safety of communities	High	• Number of grievances (related to river crossing commuters and operators, or local content) registered and addressed • Number of contractors' workers from AOI • % percentage of good/services sourced from AOI	Area of Influence (AOI); communities, river crossing commuters and operators.	Monthly review of grievance records, employment records and procurement records	LCT Ltd/./CSC.	-CPA
			Number of commuters using the new ferry routes Trends in ferry usage relative to pre-relocation conditions	New ferry routes from Ghats 12, 15 and Badalpura Ghat.	Monthly collection and review	Contractor-	LCT Ltd./CSC. -
			Number and nature of grievances registered and addressed and analysis of topics, events, locations which generate more grievances Percentage of grievances resolved within the specified timeframe Recurring grievance themes requiring corrective action	Project-affected communities; grievance locations as recorded in the grievance register.	Grievances recorded upon receipt Monthly review of grievance trends, corrective actions and resolution status	LCT Ltd./CSC.	-CPA
			Visual evidence of community health and safety risks (CHS register) Implementation of dust suppression measures.	Within and around the construction site.	Daily CHS inspections Monthly review of inspection findings, complaints and corrective actions	Contractor	LCT Ltd../CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			Number and proportion of employees from the Area of Influence, wider Chattogram District and wider Bangladesh, and value and proportion of expenditure on goods and services procured from suppliers within the Area of Influence, wider Chattogram District and wider Bangladesh.	Area of Influence, wider Chattogram District and wider Bangladesh.	Monthly	LCT Ltd/./CSC.	-CPA
			• Socio-economic conditions, including livelihoods, income, employment, access to services, community perceptions and project-related impacts collected through a social survey (min. 384 sample size)	Area of Influence (minimum sample size 384).	• Two times: • Once after one year from start of construction • Once before start of operation	Contractor	LCT Ltd././CSC
			• Solid waste and wastewater generation by the construction workforce. • Waste storage and wastewater collection capacity and utilisation. • Waste accumulation, littering, leaks or uncontrolled discharges. • Waste and wastewater collection, treatment and disposal records. • Complaints and corrective actions.	Workforce waste storage, sanitation and wastewater facilities at the construction site. Authorised waste treatment and disposal facilities.	Monthly inspection of waste storage, sanitation and wastewater facilities. Monthly review of waste and wastewater records. Following any leak, overflow, spill, uncontrolled discharge or substantiated complaint. Quarterly audit of compliance with the Waste Management Plan.	Contractor	LCT Ltd././CSC
			• Project traffic volumes. • Community traffic congestion and pedestrian crossing conditions. • Number and nature of traffic-related complaints and grievances. • Traffic incidents attributable to Project activities. • Effectiveness of traffic management measures.	VIP Road and adjacent community areas, including pedestrian crossing points.	Monthly during the first six months of construction. Following any significant traffic incident or substantiated traffic-related complaint.	Contractor	LCT Ltd././CSC
			• Community access restrictions resulting from construction activities. • Traffic, navigation and pedestrian safety controls in place. • Number and nature of access-related grievances. • Status of corrective actions.	Construction site access points and surrounding community access routes.	• Weekly during construction. • Following incidents, access changes or substantiated grievances. • Monthly review of complaints and corrective actions.	Contractor	LCT Ltd/./CSC.
			• Percentage of workers who have signed the Worker Code of Conduct. • Number of personnel trained on the Worker Code of Conduct. • Number and nature of Code of Conduct violations. • Number and nature of community grievances related to worker behaviour. • Contractor compliance with workforce management requirements.	Construction site and nearby communities.	• Prior to commencement of work for all personnel. • Monthly review of training records and Code of Conduct compliance. • Monthly review of community grievances and complaint trends. • Quarterly Contractor compliance inspections and audits by LCT Ltd. • Following any substantiated complaint, serious incident or breach of the Worker Code of Conduct.	Contractor	LCT Ltd././CSC
		High	• Approved Method Statements for high-risk construction activities. • OHS inspections and identified deficiencies.	Construction work areas, including areas for working at height,	• Prior to commencement of each construction activity	Contractor	LCT Ltd././CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			• OHS incidents, injuries, near misses and dangerous occurrences. • Non-conformances and corrective action closure. • Availability and proper use of PPE and safety-critical equipment. • Safe management of hazardous/flammable materials. • Training, competency and authorisation for high-risk work.	working over water, lifting operations and hazardous material storage.	requiring an approved Method Statement. • Daily inspection of active high-risk work activities. • Weekly inspection of lifting equipment, fall protection equipment, lifesaving equipment, hazardous material storage areas and other safety-critical equipment. • Monthly occupational health and safety inspections and audits. • Monthly review of incidents, near misses, non-conformances and corrective actions. • Following any occupational health and safety incident, dangerous occurrence, near miss or significant non-conformance. • Following any significant change in work methodology, equipment, site conditions or Project requirements.		
	Construction and Operation workers		Monitoring of personal protective equipment is used during work	Construction work areas.	Daily	Contractor	LCT Ltd././CSC
			• Availability and condition of firefighting equipment and emergency response equipment. • Implementation of fire prevention controls. • Number of emergency response drills completed. • Number of fire incidents, emergency response activations, significant near misses and non-conformances. • Status of corrective actions arising from inspections, drills and incidents.	Fuel storage areas, workshops, generators, hot-work locations and hazardous material storage areas.	• Prior to commencement of each construction activity presenting a fire or explosion risk. • Monthly inspection of firefighting equipment, emergency response equipment and fire prevention controls. • Prior to initial use of fuel storage areas, workshops, generators, hot work locations, hazardous material storage areas and temporary facilities. • Quarterly emergency response drills throughout the construction period. • Monthly review of training records, inspections, incidents, near misses and corrective actions. • Following any fire incident, explosion incident, emergency	Contractor	LCT Ltd././CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					response activation, significant near miss or non-conformance. • Following any significant change in construction activities, hazardous material inventory, fuel storage arrangements or emergency response requirements.		
			• Verification that contractors, subcontractors and labour providers have appropriate labour-management arrangements in place. • Evidence that workers have received written terms and conditions of employment. • Compliance with wage payment, overtime payment and working-hour requirements. • Condition of worker welfare facilities and accommodation. • Number and nature of worker grievances and labour-related non-conformances.	Worker welfare facilities and Contractor-provided or Contractor-arranged worker accommodation.	• Before mobilisation of each Contractor, subcontractor or labour provider to verify that appropriate labour-management arrangements are in place. • Before each worker commences work to verify that written terms of employment have been provided and communicated. • Monthly review of payroll records, working-hour records, overtime payments, deductions and evidence of wage payments. • Monthly inspection of working conditions and worker welfare facilities throughout construction. • Before occupation of any Contractor-provided or Contractor-arranged worker accommodation.	Contractor	LCT Ltd././CSC
			• Condition and availability of drinking water supplies. • Availability and condition of shaded rest areas and welfare facilities. • Number and nature of worker welfare complaints. • Number and nature of welfare-related incidents and corrective actions.	Drinking water points, shaded rest areas, welfare facilities and labour camp amenities.	• Daily inspection of drinking water points and shaded rest areas during construction. • Weekly inspection of welfare facilities and labour camp amenities. • Following any heat stress-related illness, first aid case, near miss or worker complaint. • Monthly review of inspection findings, incidents, complaints and corrective actions. • Prior to and during periods of extreme heat or heatwave conditions.	Contractor	LCT Ltd././CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
All	All VECs	High (related to the most sensitive VEC)	• Status of permits, licences and approvals. • Compliance with permit conditions and reporting requirements. • Number and nature of permit non-compliances, regulatory notices and corrective actions.	All construction activities requiring a permit, licence or approval.	• Prior to commencement of each activity requiring a permit, licence or approval. • Monthly review and update of the permit register. • Monthly inspection of compliance with applicable permit conditions. • Quarterly permit compliance audits. • Following any permit non-compliance, regulatory inspection, regulatory notice or significant change in Project activities. • In accordance with the reporting and notification requirements specified within the relevant permits and approvals.	Contractor	LCT Ltd././CSC
			• Validity of licences, permits and approvals held by suppliers, contractors, waste contractors, disposal facilities and service providers. • Compliance status of suppliers and service providers. • Material traceability, waste disposal and dredged material management records.	Suppliers, material sources, dredged material reuse/disposal facilities, waste contractors and bunkering providers.	• Prior to engagement of construction material suppliers, dredged material reuse or disposal facilities, waste contractors and bunkering providers. • Prior to approval of new material sources, disposal facilities or service providers. • Quarterly review of supplier licences, permits and compliance status. • Quarterly audits of high-risk suppliers and service providers. • Continuous maintenance of material traceability, dredged material reuse/disposal and waste disposal records throughout the construction period. • Following any environmental incident, regulatory non-compliance, significant grievance or change in supplier, disposal facility or service provider.	Contractor	LCT Ltd../CSC
			• Contractor and subcontractor compliance with Project HSSE requirements.	All Contractor and subcontractor work areas.	• Prior to Contractor and subcontractor mobilisation.	Contractor	-LCT Ltd/./CSC

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			• Number and nature of incidents, non-conformances and corrective actions. • Status of corrective action implementation.		• Prior to commencement of each major construction activity requiring an approved method statement. • Monthly Contractor and subcontractor HSSE inspections. • Quarterly HSSE audits of Contractor and subcontractor compliance. • Monthly review of non-conformances, incidents and corrective action status. • Following any significant environmental, social, health or safety incident, regulatory non-compliance or serious breach of Project requirements		
			• Availability and implementation of approved Method Statements. • Compliance with Method Statement requirements. • Number and nature of Method Statement non-conformances and corrective actions.	All major construction activities.	• Prior to commencement of each major construction activity. • Monthly inspection and audit of compliance with approved method statements during construction. • Following any significant environmental, social, health or safety incident, non-conformance or material change in construction methodology. • Monthly review and reporting of non-conformances, corrective actions and method statement implementation performance.	Contractor	LCT Ltd/./CSC

Table 1-6: Monitoring during operation phase

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
Physical environment	Drainage hydrology	High	Water level measured using automated water level monitoring equipment, including peak water levels during rainfall and monsoon events, duration of elevated water levels, evidence of flooding, waterlogging, ponding or drainage congestion, and comparison of monitored water levels with hydraulic model predictions and baseline conditions.	Upstream of the Khal 14 regulator/culvert. Access routes to the culvert, regulator, sluice gate, pumping station and associated drainage infrastructure.	• Continuous water level monitoring at 10-minute intervals for the first 3 years of operation, with monthly review and reporting of monitoring data. • Quarterly inspection of access routes, culvert access points and drainage infrastructure. • For debris accumulation and blockage: ○ Monthly inspection under usual conditions. ○ Weekly inspections during the monsoon season. ○ Additional inspections within 24-48 hours following significant rainfall or flooding events. • Immediate investigation and follow-up monitoring where water levels exceed hydraulic model predictions. • Continuous review of complaints, incidents, grievances, exceedances and non-conformances. • Additional monitoring following incidents, complaints, grievances, exceedances.	HSE team	BWDB
	River morphology	Medium	• Records of maintenance dredging activities undertaken, including volumes, frequency and dredge levels. • Pre and post dredging bathymetry. • Dredged bed dimensions, side slopes and elevations. • Sedimentation rates and spatial distribution of sediment accumulation. • Records of sediment characterisation, contaminant testing and beneficial reuse assessments. • Evidence that beneficial reuse opportunities have been assessed for each dredging campaign. • Compliance with applicable regulatory approvals and disposal requirements for dredged material.	Approved dredging area, berth pocket and associated navigation areas.	• Verification of maintenance dredging programme with CPA prior to commencement of operations and review annually thereafter. • Bathymetric and hydrographic surveys of the berth pocket and navigation areas at least quarterly during operation or more frequently where sedimentation rates require additional monitoring. • Riverbank stability and channel morphology inspections semi-annually and following the monsoon season.	Operator	LCT Ltd

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					• Annual review of long-term erosion, sedimentation and channel morphology trends using survey and monitoring data. • Continuous review of complaints, incidents, grievances, exceedances and non-conformances.		
			• Riverbank condition, including evidence of erosion, scour, instability, slumping or bank retreat. • Changes in channel morphology, riverbed levels and sedimentation patterns relative to baseline. • Number of incidents, complaints, grievances, exceedances or non-conformances related to navigation safety, dredging activities, sediment management, erosion or river morphology changes. • Records of investigations and corrective actions undertaken.	Riverbanks and channel within potentially affected areas.	• Monitoring of riverbank conditions and channel morphology: ○ Prior to commencement of dredging to establish baseline conditions. ○ Weekly during active dredging operations. ○ Within 48 hours following significant storm, flood or high-flow events. ○ Upon completion of dredging activities. ○ Monthly during the monsoon and post-monsoon period (June to November) where active dredging is not taking place. • Continuous review of complaints, incidents, grievances, exceedances and non-conformances.	HSE team	LCT Ltd
	Water and sediment quality	Medium	• Turbidity levels and suspended sediment concentrations during dredging and disposal activities. • Visual evidence of sediment plumes, sediment dispersion and water quality deterioration associated with dredging or disposal operations. • Evidence that dredging methods and operational controls are being implemented to minimise sediment resuspension and contaminant dispersion. • Number of dredging-related incidents, spills, complaints, grievances, regulatory exceedances or non-conformances. • Evidence that corrective actions have been implemented.	Dredging and disposal areas.	• Turbidity and suspended sediment monitoring during active dredging and disposal operations. • Visual inspection for sediment plumes and evidence of excessive sediment dispersion during active dredging and disposal activities • Monthly review of dredging records, sediment management records, disposal records, audit findings, complaints and monitoring results during periods when dredging activities are underway	HSE team	LCT Ltd.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					• Immediate investigation where monitoring identifies excessive sediment resuspension, elevated contaminant concentrations, significant sediment plumes, permit non-compliance or adverse environmental effects. • Continuous review of complaints, incidents, grievances, exceedances and non-conformances.		
			• **Physical water quality parameters**: temperature, turbidity, salinity, electrical conductivity (EC), total dissolved solids (TDS) and total suspended solids (TSS). • **Chemical water quality parameters**: pH, nitrate, sulphate, phosphate, arsenic (As) and oil and grease. • **Water quality indicator parameters**: dissolved oxygen (DO), biochemical oxygen demand (BOD_5) and chemical oxygen demand (COD).	Same as Baseline locations	• Once before commencement of maintenance dredging to establish baseline conditions. • Once after maintenance dredging. • For turbidity (NTU) see frequency at fisheries resources VEC	HSE team	LCT Ltd
			• Groundwater quality (pH, salinity, EC, DO, temperature, Mineral oil, BTEX, Chlorinated hydrocarbons, metals, Ca, Mg, Na, K, Fe, Mn, Cl, F, Br, SO4).	Same as Baseline locations	• Annually for three years after start of operations. • After three years decide on the frequency based on the results.	HSE team	LCT Ltd
			• Sediment quality (As, Cr, Hg, Pb, oil & grease, PAHs).	Karnaphuli River: upstream of the terminal, outfall of the drainage channel, in front of Block C, and downstream of the terminal.	• Twice every year: • Once during Feb/Mar (dry season) • Once during Jul/Aug (wet season) • After two years decide on the frequency based on the results.	HSE team	LCT Ltd
			• Physical characteristics of dredged sediment, including grain size distribution, moisture content and other parameters relevant to reuse, transport and disposal. • Chemical characteristics of dredged sediment, including contaminants relevant to the proposed reuse or disposal route and applicable regulatory requirements	Dredged material from maintenance dredging.	• As above, twice every year • Review of sediment quality assessment results prior to approval of the dredged material management, reuse or disposal plan	HSE team	LCT Ltd.
			• Records demonstrating waste segregation, storage, collection, treatment and disposal in accordance with the approved management plan • Number and type of waste facility audits completed and audit findings. • Availability, condition and operational performance of temporary wastewater collection, conveyance and treatment systems prior to connection to the CWASA sewer network	Terminal waste management and wastewater systems (collection, pumping and treatment) up to connection to the CWASA sewer network. Waste and wastewater treatment and disposal facilities used by the Project.	• Daily operational inspections of waste management, wastewater treatment, pumping and sewage collection systems. • Annual audits of waste management facilities	HSE team	LCT Ltd.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			• Volume of wastewater generated, treated and discharged • Effluent quality parameters measured against applicable ECR 2023 discharge requirements (e.g. pH, BOD, COD, TSS, oil and grease, faecal coliforms and other applicable parameters). • Sludge generation, handling, storage, transport and disposal records, including compliance with ECR 2023 requirements. • Evidence that all waste and wastewater treatment and disposal facilities used by the Project hold valid permits, licences and approvals applicable to the waste streams received		• Verification of wastewater collection, conveyance and treatment capacity prior to commencement of operations and prior to connection to the CWASA sewer network • Routine effluent quality monitoring in accordance with ECR 2023 permit requirements and approved monitoring programme (typically monthly or as permit conditions require). • Monthly review of wastewater volumes, treatment performance, sludge management records and waste transfer documentation. • Annual verification of permit validity for facilities used on an ongoing basis.		
			• Evidence that all fuels, oils, lubricants, chemicals, hazardous substances and hazardous cargo are stored, handled and transferred in accordance with the approved management plans. • Number of identified leaks and defects and time taken to complete repairs. • Availability, condition and accessibility of spill response equipment • Records of spill response drills and training exercises completed. • Hazardous material inventory records maintained and updated immediately upon receipt of hazardous materials. • Availability and currency of Safety Data Sheets (SDS) for all hazardous substances stored or used. • Condition of hazardous material storage areas, including secondary containment systems, security measures, weather protection and signage. • Evidence that all spills and releases are reported, investigated, documented and closed out through corrective actions. • Number and percentage of relevant personnel trained in spill prevention, spill response and hazardous materials handling. • Compliance with prohibition of bunkering activities. • Condition and operational performance of oil-water separators serving potentially contaminated operational areas. • Number of complaints, grievances, incidents, regulatory exceedances, permit violations or non-conformances related to hazardous materials, spills, stormwater management or pollution control.	Designated storage, handling and transfer locations for hazardous materials within the terminal area and areas under the operational control of LCT Ltd. Stormwater systems and oil-water separators.	• Hazardous material inventory updated upon receipt and reviewed monthly. • Weekly inspections of equipment, storage areas, secondary containment and spill response equipment. • Monthly inspections of hazardous material storage areas, stormwater systems and oil-water separators. • Monthly review of maintenance, spill and corrective action records. • Annual audits, training and spill response exercises. • Immediate monitoring following spills, leaks, contaminated discharges or equipment failures. • Monthly controls of conditions of oil-water separators • Additional monitoring following complaints, exceedances, non-	HSE team	LCT. Ltd.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					conformances or significant operational changes.		
	Ambient air quality	Medium	• Compliance with equipment maintenance schedules and inspection requirements. • Number of vehicles, generators, cranes and other equipment inspected and maintained. • Evidence of excessive exhaust emissions, smoke, fuel leaks or defective equipment. • Number of defective equipment items removed from service and repaired. • Compliance with vehicle and equipment idling controls. • Ambient concentrations of PM2.5, PM10, SOx, NOx • Number of complaints related to dust, exhaust emissions or air quality. • Number of air quality incidents, exceedances or non-conformances. • Evidence of corrective actions and their effectiveness.	Block A, Block C and the residential area opposite Block C (ambient PM2.5, PM10, SOx, NOx). Terminal vehicles, generators, cranes and other equipment.	• Weekly inspections of vehicles, equipment and generators. • Monthly review of maintenance records, inspection findings and idling compliance. • Immediate inspection and investigation following complaints, visible excessive emissions, exceedances or equipment failures. • Follow-up monitoring to verify effectiveness of corrective actions. • Quarterly monitoring of ambient concentrations for the first 3 years of operation then the monitoring frequency shall be adjusted depending on the monitoring results • Bi-annual review of monitoring results, trends, complaints and effectiveness of mitigation measures. • Additional review and assessment following any substantiated air quality complaint or cluster of complaints.	HSE team	LCT Ltd
			• Completion of solar PV feasibility assessment and implementation of identified feasible measures • Installed solar PV capacity (kWp) and electricity generated from solar PV (kWh/year) • Total energy consumption (electricity and fuel) • Annual Scope 1 GHG emissions from fuel combustion in vehicles, generators and terminal equipment (tCO_2e/year). • Annual Scope 2 GHG emissions from purchased electricity consumption (tCO_2e/year). • Fuel consumption by source and equipment type • GHG emissions intensity per TEU handled (tCO_2e/TEU) • Number of non-conformances or corrective actions related to GHG management and reporting. • Evidence that corrective actions have been implemented and are effective.	Terminal (electricity and fuel consumption records). Solar PV installation, where installed.	• Monthly recording of electricity and fuel consumption data. • Annual calculation and reporting of Scope 1, Scope 2 and total GHG emissions. • Annual review of GHG emissions intensity and emissions reduction initiatives. • Annual inspection and maintenance of solar PV systems, where installed. • Additional monitoring following significant operational changes, energy	Consultant	LCT Ltd

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					consumption increases, non-conformances or implementation of major emission reduction measures. • Follow-up monitoring to verify effectiveness of corrective actions.		
	Ambient noise levels	Medium	• Equivalent continuous sound level (LAeq), Maximum sound level (Lamax), and Maximum A-weighted fast response sound level (LAFmax). • Number of noise monitoring results exceeding established thresholds. • Number of vehicles, generators, cranes and other equipment inspected and maintained in accordance with maintenance requirements. • Evidence that acoustic enclosures are installed, maintained and functioning effectively. • Number of equipment items exhibiting excessive noise or vibration and removed from service for repair. • Number of noise-related complaints, grievances, incidents and non-conformances. • Evidence that corrective actions have reduced noise levels and prevented recurrence.	Block B, Block C and the residential area opposite Block C. Noise-generating equipment and acoustic enclosures at the terminal.	• Quarterly noise monitoring for the first 3 years of operation then the monitoring frequency shall be adjusted depending on the monitoring results • Monthly inspections of noise-generating equipment, acoustic enclosures and maintenance records. • Monthly review of complaints, incidents and monitoring results. • Additional monitoring following complaints, exceedances, equipment failures or significant operational changes. • Follow-up monitoring to verify effectiveness of corrective actions.	HSE Team	LCT Ltd
Ecological environment	Fisheries resources	Medium	• Number of fisheries-related complaints or grievances received. • Number of fishermen reporting disruption to fishing activities attributable to Project activities. Areas and duration of restricted access to fishing grounds resulting from Project activities.	Affected fishing communities and fishing grounds subject to restricted access.	• Grievances recorded and reviewed upon receipt. • Investigation initiated following receipt of a fisheries-related grievance • Quarterly consultation with affected fishermen throughout the construction period. • Additional consultation following significant complaints, incidents or changes in dredging or piling activities.	HSE Team	LCT Ltd.
			If dredging activities are conducted during fisheries sensitive periods as given in the ESMP: • Ambient turbidity (NTU). • Site-specific relationship between turbidity (NTU) and Total Suspended Solids (TSS) • Turbidity (NTU) and estimated TSS • Percentage increase in turbidity relative to ambient conditions.	Within 100 m of the active dredging location at mid water depth at three locations across the river width. Reference locations outside the influence of dredging.	• Once prior to the first dredging activity every year, to establish the site-specific relationship between turbidity (NTU) and TSS	HSE team	LCT Ltd.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			• Occurrence of turbidity levels exceeding the 10% trigger level (with reports of management actions taken and their effectiveness to reduce the levels below the trigger). • Occurrence of turbidity levels exceeding the 20% threshold level (with reports of management actions taken to reduce the levels below the threshold). • Width of unaffected river corridor available for fish movement. • Spatial extent of the sediment plume. • Evidence of continued occurrence and movement of migratory fish species based on consultation with fishermen and fishing communities • Reports from fishermen (through the fisheries consultant) indicating fish migratory movements and any other sources of potential disruption to fish migration, to be established prior to commencement of any turbidity inducing activities. • Reports from fishermen (through the fisheries consultant) on the success or issues with fish migration during and after project activities that could interfere with migration. • Records of consultations with the Fisheries Department regarding observed impacts on fisheries resources attributable to Project activities.	Upstream and downstream monitoring locations across the width of the estuary.	• Continuous real-time NTU measurements during active dredging activities • Daily review of data during active dredging • Daily review of satellite imagery where available during active dredging • Following any significant spill, dredging incident or abnormal monitoring result. • Weekly consultation of fishermen during active dredging activities • Consultation with the Fisheries Department annually for the first three years of operation and following any significant fisheries-related complaint, incident or observed impact. • Additional consultations where monitoring or observations indicate potential disruption of fish migration.		
	Tidal mudflats	Medium	• Abundance, density and species composition of benthic macroinvertebrate communities. • Species richness and diversity of benthic macroinvertebrate communities. • Physical sediment quality parameters: particle size distribution and total organic carbon (TOC). • Evidence of disturbance to mudflat habitat outside the approved project footprint	Two monitoring locations within the remaining mudflat habitat in the Project Area of Influence.	Annually during February/March to maintain consistency with baseline surveys and enable comparison of benthic community composition, abundance, diversity and sediment quality under comparable seasonal conditions. Following three years of operational monitoring, monitoring results and trends shall be reviewed to determine whether the monitoring frequency remains appropriate. Monitoring frequency may be revised where results demonstrate stable conditions and no evidence of Project-related impacts.	HSE Team	LCT Ltd
	Mangrove ecosystems	Medium	• Area (ha) of existing mangrove habitat present. • Area (ha) of mangrove habitat retained. • Area (ha) of mangrove habitat permanently affected. • Condition of the retained mangrove habitat, including evidence of vegetation stress, die-back, erosion, sediment deposition, physical damage, changes in canopy condition and changes in the extent of mangrove habitat. • Evidence of Project-related deterioration of retained mangrove habitat.	Mangroves near Block B (riverbank protection wall); Block C reclamation area and the area between Blocks B and C.	• Annual inspection of mangroves near Block B by a specialised expert • **Six-monthly ecological monitoring**: only applies if a future compensation/restoration site is identified following the CHA and feasibility	HSE Team	LCT Ltd.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					assessment. Every six months during the first three years following implementation of mangrove conservation, restoration, enhancement or offset measures at the approved compensation site(s). • As required during development of compensatory measures for consultation with government authorities, conservation organisations and other stakeholders. • Once prior to implementation of any approved mangrove conservation, restoration, enhancement or offset measures at the selected compensation site(s) to establish baseline ecological conditions. • Annually thereafter at the approved compensation site(s) until the approved objectives, performance criteria and success criteria have been achieved. • Following any incident, spill, storm event, unauthorised encroachment or damage affecting the mangrove habitat.		
	Dolphins	High	• Dolphin observations recorded by trained vessel personnel during maintenance dredging and vessel operations. • Evidence of dolphin avoidance behaviour, displacement, altered movement patterns or other observable behavioural responses associated with vessel activities. • With any collisions with marine mammals; monitor the number and nature of dolphin injury, mortality, collision or near-collision incidents involving Project-related vessels.	Dredging and vessel operation areas (observations from Project vessels)	Continuous observations by a dedicated person on the vessel of dolphins during maintenance dredging and vessel operations Recording and investigation of all dolphin injury, mortality, collision or near-collision incidents upon occurrence. Following any significant spill, pollution incident, dolphin mortality	HSE Team	LCT Ltd

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			• Implementation status of any dolphin conservation, habitat enhancement, research, awareness, restoration, offset or other biodiversity measures if required • Percentage of people employed by the Operator that work on the vessels having the awareness training on marine mammal collisions		event or substantiated complaint relating to dolphins. Six-monthly review of monitoring results to identify trends and determine whether additional mitigation measures are required. Monitor implementation status of dolphin conservation measures every six months after implementation for three years. Following the initial three-year period, monitoring frequency shall be reviewed based on performance against objectives, monitoring results and consultation with relevant stakeholders, and adjusted as appropriate. Additional monitoring where monitoring results indicate that objectives, performance criteria or success criteria are not being achieved. Annual awareness training		
	Avifauna and migratory birds	Low	• Bird abundance, species richness and species composition. • Presence and abundance of migratory, resident, threatened and conservation-priority bird species. • Bird habitat use, including feeding, roosting and nesting activity. • Evidence of disturbance attributable to operational activities, including noise, lighting, traffic and vessel movements.	Three representative bird habitats within the Project Area of Influence.	• One survey day at each monitoring location during February, March and April (9 days total). • Monitoring shall be undertaken once after three years of operation. Additional monitoring shall be undertaken where observations, complaints or other monitoring results indicate potential Project-related impacts on bird populations or habitat use.	HSE Team	LCT Ltd
Social Environment	Road traffic	Low	Road traffic survey (same as baseline survey) Traffic composition by vehicle type. Peak-hour traffic volumes. Average daily traffic (ADT) Evidence of Project-related changes in traffic volumes, traffic composition or congestion relative to baseline conditions	Two road traffic survey locations (same as baseline survey).	Once in the second year of operation (for 24-hour, two times): One weekday, one weekend day	Consultant	LCT Ltd.
			Report road traffic incidents with trucks coming from and going to the LCTP	Roads used by trucks to and from the LCTP.	When an incident happens	LCT Ltd.	-
	River traffic	Medium	Report river traffic incidents with Maersk vessels	River and navigation areas used by Maersk vessels.	When incident happens	LCT Ltd.	CPA

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			Counting two-way river traffic volume, vessel size & type Vessel size and vessel type. Peak-hour river traffic movements. Evidence of Project-related changes in river traffic volumes, vessel composition or navigation activity relative to baseline conditions.	Ghat–15.	Once in the second year of operation (for 24-hour, two times): One weekday, one weekend day.	Consultant	CPA
			Number of grievances (related to river crossing commuters and operators) registered and addressed	River crossing points used by commuters and operators.	Monthly review of grievance records	LCT Ltd.	CCC
			Number of commuters using the new ferry routes Trends in ferry usage relative to pre-relocation conditions	New ferry routes from Ghats 12, 15 and Badalpura Ghat.	Monthly collection and review	LCT Ltd.	CCC
			Number of grievances (including GBV/SEA-SH grievances through specific grievance mechanism)) registered and addressed and analysis of topics, events, locations which generate more grievances Percentage of grievances resolved within the defined timeframe.	Project-affected communities and workforce; grievance locations as recorded in the grievance register.	Monthly review of grievance records	LCT Ltd.	-
			Visual evidence of community health and safety risks (CHS register)	Within and around the terminal site.	Daily CHS inspections Monthly review of inspection findings, complaints and corrective actions	LCT Ltd.	-
			Number and nature of community health and safety incidents attributable to Project activities. Number and nature of emergency incidents with the potential to affect communities. Results of emergency response drills involving external stakeholders. Functionality of emergency communication and warning systems.	Terminal and surrounding communities; emergency communication and warning systems.	Monthly	HSE Team	LCT Ltd.
	Livelihood, health and safety of communities	High	• Number and nature of traffic incidents involving Project-related vehicles and community members, pedestrians, cyclists or other road users. • Number and nature of traffic-related community grievances and complaints. • Pedestrian movements and road safety conditions. • Number of driver training sessions and community road safety awareness activities completed. • Number and status of investigations and corrective actions implemented in response to traffic incidents, complaints or road safety concerns.	VIP Road, ferry access points and other key crossing locations.	• Traffic incidents and community grievances shall be recorded and investigated upon occurrence. • Pedestrian movements and road safety conditions at VIP Road, ferry access points and other key crossing locations shall be reviewed quarterly during the first three years of operation. • Driver training records and community road safety awareness activities shall be reviewed annually. • Traffic generation and traffic volumes shall be validated once during the first year of operation to confirm traffic forecasts and determine whether additional traffic management or road safety measures are required.	HSE team	LCT Ltd.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
					• Additional monitoring shall be undertaken following any significant traffic incident, substantiated community complaint or recurring road safety concern.		
			• Number and nature of community grievances or complaints relating to electricity supply interruptions, voltage fluctuations, water supply interruptions or reduced water availability potentially associated with Project operations. • Number and outcomes of consultations with BPDB, CWASA and relevant authorities regarding Project-related electricity and water demand. • Annual electricity and water consumption by the terminal. • Evidence of implementation of water and energy efficiency measures.	Terminal (electricity and water consumption); communities in the Area of Influence.	• Community grievances relating to electricity and water supply shall be recorded and reviewed upon receipt. • Electricity and water consumption data shall be reviewed annually. • Consultation with BPDB, CWASA shall be done bi-annually during the first three years of operation	HSE team	LCT Ltd.
			Socio-economic conditions, including livelihoods, income, employment, access to services, community perceptions and project-related impacts collected through a social survey (min. 384 sample size)	Area of Influence (minimum sample size 384).	Once after 3 years from start of operation	Social consultant	LCT Ltd.
	Construction and Operation workers	High	Visual inspection on health and safety measures reported in CMP Visual inspection to ensure dust suppression measures are in place Visual inspection whether fuel and other flammable materials are stored safely	Terminal site, including dust suppression areas and fuel/flammable material storage areas.	Monthly	HSE Team	LCT Ltd
			• Percentage of personnel who have signed the Worker Code of Conduct. • Number of personnel trained on the Worker Code of Conduct. • Number and nature of Code of Conduct violations. • Number and nature of community grievances related to worker behaviour. • Compliance with workforce management requirements.	Terminal site and nearby communities.	• Prior to commencement of work for all personnel. • Monthly review of training records and Code of Conduct compliance. • Monthly review of community grievances and complaint trends. • Following any substantiated complaint, serious incident or breach of the Worker Code of Conduct.	Operator	LCT Ltd.
			Number of grievances from workers registered and addressed and analysis of topics, events, locations which generate more grievances	Terminal workforce; grievance locations as recorded in the grievance register.	Monthly	LCT Ltd.	-
			Monitoring if personal protective equipment is used during work	Work areas at the terminal.	Daily	HSE Team	LCT Ltd
			Number and duration of water supply interruptions affecting terminal operations or worker welfare facilities. Water quality at points of use, including compliance with applicable drinking water standards.	Terminal operations and worker welfare facilities (water points of use).	Monthly	HSE team	LCT Ltd.

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring	
						Implemented by	Supervised by
			Availability and condition of shaded rest areas, drinking water stations and cooled recovery areas. Implementation of work-rest regimes and other heat stress control measures during periods of elevated temperature.	Shaded rest areas, drinking water stations and cooled recovery areas at the terminal.	Heat stress control measures shall be reviewed during periods of elevated temperature and extreme heat conditions	HSE team	LCT Ltd.
	All VECs	High	Number and percentage of key suppliers, contractors and subcontractors audited against environmental, social, labour, health and safety requirements	Key suppliers, contractors and subcontractors.	Prior to any engagement with contractors and thereafter annually	HSE team	LCT Ltd.

1.7.3 Residual impacts

Following the implementation of mitigation measures, several residual impacts may remain. These include:

- Permanent closure of the *Ghat 14* river crossing, resulting in changes to existing travel routes and mobility patterns. However, nearby ghats may be able to accommodate river-crossing demand currently served by *Ghat 14*.
- Long-term changes associated with the replacement of the *Khal 14* open drainage channel by a culvert, particularly regarding maintenance access for the responsible authority and sediment accumulation risks.
- In the past, physical displacement of communities from the project site caused residual impacts to the affected people at this moment in time. LCT Ltd. is developing a Social Assistance Program to address these impacts by livelihood restoration, vulnerability support, socio-economic assessments, stakeholder engagement and grievance management. This program will be implemented over the coming years.
- Remaining risks to sensitive ecological receptors, particularly dolphins, despite extensive mitigation and monitoring measures.
- The ESMP therefore adopts an adaptive management approach, allowing mitigation measures to be revised if monitoring shows impacts are greater than anticipated.

1.7.4 Institutional arrangements

Implementation of the ESMP will involve multiple organisations and authorities. Responsibilities will be shared among LCT Ltd., contractors, operators, consultants, regulatory bodies and specialised agencies. Construction and operational management plans will further define roles, responsibilities and reporting requirements. Monitoring activities will involve organisations such as the Bangladesh Water Development Board (BWDB), Chattogram City Corporation (CCC), Chittagong Port Authority (CPA), Department of Forest, Fisheries Department and the Department of Environment (DoE).

Independent oversight will be provided through consultant supervision, external audits and annual third-party reviews of ESMP implementation and environmental and social performance.

1.7.5 Grievance Redress mechanism

A project-wide Grievance Mechanism (GM) will be established to receive, register, investigate and resolve concerns from communities, workers and other stakeholders. The mechanism will include:

- A dedicated grievance process within the SAP for historically displaced households.
- Recording and monitoring of community grievances, including GBV/SEA-SH related complaints.
- Monitoring and reporting of worker grievances.
- Periodic analysis of grievance trends, locations and recurring issues to improve project performance.

The GM forms a key component of stakeholder engagement and adaptive management, providing a transparent process for identifying concerns and ensuring timely corrective action throughout the project lifecycle.

1.8 Consultation and Disclosure

The consultation process was designed to ensure that potentially affected communities, occupational groups, vulnerable populations, local institutions, and government stakeholders were provided with opportunities to understand the Project, express concerns, and contribute to the assessment and planning process. The consultations aimed to identify stakeholder priorities, understand perceived risks and benefits, gather recommendations for mitigation and benefit enhancement, and support transparent and inclusive decision-making.

A comprehensive consultation programme was implemented using a combination of Focus Group Discussions (FGDs), Public Consultation Meetings (PCMs), Key Informant Interviews (KIIs), social surveys, informal community discussions, and meetings with community leaders and institutional stakeholders. Particular emphasis was placed on engaging potentially vulnerable groups, including women, adolescent girls, landless households, elderly people, persons with disabilities, and livelihoods that could be affected by the Project such as fishermen, boatmen, transport workers, ferry users, labourers, and small business owners. In total, 194 participants attended the public consultation meetings and 145 participants took part in the FGDs, ensuring broad representation from communities within the Project Area of Influence.

Stakeholders were informed about the Project scope, potential impacts, employment opportunities, community health and safety considerations, and proposed mitigation measures. Their feedback and concerns were documented and incorporated into the ESIA and ESMP. While stakeholders generally welcomed the anticipated benefits of the Project, including economic growth, employment generation, and improved infrastructure, they emphasized that these benefits should not come at the expense of local communities, livelihoods, or environmental resources. Concerns focused on displacement, pressure on existing infrastructure and services, impacts on fisheries and water resources, and environmental degradation.

Key issues raised included the need for fair compensation for the historically resettled communities, effective rehabilitation and livelihood restoration for affected households, improved access to safe water, and protection of local environmental resources. Stakeholders also highlighted concerns regarding loss of vegetation, impacts on river ecosystems, and the protection of cultural and religious sites, while supporting reforestation. Local employment was strongly encouraged, alongside transparent recruitment, skills development, fair labour practices, and effective grievance mechanisms. Community health, safety, traffic management, and the protection of women and vulnerable groups were also identified as priorities. Overall, stakeholders expect transparent governance, meaningful engagement, robust environmental management, and equitable distribution of project benefits. The findings and recommendations from the

consultation programme have been incorporated into the ESIA assessment and informed the development of mitigation measures and management plans within the ESMP.

Disclosure will be done according to the ECR regulations of DoE.

1.9 Recommendations

The following recommendations are based on the baseline scenario, likely impacts of the Project on the VECs, environmental and social guidelines, regulations and policies and stakeholder consultations:

- It is suggested to implement the project following the recommended mitigation measures as depicted in the Environment and Social Management Plan described in Chapter 11. The ESMP shall be included in the bid document of civil works and need to become part of the civil works contracts. The timely implementation of ESMP will reduce negative impacts;
- The Environmental Monitoring Plan, described in Chapter 10, shall be strictly followed by executing agency, consultants and the contractor to ensure compliance with the mitigation measures;
- Strict monitoring shall be undertaken during maintenance dredging to ensure that turbidity levels remain within acceptable limits and potential impacts on the aquatic environment are minimized.
- LCT Ltd. and the contractors shall abide by relevant environmental rules, regulations including workers' and community health and safety aspect, prevention of air, noise and water pollution and protection of aquatic fauna and flora.
- Independent third-party environmental and social monitoring shall be undertaken during the construction phase to verify compliance with the ESMP and the effectiveness of mitigation measures.

2 General Information

2.1 Background of the Project

The Laldia Container Terminal Project (LCTP, or the Project) is a strategic initiative to address port congestion challenges in Chattogram by expanding container handling capacity and improving operational efficiency at the Port of Chattogram. Located at Laldia Char along the west bank of the Karnaphuli River in Chattogram, the terminal will add approximately 0.8 million Twenty-Foot Equivalent Unit (TEU) per year of new handling capacity (in the moderate case scenario, see Section 3.2.3.2). This will relieve pressure on existing terminals, reduce congestion and vessel waiting times, and strengthen maritime logistics performance to support Bangladesh's trade competitiveness and regional connectivity.

The terminal is being developed under a Public Private Partnership (PPP) between the Chittagong Port Authority (CPA) and Laldia Container Terminal Ltd. (LCT Ltd.), a joint venture between APM Terminals (APMT) and QNS Container Services Ltd. (QNS Ltd.). A 30□year concession agreement (CA) for the design, financing, construction, operation, and maintenance of the terminal was signed on 17 November 2025, representing one of the largest PPP investments in Bangladesh's port sector. LCT Ltd.'s involvement brings international expertise in container terminal management, digital optimization, energy efficient operations, and global best practice in port safety and reliability, supporting the long term modernization of the Port of Chattogram. The development of LCTP will take environmental and social aspects into account and therefore an Environmental and Social Impact Assessment (ESIA) is being prepared. This ESIA is prepared for submission to the Department of Environment (DoE) for permitting purposes in Bangladesh.

The construction and operation of the LCTP may affect the current conditions of the physical, ecological and social environment in the project area. This ESIA will identify and assess the significance of these (positive and negative) impacts and risks and will formulate measures to enhance positive impacts and eliminate or reduce the negative impacts.

Following the Environment Conservation Rules, 2023 (Bangladesh, 2023). LCTP falls in the "Red" category projects, which are likely to have significant environmental and/or social impacts. For this category the preparation and submission of a comprehensive ESIA and an Environmental and Social Management Plan (ESMP) needs to be prepared. A Terms of Reference (ToR) has been approved by the DoE on *07 October 2026* (Annex A).

2.2 Project Proponent

The Project Proponent's details are:

Laldia Container Terminal Ltd. (LCT Ltd.)
Gulshan Centre Point, 20th Floor
House# 23-26, Road # 90,
Gulshan 02 Dhaka-1212,

Bangladesh

Contact Person:

Romesh Michael David
Executive Director, Laldia Container Terminal Limited (LCTL)
Gulshan Centre Point, 20th Floor, House# 23-26, Road # 90, Gulshan 02 Dhaka-1212, Bangladesh
Phone: +880 9612888061
E-mail: romesh.david@apmterminals.com

2.3 Consulting Firm's Information

The ESIA consulting firm is:

Haskoning Nederland BV
Mijnbouwstraat 120, 2628 RX Delft, Netherlands
E-mail: info@haskoning.com

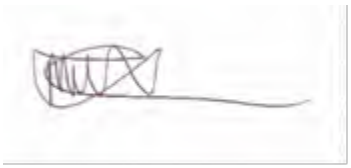
together with:

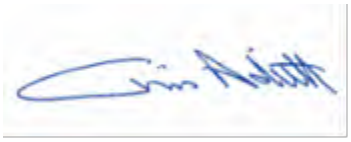
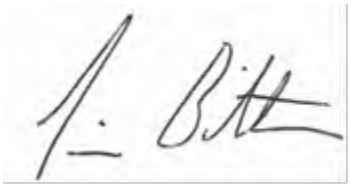
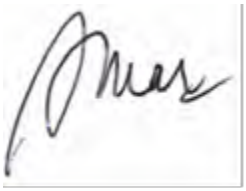
Institute of Water Modelling (IWM)
IWM Bhaban, House 6, Road 3C, Block H, Sector 15, Uttara, Dhaka 1230, Bangladesh
E-mail: fal@iwmbd.org

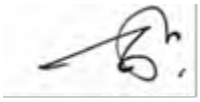
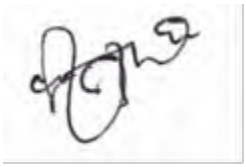
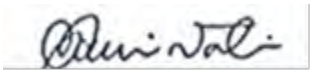
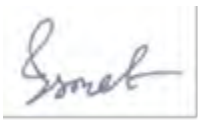
Bureau Of Research, Testing & Consultation (BRTC/BUET)
Dhaka-1000, Bangladesh
E-mail: tanvir@itn-buet.org

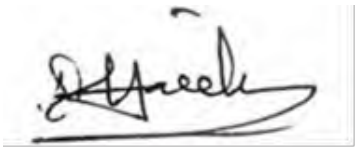
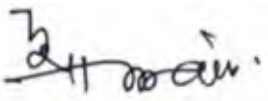
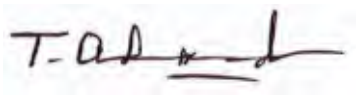
The assignment requires interdisciplinary analysis with specialized knowledge in the port and maritime sector (i.e. physicochemical environment, biodiversity, fisheries, socio-cultural, water resource, and hydrology). The composition of the study team is given below.

Table 2-1: Study team composition

Area of Expertise	Names	Qualifications	Signature
Technical Director/ Social Expert	Margriet Hartman	MSc. Physical Geography, PG Cert Social impact assessment, 35 years of experience	
ESIA expert	Hande Hatipoğlu	PhD Environmental Engineering, 17 years of experience	

Area of Expertise	Names	Qualifications	Signature
Marine ecologist	Chris Adnitt	BSc (Hons) Biological Science, 31 years of experience	
Soil expert	Jan Jurjen Schiphuis	BSc Environmental Engineering, 33 years of experience	
Marine/Aquatic Mammals specialist	Stephanie Barnicoat	MSc Biodiversity (Merit), 10 years of experience	
Underwater noise specialist	Tim Britton	Post-graduate Diploma, Acoustics and Noise Control (Special Commendation), 17 years of experience	
Social Expert	Niki Quee	MSc. Sustainable Development, BSc. Human Geography & Urban Planning, 4 years of experience.	
Ecological and water management Expert	Calvin Damen	MSc. International land and water management, 5 years of experience	
Environmental Specialist	Farhana Akhter Kamal	M.Sc. in Civil (Water Res) Engineering, University of Calgary, Canaday, Canada B.Sc. in Civil (Env.) Engineering, BUET 21 years of experience in Water and environmental sector.	
Ecologist	S M A Rashid	PhD (Zoology/Ecology/Ornithology), 40 years of experience	

Area of Expertise	Names	Qualifications	Signature
Fisheries Expert	Golam Mustafa	Ph.D. on Coastal and Marine Fishery resources management model development, 29 years of experience	
Social and Peoples' Participation Specialist	Md. Mustafizur Rahman	M.S.S and B.S.S in Sociology, DU; 27 years of Experience	
Livelihood, Gender and Labour Management Specialist	Mahidul Islam	M.S.S and B.S.S in Anthropology, 25 years of experience	
Morphologist and Sediment Plume Transport Modeller	Md Raqubul Hasib	M.Sc. in Civil Engineering, B.Sc. in Civil Engineering, 13 years of experience	
Oil Spill Modeller	Dr. Upal Mahmud	Ph.D. in Coastal Engineering, 21 years of experience	
Flood Management Specialist	Shaikh Nahiduzzaman	M.Sc. in Water Resources Engineering, B.Sc. in Civil Engineering, 15 years of experience	
Communication Expert	Samiun Nabi	Master of Business Administration (MBA), IBA, DU; BSc. In Urban & Regional Planning, BUET; 22 years of experience	
Water Supply and Sanitation Expert	Ismat Ara Parvin	Postgraduate Diploma in Disaster Management, M.Sc. in Civil Engineering (Environment), B.Sc. in Civil Engineering, 22 years of experience.	

Area of Expertise	Names	Qualifications	Signature
Noise Management Specialist	Ahmad Salman Haider	Master's in environmental engineering, The University of Melbourne, Australia. B.Sc. in Water Resources Engineering, BUET. 21 years of experience.	
Dredging Specialist	Tarek Bin Hossain	M. Eng. Water Resources, B. Sc. Engineering (Civil), 35 years of experience	
Transportation/ Traffic Specialist	Md Zahid Hasan Siddique	M.Sc. in Photogrammetry and Geoinformatics, BSc in Urban and Regional Planning, 22 years of experience.	
Environmental engineer	Professor Tanvir Ahmed	Ph. D., Environmental Engineering, more than 15 years of experience	

3 Project Description and Options

3.1 Rationale, Objective, and Benefits

Bangladesh has achieved significant economic growth over the past decades, mainly due to remarkable expansion of the textile and garment industry since the late 1970s. This growth has resulted in a significant increase of demand for international and domestic freight transport. One of the most stringent logistical issues in the country that Bangladesh faces is port congestion.

The LCTP at Chattogram Port is being developed to meet this rising demand for container handling capacity. Chattogram Port handles over 98% of Bangladesh's international containerized trade (CPA, 2025). It serves as the primary gateway for textile exports as well as most agricultural imports and exports (Kabir, 2021).

Due to rapid industrial and commercial developments, the port has exceeded its designed capacity of 1.75 million TEU since 2014 (Kawasaki, 2023). Existing facilities face significant congestion, extended vessel waiting times, and limited berth and yard capacity, leading to operational inefficiencies such as increased fuel consumption and emissions from idling ships and trucks. To support national economic growth, enhance trade competitiveness, and handle larger volumes of containerized cargo, the Government of Bangladesh and CPA have prioritized investment in a modern, efficient container terminal.

The project supports Bangladesh's sustainable development objectives by facilitating more efficient trade flows, reducing vessel idling and associated emissions, promoting safer and more transparent operational practices, and creating local employment opportunities during both construction and operation. It will also strengthen connectivity to key industrial centres, particularly the textile and garment sectors that dominate national exports.

The LCTP will introduce upgraded handling equipment, improved yard logistics, enhanced road access, and deeper berths to support efficient vessel operations. The project is expected to contribute to reduced congestion, increased cargo throughput, improved service reliability, and long-term resilience of port operations in Bangladesh.

3.2 Description of the Project

3.2.1 Requirement of Land

The LCTP site at Laldia Char was acquired by the CPA in 1930 from the Railway Board and has remained under CPA ownership since, despite periodic leasing. The site is divided into Blocks A, B, and C (see

Figure 3-2). Block A consists of 10 acres / 4.05 ha, Block B consists of 7.15 acres / 2.89 ha, and Block C consists of 32 acres / 12.95 ha. Site clearance in the past is described into more detail in Chapter 5 as part of the social baseline. Note that for the impact assessment, the area sizes from the Concession Agreement have been used, which are slightly different than the actual area sizes

that were measured and given in the handover document as given above (see Section 3.2.3.9 for area sizes used for the impact assessment).

The LCTP requires dedicated land to enable the design, construction, operation and maintenance of a modern container handling facility, including associated marine and landside infrastructure. Under the CA, the Government of Bangladesh, through the CPA, grants the Concessionaire (LCTP) the exclusive right to develop and operate the terminal within a defined Concession Area for the duration of the concession period (see Section 2.1).

The land is required to accommodate the full range of port terminal functions, including quay infrastructure, container yards, cargo handling equipment, access roads, utilities and operational support facilities. These uses are integral to the safe and efficient handling of containerised cargo and the delivery of port services in accordance with Good Industry Practice.

The Project is located on land that is under the ownership and control of the CPA. The CPA retains full legal ownership of the land and is responsible for ensuring that the Concession Area is made available to the Project with clear title, free of encumbrances and with vacant possession.

The Concessionaire does not acquire ownership of the land. Instead, it is granted:

- An exclusive licence to occupy and use the Concession Area
- Rights of access, egress and passage
- The ability to utilise the land solely for the purposes of implementing and operating the terminal

This arrangement ensures that the land remains public asset infrastructure while enabling private sector investment and operational expertise under a PPP model.

Access to the land is essential to enable:

- Site investigation, surveys, and preparatory works prior to construction
- Construction of terminal infrastructure and installation of equipment
- Ongoing operations, maintenance and service delivery during the operational phase

The requirement for land is driven by the need to:

- Develop capacity to handle growing container volumes at Chattogram Port
- Improve port efficiency, reduce congestion and enhance trade facilitation
- Provide modern infrastructure meeting safety, environmental and operational standards
- Enable integration with transport networks and logistics systems

The defined Concession Area ensures that all required infrastructure and operations are contained within a controlled footprint, allowing for effective environmental and social management, safe operations and long-term sustainability of the terminal.

3.2.2 Project Location and Surrounding Environment

The LCTP is located on the west bank of the Karnaphuli River in Bangladesh, approximately 9 km downstream from the existing Port of Chattogram and 3.5 km from the Bay of Bengal. The site lies between Shah Amanat International Airport and the Karnaphuli River, on the outskirts of Chattogram. The airport both hosts domestic and international flights, as well as a base from the Bangladesh Airforce. This area features a mix of industrial and commercial activities, agriculture, aquaculture, nearby residential settlements, and an established road network.

In the wider port environment, there are three main container terminals in Chattogram: General Cargo Berths (GCB), Chittagong Container Terminal (CCT), and New Mooring Container Terminal (NCT) (Figure *3-1:*). Expansions have been realized through the new terminals of Patenga (operational since 2024).



Figure 3-1: Location of the Laldia Container Terminal Project (LCTP) as well as the other container terminals, within Bangladesh (left) and the Port of Chattogram (right).

The Karnaphuli River supports high loads of marine traffic, industrial developments, fisheries, sand sourcing, and dredging activities. More than 800 industrial units operate along the estuary banks, including oil refineries, fertilizer plants, shipbreaking yards, textile and chemical industries, and oil depots. The project site is connected by two main roads: the Chittagong Coastal Highway, running along the coastline north of the Karnaphuli River mouth, arriving to the site from the

western direction (through the VIP road); and a second major access road linking to wider Chattogram City on the northeastern side, primarily following the river's trajectory (airport road).

On the east bank of the Karnaphuli River, opposite the project site, key industries include the Karnaphuli Fertilizer Company (KAFCO), a major urea and ammonia producer on 100 acres. Adjacent to KAFCO, there is the Korean Export Processing Zone (KEPZ), established in 2006 on 222 acres. The KEPZ hosts garment, footwear, and electronics firms. North of the KEPZ there is a natural area part of a KEPZ-managed green-space belt. Directly across Block C, there is a dry dock facility that is currently under construction. Next to industrial activities, there are several sites dedicated to the Bangladesh Navy, including multiple jetties, and a marine academy.

The project spans three blocks allocated by the CA (Block A, B, C, see Figure 3-2). The spatial division of these three blocks is further illustrated in Figure 3-6, which provides a more detailed, zoomed-in view of the project area, including the indicative Block layout as provided during the tender phase.

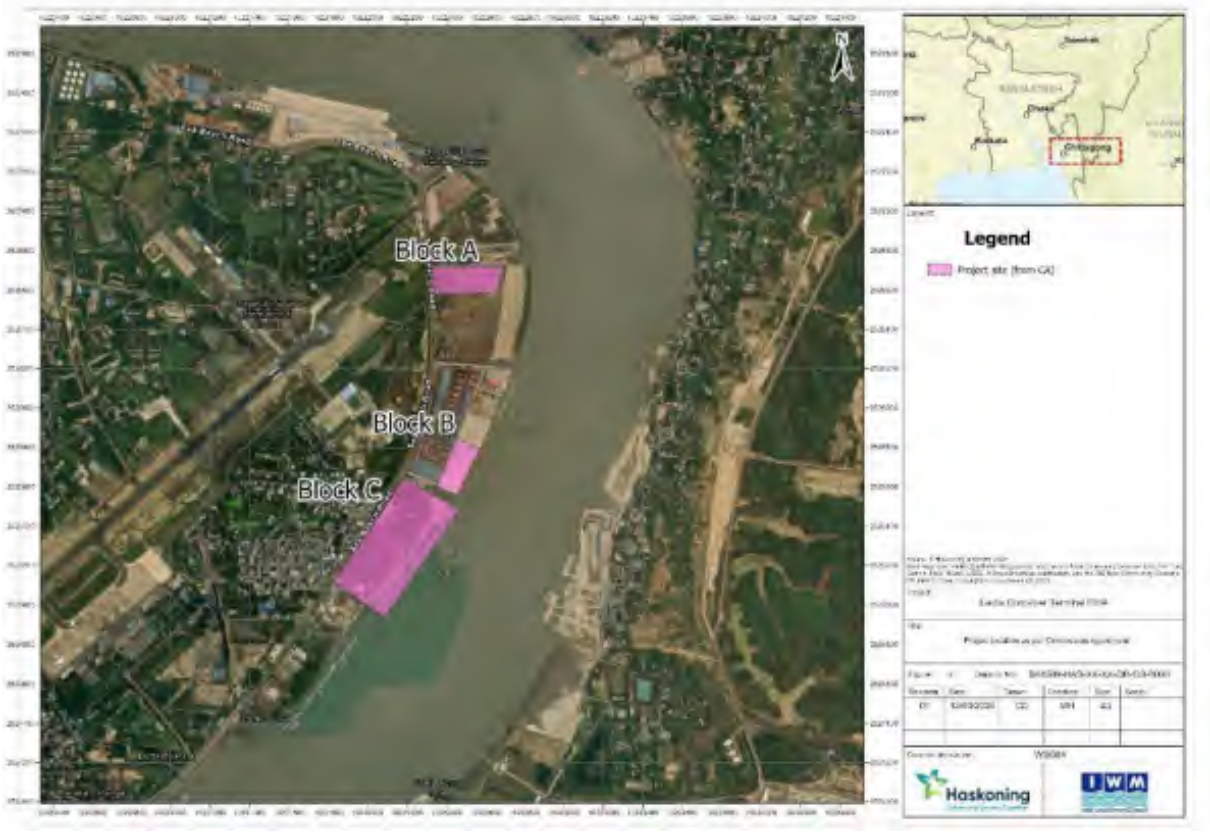


Figure 3-2: Project site layout showing Blocks A, B, and C of the LCTP (source: ESIA team)



Figure 3-3: Left: Block C; right: riverside at Block C with existing flood wall and mudflat (source: ESIA team, March 2026)

Block C, the largest block, comprises greenfield land with cleared vegetation and an intertidal mudflat between the site and river, included within the concession area (Figure 3-3). Block C is situated adjacent to Airport Road/ Patenga Road, between the road and the river. South of Block C is an ongoing activity, where dredged material is currently being stored, as observed during one of the site visits. Further south, there is a jetty that is dominantly used to host navy vessels. North of Block C, between Blocks C and B, a drainage channel managed by the Bangladesh Water Development Board (BWDB) features a sluice gate and pumping station for drainage and storm surge control. There is also a jetty that hosts a ferry to transport people across the river. See Figure 3-4:.



Figure 3-4: Left: drainage channel and ferry jetty (seen from Block C, southern side of the channel). Right: ferry and jetty seen from Block B (northern side of the channel) (source: ESIA team, March 2026)



Figure 3-5: Left: pavement on Block B, right: Block A (source: ESIA team, March 2026)

Block B, north of Block C and the drainage channel, is located adjacent to the river, between an inland container depot company, Incontrade Limited, and the river. An office from the department of fisheries and CPA's environment office sits north of Block B. Block B is completely paved (see Figure 3-5). Hundred metres north of Block B and south of Block A is a narrow drainage channel. Block A, approximately 600 m further north, occupies an existing paved area with a 20–30 m green belt comprising grassland and some trees at the river side and another drainage channel (with sluice gate and pumping station) to the north (see Figure 3-5). Two planned developments are located immediately adjacent to the Project site and may contribute to cumulative environmental and social impacts. South of the Block C boundary, a new container terminal is proposed directly adjacent to the Project area. In addition, a heavy-lift cargo terminal is planned near the riverbank adjacent to Block A. Given their proximity to the Project, these developments are considered in the cumulative impact assessment. See the division of the three different Blocks in Figure 3-6.

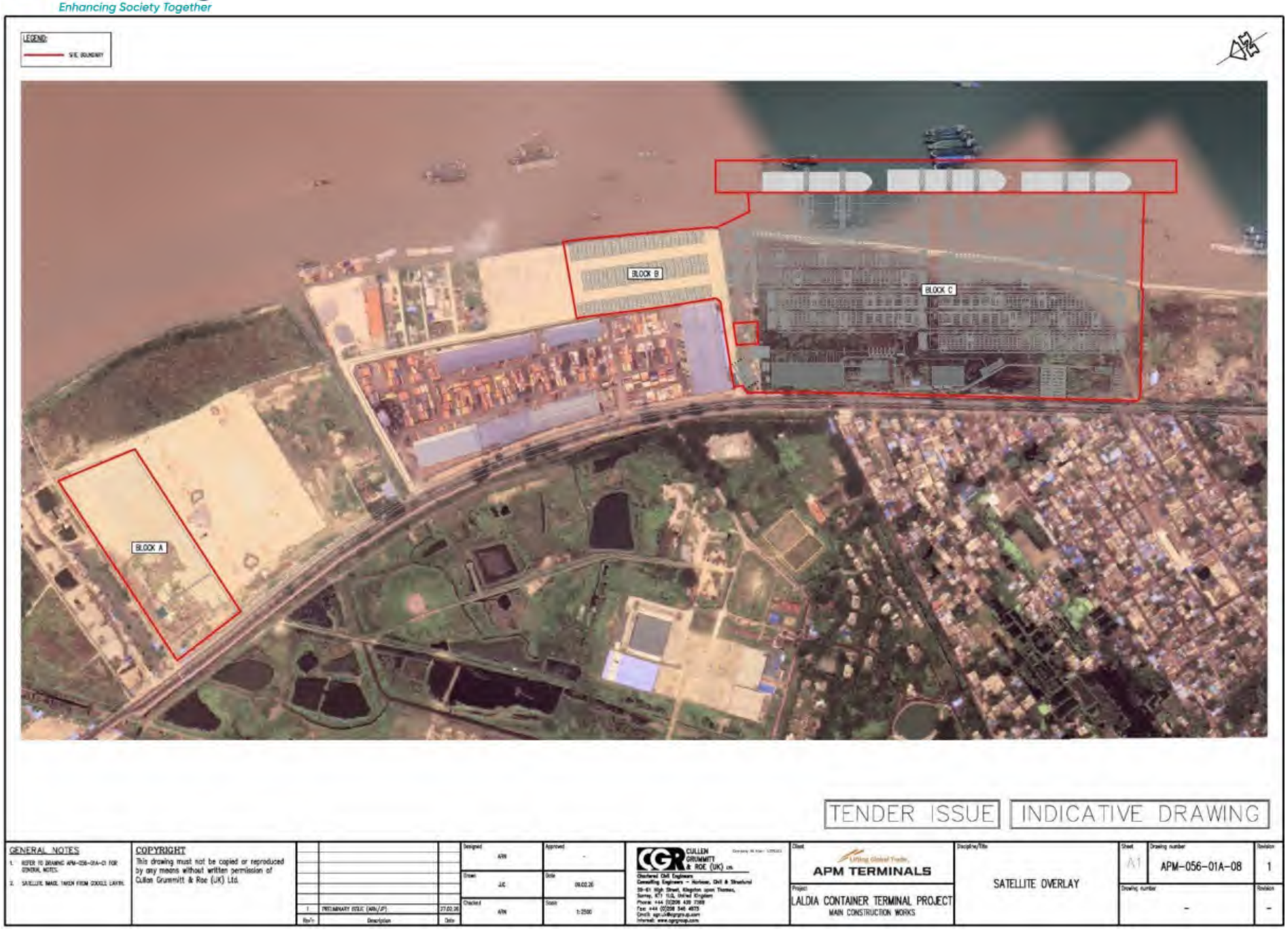


Figure 3-6: Location of Block A, B, and C, including berthing area (source: Asset Design Drawings APM-056-01A-08 rev. 1)

3.2.3 Project Components

3.2.3.1 Introduction

The project description, as given in this report, is based on the conceptual design details provided by LCT Ltd. as used in the design and construct (D&C) tenders for the LCTP. As the tenders are D&C, the contractors will prepare detailed designs and therefore the information in this ESIA may be subject to changes that will become known during the detailed design stages. The ESIA will clearly present the base case for which the impact assessment was done, as presented in this chapter.

In this ESIA, assumptions have been made for any unknown design parameters or construction methods, which will reflect the most likely scenario for this Project. In the case of doubt, a more conservative approach has been taken. These assumptions will form the basis for the impact assessment, including any modelling or calculations and the development of mitigation measures. These assumptions are integrated in this chapter and subsequent impact assessment sections.

3.2.3.2 Container Terminal

The LCTP will utilize Blocks B and C of the Laldia Char site for the container terminal, as allocated by the CA, with Block A serving a supporting role for truck parking and processing. The terminal shall be developed as an International Ship and Port Facility Security (ISPS) compliant operational zone. The size and functionality of the Blocks are as follows:

- **Block C** (32 acres / 12.95 ha) forms the core of main terminal operations due to its suitability for large-scale infrastructure.
- **Block B** (7.15 acres / 2.89 ha) supports the temporary storage of empty containers and is located adjacent to Block C.
- **Block C and B** will be connected for the transfer of containers. The area of the drainage channel will be filled with soil and a culvert.
- **Block A** (10 acres / 4.05 ha total available) will be used as waiting and processing area for trucks before entering the actual container terminal. It has space for parking more than 240 trucks. Block A is located in the flight paths of Shah Amanat International Airport runway and is therefore subject to height restrictions.

The terminal is designed for an upper capacity of 1.4 million TEU (standard size where one 40-ft container = 2 TEU), which is approximately 820,000 container boxes (with an estimated 1.71 TEU per move) annually. LCTP will be equipped with seven (7) ship-to-shore (STS) cranes, 32 electrically powered remote-controlled rail-mounted gantry cranes (eRTG), and six (6) empty container handlers (ECH). The STS cranes in the terminal will lift containers directly from arriving ships to Tractor Trailers (TTs) which are then transported onto the terminal's storage yard. Each crane can handle about 35 containers per hour during busy vessel operations, working together to quickly unload and load cargo. This crane productivity is based on the terminal's design capacity of processing 1.4 million TEUs annually. In practice, the terminal is estimated to handle around 800,000 TEU per year, presented as Scenario 2, the middle range (Figure 3-7). During highest

astronomical tide (HAT), the cranes can handle up to 5 container tiers high on typical 6,000 TEU vessels (3.2.3.2).

As part of the feasibility study, there are three throughput scenarios determined. The upper range represents the design capacity, the middle range is the scenario in accordance with the CA, and the lower scenario represents conservate utilization. See the three scenarios and throughput in TEU in Figure 3-7.

Scenario	TEU Throughput	Description
Scenario 1 — Lower Range	640,000 TEU/year	Represents a conservative ramp-up or sustained lower utilisation scenario, reflecting potential market conditions where volume growth is slower than forecast
Scenario 2 — Middle Range	800,000 TEU/year	Consistent with the Concession Agreement public target capacity and the basis for the terminal's published fact sheet parameters
Scenario 3 — Upper Range	1,400,000 TEU/year	Represents a high-utilisation scenario reflecting the terminal's design capacity potential under optimised operational conditions and favourable market conditions

Figure 3-7: Throughput scenarios (source: Technical Feasibility Study LCTP, November 2025)

Supporting facilities include eight truck entry gates and four exit gates, a 3,850 sqm warehouse and 656 reefer connections. The conceptual layout for the container terminal is given in Figure 3-8.

Basic level of technology installed includes:

- Crane Optical Character Recognition (OCR) and Truck Alignment System
- RTG Remote Control (Level 2)
- Automated Gate
- Reefer Monitoring
- Automation Integration Layer
- Asset Digitization

The proposed terminal elevation is slightly higher than the public road, estimated at +8 m Indian Spring Low Water Level (ISLWL) at Block C. In comparison, the measured elevations from the existing Block B from the 2026 topographical survey are approximately 7.65 m ISLWL and the road gradually increases in height from 6.77 m ISLWL near Block B to 7.96 m ISLWL at the envisioned northern edge of Block C (SURVEY2000, 2026). The terminal levels will differ slightly to allow natural stormwater drainage to designated underground channels (see Section 3.2.3.12). The elevations range from 7.99 m ISLWL at the main drain, to 8.61 at the highest point.

The yard is separated into several sections. The riverside edge includes a continuous quay alignment for vessel berthing, forming the marine interface of container handling operations. Crane rails are located along the quay, designating the operational span for ship-to-shore cranes used

for vessel loading and unloading. In the main yard on Block C, there are five rows of dedicated container stacks, about 26.2 meters wide and lengths of up to 277 meters with rows of smaller length near the roadside. The container stacks are designed to reach up to 6 containers in height. Dedicated reefer slots with power pedestals are depicted centrally, shown in Figure 3-8 with the blue shaded rows. A separate yard zone on Block B is dedicated to lower density stacking of empty containers.

The yard is entered on the western edge through a multi-lane entry plaza with booths, scanners, and weighbridges that are meant to regulate truck inflow and conduct inspections. A smaller exit gate area on the eastern side manages outbound traffic with verification booths and automated systems.

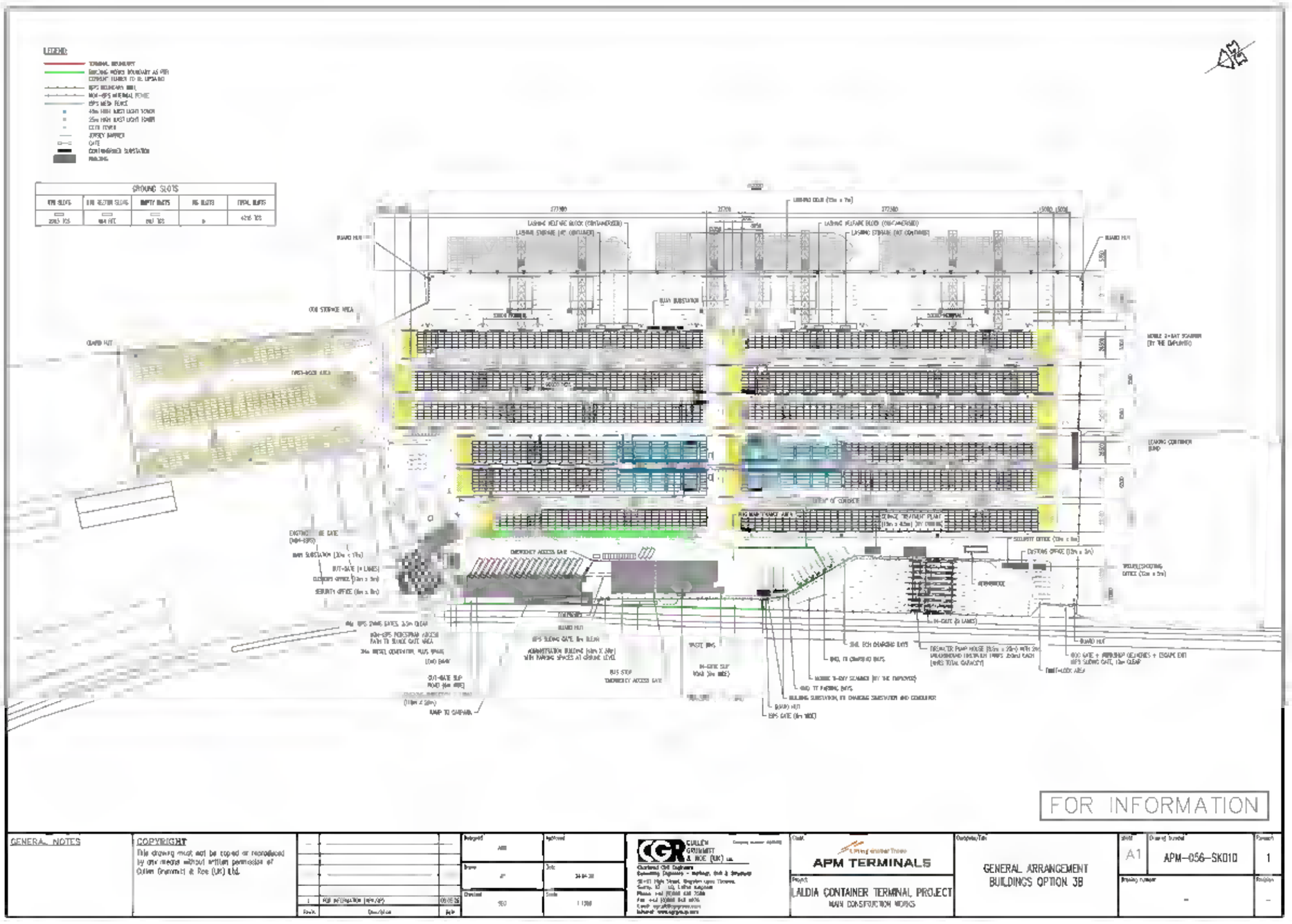


Figure 3-8: Container terminal layout (source: Asset Design Drawing APM-056-SK10 rev. 1)

3.2.3.3 Buildings

The project includes the development of several purpose-built terminal buildings, comprising a 3,850 m² customs building, administrative and operational facilities, and specialized infrastructure for secure and efficient cargo processing. All buildings are clustered near the roadside of the terminal. Buildings that are currently included in the conceptual layout are:

- 3,850 m² customs building
- Administration & operations building
- Maintenance workshop
- Electrical substation and utilities building
- Firefighting building/emergency response zone
- In gate complex (9 truck entry gates, weighbridge, x-ray scanner, troubleshooting booth)
- Out gate complex (4 truck exit gates)

3.2.3.4 Quay Wall

The quay wall forms the riverside edge of the terminal, constructed as a piled structure (approximately 613 m long and a deck-on-piles extending 50-60 m into the river) built from the landside revetment. Its location is fixed per the CA in alignment with the Initial Proposal (IP), with elevation at ISLWL +8.0-8.5 m to accommodate berthed vessels, address the large tidal range, and provide protection against cyclone storm surges (HR Wallingford, 2025). In the tender design drawings made available for the contractor, a minimum width of 45 m is included.

3.2.3.5 Dredging, Reclamation and Landfill

According to the latest information used in this ESIA and in the dredge plume modelling, no offshore borrow area will be used. Instead, reclamation material is expected to be sourced onshore, transported by truck to a river depot, and subsequently barged to the Project site.

3.2.3.6 Berthing area and Block C

Dredging operations at Block C will comprise dredging of the berth pocket, including slopes extending under the deck-on-piles, generating an estimated total capital dredging volume of up to 400,000 m³ of material. The berthing pocket will reach -12 m ISLWL (including a 1 m sedimentation buffer), accommodating vessel drafts of 10.5 m under all tidal conditions. This volume represents the upper-bound dredging volume currently adopted by LCT and forms the basis for the ESIA and dredge plume modelling.

All dredged material generated during capital dredging is assumed to be transported offsite for beneficial reuse. There will be no offshore disposal or in-river disposal. The dredged material will be transported by barge to the Char Bakalia area, where the material may be stockpiled, traded by licensed sand traders and subsequently reused for land development, filling works, road construction or other approved uses.

The dredged material cannot be reused within the Laldia Container Terminal reclamation works. Geotechnical investigations indicate that berth pocket sediments contain a high proportion of fines,

which are generally unsuitable for achieving the settlement and performance requirements of container terminal infrastructure without extensive ground improvement measures. Therefore, engineered fill from a designated sand extraction area is required for reclamation works.

For the ESIA, dredging is assessed using a cutter suction dredger (CSD) with barge loading and offsite disposal. This presents a conservative upper-bound scenario for dredge plume generation.

Maintenance dredging shall be required during operation. The sediment infill in the berth pocket is estimated to be in the range of 150,000-230,000 m^3 per year (HR Wallingford, 2024).This is confirmed by the morphological modelling study (Annex C6), estimating a total sediment infill of 159,000 m^3/year.

Reclamation will raise the existing terminal area and adjacent riverbank (see Figure 3-11, Figure 3-12 and Figure 3-13 below) to +8 m ISLWL. With an existing land level of +6.5 m ISLWL, a final terminal level of +8 ISLWL and an existing plot of 131,000 m^2 (13.1 ha) in Block C, the reclamation volume will be in the range of 196,500 m^3 of filling material. This filling material will be sourced from a designated sand extraction area in the Raozan upazila northwest of Chattogram (between 25-35 km from the LCTP).

Figure 3-10 indicates that the deck-on-piles structure will be 60 m wide, and behind that there is an area that currently consists of a mudflat where a reclamation can be put (see green area). Soil improvement measures, including surcharges, drains, and sand columns, are required to ensure stability against settlements, tidal ranges, seismic risks, and hurricane surges.

Ground clearance will be undertaken within Block C and the adjacent mudflat to remove the topsoil with unsuitable surface materials, including sediments, debris, and residual vegetation such as roots. This activity will prepare the site for reclamation and ground compaction activities.

Based on the current design, ground clearance will comprise:

- 131,000 m^2 within the container yard area (Block C), where approximately 0.5 m of unsuitable material will be removed, generating approximately 65,500 m^3 of clearance material;
- 31,650 m^2 within the intertidal mudflat area on the river side of Block C, where approximately 3.0 m of unsuitable material will be removed, generating approximately 94,950 m^3 of clearance material.

The total estimated volume of ground clearance material is therefore approximately 160,450 m^3 (excluding the material from the drainage channel, as given below). This material is expected to be transported to Char Bakalia (17 km upstream) for disposal after which it is expected to be reused.



Figure 3-9: Location of Char Bakalia sediment disposal site

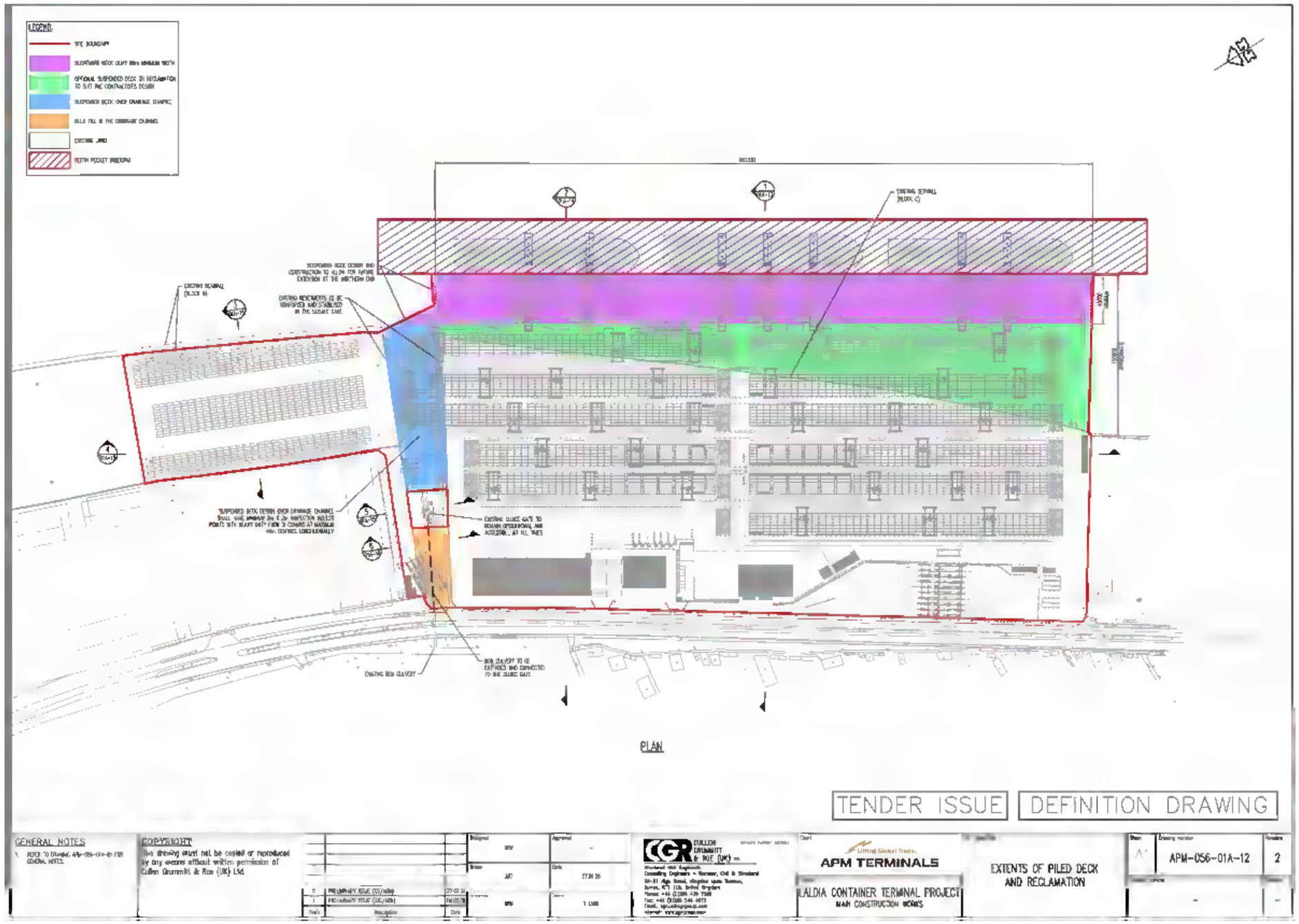


Figure 3-10: Terminal layout indicating deck-on-piles and area for reclamation (source: Asset Design Drawings APM-056-01A-12 rev. 2)

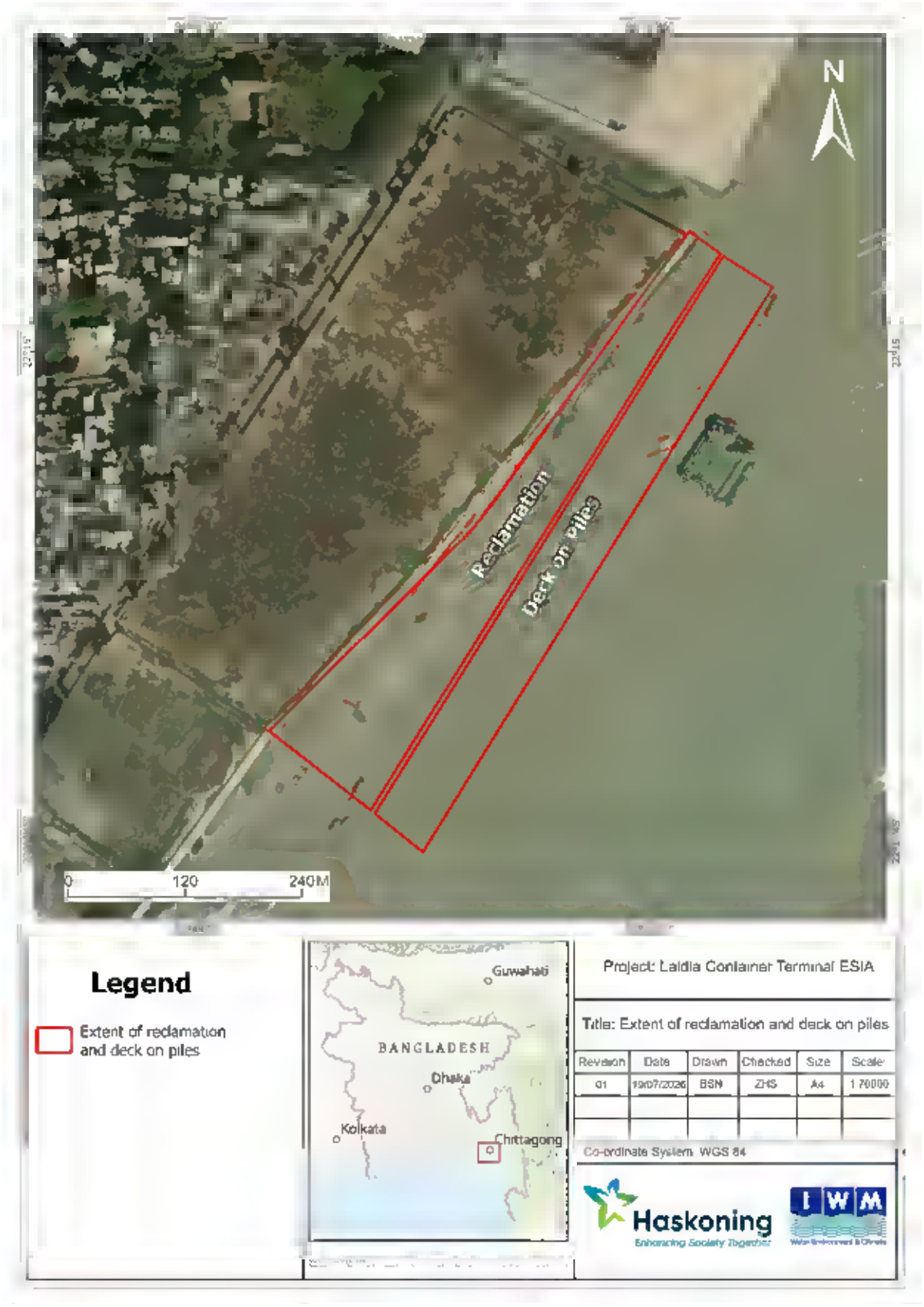


Figure 3-11: Extent of reclamation and deck on piles

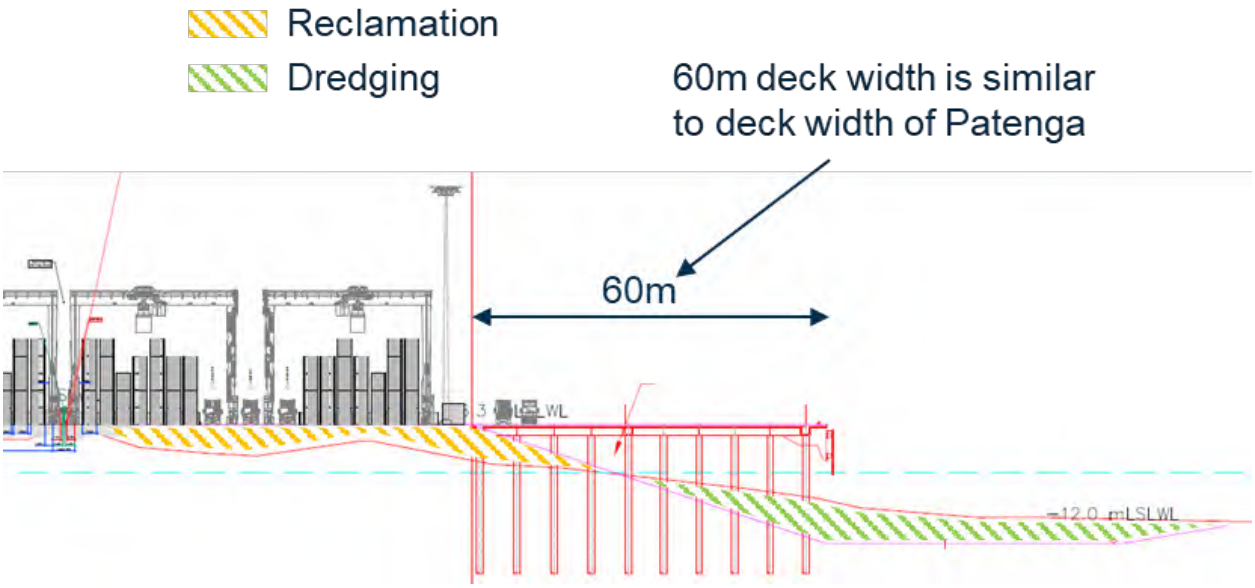


Figure 3-12: Cross-section of the conceptual dredging and reclamation, and envisioned deck on piles (source: APM Terminals, January 2026)

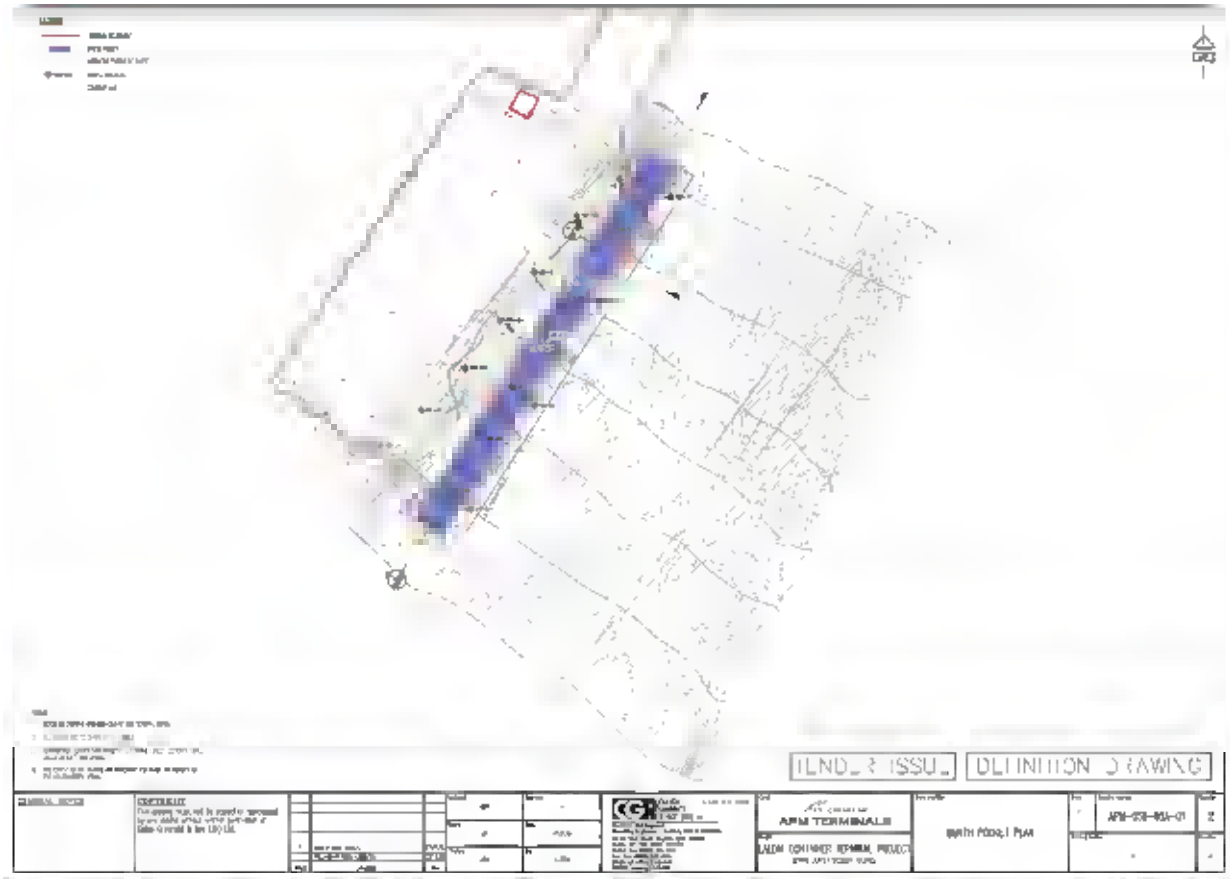


Figure 3-13: Dredging design plan view. Red line indicates the suggested project boundary (source: Asset Design Drawings APM-056-03A-01 rev. 2)

3.2.3.7 Drainage channel

The conceptual design proposes changing part of the existing open drainage channel located between the road embankment and the sluice gate area by converting this section into reclaimed land. Drainage flows that currently pass beneath the road via an existing box culvert and discharge into the open drainage channel will be rerouted through an extended box culvert system. The extended culvert will convey flows from the road crossing to the existing sluice gate and pumping station. Downstream of the sluice gate, drainage flows will continue through a box culvert before discharging into the river. The proposed box culvert will be designed to match or exceed the hydraulic capacity of the existing culvert to ensure no reduction in drainage performance (see Figure 3-14). LCT Ltd. is currently engaged with BWDB to define the optimal design solution for the drainage channel.

The current proposed design considers a backfill with a culvert to maintain hydraulic discharge capacity. Within the impact assessment, particularly the flood risk modelling (see Chapter 8 on impacts), a backfill with a culvert of a similar size to the existing sluice gate openings are included (3x1.5 m). This culvert connects the drainage channel from the road to the sluice gate and extends from the sluice gate to the river. The culvert dimensions present a conservative assumption to understand the impact of the worst-case scenario for waterlogging. The alternative compared to the proposed design option is given in the Alternative Analysis in Section 3.3.

The sluice gate and pumping station are required to be accessible for BWDB at all times, with a dedicated access zone maintained around the structures. This has been included in the latest terminal layout given in Figure 3-8. In addition, the side revetments along the exposed sections of the drainage line will be reinforced and stabilized, particularly for seismic resilience.

See the existing channel and planned modifications depicted in Figure 3-14 and Figure 3-15.

The backfill of the drainage channel requires ground clearance of approximately 8,890 m^2, resulting in approximately 26,670 m^3 of clearance material to be transported to the disposal site. This volume adds to the clearance material volume as elaborated in the section above. The full backfill of the drainage channel will demand approximately 44,450 m^3 of reclamation material to be sourced and transported on-site.

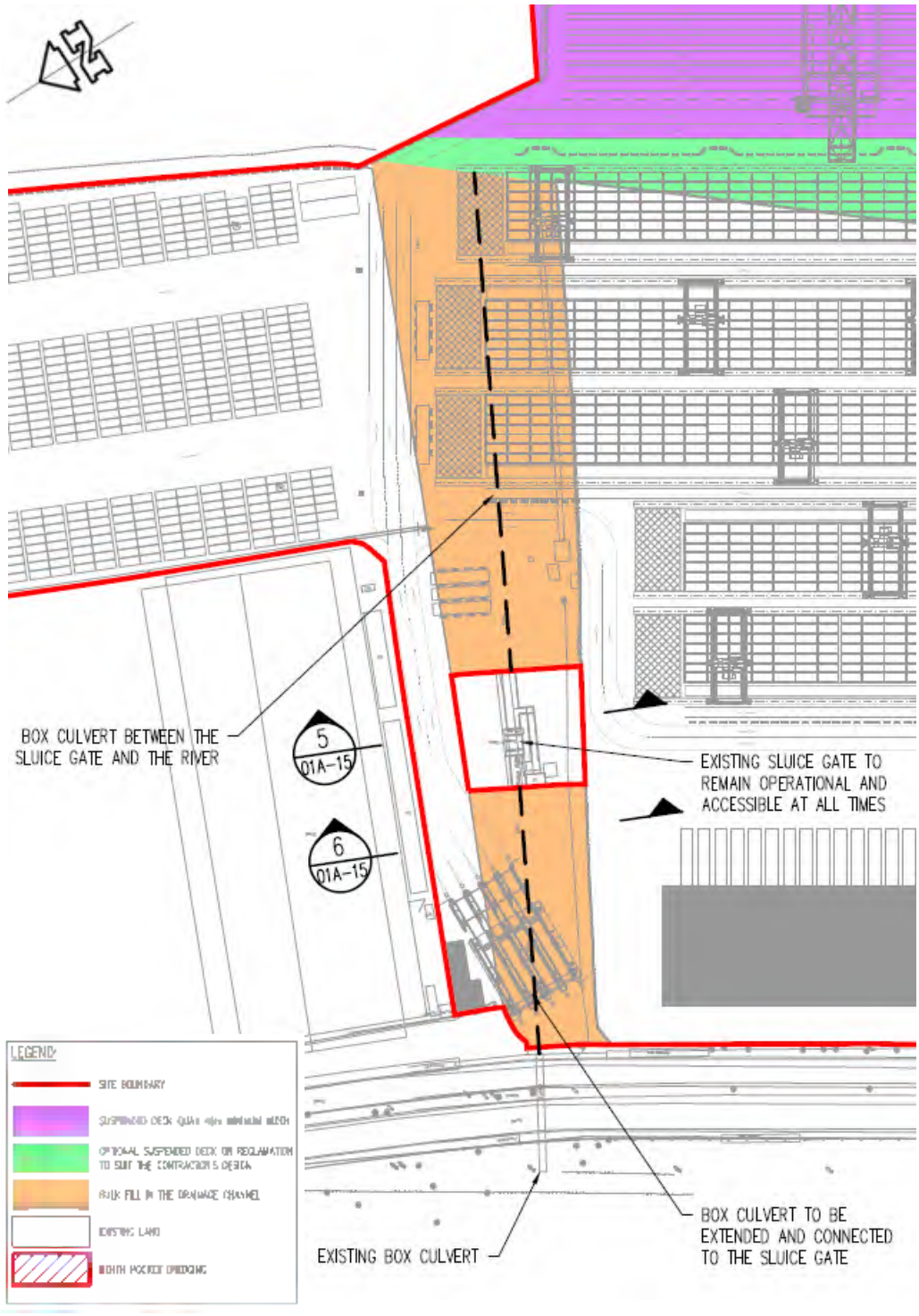


Figure 3-14: Proposed inclusion of the existing drainage channel into the LCTP design (source: Asset Design Drawings APM-056-01A-12 rev. 3)



Figure 3-15: Existing drainage channel between Block B and Block C. Top left: culvert under the road, top right: channel arriving from roadside to the sluice gate, with pumping station building, bottom left: sluice gate, bottom right: channel from sluice gate to the river (source: ESIA team, March 2026)

3.2.3.8 Ground Improvement and Surcharge

Ground improvement measures will be required beneath the future container yard and associated infrastructure to reduce long-term settlement and improve soil performance under operational loading conditions. The ground improvement approach comprises installation of Prefabricated Vertical Drains (PVDs) combined with temporary surcharge loading. The PVDs accelerate consolidation of the underlying soft cohesive soils by shortening drainage paths and facilitating the dissipation of excess pore water pressures generated by the applied surcharge.

The current design assumes installation of PVDs on an approximate 1.3 m triangular grid pattern across the areas requiring ground improvement, extending to depths of up to approximately 12 m below ground level. Following placement of the reclamation fill, temporary surcharge material will be placed above the final platform level for an estimated consolidation period of approximately two months. Surcharge heights vary across the site depending on loading requirements and geotechnical conditions, with an average surcharge thickness of approximately 3.9 m and local surcharge elevations ranging from approximately +9.7 m to +14.7 m ISLWL.

As a upper-bound estimation, approximately 299,000 m³ of surcharge material will be imported to the site during construction. Following completion of the consolidation period and achievement of the required settlement criteria, approximately 243,000 m³ of excess surcharge material will be removed and transported offsite for reuse. The surcharge material is anticipated to be sourced from the same designated sand extraction areas supplying reclamation fill and transported to site by barge.

3.2.3.9 Overview of import and export of sediment materials

The material volumes as elaborated above are presented in Table 3-1. This represents the current design basis and forms the basis for the impact assessment.

Table 3-1: Overview of sediment material volumes required for LCTP

#	Transport of materials in and out of the LCTP	Surface (m2)	Depth (m)	Volume (m3)	Import / Export	Destination/ Source	Distance by river
1	Ground clearance in the container yard area (Block C)	131,000	0,5	65,500	Export	Char Bakalia	17 km
2	Ground clearance in the tidal zones (river side of Block C)	31.650	3,0	94.950	Export	Char Bakalia	17 km
3	Ground clearance in the drainage channel (between Block B & C)	8.890	3,0	26.670	Export	Char Bakalia	17 km
4	Dredging berth pocket			400.000	Export	Char Bakalia	17 km
5	Land levelling Block C to ISLWL+8.0m	131,000	1,5	196,500	Import	Raozan	25-35 km
6	Additional levelling for removal of topsoil, to fill from removal item no. 1	131,000	0,5	65,500	Import	Raozan	25-35 km
7	Reclamation area into the river to ISLWL+8.0m			400.000	Import	Raozan	25-35 km
8	Fill in the drainage channel (between Block B & C)	8.890	5,0	44.450	Import	Raozan	25-35 km

9	Surcharge (import)			299.000	Import	Raozan	25-35 km
10	Surcharge (excess material)			243.000	Export	Char Bakalia	18 km
	TOTAL EXPORT			**830.120 m³**			
	TOTAL IMPORT			**1,005,450 m³**			

3.2.3.10 Road Traffic, Truck Parking and River Transport

The container terminal is connected to the hinterland by the existing roads. Trucks will arrive from either northern or southern side through the road connections as described in Section 3.2.2. Internal traffic circulation is designed such that incoming trucks will initially be directed to a designated waiting and parking area in Block A. Following administrative and logistical processing, trucks will be called forward in controlled timeslots to Block C, from where they enter the terminal yard. This staged access approach is intended to regulate peak flows and minimize congestion. Block A has truck parking space for about 240 trucks, according to the Feasibility Study (LCT Ltd., November 2025).

According to LCT, the terminal is expected to function continuously (24 hours per day, 365 days per year). Depending on the projected terminal throughput elaborated in Section 3.2.3.2, the expected daily amount of truck trips is estimated between approximately 990 and 2,166 trucks per day (with peak day truck arrivals between 1,287 and 2,816 trucks per day). These values represent total truck trips (inbound and outbound combined), distributed across a 24-hour operational period.

During construction, heavy vehicles will arrive as indicated with the blue arrows in Figure 3-16. Personnel can arrive through an existing access road to Block B, indicated with the green arrows. The heavy vehicles will mainly be transporting construction materials and equipment.

Based on the current design, approximately 1.0 million m³ of fill and surcharge material will be imported to the Project site and approximately 830,000 m³ of dredged and excavated material will be exported from the site (see Section 3.2.3.9). Imported material will be sourced from approved sand extraction areas in the Raozan area, while dredged and excavated materials will be transported to the Char Bakalia area for temporary storage or disposal and beneficial reuse. Assuming an average barge capacity of approximately 500 m³, the construction works will require approximately 2,000 barge trips for imported material and 1,800 barge trips for exported material.

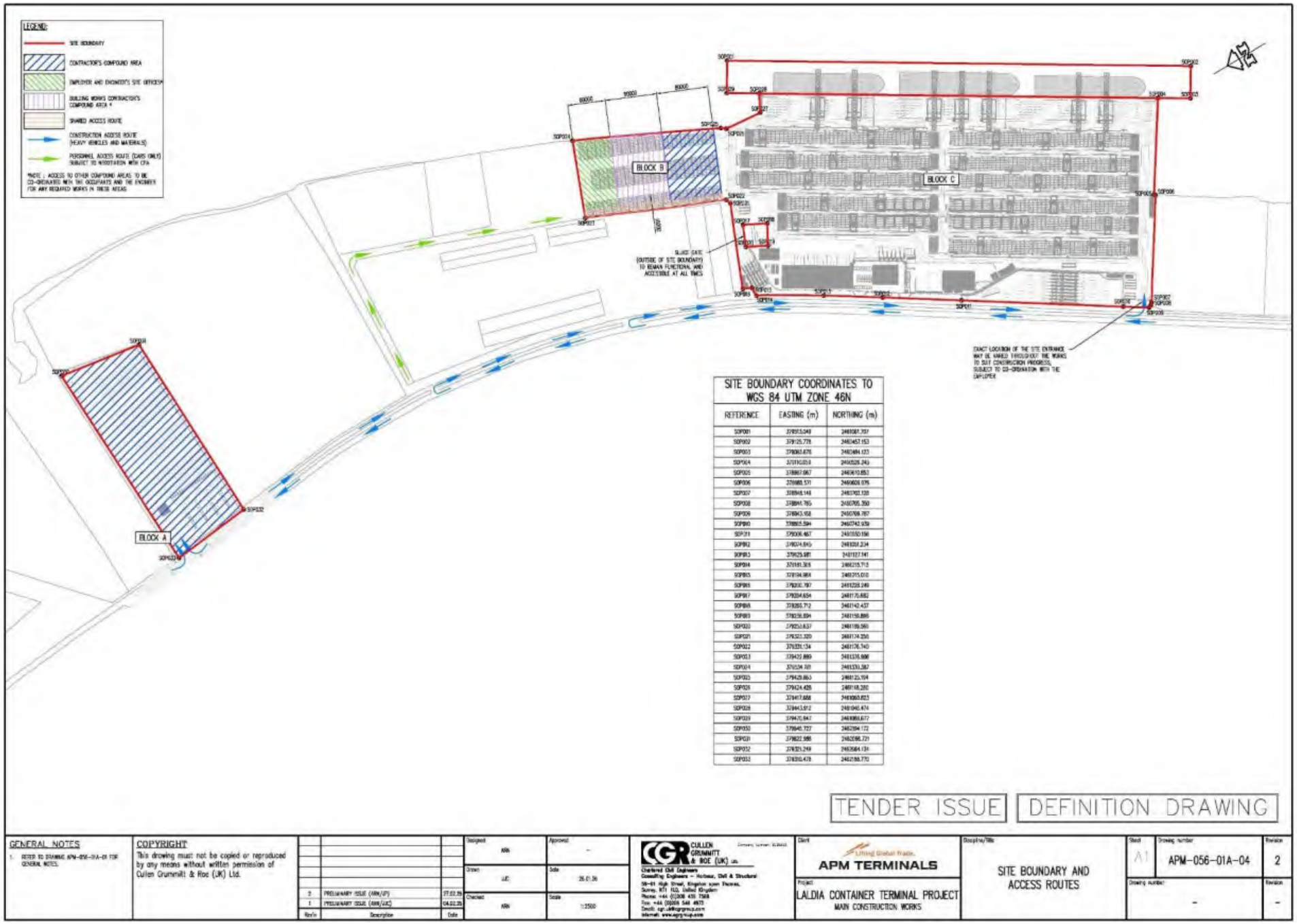
Another factor contributing to river traffic as part of the construction process are the transport of piles to the site. Based on assumptions derived from the HR Wallingford maritime feasibility study and typical quay cross-sections, approximately 567 piles are estimated to be required for LCTP. This can result in approximately 18 to 27 trips (inbound and outbound) depending on the length of the piles.

Based on those numbers, the peak vessel movements related to export and import of sediment materials and transport of piles is given in Table 3-2.

Table 3-2: Estimated trips (inbound and outbound) of barges related to the import and export of sediment materials

Activity	Import/export	Estimated period	Trips
Ground clearance	Export	2 months	10.0 per day
Dredging	Export	6 months	5.0 per day
Land levelling, reclamation, and surcharge import	Import	4 months	22.9 per day
Export surcharge excess material	Export	4 months	6.5 per day
Transport of piles	Import	-	18-27 total

River traffic during the operational phase is mainly related to the vessel calls. Based on the TEU factor of 1.71 and approximately 2,000 moves per call, the average call size is 3,420 TEU. This means that based on the scenarios elaborated in Section 3.2.3.2 the calls per year will range between 187 to 410 (depending on the throughput scenario), with the medium scenario estimated at 234 calls per year.



REFERENCE	EASTING (m)	NORTHING (m)
SDP001	378513.049	2461081.737
SDP002	379125.778	2461457.153
SDP003	379060.676	2461484.123
SDP004	379110.059	2461528.241
SDP005	378867.067	2461610.853
SDP006	378988.531	2461604.976
SDP007	378948.148	2461702.128
SDP008	378844.765	2461705.350
SDP009	378843.158	2461709.787
SDP010	378865.594	2461742.939
SDP011	379006.467	2461550.156
SDP012	379014.840	2461324.234
SDP013	379025.981	2461127.141
SDP014	379191.305	2460215.713
SDP015	378194.984	2460215.010
SDP016	378200.797	2461228.249
SDP017	379264.654	2461176.682
SDP018	378260.712	2461142.437
SDP019	378256.594	2461158.886
SDP020	378250.637	2461159.560
SDP021	378321.320	2461174.256
SDP022	379331.134	2461176.740
SDP023	379420.889	2461335.606
SDP024	379534.701	2461330.387
SDP025	379428.863	2461123.194
SDP026	379424.426	2461118.280
SDP027	379417.668	2461063.823
SDP028	379443.012	2461040.474
SDP029	379470.843	2460886.677
SDP030	378648.727	2462894.172
SDP031	378622.986	2462696.721
SDP032	378321.249	2462684.134
SDP033	378310.478	2462688.770

Figure 3-16: Road traffic movements expected during construction (source: Asset Design Drawings APM-056-01A-04 rev. 2)

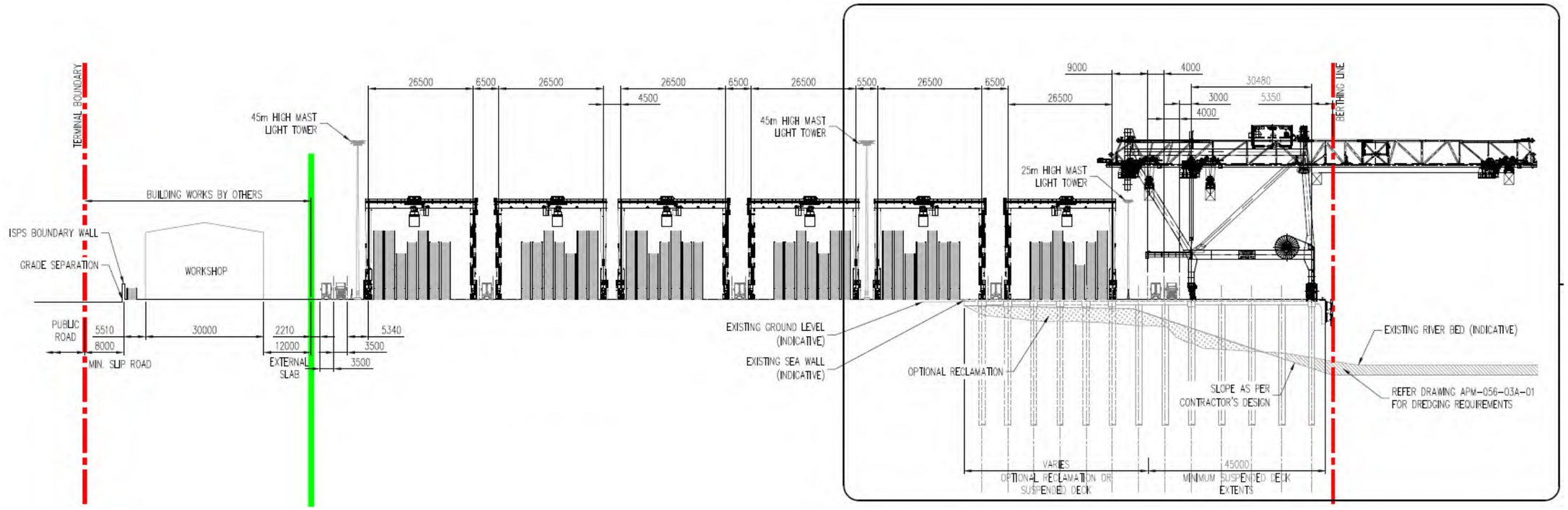


Figure 3-17: Cross-section of the Container Terminal at Block C including crane dimensions (source: Asset Design Drawings APM-056-01A-14 rev. 1)

3.2.3.11 Nautical Components

The location of the quay wall line was optimized by numerical simulations (HR Wallingford, 2024), considering:

- Alignment with river flow direction to prevent lateral flow forcing on moored ships
- Minimum sedimentation of the berthing pocket
- Safe passing distance of ships sailing to and from upstream terminals
- Safe arrival of ships with a length up to 249 m according to initial studies

According to the CA, the terminal caters for vessels with the following characteristics:

- Length overall (LOA) of 249 m
- Beam of 40 m
- Vessel draught 10 m

Ships arrive and depart in convoy from the Chattogram Port area to use the tidal benefit. The CA guarantees a draft of 9.5 m during the tidal window; however, most ships now arrive with 9.9 m draft. If the tidal window is better utilized and smaller Under Keel Clearance is allowed, this could reach a draught of 10 m. Water draft conditions are on par with the (future) Bay terminal. Discussions with the Port Authority are ongoing to allow night navigation for Laldia (since it is located downstream of the Gupta bend).

Ships will arrive and depart in convoys around high tide to maximize tidal benefits. Vessels are expected to arrive on the high tide, follow the eastern riverbank, then turn south toward the western riverbank of the Karnaphuli River to berth at Block C of the envisioned terminal (Figure 3-18).

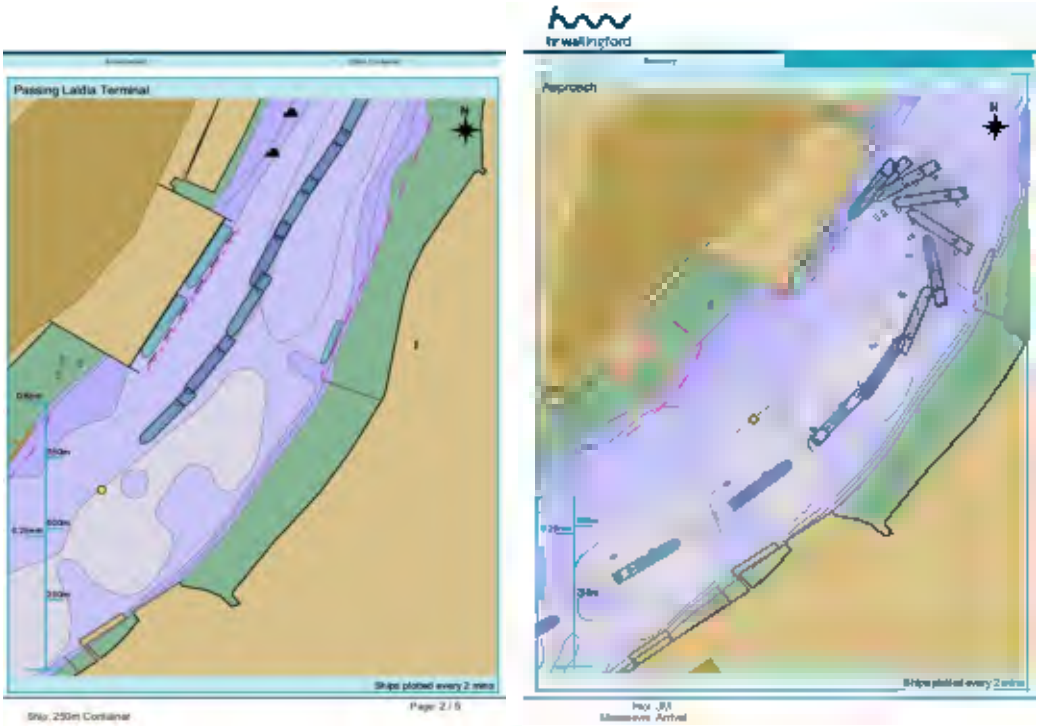


Figure 3-18: Envisioned turning of the vessel (HR Wallingford, 2024)

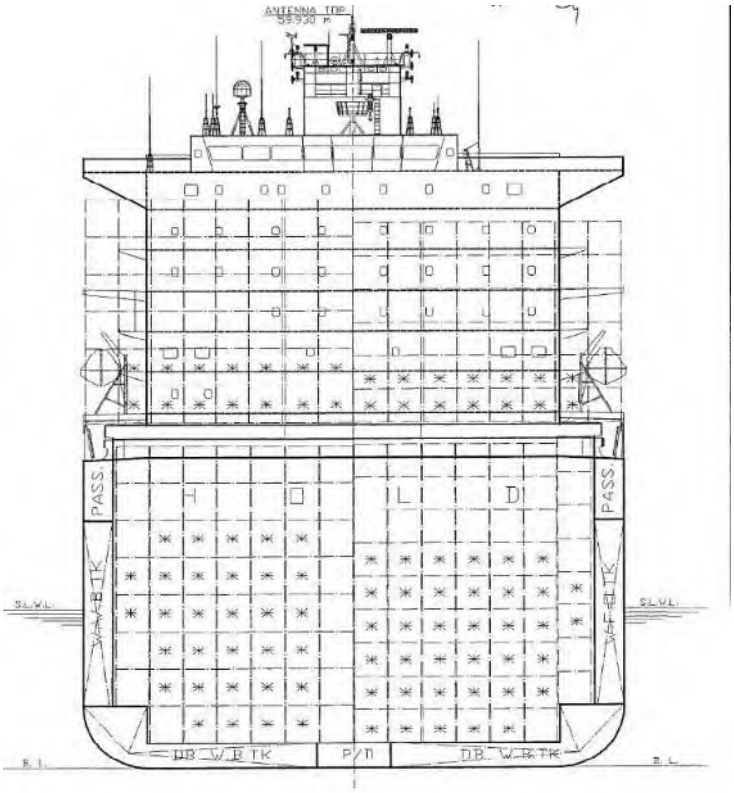


Figure 3-19: Design vessel (P&O Kobe) (HR Wallingford, 2024)

3.2.3.12 Stormwater drainage

On-site stormwater management is currently proposed through several drains that will collect water through small differences in elevation on the terminal. The drains and elevation differences are given in Figure 3-20. The drains in Block C lay in parallel to the quay wall. The drains will be connected to the existing drainage channel between Block B and Block C (see Figure 3-21). For flood modelling purposes (as given in Chapter 8), the runoff from Block C and Block B were considered to be discharging into the drainage channel downstream of the sluice gate.

Block B will make use of drainage weep holes that drain stormwater from the pavement to the river. In addition, the existing drainage trench that lies between Block B and Incontrade Ltd. is proposed to be rehabilitated to drain stormwater from Block B to the drainage channel as well.

The existing drainage system at Block A is expected to stay as it was constructed. This site is already paved and drainage is installed.

Access arrangements for inspection and maintenance of the box culvert by the BWDB have not yet been finalized. As the area above the culvert is intended to be paved and used for terminal operations, it is currently unclear how access for BWDB maintenance activities will be ensured. The access to the sluice gate and pumping station will be allowed with a fenced pathway from the Airport Road to use by BWDB or another authority responsible for the maintenance.

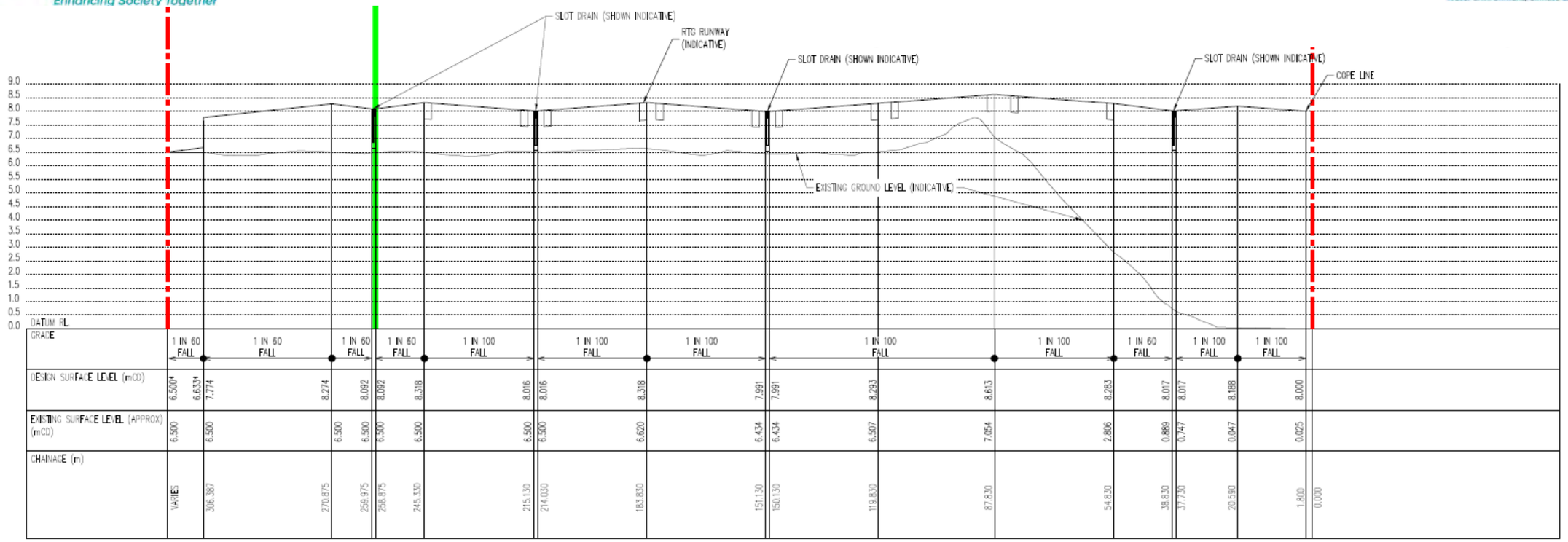


Figure 3-20: Proposed drainage (Block C) through elevation differences and indicative drains on-site (source: Asset Design Drawings APM-056-01A013 rev. 2)

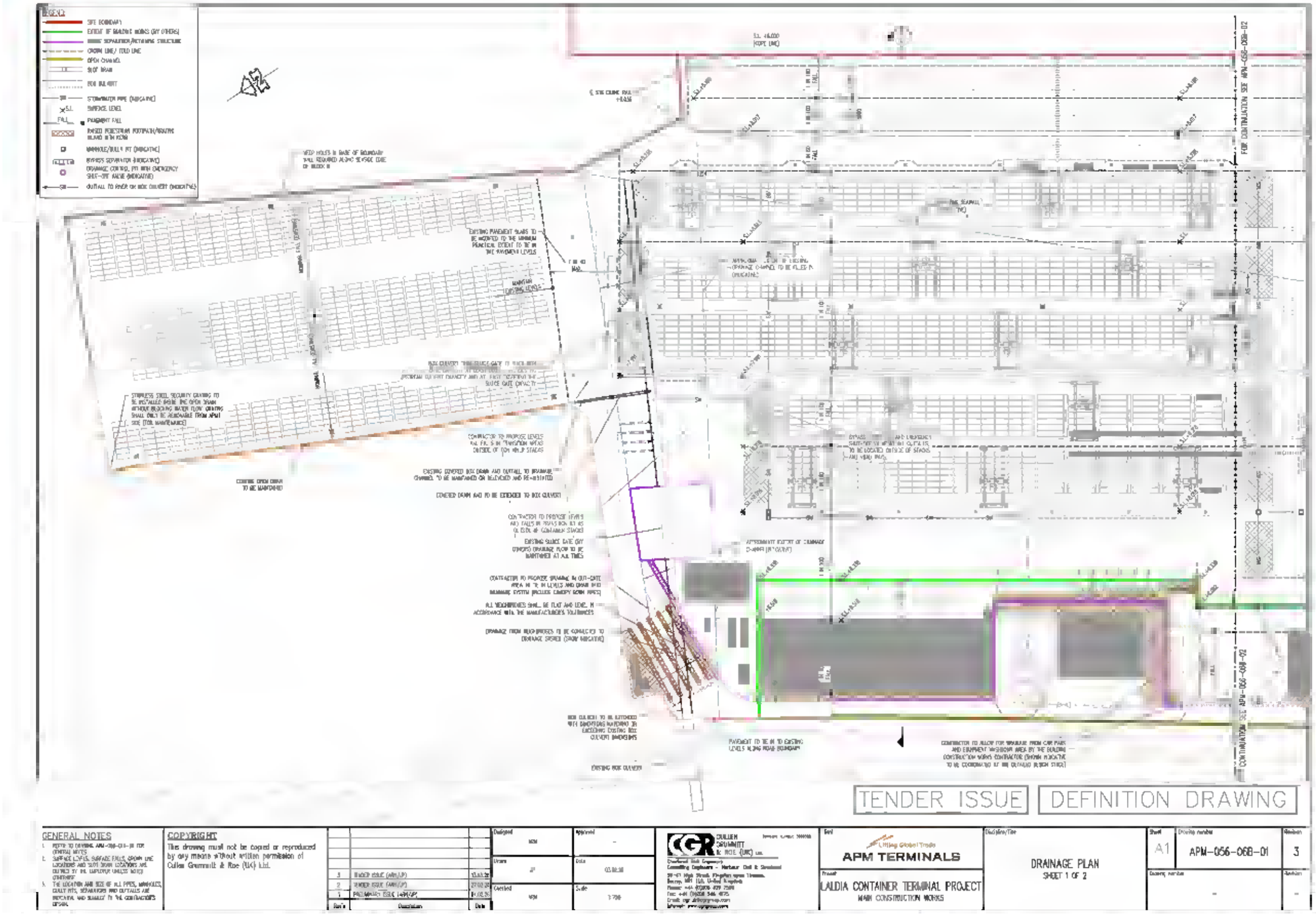


Figure 3-21: Northern side of Block C and Block B including drainage layout (source: drawing APM-056-06B-01 rev. 3)

3.2.3.13 Associated Facilities

Associated facilities are defined as infrastructure or activities that are not funded as part of the LCTP but are essential for its viability and would not have been constructed or expanded in the absence of the Project. These facilities will be considered in the ESIA to the extent that information is available, with their environmental and social impacts assessed proportionately.

Electricity infrastructure

The Project will require an offsite electricity connection from the Bangladesh Power Development Board (BPDB) network. The preferred supply point is the Halishahar substation, located approximately 8 km from the Project site by road and approximately 5 km in direct distance.

The connection is expected to comprise a new 33/11 kV transmission line and associated electrical infrastructure extending from the Halishahar substation to the terminal boundary. There are two main alternatives for the cable routing. The base case for this ESIA is the northern route (Figure 3-32). The final alignment will be confirmed following completion of a joint survey and stakeholder consultation process with BPDB and relevant authorities.

Where technically feasible, an underground cable installation is preferred as it would minimise land acquisition requirements, avoid physical displacement, reduce visual impacts, and limit potential impacts on surrounding communities and airport operations. The final route selection will take into account technical feasibility, environmental and social considerations, land availability, existing utilities, and constructability. The electricity connection will be developed and operated by BPDB and is therefore considered an Associated Facility. The ESIA assesses the likely environmental and social impacts associated with this infrastructure based on the currently available information.

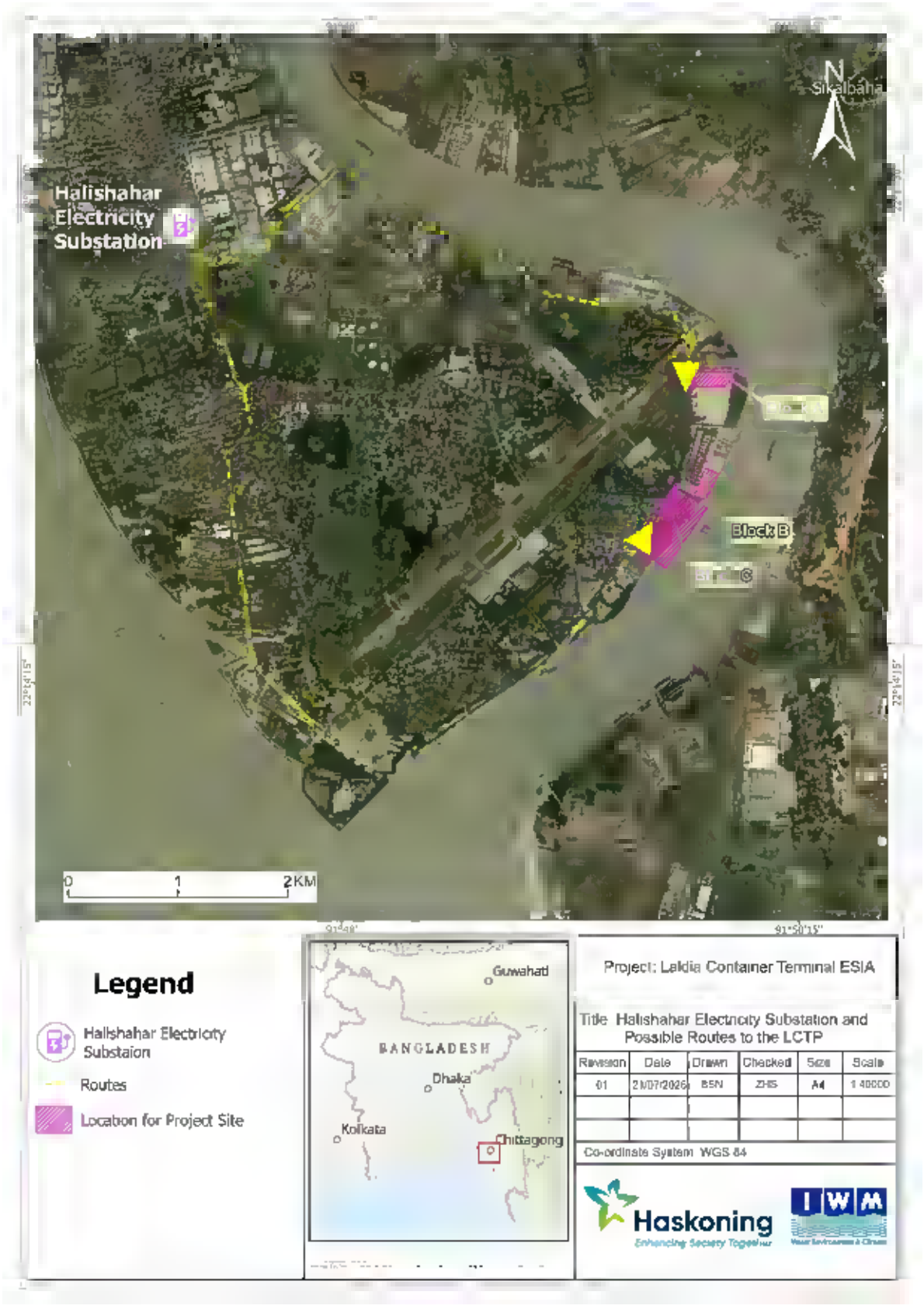


Figure 3-22: Halishahar electricity substation and possible routes to the LCTP (source: ESIA team)

Water supply infrastructure

The Project's operational water demand will be supplied through the CWASA network. According to CWASA, there is already a pipeline available that can supply water to LCTP. Although this line is currently not operational due to capacity constraints, CWASA indicated that upgrades to the water supply system are expected to be completed by Q4 2027, after which a direct connection to the Project can be established. However, any new pipelines or local distribution infrastructure required to connect the Project to the existing CWASA network are considered Associated Facilities and are required to be considered within the ESIA.

Wastewater Treatment Infrastructure

CWASA advised that a new municipal wastewater treatment plant (WWTP) is planned for the Project area and is expected to be operational around 2030. This facility is intended to serve a wider urban catchment, including the Project area.

The municipal WWTP itself is considered a third-party development because it is not being developed specifically for the LCTP. However, any dedicated wastewater collection, transfer, or conveyance infrastructure developed specifically to serve the Project would be considered an Associated Facility.

The current Project design assumes that domestic wastewater generated by the terminal will be collected in onsite septage storage facilities and transported by tanker truck to authorised treatment facilities.

Maintenance dredging in berth pocket

The sediment infill in the berth pocket is estimated to be around 159,000 m^3 per year (Annex C6), which will need to be dredged regularly. Regular maintenance dredging will be performed by CPA. Maintenance dredging activities are considered an Associated Facility as they are required to maintain operational access to the terminal.

Quarry for reclamation material supply

Approximately 1 million m^3 of fill material will be required for reclamation, likely sourced from sand quarries (see Section 3.2.3.5). Based on information provided by LCT Ltd., the filling materials will be obtained from 3-4 areas located in Raozan Upazila, Chattogram, approximately 25-35 km upstream of the LCT site along the Karnaphuli River. The sand will be loaded onto bulkhead barges and transported via designated river routes to the project site for unloading. Additional potential sources include the Karnaphuli River, Kodala, Rangunia (approximately 44 km upstream of the project site), and the Amanat Shah Bridge area (approximately 16 km upstream of the project site).

As a conservative approach, the ESIA takes into consideration that sand will be sourced from the Sylhet region, which is the furthest away from the project site (about 320 km in absolute distance).

The exact location of the quarry remains uncertain. Transportation will be done primarily through river transport.

Turning circle and navigation channel

No dredging in the access channel or turning circle is currently included in LCTP. However, if such dredging is required to enable Project operations, it may be undertaken by a third party (e.g. CPA). Where these works are required solely for the Project, they are qualified as associated facilities.

Road improvements

Upgrades to the surrounding road network may be required to accommodate increased traffic volumes associated with the Project. Where road improvements are implemented specifically to enable Project-related traffic and would not otherwise proceed, they are considered as associated facilities.

3.2.4 Project Activities and Implementation Period

This section outlines the key activities across pre-construction, construction and operation phases for the LCTP.

The construction methodology and certain design elements may be refined during the detailed design stage. Contractors may propose alternative design and construction approaches in accordance with the requirements of the tender documents. All proposed approaches are subject to approval from LCT Ltd. Consequently, the project description presented herein is indicative and subject to change as the project progresses. For the purposes of this ESIA, the assessment is based on the most likely construction methods presented as the base case, taking into account the nature of the works, site conditions, availability of equipment, as well as cost and program considerations. Where specific details remain unconfirmed, a conservative approach has been adopted to ensure a robust environmental and social assessment.

At this stage, the following principal construction methods are anticipated:

- Dredging and dredged material handling: The base case working method for undertaking the berth pocket dredging works is dredging by a Cutter Suction Dredger (CSD) with barge loading and transport of dredged material to the Char Bakalia area for temporary stockpiling or disposal for beneficial reuse, through licensed operators.
- Reclamation and soil improvement: Reclamation material of the required quality will be sourced, placed and treated to achieve the required engineering properties. Weaker subsoils will also require improvement, including drains (PVDs), and surcharge/ preloading.
- Deck on-piles structure: Piles may be installed from the water (using marine equipment) and/or the land (using land-based equipment). Concrete or steel piles may be driven or drilled to the required depth, depending on the final design and selected installation method. Once the piles are installed, the supporting beam and deck structure will be constructed, together with associated slope trimming and slope protection works as required by the final construction sequence. Longitudinal beams will be required at the location of the future STS-

crane rails. Provisions will also be installed for elements such as bollards, fenders and pits for future installation of STS-crane power supply and shore power supply.

3.2.4.1 Pre-construction

The pre-construction phase will include planning, permitting, investigations, stakeholder engagement, land preparation, and detailed engineering activities required prior to the commencement of major civil works.

Key activities will include:

Permitting, surveys and design

- Obtaining required permits, approvals, and clearances;
- Conducting topographic, bathymetric, geotechnical, environmental, and social surveys;
- Undertaking stakeholder engagement and consultations;
- Preparing detailed engineering designs and tender documentation.

Procurement and mobilisation planning

- Tendering and contractor selection;
- Planning construction logistics and supply chains;
- Development of environmental, social, health and safety management plans.

Site preparation and establishment

- Installation of temporary fencing and security facilities;
- Relocation of people and assets where required;
- Establishment of employer site offices, including utilities and backup diesel-powered electricity supply;
- Provision of potable water, sanitation, and welfare facilities.

3.2.4.2 Construction

The construction phase comprises development of the terminal and associated facilities.

Mobilisation and Temporary Facilities

Construction will commence with mobilisation of personnel, materials, and equipment to the Project site by land and water. Activities will include:

- Recruitment of the construction workforce;
- Mobilisation of cranes, piling rigs, dredging equipment, batching plants, and support vessels;
- Establishment of construction camps (if required), offices, workshops, laydown areas, warehouses, and storage yards;
- Installation of temporary utilities, including power and water supply systems;
- Installation and operation of a temporary offloading jetty;
- Installation of temporary fencing, signage, and security infrastructure.

Site Clearance and Enabling Works

Initial site preparation activities will include:

- Land clearance and vegetation removal where required;
- Demolition of existing structures;
- Establishment of permanent fencing;
- Earthworks, excavation, grading, soil stabilisation, and ground improvement works.

Marine Works

Marine construction activities will include:

- Capital dredging of the berth pocket;
- Transport and temporary disposal of dredged material for beneficial reuse;
- Installation of temporary cofferdams where required;
- Piling works from marine and land-based equipment;
- Construction of the deck-on-piles quay structure;
- Installation of fenders, bollards, crane rail beams, and utility provisions;
- Construction of scour protection and revetment structures.



Figure 3-23: Left: Cutter Suction Dredger (CSD). Right: CSD at Karnaphuli river (photo taken spring 2026)



Figure 3-24: Example of piles under a deck-on-piles

Reclamation and Ground Improvement Works

Major reclamation and ground improvement activities will include:

- Removal of topsoil for ground clearance;
- Import and placement of reclamation fill for land levelling;
- Import of surcharge material and installation of PVDs;
- Ground improvement and consolidation works.



Figure 3-25: Installation of Prefabricated Vertical Drains (PVDs) (Turukmane, 2019)

Drainage Channel Works

- Fill of the area between Blocks B and C (*Khal 14*);
- Installation of culverts to maintain stormwater drainage;
- Retention of the existing sluice gate and pumping station function for storm surge management;
- Construction of landfill and box culvert structures around the sluice gate area.

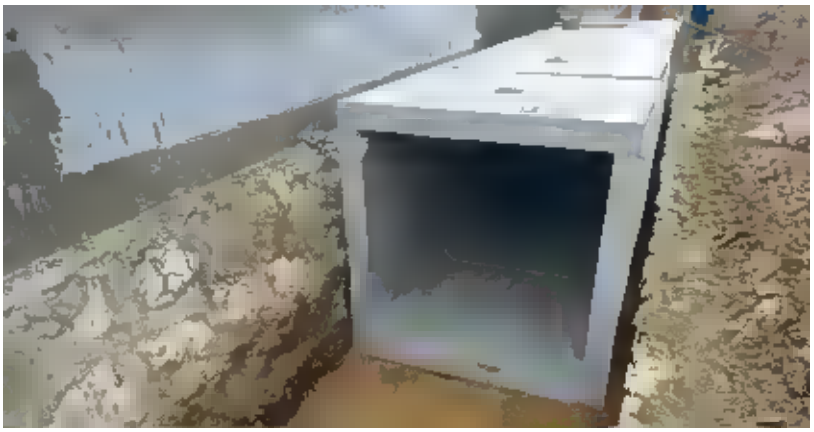


Figure 3-26: Example of a box culvert (Specialty Precast, 2025)

Buildings and Terminal Infrastructure

Construction of operational infrastructure will include:

- Administrative buildings and offices;
- Maintenance workshops and warehouses;
- Customs inspection facilities;
- Pre-gate, in-gate, and out-gate complexes;
- Charging stations for electric vehicles and equipment;
- Firefighting infrastructure, including underground water storage tanks;
- Utility corridors, manholes, and service networks;
- Potential dewatering if groundwater is encountered during underground works;
- Paved operational yards and road infrastructure.

Utilities and Services

Installation of utility systems will include:

- Construction of the associated BPDB power connection (associated facility) including the installation of substations, transformers, motor control centres (MCCs), and power distribution systems;
- Installation of underground conduits and electrical cables;
- Installation of ICT, telecommunications, security systems, and CCTV;
- Installation of wireless communication networks and radio systems;
- Installation of high-mast lighting towers up to approximately 44 m in height;
- Installation of battery energy storage systems (BESS) and backup generators;
- Construction of stormwater drainage systems and oil-water separators;
- Installation of potable water, wastewater, and firefighting systems.



Figure 3-27: Terminal lighting mast example (AEC Illuminazione, n.d.)

Equipment Installation and Commissioning

Terminal equipment installation and commissioning will include:

- Assembly and deployment of Ship-to-Shore (STS) cranes;
- Commissioning of electric Rubber-Tyred Gantry cranes (eRTGs);
- Commissioning of empty container handlers (ECHs), reach stackers, forklifts, and terminal tractors;
- Installation of mobile scanners and weighbridges;
- Preparation of terminal infrastructure to be shore-power-ready for future implementation.



Figure 3-28: Left: Ship to Shore (STS) crane example. Right: Rubber Tyred Gantry Crane example (Lledo, n.d.); (Liebherr, n.d.)

Demobilisation and Site Restoration

Following completion of construction:

- Temporary facilities and equipment will be removed and temporary utilities will be decommissioned;
- Construction wastes will be segregated, managed, and disposed of appropriately;
- Hazardous materials such as oils, paints, and solvents will be managed in accordance with applicable requirements;
- Areas disturbed by temporary facilities will be reinstated where applicable;
- Final site clean-up and waste clearance will be completed.

3.2.4.3 Operation and maintenance

The operational phase will involve container terminal operations, administration, maintenance activities, utility management, and emergency preparedness.

Terminal and Marine Operations

Core port operations will include:

- Vessel pilotage, berthing, mooring, and unmooring;
- Container loading and unloading using STS cranes;

- Handling of hatch covers, gearboxes, and occasional breakbulk cargo where required;
- Lashing and unlashing activities;
- Provision of vessel services, including crew transfers and stores delivery;
- Management of gangways and vessel access arrangements;
- Operational controls for vessel auxiliary engine use while berthed;
- Future provision for shore power connections, with the terminal designed to be shore-power-ready.

Yard and Cargo Handling Operations

Container yard activities will include:

- Operation of eRTGs, terminal tractors, empty container handlers, and reach stackers;
- Reefer container power supply and monitoring;
- Dangerous goods storage and management;
- Movement of cargo and containers within the terminal;
- Transfer of cargo to road, rail, and waterborne transport;
- Management of gate operations, truck flows, and vehicle queues.

Asset Maintenance and Support Services

Maintenance and support activities will include:

- Preventive and corrective maintenance of equipment and infrastructure;
- Maintenance dredging and management of dredged material;
- Operation of mechanical, electrical, welding, tyre-management, and cleaning workshops;
- Transformer and substation maintenance;
- Warehouse and spare parts management;
- Management of lubricants, filters, batteries, tyres, and replacement components;
- Washing and cleaning of equipment and facilities.

Utilities and Environmental Infrastructure

Operation of utilities and support infrastructure will include:

- Management of power distribution systems, substations, BESS, and backup generators;
- Operation of potable water supply and firefighting systems;
- Operation of compressed air systems;
- Collection and management of domestic wastewater through septic and septage systems and subsequent transport to authorised treatment facilities until CWASA's regional WWTP becomes operational;
- Operation and maintenance of stormwater drainage systems;
- Operation and maintenance of oil-water separators.

Waste and Hazardous Materials Management

Waste management activities will include:

- Segregation and storage of operational wastes;

- Management of municipal, recyclable, and packaging wastes;
- Management of hazardous wastes, including waste oils, oily water, filters, paints, solvents, batteries, tyres, and electronic waste;
- Management of reefer oils and coolants;
- Coordination with licensed waste contractors for collection, treatment, recycling, and disposal.

Emergency Preparedness and HSE Management

Health, safety, environmental, and emergency-response activities will include:

- Workforce recruitment, training, supervision, and welfare management;
- Shift change and operational handover procedures;
- Operation of rest areas and welfare facilities;
- Maintenance of spill response equipment and inventories;
- Fire prevention and firefighting preparedness;
- Medical emergency preparedness;
- Response planning for spills, cyclones, monsoon events, heatwaves, and lightning storms; and
- Emergency drills, mutual aid coordination, and equipment readiness exercises.

3.2.4.4 Project Implementation Schedule

The proposed development is planned to be implemented through a phased programme encompassing permitting, environmental and social studies, detailed engineering design, procurement, ground improvement works, construction, equipment supply and commissioning, testing and operational ramp-up. The implementation schedule has been developed to provide an indicative sequence and timeframe for the key project activities and milestones, supporting coordination between the various workstreams and stakeholder processes. The schedule also identifies critical decision points and interfaces between design, permitting and construction activities that are necessary to achieve the planned commencement of operations. The indicative project implementation schedule is presented in Figure 3-29.

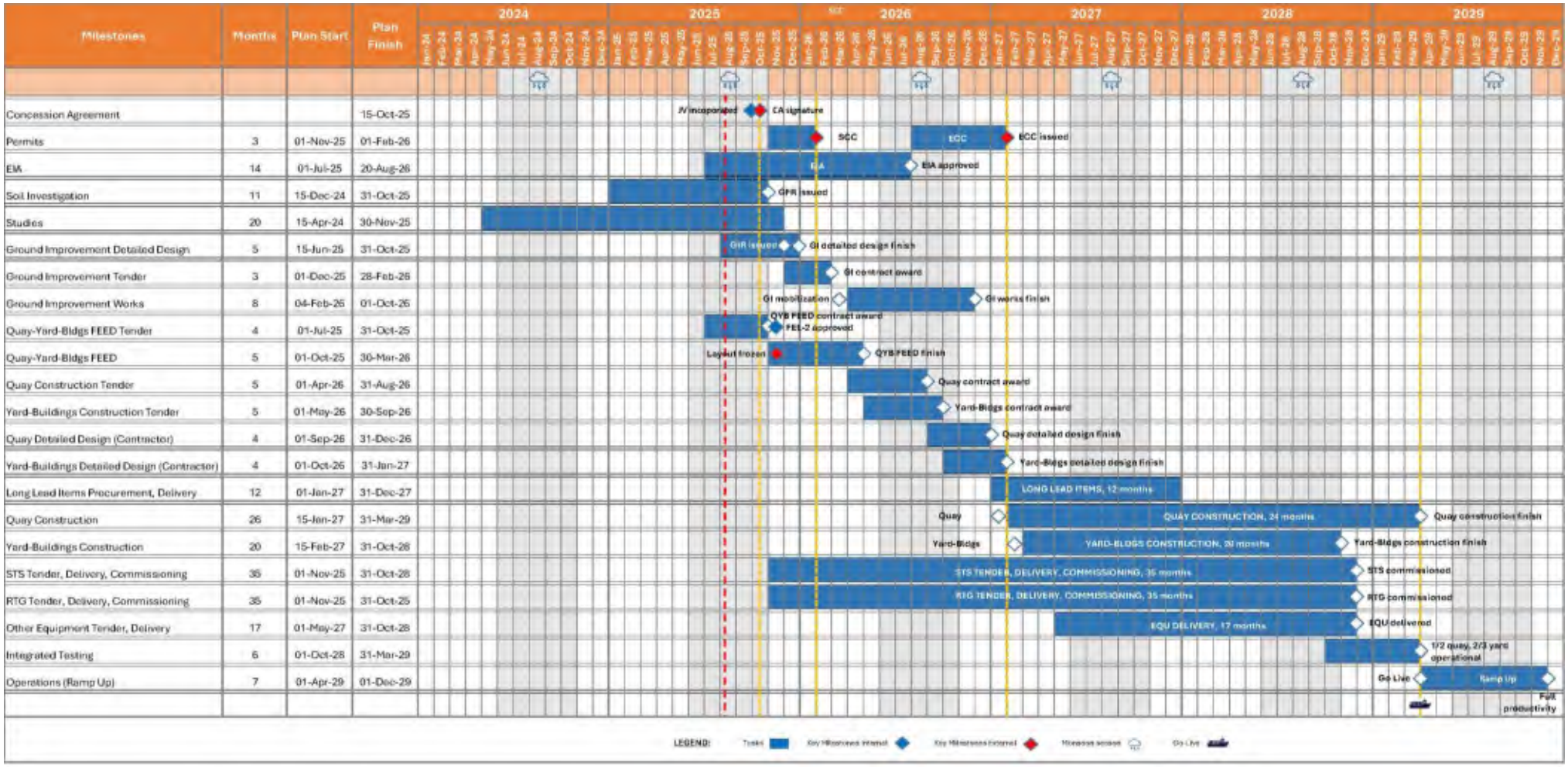


Figure 3-29: Project Implementation Schedule

3.2.5 Requirement of Resources

3.2.5.1 Labour Requirements and Facilities

According to the feasibility study (LCT Ltd. , 2025), the construction workforce is expected to peak at approximately 2,000 workers during the most intensive construction periods. The total workforce will vary over time depending on the construction phase and specific work packages. The workforce composition will include skilled, semi-skilled, and unskilled labour. Skilled personnel will be required for specialised activities such as marine works, piling, ground improvement, civil works, electrical installation, equipment assembly, surveying, supervision, and commissioning. Semi-skilled and unskilled workers will primarily support earthworks, material handling, logistics, housekeeping, and general construction activities.

Construction workers are expected to be accommodated in off-site labour camps to be developed and operated by the contractor. The specific location, layout, capacity, and associated infrastructure of these facilities have not yet been defined and will be determined by the contractor during detailed design and contractor mobilisation and approved by LCT Ltd when known. These facilities are anticipated to include accommodation, sanitation, catering, medical services, and transport arrangements between the camp and the project site. However, the project will aim to hire as much local workforce as possible, reducing the need to facilitate external workers near the project site.

The latest estimates for facility design indicate that the terminal is expected to employ a total of 1,033 persons during operation. This includes both LCT Ltd. staff (blue and white collar), third-party personnel (e.g. contractors, security, and support services), and customs personnel. During a single shift, a maximum of 427 people are working.

Operational staffing will comprise a mix of operational and technical roles and administrative and managerial roles, including:

- Quay operations personnel (e.g. STS operators, lashers, tally clerks, and supervisors);
- Yard and equipment operators (e.g. RTG operators, terminal tractor drivers, forklift operators, and dispatchers);
- Gate and logistics staff (e.g. gate clerks, inspection staff, and seal check personnel);
- Technical and maintenance staff (e.g. workshop technicians, engineers, and reefer technicians);
- Support services (e.g. security, janitorial staff, catering, and transport personnel);
- Administrative and management staff (e.g. operations control, HSE, IT, HR, finance, and commercial teams).

Terminal operations are expected to run on a 24-hour basis, with approximately 70% of personnel working in rotating shift patterns across three shifts, and the remaining 30% working standard daytime hours (approximately 09:00–17:00) in administrative and support functions.

3.2.5.2 Utilities

The LCTP will incorporate on-site utility infrastructure to support 24/7 operations for vessels and terminal activities. Key provisions include:

Water Supply

The sourcing of potable and industrial water for operations, including drinking, cleaning, and firefighting water will be supplied by a connection to the Chittagong Water and Sewerage Authority (CWASA) network. A water transmission line is present along Airport Road, directly in front of the Project site. Although this line is currently not in service due to limited water production capacity, CWASA indicated that the required capacity upgrades are expected to be completed by Q4 2027, after which the Project will be able to apply for a direct connection. For the construction phase, when a CWASA connection may not yet be available, CWASA advised that water should be supplied by licensed water tankers. Water storage infrastructure, such as underground tanks, are included in the current design.

In the event that connection to the CWASA network is not feasible, LCT Ltd. is considering the installation of a new groundwater well to support terminal operations as an alternative source of water supply. Should this option be pursued, further hydrogeological investigations, groundwater quality assessments and pump-testing programmes will be required to assess potential groundwater drawdown and the associated impacts on surrounding users and aquifer conditions.

Based on the current baseline assessment, the shallow aquifer is considered unsuitable as a reliable water supply source due to elevated salinity, vulnerability to contamination, and limited freshwater availability. The deeper aquifer (Dupi Tila) may offer better water quality and resource potential; however, no site-specific data are currently available to confirm groundwater availability, sustainable yield, or treatment requirements. It is noted that land subsidence is a significant environmental concern in Chattogram (see Chapter 5 of the ESIA), and that groundwater abstraction is subject to regulatory restrictions.

Should groundwater be considered in the future, additional assessment would also be required to determine water treatment requirements for potable and operational use, including potential treatment for salinity, iron, manganese, microbiological parameters and other water quality constituents. Furthermore, groundwater abstraction is subject to regulatory restrictions and permitting requirements in Bangladesh. Given the current uncertainties regarding groundwater availability, sustainability and treatment requirements, groundwater abstractions are unlikely to be part of the project and are therefore not considered in the ESIA.

Estimated water demand for the Project during construction and operation is presented in Figure 3-30. Total demand is expected to range between approximately 260–320 m³/day during peak construction and 70–90 m³/day during operation, excluding dedicated firefighting reserves, which will be maintained in onsite storage in accordance with relevant standards.

Use Category	Basis	Estimated Quantity	Source
Construction Phase (Peak)			
Workers' domestic use (peak ~2,000)[1]	80 L/person/day	~160 m³/day	WHO/UNHCR minimum standard for temporary workforce camps
Dust suppression and concrete curing	Industry benchmark	80–120 m³/day	PIANC Report No. 150 (2014); comparable APMT greenfield projects
Equipment washing/cooling	Industry benchmark	20–40 m³/day	PIANC Report No. 150; contractor experience
Construction Phase Total		**260–320 m³/day**	
Operation Phase			
Staff domestic (~500 operational staff)	80 L/person/day	~40 m³/day	BNBC 2020 water supply requirements
Equipment/vehicle washing	Industry benchmark	15–25 m³/day	APMT operational benchmarks (comparable terminals)
CFS/warehouse and amenities	Industry benchmark	10–15 m³/day	BNBC 2020; warehouse facility standards
Landscape/green area irrigation	Industry benchmark	5–10 m³/day	Tropical climate irrigation rates (FAO guidance)
Firefighting reserve (static)	Per NFPA 24	Maintained in on-site storage	NFPA 24 (3-hour fire demand); CA Schedule 4
Operation Phase Total		**70–90 m³/day**	

Figure 3-30: Estimated water demand for the LCTP during construction and operation (source: (LCT Ltd. , 2025)

Power supply

During construction, a temporary power connection will be requested from Bangladesh Power Development Board (BPDB) with temporary backup diesel generators. Operations will draw primary electricity from the Halishahar BPDB electricity substation circa 8 km away by road and 5 km in absolute distance. The connection will be made via a new (underground/overhead) 33/11 kV line. Onsite, there will be backup diesel generators and associated fuel storage to maintain supply reliability.

The offsite power connection will be developed and implemented by the relevant government authorities and is therefore considered an Associated Facility rather than part of the LCTP footprint (see Section 3.2.3.13). As such, any permits, approvals, and environmental clearance

requirements applicable to the transmission infrastructure will be the responsibility of the relevant government authority.

Renewable energy generation is planned through the installation of approximately 1.025 MW of rooftop solar photovoltaic panels, with an estimated annual generation of 1–1.5 GWh. The solar panels will likely be installed on top of the buildings at Block C. This system will be supported by a Battery Energy Storage System (BESS) to optimize peak demand and provide short-term backup. Total electricity consumption during operation is estimated at approximately 18,000 MWh per year, corresponding to an average daily demand of around 49,300 kWh (see Figure 3-31). Average monthly consumption is estimated at approximately 1,500 MWh. Peak demand requirements have not yet been confirmed and will be determined during detailed electrical design. All yard terminal equipment (Cranes STS and RTG cranes, terminal tractors, reach stackers, empty handlers, forklifts, service vehicles) will be electric to minimize Greenhouse Gases (GHG) emissions.

All electricity consumption estimates presented here are preliminary and will be refined during the detailed design phase.

Parameter	Estimated Value[1]
Annual consumption (full operations)	~18,000 MWh/year
Average daily consumption	~49,300 kWh/day
Average monthly consumption	~1,500 MWh/month
Peak demand	To be confirmed during detailed electrical design
Scope 2 CO_2 (estimated)	~10,000 tCO_2/year
I-REC abatement cost	~EUR 180,000/year

1. These estimates to be confirmed during detailed design

Figure 3-31: Electricity consumption estimates for LCTP during operations (LCT Ltd. , 2025)

Waste and wastewater management

LCTP will include a designated waste storage area of approximately 200 m² for domestic solid waste from the terminal. The terminal is not intended to receive, store, treat, or dispose of waste generated by visiting vessels. Vessel-generated waste will remain the responsibility of the vessel operators and will be managed through existing port reception and waste management arrangements in accordance with applicable port regulations. Solid wastes generated by the Project will be segregated at source to maximise opportunities for reuse and recycling. Recyclable materials will be transferred to authorised recycling facilities, while non-recyclable wastes will be transported to appropriately licensed waste treatment or disposal facilities.

Domestic wastewater generated by the Project will be managed through the wastewater infrastructure planned by the Chattogram Water Supply and Sewerage Authority (CWASA). During consultation with CWASA, it was confirmed that a new municipal wastewater treatment plant (WWTP) is planned to serve the Project area and is expected to become operational around 2030. This WWTP is therefore considered the long-term wastewater management solution for the Project and is assessed as the base case for the ESIA.

Until the CWASA WWTP becomes operational, domestic wastewater will be collected and stored in onsite septic and septage tanks. The accumulated wastewater will be periodically removed by vacuum tanker trucks and transported to authorised wastewater treatment and disposal facilities in coordination with CWASA and the relevant municipal authorities. Once the CWASA WWTP is operational and available to serve the Project area, domestic wastewater will continue to be collected onsite and transported by tanker trucks to the municipal treatment facility. As a contingency measure, the Project may develop an onsite sewage treatment plant (STP) should commissioning of the CWASA WWTP be significantly delayed or if municipal wastewater collection services are unable to meet Project requirements. If implemented, the STP would be designed and operated in accordance with applicable national requirements and good industry practice.

Onsite there will also be an oil and water separator that will receive a first-flush after rainfall events to prevent oil and other greasy substances to be discharged into the river. The remains will be handled and transported offsite.

The Project will evaluate opportunities for the beneficial reuse of treated wastewater where technically feasible and consistent with applicable regulatory requirements. Potential reuse applications may include landscape irrigation, dust suppression, or other non-potable uses, subject to water quality standards and operational considerations.

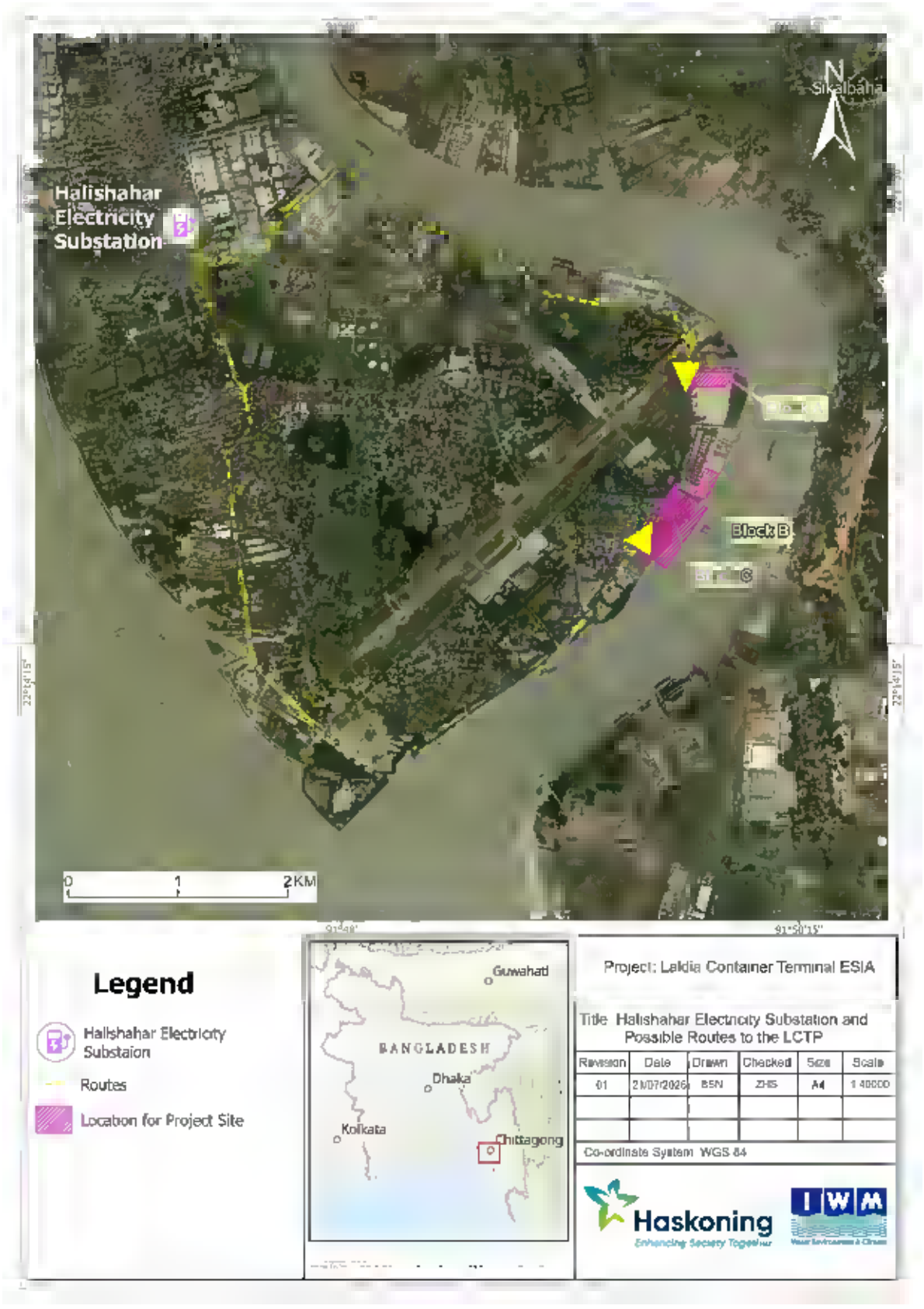


Figure 3-32: Halishahar electricity substation and possible routes to the LCTP (source: ESIA team)

Water supply infrastructure

The Project's operational water demand will be supplied through the CWASA network. According to CWASA, there is already a pipeline available that can supply water to LCTP. Although this line is currently not operational due to capacity constraints, CWASA indicated that upgrades to the water supply system are expected to be completed by Q4 2027, after which a direct connection to the Project can be established. However, any new pipelines or local distribution infrastructure required to connect the Project to the existing CWASA network are considered Associated Facilities and are required to be considered within the ESIA.

Wastewater Treatment Infrastructure

CWASA advised that a new municipal wastewater treatment plant (WWTP) is planned for the Project area and is expected to be operational around 2030. This facility is intended to serve a wider urban catchment, including the Project area.

The municipal WWTP itself is considered a third-party development because it is not being developed specifically for the LCTP. However, any dedicated wastewater collection, transfer, or conveyance infrastructure developed specifically to serve the Project would be considered an Associated Facility.

The current Project design assumes that domestic wastewater generated by the terminal will be collected in onsite septage storage facilities and transported by tanker truck to authorised treatment facilities.

Maintenance dredging in berth pocket

The sediment infill in the berth pocket is estimated to be around 159,000 m^3 per year (Annex C6), which will need to be dredged regularly. Regular maintenance dredging will be performed by CPA. Maintenance dredging activities are considered an Associated Facility as they are required to maintain operational access to the terminal.

Quarry for reclamation material supply

Approximately 1 million m^3 of fill material will be required for reclamation, likely sourced from sand quarries (see Section 3.2.3.5). Based on information provided by LCT Ltd., the filling materials will be obtained from 3-4 areas located in Raozan Upazila, Chattogram, approximately 25-35 km upstream of the LCT site along the Karnaphuli River. The sand will be loaded onto bulkhead barges and transported via designated river routes to the project site for unloading. Additional potential sources include the Karnaphuli River, Kodala, Rangunia (approximately 44 km upstream of the project site), and the Amanat Shah Bridge area (approximately 16 km upstream of the project site).

As a conservative approach, the ESIA takes into consideration that sand will be sourced from the Sylhet region, which is the furthest away from the project site (about 320 km in absolute distance).

The exact location of the quarry remains uncertain. Transportation will be done primarily through river transport.

Turning circle and navigation channel

No dredging in the access channel or turning circle is currently included in LCTP. However, if such dredging is required to enable Project operations, it may be undertaken by a third party (e.g. CPA). Where these works are required solely for the Project, they are qualified as associated facilities.

Road improvements

Upgrades to the surrounding road network may be required to accommodate increased traffic volumes associated with the Project. Where road improvements are implemented specifically to enable Project-related traffic and would not otherwise proceed, they are considered as associated facilities.

3.2.6 Pollution Potentials

The operational phase of the LCT Project may generate pollution primarily from vessel and vehicle emissions, terminal equipment, wastewater, solid and hazardous waste, noise, light, and accidental oil or chemical spills. However, the use of electric-powered terminal handling equipment and other green-terminal measures will substantially reduce direct air emissions and associated pollution from terminal operations, while the remaining impacts are expected to be localized and manageable through appropriate pollution-control, waste-management, spill-prevention and monitoring measures.

3.3 Analysis of Alternatives

The ESIA considers the environmental and social aspects of alternative design options for the Project, as well as the 'No Project' alternative. An alternative is defined as a possible course of action, in place of another, that would meet the same general purpose and need defined by the project, but which would avoid or minimize negative impacts or enhance benefits. The purpose of the alternatives analysis is to improve decisions on project design, construction, and operation methods based on feasible alternatives. This analysis facilitates the consideration of environmental and social criteria at the early stages of development and decision-making.

The alternative analysis includes considerations from environmental, social, and technical perspective. It considers alternative project locations, design options that are still feasible to alter.

3.3.1 No-project alternative

The no-project alternative considers the situation in which the LCTP is not implemented, and the site remains under its current use and condition. In this scenario, the planned container terminal would not be developed. The existing port system in Chattogram would therefore continue to rely

on the current terminals and infrastructure, which are already subject to high levels of congestion and operational pressure.

Chattogram Port is Bangladesh's principal maritime gateway and handles over 90% of the nation's trade and about 98% of its container trade (CPA, 2025). Existing container facilities are operating under heavy load, with limited spare capacity, recurring vessel delays, and constrained yard and gate operations. The LCTP aims to relief some of the current congestion by introducing a terminal design capacity of 1.4 million TEU annually Compared to the current annual TEU handling of CPA in 2025, reported at approximately 3,4 million TEU, this adds a significant amount of increase in capacity.

From an economic perspective, the no-project alternative would forego the expected contribution of the project to Bangladesh's trade logistics system. The project is intended to support export-oriented sectors, particularly garments and related industries. The average Ready-Made Garment (RMG) supply lead time in Bangladesh ranges between 90-120 days, compared to 50-60 days in China and 60-70 days in India, highlighting the competitiveness gap that improved port performance could help to close (Arnob, 2020).

For Chattogram and the surrounding logistics area, the no-project alternative would also mean that potential employment opportunities during construction and operation would not arise. LCT indicated that local labour is preferred where possible, and with a peak construction workers need of ~2,000 that would mean that many (temporary) jobs will not arise. In addition, associated investments, and indirect economic benefits, such as food/drink vendors off-site, linked to the terminal's development would not be realised.

However, the no-project alternative would avoid the direct project-related impacts associated with land development, reclamation, piling, dredging, construction traffic, and changes to drainage and access arrangements. It would therefore also avoid the associated short-term construction nuisances and habitat conversion linked to the project footprint. However, the avoidance of project-related impacts would then mean that existing port inefficiencies would remain, which could contribute to environmental pressures through prolonged vessel idling, increased truck queuing, and less efficient logistics operations.

Overall, the no-project alternative is not preferred because it would not address the general purpose and need for the project, which is the need for additional and more efficient container-handling capacity at Chattogram Port.

3.3.2 Justification of Discarding Other Options

As part of the project development process, a range of alternatives were considered to identify the option that best meets the Project objectives while minimising potential environmental and social impacts and addressing technical, operational, economic and regulatory requirements. Alternatives considered included different site locations, layout configurations, design approaches, technologies and implementation scenarios. The assessment of these alternatives enabled the

identification of the preferred option through a balanced evaluation of environmental, social, technical and commercial factors. This section summarises the alternatives that were considered and subsequently discarded, together with the key reasons for their rejection and the rationale for selecting the preferred development option.

3.3.2.1 Project location alternatives

LCT Ltd. indicates that the site at Laldia Char was identified and designated by the Chittagong Port Authority (CPA) as the location for a new container terminal and was subsequently formalised through the Concession Agreement between CPA and APM Terminals B.V. under an exclusive Government-to-Government PPP framework between Bangladesh and Denmark. The Concession Agreement defines the Concession Area across three blocks (A, B, and C, totalling 49.15 acres). The selection of the Laldia Char site by CPA was driven by its location approximately 9 km downstream of the existing port and 3.5 km from the Bay of Bengal, where naturally deeper water allows berth depths of −12.0 m ISLWL, substantially exceeding the draught limitations at the upstream city terminals, and where the river geometry permits vessels up to 300 m LOA to navigate, turn, and berth. The land is Government-owned '*khas*' land administered by CPA and was the subject of a prior feasibility study in 2016 (MMM Group/IWM), which confirmed the site's suitability for port development. As the Concession Area and its boundaries are prescribed by the Concession Agreement, the ESIA does not assess alternative project locations; rather, the assessment of alternatives focuses on design alternatives, construction methodologies, and operational configurations within the defined site.

3.3.2.2 Reclamation or deck-on-piles for the yard

The current conceptual design for the Laldia Container Terminal includes extending the yard area into the Karnaphuli River, with the new quay wall positioned 60 m beyond the existing flood wall at the northern edge and 120 m at the southern edge. The quay wall will include a 60 m wide deck-on-piles structure (613 m long), while the yard area behind this is proposed to be constructed on reclaimed land covering the existing intertidal mudflat. However, an alternative could be to construct a full deck-on-piles without introducing a reclamation (see Figure 3-10). Therefore, there are two major alternatives:

1. 60 m wide deck-on-piles with reclamation for the remaining yard area (the base case option)
2. Full deck-on-piles without any reclamation (i.e., the entire extended area constructed on piles)

Alternative 1: Deck-on-Piles with Reclamation

This alternative involves constructing a 60 m wide deck-on-piles quay wall while reclaiming the remaining yard area behind it. Reclamation would require transporting and placing sand material to cover the existing mudflat, raising the ground level to the required design elevation. The source of sand material is not yet confirmed; it may be sourced from locations such as Sylhet.

Advantages	Disadvantages
• Likely lower overall construction cost compared to full deck-on-piles, assuming sand material is reasonably accessible. However, this may be different in reality considering the long distance from the project site to possible sand sources. • Reduced need for piling, which decreases underwater noise impacts during construction compared to full deck-on-piles • Lower quantity of steel and concrete required compared to full deck-on-piles, potentially reducing material-related emissions	• Alteration of the river course, which may contribute to sediment accumulation south of Block C (as predicted in HR Wallingford morphological modelling (HR Wallingford, 2024) and Haskoning studies (BK4589-HAS-SP-XX-RP-EV-0004)). • Reclamation extends further into the river and therefore has a greater potential to alter local flow patterns and sediment transport processes than a full deck-on-piles solution • Increased need for dredging downstream due to potential sediment accumulation, which needs to be removed regularly. • Sand transportation (if by truck) creates additional traffic and road safety risks. • Sand sourcing from distant locations (e.g., Sylhet) may increase transportation costs and emissions, potentially undermining cost advantages. • Full loss of intertidal mudflat habitat covered by reclamation materials. • Construction involves sand placement activities with associated water quality risks (increased turbidity).

Alternative 2: Full Deck-on-Piles without Reclamation

This alternative involves constructing the entire extended yard area on a deck supported by piles, without any reclamation. The existing mudflat would remain in place, and water flow under the deck would be maintained. However, this mudflat would not receive any light and has limited access to species such as birds or marine mammals, resulting in a partial loss of habitat.

Advantages	Disadvantages
• The mudflat would still be accessible for species from the riverside • By maintaining flow beneath the structure and avoiding reclamation of the intertidal area, this option is expected to have a smaller effect on river morphology and sediment transport processes, potentially reducing sediment accumulation and maintenance dredging requirements compared to the reclamation option Less sand material required, eliminating sand sourcing, transportation, and placement • Less truck or river traffic associated with sand transport, reducing traffic emissions and road/navigational safety risks	• Likely higher construction cost (depending on the cost of sand) due to significantly increased quantities of steel, concrete, and piling required • Substantially more piling results in higher underwater noise generation and impacts affecting aquatic life (such as the impacts on dolphins) • Increased embodied emissions from concrete and steel production compared to reclamation • Piles may trap debris and objects from the river currents, requiring periodic cleaning

Both alternatives face trade-offs between environmental and social impacts, and hydrological alterations. If sand must be sourced from distant locations, transportation (either road or river transport) risks and emissions may increase substantially.

The full deck-on-piles option provides better environmental outcomes regarding habitat preservation and river morphology, but with increased underwater noise impacts from more intensive piling. The reclamation option involves less underwater noise but results in more transportation impacts, complete habitat loss and potential downstream sedimentation issues requiring maintenance dredging.

Results of the morphological modelling (see morphological modelling report[6]) indicate that the reclamation option is expected to have only limited effects on the overall morphology of the Karnaphuli River, with the dominant morphological processes continuing to be governed by the natural meander dynamics of the river rather than by the proposed development. The modelling predicts that the project area, located along the inner bend of the river, will continue to experience sediment deposition, while erosion predominantly occurs along the outer bend. The intervention is not expected to cause significant large-scale channel instability or major changes to navigational conditions. The modelling also indicates that the deck-on-piles structure allows water flow to pass underneath the platform, thereby reducing obstruction of river currents and limiting impacts on sediment transport processes. As the full deck-on-piles alternative would further reduce encroachment into the river compared to the reclamation option, it is expected to result in lower impacts on river morphology and sediment dynamics, although this alternative was not modelled separately.

3.3.2.3 Drainage channel alternatives

The conceptual design proposes modifying the existing open drainage channel (*Khal 14*) located between Block B and Block C. The proposed base-case design would convert this channel into reclaimed land, with drainage flows rerouted through an extended box culvert system from the road crossing to the existing sluice gate and pumping station (see Figure 3-33). Downstream of the sluice gate, flows would continue through a box culvert before discharging into the river. The proposed culvert will be designed to match or exceed the hydraulic capacity of the existing culvert. The revised drainage channel design will be confirmed with the BWDB, which is responsible for its operation and maintenance (see Figure 3-33).

[6] *Morphological Changes Modelling Report, Laldia Container Terminal ESIA, BK4589-HAS-SP-XX-RP-EV-0004 (Haskoning, 2026)*

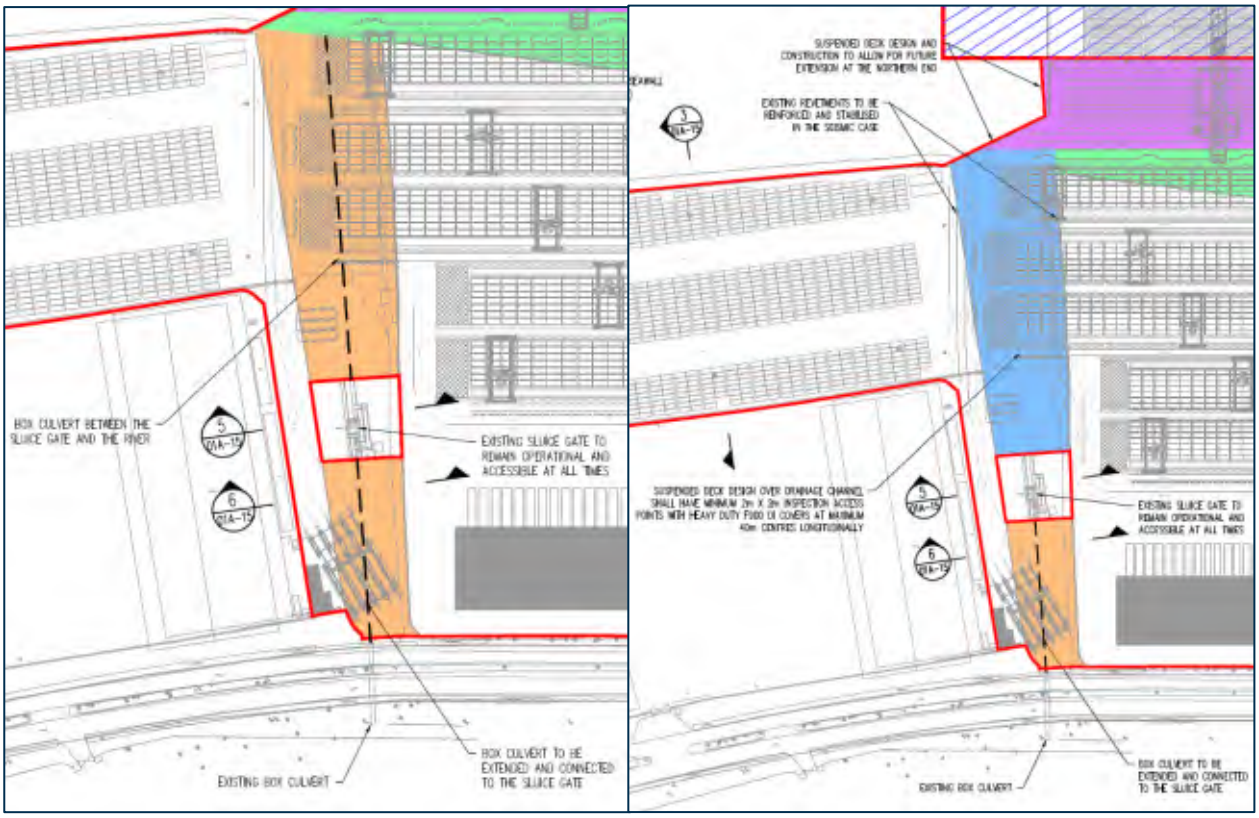


Figure 3-33: Left: landfill and a box culvert (source: Asset Design Drawings APM-056-01A-12 rev. 3). Right: landfill with culvert upstream of the sluice gate with a suspended deck downstream of the sluice gate (blue area) (source: Asset Design Drawings APM-056-01A-12 rev. 2)

Alternative 1: Complete Backfill with Box Culvert

This alternative involves fully backfilling the drainage channel (excluding the sluice gate and pumping house area) with sand, creating reclaimed land for terminal development. An extended box culvert, with dimensions similar to or larger than the existing culvert under the Airport Road, would be installed underneath to convey drainage flows from the road crossing to the sluice gate and then to the river.

Advantages	Disadvantages
• Lower long-term operational complexity for the terminal operator	• Complete loss of habitat in the drainage channel, including mangrove trees, mudflats, and associated vegetation • Requires sand material for reclamation to be sourced and transported on-site • Maintenance access for BWDB becomes difficult as the culvert is small in dimensions and can only be accessed through the terminal yard where operations are ongoing. Full access from the riverside is challenging. • Risks of more (perceived) waterlogging upstream

Alternative 2: Partial Deck-on-Piles Over Open Channel

This alternative involves constructing a deck supported by piles over the existing open drainage channel downstream of the sluice gate, with a landfill and a culvert upstream of the sluice gate. The channel would remain open, allowing continued water flow and potential access for maintenance from the riverside.

Advantages	Disadvantages
• Maintains most of the open drainage channel functionalities, resulting in a lower risk of waterlogging upstream, depending on the actual drainage capacity of the culvert. • Maintenance may be possible through partial access from the riverside to clean the channel from silts and debris. • Less loss of habitat in the channel section. Mangroves and vegetation will still have to be removed, but some of the mudflat will remain that can host riverine species • Less sand material required for reclamation in this section	• Piling construction generates underwater and ambient noise • Piles can trap debris and objects in the water, requiring periodic cleaning and creating potential flow obstructions

Both alternatives result in a loss of habitat and require relocation or modification of the existing ferry operation. The backfill option is more favourable for terminal operations and cost but creates possible challenges for drainage capacity, perceived water logging risks, and maintenance access. The deck-on-piles alternative maintains some of the ecological function under the deck and likely has more drainage capacity but at higher costs. The open basin (current situation) is not considered feasible as it would require relocating the out-gate and causes capacity loss for the terminal, which is considered a 'no-go' from the perspective of terminal operations. The preferred option from an E&S perspective would depend on underwater noise impacts created by the piling and whether this impacts any sensitive receptors, such as the dolphin populations. If this impact is not significant, the deck-on-piles likely presents the preferred alternative.

3.3.2.4 Ground improvement methods

Based on site investigations, the Project area is characterised by soft, compressible soils and liquefiable sandy layers. Without ground improvement, predicted settlements exceed allowable design limits. A range of ground improvement techniques was screened by LCT Ltd. The two options that were assessed were Prefabricated Vertical Drains (PVDs) and Sand Compaction Piles (SCPs).

Alternative 1: Prefabricated Vertical Drains (PVDs) with Surcharge

This method involves installing prefabricated vertical drains in a regular grid pattern across the site, combined with temporary surcharge loading (placement of additional fill) to accelerate consolidation of soft soils.

This method includes:

- PVDs installed typically up to ~12 m depth in a grid pattern
- Temporary surcharge fill placed for a period of approximately two months
- Accelerates dissipation of pore water pressure and consolidation settlement

Advantages	Disadvantages
• Effective in reducing long-term settlement to within acceptable limits • Lower material requirements compared to pile-based solutions (reduced steel and aggregate use) • Lower construction-related noise than driven piling or other heavy densification methods • Lower environmental footprint than deeper, more material-intensive ground improvement options • Generally less disruptive to nearby communities due to relatively limited vibration and fewer heavy impact activities	• There is a possibility that the method does not fully eliminate liquefaction risk in deeper sandy layers • Requires higher volumes of surcharge material, which may create additional transport emissions, dust, and temporary land take for stockpiling • Construction period includes consolidation time, which may delay project delivery and prolong nuisance to nearby receptors. • Use of plastic materials and risk of contaminating the soil with plastic residuals.

Alternative 2: Sand Compaction Piles (SCPs) with Surcharge

This method involves installing sand compaction piles (typically ~20 m deep) to densify and reinforce the soil, often combined with surcharge loading to further improve settlement performance.

This method includes:

- Installation of sand piles at regular spacing (e.g. 1.9 m grid) to depths of ~20 m
- Mechanical densification improves strength and stiffness of the soil mass
- Combined with surcharge to further reduce post-construction settlement

Advantages	Disadvantages
• Effectively mitigates liquefaction risk in all treated layers • Provides improved bearing capacity and overall ground stability • Reduces risk of differential settlement under operational loads	• Higher construction cost due to material and specialised equipment requirements • Increased construction noise and vibration associated with pile installation • Higher embodied carbon due to material use and installation energy. • Requires sourcing of suitable sand material, which may increase transport impacts, resource demand, and potential supply-chain risks. • Greater disturbance to the local environment and nearby communities during construction, particularly if works are prolonged or occur close to sensitive receptors.

From an environmental and social perspective, PVDs with surcharge is generally the less intrusive option during construction because it involves lower noise, vibration, and material intensity, and it is therefore likely to cause fewer short-term nuisance effects for nearby receptors. However, its

benefits are more limited in terms of deep liquefaction than with SCPs with surcharge. SCPs with surcharge offers the stronger overall ground performance, but this comes at the cost of higher construction impacts, including increased noise, vibration, material demand, transport activity, and embodied carbon.

According to LCT, PVDs are suitable for the ground improvement required on LCTP, which makes it the preferred alternative.

4 Legal, Policy and Administration Framework

4.1 Introduction

This chapter outlines the legal, policy, and administrative framework applicable to the Environmental and Social Impact Assessment (ESIA) of the project. It provides an overview of the key national laws, regulations, and policies in Bangladesh that govern environmental protection, land use, labour, health and safety, and social considerations relevant to the study.

In addition, the chapter reviews the procedures and requirements for compliance with the national ESIA approval framework, including applicable clearance processes and regulatory obligations. Relevant C conventions, and standards to which Bangladesh is a signatory are also presented.

4.2 Relevant National Legislations and Policies in Bangladesh

4.2.1 Overview of Policies, Laws, Rules and Regulations

This section presents the relevant environmental laws, acts, rules, and policies to ensure that concerned authorities, planners, designers, the project proponent, and contractors are informed of applicable regulatory requirements. It aims to facilitate compliance and support the implementation of project activities in an environmentally responsible manner. The key national policies, acts, rules, and regulations are summarized in Table 4-1.

Table 4-1: Summary of applicable environmental, social regulations of GoB

Sl No	Policies, Laws, Rules and Regulations	Key Provisions and Purpose	Applicability to the Project
1.	Environment Conservation Rules, 2023	• National Environment Quality Standards for surface water (inland and marine/ coastal), drinking water, sewage effluent, industrial effluents, liquid waste discharge standards industry wise, etc.; • Categorization of industries, development projects, and other activities based on actual and anticipated pollution load; • Procedure for obtaining Site Clearance Certificate (SCC) for Construction and Environment Clearance Certificate (ECC for Operation); • Requirements for undertaking IEE and EIA's as well as formulating EMP according to categories of industries/ development projects/ activities; • Procedure for damage claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life.	Applicable as the environmental conservation rules will ensure conservation of the natural resources and the project needs to comply with the requirements of ECR, 2023. The project falls in "red" category.
2	Bangladesh Environmental Conservation Act (ECA), 1995 and	• Define Applicability of environmental clearance; • Regulation of development activities from environmental perspective; • Framing applicable limits for emissions and effluents; Framing of standards for air, water, and noise quality;	Applicable as the proposed project activities are likely to be associated with environmental and

Sl No	Policies, Laws, Rules and Regulations	Key Provisions and Purpose	Applicability to the Project
	subsequent amendments in 2000 2002, 2010	• Formulation of guidelines relating to control and mitigation of environmental pollution, conservation, and improvement of environment; • Declaration of Ecologically Critical Area (ECA)	social issues. However, no designated Ecological Critical Area (ECA) is within the project influence boundary (5 km radius).
3.	National Environmental Policy, 2018	• Major elements of the policy are- Natural equilibrium provision and overall development of the country through environmental protection and sustainable management; • Encourage collection and promotion of low carbon emission technology in the country; • Identifying and controlling all types of environmental pollution and degradation activities; • Ensure environmental development in all fields; Ensure sustainable, long term, and environmentally friendly use of all-natural resources; • Maintain and streamline the environmental policies and strategies among other policy strategies in the interest of sustainable development; • Ensure the Environmental Impact Assessment and Strategic Environmental Assessment in all necessary sectors; • Actively involve as much as possible with all international environmental initiatives and take necessary actions at local and national levels.	Applicable as the environmental policy aims to prevent pollution and degradation of resources.
4	Bangladesh Environment Court Act, 2000 and subsequent amendments in 2019	• GoB has given the highest priority to environmental pollution; • Passed 'Environment Court Act, 2000 for completing environment related legal proceedings effectively; • Provides the jurisdictions of the environment court, penalty for violation, trial procedure in special magistrate's court, power of entry and search, procedure for investigation, power and authority of the environment court to inspect, appeal procedure and formation of the environment appeal court.	Applicable for completing environmental legal requirements effectively. According to this act, government can take legal actions if any environmental problem occurs due to project interventions.
5.	National Biodiversity Strategy and Action Plan (2004)	• Conserve and restore the biodiversity of the country for the well-being of the present and future generations; • Maintain and improve environmental stability for ecosystems; • Ensure the preservation of the unique biological heritage of the nation for the benefit of the present and future generations; • Guarantee the safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country;	Applicable for conservation of biodiversity in the study area (drainage channels, a few mangrove trees etc.).

Sl No	Policies, Laws, Rules and Regulations	Key Provisions and Purpose	Applicability to the Project
		• Stop the introduction of invasive alien species, genetically modified organisms and living modified organisms.	
6.	Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009 (updated 2022)	Provides the national framework for climate change adaptation, disaster risk reduction, climate-resilient infrastructure, mitigation and sustainable development. The strategy identifies priority actions in areas including food security, disaster management, infrastructure resilience, research and low-carbon development.	Applicable as the Project is located in a coastal area exposed to cyclones, storm surges, sea-level rise and extreme rainfall events.
7.	National Adaptation Programme of Action (NAPA), 2005 (updated 2009)	Identifies priority adaptation measures required to address vulnerabilities associated with climate change in Bangladesh, including protection of coastal infrastructure, improved disaster preparedness and adaptation of vulnerable sectors.	Applicable as the Project incorporates adaptation measures to address climate-related risks, including elevated platform levels, drainage management, storm surge resilience and emergency preparedness measures.
8.	Biodiversity Act, 2017	It provides for the creation of the National Committee and the Biodiversity Management and Surveillance Committees at local levels (i.e., Districts, Upazilas, Municipalities, and Unions). In general, all these committees are mandated to assist the Government in implementing the National Biodiversity Strategy and Action Plan (NBSAP) and to visit the biodiversity enriched areas in their respective territories; and monitor the progress of implementation of the NBSAP.	Assessment and monitoring project impact on the local biodiversity will be carried away.
9.	Forest Act 1927 (Amendment 2000)	The act empowers the government to regulate the felling, extraction, and transport of forest produce in the country.	No forest area is present in the AoI of the project.
10.	The Protection and Conservation of Fish Act (1950) and subsequent amendments in 1982	Protection and conservation of fish in Government-owned water bodies.	Applicable for the conservation of fish as the project construction/ dredging/ship movement/berthing activity may impact nearby water bodies.
11.	National Fisheries Policy, 1998	• Preservation, management, and exploitation of fisheries resources; • Fish cultivation and management;	Applicable for the preservation of fisheries resources

Sl No	Policies, Laws, Rules and Regulations	Key Provisions and Purpose	Applicability to the Project
		• Prawn and fish cultivation in coastal areas; • Preservation, management, and exploitation of sea fishery resources	since the project activities include structures in Karnaphuli river/ *khals*.
12.	Bangladesh Water Act, 2013	As per this Act, all forms of water (e.g., surface water, ground water, sea water, rainwater, and atmospheric water) within the territory of Bangladesh belong to the government on behalf of the people. Without prior permission issued by the Executive Committee, no individuals or organizations will be allowed to extract, distribute, use, develop, protect, and conserve water resources, nor they will be allowed to build any structure that impede the natural flow of rivers and creeks.	Applicable as the project is bound to comply with or consider the requirements under this policy in its design.
13.	The National Water Policy, 1999	• Protection, restoration, and enhancement of water resources; • Protection of water quality, including strengthening regulations concerning agrochemicals and industrial effluent; • Sanitation and potable water; • Fish and fisheries; • Participation of local communities in all water sector development.	Applicable for the reservation of water quality.
14.	The Ground Water Management Ordinance (1985)	• Management of GW resources; • Installation of tube- wells at any place after licensing from Upazilla Parishad only.	The proposed Project is likely be related to groundwater.
15.	Bangladesh Labor Act, 2006, Bangladesh Labor Rules, 2015	Provides health, safety, and well-being of the workforce during the project life cycle. In addition, it also stipulated that children under 18 years are not allowed to be employed during the project life cycle.	Applicable as skilled, semi-skilled and day labour will be utilized in project activities.
16.	The Noise Pollution Control Rules, 2025	The Noise Pollution Control Rules have been established in order to manage noise generating activities which have the potential to impact the health and wellbeing of workers and the surrounding communities.	Applicable as noise may be generated during the construction/ operation phase of the project.
17.	Air Pollution (Control) Rules 2022	The rules empower the DoE to enforce strict emission and dust-control limits on industries, vehicles, construction sites, and waste burning. Key provisions include declaring highly polluted zones as "Degraded Air Sheds" to freeze industrial expansion, establishing cross-ministry enforcement, and penalizing violators	Applicable for massive infrastructure and maritime developments in Bangladesh. LCT needs to follow the rules for enforcing strict dust-control and machinery testing during construction, and

Sl No	Policies, Laws, Rules and Regulations	Key Provisions and Purpose	Applicability to the Project
			utilizing a fully electrified fleet with shore-power berths during operations to keep emissions below legal thresholds.
18.	Solid Waste Management Rules 2021	It is formulated to manage solid waste in a sustainable and circular approach rather than unorganized dumping. It aims to reduce environmental pollution and health risks. The Rules require source segregation of waste into biodegradable, non-biodegradable, and domestic hazardous categories; introduce Extended Producer Responsibility (EPR) for manufacturers and brand owners; promote the 3Rs—Reduce, Reuse and Recycle, with landfilling as a last resort; and empower City Corporations and Pourashavas to establish local waste management systems, collect user fees, and take action against illegal dumping and littering.	Limited application as it does not produce any industrial products or packaging. However, the project needs to implement mandatory waste segregation at the source, and comply with municipal disposal regulations to prevent environmental pollution.
19.	National Oil and Chemical Spill Contingency Plan NOSCOP, 2020	NOSCOP, 2020 is Bangladesh's official framework designed to manage and respond to vessel-sourced marine pollution, oil slicks, and chemical spill disasters. It mandates a three-tiered response hierarchy for local, regional, and national authorities, establish clear containment jurisdictions across Bangladesh's marine and inland waterways, and dictate strict frameworks for mandatory spill reporting and technical resource mapping.	It applies to LCTP as it is applicable to all maritime ports, offshore oil and gas drilling sites, shipping vessels, fuel pipelines, and coastal industrial or power projects operating within Bangladesh's territorial waters and internal river systems.
20.	Hazardous Waste (e-waste) Management Rules, 2021	The rules protect public health and the environment by regulating the lifecycle of electrical and electronic equipment to control toxic substances and prevent hazardous e-waste from entering standard landfills.	Applicable since the proposed terminal operates a massive network of electric port machinery, automated tracking sensors, and digital IT systems.
21.	Acquisition and Requisition of Immovable Property Act, 2017	The principal legal instrument governing land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property.	The project is not likely to acquire any land since the proposed interventions are on government (CPA) land.
22.	Disaster Management Act, 2012	To make the activities about disaster management coordinated, object oriented, and strengthened and to formulate rules to build up the infrastructure of effective disaster management to fight all types of disaster.	Applicable, as the project is in a cyclonic surge prone area. However, river flood is not evident as the upstream flow of the Karnafuli River is

Sl No	Policies, Laws, Rules and Regulations	Key Provisions and Purpose	Applicability to the Project
			regulated at Kaptai Dam.
23.	Wildlife (Conservation & Security) Act 2012. Wildlife (Conservation and Security) Ordinance, 2026 was promulgated only on 7th January 2026	To provide for the conservation and safety of biodiversity, forest and wildlife of the country by repealing the existing law relating to conservation and management of wildlife of Bangladesh	Applicable, as the project may have an effect on wildlife.

4.2.2 Administrative Framework in Bangladesh

The table below provides an overview of the key organizations engaged in environmental policies and regulations relevant to LCTP.

Table 4-2: Institutional Framework in Bangladesh in the environmental sector

Organization	Affiliation	Key Roles and Responsibilities
Ministries		
Ministry of Environment, Forest and Climate Change (MoEFCC)	Government of Bangladesh	Overall policy-making body for environmental protection, forest management, and climate change; oversees DoE and Forest Department; responsible for national environmental regulations and international commitments.
Ministry of Water Resources (MoWR)	Government of Bangladesh	Responsible for national water management, including flood control, irrigation, drainage, and water resources planning.
Ministry of Labor and Employment (MoLE)	Government of Bangladesh	Ensures labor welfare, occupational health and safety, and industrial relations; regulates employment conditions and worker rights.
Ministry of Shipping (MoS)	Government of Bangladesh	Responsible for policy, regulation, and development of the maritime and inland water transport sectors. Mandate includes oversight of seaports and river ports, shipping and navigation safety, maritime administration, and shipping-related infrastructure, as well as compliance with international maritime conventions.
Departments		

Organization	Affiliation	Key Roles and Responsibilities
Department of Environment (DoE)	Under MoEFCC	Reviews EIAs and issues environmental clearance; conducts environmental monitoring and enforcement; coordinates international environmental commitments.
Forest Department (FD)	Under MoEFCC	Manages and protects reserve forests, national parks, and wildlife; ensures biodiversity conservation and enforcement at field level.
Roads and Highways Department (RHD)	Ministry of Road Transport and Bridges	Responsible for development and maintenance of national highways and major roads; ensures transport connectivity to project areas.
Regulatory Authorities		
Bangladesh Water Development Board (BWDB)	Under MoWR	Executes water resource projects; responsible for hydrological data collection, river management, flood control, and drainage infrastructure (major canals/*khals*, regulators, sluices etc.).
Chattogram Port Authority (CPA)	Ministry of Shipping (MoS)	Implements and manages port operations and infrastructure; ensures compliance with environmental, health, and safety standards; oversees contractor OHS implementation.
Bangladesh Inland Water Transport Authority (BIWTA)	Ministry of Shipping (MoS)	Responsible for development, maintenance, and regulation of inland waterways; ensures navigability, dredging, and river transport management (in inland water, outside port limit of CPA/MPA)
Chattogram Water Supply and Sewerage Authority (CWASA)	Ministry of Local Government, Rural Development and Cooperatives	Provides water supply, sewerage, and drainage services; responsible for urban water management and sanitation in Chattogram.
Local Governments		
Chattogram City Corporation (CCC)	Local Government Division	Responsible for urban governance, waste management, drainage (small drains), local infrastructure, and public services within the city area.
Ward Administration (Local Government)	Local Government Division	Represents local communities; supports coordination, public consultation, and local-level implementation.

4.2.3 Compliance with ESIA Approval Framework

The Department of Environment (DoE), under the Ministry of Environment, Forest and Climate Change (MoEFCC), is the designated authority responsible for granting environmental clearance to all public, private, and non-governmental projects in Bangladesh. The environmental clearance process is governed by the Environmental Conservation Rules (Bangladesh, 2023), which sets out the procedures, documentation requirements, and categorization of projects based on their potential environmental impacts.

Under ECR 2023, projects are classified into four categories: Green, Yellow, Orange, and Red, depending on their nature, scale, and anticipated impacts. Green category projects are subject to simplified clearance procedures, whereas projects under the yellow and orange categories require progressively more detailed documentation and regulatory review. "Red" category projects, which are likely to have significant environmental impacts, are subject to the most stringent requirements, including the preparation and submission of a comprehensive Environmental and Social Impact Assessment (ESIA) and an Environmental and Social Management Plan (ESMP) based on Terms of Reference (ToR) approved by the DoE.

The proposed Laldia Container Terminal at Patenga, Chattogram, being a large-scale port infrastructure development, falls under the "Red" category in accordance with ECR 2023. Therefore, the project requires submission of an ESIA report, along with an ESMP and other supporting documents, to obtain a Site Clearance Certificate to start construction and an Environmental Clearance Certificate (ECC) for operation from the DoE prior to implementation.

As per ECR 2023, the application for environmental clearance must be submitted in the prescribed format along with applicable fees, as specified in the relevant schedules of the Rules. The DoE reviews the submitted documents and may request additional information or clarification before granting clearance. The validity and renewal requirements of the ECC are also defined under the Rules, with "Red" category projects requiring periodic renewal within a specified timeframe (every one year).

4.2.4 Regional and International Treaties/Guidelines

Bangladesh is a signatory to several international conventions, treaties and protocols relevant to environmental protection, marine pollution control, biodiversity conservation, maritime activities and social safeguards. These instruments provide an overarching framework that complements the national legal and policy framework discussed in the preceding sections. An overview of the relevant international conventions, treaties and protocols is shown in Table 4-3.

Table 4-3: International Treaties, Conventions and Protocol

Sl No	Treaty, Convention or Protocol	Brief Description	Project Compliance
1	MARPOL Convention (1973/78)	International convention for prevention of pollution from	The Project shall ensure compliance through provision of adequate waste

Sl No	Treaty, Convention or Protocol	Brief Description	Project Compliance
		ships including oil, sewage, garbage, and air emissions.	reception facilities, spill prevention and response systems, and control of vessel-related discharges.
2	Ballast Water Management Convention (2004)	Controls transfer of invasive aquatic species through ballast water and sediments.	Visiting vessels shall comply with ballast water management requirements to prevent ecological contamination.
3	Convention on Biological Diversity (1992)	Framework for conservation of biodiversity and sustainable use of biological resources.	The Project shall implement mitigation measures to avoid, minimize, and manage impacts on terrestrial and aquatic biodiversity.
4	Convention on Migratory Species (CMS, 1979)	Conservation of migratory species across national boundaries.	Project activities shall be planned to avoid disturbance to migratory species and their habitats.
5	CITES (1973)	Regulates international trade in endangered species of wild fauna and flora.	The Project shall ensure strict prohibition of trade or use of CITES-listed species in any form.
6	Ramsar Convention (1971)	Conservation and wise use of wetlands of international importance.	Wetland impacts shall be avoided/minimized, and hydrological connectivity shall be maintained where applicable.
7	UNFCCC (1992)	Framework for global response to climate change.	Climate change considerations shall be integrated into project design and operational planning.
8	Kyoto Protocol (1997)	Sets binding greenhouse gas emission reduction commitments under UNFCCC.	The Project shall adopt energy-efficient and low-emission practices to reduce carbon footprint.
9	UNCCD (1994)	Addresses land degradation and desertification.	Soil erosion and land degradation control measures shall be implemented during construction activities.
10	Basel Convention (1989)	Controls transboundary movement and disposal of hazardous wastes.	Hazardous waste shall be managed, stored, transported, and disposed of in compliance with applicable requirements.
11	UNCLOS (1982)	Governs maritime rights, navigation, and marine resource use.	All marine and navigation-related activities shall comply with applicable international maritime law.
12	International Maritime Organization (IMO) Conventions and Codes	Provides global standards for maritime safety, security, and pollution prevention.	Port and vessel operations shall comply with applicable IMO conventions and codes relevant to safety and environmental protection.
13	Convention on the Rights of the Child (CRC, 1989)	Protects rights of children including protection from exploitation and harm.	Child labour shall be strictly prohibited and community safety measures ensured.

Sl No	Treaty, Convention or Protocol	Brief Description	Project Compliance
14	Convention on the Elimination of All Forms of Discrimination against Women (CEDAW, 1979)	Ensures elimination of discrimination against women.	Gender equality and inclusive participation shall be promoted in project activities.
15	International Covenant on Civil and Political Rights (ICCPR, 1966)	Protects civil and political rights including participation and grievance access.	Stakeholder engagement and grievance mechanisms shall ensure rights-based participation.
16	International Covenant on Economic, Social and Cultural Rights (ICESCR, 1966)	Ensures rights to health, livelihood, and social welfare.	Socio-economic impacts shall be managed with due consideration to affected communities.
17	International Convention on the Elimination of All Forms of Racial Discrimination (ICERD, 1965)	Prohibits discrimination on racial or ethnic grounds.	Non-discrimination shall be ensured in employment and stakeholder engagement.
18	Convention against Torture (CAT, 1984)	Prohibits torture and cruel, inhuman or degrading treatment.	Human rights standards shall be upheld in all project-related activities.
19	Convention on the Rights of Persons with Disabilities (CRPD, 2006)	Protects rights and dignity of persons with disabilities.	Inclusive design and accessibility considerations shall be incorporated where feasible.
20	International Convention on the Protection of the Rights of Migrant Workers (ICRMW, 1990)	Protects the rights of migrant workers and their families.	Equal labour protection and fair treatment shall be ensured for all workers.
21	IOSEA Marine Turtle MoU (2001)	Regional conservation agreement for marine turtles.	Construction and operation shall avoid disturbance to marine turtle habitats where applicable.

5 Existing Environmental Conditions

As part of the Environmental and Social Impact Assessment (ESIA) for the proposed Laldia Container Terminal at Patenga, Chattogram, baseline studies have been carried out to define the existing environmental and social conditions of the project site and its area of influence. The studies cover key aspects of the physical environment, biological environment and socio-economic environment, based on field surveys as well as review of secondary information. The identified baseline provides a clear and systematic description of current conditions, which serves as the reference for assessing potential impacts of the project and identifying appropriate mitigation measures.

Prior to baseline data collection, an initial study area was established in accordance with the Environmental Conservation Rules (ECR), 2023 and prevailing Department of Environment (DoE) ESIA practice in Bangladesh. Schedule 11 of the ECR 2023 requires preparation of land-use mapping covering the project area and study area within a 5 km radius. Accordingly, a 5 km buffer around the Project was adopted as the primary study area for baseline characterisation, identification of environmental and social receptors, and impact assessment. The location and Area of Influence of the proposed project is presented in Figure 5-1. Accordingly, the AoI encompasses areas within this buffer around the project components, including the riverine and adjacent coastal environments.

The 5 km buffer provides a practical and regulatory basis for defining the initial AoI, which may be larger for specific receptors or impacts. Consequently, where impact modelling, specialist studies, or receptor linkages indicate that project-related effects may extend beyond the initial 5 km study area, the baseline characterisation and impact assessment have taken that specific AoI into account.

The AoI considered within this ESIA report includes:

- The footprint of the project and its associated facilities;
- Areas directly affected by construction and operational activities, including dredging, reclamation, piling, and terminal operations
- Transportation routes for construction, including road and water transport till 5 km radius from the project site;
- The indirect AoI includes areas that may be affected by indirect, induced, or secondary impacts associated with the Project, which may be further changed if impact pathways extend further depending on modelling results or analysis

The spatial extent varies by environmental and social aspect and is determined by the maximum predicted extent of the relevant impact pathway. In addition, the AoI is also expected to include the following components, but is not limited to:

Environmental (physical and biological) area components

- Ambient noise buffer around construction equipment and activities (commonly within 500–1,000 m);

- Light pollution effects during construction (night works) and operations (24/7 terminal lighting);
- Visual impacts from terminal infrastructure, stacked containers, and light;
- Hydrodynamic and erosion effects from altered shoreline geometry along the Karnaphuli River;
- Water quality and sediment plume effects associated with dredging, reclamation and disposal activities, extending beyond the 5 km study area where relevant; sediment plume modelling indicates a maximum extent of approximately 11 km upstream and 8 km downstream under high-flow conditions;
- Underwater noise boundary from pile driving/dredging extending to the Gupta Bend upstream and into the Bay of Bengal;
- Oil spill impact extents, based on spill trajectory modelling and risk assessment results. Modelling indicates that diesel oil represents the largest spatial extent, with the plume extending up to approximately 7 km upstream under neap slack conditions and up to 10 km downstream towards the Bay of Bengal under falling spring tide monsoon conditions;
- Air quality impact extents associated with construction activities, road traffic and vessel emissions. The assessment includes sensitive receptors within approximately 1 km of the berths and vessel manoeuvring areas and within 200 m of affected road corridors, with a wider area considered through dispersion modelling where relevant;
- Loss of habitat due to the project footprint (Blocks A, B and C, berth pocket (including slopes);
- Indirect effects on key species (e.g., migratory birds, fish spawning grounds) to be determined through species-specific habitat mapping. The 5 km radius will be used as the primary assessment area for indirect effects, while migratory routes, spawning areas and other ecologically important habitats will be assessed to an extent appropriate to the expected impact.

Social area components

- Wards included for potential direct effects adjacent to the project site including Ward 41 Patenga North, Bara Uthan, and Bairag;
- *Khal 14* ferry jetty locations and transport corridor;
- Potential fishery grounds within the 5 km radius and areas affected by changes in navigation or water quality;
- Truck routes to and from the terminal and;
- Indirect effects extending to at least 5 km to capture employment and economic opportunities, commercial activities, fisheries and communities along the foreshore influenced by changes in navigation, with additional areas considered where impact pathways extend beyond the primary study area.

The AoI has been delineated considering a 5 km buffer from the northern corner of Block A and the southern corner of Block C. Block C is located approximately 4 km upstream from the mouth of the Karnaphuli River at the Bay of Bengal and falls within the defined AoI. The confluence of the Halda River with the Karnaphuli River is located more than 20 km upstream of the Project area and lies outside the primary 5 km study area. In addition, the hydrodynamic, sediment transport

and water quality assessments indicate that project-related effects are not predicted to extend to the Halda River.

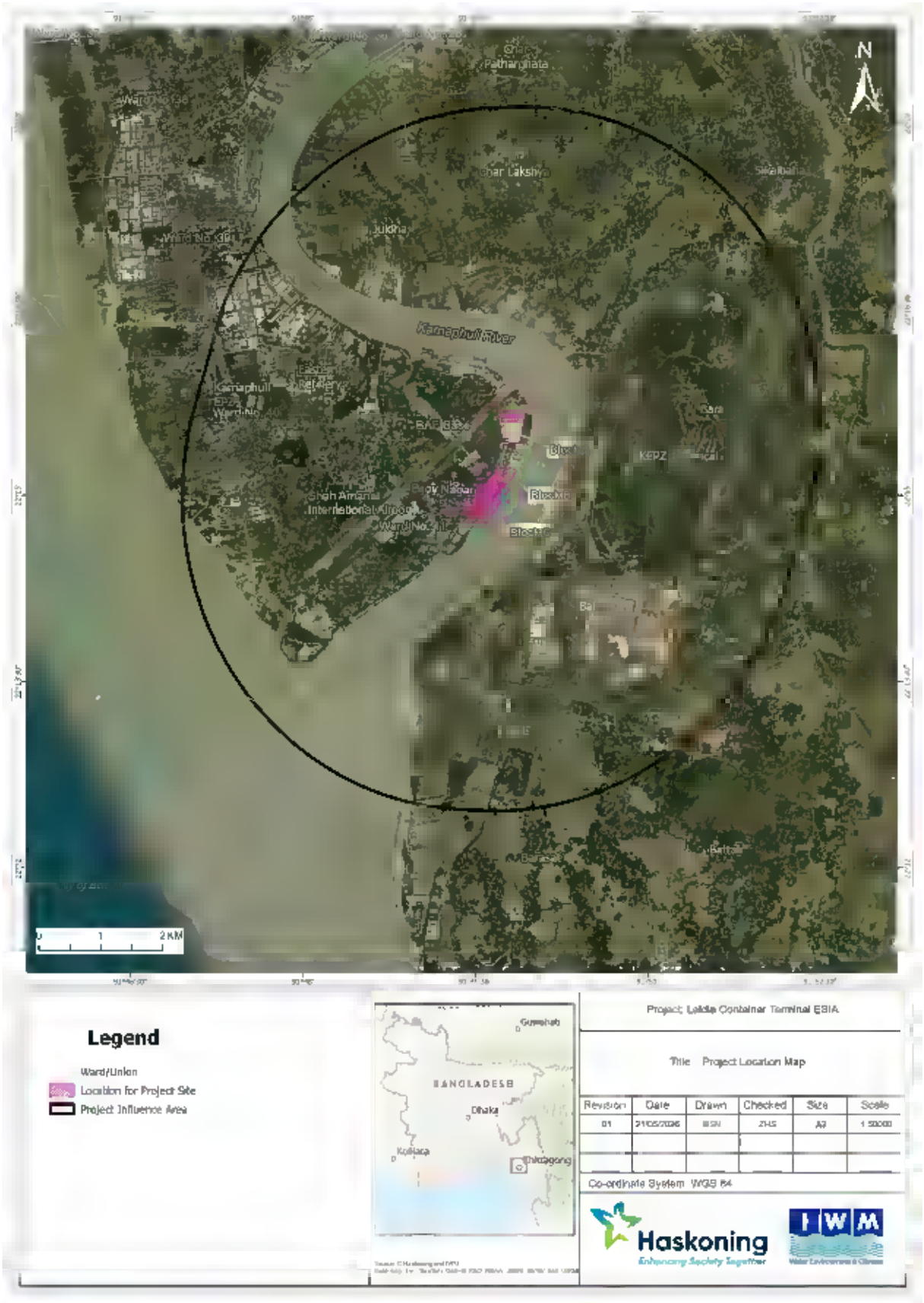


Figure 5-1: Area of Influence of the project

5.1 Physical Environment

This section describes the existing physical environment within the project site and its area of influence for the proposed Laldia Container Terminal. It presents baseline conditions related to topography, geology, geo-morphology, meteorological conditions, land use, water resources and hydrology, surface and groundwater quality, soil and sediment quality, ambient air quality and noise levels. The information has been generated from field measurements, laboratory analysis and secondary data sources to provide a clear understanding of the prevailing physical setting, which forms the basis for assessing potential impacts of the project.

5.1.1 Topography

The project site is located along the bank of the Karnaphuli River at Patenga, Chattogram, on generally flat riverbank land with an elevation of about 6-8 m MSL. The topography of Patenga area, located along the bank of the Karnaphuli River, is characterized by a low-lying estuarine floodplain with elevations only a few meters above mean sea level. The terrain is predominantly flat to gently sloping, descending gradually toward the river channel. This setting reflects active fluvial and tidal processes, with the riverbank forming a distinct edge between the higher reclaimed or natural ground and the deeper navigational channel. Chattogram area has wide variety of geological features with undulating hill topography on one side (east) and low-lying coastal mudflats on the other side (west). The area includes sandy beaches, tidal flats and intertidal zones, which are periodically inundated during high tides and exposed during low tides, indicating strong tidal influence on surface conditions. Small and scattered hilly areas are present on the opposite side of the river, but the overall regional setting is mainly characterized by flat terrain with limited elevation variation. See Figure 5-2.

The area is influenced by a mix of natural and modified drainage features, including several drainage *khals* (i.e. drainage canal) that convey stormwater and maintain tidal exchange with the Karnaphuli River. These drainage pathways are subject to seasonal variation and occasional obstruction, which can lead to localized water accumulation during heavy rainfall events. Overall, the site lies within a low-relief riverfront setting where tidal processes, monsoon rainfall and local drainage conditions jointly influence the surface environment.

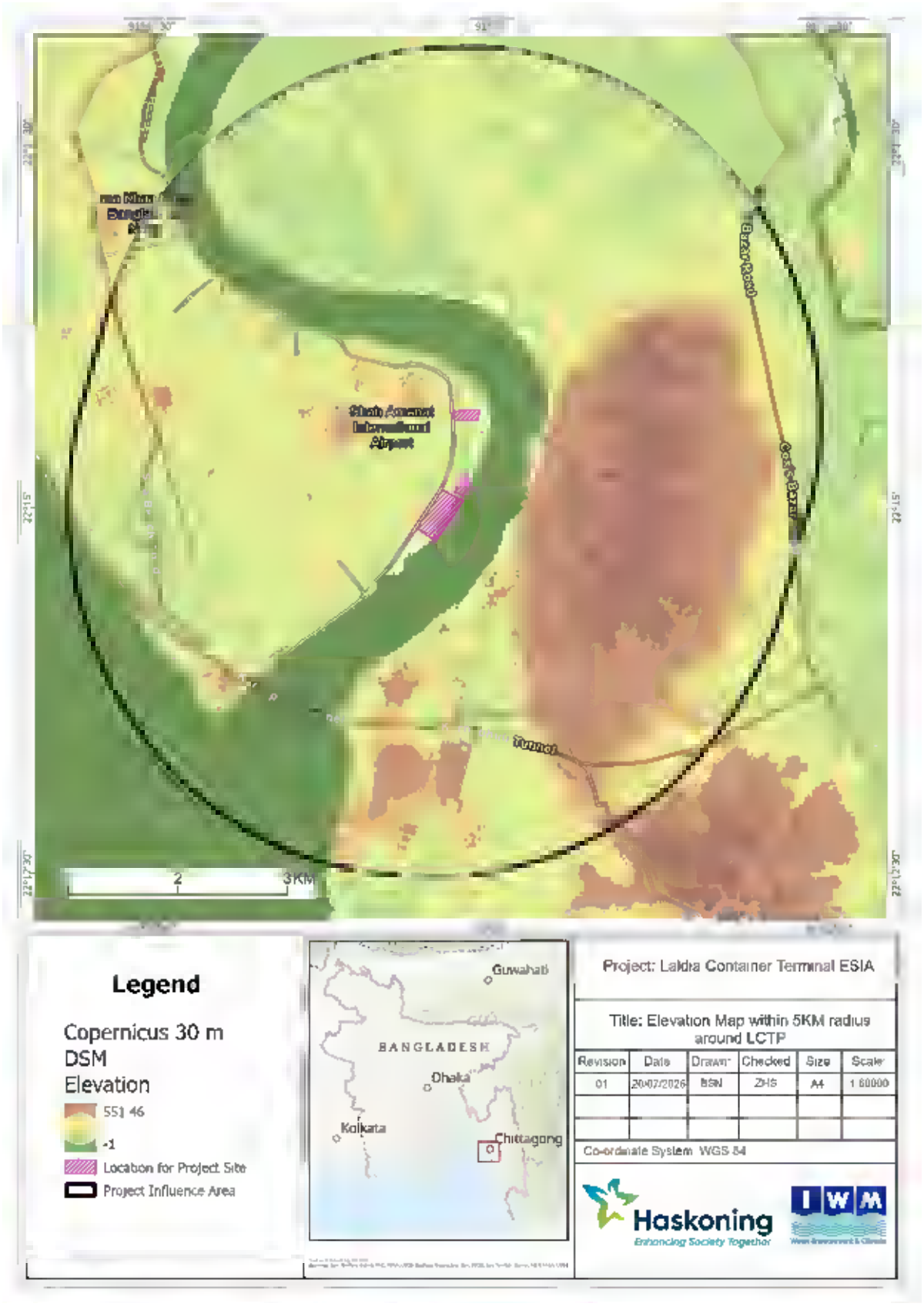


Figure 5-2: Digital Elevation Model (DEM) of the LCTP area of influence (elevation given in meter)

5.1.2 Geology and Geomorphology

The project site is located at the Patenga area, the southwestern end of the of the Chattogram City. The city consists of a wide variety of geological features with undulating hill topography in eastern side and low-lying coastal mudflats on the western side of the Karnaphuli River estuary. These surface sediments are part of the coastal and alluvial group (Geological Map of Bangladesh as shown in Figure 5-3). The project site is a sedimentary char land (river island/accretion) formed by the deposition of sediment from the Karnaphuli River and tidal influences of the Bay of Bengal and developed with filled soil dredged from the river Karnaphuli.

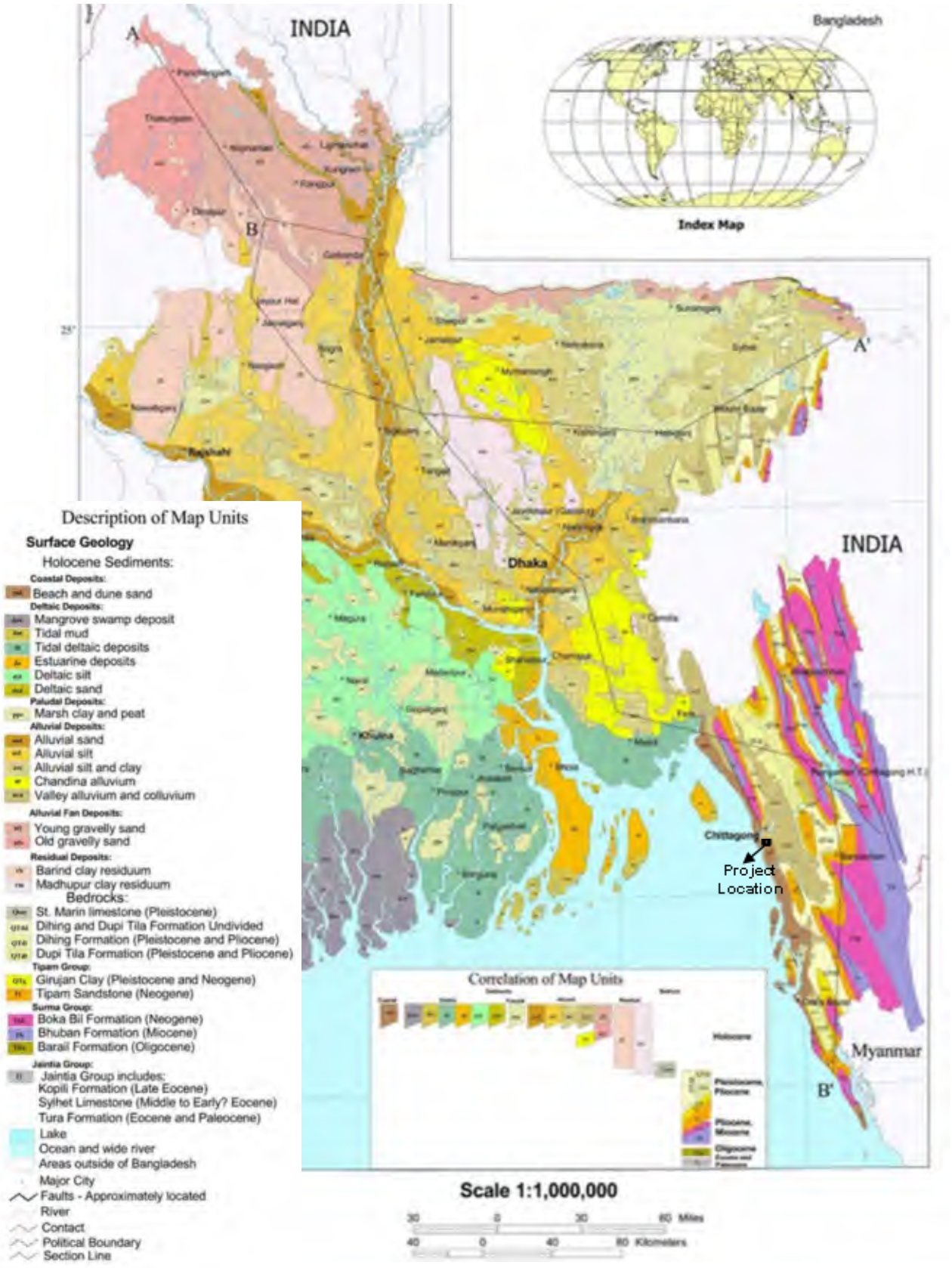


Figure 5-3: Geological map of Bangladesh (Source: U.S. Department of the Interior, U.S. Geological Survey)

The Bengal Basin is a vast foreland basin formed by the collision of the Indian Plate with surrounding plates, containing up to ~21 km of sediment from Cretaceous to recent times. Its evolution is driven by the Himalayan Orogeny and the Indo-Burman Ranges, which supplied sediments and controlled subsidence and basin development. Regionally, the basin is divided into three principal geotectonic provinces: the Stable Shelf (northwest), the Foredeep Basin (central), and the Folded Flank (eastern), the latter represented by the Chittagong-Tripura Fold Belt (CTFB) (Figure 5-4).

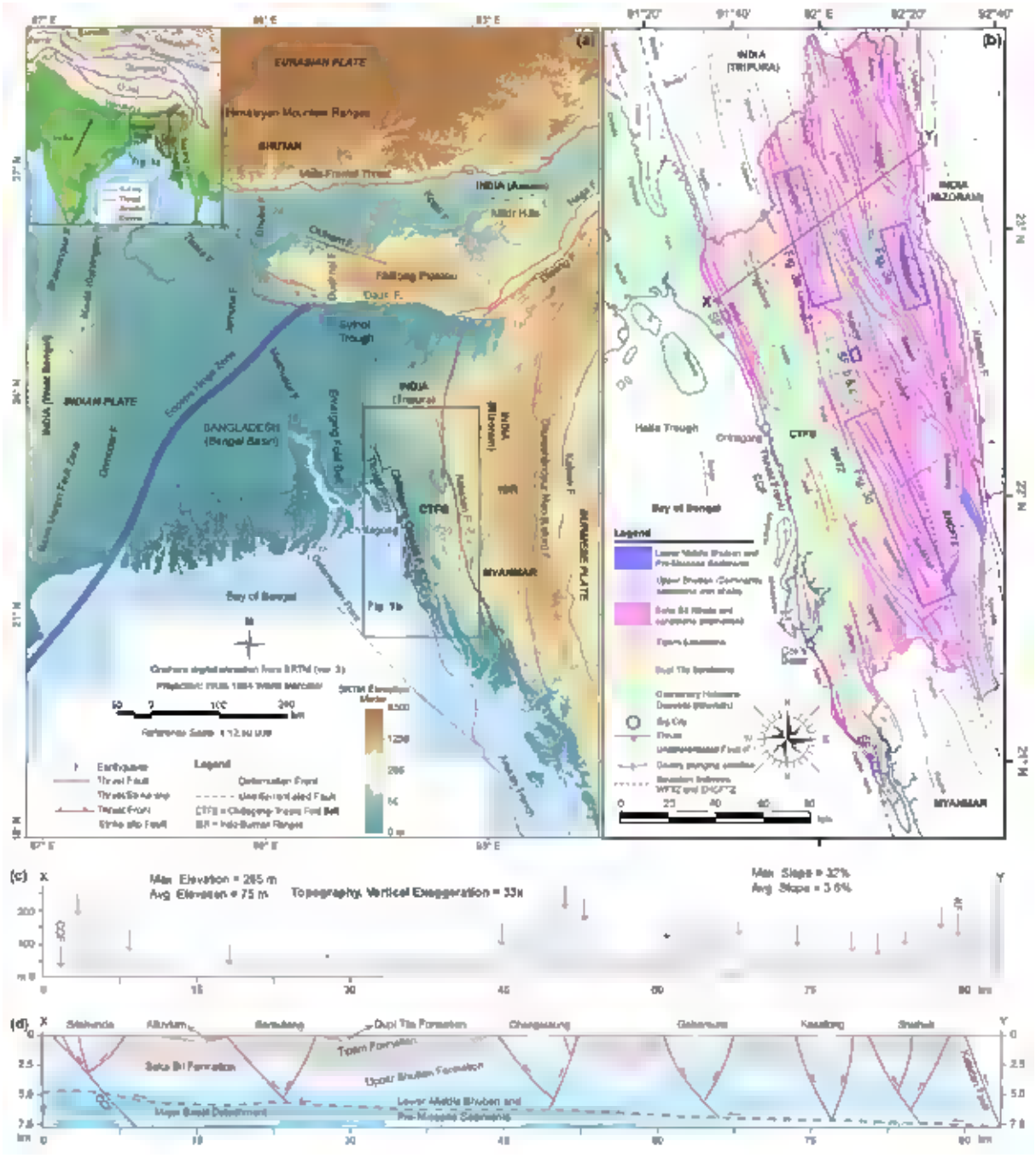


Figure 5-4: Simplified tectonic map of the (a) Bengal Basin, (b) CTFB, (c) variation of Topographic elevation of CTFB, and (d) geologic layers within CTFB (Hossain et al., 2026)

The current study area is geologically situated in the Chittagong Tripura Fold Belt (CTFB), the eastern folded flank of the Bengal Basin formed due to the still-ongoing collision between the Indian Plate and the Burmese Plate and exposing the Miocene to Recent deposits (Hossain, et al., 2026) (Steckler, et al., 2016). The western part of the Chittagong-Tripura Fold Belt (CTFB) represents the transition between the middle asymmetric thrust-faulted zone and the western quiet zone. This area is characterized by relatively gentle to moderate folding with NNW–SSE structural trends, low plunge angles, and asymmetric anticlines and synclines, where deformation intensity decreases westward toward the coastal plain (Khan, Hossain, & Chowdhury, 2017) The subsurface is composed predominantly of Neogene clastic sediments overlain by younger deltaic and estuarine deposits associated with the Karnaphuli River system. Structurally, the folds exhibit steep axial planes and locally faulted limbs, although deformation is less intense compared to the eastern parts of the fold belt. The overall geological setting reflects a combination of tectonic control from the Indo-Burman compressional regime and active sedimentation processes within the estuarine and coastal environment, indicating a seismically active setting with potential exposure to earthquake hazards.

The northern and northeastern parts of Bangladesh are characterized by relatively high seismic activity, and several major earthquakes originating in these regions have affected adjacent areas of the country. Bangladesh is divided into four seismic zones, and the project area falls within Seismic Zone III (Figure 5-5), which is assigned a seismic zone coefficient of 0.28 and classified as having severe seismic intensity. This indicates that the project area is susceptible to strong earthquake events and associated seismic hazards.

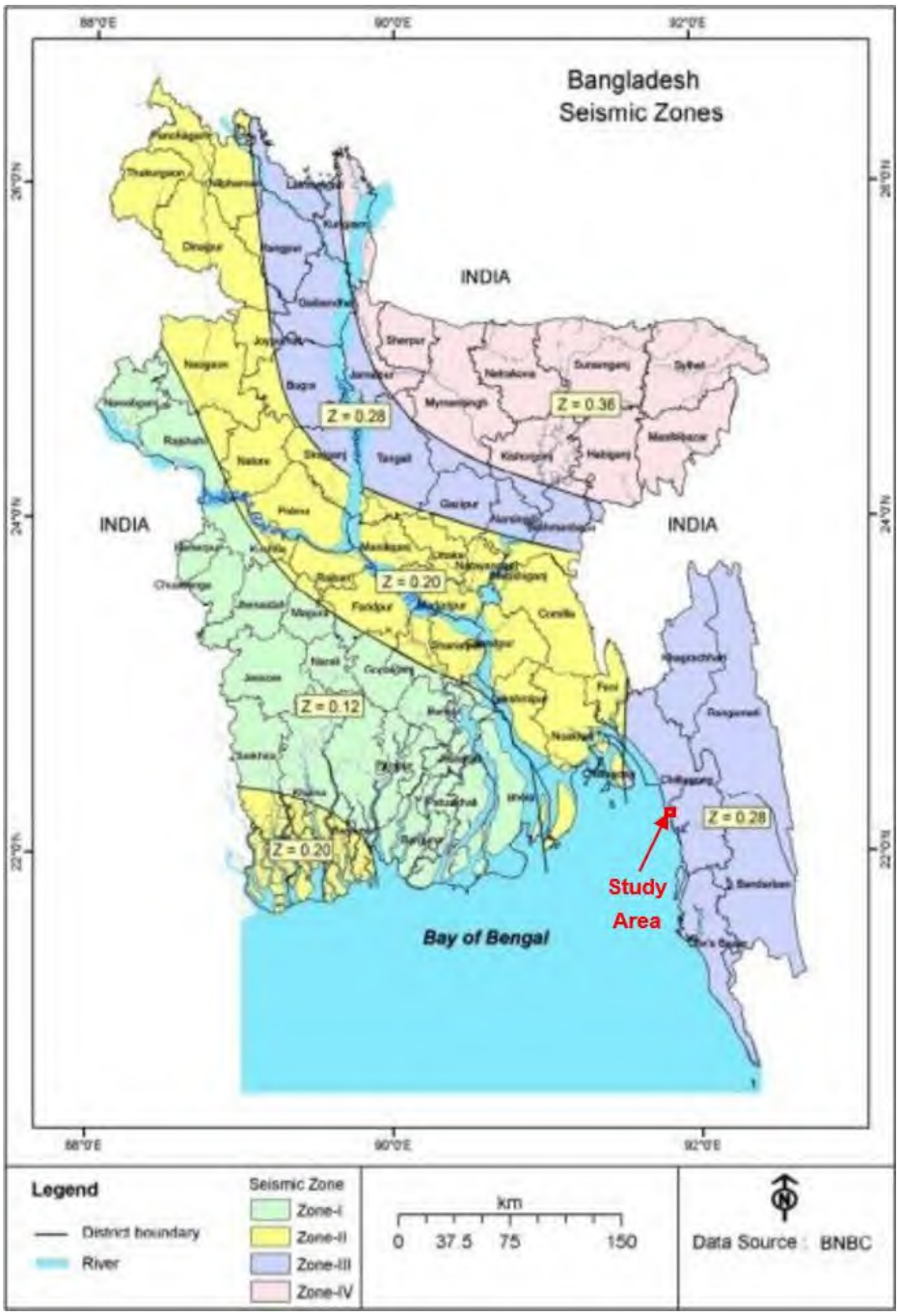


Figure 5-5: Seismic zone map of Bangladesh (Source: BNBC 2020)

5.1.3 Soil

According to the Soil Resources Development Institute (SRDI) soil classification, the Grey Piedmont Soils of the Chattogram coastal zone are typically developed on gently sloping piedmont plains at the foothills of the Chittagong Hill Tracts and extend toward the coastal lowlands, including areas near the Karnaphuli estuary. These soils are generally silt loam to silty clay loam in texture, moderately well to imperfectly drained, and exhibit grey to light grey colors due to periodic water saturation and reduction conditions. They are usually moderately acidic, low to

medium in organic matter, and have moderate fertility status, though deficiencies in nitrogen and phosphorus are common. The soils often show stratification and variable texture due to fluvial and colluvial depositional processes, with seasonal waterlogging in lower positions. The soil map of Bangladesh is given in Figure 5-6.

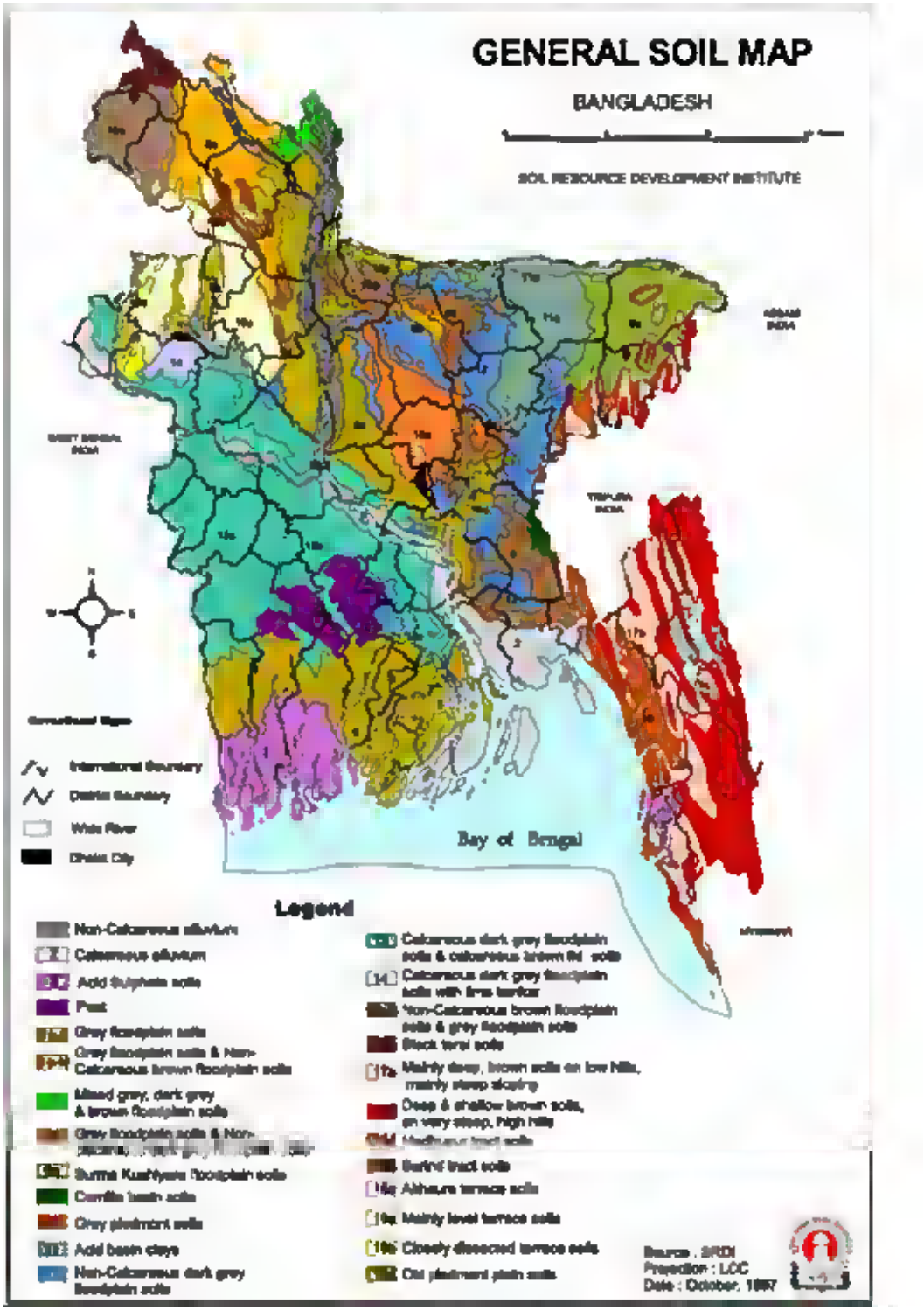


Figure 5-6: Soil map of Bangladesh (Source: Soil Resources Development Institute)

Grey Piedmont Soils in this coastal setting support mixed land use, including agriculture and settlement, but require appropriate drainage and soil management practices for sustained productivity. According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service, soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation. As part of the physical environmental survey conducted within the ESIA study, soil samples were collected in March 2026 from 0-1.5 m below ground surface and were analyzed in the environmental laboratory of BCSIR and also in the Netherlands to assess the current soil quality of the project area. The detailed results are presented in Section 5.1.7.5.

5.1.4 Water Resources, Hydrology and Flooding

The project site at Laldia Char is on the bank of the Karnaphuli River. The Karnaphuli River originates from the Lushai Hills in the Mizoram state of India and discharges into the Bay of Bengal near Patenga, Chattogram. A hydropower facility was established in 1960 with the construction of the Kaptai Dam across the river. The dam has significantly altered the hydrological regime both upstream and downstream (Rahman et al., 2024). Karnaphuli river basin is illustrated in Figure 5-7.

The Kaptai Dam also acts as a sediment trap, retaining part of the sediment load that would otherwise be transported downstream. As a result, the downstream sediment regime has been modified compared with pre-dam conditions (Rahman et al., 2024). Nevertheless, the lower Karnaphuli River and estuary remain highly dynamic environments, where sediment transport and deposition continue due to contributions from downstream tributaries, bank erosion processes, catchment runoff, and tidal exchange with the estuarine and coastal system.

Within the vicinity of the Project, river morphology is controlled by the interaction of river discharge, tidal dynamics, channel geometry and navigation-related influences. Sedimentation and erosion occur naturally along different sections of the river, contributing to the ongoing evolution of riverbanks, shoals and navigation channels. The Project area is located on the inner bend of the Karnaphuli River, where flow velocities are generally lower and depositional processes are more prevalent. As a result, this area is characterised by a tendency for sediment accumulation.

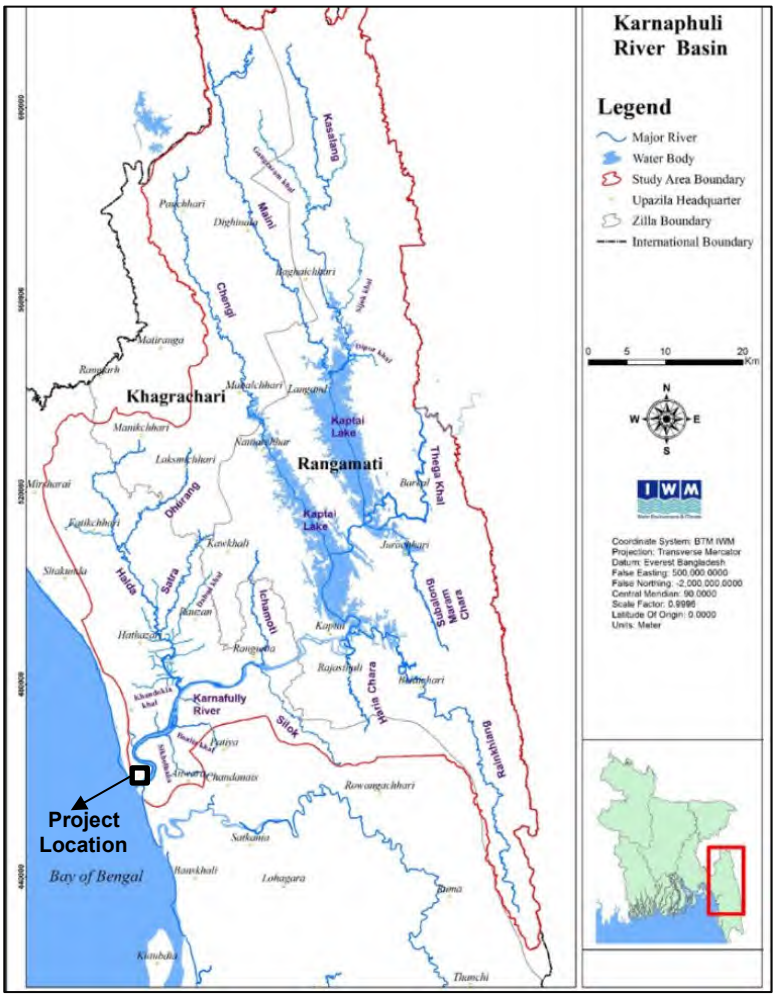


Figure 5-7: Karnaphuli River and River basin

The downstream hydrology of the Karnaphuli River around the project area is influenced by both tidal influxes from the Bay of Bengal and the regulated discharges from the Kaptai Dam, along with flows from its numerous tributaries. Consequently, the river and its downstream tributaries exhibit tidal characteristics. CPA operates a tidal water level monitoring station at Sadarghat, located 17 km upstream of the river estuary and 12 km upstream from the Laldia Char.

Observations indicate a maximum tidal range of approximately 4.6 m and a seasonal water level variation of around 1 m. Recorded water levels at this station show a minimum of –2.13 m, a maximum of 3.66 m, and an average of 0.556 m relative to MSL. Note that MSL is +2.7 m above Indian Spring Low Water Level (ISLWL). The figures below (Figure 5-8 and Figure 5-9) provide variations over the years and within a year in water levels.

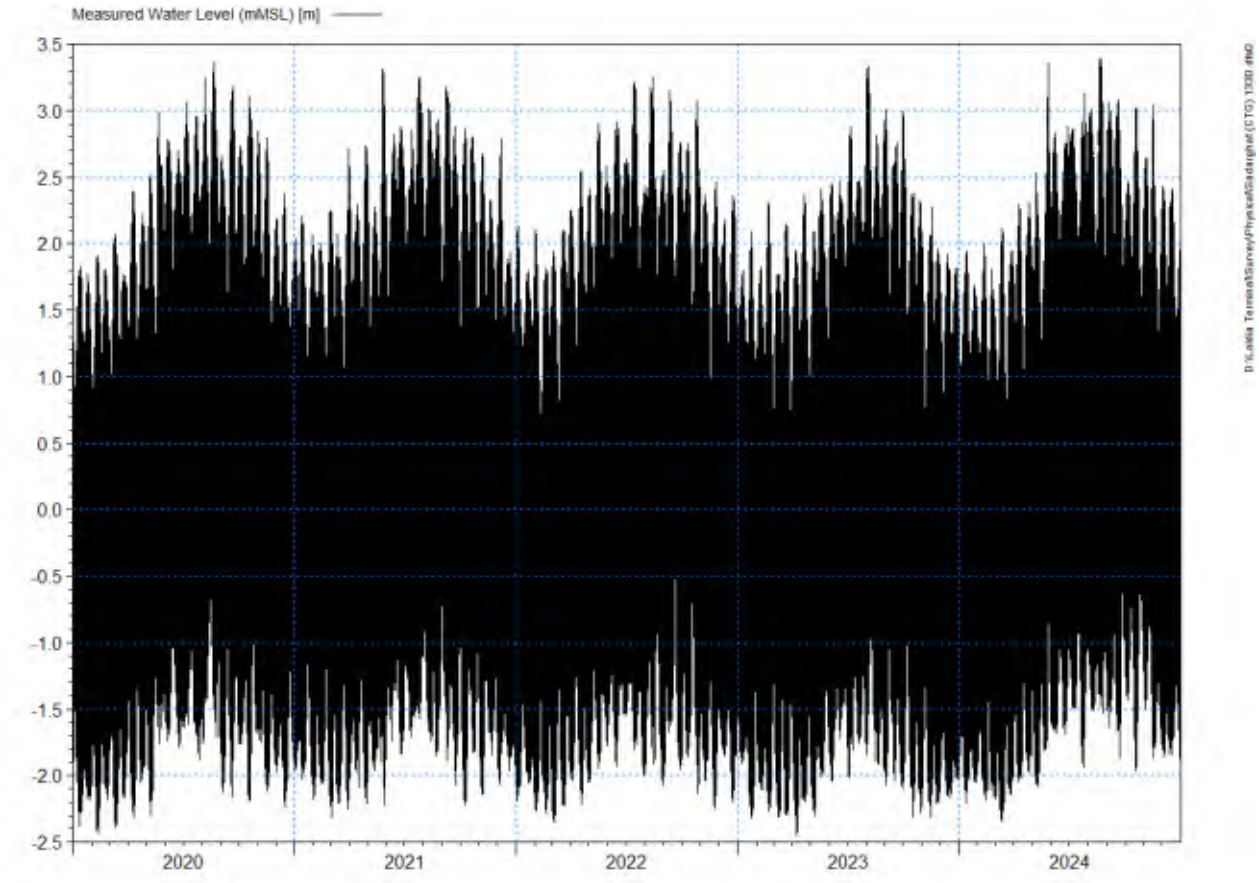


Figure 5-8: Water level hydrograph of Karnaphuli River at Sadarghat (Source: Bangladesh Inland Water Transport Authority (BIWTA))

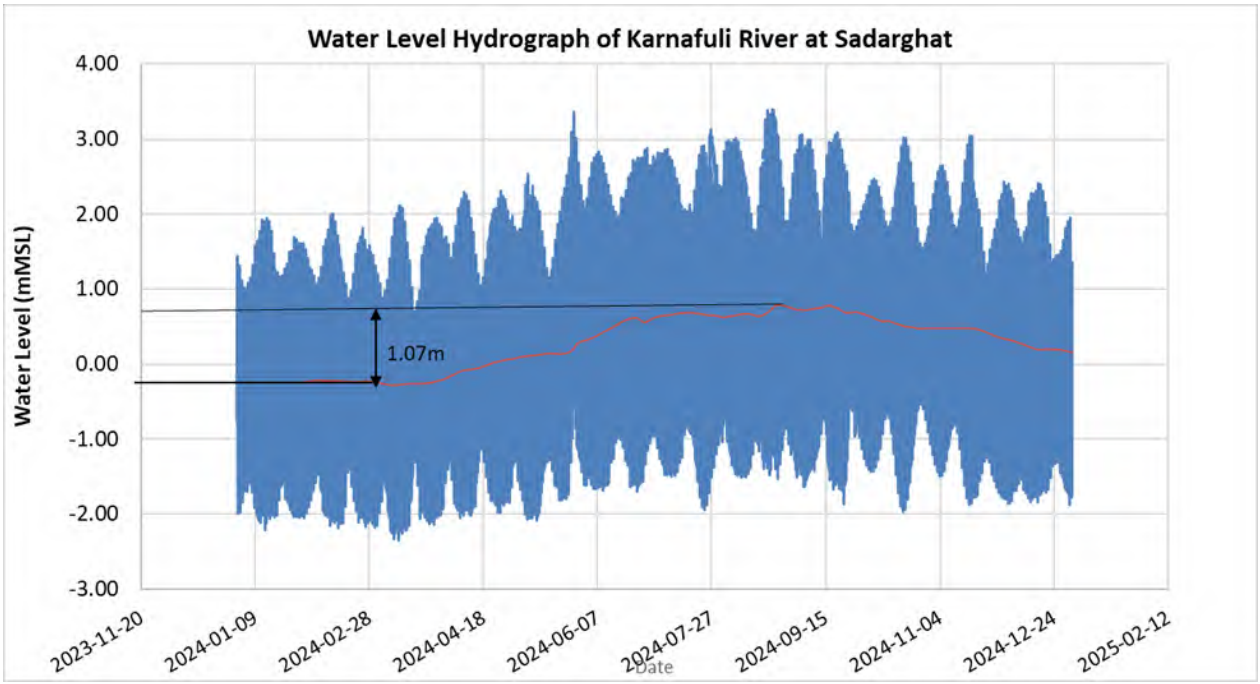


Figure 5-9: Seasonal variation of water level of Karnaphuli river at Sadarghat (Source: Bangladesh Inland Water Transport Authority (BIWTA))

The tidal regime in the study area is semi-diurnal, characterized by two high waters and two low waters each day, with a predominant tidal period of approximately 12 hours and 25 minutes. The tidal wave is generally symmetric. As tidal waves propagate towards the coast of Bangladesh, they are influenced by the wide continental shelf of the Bay of Bengal, local coastal geometry, and upland river flow, which together affect tidal propagation and amplification. Tidal range varies between spring and neap tides. Based on measurements undertaken by IWM in 2011, the minimum tidal range during the dry season is approximately 2.1 m, while the maximum tidal range during the monsoon season is approximately 4.9 m. Seasonal variation in tidal characteristics is described as negligible in the study area; however, the maximum water level during the monsoon period is reported to be approximately 1.07 m relative to the Public Works Department (PWD) datum.

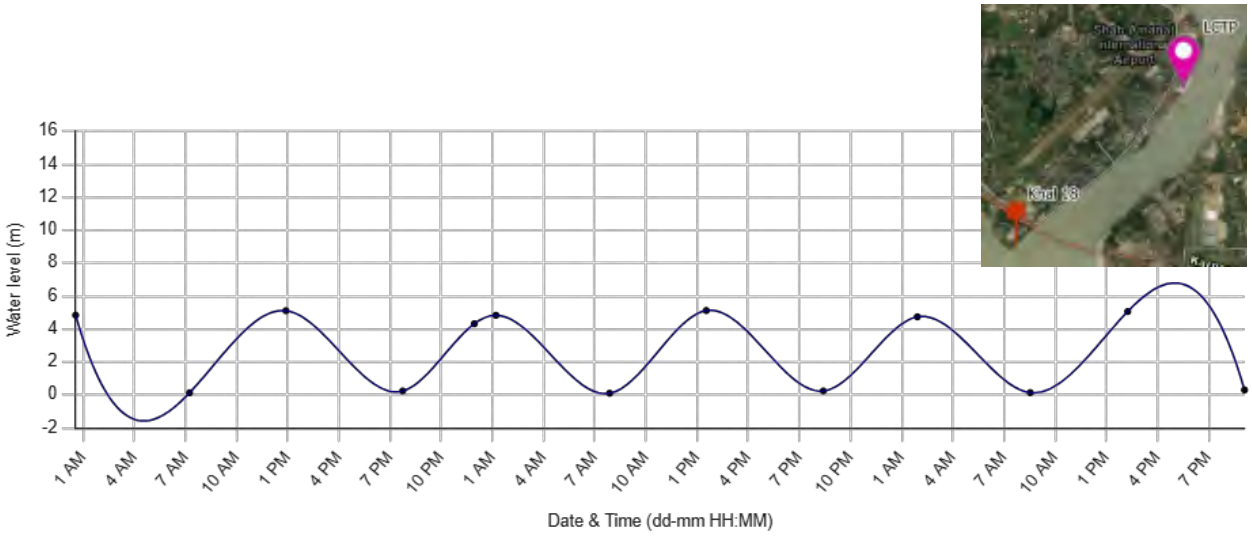


Figure 5-10: Tidal cycle from 18 to 20 April 2026 at Khal 18 (water level in ISLWL) (source: (CPA, 2026))

Results from wave simulations indicate that wave heights at the outfall of the Karnaphuli River range from approximately 0.25 m to 0.88 m. During the monsoon season, the dominant wave direction varies between 221° and 240°, indicating a prevailing south-westerly wave approach. This wave climate is associated with northward longshore sediment transport along the adjacent coastline. Measurements further indicate that significant wave heights in the range of 0.5 m to 1.0 m have a relatively high frequency of occurrence during the monsoon period, reflecting increased wind forcing and more energetic sea states compared to non-monsoon conditions.

The drainage system of the study area comprises numerous drainage *Khals* with water control structures and drainage pumps installed at the downstream end of each *Khal*. All *Khals* within the network are ultimately connected to the Karnaphuli River, which serves as the primary receiving water body and discharges into the Bay of Bengal.

Pluvial flooding in the study area can occur as a result of intense rainfall saturating soil infiltration and generating overland flow that is obstructed or stored in low-lying areas when the drainage capacity of the *Khal* network is exceeded. Under such conditions, surface water accumulates in

topographic depressions within the catchment, leading to inundation that may persist until drainage conditions improve or mechanical pumping evacuates the stored water.

Drainage through the *Khal* network generally operates under gravity flow conditions, the effectiveness of which depends on both the conveyance capacity of the *Khals* and the prevailing water level of the Karnaphuli River at the point of discharge. When the river water level rises above the *Khal* water level, due to tidal influence, monsoon discharge, or storm surge, gravity drainage becomes hydraulically impossible, and pumps are activated to pump out stormwater drainage towards the river. Under these circumstances, water control structures must remain closed to prevent reverse flow from the river into the drainage network, resulting in drainage congestion and progressive inundation within the catchment area. The most critical flood scenario arises when heavy rainfall and elevated river water levels occur simultaneously, creating a compound condition in which neither overland flow nor *Khal* drainage can be effectively discharged.

Recently Bangladesh Water Development Board (BWDB) has installed drainage pumps beside the regulators to facilitate drainage during flood tide condition in the river since the rainwater from the catchments cannot be entirely drained by the sluices during monsoon when there are heavy rainfalls and also high-water level in the river. Together with the sluice gates, the regulators are shown below in Figure 5-11.



Figure 5-11: Drainage map of the area near LCT sites

The Project Influence Area of LCT contains a total of nine *khals*, with a combined *khal* network length of approximately 13 km. The *khals* are controlled by 5 regulators at their downstream ends to prevent the inflow of tidal water. The invert levels of the regulators and vents are provided in Table 5-1 below. To aid drainage improvement, pumps have been installed alongside the regulators, the details of which are also provided below.

Table 5-1: Existing Regulator Details within Project Influence Area of LCT

SL	Structure Type	*Khal* Name	No. of Vent	Height (m)	Width (m)	Sill Level (mMSL)	Number of Pumps	Capacity of Each Pump (cusec)
1	Regulator Sluice	12 No. Boat Club *Khal*	2	1.5	1.5	-0.96	2	Each pump 10 cusec
2		14 No. Laldiar Char 1 *Khal*	2	1.5	1.5	-0.96	2	
3		15 No. Airport *Khal*	4	1.5	1.5	-0.96	4	
4		17 No. Nizam Market *Khal*	4	1.8	1.8	-0.96	4	
5		Gullakhali *Khal*	2	1.5	1.5	-0.96	-	

5.1.5 Meteorology

The meteorology of the study area is characterized by a tropical monsoon regime, similar to the rest of Bangladesh, and also influenced by its coastal location along the Bay of Bengal. The area experiences high temperatures and humidity throughout the year. The summer season (March – May) is warm and relatively humid. During the monsoon season (June – October), the area receives significantly higher rainfall compared to inland regions. The cooler and drier winter extends from late November to early February. Due to its coastal setting, the area is particularly prone to rough weather conditions during the monsoon as well as pre- and post-monsoon periods. The meteorological data used for analysis in this section have been derived from the measurements of 2016-2026 by Bangladesh Metrological Department (BMD). The BMD station locations with respect to the project site are presented in the following map (Figure 5-12).

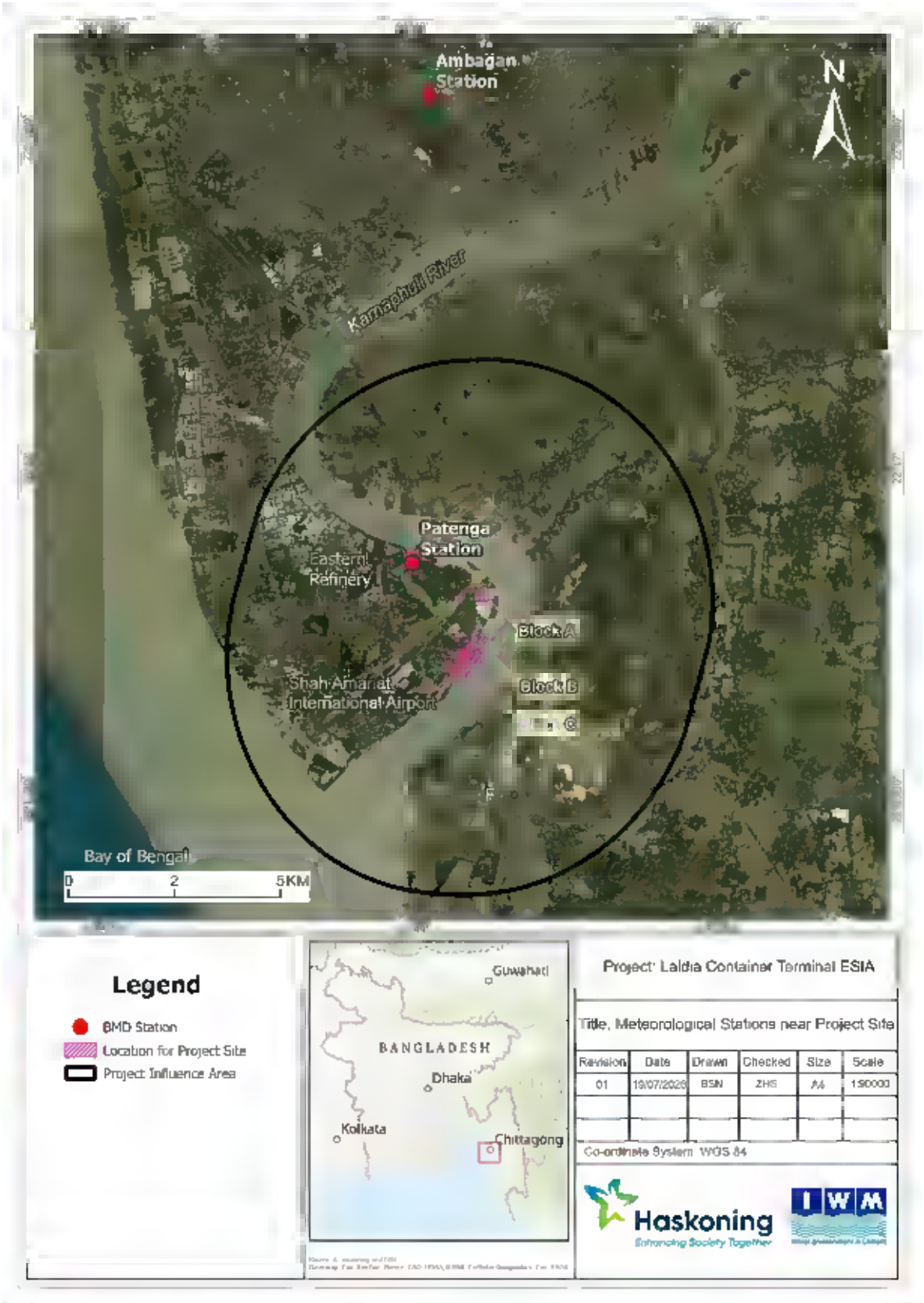


Figure 5-12: BMD station locations near the LCTP site location

5.1.5.1 Rainfall

The maximum average monthly rainfall recorded at Aambagan and Patenga stations is 650 mm and 700 mm respectively for the period 2016-2025, as shown in Figure 5-13. About 77 % of rainfall has occurred in monsoon season in these regions. June, July, August and September are the wettest months in both locations, receiving the majority proportion (about 70%) of rainfall. On the other hand, winter season (December-February) received significantly lower rainfall.

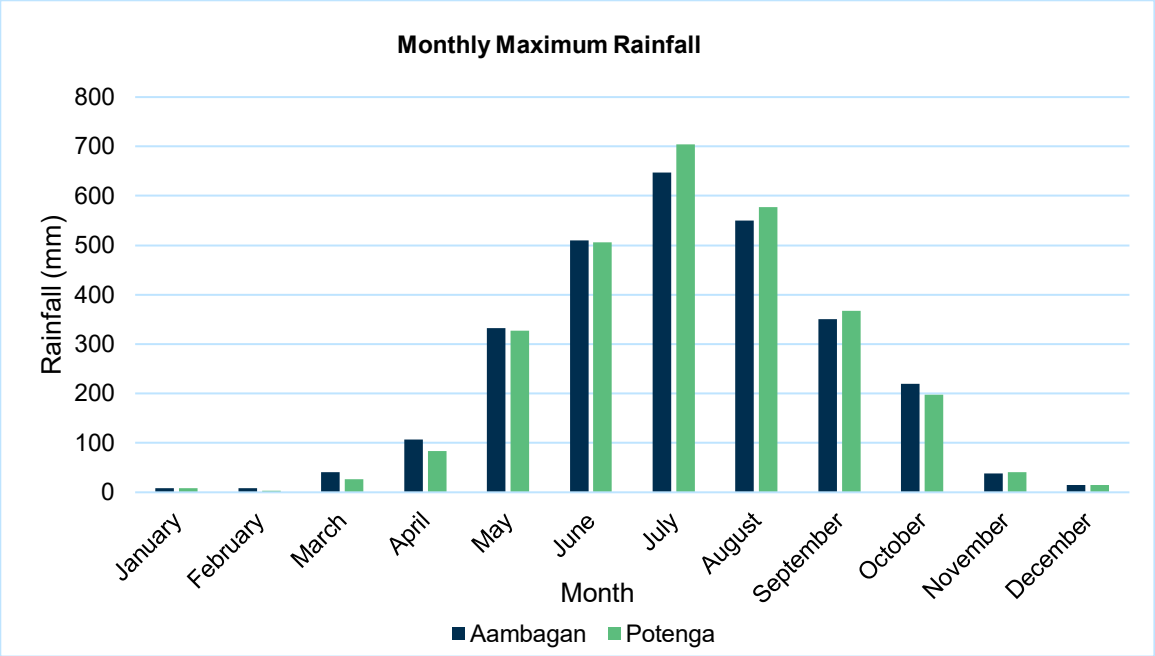


Figure 5-13: Monthly Maximum Rainfall at Aambagan and Patenga

5.1.5.2 Temperature

The average monthly maximum and minimum temperature of Aambagan and Patenga are shown in Figure 5-14 and Figure 5-15: Variation of Average Monthly Maximum & Average Monthly Minimum temperature at Patenga respectively. Figure 5-14 shows that monthly average maximum temperature ranges between 30.07°C to 35.19°C and minimum temperature varies from 12.93°C to 25.04°C at Aambagan. Similarly, Figure 5-15: Variation of Average Monthly Maximum & Average Monthly Minimum temperature at Patenga shows that monthly average maximum temperature ranges between 28.75°C to 36.01°C and minimum temperature varies from 13.31°C to 25.07°C at Patenga. These values of temperature are derived from analysis of timeseries temperature data from 2016 to 2025 of Bangladesh Meteorological Department (BMD).

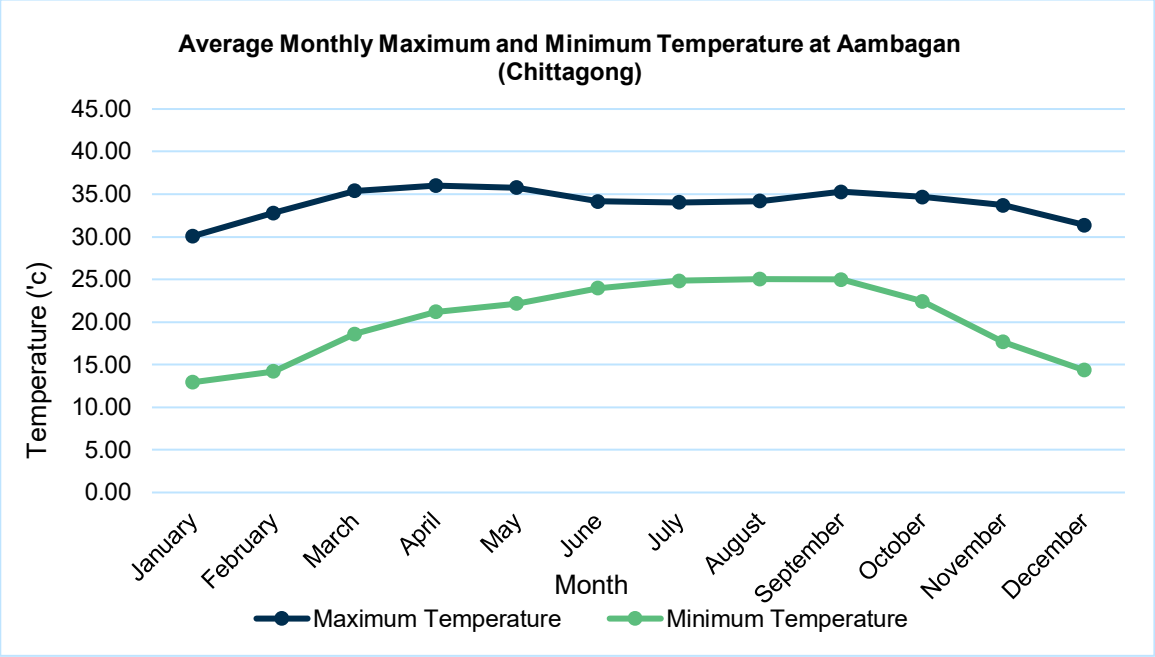


Figure 5-14: Variation of Average Monthly Maximum & Average Monthly Minimum temperature at Aambagan

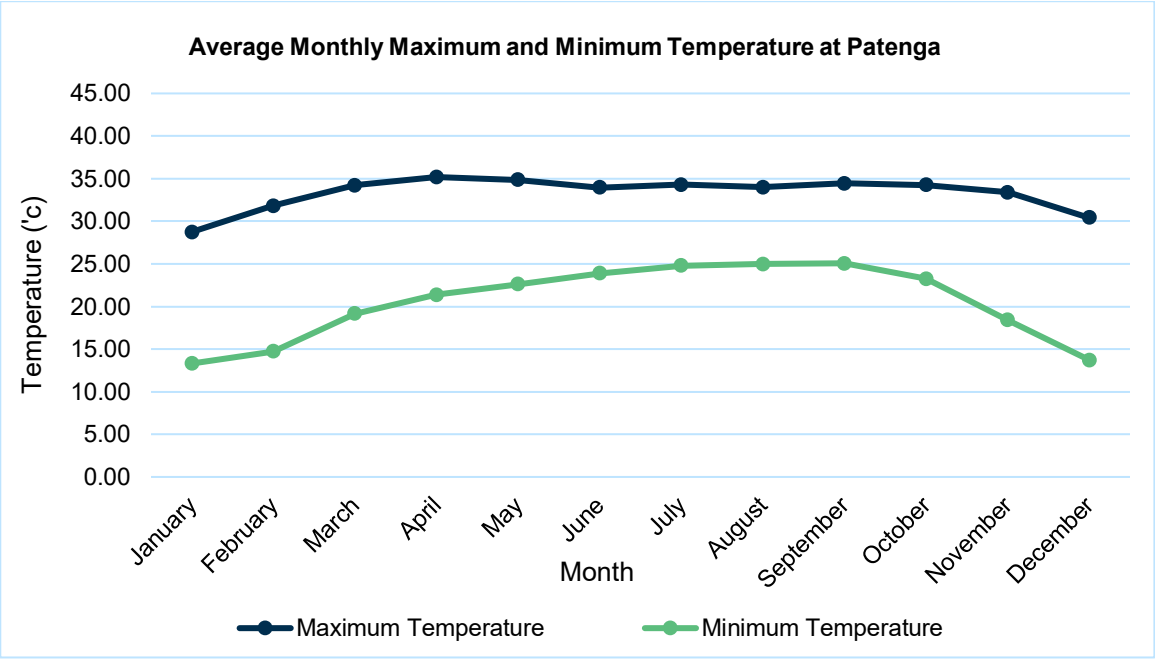


Figure 5-15: Variation of Average Monthly Maximum & Average Monthly Minimum temperature at Patenga

5.1.5.3 Relative Humidity

The monthly average humidity at Aambagan and Patenga is given in Figure 5-16. Humidity remains high throughout the year, peaking during the monsoon season (June to October). February-March are the least humid months (humidity around 70%), while highest humidity prevailed throughout the monsoon season (July-September) at around 86%.

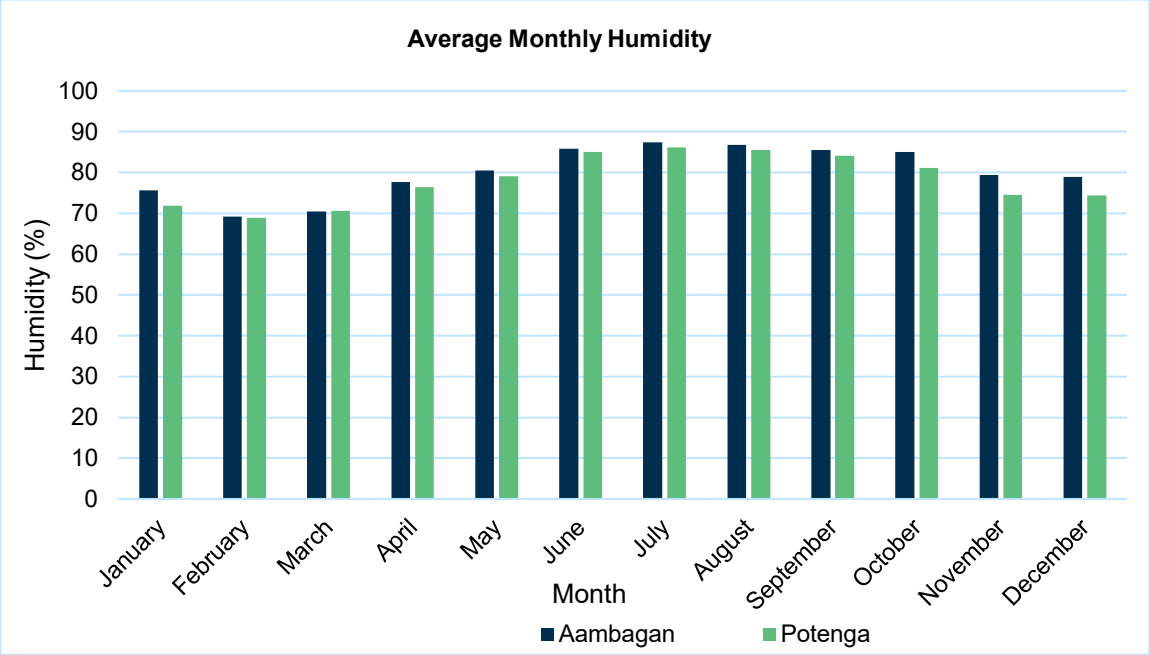


Figure 5-16: Average Monthly Humidity at Aambagan and Patenga

5.1.5.4 Ambient Pressure

Station Level Pressure is the atmospheric pressure measured directly by a barometer at the specific elevation of the weather station whereas sea level pressure represents what the atmospheric pressure would be if the station were located at mean sea level. Figure 5-17 shows the sea level pressure at Aambagan and Patenga.

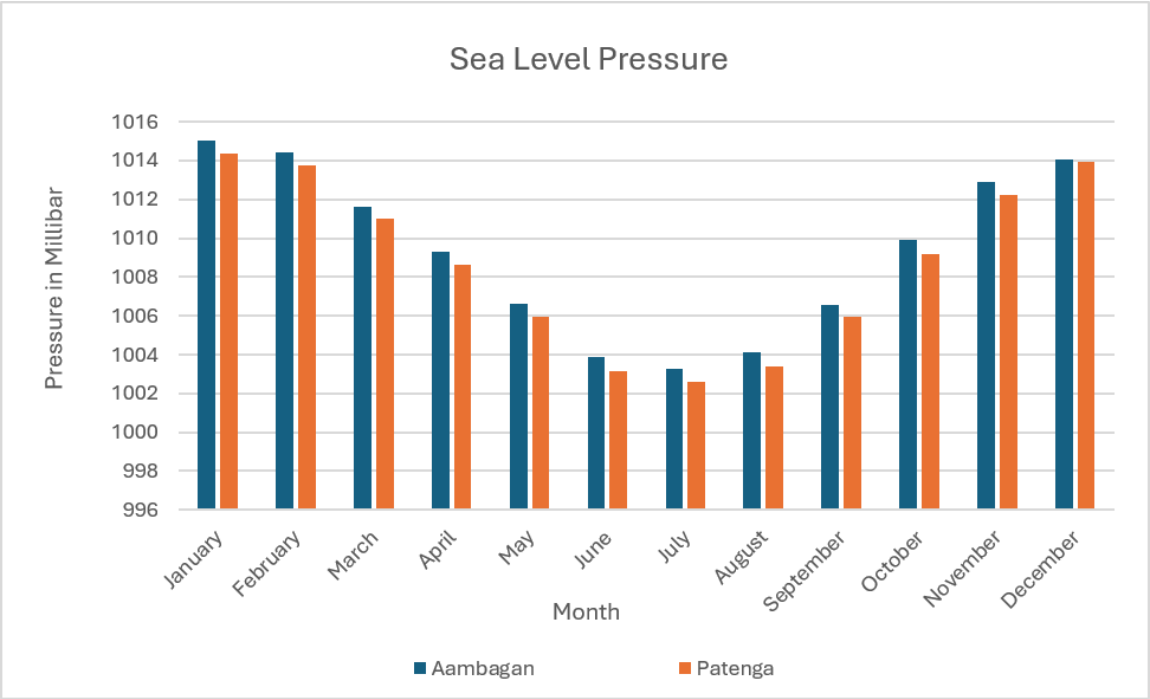


Figure 5-17:Sea level Pressure and Station Level Pressure at Aambagan and Patenga

5.1.5.5 Evaporation

Cloud cover is often described using oktas, on a scale of 0 to 8 where 0 means a completely clear sky and 8 means completely overcast conditions. The following figure (Figure 5-18) shows the cloud cover in Aambagan and Patenga from 2016 to 2025. During the winter season, the cloud cover is lowest, while the highest cloud cover, reaching 6.7-6.8 oktas, occurs during the monsoon season.

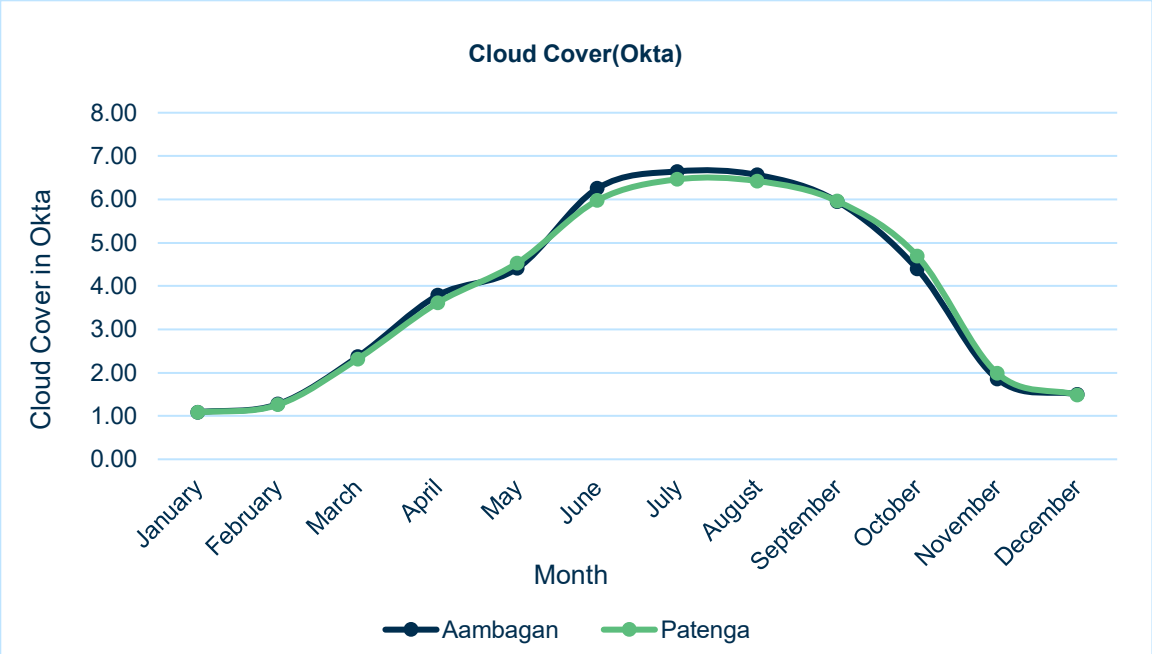


Figure 5-18:Cloud Cover at Aambagan and Patenga

5.1.5.6 Sunshine Hours

BMD stations at Aambagan and Patenga also measure sunshine duration in hours as shown in Figure 5-19. Sunshine duration in these regions exhibits a strong inverse relationship with cloud cover. During the dry winter months (November-February), the region experiences the highest sunshine, with daily averages ranging from 7 to 8 hours. Conversely, the peak of the monsoon season (June-August) witnesses a drastic reduction, with daily sunshine dropping to 4 hours due to persistent overcast conditions. The pre-monsoon months (March-May) offer transitional sunshine hours, generally between 6 and 7 hours per day, before conditions stabilize again in the post-monsoon period.

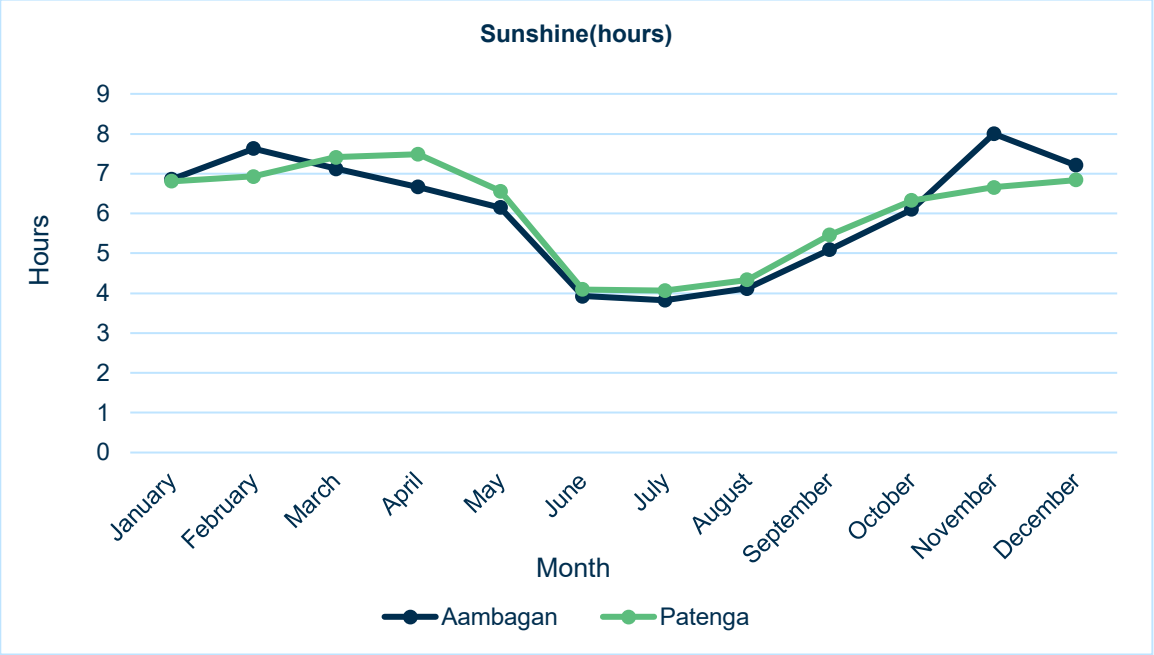


Figure 5-19: Sunshine Duration at Aambagan and Patenga

5.1.5.7 Wind Speed and Direction

The wind and atmospheric pressure variations are responsible for the generation of waves, surges and wind-generated currents. Figure 5-20 shows the average wind speed at Aambagan and Patenga station for the period 2016-2025. Wind speed of Patenga is quite higher than Aambagan, possibly influenced by the exposure to the coast.

Figure 5-21 represents the wind rose plot for both locations. The predominant wind directions at the project site are from the south and southeast. The figures also show that Aambagan is characterized by strong but intermittent southerly winds and a high calm frequency (45.92%), while Patenga experiences lower speed but more persistent winds from multiple directions, with a lower calm frequency (28.34%).

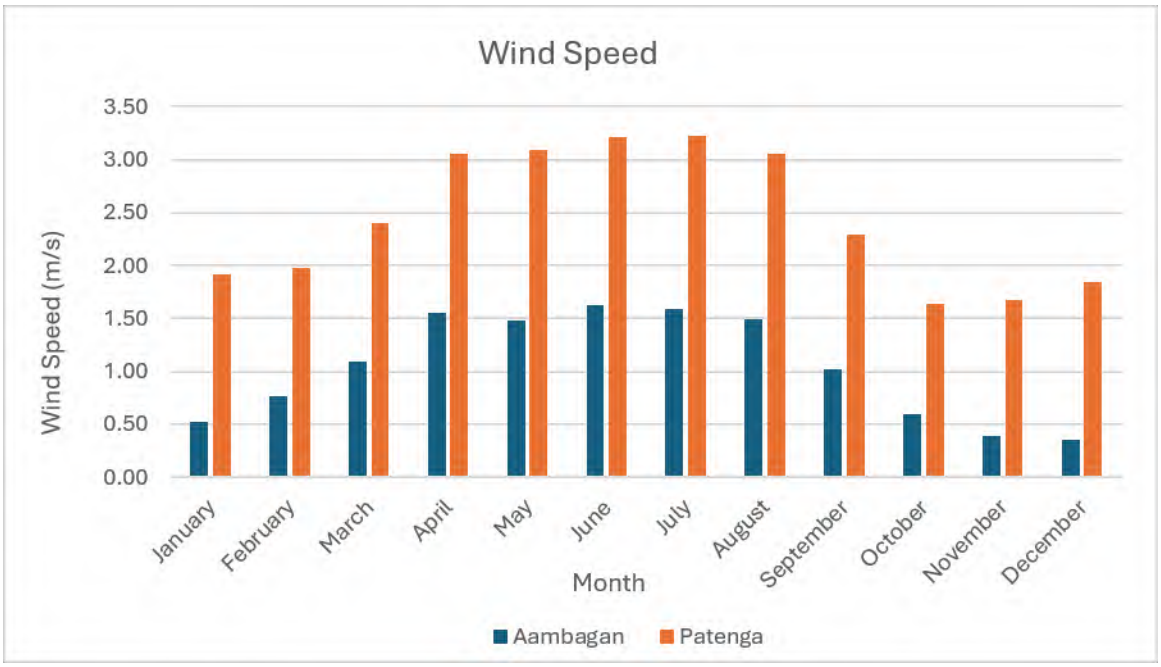


Figure 5-20: Average Wind Speed at Aambagan and Patenga

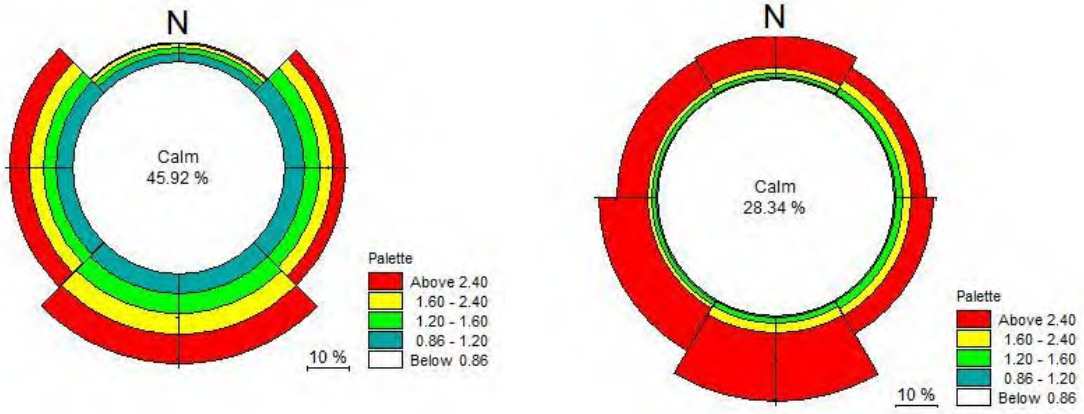


Figure 5-21: Wind Rose Plot at Aambagan (left) and Patenga (right)

5.1.6 Climate Change

Bangladesh is widely recognised as one of the countries that is most vulnerable to climate change, due to its low-lying topography, exposure to tropical cyclones, and dense population in coastal areas. The Chattogram region, including the LCTP area, is particularly exposed to coastal hazards such as storm surges, extreme rainfall, and sea-level rise.

Climate change is likely to change weather patterns which will have consequences for the Chattogram region. The projected changes as per the IPCC scenarios (RCP4.5 and RCP8.5[7]) are elaborated below.

5.1.6.1 Temperature

Projected changes in extreme heat for the Chattogram area indicate both an increase in peak temperatures and a strong rise in the frequency of hot days. Maximum daily temperatures (TXx) show a consistent upward trend across all return periods and time horizons, with modest increases by 2030 (approximately +1°C), and substantially higher increases by the end of the century, particularly under high-emission scenarios. The most extreme events intensify more strongly than more frequent events, with 100-year return period temperatures reaching approximately 42–46°C by 2090 under RCP8.5 (see Figure 5-22).

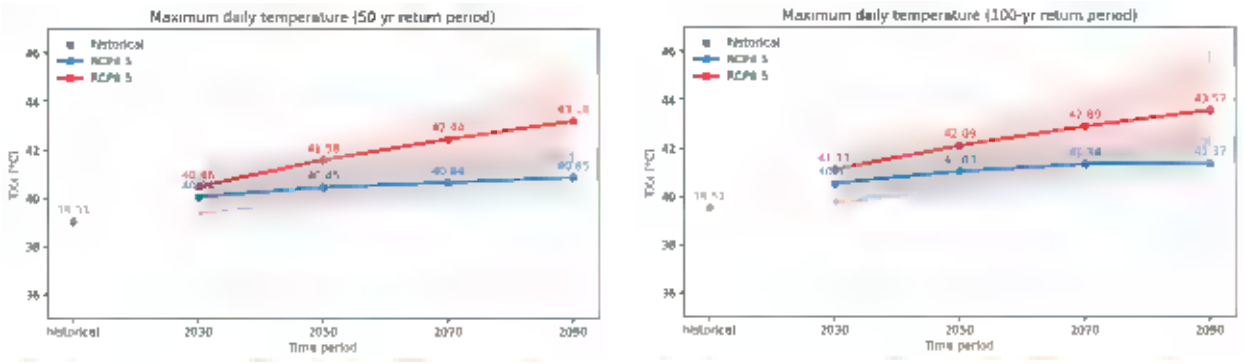


Figure 5-22: Projected increase in maximum daily temperatures (for 50, and 100-year return period) for RCP4.5 and RCP8.5 in Chattogram

In addition to increasing intensity, the frequency of hot conditions increases significantly. Days exceeding 35°C (TX35) rise from a limited number in the historical baseline to tens to over a hundred days per year by 2090, depending on the scenario. Extremely hot days above 39°C (TX39), absent in the historical record, are projected to occur regularly after mid-century, reaching up to several days per year (see Figure 5-23).

[7] *RCPs are scenarios used in climate modeling to project future climate conditions based on different levels of greenhouse gas concentrations. Each RCP represents a trajectory of radiative forcing, the additional energy trapped in the atmosphere due to greenhouse gases, by the year 2100, measured in watts per square meter. The original RCPs include:*
RCP2.6: 'Stringent' mitigation scenario, resulting in 2.6 W/m^{-2} radiative forcing in 2100.
RCP4.5: Intermediate scenario, resulting in 4.5 W/m^{-2} radiative forcing in 2100.
RCP6.0: Intermediate scenario with higher warming than RCP4.5, resulting in 6.0 W/m^{-2} radiative forcing in 2100.
RCP8.5: High-warming scenario, often considered a "business-as-usual" pathway with severe climate impacts. (Emission Scenarios, IPCC, 2000). This high-end scenario have recently been argued to be implausible to unfold (e.g., Hausfather and Peters, 2020) but is still used to provide insights in extremes.

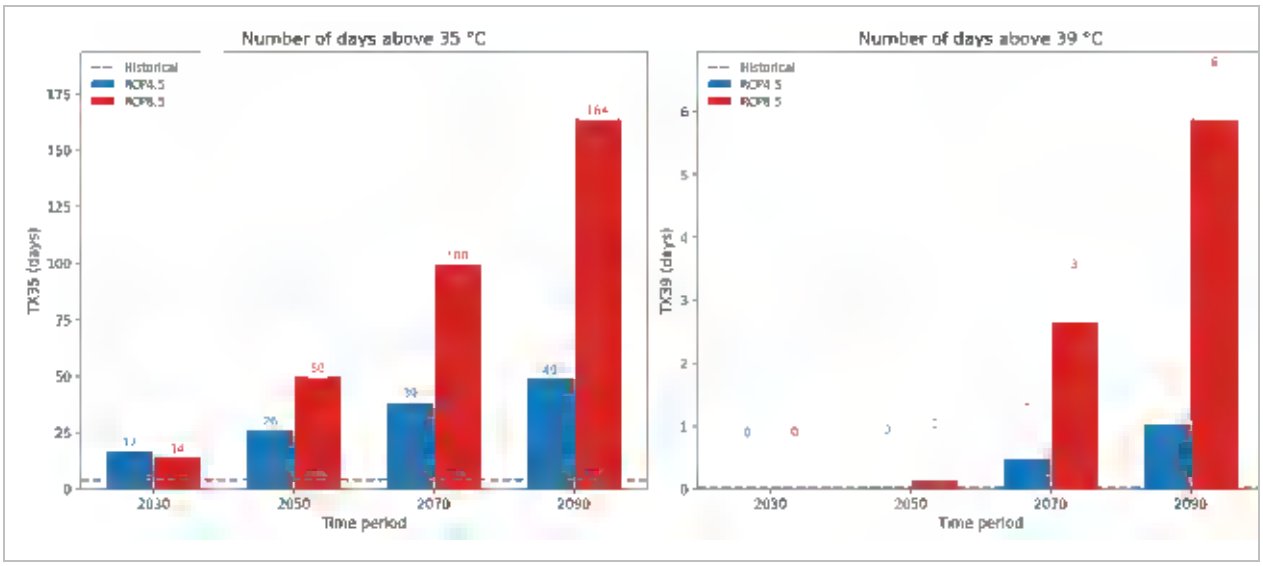


Figure 5-23: Projected increase in number of hot days (above 35 and 39 degrees) for RCP4.5 and RCP8.5 in Chattogram

5.1.6.2 Rainfall

Projected changes in extreme precipitation for the Chattogram area indicate a moderate but uncertain increase in rainfall intensity, with differences between short-duration and multi-day events. For short-duration extremes (RX1day), projections show high variability and uncertainty, with limited changes for more frequent events. However, for higher return periods, particularly towards the end of the century under high-emission scenarios, a moderate increase in extreme rainfall intensity is observed. For example, 100-year return period rainfall may increase substantially, indicating a potential intensification of rare but severe storm events.

In contrast, multi-day rainfall (RX5day) shows a more consistent increasing trend across return periods and time horizons. Increases are generally modest for frequent events but become more pronounced for rarer events, reaching approximately 10–15% higher values by 2090 under RCP8.5. The projected increases in precipitation are illustrated in Figure 5-24.

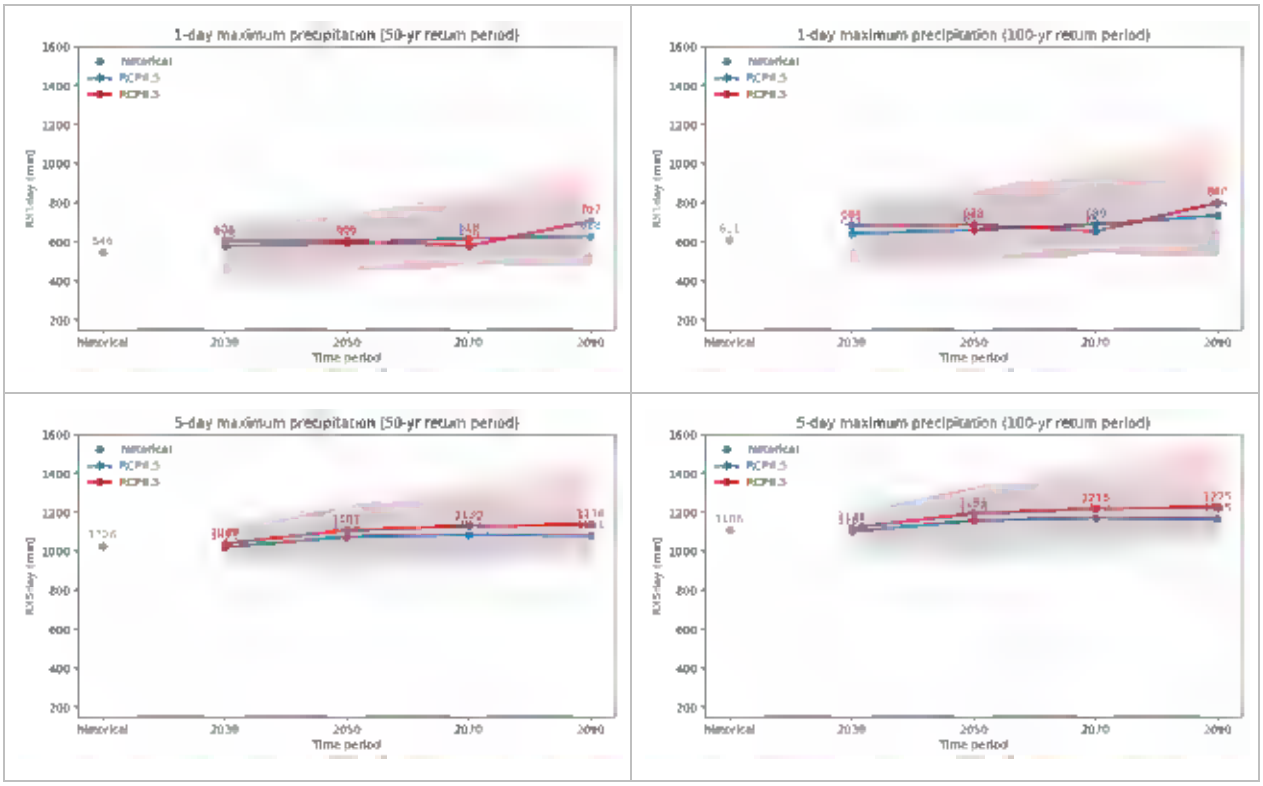


Figure 5-24: Projected increase in 1-day and 5-day maximum precipitation for a 50 and 100-year return period for RCP4.5 and RCP8.5

5.1.6.3 Wind and tropical cyclones

Projected changes in wind conditions for the Chattogram area indicate limited changes in normal wind speeds, with no clear long-term trend. For extreme wind events, a slight increase in higher return-period wind speeds is observed towards the end of the century under high-emission scenarios, although changes remain modest and uncertain.

Tropical cyclones are the primary driver of extreme wind conditions in the Chittagong/Patenga coastal area and therefore remain a key hazard for port infrastructure and operations. The historical cyclone inventory and the observed 3-hourly Patenga wind records show that the highest wind-speed peaks are associated with cyclone occurrence, particularly during the pre-monsoon and post-monsoon cyclone seasons.

Based on the available project data, future changes in cyclone frequency cannot be robustly quantified, as the applied climate model outputs do not explicitly resolve cyclone dynamics and the observational dataset does not provide event-based cyclone tracking. However, projections of extreme wind speed (as a proxy for cyclone intensity) suggest slight increases in higher return-period wind speeds under high-emission scenarios, although uncertainty remains considerable. Consistent with the AR6 of the IPCC[8], which projects an increase in the proportion and peak wind speeds of intense tropical cyclones while total cyclone frequency decreases or remains broadly unchanged, the assessment should assume persistent cyclone exposure and a potential increase

[8] *https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-11/*

in severity of cyclone-related impacts, particularly through extreme wind, heavy rainfall, storm surge and compound coastal flooding.

5.1.6.4 Sea level rise

Projected sea-level rise for the Chattogram coastal area, based on Met Office ARRCC projections and consistent with IPCC AR6 ranges, indicates a progressive increase in mean sea levels throughout the century. By 2050, sea levels are projected to rise by approximately 0.15–0.30 m, increasing to approximately 0.3–0.9 m by 2090, depending on the emissions scenario, with higher values under RCP8.5. Projected sea level change is illustrated in Figure 5-25.

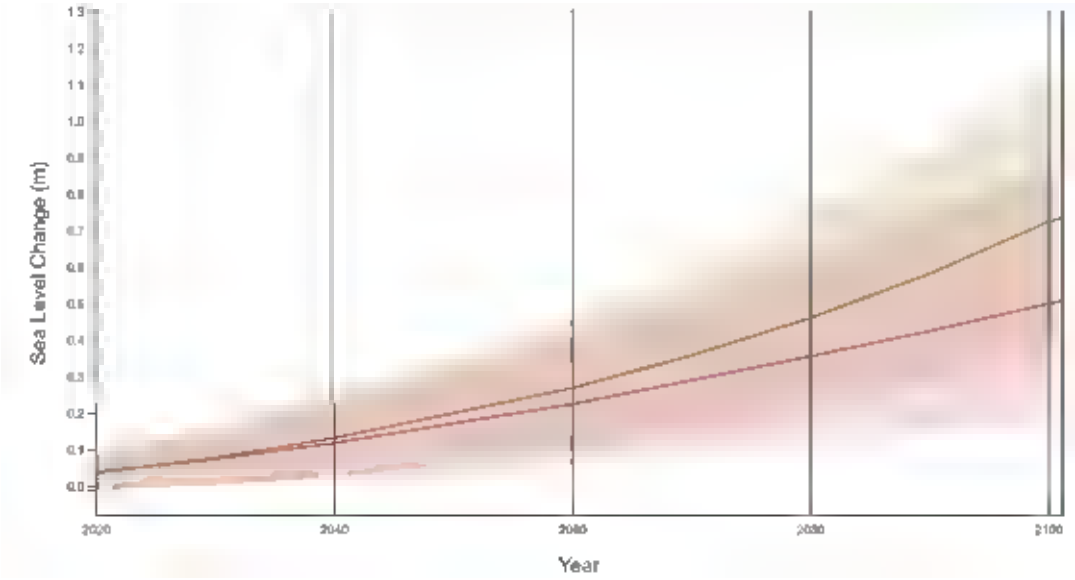


Figure 5-25: Sea level rise that is taken into account based on IPCC AR6[9]

In addition to absolute sea-level rise, the Chattogram area is subject to land subsidence. Chattogram is one of the ten fastest-sinking coastal cities in the world. Human activities, particularly groundwater extraction, contribute significantly to this subsidence, resulting in 20 mm line of sight displacement per year in Chattogram, nearly ten times the average sea level rise (Wu, 2022). As a result, relative sea-level rise at the Project site is expected to exceed IPCC-based projections, as ground levels may decrease over time.

5.1.7 Environmental Quality

The existing environmental quality in the project influence area serves as the basis for identification, prediction and evaluation of potential environmental impacts of the proposed project interventions. The baseline environmental quality is assessed through field studies within the impact zone and analysis of the information for various components of the environment, such as surface and ground water, riverbed sediments, soil, air and noise levels.

[9] *NASA. (2021). IPCC AR6 Sea Level Projection Tool. NASA Sea Level Change.*

5.1.7.1 Surface Water Quality

Dry Season

The surface water quality assessment in the project influence area is carried out for the various water quality parameters. The sampling locations are illustrated in Figure 5-26. Surface water sampling was undertaken to characterize water quality conditions within the estuarine river system in the vicinity of the project (upstream and downstream). The samplings were undertaken during the dry season (April 2026). The detailed analyses are incorporated with the standard values set by the DoE are shown in Table 5-2.



Figure 5-26: Surface water sampling locations (Dry season 2026)

Table 5-2: Test results of surface water samples collected from Karnaphuli River inside project influence area[10]

Parameter	Unit	SW1	SW2	SW3	SW4	SW5	SW6	ECR 2023*
Temperature	°C	32.50	35.2	33.50	35.80	33.70	32.90	**
pH		8.38	8.27	8.16	8.09	8.09	8.05	6.5–8.5
Salinity	ppt	3.10	4.49	5.50	6.49	7.76	10.69	**
EC	mS/cm	5.73	8.54	9.76	11.38	13.47	18.19	**
BOD	mg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**
COD	mg/L	2.82	1.88	1.95	2.92	3.92	2.94	5
TOC	mg/L	2.92	3.68	2.04	3.96	4.8	5.99	**
TDS	mg/L	4232	6632	7492	8750	10388	12856	**
TSS	mg/L	176	302	550	572	698	706	50
Sulphate	mg/L	310	449	493	531	547	534	**
Nitrate	mg/L	< 3.0	3.11	< 3.0	5.45	7.68	12.1	0.8
Metals								
Arsenic (As)	µg/l	< 3.0	< 3.0	< 3.0	3.0	< 3.0	3.3	3
Antimony (Sb)	µg/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**
Barium (Ba)	µg/l	18	26	31	35	40	57	**
Beryllium (Be)	µg/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**
Cadmium (Cd)	µg/l	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	5
Chromium (Cr)	µg/l	2.0	3.5	5.0	5.0	4.0	5.2	**
Cobalt (Co)	µg/l	1.2	2.6	2.8	3.2	2.6	3.6	**
Copper (Cu)	µg/l	4.9	9.1	10	11	8.9	11	**
Mercury (Hg)	µg/l	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.1
Lead (Pb)	µg/l	< 3.0	6.2	7.1	7.1	5.8	7.1	50
Molybdenum (Mo)	µg/l	< 2.0	< 2.0	< 2.0	< 2.0	2.3	2.5	**
Nickel (Ni)	µg/l	2.9	5.1	6.4	6.7	5.5	7.3	**
Selenium (Se)	µg/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**
Tin (Sn)	µg/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**
Vanadium (V)	µg/l	3.9	6.6	6.8	7.7	6.6	8.4	**

[10] *Dissolved Oxygen (DO) – mg/L – was measured but could not be tested so secondary data was used*

Parameter	Unit	SW1	SW2	SW3	SW4	SW5	SW6	ECR 2023*
Zinc (Zn)	µg/l	6.3	12	19	12	13	14	**
Calcium (Ca)	mg/l	60	80	99	110	130	170	**
Iron (Fe)	mg/l	0.37	0.50	0.57	0.87	0.67	0.97	**
Potassium (K)	mg/l	48	67	85	95	120	150	**
Magnesium (Mg)	mg/l	150	230	290	350	390	500	**
Manganese (Mn)	mg/l	0.046	0.079	0.075	0.12	0.10	0.12	**
Sodium (Na)	mg/l	1300	1800	2200	2700	3000	3800	**
Mono Aromatic Hydrocarbons								
Benzene	µg/l	< 0.2	< 0.2	< 0.2	< 0.2	0.3	< 0.2	**
Toluene	µg/l	< 0.2	< 0.2	< 0.2	< 0.2	0.4	< 0.2	**
Ethylbenzene	µg/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**
o-Xylene	µg/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**
m,p-Xylene	µg/l	< 0.2	< 0.2	< 0.2	< 0.2	0.2	< 0.2	**
BTEX (sum)	µg/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.3	**
Xylenes (sum)	µg/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 1.0	**
Naphtalene	µg/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**
Volatile halogenated Hydrocarbons								
Trichloromethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
Tetrachloromethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
Trichloroethene	µg/l	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	**
Tetrachloroethene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
1,2-Dichloroethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
1,1,1-Trichloroethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
1,1,2-Trichloroethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
cis-1,2-Dichloroethene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
Monochlorobenzene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
1,2-Dichlorobenzene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**

Parameter	Unit	SW1	SW2	SW3	SW4	SW5	SW6	ECR 2023*
1,3-Dichlorobenzene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
1,4-Dichlorobenzene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
Dichlorobenzenes (sum 3)	µg/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	**
Chlorobenzenes (sum 4)	µg/l	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	**
Chlorinated Hydrocarbons (sum)	µg/l	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	**
Total Petroleum Hydrocarbons								
TPH (C10-C12)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH (C12-C16)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH (C16-C21)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH (C21-C30)	µg/l	< 15	< 15	< 15	< 15	< 15	< 15	**
TPH (C30-C35)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH (C35-C40)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH Sum (C10-C40)	µg/l	< 38	< 38	< 38	< 38	< 38	< 38	**
Inorganic Compounds								
Bromide	mg/l	7.1	13	14	17	22	26	**
Chloride	mg/l	2200	3800	4200	5300	6400	7500	**
Fluoride	mg/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**
Sulphate	mg [SO4]/l	300	530	590	700	900	1100	**

**The standards are taken from ECR 2023 for coastal waters suitable for fisheries*
*** No specific standard value found in ECR 2023 for coastal waters suitable for fisheries*

The 2026 dry season surface water investigation indicates that water quality is largely governed by natural hydrological and geochemical conditions rather than localised pollution sources. Organic pollution is minimal, with low COD and TOC, and BOD while hydrocarbons, chlorinated compounds and TPH are absent or negligible. During the field survey, dissolved oxygen (DO) could not be measured due to instrumental malfunctioning. However, the surface water quality monitoring by DoE reveals that DO remains quite high in Karnaphuli river; about 8.4mg/l in April 2023 with a maximum 8.5 mg/l in July and minimum 6.5 mg/l in December at CUFL *ghat* which is very near to the project site. Elevated suspended solids reflect naturally high sediment loads typical of riverine systems. The water is characterised by high salinity, with elevated TDS, chloride

and sulphate concentrations increasing downstream, indicating strong saline or tidal influence, which may limit water use without treatment. Nitrate exceeds the ECR standard (0.8 mg/L) in several samples (SW2, SW4–SW6), with highest levels at SW6 which may be caused by the presence of fertilizer factories in the vicinity. The arsenic standard at location 6 is generally higher than surface water standard for fisheries. TSS concentrations are elevated in all samples and significantly exceed the ECR standard (50 mg/L), reflecting a high sediment load typical of riverine systems.

Overall, except for elevated salinity and background-related metal concentrations, the results suggest stable water quality conditions without evidence of significant anthropogenic contamination.

Monsoon Season

A survey sampling campaign was conducted in the LTCP area and surroundings during the monsoon season (September–October) in 2025 (DAR, 2025).

Overall, most water quality parameters fall within acceptable limits for fisheries, notably chloride, nitrite, ammonia, calcium, magnesium, potassium, and iron (in one sample), indicating salinity, hardness, and nutrient pollution likely driven by saline intrusion, natural mineral weathering, and anthropogenic sources such as agriculture, urban runoff, and industrial activities. While oil and grease, TSS, and colloidal silica remain low and no PCB or PAH were detected, some localised elevations in TPH, conductivity, and TOC occur. The measured solid-related parameters, including turbidity and suspended solids, appear to be lower than expected. However, both field observations and the dry season monitoring results consistently indicate that the river carries a relatively high solids load. This discrepancy suggests that the reported values may underestimate the actual sediment concentrations present in the river system.

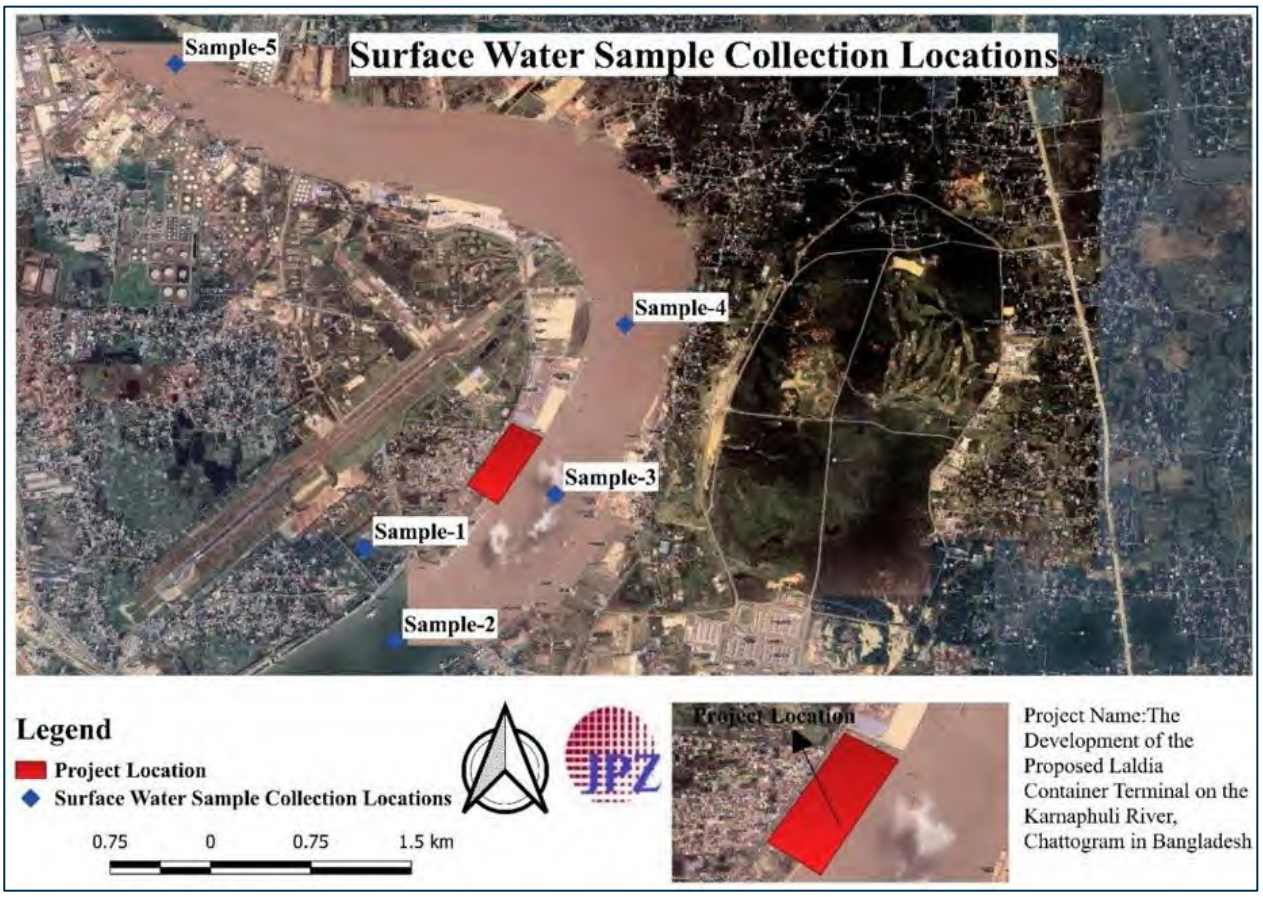


Figure 5-27: Surface water sampling locations (monsoon 2025)

Table 5-3: Test results of surface water samples collected from project influence area during monsoon 2025

Name of Parameters	Concentration Present					ECR 2023*	Unit
	P.W (S 1)	S.W (S 2)	S.W (S 3)	S.W (S 4)	K.R.W (S 5)		
pH	7.1	7.6	7.6	7.4	7.3	6.5-8.5	-
Turbidity	<1	1.2	1	<1	<1	**	NTU
Conductivity	620	650	460	415	790	**	µS/cm
TDS	310	330	230	210	400	**	mg/L
TSS	<2	<2	<2	<2	<2	50	mg/L
DO	6	5.8	6	5.8	5.9	≥5	mg/L
BOD5 20°C	0.4	0.8	0.4	0.4	0.8	**	mg/L
COD	1.2	4	2.6	3.2	1.7	5	mg/L
Alkalinity	130	152	140	138	148	**	mg/L

Iron	0.26	10.97	0.36	<0.05	4.75	**	mg/L
Manganese	<0.1	0.1	0.1	<0.1	0.1	**	mg/L
Arsenic	<0.003	<0.003	0.004	<0.003	<0.003	0.003	mg/L
Sulphate	8.4	15.5	12.8	6.8	4.4	**	mg/L
Phosphate	0.35	0.77	0.8	0.3	0.28	0.08	mg/L
TOC (Total Organic Carbon)	5.58	4.2	3.99	4.33	4.4	**	mg/L
Chloride (Cl)	39.7	4047	2571	3366	3299	**	mg/L
Nitrate (NO3)	<3.0	<3.0	<3.0	< 3.0	<3.0	0.8	mg/L
Nitrite (NO2)	1.58	<1.0	<1.0	< 1.0	<1.0	**	mg/L
Ammonia (NH3-N)	0.98	0.62	<0.5	< 0.5	<0.5	**	mg/L
Ammonium (NH4)	1.04	0.68	<0.5	< 0.5	<0.5	**	mg/L
Silica Calloidal (SiO2)	<2.0	<2.0	<2.0	<2.0	<2.0	**	mg/L
Calcium (Ca)	41.6	117	138	154	175	**	mg/L
Magnesium (Mg)	5.71	73.7	80.6	96.5	147	**	mg/L
Sodium (Na)	27.3	2066	1286	1774	1578	**	mg/L
Potassium (K)	3.13	81.9	50.2	70.5	61.3	**	mg/L
Lead (Pb)	<0.01	<0.01	<0.01	< 0.01	<0.01	0.05	mg/L
Cadmium (Cd)	<0.001	<0.001	<0.001	<0.001	< 0.001	0.005	mg/L
Chromium (Cr)	<0.005	<0.005	0.02	<0.005	<0.005	0.05	mg/L
Mercury (Hg)	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	mg/L
Zinc (Zn)	<0.05	<0.05	<0.05	<0.05	<0.05	**	mg/L
Oil & Grease	<2.0	<2.0	<2.0	< 2.0	<2.0	**	mg/L
TPH	0.92	1.1	1.1	1.89	1.63	**	mg/L

**The standards are taken from ECR 2023 for coastal waters suitable for fisheries*
*** No specific standard value found in ECR 2023 for coastal waters suitable for fisheries*

5.1.7.2 Ground Water Quality

Dry Season

Ground water samples were taken from 8 locations in the study area in April 2026 as shown in the following map (Figure 5-28). One ground water well has been established in Block-A (GWA-1), one in Block-B (GW-B-1) and four in Block-C (GW-C-1, GW-C-2, GW-C-3 and GW-C-4), all shallow wells, before the sampling procedure. Two samples (GW-AOI-1 and GW-AOI2 – deeper wells) have been taken from two community wells in the area. Sampling was done with low flow peristaltic pumps.

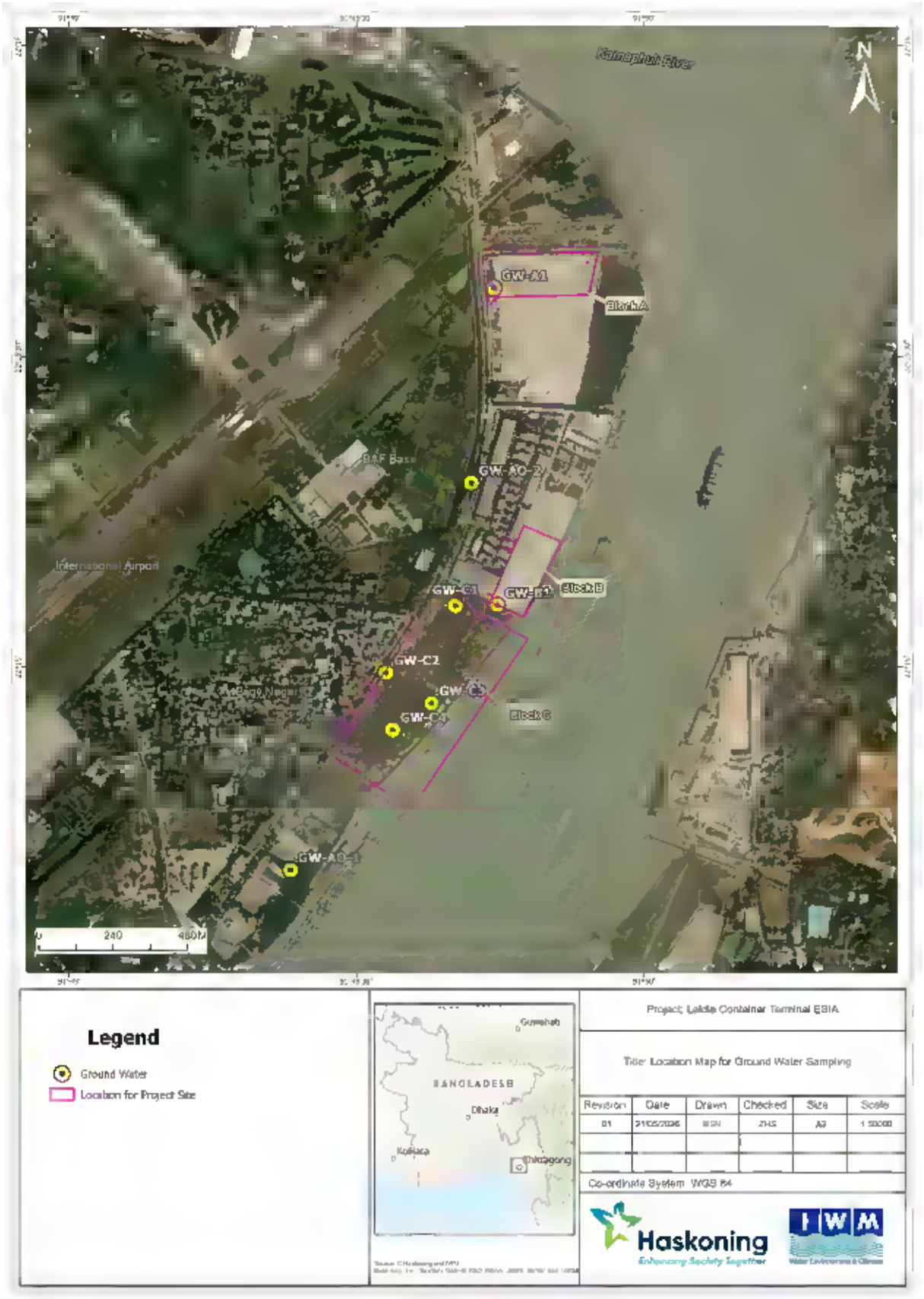


Figure 5-28: Groundwater sampling locations

Table 5-4: Analysis results of groundwater samples collected from project influence area (Dry season 2026)

Parameter	Unit	GW-AOI-1	GW-AOI-2	GW-A1	GW-B1	GW-C1	GW-C2	GW-C3	GW-C4	ECR 2023*
Temperature	°C	27.7	27.8	29.5	28.4	30.2	30.1	29	29.8	20-30
pH		8.44	7.1	7.21	6.97	7.18	7.13	7.27	7.37	6.5-8.5
Salinity	ppt	1.66	0.98	1.33	7.03	8.52	2.69	9.34	12.01	**
EC	ms/cm	3.15	1856	2.58	12.29	14.67	5.02	15.94	20.2	**
TDS	g/L	1616	933	1320	6790	8230	2640	9010	11610	1000
DO	mg/L	0.16	0.26	0.2	0.13	0.21	0.35	0.19	0.11	**
Metals										
Arsenic (As)	µg/l	41	< 3.0	< 3.0	99	< 3.0	< 3.0	14	< 3.0	50
Antimony (Sb)	µg/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	5.0	**
Barium (Ba)	µg/l	30	67	32	180	320	58	250	210	700
Beryllium (Be)	µg/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**
Cadmium (Cd)	µg/l	< 0.40	< 0.40	<0.40	<0.40	<0.40	<0.40	<0.40	< 0.40	3
Chromium (Cr)	µg/l	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 10	< 2.0	50
Cobalt (Co)	µg/l	< 1.0	< 1.0	< 1.0	1.4	< 1.0	< 1.0	< 1.0	< 1.0	**
Copper (Cu)	µg/l	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	1,500
Mercury (Hg)	µg/l	< 0.04	< 0.04	<0.04	<0.04	<0.04	<0.04	<0.04	< 0.04	1
Lead (Pb)	µg/l	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 10	< 3.0	10
Molybdenum (Mo)	µg/l	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	4.5	5.1	**
Nickel (Ni)	µg/l	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	50
Selenium (Se)	µg/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 7.0	< 5.0	10
Tin (Sn)	µg/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	2,000
Vanadium (V)	µg/l	< 2.0	< 2.0	< 2.0	2.0	< 2.0	< 2.0	< 10	< 2.0	**
Zinc (Zn)	µg/l	< 5.0	< 5.0	18	< 5.0	5.0	52	8.4	12	5,000
Calcium (Ca)	mg/l	19	53	88	63	320	58	150	160	75
Iron (Fe)	mg/l	2.3	8.6	4.3	6.9	11	3.9	3.7	8.8	0.3-1.0
Potassium (K)	mg/l	32	12	30	49	110	44	79	91	12
Magnesium (Mg)	mg/l	75	65	97	160	600	99	360	520	30-35

Parameter	Unit	GW-AOI-1	GW-AOI-2	GW-A1	GW-B1	GW-C1	GW-C2	GW-C3	GW-C4	ECR 2023*
Manganese (Mn)	mg/l	0.070	1.1	1.7	0.30	3.3	0.82	0.28	1.2	0.4
Sodium (Na)	mg/l	530	170	260	2100	1800	900	2800	3500	200
Mono Aromatic Hydrocarbons										
Benzene	µg/l	1.1	0.8	2.7	2.7	13	2.8	1.7	3.5	10
Toluene	µg/l	5.9	4.9	4.7	9.9	9.4	4.5	2.3	3.0	**
Ethylbenzene	µg/l	0.8	0.7	0.3	1.0	0.3	0.3	< 0.2	< 0.2	**
o-Xylene	µg/l	2.0	1.8	1.1	2.4	1.0	1.2	0.6	0.5	**
m,p-Xylene	µg/l	4.0	3.4	1.8	5.1	1.3	1.9	0.9	0.6	**
BTEX (sum)	µg/l	14	12	11	21	25	11	5.5	7.6	**
Xylenes (sum)	µg/l	6.0	5.2	2.9	7.5	2.3	3.1	1.5	1.0	**
Naphtalene	µg/l	0.9	0.8	0.3	0.6	< 0.2	0.3	< 0.2	< 0.2	**
Volatile halogenated Hydrocarbons										
Dichloromethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
Trichloromethane	µg/l	2.7	2.3	1.7	4.9	3.0	1.8	0.9	1.1	**
Tetrachloromethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
Trichloroethene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	20
Tetrachloroethene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
1,1-Dichloroethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	30
1,2-Dichloroethane	µg/l	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	30
1,1,1-Trichloroethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
1,1,2-Trichloroethane	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
cis1,2-Dichloroethene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
trans 1,2-Dichloroethene	µg/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**
Chlorinated Hydrocarbons (sum)	µg/l	2.8	2.3	1.7	4.9	3.0	1.8	< 1.1	< 1.1	**
cis+trans 1,2-Dichloroethenes (sum)	µg/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**
Total Petroleum Hydrocarbons										
TPH (C10-C12)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	**

Parameter	Unit	GW-AOI-1	GW-AOI-2	GW-A1	GW-B1	GW-C1	GW-C2	GW-C3	GW-C4	ECR 2023*
TPH (C12-C16)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	15	16	**
TPH (C16-C21)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH (C21-C30)	µg/l	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	**
TPH (C30-C35)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH (C35-C40)	µg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	**
TPH Sum (C10-C40)	µg/l	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	**
Inorganic Compounds										
Bromide	mg/l	2.1	1.7	1.7	13	17	4.8	18	23	**
Chloride	mg/l	600	490	400	3600	4800	1300	5200	6800	250
Fluoride	mg/l	0.58	< 0.50	<0.50	< 5.0	< 5.0	<0.50	< 5.0	< 5.0	1
Sulphate	mg/l	< 2.0	4.2	27	35	510	190	490	530	250

**The standards are taken from ECR 2023 for drinking waters*
*** No specific standard value found in ECR 2023 for drinking waters*

The groundwater samples collected within the project site as well as the area of influence show that the groundwater is overall in a good condition for various uses. The elevated concentrations of iron, potassium, magnesium, sodium, sulphate and chloride in groundwater are likely due to the estuarine setting of Laldia Char, where saline water influence, tidal interaction and dissolution of minerals from marine and alluvial sediments increase dissolved ion concentrations. The high iron content is consistent with reducing conditions commonly found in the deltaic aquifers of the Karnaphuli Estuary. Except one well in the local community the groundwater in the shallow aquifer is saline since it is near to the Karnaphuli estuary.

One groundwater well (GW-B1) recorded an arsenic concentration, and another well (GW-C1) recorded a benzene concentration above the applicable standard. As these exceedances were identified in single samples, they are currently considered isolated findings. A second sampling campaign will be undertaken to verify these results and determine whether the elevated arsenic and benzene concentrations are persistent. If confirmed, further investigation may be required to identify potential sources and assess the significance of the findings.

Monsoon Season

A survey sampling campaign was conducted in the LTCP area and surroundings during the monsoon (September–October) in 2025 (DAR, 2025). The sampling locations are illustrated in Figure 5-29 while the results are given in Table 5-5.

The groundwater quality shows that key parameters such as pH, turbidity and most trace metals are within acceptable limits, indicating generally suitable baseline conditions; however, elevated conductivity and TDS reflect high dissolved salts, likely from natural mineral dissolution and anthropogenic inputs. Several parameters exceed standards in specific samples, including iron, chloride, sodium, ammonia/ammonium, nitrite, magnesium, and potassium, suggesting influences from saline intrusion, agricultural activities, organic decomposition, and infrastructure corrosion. Hydrocarbon-related compounds (PAH, PCB, TPH) remain within permissible limits or were not detected. Overall, while the water is largely compliant, these elevated constituents may affect usability and require regular monitoring and targeted treatment for safe consumption.

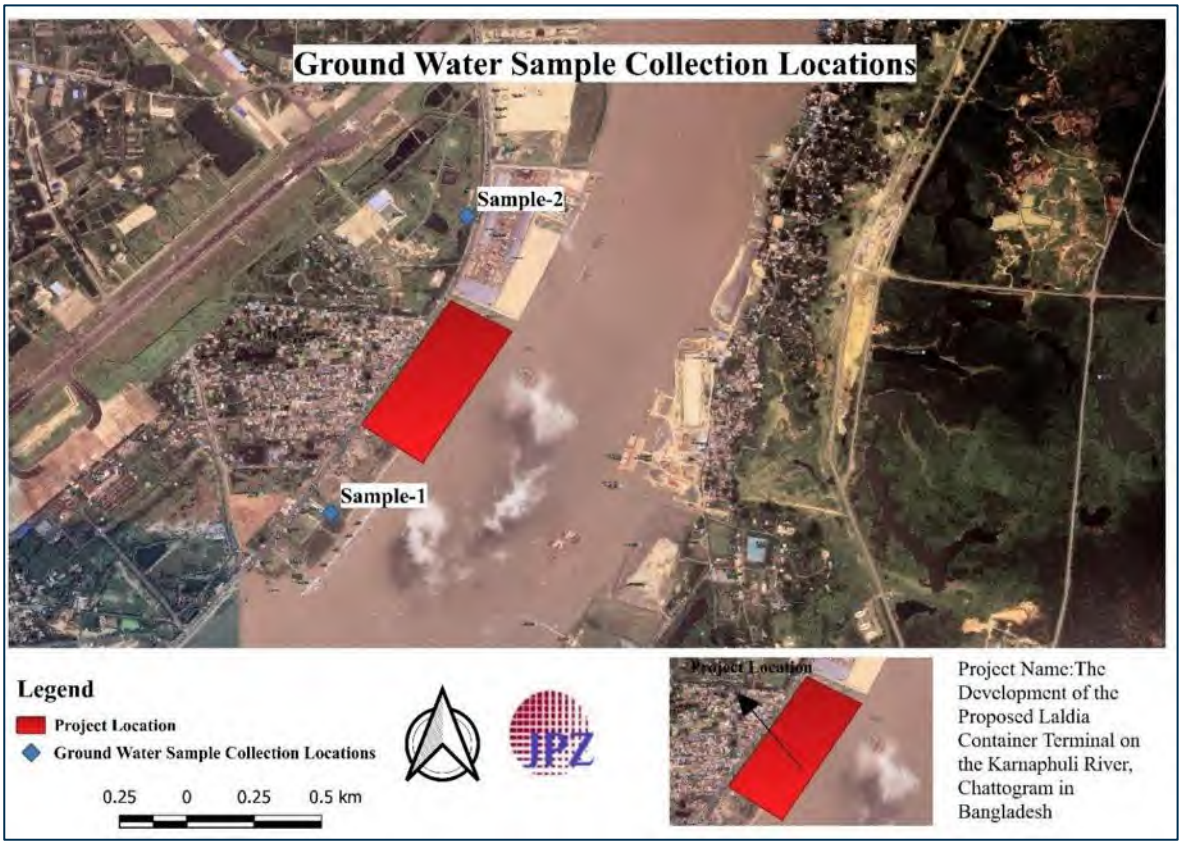


Figure 5-29: Groundwater sampling locations for the Monsoon season

Table 5-5: Groundwater analysis results

Name of Parameters	Concentration Present		Drinking Water Quality Standard as per ECR 2023	Unit
	Ground 1	Ground 2		
pH	7.2	7.5	6.5-8.5	-
Turbidity	<1	<1	5	NTU
Conductivity	7,040	4,280	**	(uS/cm)
TDS	3,520	2,150	1,000	mg/L

Name of Parameters	Concentration Present		Drinking Water Quality Standard as per ECR 2023	Unit
	Ground 1	Ground 2		
TSS	<2	<2	10	mg/L
DO	5.8	5.9	**	mg/L
BOD5 20°C	<0.2	<0.2	**	mg/L
COD	1.1	1.5	**	mg/L
Alkalinity	112	137	**	mg/L
Iron	0.22	9.25	1	mg/L
Manganese	0.1	0.2	0.4	mg/L
Arsenic	0.009	0.007	0.05	mg/L
Sulphate	<1	<1	250	mg/L
Phosphate	0.15	0.25	**	mg/L
TOC (Total Organic Carbon)	1.94	3.17	**	mg/L
Chloride (Cl)	991	6.86	250	mg/L
Nitrate (NO3)	5.65	<3.0	45	mg/L
Nitrite (NO2)	< 1.0	2.82	1.0	mg/L
Ammonia (NH3-N)	1.71	<0.5	1.50	mg/L
Ammonium (NH4)	1.81	<0.5	**	mg/L
Silica Calloidal (SiO2)	<2.0	< 2.0	**	mg/L
Calcium (Ca)	64.1	23.9	75	mg/L
Magnesium (Mg)	83.6	1.59	30-35	mg/L
Sodium (Na)	546	74.1	200	mg/L
Potassium (K)	35.5	0.82	12	mg/L
Lead (Pb)	< 0.01	<0.01	0.01	mg/L
Cadmium (Cd)	< 0.001	<0.001	0.003	mg/L
Chromium (Cr)	<0.005	<0.005	0.05	mg/L
Mercury (Hg)	<0.001	< 0.001	0.001	mg/L
Zinc (Zn)	<0.05	<0.05	5	mg/L

Name of Parameters	Concentration Present		Drinking Water Quality Standard as per ECR 2023	Unit
	Ground 1	Ground 2		
Oil & Grease	<2.0	<2.0	0.01	mg/L
TPH	0.93	1.42	**	mg/L

*** No specific standard value found in ECR 2023 for drinking waters*

5.1.7.3 Ambient Air Quality

Ambient air quality measurements have been carried out at six locations (see Figure 5-30), and the results are shown in Table 5-6. The key air quality parameters (particulate matter- PM_{10} and $PM_{2.5}$, oxides of sulphur - SO_x, carbon monoxide- CO, oxides of nitrogen – NOx, ground ozone O_3) were analysed from samples collected over a twenty-four (24) hour period each for consecutive four weeks at the sampling sites. A total of six (06) ambient air quality monitoring locations were selected within the project Area of Influence (AoI) of the proposed Laldia Container Terminal.

Do note that during the time of monitoring, a fuel crisis was affecting the country. No specific data has been collected yet to determine the effect of the fuel crisis on the traffic estimations, which is why it is only qualitatively mentioned. Monitoring was conducted during four consecutive monitoring rounds between 13 April and 10 May 2026, representing the pre-monsoon season. Continuous 24-hour monitoring was performed at each location using the OCEANUS AQM-09 Real-Time Air Quality Monitoring System and OC-1000 Intelligent Gas Detector. The monitoring program covered particulate matter, gaseous pollutants, hydrocarbons, and atmospheric indicators. Monitoring procedures followed the established field methodology and real-time data acquisition framework. The survey report is presented in Annex C1.

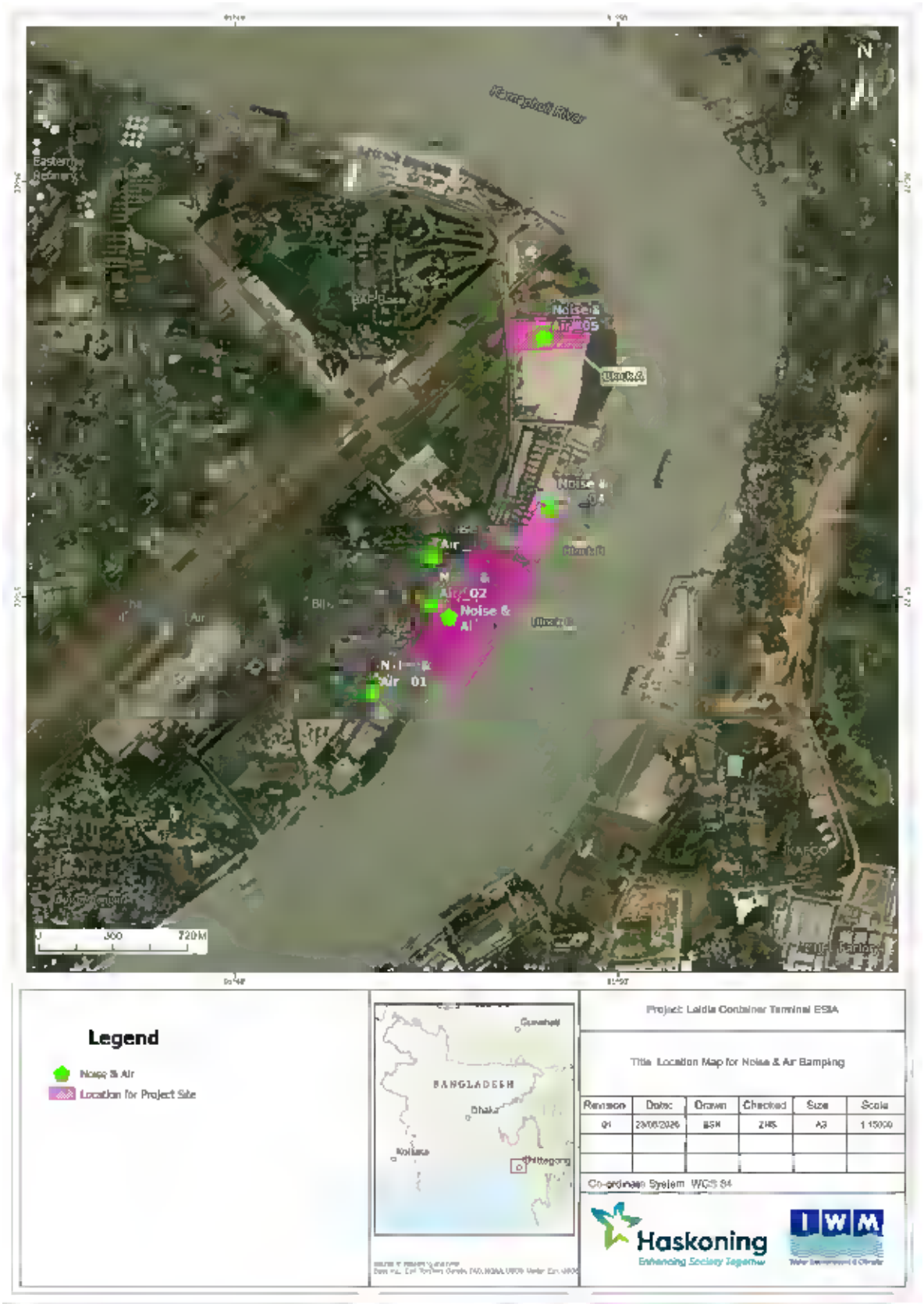


Figure 5-30: Locations of measuring air quality and noise

Table 5-6: Ambient Air Quality Parameters in Project Area (April-May 2026)

Location	SO_X	NO_2	O_3	CO	NH_3	CO_2	$PM_{2.5}$	PM_{10}	SPM	CH_4	NMHC	THC	NO	NO_x	H_2S
Location 1	33.5	43.84	34.26	0.45	0	863.52	22.13	47.98	101.86	1812	313.5	2125.5	0	43.84	0
Location 2	33.29	44.09	33.27	0.49	0	701.09	22.18	46.95	98.95	1982.6	283.77	2266.4	0	44.09	0
Location 3	33.73	43.51	34.33	0.44	0	756.44	21.87	46.56	98.51	2190.3	344.65	2534.9	0	43.51	0
Location 4	33.71	43.98	33.46	0.42	0	787.85	21.84	46.68	99.01	1525.2	1616.2	3141.4	0	43.98	0
Location 5	34.13	43.81	33.97	0.25	0	842.35	19.79	45.55	90.71	1410.9	7602.9	9013.9	0	43.81	0
Location 6	33.62	43.45	33.55	0.27	0	961.56	20.96	49.61	115.57	1954.6	397.55	2352.2	0	43.45	0
Unit	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
Monitoring Duration as per APCR'2022	24	24	8	8	24	24	24	24	24	24	24	24	24	24	24
APCR'2022	80	80	100	5	400	NYS	65	150	200	NYS	NYS	NYS	NYS	NYS	0.02-0.2

**Air Pollution Control Rules (APCR) on 26th July 2022; Vide S.R.O No. 255-Law/2022, Schedule 1 (Ambient Air Quality Standards).*

***Primary Data Source:** (ECIL) Laboratory, May, 2026.*

NYS = Not Yet Set

The Suspended Particulate Matter (SPM) concentrations ranged from 90.71 to 115.57 µg/m³, with the highest concentration observed at Location-6 and the lowest at Location-5. Although no specific APCR standard exists for SPM, observed concentrations indicate relatively low to moderate particulate loading and reflect background conditions within the project influence area.

The recorded concentrations of particulate matter were observed well below the APCR standards at all monitoring locations. $PM_{2.5}$ concentrations ranged from 19.79–22.18 µg/m³, which remained significantly below the Bangladesh standard value of 65 µg/m³. PM_{10} concentrations ranged from 45.55–49.61 µg/m³, considerably below the standard limit of 150 µg/m³.

Carbon Monoxide concentrations ranged from 0.25–0.49 mg/m3, which remained substantially lower than the APCR standard value of 5 mg/m3. The observed concentrations suggest the absence of major incomplete combustion sources or heavy vehicular congestion during the monitoring period. NO_2 concentrations ranged from 43.45–44.09 µg/m3, while NOx concentrations varied between 43.45–44.09 µg/m3values. Recorded NO_2 levels remained considerably below the APCR standard daily mean limit of 80 µg/m3 at all monitoring locations. SOx concentrations ranged from 33.29–34.13 µg/m3, remaining substantially below the Bangladesh standard limit of 80 µg/m3. The recorded concentrations indicate minimal influence from sulphur-containing fuel combustion sources and absence of major industrial emission activities within the immediate monitoring area. Ozone concentrations ranged from 33.27–34.33 µg/m3, remaining well below the APCR limit of 100 µg/m3. The observed levels indicate normal atmospheric photochemical conditions without evidence of elevated secondary pollutant formation. No measurable concentrations of NH_3 and H_2S were detected during the monitoring campaign. This suggests the absence of nearby agricultural activities, sewage emissions or industrial processes commonly associated with these pollutants. CO_2 concentrations ranged between 701.09–961.56 mg/m3, consistent with expected ambient atmospheric levels observed in mixed-use urban and coastal environments. Slightly elevated concentrations at some locations may be attributed to localized traffic movement and human activities. Methane concentrations ranged from 1410.94–2190.29 µg/m3, while Non-methane Hydrocarbons (NMHC) concentrations ranged from 313.5–7602.94 µg/m3. Total Hydrocarbon (THC) concentrations ranged from 2125.5–9013.88 µg/m3, with the highest value observed at Location-5.

Overall, the monitored ambient air quality conditions indicate that all measured parameters remained within applicable Bangladesh standard limits and reflect acceptable baseline environmental conditions within the project area. The monitoring area experienced relatively low industrial emissions, moderate traffic activity, adequate atmospheric dispersion conditions, and favourable coastal wind circulation patterns. Moreover, it is worth noting that the air quality survey was carried out during a fuel crisis in Bangladesh (due to the global oil crisis because of instability in the middle east) which may have attenuating impacts on fuel combustions as well as the air quality parameters. The influence of coastal air movement and absence of major combustion sources contributed to maintaining pollutant concentrations within Bangladesh standard limits. Vegetation cover and open atmospheric conditions may also have enhanced pollutant dilution and

dispersion. Therefore, existing baseline conditions indicate no significant adverse air quality concerns within the project influence area.

5.1.7.4 Ambient Noise Level

A total of six (06) ambient noise monitoring locations (shown in Figure 5-30) were monitored within the project Area of Influence (AoI) of the proposed Laldia Container Terminal through four (04) monitoring rounds. Continuous 24-hour monitoring was conducted covering both daytime and nighttime periods, and the results were assessed against the Bangladesh Noise Pollution Control Rules (NPCR, 2025) mixed standards of 60 dB(A) for daytime and 50 dB(A) for nighttime for mixed zones (i.e. combining residential, commercial and industrial purposes). The results are summarized in the table below and the full survey report is provided in Annex C2.

Table 5-7: Noise Levels in Project Influence Area, all units are in dB[11]

Location	Period	Leq[12]	Lmax	Lmin	L90	L50	L10	Category
Location 1	Day-time	**72.39**	84.8	44.3	54.9	66.6	77.1	Industrial
	Night-time	**68.36**	79.6	39.6	50	62.3	73.2	
Location 2	Day-time	**67.37**	81.4	40.3	49.5	60.4	71.9	Industrial
	Night-time	**63.8**	78.4	36.2	45.5	56.7	68.3	
Location 3	Day-time	**67.57**	82.9	41.6	50	60.7	71.9	Residential
	Night-time	**62.42**	78.2	37.2	44.6	55.3	66.7	
Location 4	Day-time	**68.68**	82.1	42.3	50.6	61.7	73.3	Residential
	Night-time	**62.16**	74.9	38.7	45.6	55.9	66.8	
Location 5	Day-time	**65.64**	78.4	42.2	49.5	59.6	70.2	Industrial
	Night-time	**60.65**	74.6	37.9	44.8	54.7	65.1	
Location 6	Day-time	**74.92**	88.5	46.4	56.2	68.2	79.4	Residential/ Educational
	Night-time	**68.38**	81.4	41.6	50.6	62.4	73	
Noise Pollution (Control) Rules, 2025)							**Day-Time Leq**	**Night-Time Leq**
Silent Zone							50	40

[11] dBA= A weighted measurement of sound. Since the range of sound pressure levels varies considerably, sound levels are expressed on a logarithmic scale, which compresses the range. The standard measurement unit of sound is the decibel (dB), which represents a ratio of pressure levels referenced to the 0.0002 microbar, which is considered to be the threshold audible range of human hearing. The threshold of pain, which is of the order end of the audible range, occurs at approximately 140 decibels. Using the decibel scale, an increase of three decibels is barely perceptible and an increase or decrease of ten decibels is perceived as a doubling or halving of the sound level. Humans are capable of hearing only a limited frequency range of sound and the human ear is not equally sensitive to all frequencies. The human ear is more tolerant to higher noise levels at lower frequencies and can hear frequencies ranging from 20 hertz (Hz) to 20,000 Hz. In order to take this characteristic into account in noise measurements, a frequency weighting known as A-weighting is commonly applied to the sound pressure levels which approximate the frequency response of the human ear by placing most emphasis on the frequency range of 1,000 to 5,000 hertz. Because the A-weighted scale closely describes the subjective response of the human ear, it is most commonly used in noise measurements. Sound level measurement using A-weighting are expressed as dBA.

[12] Leq= the sound level equivalent, i.e., an energy-averaged sound level that includes both steady background sounds and transient short-term sounds. The Leq represents the level of steady sound which, when averaged over the sampling period, is equivalent in energy to the fluctuating sound level over the same period. The Leq is commonly used to describe traffic noise levels that tend to experience hourly peaks.

Residential Zone	55	45
Mixed Zone (this area is used combining residential, commercial and industrial purposes)	**60**	50
Commercial Zone	70	60
Industrial Zone	75	70
World Bank/IFC Standard (General EHS Guidelines, 2007)	**Day-Time**	**Night-Time**
Industrial Area	70	70
Residential, Institutional, Educational	55	45

** Noise Pollution Control Rules 2006, Schedule 1 (Zone Based Noise Level Standard): ECIL Laboratory, May 2026*

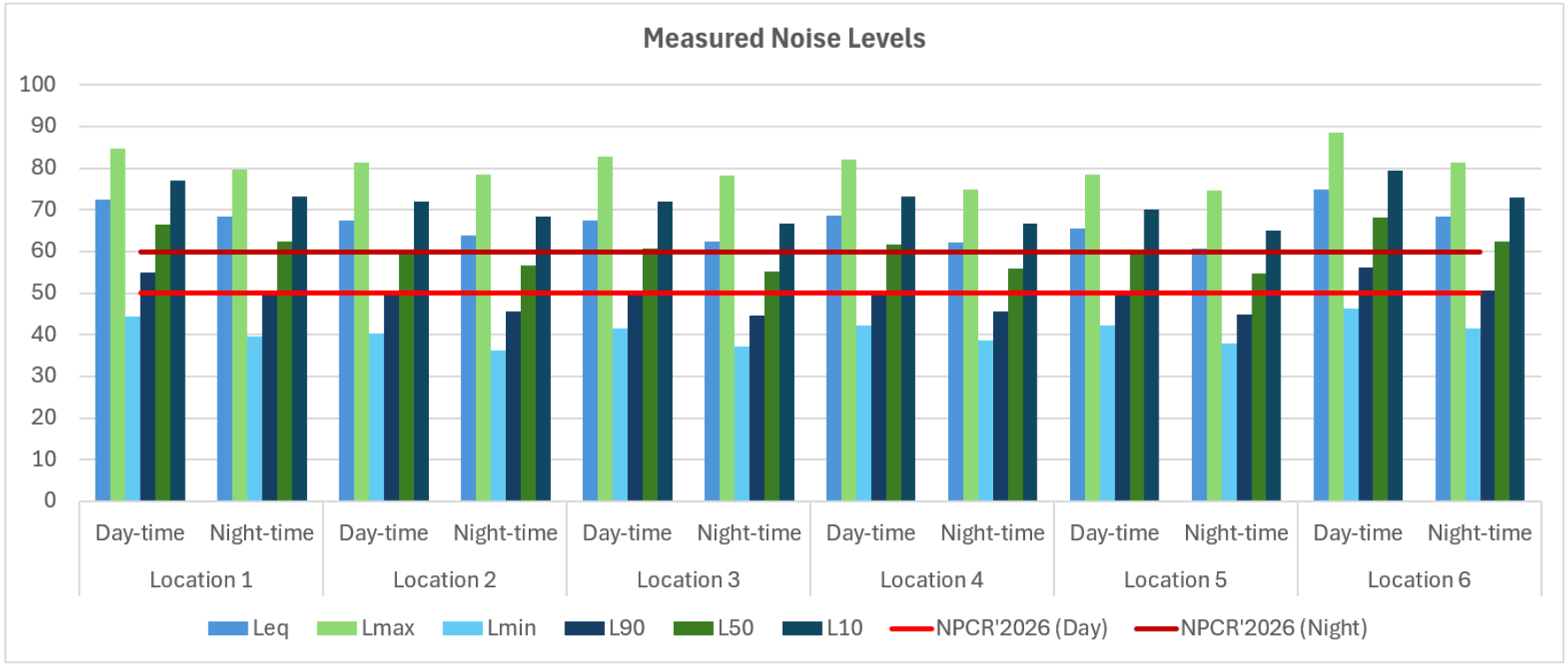


Figure 5-31: Linear relationship between the noise level (day time), noise level (night time) and BD standard

The analysis reveals that equivalent noise levels (Leq) at all monitoring locations exceeded the residential standard during both periods (see Figure 5-31). Daytime Leq values ranged from 65.64–74.92 dB(A), while nighttime levels ranged from 60.65–68.38 dB(A) with limits being 60 dBA and 50 dBA for daytime and night-time, respectively.

The highest noise levels were recorded at Location–6 with 74.92 dB(A) during daytime and 68.38 dB(A) during nighttime, whereas the lowest levels were observed at Location–5, recording 65.64 dB(A) and 60.65 dB(A) respectively. Maximum noise levels (Lmax) reached up to 88.5 dB(A), indicating intermittent high-intensity sound events.

The elevated baseline noise levels are primarily associated with road traffic movement, transportation activities, nearby air traffic (the airport and Airforce base are in a close proximity) commercial activities, and other anthropogenic sources within South Patenga. In addition, the coastal setting and sea wind conditions may contribute to the existing acoustic environment through wind-induced ambient sounds, wave action, and enhanced sound propagation characteristics.

Overall, the study area exhibits a relatively elevated acoustic environment compared to residential area standards, indicating existing background influence from the coastal setting and sea wind conditions as well as surrounding urban and transportation activities.

5.1.7.5 Soil Quality

Soil and sediment quality is assessed using Dutch Soil Quality Standards, which are widely applied internationally in ESIA practice where national soil criteria are absent. Current national Rules do not provide legally binding standards for soil or sediment quality. While the legislation refers to the collection and analysis of soil samples for pollution assessment, it does not include specific schedules or tables with numerical acceptance criteria for soil or sediment contaminants. Dutch soil and sediment intervention values are suitable for ESIA purposes because they are risk-based standards derived from thresholds for unacceptable effects on both human health and ecosystems. As such, they provide a scientifically robust benchmark for identifying contamination levels requiring remediation or risk mitigation.

The Dutch standards distinguish between:

- Background Values, representing natural background or sustainable soil quality; and
- Intervention Values, representing concentrations above which a serious case of soil contamination may exist.

Dry Season

Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation. The soil in the project area is mostly silty and suitable to support different ecosystems in balance (SURVEY2000, 2026). When a land area is filled with imported earth, there is the chance of the native soil to be disturbed by it. Hence, soil

samples have been collected from several locations during April 2026 and were analyzed in the environmental laboratory in the Netherlands to assess the current soil quality of the project area.

The March 2026 soil analysis results, representing the dry season, show predominantly low contaminant levels, with only a few isolated and minor exceedances of background values. Slightly elevated nickel was found in two topsoil samples, likely reflecting natural background conditions, while single localised exceedances were observed for copper and PCBs without any clear spatial pattern or source. All other metals, as well as TPH and PAHs, remained below background levels, often below detection limits. Overall, the results indicate no widespread contamination and largely reflect natural geochemical conditions, with only limited, localised anomalies in topsoil.

The soil quality results show that all analysed parameters remained within internationally accepted limits during the dry season, with heavy metals and pH values consistently within acceptable ranges. No PAHs were detected in any samples, indicating the absence of hydrocarbon-related contamination.

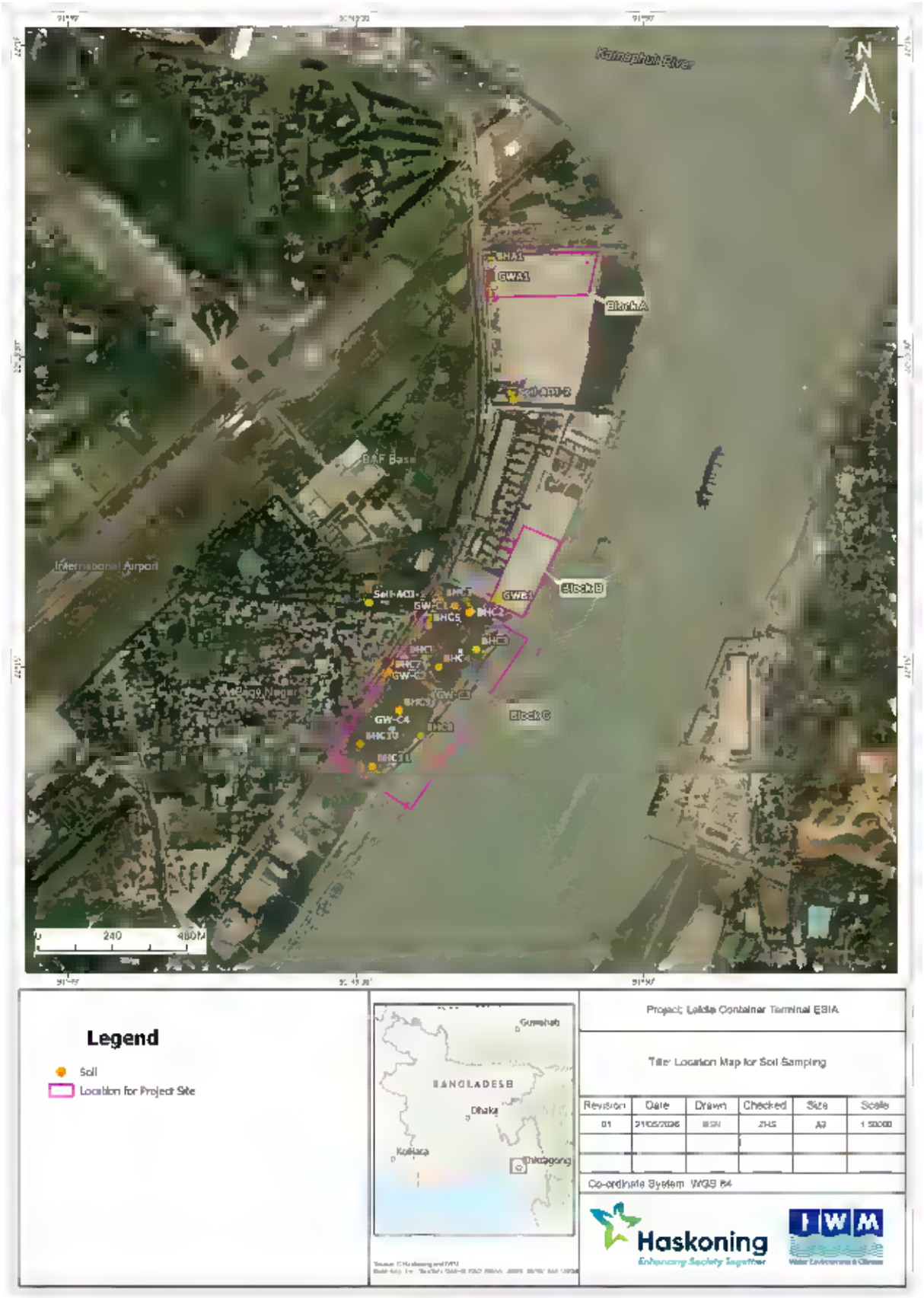


Figure 5-32: Soil sampling locations

Table 5-8: Analysis Results of Soil Samples Collected from Project Area (Dry Season 2026)

Analysis	Unit	Background value	Intervention value	BHA1-1	BHC1-1	BHC1-2	BHC2-1	BHC3-1	BHC4-1	BHC5-1	BHC6-1	BHC7-1	BHC8-1	BHC9-1	BHC10-1	BHC11-1	BHC11-2	GW-A1-1	GW-B1-1	Soil-AOI-2-1	Soil-AOI-3-1
Characteristics																					
Dry matter	% [w/w]			87.2	99.2	93.5	94.8	98.3	94.8	97.2	97.3	85.3	94.6	96.7	89.3	97.9	89.4	88.1	79.1	82.2	97.4
Organic matter	% [w/w dm]			1.6	< 0.7	1.2	0.9	< 0.7	< 0.7	< 0.7	< 0.7	1.2	< 0.7	< 0.7	1.7	< 0.7	< 0.7	1.4	1.8	2.0	0.7
Residue on ignition	% [w/w dm]			97.5	99.4	98.5	98.9	99.4	99.3	99.4	99.5	97.8	99.3	99.3	97.9	99.4	99.2	97.6	96.9	96.6	99.0
Fraction <2 µm	% [w/w dm]			12.4	2.2	5.0	2.4	< 2.0	2.7	2.7	< 2.0	13.6	2.2	3.1	5.1	< 2.0	2.6	15.0	18.6	19.8	3.0
Metals																					
Arsenic (As)	mg/kg dm	20	76	< 5.0	< 5.0	5.3	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	5.6	5.7	6.0	< 5.0
Barium (Ba)	mg/kg dm		920 *	34	< 15	15	< 15	< 15	15	< 15	< 15	25	< 15	< 15	< 15	< 15	< 15	39	46	60	< 15
Beryllium (Be)	mg/kg dm		30 **	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Cd)	mg/kg dm	0.6	13	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Cobalt (Co)	mg/kg dm	15	190	8.4	< 5.0	7.0	5.2	< 5.0	< 5.0	< 5.0	< 5.0	8.6	< 5.0	5.4	5.5	< 5.0	< 5.0	11	12	12	5.5
Chromium (Cr)	mg/kg dm	55	180	26	10	16	12	9.7	11	10	8.9	24	11	12	14	8.9	9.8	31	35	39	14
Copper (Cu)	mg/kg dm	40	190	53	< 5.0	8.6	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	17	< 5.0	< 5.0	6.6	< 5.0	< 5.0	33	29	28	< 5.0
Mercury (Hg)	mg/kg dm	0.15	36	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Molybdenum (Mo)	mg/kg dm	1.5	190	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Nickel (Ni)	mg/kg dm	35	100	25	12	18	13	9.5	9.4	12	8.6	26	11	14	15	11	12	33	37	38	25
Lead (Pb)	mg/kg dm	50	530	12	< 10	13	< 10	< 10	< 10	< 10	< 10	12	< 10	< 10	< 10	< 10	< 10	20	15	17	< 10
Antimony (Sb)	mg/kg dm	4	22	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Selenium (Se)	mg/kg dm		100 **	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Tin (Sn)	mg/kg dm	6.5	900	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vanadium (V)	mg/kg dm	80	250	24	11	17	13	10	18	12	9.8	24	12	12	14	11	12	30	34	36	13
Zinc (Zn)	mg/kg dm	140	720	59	15	30	29	12	20	15	12	47	50	21	30	14	16	90	74	72	25
Total Petroleum Hydrocarbons																					

Analysis	Unit	Background value	Intervention value	BHA1-1	BHC1-1	BHC1-2	BHC2-1	BHC3-1	BHC4-1	BHC5-1	BHC6-1	BHC7-1	BHC8-1	BHC9-1	BHC10-1	BHC11-1	BHC11-2	GW-A1-1	GW-B1-1	Soil-AOI-2-1	Soil-AOI-3-1
TPH >C10-C12	mg/kg dm			< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
TPH >C12-C16	mg/kg dm			< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
TPH (>C16-C21)	mg/kg dm			< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	8	< 6	< 6
TPH (C21-C30)	mg/kg dm			23	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	37	15	< 12
TPH (C30-C35)	mg/kg dm			13	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	8	22	12	< 6
TPH (C35-C40)	mg/kg dm			7	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	12	7	< 6
TPH (sum C10-C40)	mg/kg dm	190	5000	51	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	< 38	84	< 38	< 38
Polychlorinated Biphenyls																					
PCB 28	mg/kg dm			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 52	mg/kg dm			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0019	< 0.0010	< 0.0010	< 0.0010
PCB 101	mg/kg dm			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.013	< 0.0010	< 0.0010	< 0.0010
PCB 118	mg/kg dm			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.013	< 0.0010	< 0.0010	< 0.0010
PCB 138	mg/kg dm			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.018	< 0.0010	< 0.0010	< 0.0010
PCB 153	mg/kg dm			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.019	< 0.0010	< 0.0010	< 0.0010
PCB 180	mg/kg dm			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.011	< 0.0010	< 0.0010	< 0.0010
PCB (7) (Sum)	mg/kg dm	0.02	1	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	0.076	< 0.0070	< 0.0070	< 0.0070
Polycyclic Aromatic Hydrocarbons																					
Naphthalene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Acenaphthylene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Acenaphthene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Fluorene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Phenanthrene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Anthracene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Fluoranthene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035

Analysis	Unit	Background value	Intervention value	BHA1-1	BHC1-1	BHC1-2	BHC2-1	BHC3-1	BHC4-1	BHC5-1	BHC6-1	BHC7-1	BHC8-1	BHC9-1	BHC10-1	BHC11-1	BHC11-2	GW-A1-1	GW-B1-1	Soil-AOI-2-1	Soil-AOI-3-1
Pyrene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Benz(a)anthracene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Chrysene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Benzo(b)fluoranthene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Benzo(k)fluoranthene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Benzo(a)pyrene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Dibenz(a,h)anthracene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Benzo(g,h,i)perylene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
Indeno(123cd)pyrene	mg/kg dm			< 0.040	< 0.035	< 0.036	< 0.035	< 0.033	< 0.035	< 0.034	< 0.035	< 0.038	< 0.035	< 0.035	< 0.036	< 0.034	< 0.037	< 0.037	< 0.043	< 0.039	< 0.035
PAH 16 EPA (sum)	mg/kg dm	1.5	40	< 0.64	< 0.56	< 0.58	< 0.56	< 0.53	< 0.56	< 0.54	< 0.56	< 0.61	< 0.56	< 0.56	< 0.58	< 0.54	< 0.59	< 0.59	< 0.69	< 0.62	< 0.56

Monsoon Season

During the monsoon season, six soil samples were collected in September (DAR. 2026) using standard composite sampling techniques from the topsoil layer (0–15 cm). The sampling locations

The soil quality results show that all analysed parameters remained within limits, with heavy metals and pH values consistently within acceptable ranges. No PAHs or PCBs were detected in any samples, indicating the absence of hydrocarbon-related contamination. The sampling locations are illustrated in Figure 5-33 and the results are shown in Table 5-9.

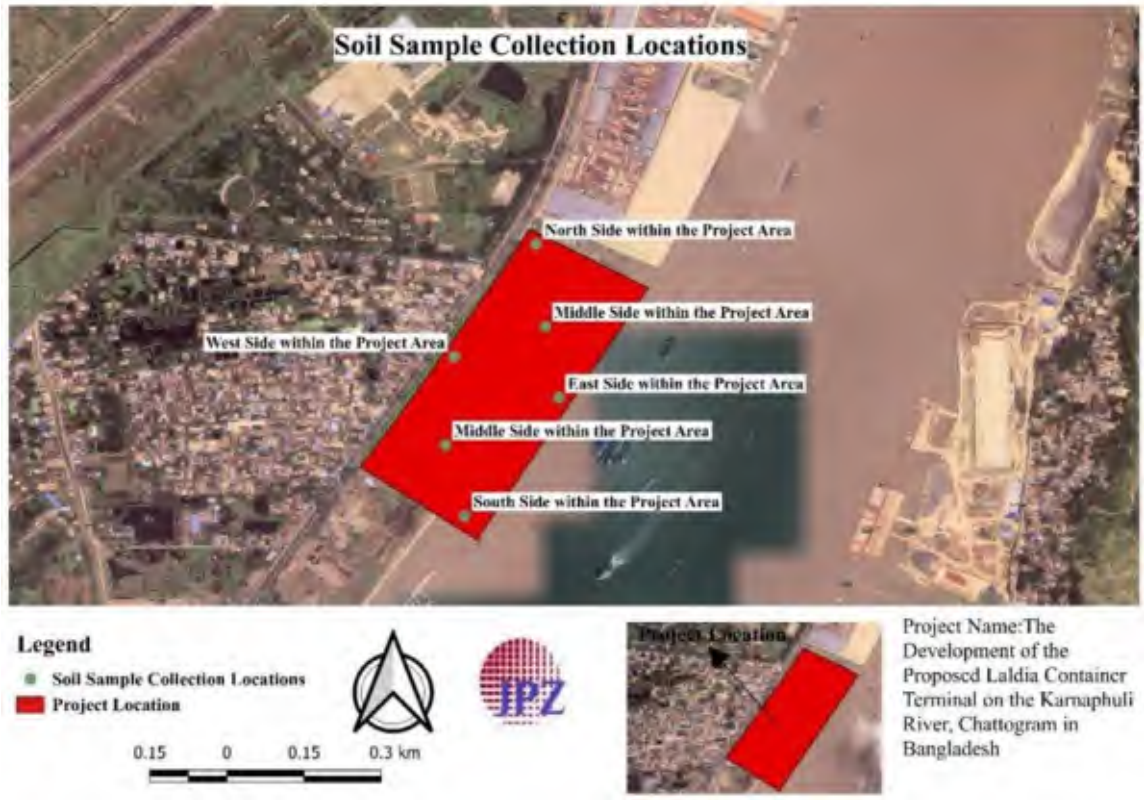


Figure 5-33: Soil analysis monsoon season

Table 5-9: Soil analysis result for monsoon season

Parameters	S-1	S-2	S-3	S-4	S-5	S-6	Unit	Background value	Intervention value
Arsenic	1.79	2.69	1.50	2.03	3.25	1.21	mg/kg	20	76
Lead	1.73	3.01	1.72	2.53	7.14	0.89	mg/kg	50	530
Cadmium	0.001	0.001	0.001	0.001	0.001	0.001	mg/kg	0.6	13
Chromium	9.01	11.8	8.23	11.9	16.6	8.4	mg/kg	55	180
Mercury	0.001	0.001	0.001	0.001	0.001	0.001	mg/kg	0.15	36
Zinc	19.9	24.8	19.0	24.8	40.0	18.9	mg/kg	140	720
TPH	160	98.5	105	52.8	56.4	78.4	mg/kg	190	5000
pH at 24.8˚C	8.48	6.99	8.61	8.21	8.55	8.34	5% Solution		
Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Clay	Clay	Sandy Clay	-		

5.1.7.6 Riverbed Sediment Quality

Dry Season

The riverbed sediment is an integral component of the aquatic ecosystem providing habitat and a source of food for key components of the food web. The sediment often becomes a catchment for natural and anthropogenic toxic substances that bind to particles and settle from the water column to the riverbed. The toxicity from the buildup of these contaminants may threaten the sediment-dwelling benthic organisms, vegetative communities and the aquatic food web that depend on them. Organisms and plants, particularly those living in the sediment, can acquire and accumulate toxic substances through epidermal contact, respiration, or by ingestion of toxins. Knowing the quality of the dredged sediment will be particularly important before any potential reuse of the dredged material or placement of the dredged sediment on land or offshore.

The riverbed sediment samples have been collected in the project area during April 2026 and the result of quality analyses are shown in Table 5-10.

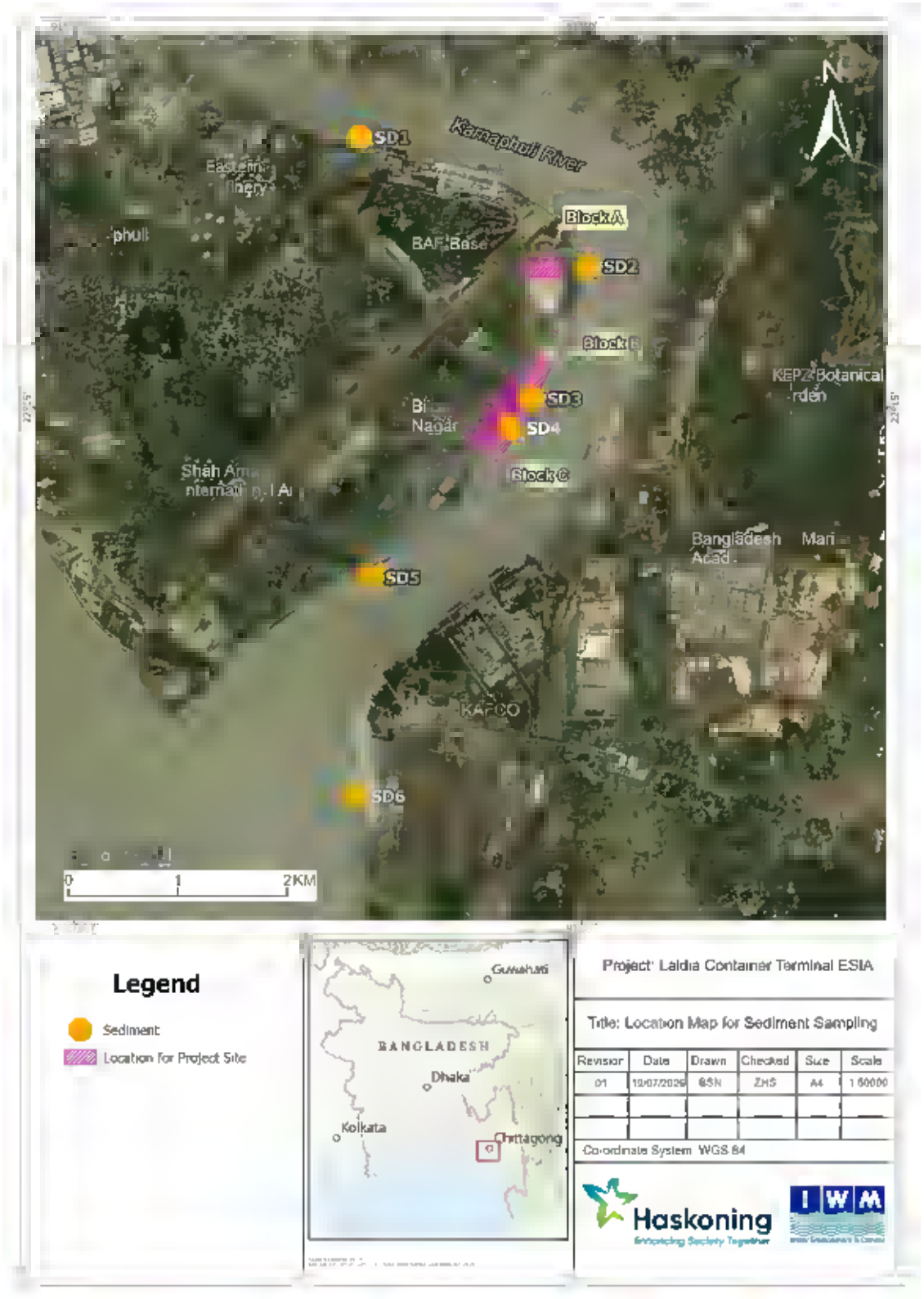


Figure 5-34: Riverbed sediment sampling locations

Table 5-10: Analysis results of sediment samples collected from project influence area

Analysis	Unit	SD-01-1	SD-02-1	SD-03-1	SD-04-1	SD-05-1	SD-06-1	Background Value	Intervention Value
Characteristics									
Dry matter	% [w/w]	65.5	80.6	67.2	86.7	77.5	77.7		
Total Organic Carbon (TOC)	g/kg dm	< 5.0	< 5.0	6.8	< 5.0	< 5.0	< 5.0		
Organic matter	% [w/w dm]	2.2	< 0.7	2.0	< 0.7	0.7	0.9		
Residue on ignition	% [w/w dm]	96.5	99.5	96.9	99.5	98.8	98.9		
Fraction <2 µm	% [w/w dm]	18.0	< 2.0	15.5	< 2.0	6.3	2.9		
Metals									
Arsenic (As)	mg/kg dm	< 5.0	< 5.0	5.9	< 5.0	< 5.0	< 5.0	20	76
Barium (Ba)	mg/kg dm	27	< 15	31	< 15	< 15	< 15		920 *
Beryllium (Be)	mg/kg dm	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		30 **
Calcium (Ca)	mg/kg dm	1800	340	2700	310	1300	670		
Cadmium (Cd)	mg/kg dm	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	0.6	13
Cobalt (Co)	mg/kg dm	10	< 5.0	12	< 5.0	6.9	7.7	15	190
Chromium (Cr)	mg/kg dm	30	5.5	35	7.3	20	18	55	180
Copper (Cu)	mg/kg dm	23	< 5.0	26	< 5.0	11	5.3	40	190
Mercury (Hg)	mg/kg dm	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.15	36
Potassium (K)	mg/kg dm	2400	310	2800	350	1300	1000		
Magnesium (Mg)	mg/kg dm	6600	900	7900	900	4200	3500		

Analysis	Unit	SD-01-1	SD-02-1	SD-03-1	SD-04-1	SD-05-1	SD-06-1	Background Value	Intervention Value
Molybdenum (Mo)	mg/kg dm	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	1.5	190
Sodium (Na)	mg/kg dm	3200	1800	2800	740	2100	2000		
Nickel (Ni)	mg/kg dm	31	5.2	36	6.2	21	21	35	100
Lead (Pb)	mg/kg dm	13	< 10	15	< 10	< 10	< 10	50	530
Antimony (Sb)	mg/kg dm	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	4	22
Selenium (Se)	mg/kg dm	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		100**
Tin (Sn)	mg/kg dm	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	6.5	900
Vanadium (V)	mg/kg dm	29	6.5	32	9.4	20	16	80	250
Zinc (Zn)	mg/kg dm	52	8.4	59	9.8	35	28	140	720
Total Petroleum Hydrocarbons									
TPH >C10-C12	mg/kg dm	< 3	< 3	< 3	< 3	< 3	< 3		
TPH >C12-C16	mg/kg dm	< 6	< 5	< 5	< 5	< 5	< 5		
TPH (>C16-C21)	mg/kg dm	< 6	< 6	10	< 6	< 6	< 6		
TPH (C21-C30)	mg/kg dm	< 13	< 12	22	< 12	< 12	< 12		
TPH (C30-C35)	mg/kg dm	12	< 6	23	< 6	< 6	< 6		
TPH (C35-C40)	mg/kg dm	< 6	< 6	< 6	< 6	< 6	< 6		
TPH (sum C10-C40)	mg/kg dm	< 38	< 38	67	< 38	< 38	< 38	190	5000
Polychlorinated Biphenyls									
PCB 28	mg/kg dm	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		

Analysis	Unit	SD-01-1	SD-02-1	SD-03-1	SD-04-1	SD-05-1	SD-06-1	Background Value	Intervention Value
PCB 52	mg/kg dm	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		
PCB 101	mg/kg dm	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		
PCB 118	mg/kg dm	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		
PCB 138	mg/kg dm	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		
PCB 153	mg/kg dm	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		
PCB 180	mg/kg dm	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		
PCB (7) (Sum)	mg/kg dm	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	0.02	1
Polycyclic Aromatic Hydrocarbons									
Naphthalene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Acenaphthylene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Acenaphthene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Fluorene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Phenanthrene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Anthracene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Fluoranthene	mg/kg dm	< 0.053	< 0.041	0.063	< 0.039	< 0.044	< 0.044		
Pyrene	mg/kg dm	< 0.053	< 0.041	0.060	< 0.039	< 0.044	< 0.044		
Benz(a)anthracene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Chrysene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Benzo(b)fluoranthene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		

Analysis	Unit	SD-01-1	SD-02-1	SD-03-1	SD-04-1	SD-05-1	SD-06-1	Background Value	Intervention Value
Benzo(k)fluoranthene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Benzo(a)pyrene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Dibenz(a,h)anthracene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Benzo(g,h,i)perylene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
Indeno(123cd)pyrene	mg/kg dm	< 0.053	< 0.041	< 0.049	< 0.039	< 0.044	< 0.044		
PAH 16 EPA (sum)	mg/kg dm	< 0.85	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	1.5	40
Inorganic Compounds									
Nitrate (NO3-N)	mg/kg dm	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		
Nitrate (NO3)	mg/kg dm	< 9.0	< 9.0	< 9.0	< 9.0	< 9.0	< 9.0		
Ortho-phosphate (PO4-P)	mg/kg dm	0.86	0.47	0.59	0.26	0.34	0.33		
Ortho-phosphate (PO4)	mg/kg dm	2.6	1.4	1.8	0.78	1.0	1.0		

Monsoon Season

Sediments in the Laldia port area are primarily derived from fluvial and estuarine deposition of the Karnaphuli River and its tidal channels and are generally composed of fine to medium sands with varying proportions of silt and clay influenced by tidal dynamics and sediment transport processes. To assess baseline conditions, six surface sediment samples were collected during September by DAR (DAR. 2026) using standard grab sampling techniques from the top 0–5 cm layer, ensuring minimal disturbance and avoiding contamination from overlying water. The sampling points are illustrated in Figure 5-35 whereas the results are shared in Table 5-11. Additionally, sediment samples were tested for Polychlorinated Biphenyls (PCBs) and Polycyclic Aromatic Hydrocarbons (PAHs) to establish baseline levels of persistent organic pollutants and to assess potential contamination from surrounding industrial, urban, and port-related activities.

Sediment quality results show that all analysed parameters, including heavy metals, remain within applicable regulatory limits, indicating no exceedances and generally low contamination levels. Metal concentrations vary slightly across samples, with localized elevations of arsenic, chromium, lead, and zinc (notably in S2), while cadmium and mercury are negligible in all cases. Total Petroleum Hydrocarbon (TPH) levels show moderate variation, with higher values in one sample suggesting localised petroleum inputs, likely linked to ongoing river activities, although PAHs and PCBs were not detected. Overall, the results represent baseline conditions, reflecting minor spatial variability but no significant contamination, and will serve as a reference for future monitoring.

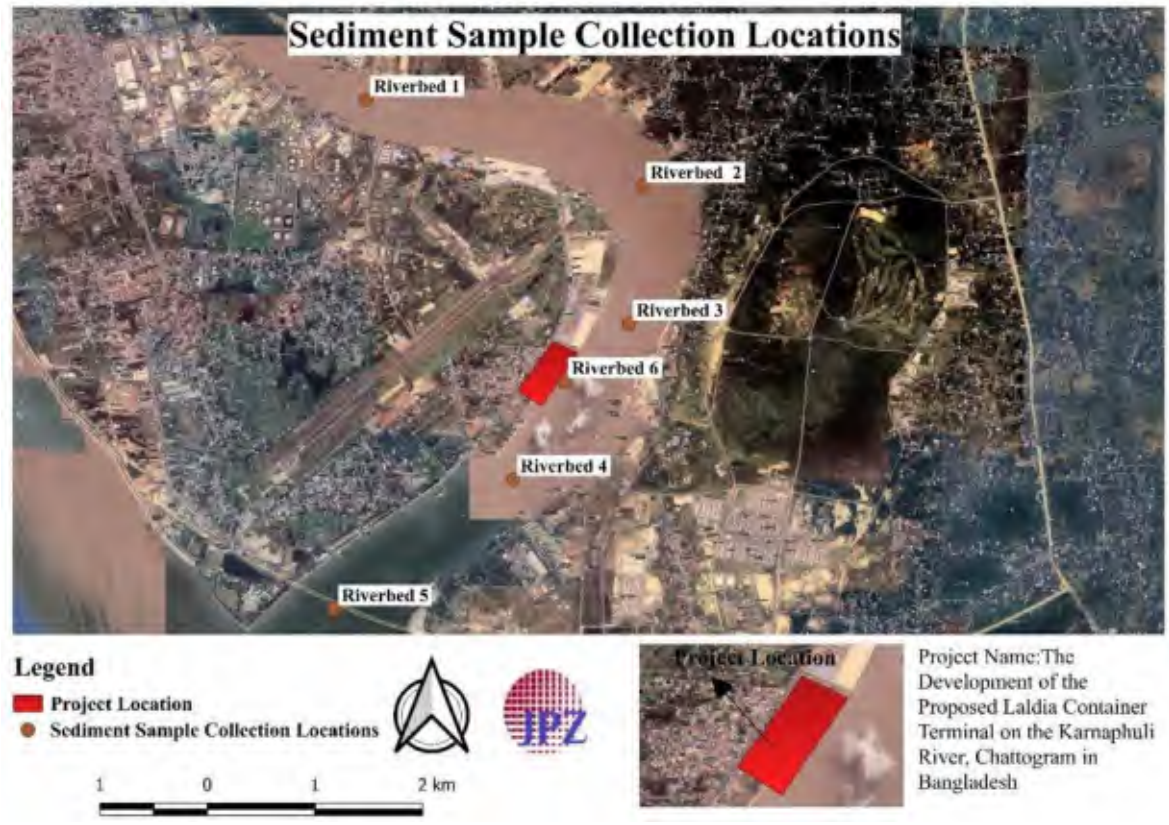


Figure 5-35:Sediment analyses for monsoon season

Table 5-11: Analysis results of sediment samples collected from project influence area (monsoon 2025)

Name of Parameters	Concentration Present						Unit	Background Value	Intervention Value
	S 1	S 2	S 3	S 4	S 5	S 6			
Arsenic (As)	3.46	4.03	2.75	3.57	3.14	3.42	mg/kg	20	76
Lead (Pb)	9.35	9.35	7.11	6.67	5.93	6.19	mg/kg	50	530
Cadmium (Cd)	<0.001	< 0.001	<0.001	< 0.001	< 0.001	<0.001	mg/kg	0.6	13
Chromium (Cr)	16.4	20.3	16.4	16.5	15.1	16.6	mg/kg	55	180
Mercury (Hg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/kg	0.15	0.36
Zinc (Zn)	38.8	44.9	39.2	39.1	36.1	39.3	mg/kg	140	720
TPH	73.5	99.8	105	160	79.8	93.7	mg/kg	190	5000

5.1.7.7 Existing Sources of Pollution

The major existing sources of pollution in the Karnaphuli River are mainly associated with rapid urbanization, industrialization, port activities and improper waste management practices. The river receives a large volume of untreated and partially treated wastes from both point and non-point sources.

Major existing pollution sources include:

- Untreated domestic sewage and municipal wastewater discharged through canals, drains, and stormwater outfalls (such as *Khal 11*, *Khal 12*, *Khal 13*, *Khal 14*, *Khal 15* etc.) from urban areas of Chattogram.
- Industrial effluents from chemical industries, fertilizer factories, shipyards, steel rerolling mills and other industries located along the riverbanks.
- Oil and grease pollution from ship operations, oil tankers, cargo vessels, dry docks, refineries, fuel depots and port-related activities.
- Solid waste dumping including plastics, polythene, household garbage, market waste and floating debris from residential and commercial areas. It should be noted that the Halishahar landfill, ~10 km away from LCTP, is overloaded and known to be a major source of pollution.
- Pollution from vessels and navigation activities including bilge discharge, fuel leakage, cargo residues, antifouling chemicals and waste dumping from significant number of registered and unregistered boats and ships operating in the river.
- Heavy metals and toxic chemicals entering the river from industrial discharge points, workshops, garages, automobile repair yards and engineering facilities.
- Microplastic pollution originating from plastic waste, fishing gear, packaging materials and urban runoff.

These pollution sources result in deterioration of water quality, increased turbidity, oil contamination, heavy metal accumulation, depletion of dissolved oxygen, and degradation of aquatic habitats in the Karnaphuli River system. Although these potential sources are identified, the surface water quality analysis results did not indicate concerning levels of contamination in the river.

5.2 Biological Environment

5.2.1 Ecological Resources

5.2.1.1 Terrestrial Ecology

To establish the terrestrial ecological baseline, field surveys were undertaken between 1 and 8 February 2026, 6 and 12 March 2026, and 18 and 25 April 2026 within the Project AoI.

Aquatic surveying is given in 5.2.2. The survey period was selected to coincide with the presence of wintering and passage migratory bird species that seasonally utilise the Karnaphuli River estuary and adjacent coastal habitats. A total of seven survey locations were initially selected based on habitat characteristics, expected ecological value, and a review of available secondary information. These locations included Shahmirpur, Badalpura, Majher

Char, Patenga Beach and adjacent areas, areas adjacent to the Naval Academy, areas adjacent to the airport, and the Project site (Blocks A, B and C).

Survey transects were established to cover the range of representative habitats present within the study area, including estuarine mudflats, mangrove vegetation, riverbanks, sandy beaches, grasslands, open woodland, wetlands, agricultural land, homestead vegetation, and developed port and industrial areas. Transects were walked during periods of peak bird activity, and all birds seen or heard were recorded together with observations of habitat use and behaviour. Opportunistic observations of other fauna, including reptiles, amphibians, mammals, and signs of wildlife presence, were also documented. Habitat characteristics, vegetation communities, and notable ecological features were recorded along each transect to support interpretation of species distribution patterns.

The location of the ecological survey transects is shown in Figure 5-36.



Figure 5-36: Ecological survey transects

5.2.1.2 Flora

During the ecological surveys undertaken between February and April 2026, the project site hosts limited terrestrial vegetation. At Block A, the site is fully paved, with a vegetation buffer between Block A and the Karnaphuli River (see Figure 5-37). Block B is also fully paved but includes a buffer of mangroves that grows within the revetment (see Figure 5-38). The drainage channel between Block B and Block C hosts some tidal species, including several grasses and some mangrove trees (see Figure 5-39). Block C had vegetation before, but this was recently removed and therefore it currently hosts sparse vegetation (Figure 5-40). Along the road at Block C, there is a treeline with mature trees.

The study area supports a wide variety of terrestrial, wetland, and aquatic plant species reflecting a mixed ecological setting influenced by riverine, estuarine, and homestead environments (see Figure 5-41 and Figure 5-42). In total, approximately 185 plant species belonging to 57 families or taxonomic groups were recorded during the baseline surveys. The vegetation comprises trees, shrubs, herbs, grasses, climbers, aquatic plants and mangrove species. Species richness was highest within the Fabaceae family (15 species), followed by Poaceae (11 species), Mimosaceae (10 species), Cyperaceae (9 species), and Myrtaceae (9 species). Further species identification is given below.



Figure 5-37: Vegetation between Block A and the Karnaphuli River (source: CARINAM, April 2026)



Figure 5-38: Mangroves (Avicennia alba) adjacent to Block B (source: ESIA team, April 2026)



Figure 5-39: Vegetation in the drainage channel between Block B and C (source: ESIA team, April 2026)



Figure 5-40: Left: cleared vegetation at Block C. Right: treeline at the roadside just outside Block C (source: ESIA team, February 2026)



Figure 5-41: Vegetation at the Majher Char area (source: CARINAM, March 2026)



Figure 5-42: Vegetation in the KEPZ and adjoining areas of Badalpura (source: CARINAM, February 2026)

Arboreal vegetation is dominated by a mixture of native and planted species commonly associated with homesteads, institutional lands and roadside plantations. Representative tree species that can be found within the project AoI include *Mangifera indica* (Aam), *Artocarpus heterophyllus* (Kathal), *Syzygium cumini* (Jam), *Syzygium nervosum* (Buno jam), *Psidium guajava* (Peyara), *Litchi chinensis* (Lichu), *Musa paradisiaca* (Kola), *Areca catechu* (Supari), *Cocos nucifera* (Narikel), *Ficus benghalensis* (Bot), *Ficus religiosa* (Ashwath/Pipal), *Terminalia arjuna* (Arjun), *Terminalia catappa* (Kathbadam), *Swietenia mahagoni* (Mehogoni), *Eucalyptus citriodora*, *Dalbergia sissoo* (Shishu), *Pongamia pinnata* (Koroch), *Acacia auriculiformis* (Akashmoni), and *Casuarina equisetifolia* (Jhau). These species are commonly found in homestead areas, roadside plantations, and institutional lands, providing timber, fruit, fuelwood, shade, and ecological stability.

Shrub and herbaceous vegetation are highly diverse and include species such as *Acalypha indica*, *Euphorbia hirta*, *Centella asiatica* (Thankuni), *Alternanthera sessilis* (Helencha shak), *Amaranthus spp*. (Shak varieties), *Commelina benghalensis*, *Oxalis corniculata*, and *Enhydra fluctuans*. These species are widely distributed in homesteads, agricultural lands, and disturbed areas and serve as important sources of vegetables, medicinal plants, and ground cover.

Grassland and wetland vegetation communities occur principally in low-lying areas, drainage channels, riverbanks and tidal habitats. Dominant species include *Cynodon dactylon* (Durba ghas), *Phragmites australis* and *Phragmites karka* (Nol/Nolkhaagra), *Oryza sativa* (Dhan),

Echinochloa polystachya, *Saccharum officinarum* (Akh), *Cyperus spp*., *Eleocharis atropurpurea*, and *Porteresia coarctata* (Buno dhan). These species play an important role in soil stabilization, grazing, and wetland ecosystem functioning. Creeper and climber species such as *Cuscuta reflexa* (Swarnalata), *Ipomoea pes-caprae*, *Ipomoea purpurea*, *Merremia hederacea*, *Passiflora foetida*, and *Mikania micrantha* are common in the area, particularly in disturbed habitats and along edges of vegetation zones. Mangrove species or mangrove-related species were locally recorded along the riverbanks and within the drainage channel between Blocks B and C and along the riverside at Block B, including *Avicennia spp*., *Sonneratia apetala*, *Carallia brachiata* and *Ceriops roxburghiana*.

Overall, the flora of the Project AoI represents a diverse but largely human-influenced vegetation assemblage comprising homestead, agricultural, wetland, riverine and estuarine plant communities. Most recorded species are common and widespread in Bangladesh and are classified as Least Concern under national and global conservation assessments.

A complete overview of identified flora species and their corresponding conservation status (national and global) is presented in Table 5-12.

Table 5-12: Flora Species List found within the AoI with Local Names, Habit and IUCN Status.

Note: LC = Least Concern; NE = Not Evaluated. National status (BGD) follows the Bangladesh Red List and global status follows the IUCN Red List.

Family	Scientific Name	Habit	IUCN Status	
			BGD	Global
Acanthaceae	*Acanthus ilicifolius*	Herb	LC	LC
Acanthaceae	*Avicennia alba*	Herb	LC	LC
Amaranthaceae	*Alternanthera sessilis*	Herb	LC	LC
Amaranthaceae	*Alternanthera paronychioides*	Herb	LC	LC
Amaranthaceae	*Amaranthus tricolour*	Herb	LC	LC
Amaranthaceae	*Amaranthus blitum*	Herb	LC	LC
Amaranthaceae	*Amaranthus tenuifolius*	Herb	LC	LC
Amaranthaceae	*Cyathula prostrata*	Herb	LC	LC
Anacardiaceae	*Anacardium occidentale*	Tree	LC	LC
Anacardiaceae	*Lannea coromandelica*	Tree	LC	LC
Anacardiaceae	*Mangifera indica*	Tree	LC	LC
Anacardiaceae	*Mangifera sylvatica*	Tree	LC	LC
Annonaceae	*Monoon longifolium*	Tree	LC	LC
Annonaceae	*Annona reticulata*	Tree	LC	LC

Family	Scientific Name	Habit	IUCN Status	
			BGD	Global
Annonaceae	*Polyalthia longifolia*	Tree	LC	LC
Apiaceae	*Centella asiatica*	Herb	LC	LC
Apocynaceae	*Alstonia macrophylla*	Tree	NE	LC
Apocynaceae	*Alstonia scholaris*	Tree	LC	LC
Apocynaceae	*Holarrhena antidysenterica*	Shrub	LC	LC
Apocynaceae	*Holarrhena floribunda*	Shrub	LC	LC
Apocynaceae	*Oxystelma esculentum*	Herb	LC	LC
Araceae	*Alocasia esclenta*	Tuberous, Herb	LC	LC
Araceae	*Amorphophallus bulbifer*	Tuberous, Herb	LC	LC
Arecaceae	*Areca catechu*	Palm	LC	LC
Arecaceae	*Cocos nucifera*	Palm	LC	LC
Asteraceae	*Cyanthillium cinereum*	Herb	LC	LC
Asteraceae	*Enhydra fluctuans*	Semi-aquatic herb	LC	LC
Asteraceae	*Mikania micrantha*	Climber vine	LC	LC
Asteraceae	*Synedrella nodiflora*	Herb	LC	LC
Asteraceae	*Wedelia biflora*	Creeper	LC	LC
Bignoniaceae	*Jacaranda mimosifolia*	Tree	LC	LC
Bignoniaceae	*Oroxylum indicum*	Tree	LC	LC
Bignoniaceae	*Spathodea campanulata*	Tree	NE	LC
Bignoniaceae	*Sterospermum colais*	Tree	NE	LC
Bombaceae	*Bombax ceiba*	Tree	LC	LC
Bombaceae	*Ceiba pentandra*	Tree	LC	LC
Caesalpiniaceae	*Bauhinia variegata*	Tree	LC	LC
Caesalpiniaceae	*Cassia fistula*	Tree	LC	LC
Caesalpiniaceae	*Delonix regia*	Tree	LC	LC
Casuarinaceae	*Casuarina equisetifolia*	Tree	LC	LC
Clusiaceae	*Garcinia cowa*	Tree	LC	LC
Clusiaceae	*Mesua ferrea*	Tree	LC	LC

Family	Scientific Name	Habit	IUCN Status	
			BGD	Global
Combretaceae	*Terminalia arjuna*	Tree	LC	LC
Combretaceae	*Terminalia bellirica*	Tree	LC	LC
Combretaceae	*Terminalia chebula*	Tree	LC	LC
Commelinaceae	*Commelina benghalensis*	Herb	LC	LC
Commelinaceae	*Commelina difusa*	Herb	LC	LC
Convolvulaceae	*Cuscuta reflexa*	Vine	LC	LC
Convolvulaceae	*Ipomoea pes-caprae*	Creeper vine	LC	LC
Convolvulaceae	*Ipomoea purpurea*	Vine	LC	LC
Convolvulaceae	*Merremia hederacea*	Vine	LC	LC
Cucurbitaceae	*Cucumis sativus*	Creeper vine	LC	LC
Cyperaceae	*Actinoscirpus grossus*	Weed, grass	LC	LC
Cyperaceae	*Cyperus aromaticus*	Sedge	LC	LC
Cyperaceae	*Cyperus dofformis*	Herb	LC	LC
Cyperaceae	*Cyperus esculentus*	Sedge	LC	LC
Cyperaceae	*Cyperus ligularis*	Sedge	LC	LC
Cyperaceae	*Cyperus polystachyos*	Sedge	LC	LC
Cyperaceae	*Cyperus rotundus*	Sedge	LC	LC
Cyperaceae	*Cyperus surinamensis*	Sedge	LC	LC
Cyperaceae	*Eleocharis atropurpurea*	Sedge, aquatic	LC	LC
Dilleniaceae	*Dillenia indica*	Tree	LC	LC
Dilleniaceae	*Tetracera sarmentosa*	Tree	LC	LC
Dipterocarpaceae	*Dipterocarpus turbinatus*	Tree	LC	LC
Dipterocarpaceae	*Hopea odorata*	Tree	LC	LC
Ebenaceae	*Diospyros discolor*	Tree	LC	LC
Ebenaceae	*Diospyros malabarica*	Tree	LC	LC
Elaeocarpaceae	*Elaeocarpus floribundus*	Tree	LC	LC
Euphorbiaceae	*Acalypha indica*	Herb	LC	LC
Euphorbiaceae	*Aporosa wallichii*	Tree	LC	LC

Family	Scientific Name	Habit	IUCN Status	
			BGD	Global
Euphorbiaceae	*Bridelia tomentosa*	Tree	LC	LC
Euphorbiaceae	*Euphorbia hirta*	Herb, weed	LC	LC
Euphorbiaceae	*Macaranga peltata*	Tree	LC	LC
Euphorbiaceae	*Macaranga denticulata*	Tree	LC	LC
Euphorbiaceae	*Phyllanthus emblica*	Tree	LC	LC
Euphorbiaceae	*Suregada multiflora*	Tree	NE	LC
Fabaceae	*Acacia auriculiformis*	Tree	LC	LC
Fabaceae	*Albizia chinensis*	Tree	LC	LC
Fabaceae	*Albizzia procera*	Tree	LC	LC
Fabaceae	*Bauhinia acuminata*	Tree	LC	LC
Fabaceae	*Butea monosperma*	Tree	LC	LC
Fabaceae	*Dalbergia sissoo*	Tree	LC	LC
Fabaceae	*Dolichos lablab*	Climber	LC	LC
Fabaceae	*Erythrina fusca*	Tree	LC	LC
Fabaceae	*Leucaena latisiliqua*	Tree	LC	LC
Fabaceae	*Mimosa pudica*	Sedge, weed	LC	LC
Fabaceae	*Pongamia pinnata*	Tree	LC	LC
Fabaceae	*Pterocarpus indicus*	Tree	LC	LC
Fabaceae	*Sesbania bispinosa*	Sedge	LC	LC
Fabaceae	*Sesbania grandiflora*	Tree	LC	LC
Fabaceae	*Tamarindus indicus*	Tree	LC	LC
Lamiaceae	*Tectona grandis*	Tree	LC	LC
Lauraceae	*Cinnamomum iners*	Tree	LC	LC
Lauraceae	*Cinnamomum tamala*	Tree	LC	LC
Lauraceae	*Litsea glutinosa*	Tree	LC	LC
Lauraceae	*Persea americana*	Tree	LC	LC
Lecythidaceae	*Barringtonia acutangula*	Tree	LC	LC
Lythraceae	*Lagerstroemia speciosa*	Timber+Flower	LC	LC

Family	Scientific Name	Habit	IUCN Status	
			BGD	Global
Magnoliaceae	*Michelia champaca*	Tree	LC	LC
Malvaceae	*Hibiscus tiliaceous*	Tree	LC	LC
Meliaceae	*Aphanamixis polystachya*	Tree	LC	LC
Meliaceae	*Azadirachta indica*	Tree	LC	LC
Meliaceae	*Chukrasia tabularis*	Tree	LC	LC
Meliaceae	*Melia azedarach*	Tree	LC	LC
Meliaceae	*Swietenia mahagoni*	Tree	LC	LC
Meliaceae	*Swietenia macrophylla*	Tree	LC	LC
Meliaceae	*Toona ciliate*	Tree	LC	LC
Mimosaceae	*Acacia catechu*	Tree	LC	LC
Mimosaceae	*Acacia longifolia*	Tree	LC	LC
Mimosaceae	*Acacia mangium*	Tree	LC	LC
Mimosaceae	*Albizia lucidor*	Tree	LC	LC
Mimosaceae	*Albizia odoratissimus*	Tree	LC	LC
Mimosaceae	*Albizia procera*	Tree	LC	LC
Mimosaceae	*Leucaena leucocephala*	Tree	LC	LC
Mimosaceae	*Paraserianthes falcataria*	Tree	LC	LC
Mimosaceae	*Samanea saman*	Tree	LC	LC
Mimosaceae	*Xylia xylocarpa*	Tree	LC	LC
Moraceae	*Artocarpus heterophyllus*	Tree	LC	LC
Moraceae	*Ficus benghalensis*	Tree	LC	LC
Moraceae	*Ficus religiosa*	Tree	LC	LC
Moraceae	*Ficus hispida*	Tree	LC	LC
Moraceae	*Ficus lamponga*	Tree	LC	LC
Moraceae	*Ficus rumphii*	Tree	LC	LC
Moraceae	*Ficus varigata*	Tree	LC	LC
Moraceae	*Streblus asper*	Tree	LC	LC
Moringaceae	*Moringa oleifera*	Tree	LC	LC

Family	Scientific Name	Habit	IUCN Status	
			BGD	Global
Musaceae	*Musa paradisiaca*	Cultivar	LC	LC
Myrsinaceae	*Maesa ramentacea*	Tree	LC	LC
Myrtaceae	*Callistemon citrinus*	Tree	LC	LC
Myrtaceae	*Eucalyptus citriodora*	Tree	LC	LC
Myrtaceae	*Psidium guajava*	Tree	LC	LC
Myrtaceae	*Syzygium cumini*	Tree	LC	LC
Myrtaceae	*Syzygium fruiticosum*	Tree	LC	LC
Myrtaceae	*Syzygium grande*	Tree	LC	LC
Myrtaceae	*Syzygium nervosum*	Tree	LC	LC
Myrtaceae	*Syzygium operculatum*	Tree	LC	LC
Myrtaceae	*Syzygium syzyzoides*	Tree	DD	LC
Myrtales	*Terminalia arjuna*	Tree	LC	LC
Myrtales	*Terminalia catappa*	Tree	LC	LC
Oryzeae	*Porteresia coarctata*	Grass	LC	LC
Oxalidaceae	*Averrhoa carambola*	Tree	LC	LC
Passifloraceae	*Passiflora foetida*	Creeper	LC	LC
Poaceae	*Axonopus compressus*	Grass	LC	LC
Poaceae	*Brachiaria reptans*	Grass	LC	LC
Poaceae	*Chrysopogon zizanioides*	Grass	LC	LC
Poaceae	*Cynodon dactylon*	Grass	LC	LC
Poaceae	*Echinochloa polystachya*	Grass	LC	LC
Poaceae	*Oryza sativa*	Grass	LC	LC
Poaceae	*Phragmites australis*	Grass	LC	LC
Poaceae	*Phragmites karka*	Grass	LC	LC
Poaceae	*Saccharum officinarum*	Grass	LC	LC
Poaceae	*Secale sylvestre*	Grass	LC	LC
Poaceae	*Sorghum halepense*	Grass	LC	LC
Pteridaceae	*Pteris vittata*	Fern	LC	LC

Family	Scientific Name	Habit	IUCN Status	
			BGD	Global
Rhizophoraceae	*Carallia brachiata*	Mangrove Tree	LC	LC
Rhizophoraceae	*Ceriops roxburghiana*	Mangrove tree	LC	LC
Rubiaceae	*Aidia cochinchinensis*	Tree	LC	LC
Rutaceae	*Aegle mermelos*	Tree	LC	LC
Rutaceae	*Citrus aurantifolia*	Tree	LC	LC
Rutaceae	*Citrus hystrix*	Tree	LC	LC
Sapindaceae	*Lepisanthes rubiginosa*	Tree	LC	LC
Sapindaceae	*Lepisanthes senegalensis*	Tree	LC	LC
Sapindaceae	*Litchi chinensis*	Tree	LC	LC
Sapindaceae	*Nephelium ramboutan-ake*	Tree	LC	LC
Sapindaceae	*Schleichera oleosa*	Tree	NE	LC
Sapotaceae	*Madhuca longifolia*	Tree	NE	NE
Sapotaceae	*Mimusops elengi*	Tree	LC	LC
Solanaceae	*Lycopersicon lycopersicum*	Shrub	LC	LC
Solanaceae	*Physalis angulata*	Herb	LC	LC
Solanaceae	*Solanum melongena*	Shrub	LC	LC
Sterculiaceae	*Pterospermum semisagittatum*	Tree	LC	LC
Sterculiaceae	*Sterculia villosa*	Tree	LC	LC
Strelitziaceae	*Ravenala madagascariensis*	Tree	LC	LC
Theaceae	*Eurya acuminata*	Tree	LC	LC
Thymeleaceae	*Aquilaria agallocha*	Tree	LC	LC
Ulmaceae	*Trema orientalis*	Tree	LC	LC
Verbenaceae	*Avicennia officinalis*	Tree	LC	LC
Verbenaceae	*Gmelina arborea*	Tree	LC	LC
Verbenaceae	*Lippia alba*	Shrub	LC	LC
Verbenaceae	*Tectona grandis*	Tree	LC	LC
Verbenaceae	*Vitex peduncularis*	Climber	LC	LC

5.2.1.3 Fauna

The terrestrial fauna within and around the Laldia Container Terminal project area is relatively limited due to extensive habitat alteration, industrial activities, urbanization, and human disturbance along the Karnaphuli River corridor. However, adjacent habitats such as mangrove patches, grasslands, homestead vegetation, agricultural land, riverbanks, and mixed vegetation continue to support a variety of common terrestrial wildlife species.

In total, the field surveys conducted between February and April 2026 (Section 5.2.1.1) found 11 terrestrial vertebrate species, comprising one amphibian, five reptile species and five mammal species. Reptiles represented the most species-rich group, including lizards, skinks, geckos and monitor lizards, while mammals were primarily represented by common and adaptable species associated with human-modified landscapes. The relatively low species richness reflects the highly disturbed nature of the project area, although the presence of several reptile and mammal species demonstrates that remnant vegetation patches, riverbanks, and semi-natural habitats continue to provide ecological value, including habitat connectivity and movement corridors, within the surrounding landscape (Figure 5-43).

Recorded amphibian and reptile species included Skipper Frog, Garden Lizard, Asian Water Monitor, Bengal Monitor, Tokay Gecko, and Spotted Supple Skink, while mammalian fauna included Small Indian Mongoose, Golden Jackal, Flying Fox, Large Bandicoot Rat, and House Shrew. Among these, the Bengal Monitor Lizard is categorized as Near Threatened (NT) due to continuing declines in its population. Hatchlings of Asian Water Monitor and colonies of Flying Foxes observed in homestead trees further indicate the ecological importance of remaining vegetated areas. Overall, terrestrial fauna diversity within the direct project footprint remains relatively low, with most wildlife associated with less disturbed peripheral habitats rather than the highly modified industrial core area.



Golden Jackal



Golden Jackal



Skipper frog



Garden Lizard





Small Indian Mongoose



Flying Fox colony



Flying Fox



Spotted Supple Skink

Figure 5-43: Faunal species observed in the project area (CARINAM, March 2026)

5.2.1.4 Avifauna

The baseline avifaunal assessment recorded 167 bird species within the project influence area and surrounding habitats (between February-April 2026), indicating a diverse avifaunal assemblage associated with the Karnaphuli River corridor and adjacent wetland, agricultural, and mixed-vegetation habitats. Of the recorded species, 104 are resident and 63 are migratory, highlighting the importance of the wider study area for both year-round and seasonal bird communities. The resident bird community includes commonly recorded waterbirds and wetland-associated species such as Little Cormorant, Oriental Darter, Little Egret, Grey Heron, White-breasted Waterhen, Bronze-winged Jacana, Red-wattled Lapwing, Indian Pond Heron, Common Kingfisher, and Baya Weaver.

The remaining 63 species are migratory, including several waders and winter visitors such as Common Sandpiper, Common Greenshank, Common Redshank, Kentish Plover, Lesser Sand Plover, Greater Sand Plover, Little Stint, Temminck's Stint, Whimbrel, Eurasian Curlew, Sanderling, and Great Knot. Most of the recorded species are categorized as Least Concern (LC) under the Bangladesh national conservation status, indicating the dominance of common and widely distributed birds. However, the occurrence of conservation-priority species, including Great Knot (*Calidris tenuirostris*), listed as Endangered (EN); Black-headed Ibis (*Threskiornis melanocephalus*), listed as Vulnerable (VU) nationally; and Oriental Darter (*Anhinga melanogaster*), listed as Near Threatened (NT), highlights the ecological significance of the wider study area. The full list of recorded bird species, including their conservation status and residency status, is presented in Table 5-13.

Table 5-13: Bird species recorded in the project AoI during the observational surveys in February, March, and April 2026.

Note: LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered. National status (BGD) follows the Bangladesh Red List and global status follows the IUCN Red List.

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
1	Ashy Drongo	*Dicrurus leucophaeus*	LC	LC	M
2	Ashy Woodswallow	*Artamus fuscus*	LC	LC	R
3	Asian Green Bee-eater	*Merops orientalis*	LC	LC	R
4	Asian Koel	*Eudynamys scolopaceus*	LC	LC	R
5	Asian Openbill Stork	*Anastomus oscitans*	LC	LC	R
6	Asian Palm Swift	*Cypsiurus balasiensis*	LC	LC	R
7	Asian Pied Starling	*Gracupica contra*	LC	LC	R
8	Asian Plain Martin	*Riparia chinensis*	LC	LC	R

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
9	Bank Myna	*Acridotheres ginginianus*	LC	LC	R
10	Barn Swallow	*Hirundo rustica*	LC	LC	R
11	Baya Weaver	*Ploceus philippinus*	LC	LC	R
12	Bengal Bushlark	*Plocealauda assamica*	LC	LC	R
13	Black Drongo	*Dicrurus macrocercus*	LC	LC	R
14	Black Kite	*Milvus migrans*	LC	LC	R
15	Black Redstart	*Phoenicurus ochruros*	LC	LC	M
16	Black-capped Kingfisher	*Halcyon pileata*	LC	VU	R
17	Black-crowned Night Heron	*Nycticorax nycticorax*	LC	LC	R
18	Black-headed Cuckooshrike	*Lalage melanoptera*	LC	LC	R
19	Black-headed Ibis	*Threskiornis melanocephalus*	VU	NT	M
20	Black-hooded Oriole	*Oriolus xanthornus*	LC	LC	R
21	Black-naped Oriole	*Oriolus chinensis*	LC	LC	R
22	Black-rumped Flameback	*Dinopium benghalense*	LC	LC	R
23	Blue Rock Thrush	*Monticola solitarius*	LC	LC	M
24	Blue-bearded Bee-eater	*Nyctyornis athertoni*	LC	LC	M
25	Blue-tailed Bee-eater	*Merops philippinus*	LC	LC	R
26	Bluethroat	*Luscinia svecica*	LC	LC	M
27	Blyth's Reed Warbler	*Acrocephalus dumetorum*	LC	LC	M
28	Booted Eagle	*Hieraaetus pennatus*	LC	LC	M
29	Brahminy Kite	*Haliastur indus*	LC	LC	R
30	Bronzed Drongo	*Dicrurus aeneus*	LC	LC	R
31	Bronze-winged Jacana	*Metopidius indicus*	LC	LC	R
32	Brown Shrike	*Lanius cristatus*	LC	LC	M
33	Brown-headed Gull	*Chroicocephalus brunnicephalus*	LC	LC	R

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
34	Cattle Egret	*Bubulcus ibis*	LC	LC	R
35	Changeable Hawk Eagle	*Nisaetus cirrhatus*	LC	LC	M
36	Chestnut Munia	*Lonchura atricapilla*	LC	LC	R
37	Chestnut-headed Bee-eater	*Merops leschenaulti*	LC	LC	M
38	Chestnut-tailed Starling	*Sturnia malabarica*	LC	LC	R
39	Cinereous Tit	*Parus cinereus*	LC	LC	M
40	Cinnamon Bittern	*Ixobrychus cinnamomeus*	LC	LC	R
41	Citrine Wagtail	*Motacilla citreola*	LC	LC	M
42	Clamorous Reed Warbler	*Acrocephalus stentoreus*	LC	LC	R
43	Collared Kingfisher	*Todiramphus chloris*	LC	LC	R
44	Common Chiffchaff	*Phylloscopus collybita*	LC	LC	M
45	Common Greenshank	*Tringa nebularia*	LC	LC	M
46	Common Iora	*Aegithina tiphia*	LC	LC	R
47	Common Kingfisher	*Alcedo atthis*	LC	LC	R
48	Common Moorhen	*Gallinula chloropus*	LC	LC	R
49	Common Myna	*Acridotheres tristis*	LC	LC	R
50	Common Redshank	*Tringa totanus*	LC	LC	M
51	Common Rosefinch	*Carpodacus erythrinus*	LC	LC	M
52	Common Sandpiper	*Actitis hypoleucos*	LC	LC	M
53	Common Snipe	*Gallinago gallinago*	LC	LC	M
54	Common Tailorbird	*Orthotomus sutorius*	LC	LC	R
55	Coppersmith Barbet	*Psilopogon haemacephalus*	LC	LC	R
56	Crested Serpent Eagle	*Spilornis cheela*	LC	LC	R
57	Dusky Warbler	*Phylloscopus fuscatus*	LC	LC	M
58	Eastern Yellow Wagtail	*Motacilla tschutschensis*	LC	LC	M
59	Eurasian Collared Dove	*Streptopelia decaocto*	LC	LC	R

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
60	Eurasian Curlew	*Numenius arquata*	NT	NT	M
61	Eurasian Hoopoe	*Upupa epops*	LC	LC	R
62	Eurasian Kestrel	*Falco tinnunculus*	LC	LC	M
63	Eurasian Wryneck	*Jynx torquilla*	LC	LC	M
64	Fulvous-breasted Woodpecker	*Dendrocopos macei*	LC	LC	R
65	Glossy Ibis	*Plegadis falcinellus*	LC	LC	M
66	Golden-fronted Leafbird	*Chloropsis aurifrons*	LC	LC	R
67	Gray-headed Canary Flycatcher	*Culicicapa ceylonensis*	LC	LC	M
68	Great Egret	*Ardea alba*	LC	LC	R
69	Great Knot	*Calidris tenuirostris*	EN	EN	M
70	Greater Coucal	*Centropus sinensis*	LC	LC	R
71	Greater Sand Plover	*Charadrius leschenaultii*	LC	LC	M
72	Green Sandpiper	*Tringa ochropus*	LC	LC	M
73	Green-billed Malkoha	*Phaenicophaeus tristis*	LC	LC	R
74	Greenish Warbler	*Phylloscopus trochiloides*	LC	LC	M
75	Grey Heron	*Ardea cinerea*	LC	LC	R
76	Grey Wagtail	*Motacilla cinerea*	LC	LC	M
77	Grey-breasted Prinia	*Prinia hodgsonii*	LC	LC	R
78	Grey-capped Emerald Dove	*Chalcophaps indica*	LC	LC	R
79	Grey-headed Fish Eagle	*Ichthyophaga ichthyaetus*	LC	LC	R
80	Grey-headed Lapwing	*Vanellus cinereus*	LC	LC	M
81	Hair-crested Drongo	*Dicrurus hottentottus*	LC	LC	R
82	House Crow	*Corvus splendens*	LC	LC	R
83	House Sparrow	*Passer domesticus*	LC	LC	R
84	House Swift	*Apus nipalensis*	LC	LC	R
85	Indian Cuckoo	*Cuculus micropterus*	LC	LC	M

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
86	Indian Pond Heron	*Ardeola grayii*	LC	LC	R
87	Indochinese Roller	*Coracias affinis*	DD	LC	R
88	Intermediate Egret	*Ardea intermedia*	LC	LC	R
89	Jungle Babbler	*Turdoides striata*	LC	LC	R
90	Jungle Myna	*Acridotheres fuscus*	LC	LC	R
91	Kentish Plover	*Charadrius alexandrinus*	LC	LC	M
92	Large-billed Crow	*Corvus macrorhynchos*	LC	LC	R
93	Lesser Coucal	*Centropus bengalensis*	LC	LC	R
94	Lesser Sandplover	*Charadrius mongolus*	LC	LC	M
95	Lesser Whistling Duck	*Dendrocygna javanica*	LC	LC	R
96	Lineated Barbet	*Psilopogon lineatus*	LC	LC	R
97	Little Cormorant	*Microcarbo niger*	LC	LC	R
98	Little Egret	*Egretta garzetta*	LC	LC	R
99	Little Grebe	*Tachybaptus ruficollis*	LC	LC	R
100	Little Ringed Plover	*Charadrius dubius*	LC	LC	M
101	Little Spiderhunter	*Arachnothera longirostra*	LC	LC	R
102	Little Stint	*Calidris minuta*	LC	LC	M
103	Long-tailed Shrike	*Lanius schach*	LC	LC	R
104	Marsh Sandpiper	*Tringa stagnatilis*	LC	LC	M
105	Olive-backed Pipit	*Anthus hodgsoni*	LC	LC	M
106	Orange-headed Thrush	*Zoothera citrina*	LC	LC	R
107	Oriental Cuckooshrike	*Coracina melaschistos*	LC	LC	R
108	Oriental Darter	*Anhinga melanogaster*	NT	NT	R
109	Oriental Honey Buzzard	*Pernis ptilorhynchus*	LC	LC	M
110	Oriental Magpie Robin	*Copsychus saularis*	LC	LC	R
111	Oriental Turtle Dove	*Streptopelia orientalis*	LC	LC	R

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
112	Osprey	*Pandion haliaetus*	LC	LC	M
113	Pacific Golden Plover	*Pluvialis fulva*	LC	LC	M
114	Paddyfield Pipit	*Anthus rufulus*	LC	LC	R
115	Pale-billed Flowerpecker	*Dicaeum erythrorhynchos*	LC	LC	M
116	Peregrine Falcon	*Falco peregrinus*	LC	LC	M
117	Pied Bushchat	*Saxicola caprata*	LC	LC	M
118	Pied Kingfisher	*Ceryle rudis*	LC	LC	R
119	Pin-Tailed Snipe	*Gallinago stenura*	LC	LC	M
120	Plain Prinia	*Prinia inornata*	LC	LC	R
121	Plaintive Cuckoo	*Cacomantis merulinus*	LC	LC	M
122	Purple Sunbird	*Cinnyris asiaticus*	LC	LC	R
123	Purple-rumped Sunbird	*Leptocoma zeylonica*	LC	LC	R
124	Red Junglefowl	*Gallus gallus*	LC	LC	R
125	Red-collared Dove	*Streptopelia tranquebarica*	LC	LC	R
126	Red-necked Falcon	*Falco chicquera*	LC	NT	M
127	Red-rumped Swallow	*Cecropis daurica*	LC	LC	M
128	Red-vented Bulbul	*Pycnonotus cafer*	LC	LC	R
129	Red-wattled Lapwing	*Vanellus indicus*	LC	LC	R
130	Red-whiskered Bulbul	*Pycnonotus jocosus*	LC	LC	R
131	Richard's Pipit	*Anthus richardi*	LC	LC	M
132	Rock Pigeon	*Columba livia*	LC	LC	R
133	Rose-ringed Parakeet	*Psittacula krameri*	LC	LC	R
134	Ruddy Shelduck	*Tadorna ferruginea*	LC	LC	M
135	Rufous Treepie	*Dendrocitta vagabunda*	LC	LC	R
136	Rufous-necked Laughingthrush	*Garrulax ruficollis*	LC	LC	R
137	Sanderling	*Calidris alba*	LC	LC	M

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
138	Scaly-breasted Munia	*Lonchura punctulata*	LC	LC	R
139	Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	LC	LC	R
140	Shikra	*Accipiter badius*	LC	LC	M
141	Siberian Rubythroat	*Calliope calliope*	LC	LC	M
142	Siberian Stonechat	*Saxicola maurus*	LC	LC	M
143	Slaty-breasted Rail	*Lewinia striata*	LC	LC	R
144	Spotted Dove	*Spilopelia chinensis*	LC	LC	R
145	Spotted Owlet	*Athene brama*	LC	LC	R
146	Stork-billed Kingfisher	*Pelargopsis capensis*	LC	LC	R
147	Streaked-throated Woodpecker	*Picus xanthopygaeus*	LC	LC	R
148	Striated Babbler	*Argya earlei*	LC	LC	R
149	Striated Grassbird	*Megalurus palustris*	LC	LC	R
150	Striated Heron	*Butorides striata*	LC	LC	R
151	Taiga Flycatcher	*Ficedula albicilla*	LC	LC	M
152	Tarek Sandpiper	*Xenus cinereus*	LC	LC	M
153	Temminck's Stint	*Calidris temminckii*	LC	LC	M
154	Tickell's Leaf Warbler	*Phylloscopus affinis*	LC	LC	M
155	Whimbrel	*Numenius phaeopus*	LC	LC	M
156	Whiskered Tern	*Chlidonias hybrida*	LC	LC	R
157	White Wagtail	*Motacilla alba*	LC	LC	M
158	White-breasted Waterhen	*Amaurornis phoenicurus*	LC	LC	R
159	White-rumped Munia	*Lonchura striata*	LC	LC	R
160	White-throated Fantail	*Rhipidura albicollis*	LC	LC	R
161	White-throated Kingfisher	*Halcyon smyrnensis*	LC	LC	R
162	Wood Sandpiper	*Tringa glareola*	LC	LC	R
163	Yellow Bittern	*Botaurus sinensis*	LC	LC	R

Sl. No	Common Name	Scientific Name	IUCN Status		Resident (R) Migratory (M)
			BGD	Global	
164	Yellow-browed Warbler	*Phylloscopus inornatus*	LC	LC	M
165	Yellow-footed Green Pigeon	*Treron phoenicopterus*	LC	LC	R
166	Yellow-vented Flowerpecker	*Pachyglossa chrysorrhea*	LC	LC	M
167	Zitting Cisticola	*Cisticola juncidis*	LC	LC	R

Bird distribution is strongly influenced by habitat conditions and seasonal variation. Riverbanks, mudflats, wetland edges, grasslands, agricultural land, and mixed vegetation support higher species richness by providing feeding and resting opportunities. Consequently, the wider Project AoI supports a relatively diverse avifaunal community, including resident and migratory species associated with a range of wetland, riverine, and terrestrial habitats.

Avifaunal diversity within the project site was lower than in other parts of the Project AoI, as reflected by the lower species richness and bird density recorded during the baseline surveys. Project Blocks A, B, and C exhibited the lowest species richness (61 species) and species density (0.80 species/ha), during the surveys, likely due to dry conditions, limited vegetation, and greater human disturbance. Seasonal changes are particularly evident in Block C. Earlier observations in September 2025 recorded a higher number of bird species when the area contained seasonal vegetation, grasses, and rainwater-filled depressions (DAR, 2025). The limited occurrence of wetland- and vegetation-dependent species during the baseline surveys suggests that recent changes to the site have resulted in habitats that are less suitable for birds. Representative bird species recorded during the baseline surveys are presented in Figure 5-44.

The Block ‘C’ foreshore tidal mudflats support only a limited bird assemblage, mainly consisting of common resident and disturbance-tolerant species. Waders are represented by Little Ringed Plover, while Common Sandpiper and Whimbrel were the only migratory species recorded during the baseline surveys at Block C mudflats. This indicates that the mudflat provides some foraging habitat for birds, although its value is likely to vary with tidal exposure, moisture conditions, and disturbance levels.


Grey-headed Fish Eagle


Blue-bearded Bee-eater


Shikra


Clamorous Reedwarbler


Great Egret


Citrine Wagtail


Baya Weaver


Bronze-winged Jacana (imm.)


Brahminy Kite & Median Egret


Purple Sunbird


Blyth's Reedwarbler


Fulvous-breasted Woodpecker

Figure 5-44: Photos of bird species observed in the project AoI (CARINAM, Feb-Mar-Apr 2026)

5.2.2 Aquatic Ecology

The project AoI includes the Karnaphuli River, estuarine channels, coastal waters of the Bay of Bengal, wetlands, tidal mudflats, ponds, canals, and drainage ditches, all of which provide important aquatic habitats for naturally occurring and cultured aquatic species. The Karnaphuli River is the principal aquatic system supporting brackish-water dependent and migratory species, while adjacent estuarine and marine waters sustain a wider range of aquatic ecosystems.

Aquatic ecological surveys were undertaken between February and June 2026 and included fisheries surveys, benthic sampling, dolphin observations, and marine turtle beach walkovers. Surveys were designed to characterise key aquatic habitats and ecological receptors within the Karnaphuli River estuary, adjacent coastal waters, and associated intertidal habitats. Survey locations are presented in Figure 5-45 and Figure 5-46 (and observations done during the transects in Figure 5-36).

Benthic surveys were conducted at representative locations within the estuarine and nearshore environment to assess the composition and distribution of benthic fauna inhabiting intertidal and subtidal sediments.

Observations were conducted during periods of peak dolphin activity, including early morning and late afternoon. The survey area extended from the Karnaphuli River estuary, including waters up to approximately 500 m seaward of the river mouth, upstream to the Shah Amanat Bridge, located approximately 15 km upstream of the proposed Laldia Container Terminal.

Sea turtle surveys were undertaken through beach walkovers along accessible stretches of coastline and sandy beach habitats within the wider study area (see transects in Figure 5-36). The surveys focused on identifying evidence of turtle nesting activity, nesting habitat suitability, tracks, nests, and other indicators of sea turtle use of coastal habitats. Habitat characteristics and potential disturbance factors were also recorded to assess the suitability of the coastline for nesting turtles and to identify areas of ecological importance.



Figure 5-45: Benthic sampling survey sites

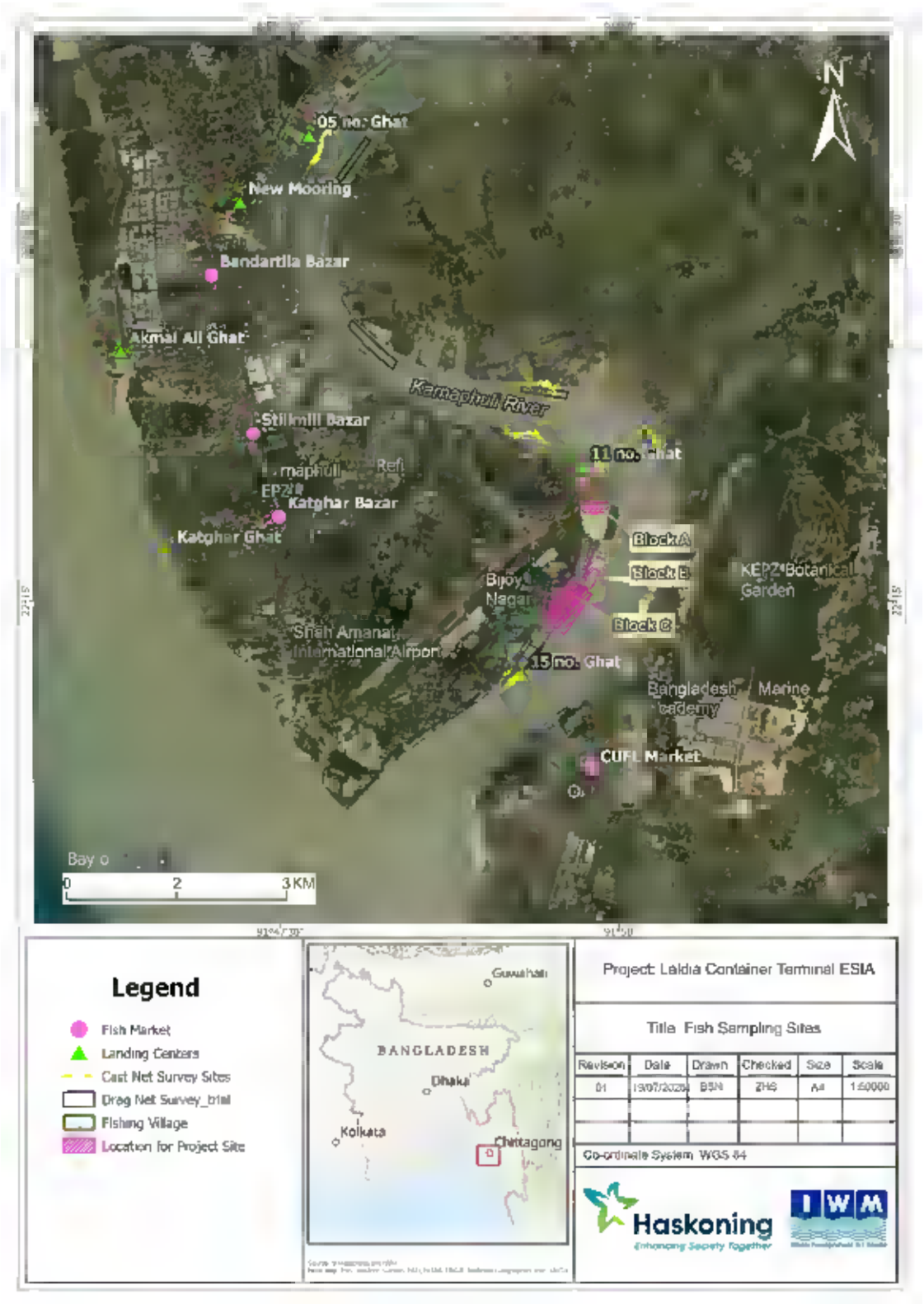


Figure 5-46: Sites surveyed during the fisheries and aquatic resources survey

5.2.2.1 Flora

Aquatic and semi-aquatic vegetation within the Project AoI is associated with the Karnaphuli River, tidal channels, wetlands, and waterlogged areas, where hydrological and salinity gradients influence species composition. Field observations identified common floating and emergent macrophytes, including *Pistia stratiotes* (Topapana), *Eichhornia crassipes* (Kochuripana), and *Ludwigia adscendens*, as well as mangrove and mangrove-associated species such as *Sonneratia apetala* (Keora), *Avicennia alba* (Sada Baen), *Acanthus ilicifolius* (Sea Holly) and grass *Phragmites australis* (Common Reed) typically occurring along tidal margins and low-lying wetlands. No evidence of seagrass habitats was identified within the study area.

Secondary data from the DAR baseline surveys (2025) confirm the presence of coastal and estuarine vegetation assemblages, including mangrove and mangrove-associated species (e.g. *Sonneratia apetala*, *Avicennia alba*) and aquatic macrophytes (*Eichhornia crassipes*, *Hydrilla verticillata*).

Overall, aquatic vegetation within the Project AoI is limited and largely restricted to tidal margins, wetlands, drainage channels, and localized mangrove habitats. No seagrass habitats were identified during the baseline study.

5.2.2.2 Fauna

Marine mammals

Both the Irrawaddy dolphin (*Orcaella brevirostris*) and the Ganges River dolphin (*Platanista gangetica*) are known to occur within the broader Karnaphuli River–estuarine system.

During dedicated surveys undertaken between 8 and 13 June 2026, between 20 and 30 Ganges River Dolphins were observed per day, including several mother-calf pairs. Dolphins were observed throughout the survey area between the Shah Amanat Bridge and the river mouth, with observations indicating tidal movements within the Karnaphuli River. No Irrawaddy Dolphins were recorded during the survey period, although the species is known to occur within the broader Karnaphuli-Sangu river system.



Figure 5-47: Ganges dolphin mother with calf, sighted on 9th June 2026 near the Gupta bend (source: CARINAM, June 2026)

Ganges Dolphin

The Ganges River dolphin, locally known as Nadir Shushuk, is classified as Endangered globally (IUCN, 2022) and Vulnerable nationally. The species is an obligate freshwater cetacean restricted to large river systems in South Asia (WWF, 2021). Within Bangladesh, the species occurs across all major river systems, including the Karnaphuli river system, which drains into the Bay of Bengal near Chattogram (Bangladesh Forest Department , 2022).

Ganges river dolphins have been recorded within the freshwater and low-salinity tidal reaches of the Karnaphuli River, particularly upstream of strong estuarine influence (Smith B. D., 1998; Sinha R. K., 2014). Within this system, occurrence is typically associated with river bends, deep pools, and confluence zones, including the Karnaphuli confluence, where counter-current eddies and elevated prey availability create favourable foraging conditions (Sinha R. K., 2014). IUCN reports a global population of between 4,700 and 5,200 individuals. Richman *et al.* (2014) estimated that a total of 203 dolphins inhabiting the Karnaphuli-Sangu River system, with higher densities in lower river reaches (Richman, 2014). Although site-specific population estimates are not available, observations from the wider Karnaphuli–Halda system confirm presence and indicate seasonal variability, with increased dispersion during the wet season when dolphins expand into tributaries, and concentration in deeper main-channel habitats during the dry season. Dolphin sightings are known to increase during the wet season (March to June), when individuals move into tributaries such as the Halda River to exploit seasonally elevated prey availability associated with carp spawning, resulting in higher encounter rates compared to the dry season.

Across their distribution range, Ganges River dolphins preferentially occupy deep (>3 m), turbid river channels with slow to moderate flow, relying on echolocation for navigation and foraging in visually limited environments (Swinton, 2009; Sinha R. K., 2014). Ganges dolphin is almost blind, depending almost solely on their echolocation (cGanga and NMCG, 2021).

Reproductive activity in the Ganges River dolphin is considered seasonally structured, although precise timing varies geographically and remains imperfectly documented due to the cryptic behaviour of the species (Sinha R. K., 2014). Mating is believed to occur primarily during the late monsoon to early dry season, when hydrological conditions stabilise while habitat connectivity remains relatively high (Sinha R. K., 2014). Following a gestation period of approximately nine to ten months, calving most frequently occurs during the late dry season and early monsoon (approximately March to July) (Smith B. D., 1998; Sinha R. K., 2014).

Calves are typically born singly, and mother–calf pairs are often associated with low flow, sheltered habitats, including deep pools and areas of reduced current, which are likely to offer energetic advantages and reduced risk of displacement (Smith B. D., 1998; Wakid, 2018).

Unlike many marine dolphin species, the Ganges River dolphin is non-whistling and therefore does not produce tonal social whistles. Its vocal repertoire is dominated by broadband echolocation clicks, associated primarily with navigation and prey detection (Jensen, 2013; Wakid, 2018)). Dominant click frequencies typically range from 20 to 100 kilohertz (kHz), with peak energy commonly reported between 40 to 70 kHz (Jensen, 2013; Ladegaard, 2017). These high frequency signals are adapted to short range detection in shallow, acoustically complex riverine habitats.

Irrawaddy Dolphin

The Irrawaddy dolphin (*Orcaella brevirostris*) is classified as Endangered globally (IUCN, 2023) due to population declines associated with habitat degradation, bycatch, and vessel interactions (Minton, 2017). The species occurs in coastal, estuarine, and freshwater systems across South and Southeast Asia, including Bangladesh. Within Bangladesh, populations are reported from the Meghna River system, the Sundarbans, and coastal and estuarine rivers, including the Karnaphuli–Sangu river system, which is therefore considered part of the species' recognised distribution range and of regional conservation importance (Smith B. D., 1997; Bangladesh Forest Department, 2022).



Figure 5-48: Irrawaddy Dolphin (Orcaella brevirostris) (cGanga and NMCG, 2021)

Within the Karnaphuli River, Irrawaddy dolphins have been recorded in freshwater, tidal freshwater, and estuarine zones, particularly in the lower and middle river reaches (Bangladesh Forest Department, 2022). Habitat use is typically associated with deep channels, river bends, and confluence areas, where prey availability and hydrodynamic conditions are favourable (Smith B. D., 1997; Smith B. D., 2002). However, available records are based primarily on opportunistic observations and limited targeted surveys, and there are no river-specific abundance or density estimates for this system. As such, the presence of the species is confirmed, but population size and distribution patterns remain poorly defined, representing a baseline data gap rather than evidence of low abundance.

Irrawaddy dolphins exhibit flexible habitat use, occupying freshwater, estuarine, and nearshore coastal environments, and are often associated with deep pools, slow-moving channels, and confluence zones. Within the Karnaphuli River, suitable habitat includes deep navigational channels and tidal transition zones, where freshwater and saline conditions interact. The species is adapted to turbid, low-visibility environments and may co-occur with areas of high vessel activity, increasing potential exposure to anthropogenic disturbance.

Seasonal movements are primarily driven by changes in river discharge, salinity gradients, and water depth, rather than long-distance migration. During the monsoon or high-flow season,

dolphins may extend upstream into freshwater reaches and tributaries, while in the dry season they tend to concentrate in deeper pools, main channels, and estuarine transition zones where sufficient depth is maintained (Smith B. D., 1997; Smith B. D., 2006). In the Karnaphuli River, which experiences pronounced seasonal flow variation and tidal influence, similar patterns of seasonal expansion and contraction of habitat use are expected.

Information on breeding and calving is limited, but available evidence suggests year-round reproduction with seasonal peaks, depending on local conditions (Smith B. D., 2006; IUCN, 2023). Calves are born singly, and mother–calf pairs are typically associated with sheltered, low-current habitats, such as deep pools.

Irrawaddy dolphins rely on acoustic communication and echolocation for navigation and foraging in turbid environments. They produce broadband echolocation clicks and tonal whistles, with click frequencies generally reported in the tens of kilohertz range and whistles centred at lower frequencies (Marten, 2000; Jensen, 2013; Niu F. Q., 2019). Compared to other delphinids, their acoustic signals are typically lower in frequency and less directional, reflecting adaptation to complex riverine and estuarine environments.

Fish and shellfish species

The aquatic environment around the LCTP site supports a various range of fish and shellfish species. Estuaries, rivers, wetlands, canals, and drainage ditches also function as important breeding, nursery, and feeding grounds.

A total of 48 fish and shellfish species have been identified within the study area through field surveys, and fish market observations (February-April 2026). Nearly half of the recorded species are associated with brackish-water and estuarine habitats, while approximately one-third are coastal and marine species. The remaining species comprise freshwater or mixed freshwater–brackish-water dependent species. Fish market surveys conducted in Bandar Bazar, Katghar Bazar, and Fishery *Ghat* (see Figure 5-46) indicate that most fish sold in the area originate from estuarine, coastal, and marine fishing grounds, while a smaller proportion is sourced from the Karnaphuli River. This distribution pattern reflects the dominant estuarine and marine influence on fisheries resources in the project influence area. The Hilsa, the national fish of Bangladesh, can also be found in limited numbers in the Karnaphuli river, although the population is mainly concentrated around the Meghna estuary and the Karnaphuli only accounts for a minor share. See Table 5-14 for the fish and shrimp/prawn species recorded during the survey.

Table 5-14: List of fish and shrimp/prawn species identified in project influence area

Sl.	Bangla Name	English Name	Scientific Name	IUCN Status	BD Red List Status
1	Ilish	Hilsa Shad	*Tenualosa ilisha*	LC	Least Concern (LC)
2	Surma	King Mackerel	*Scomberomorus commerson*	NT	Least Concern (LC)

Sl.	Bangla Name	English Name	Scientific Name	IUCN Status	BD Red List Status
3	Kalo chanda	Black Pomfret	*Parastromateus niger*	LC	Least Concern (LC)
4	Rup chanda	White Pomfret	*Pampus argenteus*	VU	Least Concern (LC)
5	Poma	Pama Croaker	*Otolithoides pama*	DD	Near Threatened (NT)
6	Poa	Jewfish	*Johnius spp.*	LC	Data Deficient (DD)
7	Bagadati poa	Tigertooth Croaker	*Otolithes ruber*	LC	Least Concern (LC)
8	Chapila	Indian River Shad	*Gudusia chapra*	LC	Least Concern (LC)
9	Phasa	Anchovy	*Setipinna phasa*	LC	Least Concern (LC)
10	Alua	Goldspotted Anchovy	*Coilia dussumieri*	LC	Least Concern (LC)
11	Loittya	Bombay Duck	*Harpadon nehereus*	NT	Least Concern (LC)
12	Bata	Mullet	*Mugil cephalus*	LC	Least Concern (LC)
13	Keda/Mad	Sea Catfish	*Arius spp.*	DD	Data Deficient (DD)
14	Air	Catfish	*Sperata aor*	LC	Vulnerable (VU)
15	Pangus	Pangas Catfish	*Pangasius pangasius*	LC	Endangered (EN)
16	Koral	Sea Bass	*Lates calcarifer*	LC	Near Threatened (NT)
17	Taposhi	Threadfin	*Polynemus sp.*	LC	Endangered (EN)
18	Taposhi	Paradise Threadfin	*Polynemus paradiseus*	LC	Endangered (EN)
19	Shomodro koi	Tripletail	*Lobotes surinamensis*	LC	Least Concern (LC)
20	Ranga chowkka	Red Snapper	*Lutjanus spp.*	LC	Least Concern (LC)
21	Chapila	Sardine	*Sardinella spp.*	LC	Least Concern (LC)
22	Keski	Small Clupeid	*Corica soborna*	LC	Least Concern (LC)
23	Mola	Mola Carplet	*Amblypharyngodon mola*	LC	Least Concern (LC)
24	Boro jarki	Silverbiddy	*Gerres filamentosus*	LC	Least Concern (LC)
25	Tengra	Estuarine Catfish	*Mystus gulio*	LC	Near Threatened (NT)
26	Baila	Tank Goby	*Glossogobius giuris*	LC	Least Concern (LC)

Sl.	Bangla Name	English Name	Scientific Name	IUCN Status	BD Red List Status
27	Chewa	Eel Goby	*Odontamblyopus rubicundus*	LC	Data Deficient (DD)
28	Suri mach	Ribbonfish	*Trichiurus lepturus*	LC	Least Concern (LC)
29	Datina	White Grunter	*Pomadasys hasta*	LC	Least Concern (LC)
30	Barkuda	Barracuda	*Sphyraena spp.*	LC	Least Concern (LC)
31	Rocket mach	Spanish Mackerel	*Scomberomorus guttatus*	LC	Least Concern (LC)
32	Kawa mach	Indian Mackerel	*Rastrelliger kanagurta*	LC	Least Concern (LC)
33	Aila	Indian Mackerel	*Rastrelliger kanagurta*	LC	Least Concern (LC)
34	Bom-maitta	Bullet Tuna	*Auxis rochei*	LC	Least Concern (LC)
35	Lakhua	Indian Threadfin	*Leptomelanosoma indicum*	LC	Near Threatened (NT)
36	Kamila	Eel Fish	*Muraenesox spp.*	LC	Data Deficient (DD)
37	Moila	White Sardine	*Escualosa thoracata*	LC	Least Concern (LC)
38	Rupban	Goatfish	*Upeneus moluccensis*	LC	Least Concern (LC)
39	Sonali bata	Goatfish	*Upeneus spp.*	LC	Least Concern (LC)
40	Chama chingri	Coromandel Shrimp	*Metapenaeus monoceros*	LC	Least Concern (LC)
41	Ruda chingri	Rainbow Shrimp	*Parapenaeopsis sculptilis*	LC	Least Concern (LC)
42	Sada chingri	White Shrimp	*Penaeus indicus*	LC	Least Concern (LC)
43	Golda chingri	Giant Freshwater Prawn	*Macrobrachium rosenbergii*	LC	Least Concern (LC)
44	Kola chingri	Banana Prawn	*Penaeus merguiensis*	LC	Least Concern (LC)
45	Loittya chingri	Acetes Shrimp	*Acetes indicus*	LC	Not Evaluated (NE)
46	Ruda chingri	Kiddi Shrimp	*Acetes spp.*	NE	Not Evaluated (NE)
47	Gura chingri	Small Freshwater Prawn	*Macrobrachium spp.*	NE	Not Evaluated (NE)
48	Shol (marine)	Suckerfish	*Echeneis naucrates*	LC	Least Concern (LC)



Figure 5-49: Photos of fish species found in the project area

**Photos (a) and (b) show fish species sourced from the Karnaphuli River, photo (c) shows crab harvesting traps, Photos d–f shows coastal and marine fish species sold in nearby local markets such as Bandar Bazar, Katghar Bazar, and Fishery Ghat (Photos d–f).*

Benthic fauna

Various benthic species inhabit the coastal mudflats, sandy beaches, riverbed, and seabed habitats within the study area. Benthic communities form an important component of the aquatic ecosystem by contributing to nutrient cycling, organic matter decomposition, sediment stabilization, and serving as a food source for fish, crustaceans, and migratory birds. To characterize the benthic fauna of the area, sediment samples were collected from locations offshore of Block-C and in the vicinity of Parki Beach during field surveys conducted in April and May 2026 (see Section 5.2.2).

Analysis of the benthic samples taken in April 2026 near Block-C (SD3 and SD4) identified a benthic community dominated by *Chironomus* sp. (Family: Chironomidae, Order: Diptera) and *Corbicula* sp. (Phylum: Mollusca), which were the most abundant and widely distributed taxa across all sampling locations.

Additional taxa recorded included *Tipula* sp., *Tubifex* sp., *Simulium* sp., and *Eristalis* sp. The occurrence of these taxa suggests a benthic assemblage influenced by estuarine and freshwater

inputs, with several taxa known to tolerate variable salinity, fine sediments, and elevated organic matter conditions. In particular, chironomids and tubificid oligochaetes are widely associated with nutrient enrichment and low-oxygen sediments, while *Corbicula* is typically reported from fresh to brackish conditions rather than fully marine environments (Jirka, 2022; JNCC).

A subsequent benthic survey in May 2026 sampled near Parki Beach, at a site with a comparable mudflat to the one near Block C (SD7 and SD8 in Figure 5-45), revealed a community largely composed of polychaete worms (*Capitella* sp. and *Namalycastis* sp.), sand worms (*Nephtys* sp.), estuarine isopods, and *Corbicula* sp. clams. The occurrence of polychaetes and estuarine crustaceans reflects the influence of brackish-water conditions and soft-bottom sediment habitats characteristic of the estuary. The widespread distribution of *Corbicula* sp. further indicates the influence of freshwater in parts of the study area. The presence of *Capitella* sp. and other opportunistic polychaetes is also consistent with organically enriched or physically disturbed muddy sediments, although such taxa may also occur naturally in estuarine soft-bottom habitats (JNCC; McLusky, 2004).

The presence of pollution-tolerant taxa, particularly *Chironomus* sp., *Tubifex* sp., and *Capitella* sp., may indicate localized organic enrichment, elevated sediment organic matter content, and/or reduced dissolved oxygen conditions. However, such taxa are also commonly associated with naturally dynamic estuarine environment

Marine turtles

The Karnaphuli River estuary and adjacent coastal waters form part of the broader marine turtle range along the Bangladesh coast. The Olive Ridley Turtle (*Lepidochelys olivacea*) is the species most commonly reported from the Bay of Bengal and is known to occur in coastal waters near Chattogram. Regionally important marine turtle nesting areas include St. Martin's Island (~221 km), Sonadia Island (~80 Km), and Cox's Bazar (~101 km), which support nesting and migratory populations of marine turtles.

Marine turtles depend on suitable foraging habitats and undisturbed sandy beaches for feeding, breeding, and nesting. No seagrass meadows were identified within the Project AoI (Section 0), and the highly modified nature of the Karnaphuli estuary limits the availability of suitable foraging habitat. As such, the AoI is considered to provide limited suitable foraging habitat for marine turtles, making regular feeding activity within the area unlikely. In addition, the heavily modified nature of the AoI and the absence of suitable nesting beaches indicate that breeding or nesting activity is unlikely to occur within the Project area.

Sandy beaches can be found mainly near Patenga Beach KBA, and Parki Beach (Majher Char). Majher Char provides suitable conditions for potential nesting due to its natural sandy substrate and mangrove-associated vegetation. During a marine turtle observational survey (February-April 2026), dead individuals of the Olive Ridley Turtle (*Lepidochelys olivacea*) were observed washed ashore. Due to the advanced state of decomposition, the cause of mortality could not be

determined, and no visible injuries were identifiable. Consequently, it was not possible to establish whether these observations represented isolated incidents or part of a recurring mortality pattern.

Nevertheless, observations of stranded marine turtles are not uncommon along the Bangladesh coast. Published studies from Cox's Bazar and adjacent coastal areas identify incidental capture in fishing gear, entanglement in nets, coastal development, and other anthropogenic pressures as significant threats to marine turtle populations (Hossain M. M., 2013). More recent investigations and local community observations have similarly reported recurring Olive Ridley turtle strandings and bycatch incidents along the Cox's Bazar coastline, with fisheries interactions recognised as one of the principal causes of mortality (Antar Sarkar, 2025).

Overall, the baseline surveys confirm that marine turtles occur within the wider coastal environment surrounding the Project AoI. However, the absence of suitable foraging habitat, the highly modified nature of the Project area, and the lack of evidence of nesting activity indicate that the Project AoI is unlikely to represent an important nesting or regular feeding habitat for marine turtles.

5.2.3 Endemic, Endangered and threatened species

Species recorded during the baseline ecological studies were screened against both the IUCN Red List of Threatened Species (global conservation status) and the IUCN Bangladesh Red List (2015) to identify species of conservation concern. The national assessment was used alongside the global IUCN Red List to identify species that may be subject to elevated conservation concern within Bangladesh, even where their global status is less threatened. In addition to species confirmed during the baseline surveys, a broader review of species of concern was undertaken using literature, species distribution data, and consultation with local ecological experts. The review considered habitat suitability, known regional occurrence, and expert judgement to identify species that may occur within the Project AoI and could be relevant to subsequent biodiversity assessments. Where uncertainty remained regarding species occurrence, a precautionary approach was applied to ensure that potentially sensitive species were not excluded from further consideration.

No endemic plant species were recorded within the study area. The majority of recorded flora are classified as Least Concern (LC); however, a limited number of species of conservation interest were identified. This includes *Madhuca longifolia*, which, while listed as Least Concern (LC) globally, is considered very rare within Bangladesh, indicating localised conservation relevance.

Among the recorded avifauna, most species are also categorised as Least Concern (LC). However, several species of elevated conservation concern were identified. The Great Knot (*Calidris tenuirostris*), a migratory shorebird observed in the Project AoI, is classified as Endangered (EN) globally. Additional globally threatened migratory shorebirds considered include the Critically Endangered (CR) Spoon-billed Sandpiper (*Calidris pygmaea*) and the Endangered (EN) Spotted Greenshank (*Tringa guttifer*) and Lesser Sand Plover (*Anarhynchus mongolus*), and

the Vulnerable (VU) Black-capped Kingfisher (*Halcyon pileata*). At the national level, the Black-headed Ibis (*Threskiornis melanocephalus*) is categorized as Vulnerable (VU), and the Oriental Darter (*Anhinga melanogaster*) as Near Threatened (NT). The presence of these species indicates that riverbanks, mudflats, wetland margins, and seasonal wetlands within the area provide important feeding, roosting, and migratory habitats. Species occurrence is likely to vary seasonally.

Aquatic biodiversity assessments identified a range of fish, shrimp, and crab species across freshwater, brackish-water, and estuarine environments. While most recorded fisheries species are classified as Least Concern (LC) globally, national assessments indicate elevated conservation concern for several taxa. Notably, Pangas (*Pangasius pangasius*) is classified as Endangered (EN) in Bangladesh due to population declines associated with overfishing and habitat modification, despite its global classification as Least Concern (LC). Similarly, Air catfish (*Sperata aor*) is categorized as Vulnerable (VU) nationally, while remaining Least Concern (LC) globally. Species such as Tengra (*Mystus gulio*) and Indian threadfin (*Leptomelanosoma indicum*) are assessed as Near Threatened (NT), indicating moderate conservation concern. In addition, *Polynemus paradiseus* is classified as Endangered (EN) in Bangladesh but Near Threatened (NT) globally, reflecting localized pressures on estuarine fisheries resources. Likewise, Pama croaker (*Otolithoides pama*) and the horseshoe crab (both *Tachypleus gigas* and *Carcinoscorpius rotundicauda)* is considered Near Threatened (NT) nationally but remains Data Deficient (DD) globally. These discrepancies highlight the importance of national Red List assessments in capturing site-specific pressures on aquatic biodiversity.

In addition to fish and invertebrate species, key threatened taxa within the Area of Influence (AoI) include the Irrawaddy Dolphin (*Orcaella brevirostris*) and Ganges River Dolphin (*Platanista gangetica*), both of which are globally classified as Endangered (EN) and are further discussed in Section 5.2.2.2.

No endemic species were confirmed during the baseline studies. However, a number of species classified as Endangered (EN), Vulnerable (VU), Near Threatened (NT), or Data Deficient (DD) at the national and/or global level were recorded within the Project AoI. These include aquatic mammals, birds, reptiles, fish, and invertebrate species associated with the Karnaphuli River estuary and adjacent coastal habitats.

In addition, several species of conservation concern were retained for further consideration based on their conservation status, known regional distribution, habitat suitability within the Project AoI, available occurrence records, and expert judgement. Although these species were not confirmed during the baseline surveys, they were considered potentially relevant for subsequent biodiversity assessments. This includes the endemic Ganges Shark (*Glyphis gangeticus*), which was not recorded during baseline studies but was retained as a precautionary consideration due to its conservation significance and potential occurrence within suitable habitats in the region.

Table 5-15 presents all confirmed species of conservation concern recorded during the baseline surveys together with their corresponding national and global conservation status.

Table 5-15: Species of Conservation Concern Confirmed within the Project AoI and their National and Global Conservation Status

Taxonomic Group	Name	Scientific Name	National Status	Global Status (IUCN)
Mammalia (Cetacea)	Ganges River Dolphin	*Platanista gangetica*	Vulnerable (VU)	Endangered (EN)
Mammalia (Cetacea)	Irrawaddy Dolphin	*Orcaella brevirostris*	Endangered (EN)	Endangered (EN)
Chondrichthyes	Ganges Shark	*Glyphis gangeticus*	Not Evaluated (NE)	Critically Endangered (CR)
Chondrichthyes	Shorttail Whipray	*Maculabatis bineeshi*	Not Evaluated (NE)	Critically Endangered (CR)
Chondrichthyes	Smoothback Guitarfish	*Rhinobatos lionotus*	Not Evaluated (NE)	Critically Endangered (CR)
Reptilia (Testudines)	Olive Ridley Turtle	*Lepidochelys olivacea*	Endangered (EN)	Vulnerable (VU)
Aves (Charadriiformes)	Great Knot	*Calidris tenuirostris*	Endangered (EN)	Endangered (EN)
Aves (Charadriiformes)	Spotted Greenshank	*Tringa guttifer*	Critically Endangered (CR)	Endangered (EN)
Aves (Coraciiformes)	Black-capped Kingfisher	*Halcyon pileata*	Least Concern (LC)	Vulnerable (VU)
Aves (Pelecaniformes)	Black-headed Ibis	*Threskiornis melanocephalus*	Vulnerable (VU)	Least Concern (LC)
Aves (Suliformes)	Oriental Darter	*Anhinga melanogaster*	Near Threatened (NT)	Least Concern (LC)
Aves (Charadriiformes)	Spoon-billed Sandpiper	*Calidris pygmaea*	Critically Endangered (CR)	Critically Endangered (CR)
Aves (Charadriiformes)	Lesser Sand Plover (Siberian Sandplover)	*Charadrius mongolus*	Least Concern (LC)	Endangered (EN)
Actinopterygii	Pangas Catfish	*Pangasius pangasius*	Endangered (EN)	Least Concern (LC)
Actinopterygii	Air Catfish	*Sperata aor*	Vulnerable (VU)	Least Concern (LC)
Actinopterygii	Indian Threadfin	*Leptomelanosoma indicum*	Near Threatened (NT)	Least Concern (LC)
Actinopterygii	Estuarine Catfish (Tengra)	*Mystus gulio*	Near Threatened (NT)	Least Concern (LC)

Taxonomic Group	Name	Scientific Name	National Status	Global Status (IUCN)
Actinopterygii	King Mackerel	*Scomberomorus commerson*	Not Evaluated (NE)	Near Threatened (NT)
Actinopterygii	Bombay Duck	*Harpadon nehereus*	Least Concern (LC)	Near Threatened (NT)
Merostomata (Xiphosura)	Mangrove Horseshoe Crab	*Carcinoscorpius rotundicauda*	Not Evaluated (NE)	Data Deficient (DD)

Note: National conservation status follows the IUCN Bangladesh Red List (2015), including Volume 2[13] (Mammals), Volume 3[14] (Birds), Volume 4[15] (Reptiles and Amphibians), Volume 5[16] (Freshwater Fishes), and Volume 6[17] (Crustaceans), while global conservation status follows the IUCN Red List of Threatened Species (latest available assessment found on IUCN Red List of Threatened Species).

5.2.4 Ecologically Critical Areas and Protected Areas

Within the 5 km radius Area of Influence around the project site, there are no official ecological critical or protected area, including areas that are officially in the process of being designated as a protected or sensitive area. As per ECR 2023, environmentally sensitive areas designated or protected by law, including protected areas, heritage sites, ecologically critical areas, and areas safeguarded under bilateral or international conventions; habitats of environmental or biodiversity significance, including the habitats of endemic, threatened, or resident species, as well as wetlands, hills, natural forests, mangrove forests, coral-associated islands, and similar ecosystems; forest areas declared by the government; highly productive agricultural land; and historical sites, memorial areas, playgrounds/parks, health centres, residential areas, hospitals, protected areas, educational institutions, and any area identified by the government or by law as environmentally or socially sensitive needs to be avoided for selecting project sites. The project site for proposed container terminal is not located in these types of area.

In Bangladesh, protected and conservation areas may be declared under several legal instruments, including the Bangladesh Wildlife (Conservation and Security) Act, 2012; the Ecologically Critical Areas Management Rules, 2016; the Marine Fisheries Act, 2020; and the Protection and Conservation of Fish Act, 1950, where relevant. The project influence area does not include any protected areas according to the World Database on Protected Areas and a review of applicable national regulations in Bangladesh (including the Bangladesh ECA, 1995, as amended). However, there are designated areas with ecological importance in the coastal area of Bangladesh and along the Karnaphuli River and its estuary, which are given in Table 5-16

[13] portals.iucn.org/library/sites/library/files/documents/RL-549.3-003-v.2.pdf
[14] RL-549.3-003-v.3.pdf
[15] RL-549.3-003-v.4.pdf
[16] RL-549.3-003-v.5.pdf
[17] RL-549.3-003-v.6.pdf

and shown in Figure 5-50 and Figure 5-51.

Table 5-16: Designated natural areas

Sl No	Name	Distance to LCTP	Category
1	Dudpukuria-Dhopachari Wildlife Sanctuary	36.2 km	IUCN Category IV Habitat or species management area
2	Hajarikhil Wildlife Sanctuary	49.0 km	IUCN Category II National Park Important Bird Area (IBA) and Key Biodiversity Area (KBA)
3	Baroiyadhala National Park	47.7 km	IUCN Category II National Park
4	Rampahar-Sitapahar Wildlife Sanctuary	59.0 km	IUCN Category IV Habitat or species management area Important Bird Area (IBA) and Key Biodiversity Area (KBA)
5	Patenga Beach	6.0 km	Important Bird Area (IBA) and Key Biodiversity Area (KBA)
6	Ganges-Brahmaputra-Meghana KBA	68.1 km	Important Bird Area (IBA) and Key Biodiversity Area (KBA)

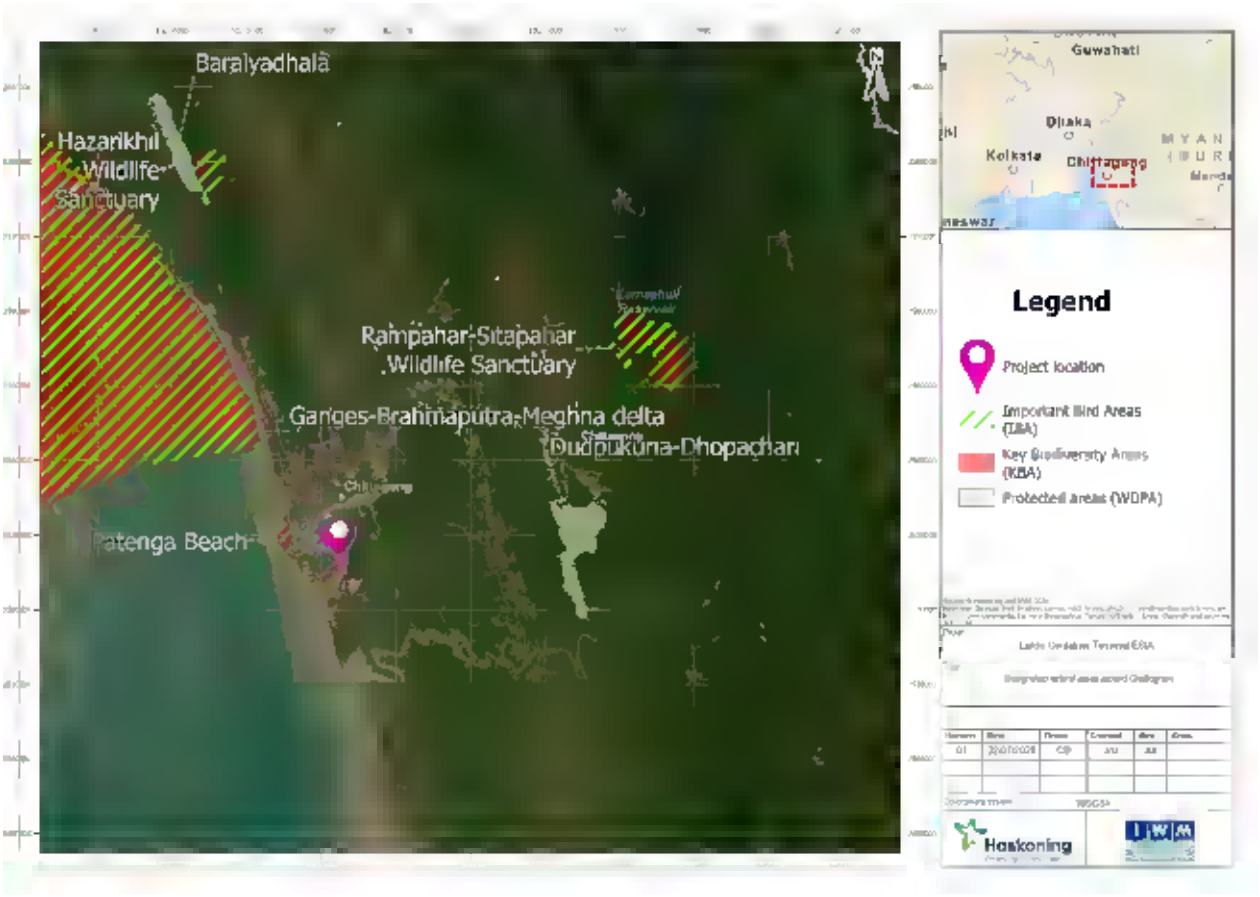


Figure 5-50: Designated natural areas around Chattogram

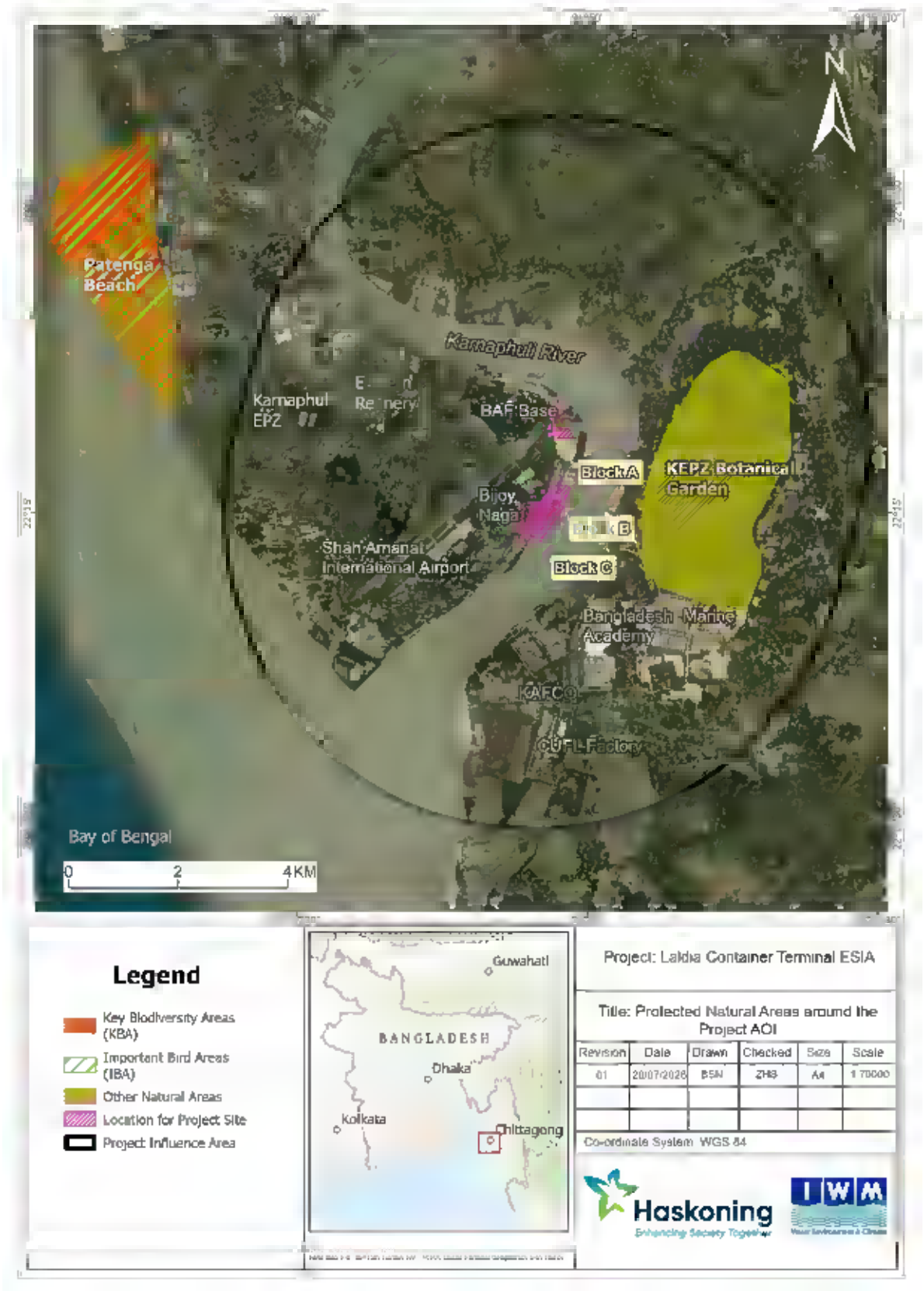


Figure 5-51: Designated natural areas near the project site

KEPZ natural area

The Korean Export Processing Zone (KEPZ) sits on the southern side of the Karnaphuli river, across the river from the LCTP. KEPZ is primarily an industrial development, which incorporates significant green space. About 52% of their total area is dedicated to natural development and according to Youngone Corporation, the developer, 2.4 million trees of 400 different species cover the area. The Department of Environment (DoE), on 23 November 2009, gave the environment clearance to the KEPZ authorities on the condition that 52% (1,295 acres) of the total project area will be preserved for greenery and the remaining 48% (1,196 acres) will be used for industrial and other infrastructure. The area is a mix of forest, water bodies, and shrubs that are known to attract a lot of different species of birds. Although the area is fenced, it is officially not a protected natural area.

5.3 Land Use

5.3.1 Present Land Use

Estimating the land use within a 5-kilometer radius of the Laldia Container Terminal project site reveals a complex distribution, as the location sits precisely at the intersection of major maritime routes, industrial hubs and natural riverine ecosystems. The land use within and surrounding the proposed project area is predominantly commercial, with a significant portion of the land owned and managed by the Chittagong Port Authority (CPA). In addition to commercial activities, the surrounding landscape includes industrial zones, undeveloped land, and residential areas. Shah Amanat International Airport (CGP) lies in close proximity to the project site and is part of an area managed by the Civil Aviation Authority (CAA). Next to the airport, the CAA area hosts the Bangladesh AirForce Zahurul Haque base and residential buildings. On the western side of the airport there is a mix of small-scale agriculture, aquaculture, and residential areas. On the other side of the river, the landcover is more mixed with forest areas, agriculture, and residential areas, with the latter mainly concentrated around the river edges. Approximately 40–45% of the AoI comprises water bodies and tidal mudflats, primarily due to the presence of the main channel of the Karnaphuli River, the mouth of the Bay of Bengal, natural mudflats, and coastal accretion zones. The landcover map is given in Figure 5-52.

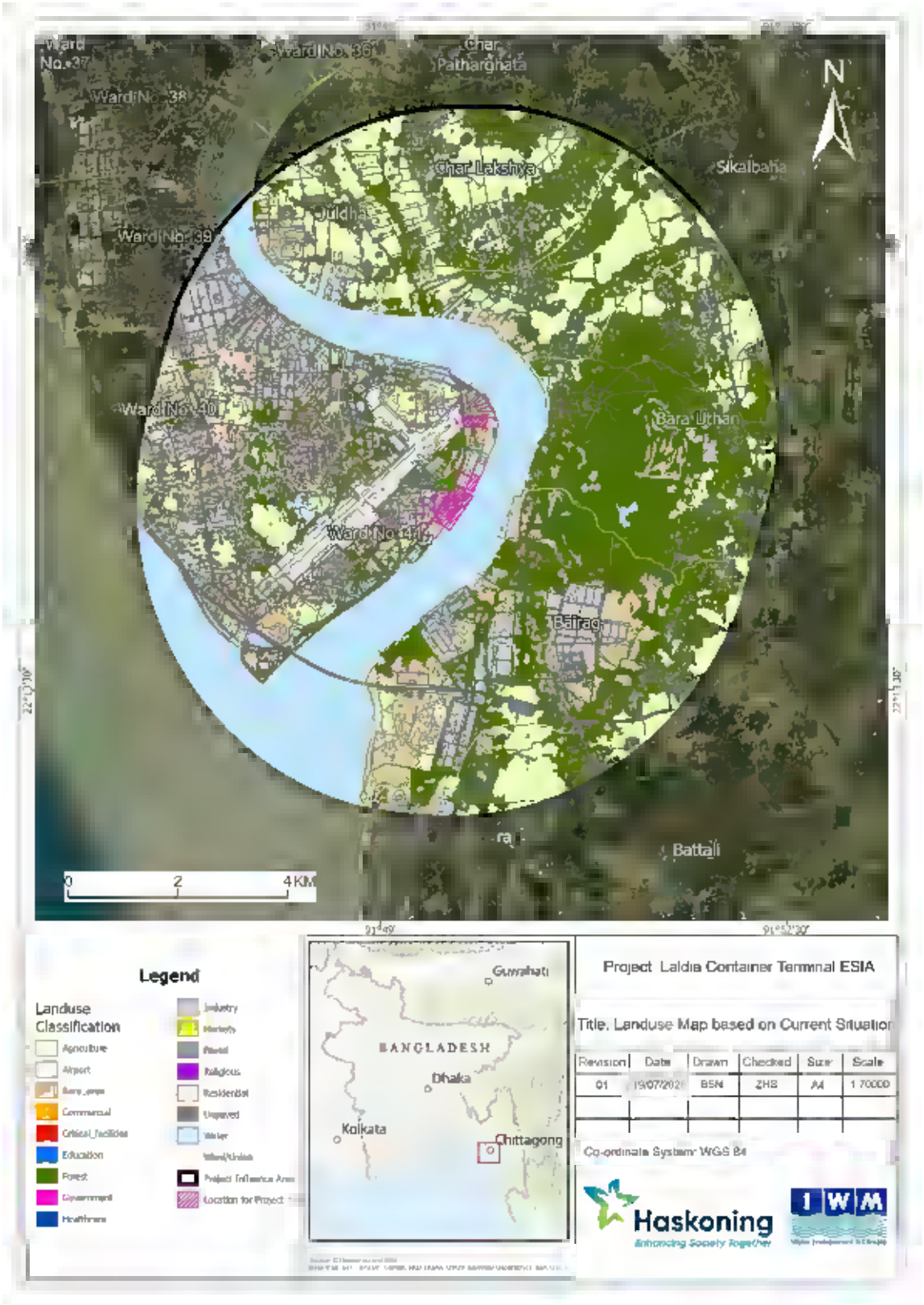


Figure 5-52: Land use map based on current situation with wards layer overlay (source: combined OSM and ESA landcover data)

5.3.2 Proposed Land Use

Land-use change within the AoI of the proposed LCTP has historically been influenced by the progressive development of Chattogram Port, industrialization, urban expansion, transportation infrastructure and population growth. The area has gradually evolved from a landscape containing substantial riverine areas, tidal mudflats, char and accretion land, agricultural/open land and scattered settlements toward a more intensively developed port, industrial, commercial, residential and transportation-oriented landscape. The development of port facilities along the Karnaphuli River, expansion of industrial areas around Patenga and South Halishahar, and improvement of road and logistics infrastructure have been major drivers of this transformation. As a result, open and low-intensity land uses have progressively been replaced or fragmented by built-up and infrastructure-related uses, while the river, tidal channels and intertidal areas continue to constitute a significant component of the AoI.

The prevailing land-use trend indicates that the port and logistics functions of the area are likely to continue expanding and intensifying, accompanied by further growth of associated industrial, commercial, warehousing, transportation and service facilities. Development pressure is also expected to encourage further urbanization of vacant and low-intensity areas, particularly along existing road corridors and around established industrial and port facilities. The proposed LCT is consistent with this established development trajectory and is expected to reinforce the existing port-oriented land-use pattern rather than introduce a fundamentally new land-use function to the AoI. The project may also indirectly contribute to increased demand for supporting logistics, transport, commercial and service facilities in the surrounding area.

Because nearly 65% of the AoI comprises open water areas or highly restricted industrial and military zones, the spatial footprint available for urban expansion is limited. Consequently, future development is expected to result in the continued conversion and intensification of the remaining terrestrial areas toward port, industrial, commercial, residential and transportation uses, with increasing development pressure on open and low-intensity land. The near-future land-use pattern is therefore likely to undergo a rapid structural transition from a mixed industrial-buffer zone toward a more densely developed and increasingly automated maritime logistics corridor, with associated traffic, environmental runoff and socio-economic pressures becoming concentrated within the remaining East Patenga residential and commercial areas, while the major riverine and tidal water bodies remain persistent features of the landscape.

5.4 Socio-economic Environment

The socioeconomic profile is a key element of the ESIA for the LCTP. It presents the existing social, demographic, economic, and livelihood conditions of the people living within and around the project influence area, and characterises affected, benefitting and surrounding communities in terms of population composition, age and gender structure, education, occupation and income, housing status, access to basic services, livelihood dependence, and social vulnerability.

Laldia Char is a socially and economically sensitive area with diverse livelihood systems such as fishing, small enterprise, day labour, transport-related work and informal port-linked employment. Understanding these baseline conditions is necessary to assess how the proposed terminal may influence local livelihoods, settlement patterns, access to services, community mobility, community relationships, and vulnerable groups.

In the Socioeconomic Environment chapter, primary and secondary data have been used to provide relevant information for the socio-economic environment. The socioeconomic survey data (Haskoning/IWM, 2026) and the findings from the stakeholder engagement activities were used as a primary data source, and the Population and Housing Census 2022 (Bangladesh Bureau of Statistics, 2022) was used to support the analysis as a secondary data source whenever the primary data did not cover the entirety of the required research. The questionnaire that is used can be found in Annex B5.

It should be noted that the Census data was collected at a different spatial resolution than the primary data. The primary survey data was collected within the AoI, while the Census data has been retrieved at a level that covers a larger area, which is shown in the image below (Figure 5-53). Wherever possible, secondary data from the census has been integrated at a higher resolution (e.g. Ward level). Within the Chattogram City Corporation (CCC), the Wards 40 and 41 (Figure 5-54:) could be extracted from the data, which makes the findings more relevant to the AoI. If this is not specifically mentioned, it should be noted that the CCC covers a broader area including the urban centre of Chattogram. The Karnaphuli region expands towards the northern side of the AoI but lies mostly within the AoI, including the surveyed wards Bara Uthan, Sikalbaha, Char Laskhya and Juldha). The Anwara region, however, expands much further outside the AoI, as can be seen in the image below. The socio-economic survey includes the wards Bairag and Barasat located in Anwara. These spatial differentiations should be kept in mind when interpretating the results.

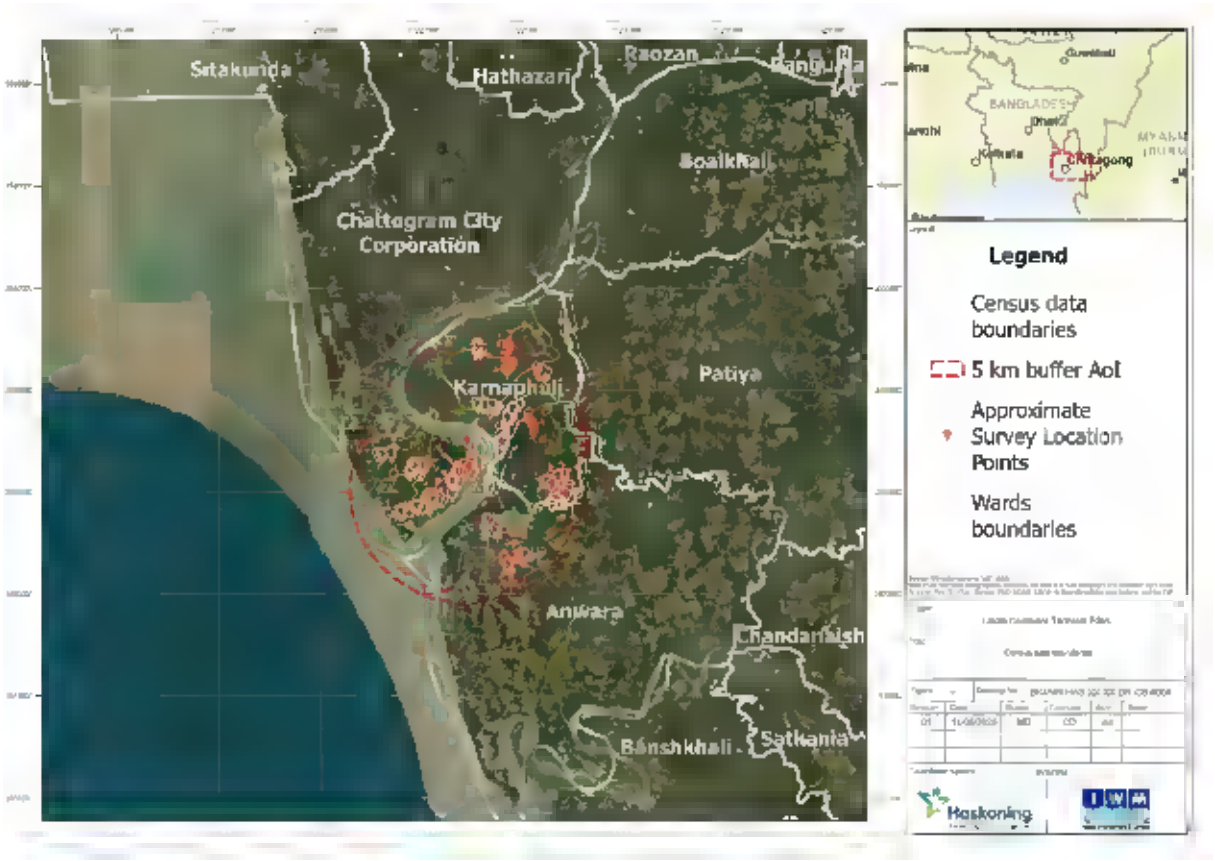


Figure 5-53: Spatial boundary levels used for the secondary data collection (Census boundaries) and the primary data collection (Approximate survey location points). (Bangladesh Bureau of Statistics, 2022)

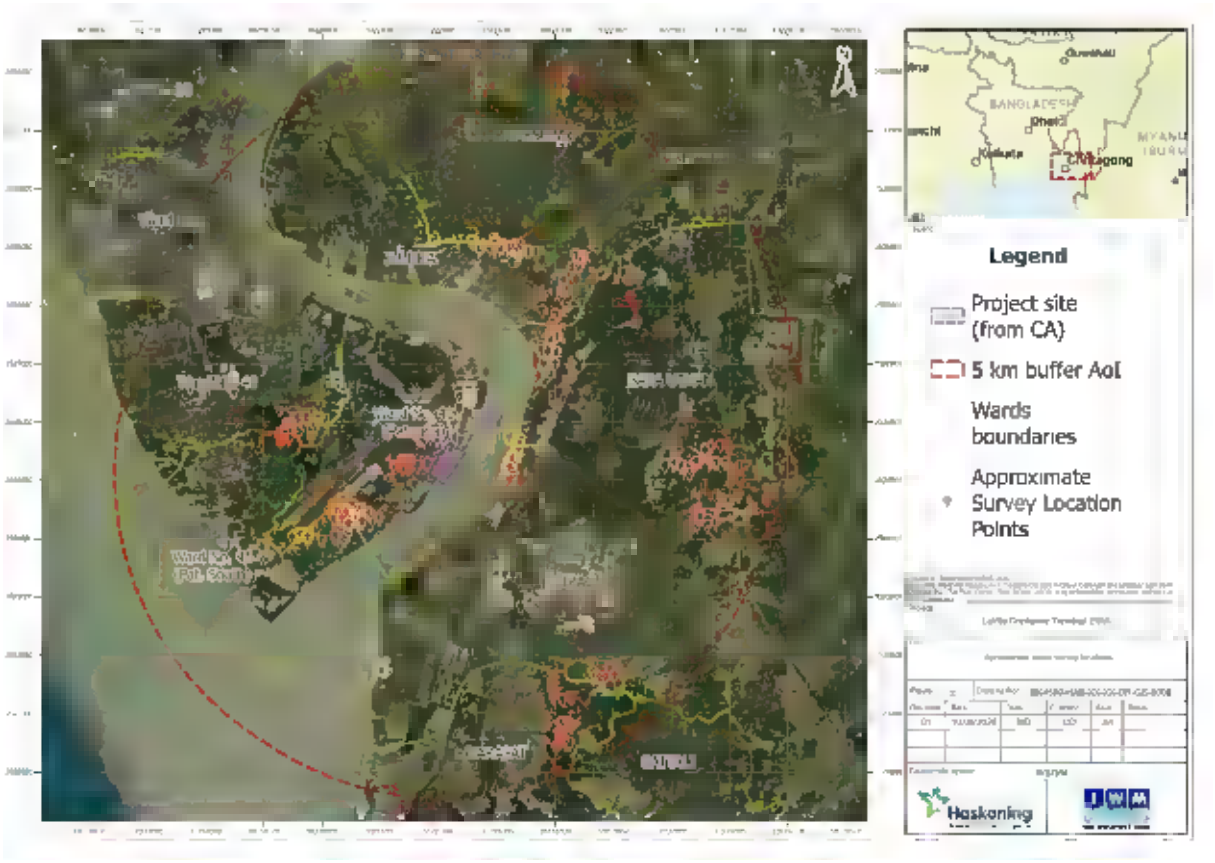


Figure 5-54: Spatial boundary levels used for the secondary data collection (Ward boundaries) and the primary data collection (Approximate survey location points).

5.4.1 Population Distribution and Demography

5.4.1.1 Households and Population

Population size and household composition are important indicators to understand the scale and nature of potential project impacts. Based on the Census data of 2022 (Bangladesh Bureau of Statistics, 2022),

Table 5-17 shows about 93,600 households with 402,400 (male 51.34% female 48.66%) people living in the study area. The average household size is 4.30 people per household.

This demographic profile indicates that the AoI is located in a densely populated area, compared to other regions in Bangladesh. The reason for that can be that Chattogram is one of the main commercial hubs of Bangladesh, resulting in relatively higher income levels in the region. The city attracts people from across the country who migrate in search of employment opportunities.

Table 5-17: Distribution of Household and Population

Area	No. of Households	No. of Population	Male		Female		Third Gender		Average Household Size
			No.	%	No.	%	No.	%	
Ward No. 40 & 41 of CCC	42,884	164,015	85,833	52.33%	78,182	47.67 %	4	0.00 %	3.82

Area	No. of Households	No. of Population	Male		Female		Third Gender		Average Household Size
			No.	%	No.	%	No.	%	
Karnaphuli	17,549	80,776	40,719	50.41%	40,057	49.59 %	-	-	4.60
Anowara	33,168	157,608	80,026	50.78%	77,582	49.22 %	8	0.01 %	4.75
Total	93,601	402,399	206,578	51.34%	195,821	48.66 %	12	0.00 %	4.30

Source: *Population and Housing Census 2022, Community Report, Bangladesh Bureau of Statistics, Statistics and Information Division, Ministry of Planning*

5.4.1.2 Respondent Background

The respondents, i.e., the individuals and groups consulted in the stakeholder engagement for the ESIA, are highly important for the LCTP. Their views, concerns, and lived experiences provide a realistic understanding of the potential social impacts of the project within the complex socio-economic context of Laldia Char, Chattogram.

Presenting the age of respondents helps ensure that the assessment captures both historical realities and future concerns of the affected communities, leading to more appropriate mitigation measures and socially responsible project planning.

A socio-economic survey was conducted within the LCTP and AoI (within a 5 km radius). This sample survey was carried out considering various factors such as proximity to the LCT, urban, semiurban, rural areas, people from different classes of occupation, etc., so that a holistic scenario of the study area can be visualized. For the SIA, the socioeconomic Survey (2026) has been integrated, for which a total of 577 households have been surveyed. Table 5-18 presents the age of the respondents (which were heads of households) for Socioeconomic Survey for the Laldia Container Terminal Project.

Table 5-18: Respondents by Age and Sex

Age Group	Male	Female	Total	Percentage (%)
18 to 25	17	4	21	3.64%
26 to 40	169	51	220	38.13%
41 to 65	269	53	322	55.81%
More than 65	14	0	14	2.43%
Total	469	108	577	100.00%

Source: Socio-economic survey (ESIA team, April 2026)

While interpreting the primary data, it should be noted this data is based on interviewing a specific group of people, namely the households head which are predominantly male respondents between 26-65 years old. Bangladesh is consisting predominantly of male-headed households, and the Chattogram area is a religiously conservative area.

5.4.1.3 Vulnerable groups

Vulnerable people are (groups of) individuals that are more likely to be harmed by the Project, such as the economically deprived, small ethnic groups, children and women, the elderly, the disabled, as well as to the population most exposed to risks arising from the planned intervention. The vulnerable groups living in the Project AoI are listed below:

1. Female-headed households without stable income (8,6% of surveyed population)
2. Households living in non-durable structures (wooden house, make-shift housing, tin-made house) (41,4% of the surveyed population lives in a non-durable house).
3. Households living below poverty line (<12,000 BDT)
4. Pregnant women
5. Elderly people
6. Children and Youth
7. Disabled people and chronically ill individuals (3,1% of the surveyed population is disabled and chronically ill, 6% of surveyed population is chronically ill, 0,7% has a mental disease)
8. Previously displaced people from block A, B and C
9. Adolescent girls
10. Illiterate people
11. People without access to clean drinking water
12. People with unsafe disposal toilet facilities and pit latrine without slab/open pit and kancha/open/hanging latrine

5.4.1.4 Previous land use of blocks A, B and C[18]

The project zones in block A, B and C have been populated and used for aqua- and agricultural purposes since 1930. In 1972, the District Administration relocated 351 families following airport expansion. 124 of them received 1 acre each (totalling 124 acres), while 227 were directed to self-settle without formal titles. The occupants that were directed to self-settle fostered informal settlement growth in the area over nearly 50 years. They got access to utilities, voter lists, and services such as electricity, water, schools on humanitarian grounds, though courts consistently upheld CPA ownership.

Temporary reoccupation of Block C (25–30 structures) happened mid-2024 amid national unrest. The subsequent clearance of the site was done in March 2025 at the request of CPA. In total, three successive court-directed land clearance operations resulted in the removal of these households: Block B in 2005 (approximately 500 households), Block A in 2019 (approximately 250 households), and Block C in March 2021 (726 households according to 2016 data). In total, an estimated 6,000 or more people were physically displaced. While the land clearance was done in line with Bangladeshi requirements.

[18] *The ESIA scope does not cover past displacement, but focuses on potential future displacement associated with the project. Impacts and possible repair measures of past displacement will be addressed by the SAP Consultant. The planned SAP outcomes will be referenced in the ESIA.*

5.4.1.5 Households and Population of Sample Households

The socio-economic survey reached 577 households with approximately 2,575 persons who are living in the study area. The male population (50.41%) is little bit higher compared to female (49.59%). The field findings revealed sex ratio is 101.64 males per 100 females. This ratio varies among the different locations in the study area.

According to the secondary data, the revealed sex ratio is 108.46 males per 100 females in Anowara, 103.66 in Karnaphuli and 96.61 in Ward No. 40 & 41 of CCC. Population and Housing Census 2022 male female ration in national level is 98.07 (95.30 in rural and 104.35 in urban area) and Chattogram district 99.37 (Bangladesh Bureau of Statistics, 2022).

The survey also revealed average household size is 4.46 which is higher compared to national level 3.98 and Chattogram division 4.35 (according to the census data). It was found that there is a declining trend in the Chattogram district, based on secondary sources, as it showed an average household size of 4.24 in 2022, 4.92 in 2011, 5.35 in 2001[19]. Table 5-19 shows the detailed breakdown of number of households and population in the study area.

Table 5-19: Distribution of Household and Population of Sample Households

Area	No. of Households	No. of Population	Male		Female		Average Household Size	Sex Ratio
			No.	Percentage (%)	No.	Percentage (%)		
Ward No. 40 & 41 of, CCC	217	987	485	49.14%	502	50.86%	4.55	96.61
Karnaphuli	253	1,169	595	50.90%	574	49.10%	4.62	103.66
Anowara	107	419	218	52.03%	201	47.97%	3.92	108.46
Total	577	2,575	1,298	50.41%	1,277	49.59%	4.46	101.64

Source: Socio-economic survey (ESIA team, April 2026)

Head of the Households

Head of household means a member of the household who is the decision-maker regarding the different activities of the household. In case of the LCT Ltd. survey, a member is regarded as the head of a household if the other members consider them so. Generally, the eldest male or female earner of the household or the main decision-maker is considered to be the head of the household. The head of household is interviewed as this person often has the broadest understanding of the households sources of income, livelihood activities, assets, etc.

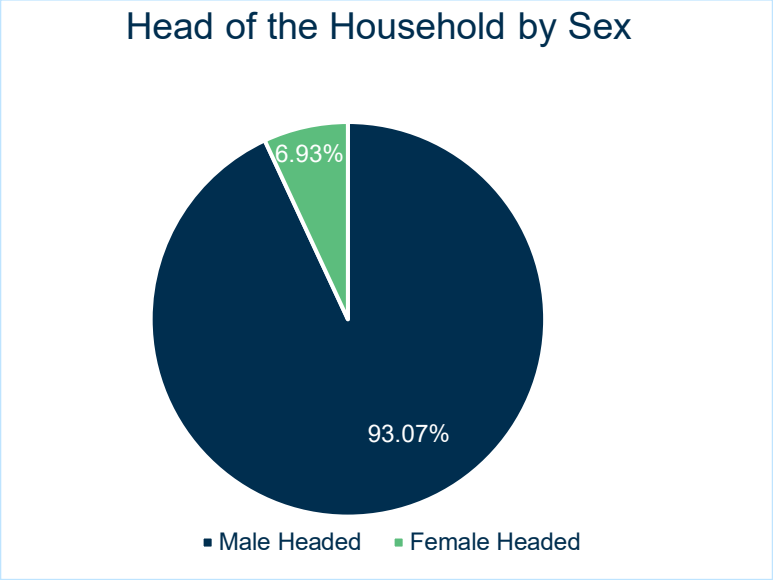


Figure 5-55: Head of the Household by Sex (Socio-economic survey, April 2026).

Table 5-20 shows a summary of the head of the households by sex, as was found during the primary data collection. It is observed from the field survey that the percentage of male headed households (93.07%) is higher than that of female headed households (6.93%). Compared to the average in Bangladesh, this shows that there are slightly more male headed households in the AoI. About 87.4% of the households is male headed and 12.6% female headed in Bangladesh (Bangladesh Bureau of Statistics, 2022). According to the Population and Housing Censuses of Bangladesh conducted in 2001 and 2011, female-headed households accounted for 13.8% and 15.6% of all households in the Upzilas of interest, respectively. This indicates that the proportion of female-headed households in the study area is higher than the corresponding national averages. Area-wise distribution of head of the households presented in Table 5-20.

Table 5-20: Distribution of the Head of the Households by Sex

Area	Total HH	Male Headed		Female Headed	
		Number	Percentage	Number	Percentage
Anwara	107	102	95.33%	5	4.67%
Karnaphuli	253	237	93.68%	16	6.32%
Ward No. 40 & 41 of CCC	217	198	91.24%	19	8.76%
Total	**577**	**537**	**93.07%**	**40**	**6.93%**

Source: Socio-economic survey (ESIA team, April 2026))

Age Composition

The potential workforce (age between 15 – 64 years) plays a vital role for developing countries like Bangladesh. A large young population can boost economic growth by providing a strong workforce. Age structure influences the dependency ratio and the demand for social services,

making it essential for effective policy planning, resource allocation, and addressing future challenges such as job creation and population aging. According to secondary sources, the percentage of population between 15-64 years is 67.28% in the Upzilas of interest. A detailed breakdown is presented in Table 5-21.

According to the census data, it is found that the AoI supports a predominantly young population, with the largest portion belonging to the 15–44 years age group (53.42%), followed by the 45–64 years (13.85%). Overall, nearly three-fifths (28.68%) of the population is below 15 years of age.

The census data also revealed that older adults aged 65 years and above constitute only 4.05% of the total population. In Bangladesh, it is assumed that most of them are not physically capable to contribute to the economy of the country. Overall, the age composition reflects a demographic structure with a large proportion of economically productive and young population, which is comparable to the age pyramid for Bangladesh overall.

Table 5-21: Distribution of Population by Age Group and Sex of the Study Area in Percentage

Area	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	50-59	60-64	65 and above
Ward No. 40 & 41 of CCC	10%	10%	11%	12%	10%	9%	7%	7%	5%	4%	4%	3%	3%	5%
Karnaphuli	10%	10%	10%	11%	11%	10%	8%	7%	5%	4%	4%	3%	3%	4%
Anowara	8%	8%	9%	11%	12%	12%	9%	9%	6%	5%	4%	3%	2%	3%
Total	**9%**	**9%**	**10%**	**11%**	**11%**	**10%**	**8%**	**8%**	**6%**	**5%**	**4%**	**3%**	**3%**	**4%**

Source: Population and Housing Census 2022, Community Report, Marital Status (Bangladesh Bureau of Statistics, 2022)

Marital Status

In the context of Bangladesh, marriage is closely linked with cultural and religious traditions and is often regarded as an important stage of social life. Marital status in Bangladesh is linked to an individual's well-being, decision-making role, dependency, and vulnerability[20]. Therefore, understanding marital status helps assess household structure, social relationships, and the overall socioeconomic condition of the community. Based on the census data of 2022, the following marital status indicators are expected in the AoI:

Table 5-22: Distribution of Population Aged 12 Years and Above by Sex, Marital Status in Percentage

Area	Male in percentage (%)	Female in percentage (%)

[20] *In the socio-cultural context of Bangladesh, men's earning role often becomes more important after marriage. Traditionally, women depend on their father's income before marriage and on their husband's income after marriage, particularly where women are not engaged in income-generating activities. Housewives generally contribute to the family by taking care of children and performing household responsibilities, although these activities usually do not have direct monetary value. On the other hand, men are commonly responsible for managing the financial and economic needs of the household.*

	Never Married	Currently Married	Widowed/ Widower	Divorced	Separated	Never Married	Currently Married	Widowed/ Widower	Divorced	Separated
CCC	45.78%	53.31%	0.90%	-	-	29.07%	60.17%	9.88%	0.29%	0.58%
Karnaphuli	43.41%	55.64%	0.72%	-	0.24%	27.11%	61.94%	9.70%	0.50%	0.75%
Anowara	39.63%	59.76%	0.61%	-	-	27.63%	63.82%	7.24%	0.66%	0.66%
Total	43.59%	55.53%	0.77%	-	0.11%	27.95%	61.58%	9.35%	0.45%	0.67%

Source: Population and Housing Census 2022 (Bangladesh Bureau of Statistics, 2022)

Table 5-22 shows that married persons dominate both male and female groups in all areas. Among males, the currently married proportion is highest in Anowara (59.76%), followed by Karnaphuli (55.64%) and CCC (53.31%) (see Figure 5-53). Among females, Anowara also has the highest 'currently married' rates (63.82%). Comparing that to the census data, it appears that in Chattogram District (age over 10 years) 26.52% people are unmarried, 63.54% married, 8.99% Widow, 0.42% divorced and 0.52% separated (Bangladesh Bureau of Statistics, 2022).

The proportion of never married males is higher than never married females in all areas. Overall, 43.59% of males are never married compared to 27.95% of females. This may be due to earlier marriage among females compared to men in the study area. Lack of proper education of the guardian, religious factors, poverty, social degradation such as eve-teasing, rape of children and women trafficking, etc. are considered reasons for more early marriages of girls compare to boys in Bangladesh.

The widowed/widower persons is much higher among females than males. Overall, 9.35% of females are widowed, while only 0.77% of males are widowers. This may reflect higher male mortality, remarriage patterns, or age differences between spouses. Divorce and separation rates are very low in all areas. Overall, divorced females account for 0.45% and separated females for 0.67%, while male divorce is absent and male separation is only 0.11%.

Population by Religion

Religion is an important consideration in the SIA of the proposed Project, as it influences the cultural, social, and community life of local people. Analysis of religious composition helps identify sensitive places such as mosques, temples, churches, graveyards, cremation grounds, religious schools, and community gathering spaces that may require protection or special management. The religion identifies with a particular religion or religiously unaffiliated. It is a measure of the diversity of beliefs and practices within a nation.

According to the socioeconomic survey, Islam is the dominant religion, with Muslims comprising 91.73% while Hindus represent 7.92%, making largest minority group. Christian and Buddhist communities account for only 0.19% and 0.16% of the study area indicating relatively small

presence in the area. Area-wise distribution of percentage of population is presented in Table 5-23.

Table 5-23: Distribution of Population by Religion in Percentage

Area	Total Population	Muslim	Hindu	Christian	Buddhist
Ward No. 40 & 41 of CCC	987	86.83%	12.77%	-	0.41%
Karnaphuli	1,169	96.66%	2.99%	0.34%	-
Anowara	419	89.50%	10.26%	0.24%	-
Total	**2,575**	**91.73%**	**7.92%**	**0.19%**	**0.16%**

Source: Socio-economic survey April 2026

According to the census data, Muslims constitute 91.00% of the total population, followed by Hindus at 8.67%, while Christians and Buddhists represent very small proportions of 0.19% and 0.41%, respectively in the study area. In Chattogram district Muslims constitute 87.83% of, followed by Hindus at 10.72%, while Christians 0.09%, Buddhists 1.63% and other 0.03% respectively (Bangladesh Bureau of Statistics, 2022).

Educational Attainment

Education is one of the most important indicators of socioeconomic status. This section deals with the status of education among individuals and the impact of education on other aspects of the well-being of households. The aspects covered include literacy, level of education, and type of school attended. The socio-economic survey data showed the following educational indicators:

Table 5-24: Educational Status of Household Members (7 Years and Above) by Sex in Percentage

Area	Attended School but Not CompletedPlay /Nursery/ KG/Pre-Primary/Class I	Play/Nursery/KG/Pre-Primary student	Student-Class I	Class I- V	Class VI- IX	SSC/Dakhil/O-Level/Equivalent	HSC/Alim/A-Level/Equivalent	Diploma/Nursing/ Midwifery	Graduate and above*	Non-formal/Informal Education and Others
Ward No. 40 & 41 of CCC	1.35%	2.93 %	2.14 %	30.74 %	31.31 %	13.06%	8.11%	0.23%	4.73%	5.41%
Karnaphuli	1.34%	2.86 %	2.39 %	33.87 %	31.58 %	12.69%	7.63%	0.29%	3.91%	3.44%
Anowara	1.04%	2.33 %	1.55 %	25.65 %	25.13 %	14.25%	13.47 %	0.52%	13.21 %	2.85%
Total	1.24%	2.71 %	2.03 %	30.09 %	29.34 %	13.33%	9.74%	0.34%	7.28%	3.90%

Source: Socio-economic survey April 2026

Table 5-24 illustrates the educational status of household members aged 7 years and above across in the study area. The results show that the population is predominantly concentrated in the primary and secondary levels of education. Overall, 30.09% of the population has attained

education up to Class I–V, while 29.34% has completed education up to Class VI–IX. About 13.33% completed Secondary School Certificate (SSC) or equivalent, 9.74% High School Certificate (HSC) or equivalent and 7.28% have achieved graduate or above-level education.

As per the census report, 30.09% of the population completed primary level of education while 13.33% SSC 9.74% HSC and only 7.28% graduation and above degree. The census data also revealed that about 3.90% have no formal education. Literacy rate of Ward No. 40 is 84.40% and Ward No. 41 83.28% (Bangladesh Bureau of Statistics, 2022).

The census report of 2022 also revealed the literacy rate (age 7 year and above) of the country is 74.08% (male 75.83% and 72.38%) while Chattogram district is 80.21% (male 81.87% and female 78.56%). The literacy rate of Bairang Union is 79.87% (male 82.87% and female 76.73%, Barasha Union 76.66% (male 79.43% and female 73.93%) under Anowara Upazila, Char Lakkhya Union 75.27% (male 77.63% and female 72.80%), Bara Uthan Union 78.48% (male 81.32% and female 75.62%), Juldha Union 74.40% (male 77.23% and female 71.44%) and Shikalbaha Union 75.60% (male 77.97% and female 73.13%) under Karnaphuli Upazila. The literacy rate of ward no. 40 is 84.40% (male 85.76% and female 82.99%) and ward no. 41 83.28% (male 85.88% and female 82.99%) under CCC.

Small Ethnic Communities

The Chittagong Hill Tracts (CHT), historically home to the ethnic Jumma peoples, became part of British India, then Pakistan (1947), and Bangladesh (1971). Since 1971, Jummas have sought recognition of their distinct identity and rights. Following the rejection of Indigenous autonomy demands in 1972, armed conflict and militarization led to widespread displacement, land dispossession, and human rights abuses. Although the 1997 Peace Accord ended the conflict, key provisions on land rights, demilitarization, and autonomy remain largely unimplemented. As a result, many Ethnic people remain displaced and unable to return to their ancestral lands, particularly where these are occupied by Bengali settlers (OHCHR, 2023).

Chattogram District is generally known as an area where different ethnic communities are present as a result of the displacement. In the larger Chattogram District, 48,245 Ethnic people are present (Population and Housing Census, 2022). The largest groups include Chakma (11,957), Marma (3,739), Tripuria (1,420), who are all part of the Jumma people described in Chapter 3.

The Population and Housing Census (2022), additionally provides a Community Report for Chattogram, providing data on the presence of ethnic People at the Ward level. On the west bank of the river, this includes Ward No. 41, Ward No. 40, Ward No. 39, Juldha Union, Char Lakkya Union, Bara Uthan Union, and part of Shikalbaha Union. On the east bank, the AoI covers Bairag Union and part of Barashat Union (see Figure 3-2). However, the direct impacts of the Project are anticipated to take place in Ward 41, Bara Uthan and Bairag.

The findings of the social survey show that all respondents identify themselves as Bengali, and no Ethnic People were identified in the socio-economic survey. The reason why there were no Ethnic People identified in the socio-economic survey can be explained by the fact that the percentage

of Ethnic People residing in the Project AoI is low (in total only 1.5%). In nearly all of the Wards, the percentage is less than 0.5% of the population, except for Ward 39, which has relatively more Ethnic People (3.5%). However, as Ward 39 is only partly in the Projects AoI and located quite far away from the project site and behind the airport, which is perceived as a physical barrier to the project, the ward was not a focus area for the socio-economic survey.

5.4.2 Economic Activities

The economy of Chattogram is largely driven by port-based trade, industrial activities, commerce, transport, and services. Operations of CPA play a central role, supporting import-export trade, cargo handling, container transport, ship services, freight forwarding, warehousing, and logistics. The city also hosts major industries such as garments, steel and re-rolling mills, cement, ship-breaking and shipbuilding, food processing, chemical, and petroleum-related industries. Wholesale and retail trade are significant economic sectors, as Chattogram serves as a major distribution hub for imported goods and commercial products across Bangladesh. In addition, road transport, trucking, container movement, inland transport, fishing, fish trading, dry fish processing, informal labour, street vending, small businesses, repair workshops, rickshaw/vehicle driving, hotels, restaurants, tourism, and recreational services contribute substantially to the local economy and livelihoods.

In this chapter, the statistics and survey information regarding economic activities in the AoI are presented.



Figure 5-56: Shops Near the Ferry Ghat (source: ESIA team)

5.4.2.1 Dependency Ratio

The dependency ratio is an age-population ratio of those typically not in the labor force (the dependent part ages 0-14 and 65 and above) and those typically in the labor force (the productive part ages 15 to 64). It is used to measure the pressure on the productive population, as was also explained in the paragraph above.

Consideration of the dependency ratio is essential for governments, economists, bankers, business, industry and all other major economic segments which can benefit from understanding the impacts of changes in population structure, which is why it is also presented to LCT Ltd. A low dependency ratio means that there are sufficient people working who can support the dependent population. A lower ratio could allow for better pensions and better health care for citizens. A higher ratio indicates more financial stress on working population.

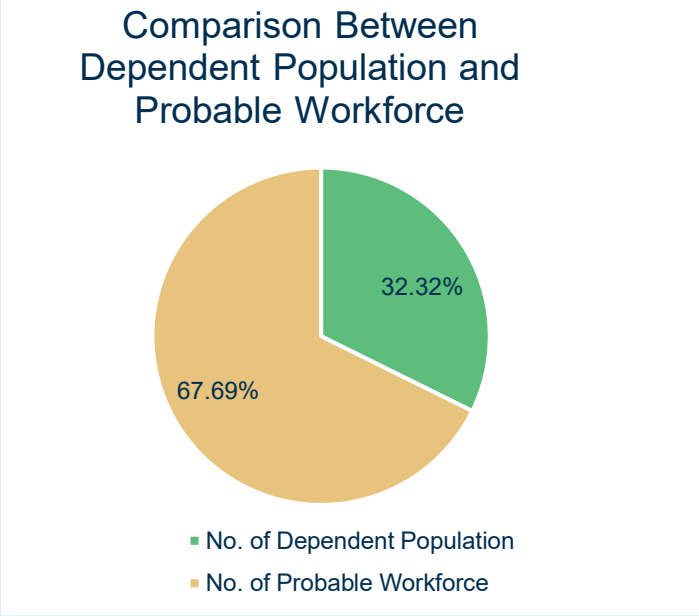


Figure 5-57: Comparison between dependent population and probable workforce.

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022)

Figure 5-58 is based on the census data and shows that probable workforce is (age between 15-64 years) 67.69% and dependent people is (age between 0-14 years and 65 years and above) 32.32%. This results in a dependency ratio of 45.81. Dependency ratio at national level was 52.63 in 2022, 73.0 in 2011, 82.70 in 2001 (Bangladesh Bureau of Statistics, 2022), so this shows that the region is showing more favourable conditions.

Table 5-25 presents the number of dependent and probable workforce and dependency ratio. The dependency ration in the study area is 45.81 *i.e.* 100 people earn and 45.81 people dependent on the income. Dependency ratio of Ward 40 & 41 of CCC is 52.32, Anowara Upazila 36.93, Karnaphuli Upazila 48.18.

Table 5-25: Number of Dependent and Probable Workforce and Dependency Ratio

Area	Number of Total Population	No. of Dependent Population (Age below 15 and age over 64 years)	No. of Probable Workforce (Age between 15 – 64 Years)	Dependency Ratio
Ward No. 40 & 41 of CCC	987	339	648	52.32
Karnaphuli	1,169	380	789	48.18
Anowara	419	113	306	36.93
Total	2,575	832	1,743	45.81

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022)

5.4.2.2 Main Source of Livelihood

According to the census data (Bangladesh Bureau of Statistics, 2022), the main sources of livelihood of the people living in the surrounding areas of the Project site are primarily linked with port-based activities, trade, transport, industrial employment, and informal urban livelihoods.

A substantial number of people also depend on small businesses, wholesale and retail trade, street vending, day labour, repair workshops, and various informal sector occupations for their income. Fishing, fish trading, dry fish processing, and boat-related activities remain important livelihood sources for some coastal and riverbank communities. In addition, industrial and service-sector employment, including work in garment factories, ship-breaking yards, restaurants, hotels, and local markets, contributes to household income in the surrounding areas (Bangladesh Bureau of Statistics, 2022).

According to the data from the socio-economic survey, the livelihoods of the communities surrounding the Laldia Char area is characterized by a mixed employment such as transport fishing, business, service[21], transport and informal urban economic activities[22]. Summary of main sources of livelihoods in the study area shown in Table 5-26.

Table 5-26: Sources of Main Livelihood in Percentage (Source: Socio-economic survey April 2026)

Main Source of Income	Total Households	Ward No. 40 & 41 of CCC	Karnaphuli	Anowara	Total
Agriculture	54	6.91 %	12.25 %	7.48 %	8.88 %
Business[23]	178	42.40 %	22.53 %	27.10 %	30.68 %
Construction work	48	6.91 %	8.70 %	10.28 %	8.63 %
Fisheries	52	4.15 %	16.60 %	0.93 %	7.23 %
Service	133	20.28 %	24.11 %	26.17 %	23.52 %
Transport	72	12.44 %	11.46 %	14.95 %	12.95 %
Port Based Livelihood	40	6.91 %	5.07 %	6.45 %	6.14 %

[21] *Service refers to those people who have a job in the service sector in the government or private sector.*
[22] *Informal economic activities refer to hawkers, vendors and other type of works that can differ per season.*
[23] *Business refers to any income-generating commercial activity operated by an individual or household in the study area. This includes, but not limited to, tea stalls, grocery shops, fish sellers, vegetable sellers, fruit vendors, roadside food stalls, mobile phone recharge, accessories shops, mobile money, hardware shops, small restaurants, etc.*

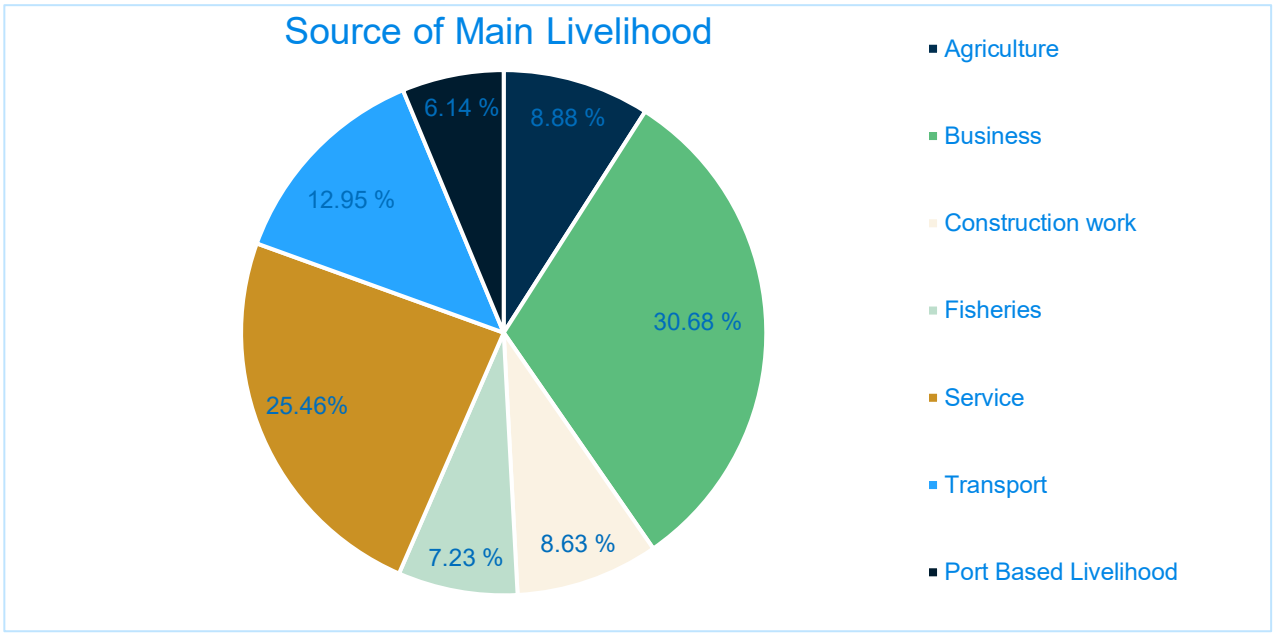


Figure 5-59: Main Source of Livelihood (socio-economic survey April 2026).

The field data indicates that business is the principal source of household income, engaging 178 households. This share is highest in CCC at 42.40%, followed by Anowara at 27.10% and Karnaphuli at 22.53%. When comparing main sources of income between male headed households and female headed households, it appears that Business is the most popular source of income for both household head categories.

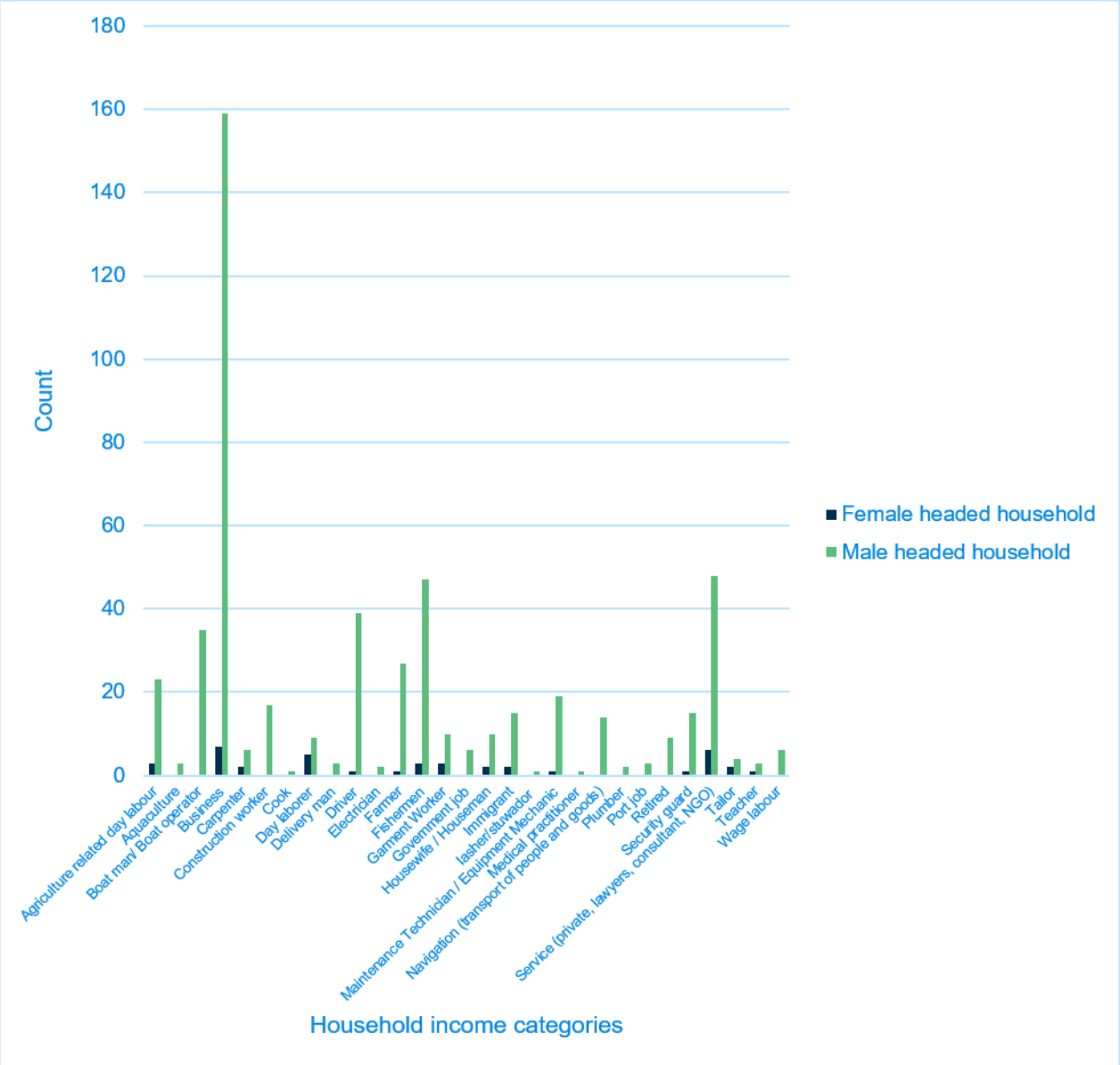


Figure 5-60: Source of Livelihood (in counts) based on socio-economic survey April 2026.

Services constitute the second-largest source of household income, accounting for 23.52% of households in the survey. Anowara records the highest share at 26.17%, followed by Karnaphuli at 24.11% and CCC at 20.28%. Transport and agriculture also contribute to household livelihoods, involving 12.95% and 8.88% households, respectively. Transport is most prominent in Anowara at 14.95%, while agriculture has the highest share in Karnaphuli at 12.25%.

Fisheries and port-based livelihoods show area-specific significance. Fisheries is comparatively higher in Karnaphuli at 16.60% but remains very low in Anowara at 0.93%. According to the FGD with fishermen, fishing has traditionally been the primary occupation of local communities in the area, with many fishermen engaged in the profession for generations. Fishing activities are mainly concentrated between *Ghat* No. 10 and *Ghat* No. 13, using traditional boats, manual nets, and

small-scale fishing activities. Most fishermen lack access to modern fishing technologies (FGD Fishermen, April 2026).

5.4.2.3 Occupation

Occupation is an indicator of the socioeconomic status of the household's members. Occupation refers to a person's primary job, where source of Livelihood refers to all the resources, activities and income sources that people use to sustain themselves. In the context of the proposed LCTP, occupation helps identify potential impacts of the Project on port workers, transport operators, fishers, traders, small business owners, and informal labourers. It also supports the preparation of suitable mitigation measures, livelihood restoration plans, skill development initiatives, and inclusive employment opportunities. Quite some occupations of people living in Laldia Char and its surrounding areas are closely linked with port-based activities, transport services, trade, fishing, and informal urban employment, according to the census data. Table 5-27 illustrates occupation of head of the households by gender of the household head.

Table 5-27: Occupation of the Head of the Household in Percentage

Occupation	Total (in percentage %)		Ward No. 40 & 41 of CCC (in percentage %)		Karnaphuli (in percentage %)		Anowara (in percentage %)	
	Male	Female	Male	Female	Male	Female	Male	Female
Business	28.78%	28.70%	41.62%	31.82%	17.96%	27.66%	28.89%	23.53%
Construction worker	4.48%	4.63%	3.47%	2.27%	5.83%	2.13%	3.33%	17.65%
Day laborer	8.32%	9.26%	6.36%	11.36%	9.71%	8.51%	8.89%	5.88%
Electrician	0.43%	-	-	-	0.49%	-	1.11%	-
Farmer	4.69%	5.56%	2.89%	2.27%	6.31%	10.64%	4.44%	-
Fisheries	10.02%	5.56%	5.20%	-	17.96%	12.77%	1.11%	-
Government job	0.85%	1.85%	-	4.55%	0.97%	-	2.22%	-
Housewife / Houseman	0.85%	7.41%	1.16%	4.55%	-	8.51%	2.22%	11.76%
Maintenance Technician / Equipment Mechanic	3.62%	2.78%	3.47%	4.55%	3.88%	2.13%	3.33%	-
Plumber	0.21%	0.93%	-	2.27%	-	-	1.11%	-

Occupation	Total (in percentage %)		Ward No. 40 & 41 of CCC (in percentage %)		Karnaphuli (in percentage %)		Anowara (in percentage %)	
	Male	Female	Male	Female	Male	Female	Male	Female
Retired	1.49%	1.85%	0.58%	2.27%	1.94%	2.13%	2.22%	-
Security guard	2.35%	3.70%	1.16%	-	3.40%	4.26%	2.22%	11.76%
Service (private, lawyers, consultant, NGO)	13.22%	23.15%	12.72%	29.55%	13.11%	14.89%	14.44%	29.41%
Tailor	1.07%	0.93%	1.16%	-	0.97%	2.13%	1.11%	-
Teacher	0.85%	-	0.58%	-	0.49%	-	2.22%	-
Transport worker	18.76%	3.70%	19.65%	4.55%	16.99%	4.26%	21.11%	-

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022).

Overall, business was the leading occupation, involving 166 (26 household heads, including 135 males and 31 females). Transport work was the second major occupation, with 92 household heads, followed by service-related employment with 87 household heads. Fisheries, day labour, farming, construction work, and maintenance-related activities also contributed to household livelihoods. For the socio-economic survey results in the CCC area, business was the dominant occupation, especially among male household heads, followed by transport work and service-related jobs. In Karnaphuli, business, fisheries, transport work, and private service were the major livelihood activities. In Anowara, business also remained the leading occupation, followed by transport work and service-related employment.

Figure 5-61 presents the occupation of household heads by gender in the study area, based on the socio-economic survey.

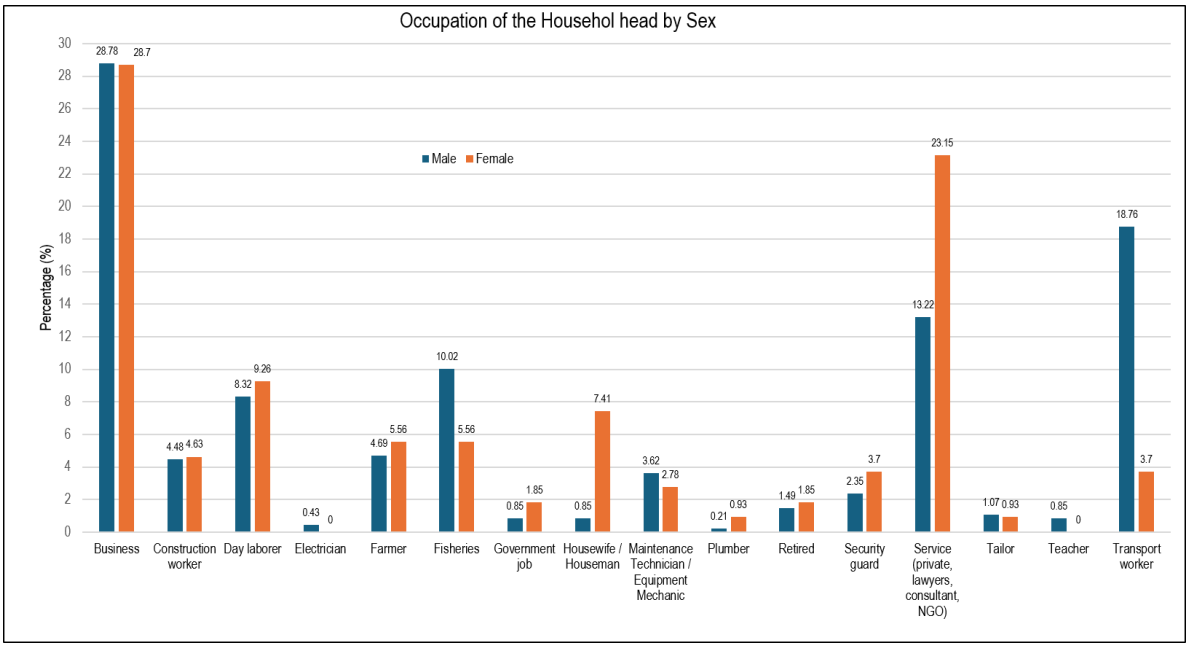


Figure 5-61: Occupation of the households' head per gender (Socio-economic survey April 2026)

Female household heads were mainly engaged in business, service-related work, day labour, housewife/houseman categories, fisheries, and farming. Their involvement was comparatively limited in technical and labour-intensive occupations such as transport work, construction, maintenance, plumbing, and security services.

Overall, the occupational pattern indicates that livelihoods of the heads of the household in the study area are mainly based on business, transport, service, fisheries, and wage-based activities. The findings also reveal a clear gender difference in livelihood engagement, where male household heads are involved in more diversified income-generating activities, while female household heads are concentrated in fewer occupational categories. Table 5-28 illustrates occupation of the households' members (age over 15 and above year) in the study area.

Table 5-28: Occupation of the of the Household Members (15 Years and Above) in Percentage

Occupation	Ward No. 40 & 41 of CCC		Karnaphuli		Anowara		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Service (private, lawyers, consultant, NGO)	8.47%	16.98%	-	-	18.18%	15.38%	6.10%	10.58%
Trade/shop keeper	19.49%	20.75%	22.18%	23.68%	20.45%	38.46%	20.85%	24.04%
Farmer	11.02%	-	13.91%	21.05%	-	7.69%	10.68%	8.65%
Agriculture related day labour	17.80%	20.75%	29.70%	-	20.45%	30.77%	23.56%	14.42%
Transport Worker	21.19%	-	8.65%	-	-	-	12.37%	-

Occupation	Ward No. 40 & 41 of CCC		Karnaphuli		Anowara		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Port Security	5.51%	-	3.76%	34.21%	-	-	3.90%	12.50%
Maintenance Technician / Equipment Mechanic	1.69%	-	7.14%	21.05%	-	-	3.90%	7.69%
Aquaculture	1.69%	-	8.65%	-	-	-	4.58%	-
Navigation (transport of people and goods)	1.69%	-	1.50%	-	-	-	1.36%	-
Carpenter	1.69%	-	1.50%	-	-	-	1.36%	-
Construction worker	3.81%	20.75%	-	-	20.45%	-	4.58%	10.58%
Medical practitioner	1.27%	-	1.50%	-	-	-	1.19%	-
Fishing	2.12%	-	1.50%	-	-	-	1.53%	-
Teacher	2.54%	20.75%	-	-	20.45%	7.69%	4.07%	11.54%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Socio-economic survey April 2026

5.4.2.4 Monthly Income of the Households

Household income plays a crucial role in various aspects of life which includes (i) standard of living: higher household income generally leads to a better standard of living, allowing families to afford better housing, healthcare, education, and other necessities; (ii) health and nutrition: adequate income ensures access to nutritious food and healthcare services, leading to better overall health and well-being; (iii) education: families with higher income can invest more in their children's education, providing them with better opportunities for the future; (iv) economic stability: stable and sufficient income helps households manage financial risks and uncertainties, reducing the likelihood of falling into poverty; (v) social mobility: higher income can provide opportunities for upward social mobility, enabling families to improve their socioeconomic status over time.

The survey findings also indicate that the study population is predominantly composed of low- to middle-income households, with limited representation of higher-income groups. Anowara appears comparatively more vulnerable due to a higher proportion of low-income households, while Karnaphuli shows a slightly better income profile due to a larger share in the BDT 20,001–30,000 income range. Do note that the upper poverty line in Bangladesh lies at 22,739 BDT per month, and the lower poverty line at 19,635 BDT per month. That means that approximately 55% of the interviewed population lives below the poverty line in the area.

Table 5-29: Average Monthly Income of the Households

Income Range	CCC	Karnaphuli	Anowara	Total

	No.	%	No.	%	No.	%	No.	%
BDT 6001 – 12,000	29	13.36%	11	10.28%	49	19.37%	89	15.42%
BDT 12,001 – 20,000	96	44.24%	42	39.25%	92	36.36%	230	39.86%
BDT 20,001 – 30,000	60	27.65%	39	36.45%	67	26.48%	166	28.77%
BDT 30,001 – 50,000	24	11.06%	11	10.28%	36	14.23%	71	12.31%
BDT More than 50,000	8	3.69%	4	3.74%	9	3.56%	21	3.64%

Source: Socio-economic survey April 2026

Table 5-29 illustrates again how most of the households fall within the lower-middle income groups. Out of 577 households, the highest proportion, 39.86%, reported a monthly income of BDT 12,001–20,000, followed by 28.77% in the BDT 20,001–30,000 range.

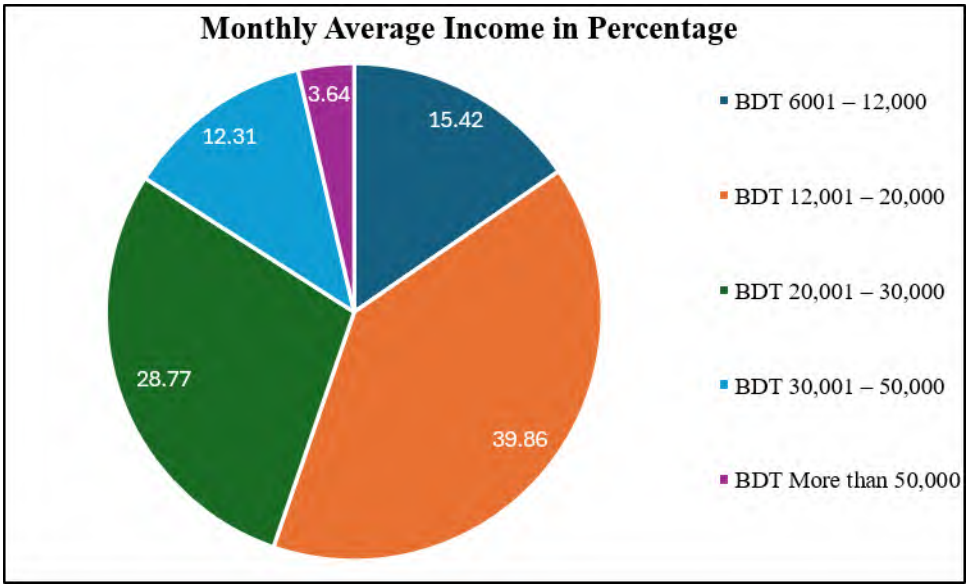


Figure 5-62: Monthly Income in Percentage (source: socio-economic survey April 2026)

5.4.2.5 Monthly Expenditure of the Households

Spending on essential needs like food, housing, healthcare, and education directly impacts the quality of life and well-being of family members. The socio-economic survey does not directly provide information on the amount that people are spending on a monthly basis. This table is therefore based on an analytical proxy calculated based on income, aligning with the census data based (Bangladesh Bureau of Statistics, 2022) findings where national average monthly expenditure (Tk. 31,500) constitutes roughly 97% of average monthly income (Tk. 32,422).

Table 5-30: Average Monthly Expenditure of the Households in Percentage

Area	Ward No. 40 & 41 of CCC		Karnaphuli		Anowara		Total	
	No.	%	No.	%	No.	%	No.	%

6001 – 12,000 BDT	42	19.35%	67	26.48%	21	19.63%	130	22.53%
12,001 – 20,000 BDT	95	43.78%	91	35.97%	37	34.58%	223	38.65%
20,001 – 30,000 BDT	52	23.96%	59	23.32%	35	32.71%	146	25.30%
30,001 – 50,000+ BDT	21	9.68%	29	11.46%	10	9.35%	60	10.40%
More than 50000 BDT	7	3.23%	7	2.77%	4	3.74%	18	3.12%
Grand Total	217	100.00%	253	100.00%	107	100.00%	577	100.00%

Source: Calculation based on socio-economic survey April 2026

The table above shows the average monthly expenditure of households in the study area. Among 577 households, the highest proportion (38.65%) spent between 12,001 and 20,000 BDT per month. This was followed by 25.30% of households spending 20,001–30,000 BDT and 22.53% spending 6,001–12,000 BDT. Households with monthly expenditure above 30,000 BDT were presenting the smallest group.

5.4.2.6 Poverty Level

Poor households often have limited income, low savings, insecure employment, poor housing conditions, and inadequate access to health, education, sanitation, and other basic services. Therefore, their capacity to cope with displacement, livelihood disruption, increased living costs, or restricted access to resources is usually lower.

For the LCTP, poverty is particularly important for understanding the condition of low-income groups such as informal, garments workers, labourers, fishers, transport workers, small traders, and daily wage earners. It helps identify households that may require special support through livelihood restoration, skill development, employment opportunities, or social protection measures.

In Bangladesh, the Food Poverty Line (FPL) is commonly used by the Bangladesh Bureau of Statistics in poverty assessments and HIES. Households whose income or consumption falls below the FPL are generally considered extremely poor, as they are unable to meet minimum food and nutritional requirements.

From a socioeconomic perspective, the FPL is important because it helps identify highly vulnerable populations who may be more severely affected by livelihood disruption, income loss, food insecurity, or increased living costs due to development projects. The FPL differentiates between two levels: the upper poverty line and the lower poverty line. The upper poverty line is the income or consumption threshold required to meet minimum food needs as well as basic non-food needs such as clothing, housing, health care, education and transport. People whose income or consumption falls below this line are considered poor. Upper poverty means a condition where a household can hardly meet basic food and essential non-food needs but may not be as severely deprived as those below the lower poverty line. Lower poverty means a condition where a household cannot properly meet even its minimum food requirements and faces severe deprivation in basic living needs.

The lower poverty line is the minimum income or consumption level required to meet only basic food needs, with very limited or no capacity to meet essential non-food needs such as housing, clothing, health care, education and transport. People whose income or consumption falls below this line are considered extremely poor. Considering this FPL has been adopted for LCTP to identify the lower and upper poverty level. The upper poverty line is 18.7% and lower poverty line 5.6% (Bangladesh Bureau of Statistics, 2022).

There were no indicators found in the primary and secondary data sources regarding the amount of people living under the FPL level in the AoI. However, the survey findings do indicate that the study population is predominantly composed of low- to middle-income households, with limited representation of higher-income groups. Anowara appears comparatively more vulnerable due to a higher proportion of low-income households, while Karnaphuli shows a slightly better income profile due to a larger share in the BDT 20,001–30,000 income range. The upper poverty line in Bangladesh lies at 22,739 BDT per month, and the lower poverty line at 19,635 BDT per month. The categories were not indicated so clearly in the socio-economic survey, but when one rounds both the numbers to 20,000 it appears that approximately 55% of the interviewed population lives below the poverty line(s) in the area.

Table 5-31: Average Monthly Income of the Households

Income Range	CCC		Karnaphuli		Anowara		Total	
	No.	%	No.	%	No.	%	No.	%
BDT 6001 – 12,000	29	13.36%	11	10.28%	49	19.37%	89	15.42%
BDT 12,001 – 20,000	96	44.24%	42	39.25%	92	36.36%	230	39.86%
BDT 20,001 – 30,000	60	27.65%	39	36.45%	67	26.48%	166	28.77%
BDT 30,001 – 50,000	24	11.06%	11	10.28%	36	14.23%	71	12.31%
BDT More than 50,000	8	3.69%	4	3.74%	9	3.56%	21	3.64%

Source: Socio-economic survey April 2026, numbers under approximate poverty line indicated in red.

5.4.3 Physical Infrastructure and Services

In this chapter, the socio-economic indicators that are linked to the physical infrastructure and services in the area are described.

5.4.3.1 Current road infrastructure and traffic

This chapter includes a summary of the Traffic Impact Study (Haskoning, 2026), which includes more detailed information.

The LCTP surrounding road network consists of one major northeast-southwest corridor, which forms the primary connection to the wider road network. Based on the Traffic Survey (IWM, 2026), the majority of traffic in the area currently originates from the northeast and is destined towards

the southern part of the network. The corridor consists of the Airport Road and VIP Road and runs alongside Chattogram International Airport (see Figure 5-63:).



*Figure 5-63: Main road structure surrounding LTCP – including junction type at main junctions. *RiRo = Right-in, Right-out*

The corridor passes along and intersects two main urban areas that include residential functions and local amenities. At the north-eastern side of the airport along the Airport Road, the road runs along the edge of the urban area. Most residential and commercial functions are located on one side of the road, which reduces the need for pedestrians to cross the carriageway. In this section, the road primarily functions as an access route serving the adjacent area.

At the south-western side of the airport, the VIP Road divides the urban area into two parts. Residential areas and local facilities are present on both sides of the road, resulting in a higher demand for crossing movements. The corridor has priority over the connecting side roads and functions as the main road traffic artery in the area. Intersections along the route consist of priority-controlled junctions, right-in/right-out (RIRO[24]) connections supported by U-turn facilities in the central median, a roundabout and one uncontrolled intersection[25].

The Airport Road and VIP Road corridor consists of a dual carriageway with two lanes in each direction, separated by a central median (source: site visit by Haskoning and Google Street View). This configuration provides relatively high road capacity (for the calculation, see Figure 5-64:) and contributes to road safety by separating opposing traffic flows and enabling safer overtaking of heavy vehicles. In addition, the presence of a central median provides a safe stop for crossing pedestrians, allowing for two-stage crossings.



Figure 5-64: Airport Road design with 2 lanes in each direction and a central median (Streetview, 2024)

Roadside activities with on-street parking are observed along certain sections of the road, particularly in more urban areas where commercial activities are present (see figure below). On-street parking reduces the effective capacity of the road and introduces local disturbances to traffic

[24] *A right-in/right-out (RIRO) intersection allows vehicles to only turn right when entering or exiting a roadway, improving safety and traffic flow.*
[25] *An uncontrolled intersection is a junction without traffic lights, stop signs, or yield signs dictating the right-of-way, requiring drivers to rely on standard traffic rules and caution.*

flow. It also poses safety risks, as stationary vehicles on the carriageway increase the likelihood of rear-end collisions, while boarding and alighting on the right side of the vehicle goes without physical separation from through traffic.

The accessibility of emergency services, such as ambulances, police and fire brigades, to both the communities and the LCTP site are crucial to meet safety regulations. According to the respondents in the Socio-Economic Survey, there are some emergency facilities close to the project site, but these often lack the capacity or specialism to deal with larger emergencies. For example, there are plenty of pharmacies in the area of influence (AoI) who can support with minor medical treatments, but all government owned hospitals are more than 5 kilometers away. The conservative assumption used in this analysis is that the police, ambulances and fire brigades need to come from outside the AoI (5 kilometers buffer around the project site) towards any emergency, resulting in the need to have enough capacity on the road network to facilitate these vehicles.

Road traffic counts

Road traffic counts were conducted in April 2026 by IWM. The counts provide insights into the current traffic volumes on the network. The traffic count locations were on both the Airport Road (location 1) and on both sides of the VIP Road (location 2). Figure 5-65: shows the results on a typical workday and weekend day on both locations. Peak hour traffic volumes are relatively moderate for a 2x2 lane road. The morning peak hour traffic volume (08:00–09:00) reaches approximately 900 vehicles/hour, while the evening peak hour (17:00–18:00) reaches approximately 1,140 vehicles/hour. The absolute busiest hour is observed between 18:30 and 19:30, with a volume of approximately 1,320 vehicles/hour.

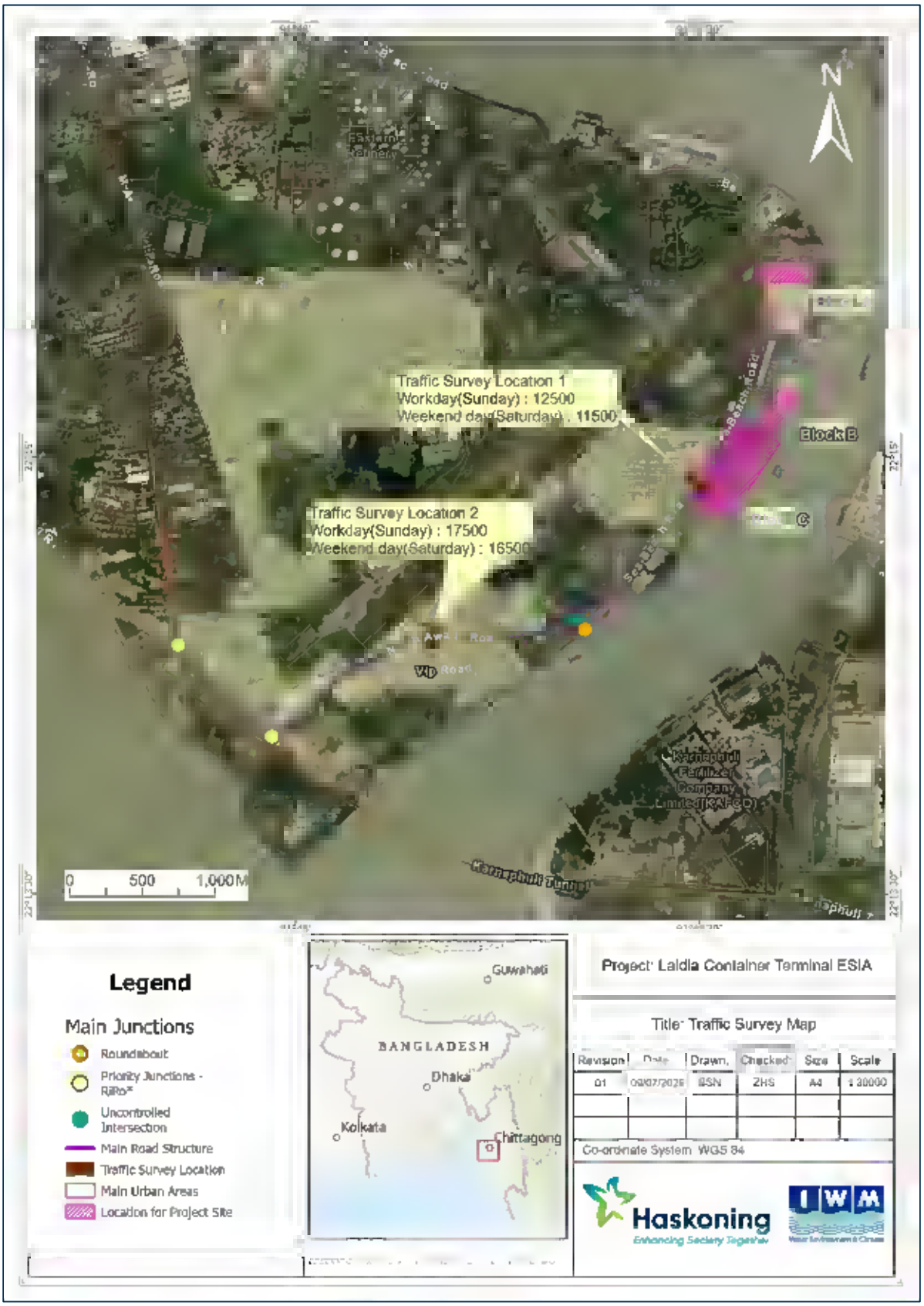


Figure 5-65: Traffic volumes in vehicles/day.

V/C ratio

The Volume-to-Capacity (V/C) ratio is a commonly used indicator in road traffic engineering to assess the level of utilisation of a road section. It is defined as the ratio between the traffic volume (V) and the available road capacity (C). Road traffic volume is typically expressed in Passenger Car Units per hour (PCU/h), a standard traffic engineering measure that converts different vehicle types into equivalent passenger cars based on their impact on traffic operations. For example, heavy vehicles generally have a higher PCU value (e.g. 2.3) than motorcycles (e.g. 0.3), reflecting their greater effect on road traffic flow and road space requirements.

The road capacity of the corridor (VIP Road and Airport Road) can be estimated based on standard values for urban arterial roads. The dual carriageway (2×2 lanes) is assumed to provide an effective capacity of approximately 2,200 PCU/hour per direction.

This is a conservative assumption. Under ideal conditions, international guidance such as the Highway Capacity Manual (HCM) indicates that roads of this type can accommodate approximately 3,800–4,400 vehicles per hour per direction. However, the Airport Road / VIP Road corridor does not operate under ideal conditions. On-street parking is present at several locations, roadside activities occur along parts of the route, operating speeds are relatively low, and traffic consists of a mix of vehicle types, including heavy vehicles and non-motorised traffic. Furthermore, junctions, access points, and adjacent developments regularly interrupt road traffic flow.

These factors reduce the practical capacity of the road compared to its theoretical capacity. To account for local conditions and to ensure a prudent assessment, a capacity of 2,200 PCU/hour per direction has been adopted. This represents a conservative assumption (50% capacity of the international guideline from the HCM) and reflects a realistic worst-case operating condition for the corridor.

Crossability pedestrians

Waiting times for pedestrians can be calculated using road traffic engineer tools/formulas. Based on a road traffic flow, width of the road and typical pedestrian behavior (i.e. walking speed), a calculation is made which results in the average waiting time for a pedestrian to cross the road. A higher waiting time results in pedestrians who are willing to take more risks to cross the road.

Table 5-32: Level of Service

Average waiting time	Level of Service / classification
0 – 5 sec.	Very good
5 – 10 sec.	Good
10 – 15 sec.	Acceptable
15 – 30 sec.	Moderate
> 30 sec.	Very Poor

The assessment indicates a good to very good level of Pedestrian permeability under current traffic conditions.

Table 5-33: Pedestrian permeability

Vehicle	Current situation	
Location	AM	PM
Traffic count 1	3 sec	3 sec
Traffic count 2	3 sec	8 sec

Pedestrian crossing conditions are considered acceptable under the current traffic situation, as waiting times are acceptable on both locations.

5.4.3.2 River Traffic

River Crossing Boats at *Ghat* No. 14

A field survey was done May 2026 by IWM to identify the baseline setting. In addition, stakeholder consultations were conducted and secondary data was assessed. *Ghat* No. 14, locally known as Balur Tal, is the principal river-crossing point closest to the proposed terminal. It connects Laldia on the northern bank with Badarpura *Ghat* on the opposite bank near Anwara Upazila. CUFL *Ghat* is located downstream on the opposite bank, approximately opposite *Ghat* No. 15. These crossings are important because they create frequent transverse movements across the main river traffic corridor.

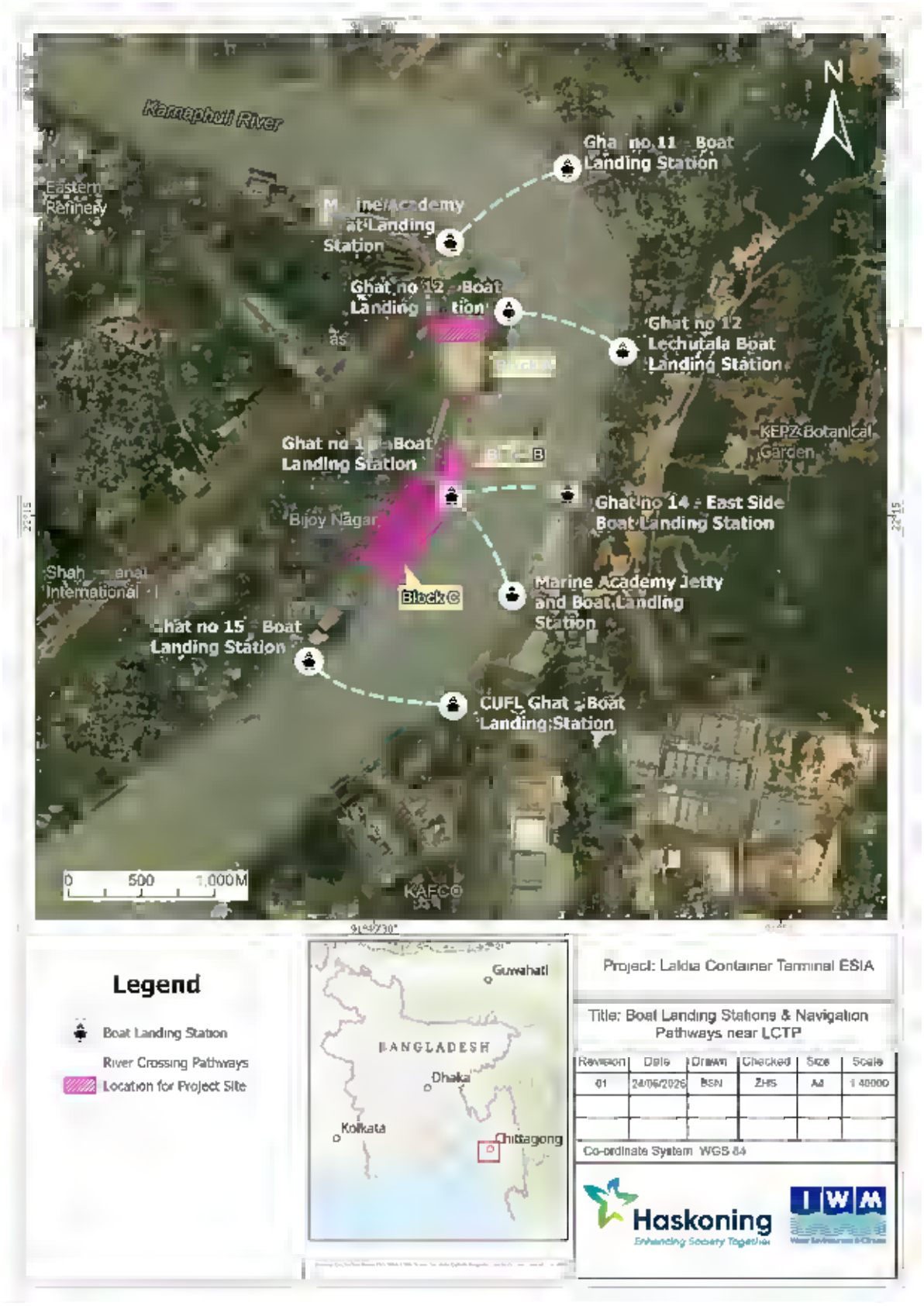


Figure 5-66: Survey locations and current river crossing boat landing stations near LCT. Survey locations were at Ghat no 14 – Boat Landing Station and at Ghat no 15 – Boat Landing Station.

The crossing service uses a small fleet of motorized wooden boats and operates daily between approximately 05:00 and 22:00. Consultation information indicates that the crossing normally serves about 3,000 passengers per day, with higher demand during major religious festivals. The May 2026 survey recorded 308 boat movements and 4,167 passengers on Thursday 7 May, and 206 boat movements and 2,795 passengers on Friday 8 May.

The difference between the two survey days is consistent with weekday demand patterns. The lower Friday count reflects reduced commuter activity associated with weekly closures in the garment and industrial sectors. This confirms that crossing activity is not constant through the week and should be treated as demand-led rather than fixed.

The day-wise crossing totals are shown in Table 3-1.

Date	Arrivals	Departures	Total Boat Movements	Total Passengers
7 May 2026 (Thursday)	2,806	1,361	308	4,167
8 May 2026 (Friday)	1,451	1,344	206	2,795

Table 5-34: River Crossing Boats at Ghat No. 14 - Day-wise River Crossing Boat Movements at Ghat No. 14 (Survey: 7–8 May 2026)

The hourly survey record indicates a morning peak around 08:00-09:00 and a broader evening peak between approximately 17:00 and 21:00. These peak periods are important for the risk assessment because they coincide with times when frequent crossing movements may interact with commercial vessel transits, construction craft or manoeuvring vessels.





Figure 5-67: Ghat 14 top left and right (between block B and C), Ghat 15 bottom left, and CUFL Ghat (Opposite to Ghat No 15) bottom right

Traffic pattern and tidal influence

The survey indicates that local and commercial movements are not evenly distributed across the day. River-crossing activity follows commuter and worker demand, while larger commercial vessel movements are influenced by tidal windows, port operating requirements and pilotage arrangements. This produces periods of increased interaction intensity rather than a simple constant traffic load.

The figures retained below illustrate the relationship between observed movement patterns and tidal conditions. They should be read as indicative because the survey covered a short period. They are useful for identifying interaction mechanisms but should not be used alone to define long-term seasonal or peak traffic conditions.

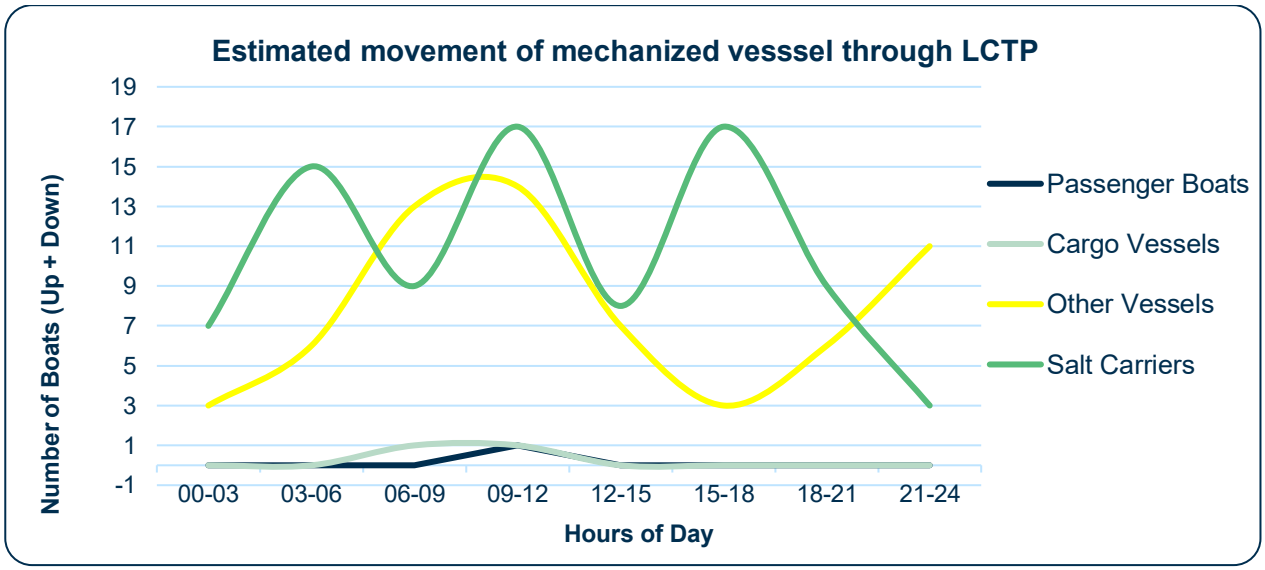


Figure 5-68: Estimate movement of mechanized vessels

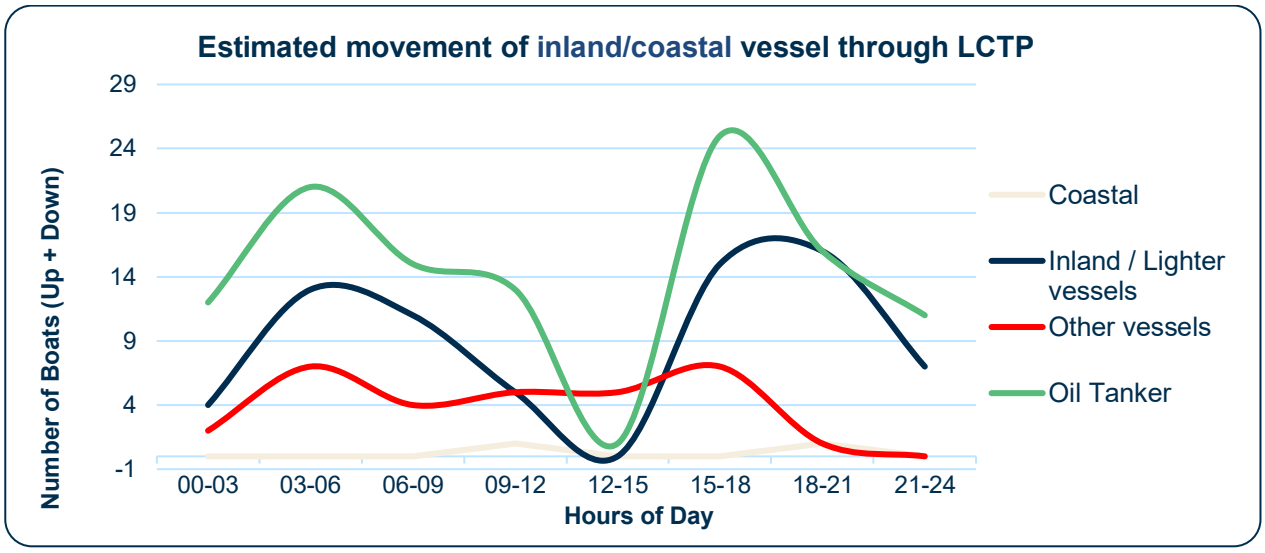


Figure 5-69: Estimated movement of inland/coastal vessel

Based on the survey results, an average estimate has been developed to provide a baseline indication of river traffic generated by mechanized boats and inland/coastal vessels. The estimate was derived by combining upstream and downstream vessel movements recorded during each survey period and calculating the average traffic volume. As complete 24-hour vessel movement data were available for only two survey days, the estimate relies on these datasets to establish a representative baseline of existing navigation activity in the study area.

5.4.3.3 Type of Main Dwelling

Type of main dwelling is an important indicator of socioeconomic condition, living standard, and vulnerability of households within the study area. The nature of housing provides information on structural durability, construction materials, access to basic services, land tenure status, and the overall quality of life of the population.

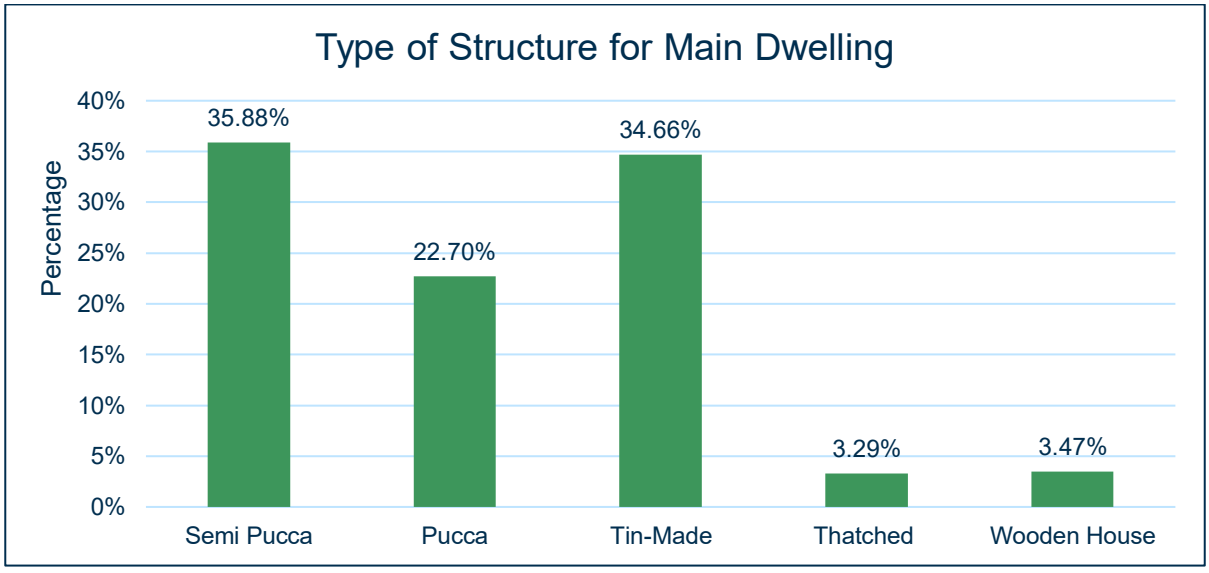


Figure 5-70: Type of Structure for main dwelling

The following images show examples of the different types of building structures:



Figure 5-71: Example of a Semi Pucca structure



Figure 5-72: Example of a Pucca structure



Figure 5-73: Example of a tin made structure (floor paved)



Figure 5-74: Example of a tin made structure (floor unpaved)



Figure 5-75: Example of a thatched structure



Figure 5-76: Example of a wooden house[26]

Table 5-35 shows the structure used for main dwelling of the household's member of the study area.

[26] *Retrieved from Alamy: https://c8.alamy.com/comp/2YYYDM3/traditional-wooden-houses-of-bangladesh-2YYYDM3.jpg.*

Table 5-35: Type of Structure Used for Living of Household Members

Type of Structure	Ward No. 40 & 41 of CCC		Anwara		Karnaphuli		Total	
	No	%	No	%	No	%	No	%
Semi Pucca	84	38.71%	51	47.66%	72	28.46%	207	35.88%
Pucca	57	26.27%	26	24.30%	48	18.97%	131	22.70%
Tin-Made	67	30.88%	25	23.36%	108	42.69%	200	34.66%
Thatched	7	3.23%	4	3.74%	8	3.16%	19	3.29%
Wooden House	2	0.92%	1	0.93%	17	6.72%	20	3.47%

Source: Socio-economic survey April 2026

Among 577 households, semi-pucca structures were the most common, which cover 35.88%, followed by tin-made structure 34.66% and pucca structure 22.70%. In CCC, semi-pucca structures are the highest at 38.71%, followed by tin-made houses at 30.88% and pucca structures at 26.27%. In Anowara, semi-pucca houses were also dominant, accounting for 47.66% of structures. In Karnaphuli, tin-made houses were the most common, representing 42.69% of households, followed by semi-pucca houses at 28.46%. However, spatially there are no aggregations of similar house structures visible, based on the Socio-Economic Survey results and the site visit, within the neighbourhoods nor between the different regions. It can therefore not be concluded which areas are more or less vulnerable, purely based on the Socio-Economic Survey results of the dwelling structures.

Overall, the findings indicate that semi-pucca and tin-made structures are the dominant types of housing in the study area, reflecting mixed structures conditions. The relatively higher share of pucca houses in CCC indicates better housing quality as pucca houses are in general more durable, while the dominance of tin-made houses in Karnaphuli suggests comparatively less quality housing conditions.

5.4.3.4 Electricity Connection of Households

Household electricity connection helps identify disparities in service access, assess the level of infrastructure development, and understand the vulnerability of communities that may have limited or unreliable electricity supply. This information is important for evaluating potential impacts on utility services and for planning appropriate mitigation and community development measures.

Availability of electricity supports daily activities such as lighting, cooking, refrigeration, use of electronic devices, access to information, and operation of small businesses or income-generating activities. It also contributes to better educational opportunities for children and improves access to communication and emergency services.

According to the socioeconomic survey findings, almost 100.00% households have electricity connection in the study area. Among them only 2 households (0.35%) have no electricity connection with national grid but enjoying electricity from solar system.

Table 5-36: Source of Electricity in the Households

Area	National Grid		Solar System		Total	
	No.	%	No.	%	No.	%
Ward No. 40 & 41 of CCC	216	99.54%	1	0.46%	217	100.00%
Karnaphuli	252	99.60%	1	0.40%	253	100.00%
Anowara	107	100.00%	0	-	107	100.00%
Total	575	99.65%	2	0.35%	577	100.00%

Source: Socio-economic survey April 2026

5.4.3.5 Population owning a Mobile Phone

In Bangladesh, ownership of a mobile phone is an important socioeconomic indicator, as it reflects access to communication, information, services, and economic opportunities. Mobile phones have become an essential part of daily life by enabling communication among family members, access to emergency support, business transactions, employment opportunities, education, and social interaction. Mobile phone access also supports the use of digital services such as mobile banking, online payments, internet communication, weather forecasts, market information, and access to government and healthcare services.

In CCC about 62.65% use mobile phone of the total population, while this value is lower at 47.49% in Karnaphuli and 46.11% Anowara Upazila (Bangladesh Bureau of Statistics, 2022).

Table 5-37 shows the gender-wise distribution of the population aged 15 years and above having mobile phones in the study area. A total of 607 mobile phones users were recorded, of which 68.70% users were male and 31.30% users were female. This finding shows that mobile phone use is considerably higher among males. Among the study area, Anowara recorded 66.42% males and 33.58%. Karnaphuli Upazila had the highest number of users, with 71.75% were male 28.25% were female. CCC Upazila recorded males 66.18% females 33.82%.

Table 5-37: Population Having Mobile Phone Account (15 Years and above) in Percentage

Area	Male (in percentage %)	Female (in percentage %)
Ward No. 40 & 41 of CCC	66.18%	33.8%
Karnaphuli	71.75%	28.3%
Anowara	66.42%	33.6%
Total	**68.70%**	**31.3%**

Source: Population and Housing Census 2022, Community Report, Bangladesh Bureau of Statistics, Statistics and Information Division, Ministry of Planning

5.4.3.6 Internet Users

In Bangladesh, internet use is considered an important socioeconomic indicator, as it reflects the level of access to information, communication, education, digital services, and economic opportunities. Internet connectivity contributes significantly to knowledge sharing, online communication, business operations, access to government services, and overall social and economic advancement.

In CCC about 49.67% people use internet of the total population while in Anowara 30.74% and Karnaphuli 32.56% respectively (Bangladesh Bureau of Statistics, 2022).

Access to the internet enables people to use online education platforms, digital banking services, e-commerce, telemedicine, employment information, weather forecasts, market updates, and social networking applications. It also facilitates communication through email, social media, and various internet-based platforms, which have become increasingly important in both urban and rural communities. Table 5-38 describes the internet user (age above 15) in the study area. Of the total internet users in Chattogram district is 50.82% while male 59.54% and female 42.43%.

Table 5-38: Internet Users (15 Years and above)

Area	Male (in percentage %)	Female (in percentage %)	Total (in percentage %)
Ward No. 40 & 41 of CCC	59.02%	40.98%	100.00%
Karnaphuli	64.94%	35.06%	100.00%
Anowara	61.85%	38.15%	100.00%
Total	**62.48%**	**37.52%**	**100.00%**

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022).

Among the study area, CCC recorded 59.02% male and 40.98% % internet users, this indicates comparatively better female participation in internet use within the urban area. Karnaphuli Upazila had the highest percentage of internet users. Among them, 64.94% were male and 35.06% were female users, showing a clear dominance of male internet users. In Anowara Upazila, 44.48% internet users were recorded, including 61.85% male users and 38.15% female users. Overall, internet use among people aged 15 years and above is higher among males in all surveyed areas, while female internet use is relatively better in CCC and Anowara compared to Karnaphuli.

5.4.4 Gender

In the LCTP area, women, female-headed households, low-income households, women with limited education, and women engaged in informal or small-scale livelihood activities may face particular vulnerabilities. These groups may have lower access to formal employment, less participation in public decision-making, and limited capacity to cope with livelihood disruption, relocation, increased traffic, labor influx, or changes in community access.

Women empowerment is very important for economic growth, health and education, social justice, sustainable development etc. Participation in decision making is also important for better outcomes and sustainable development of the household.

The following information was retrieved from the Socio-Economic Survey Report and FGDs. The gender distribution between household members was nearly balanced, with 1,298 males (50.41%) and 1,277 females (49.59%). No respondents identified as third gender by the survey.

18% of the respondents identified as woman, and the other 81% as man. However, that does not necessarily mean that these people were the head of the households, as they may not have been at home at the time of the survey. Seven percent of the respondents mentioned living in a female headed household (40 respondents in total), compared to 93% living in a male headed household (537 respondents in total). The indicator of male or female headed household will be used to identify differences between the genders, based on the survey results.

As can be seen in the image Figure 5-77:, both male headed and female headed households live mostly in houses with a household size of 3-5 people or 6-10 people. There is little difference in the distribution.

Table 5-39: Household size distribution per gender as head.

Household Size	Male headed (in percentage %)	Female headed (in percentage %)
3 to 5	71%	73%
6 to 10	25%	25%
More than 10	4%	3%

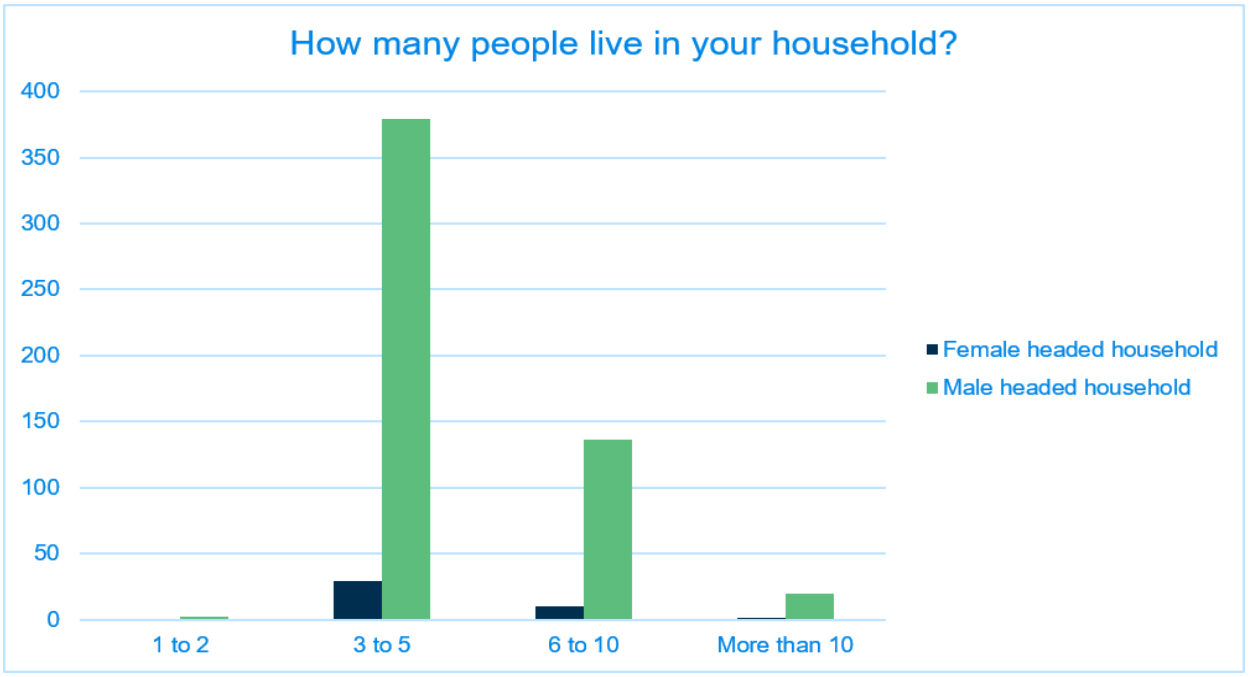


Figure 5-77: People living in the household, separated by male and female headed households.

When it comes to the highest level of education followed by the household head, it is apparent that female heads of households are more likely to have not had any education, or education below the level of SSC, compared to men. Male headed households are more likely to have received most of the other levels of education, except for the ability to be able to only read (not write), which is also where female heads of the households are relatively more present. This is visualized in Figure 5-78:. These gender differences indicate a vulnerability that female headed households face more difficulties in receiving education, resulting in additional needs for proper communication styles to be able to reach these women of the female headed households.

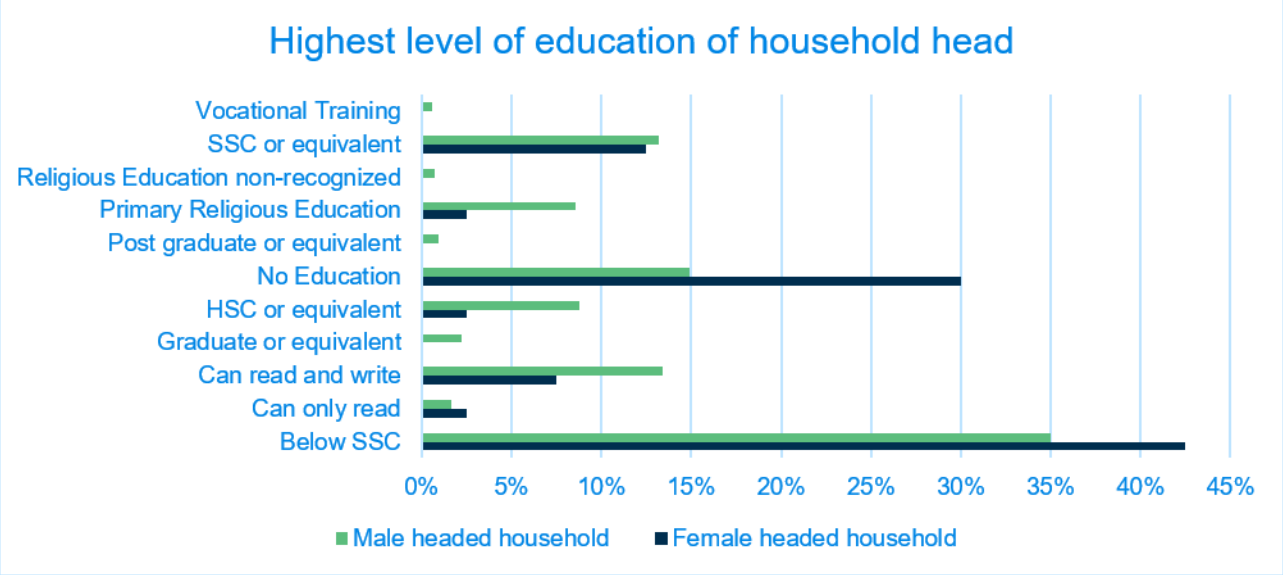


Figure 5-78: Highest level of education followed by male and female headed households.

Comparing these values to the highest levels of education of household members, female headed households surpass men when it comes to the levels: “Below SSC”, “Primary Religious Education”, “No Education”, “Can read and write” and “can only read”. Both male and female headed household members are more likely to have received HSC or equivalent than the household heads were. Relatively, male headed households are more prevalent in the higher levels of education than female headed households, while female headed households are more prevalent in lower levels of education, compared to men.

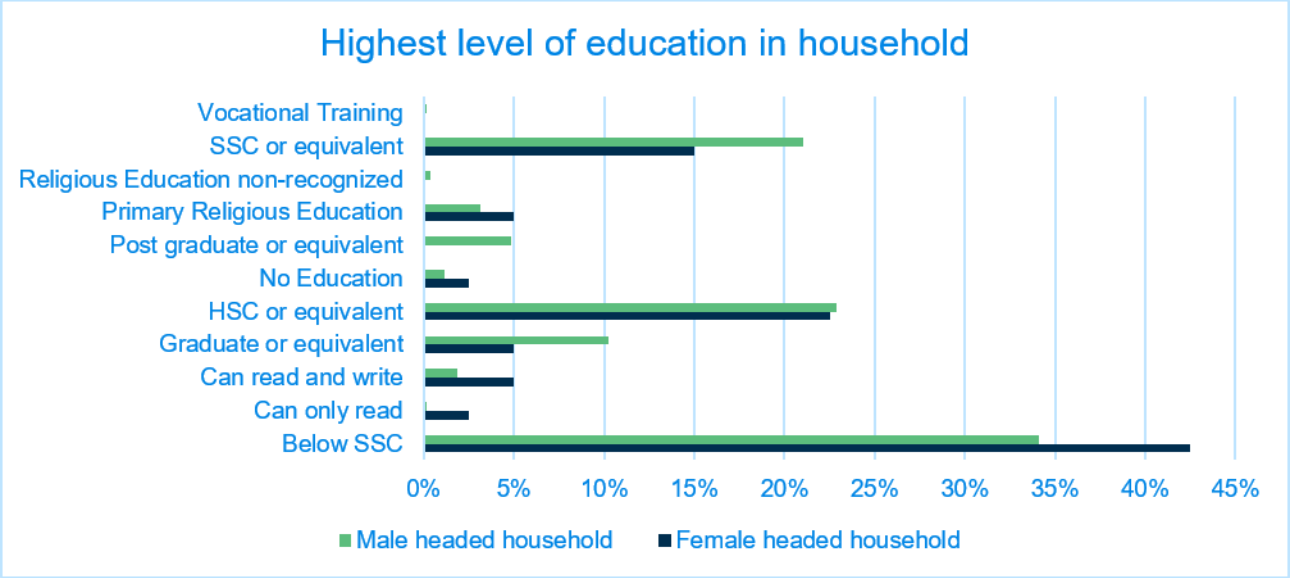


Figure 5-79: Highest level of education followed by household members of male and female headed households.

Looking at source of income for the household, it appears that male headed households are more likely to get their main source of income from a diversity of income sources, of which Business and the Service industries are most pronounced. Sources of income of female headed households, on the other hand, are found in agriculture, business, day labourers, fisheries and agriculture, and the service industry. Locations where more female headed households get their income from compared to men are in agriculture, carpenters, day labourer, garment workers, housewife/man, immigrant[27], service industry, tailors and teachers. Based on the number of households that are part of this analysis under female headed households, it can be argued that no hard conclusions can be drawn on the income diversification differences between male and female headed households.

[27] *Immigrants refer to expatriate workers.*

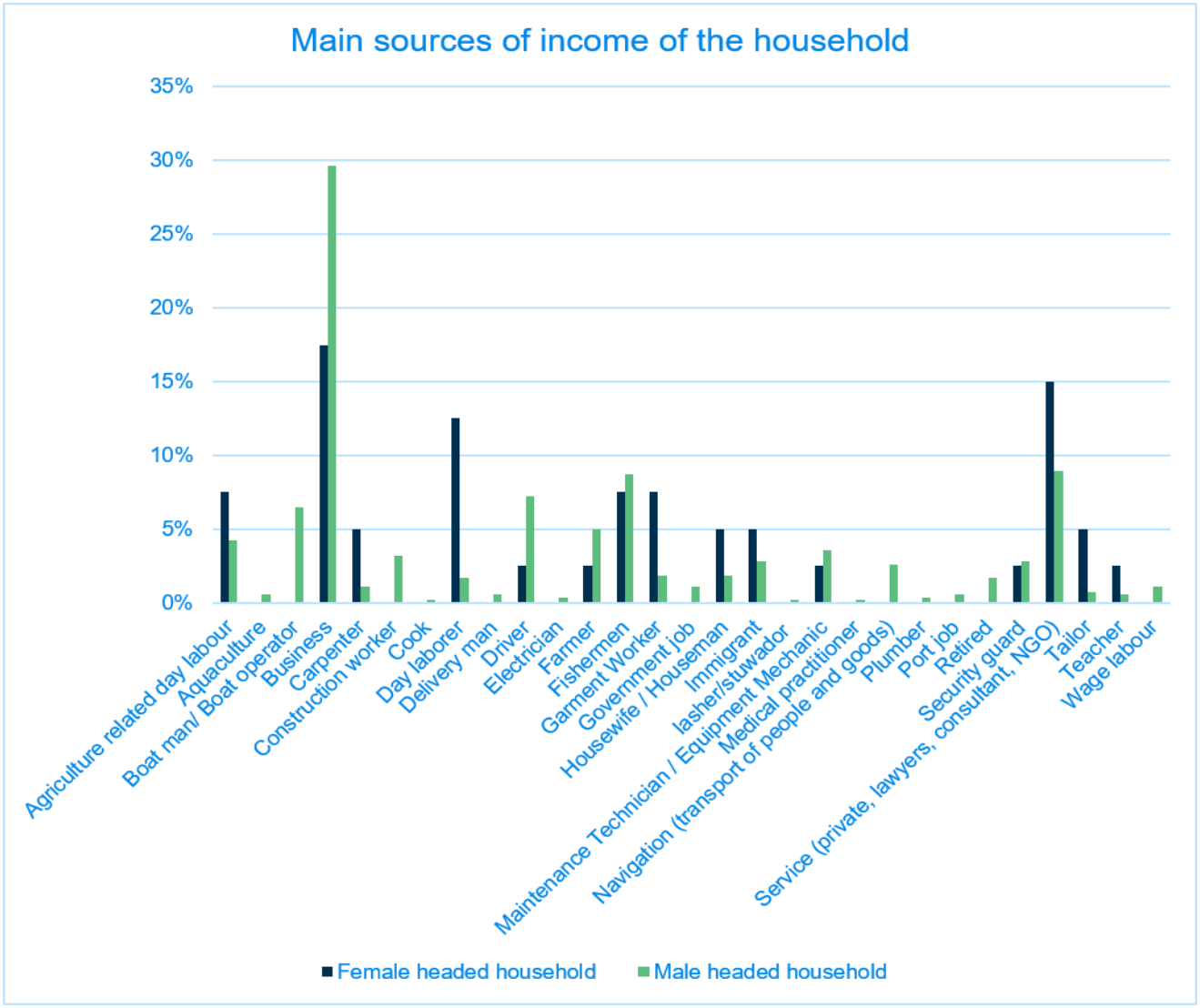


Figure 5-80: Main sources of income per household.

There are differences visible when it comes to total monthly income per household, as can be seen in Figure 5-81:. Female headed households are more present in the lower ends of the monthly income of the households, while male headed households are more present in the higher ends of the income levels. It can be concluded from this graph that the incomes of female headed households are more likely to be on the lower end compared to male headed households, which is an indicator that female headed households are more vulnerable than male headed households. It was also mentioned in the FGD that women's participation in income-generating activities still remains limited, with most women engaged in household responsibilities.

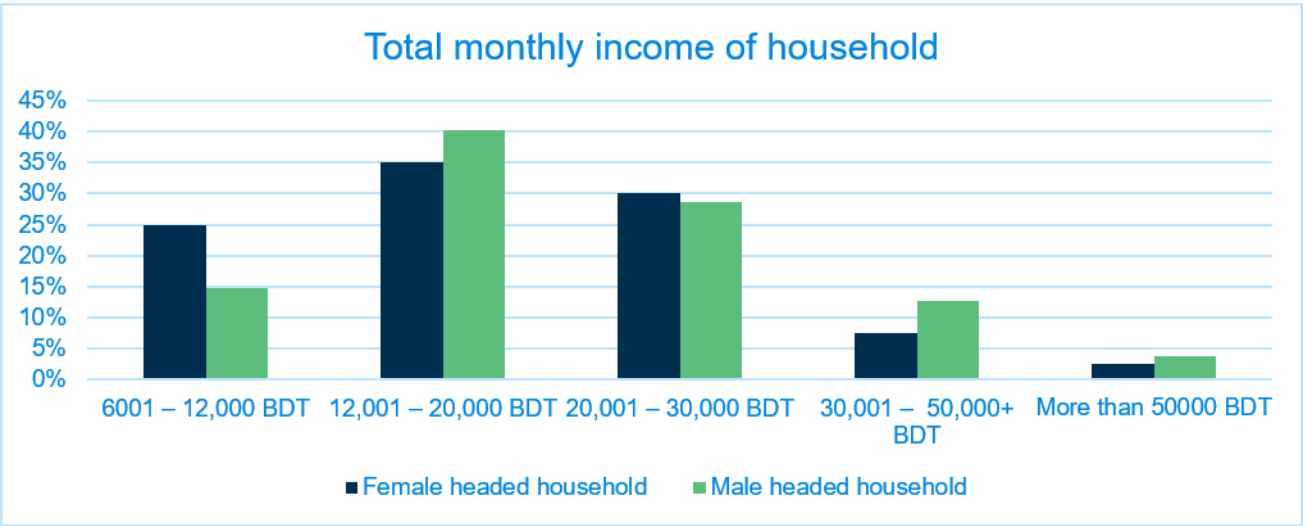


Figure 5-81: Total monthly income of household

Land ownership provides an economic indicator apart from income. As can be seen in Figure 5-82:, female headed households are more likely to live on rented land, compared to men. Both are predominantly owners of the land they live on. This is again an indicator that female headed households may have less resources and are therefore more vulnerable in an economic sense, compared to male headed households. A similar pattern is observed when comparing with house ownership.

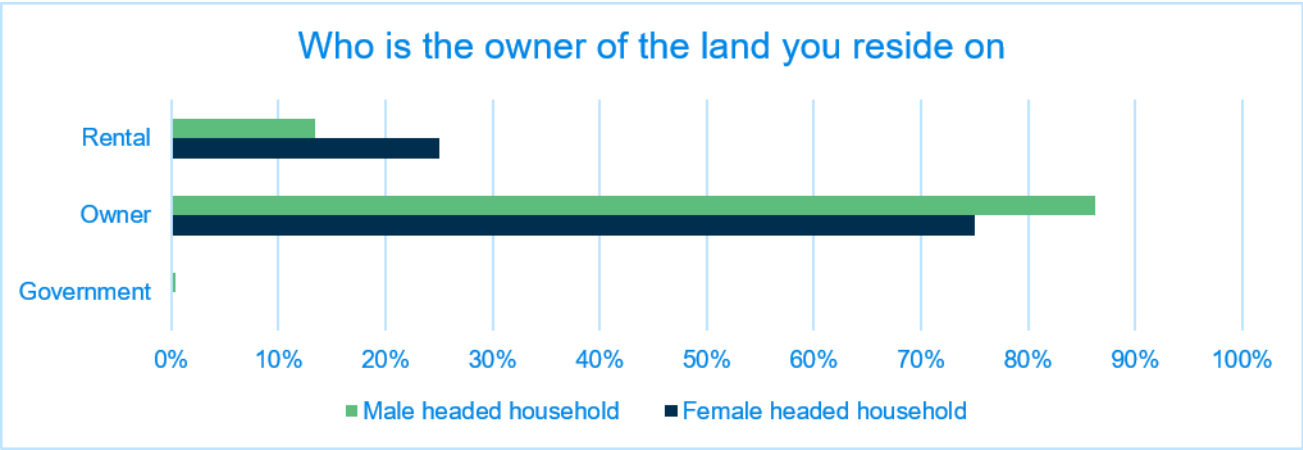


Figure 5-82: Landownership per household head

Both male headed households and female headed households are equally enthusiastic to work for the Project during the operation phase. Gender considerations should be integrated into stakeholder engagement and project implementation. In the FGD for women, it was mentioned that community safety, particularly for women and adolescent girls is an issue in the area due to eve-teasing, harassment, insecurity and anti-social activities associated with unemployed youth and outside labourers. Additionally, GBV, domestic conflicts, and social inequalities were identified as major social challenges affecting women's empowerment and wellbeing. However, the socio-economic surveys shows that only 1,5% of the people (both men and women) recognized GBV

issues in the area. This is notable, as statistics show that three out of four women (76%) have experienced at least one form of intimate partner violence in their lifetime, including sexual, emotional, physical and economic violence (United Nations in Bangladesh, 2025).

5.4.5 Social and Cultural Amenities

Religion and related social and cultural amenities are important considerations in the ESIA of the proposed LCTP, as they influence community cohesion, cultural practices, and local social life. The study area is predominantly Muslim-majority (91%), with Hindu communities (8.67%) and small proportions of Christian and Buddhist populations also present, indicating the need for culturally inclusive planning and protection of religious and community facilities. Religious amenities found in the project area are shown in Figure 5-83: Religious amenities near the project AoI.

Consultations with religious leaders revealed concerns regarding financial hardship, limited livelihood opportunities, and expectations for local employment support from the Project. At the same time, participants expressed positive attitudes toward the Project, highlighting its potential contribution to regional development, infrastructure improvement, social welfare, and increased economic opportunities. Religious leaders also indicated their willingness to cooperate with successful project implementation, while emphasizing the importance of safeguarding religious institutions, community spaces, and culturally sensitive social environments during project development.

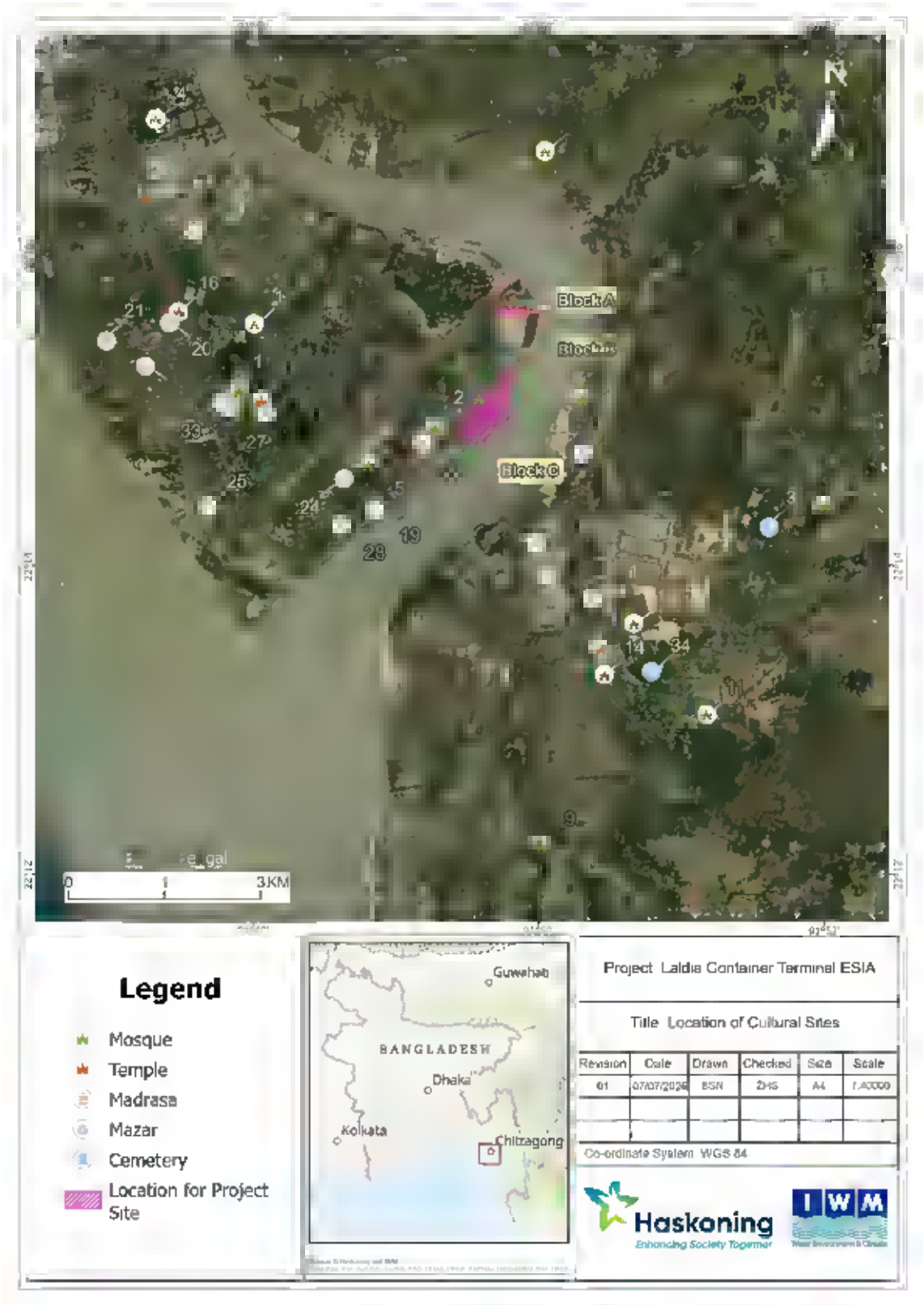


Figure 5-83: Religious amenities near the project AoI, see table below for corresponding names.

Table 5-40: Names of the religious amenities near the project AoI.

Amenities	ID	Name
Mosque	1	KAFCO Mosque
	2	Bijoy Nagar Jame Moqsue
	3	Baitul Aman Jame Mosque
	4	BNS Issa Khan Mosque
	5	Masjid A Baitur Rahat
	6	Badalpur Kaderia Jame Mosque
	7	Uttar Guapanchak Nobo Nur Jame Mosque
	8	Alom majhir jame mosque
	9	Haji Moqbul Ali Jame Mosjid
	10	Chowdhury Para Baitur Rahamat Jame Masjid
	11	Khan Bari Jame Masjid
	12	Masjid a Baitur Rahat
	13	Purbo Katgor Jame Moqsue
Temple	14	Shani Thakur Temple
	15	Sri Sri Kali and Basanti Mata Temple
	16	Mahajanghata mondir
	17	Hindu Para Shiva & Kali Mandir
	18	Durga Temple
Madrasa	19	Darul Islam Madrasa
	20	Najirpara Hafezia Madrasa
	21	Patenga Islamia Fazil Madrasa
	22	Taimul Quran Hifz Madrasa
	23	Charbasti Baitur Rasul Taheria Sunnia Madrasa
	24	Shah Mohsen Awlia Gausia Tayabia Madrasa Complex
Mazar	25	Hazrat Nizamuddin Aulia Mazar
	26	Hazrat Hafez Mobarok Ali Shah (RA) Mazar
	27	Hazrat Mohammad Ali Shah Mazar
	28	Neyamat Ali Shah Mazar
Cemetery	29	Mosque Cemetry
	30	Wuwaiz Mohammad Chowdhury Cemetry
	31	Badalpura Graveyeard

Amenities	ID	Name
	32	Syed Hossain Graveyard
	33	Khan bari cemetry
	34	Nazirpara Graveyard
	35	Khalifa Para Graveyard

5.4.6 Public Health

Bangladesh has made significant progress in improving sanitation and access to safe water. Here are some key points: As of 2019, 98% of the population had access to safe drinking water. Open defecation practices have been reduced to almost zero, with only 1.5% of the population still practicing it in 2019. In 2018, 74.8% of the population had a handwashing station with water and soap on their premises. Despite these improvements, challenges remain, such as ensuring water quality, safe disposal of human excreta, and addressing the impacts of climate change on water and sanitation services. The government has been increasing budget allocations for water, sanitation, and hygiene (WASH) services, with a significant portion of the budget coming from public-sector funds. The following sections illustrate current water and sanitation status of the study area.

5.4.6.1 Source of water for drinking water

In the context of Bangladesh, the source of drinking water is an important socioeconomic and public health indicator, as it directly affects health, hygiene, living conditions, and overall quality of life. Access to safe and reliable drinking water helps reduce waterborne diseases and supports healthier life of the community. The type of drinking water source also reflects the level of infrastructure and economic condition of a community. Households using improved sources such as piped water, deep tube wells, or treated water generally have better access to safe water than those depending on unsafe or seasonal sources. In coastal areas of Bangladesh, drinking water is affected by arsenic contamination, salinity, iron, flooding, drought, and pollution (Uddin, 2025).

Table 5-41 illustrates main sources of drinking water in the study area, based on the survey data. Only Ward No. 40 & 41 are in Municipal area where tube well water is available, and the connection ends at the border of the CCC. On the opposite side of the river Karnaphuli and Anowara Upazila the usage of Tube well / Borehole (deep or shallow) is more common.

Table 5-41: Main Source of Drinking Water

Water Sources	Ward No. 40 & 41 of CCC	Karnaphuli	Anowara
Piped water	17.76%	20.95%	5.76%
Tube well / Borehole (deep or shallow)	79.44%	82.21%	44.86%
Pond / River / Canal (surface water)	2.80%	7.51%	2.88%

Rainwater	0.93%	1.58%	0.41%

Source: Socio-economic survey April 2026

In the AoI, the quality of piped water is not suitable for drinking. If a person wants to drink water from pipes they need to boil it first, which adds additional costs. Therefore, most of the people use pipe supply water for other domestic uses rater that drinking purpose. Additionally, in the FGD with women it was mentioned that poor water quality and environmental pollution caused skin diseases.

5.4.6.2 Source of Water for Domestic Uses

Domestic water use is an important indicator of household well-being, public health, and living standards in Bangladesh. It is essential for daily activities such as drinking, cooking, bathing, washing, cleaning, and sanitation.

Adequate access to domestic water helps maintain hygiene, prevent diseases, and ensure a healthy living environment. The availability and quality of domestic water also reflect the level of infrastructure development and socioeconomic condition of a community.

In Bangladesh, domestic water availability is often affected by seasonal variation, groundwater depletion, salinity intrusion, arsenic contamination, flooding, drought, and pollution, particularly in coastal, urban slum, and drought-prone areas. Women and children are often more affected, as they commonly collect water for household use.

Domestic water supply supports social and economic development by reducing health expenses, saving time, improving productivity, and supporting education and household activities. Therefore, domestic water access and use are important indicators in public health assessment, poverty analysis, urban and rural planning, and sustainable water resources management. Table 5-42 presents the sources of water for domestic use as per the census data.

Table 5-42: Source of Water for Domestic Uses in Percentage

Water Sources	No. of Households	Ward No. 40 & 41 of CCC (%)	Karnaphuli (%)	Anowara (%)
Piped water	142	21.50%	32.02%	17.51%
Tube well / Borehole (deep or shallow)	498	90.65%	93.28%	76.04%
Pond / River / Canal (surface water)	102	2.80%	9.09%	35.02%
Rainwater	11	0.93%	1.58%	2.76%

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022).

In Bangladesh, ownership of tube-wells is an important socioeconomic and water security indicator, as it reflects household access to safe and reliable water sources. Tube-wells are widely

used for drinking, cooking, domestic purposes, and sometimes irrigation, particularly in rural and semi-urban areas.

Households with private tube-wells generally have better access to water, greater convenience, and more control over water availability compared to households depending on shared, community, or distant water sources. Tube-well ownership also reduces the time and effort required for water collection and supports better hygiene and sanitation practices, according to the census report. Table 5-43 presents the ownership of the tube-wells.

NGO ownership refers to tubewells where non-governmental organizations operate projects related to water supply, sanitation, health, and associated services across Bangladesh. Under such initiatives, these organizations provide facilities such as latrines and tube wells to communities, often as part of broader development programmes. In some contexts, facilities are provided at a community level rather than for individual households. For example, the government or NGOs may develop shared sanitary complexes intended for use by the entire community.

Table 5-43: Ownership of the Tube-Well Used by the Household Members in Percentage

Area	NGO	Community	Private/Individual	Jointly Owned[28]	Government	Total
Ward No. 40 & 41 of CCC	1.03%	12.37%	57.73%	27.84%	1.03%	100%
Karnaphuli	2.97%	5.93%	52.54%	36.86%	1.69%	100%
Anowara	1.82%	9.09%	66.06%	21.82%	1.21%	100%
Total	2.21%	8.23%	58.03%	30.12%	1.41%	100%

Population and Housing Census 2022, Community Report, Bangladesh Bureau of Statistics, Statistics and Information Division, Ministry of Planning

5.4.6.3 Toilet Facilities of Households

Access to improved toilet facilities helps maintain a clean and healthy environment by reducing the risk of waterborne and sanitation-related diseases such as diarrhea, cholera, dysentery, and typhoid, according to the census data. The type and condition of toilet facilities also reflect the socioeconomic status of households and the level of infrastructure development in a community. In many rural and low-income areas of Bangladesh, inadequate sanitation facilities and improper waste disposal continue to create environmental and public health challenges. Poor toilet facilities may contaminate nearby water sources, drainage systems, ponds, rivers, and groundwater, increasing health risks for local communities. Households with sanitary and hygienic toilets generally experience better health conditions, improved privacy, and greater personal safety, particularly for women, children, and elderly people. Improved toilet facilities also contribute to social and economic development by reducing medical expenses, improving school attendance, enhancing productivity, and promoting dignity and social well-being.

[28] *Jointly means that the tube-well is owned by more than one household.*

Table 5-44 presents the toilet facilities used by households in the study area (also illustrated in the graph below, Figure 5-78), based on census data (Bangladesh Bureau of Statistics, 2022). Overall, most households use safe disposal systems with flushing or pouring water, accounting for 70.00% of total households. This indicates that access to improved sanitation facilities is relatively high compared to Bangladesh average.

Table 5-44: Toilet Facilities in Percentage

Type of Toilet	Ward No. 40 & 41 of CCC in %	Karnaphuli in %	Anowara in %	Total in %
Safe Disposal with Flushing/ Pouring Water	58.88%	66.80%	84.33%	70.00%
Pit Latrine with Slab/ Ventilated Improved Latrine/ Composting Latrine	19.63%	20.95%	10.14%	16.91%
Unsafe Disposal with Flushing/ Pouring Water	14.95%	8.30%	4.61%	9.29%
Pit Latrine Without Slab/ Open Pit	3.74%	2.37%	0.92%	2.34%
Kancha/Open/ Hanging Latrine (Permanent/ Temporary)	1.87%	1.19%	0.00%	1.02%
Open Defecation/ No Latrine Available	0.93%	0.40%	0.00%	0.44%

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022).

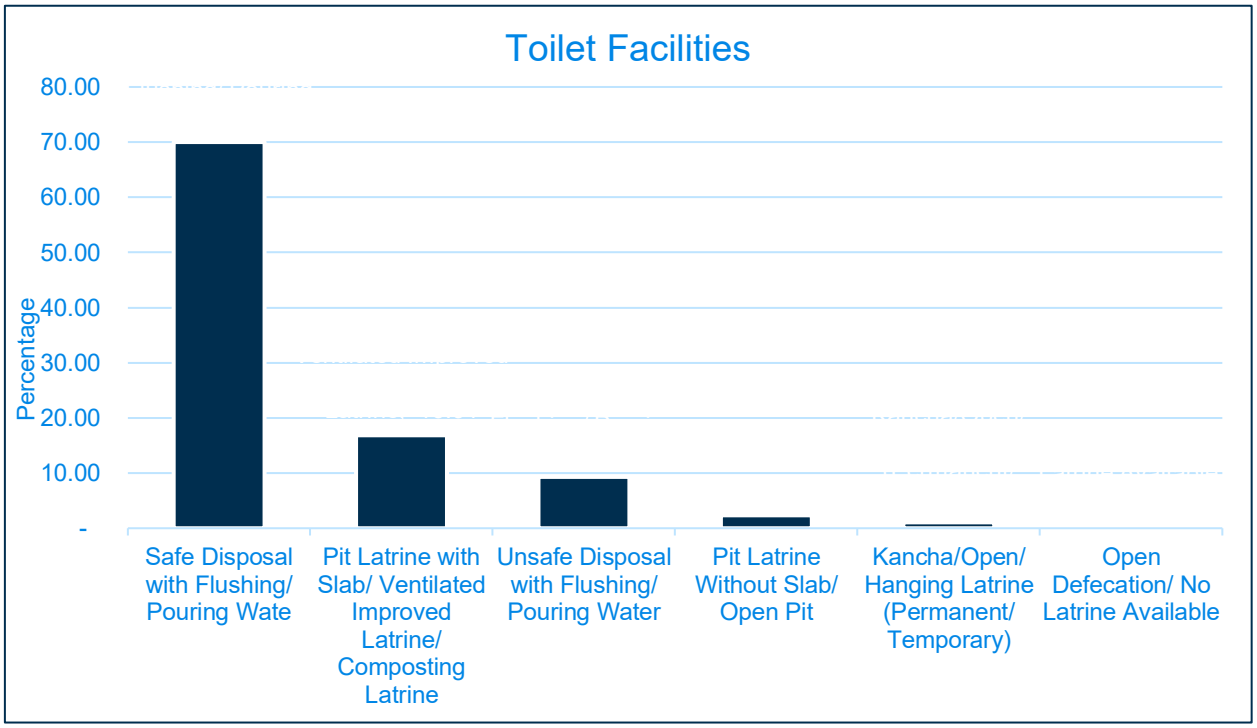


Figure 5-84: Toilet facilities

Within the surveyed areas, Anowara shows the highest use of safe disposal with flushing or pouring water at 84.33%, followed by Karnaphuli at 66.80% and CCC at 58.88%. Pit latrines with

slab, ventilated improved latrines, or composting latrines account for 16.91% overall, with higher use in Karnaphuli (20.95%) and CCC (19.63%).

Unsafe disposal with flushing or pouring water is reported by 9.29% of households, with the highest proportion in CCC (14.95%). Other unimproved facilities, including pit latrines without slab, kancha/open/hanging latrines, and open defecation, are comparatively limited. Overall, the findings indicate that sanitation conditions in the study area are generally satisfactory, as most households use improved toilet facilities.

Table 5-45 presents the ownership status of latrines used by households in the study area. Jointly owned latrines refer to a single latrine that is shared by two or more members across one or multiple households. Government-owned latrines refer to projects where the government implements water and sanitation projects and provides facilities such as latrines and tube wells free of charge. Where community latrines are installed for shared use, a small fee may be collected from users to cover operation and maintenance costs. Overall, most households (60.49%) use self-owned latrines, while 38.82% use latrines jointly with other households. Only a very small proportion reported having no latrine (0.35%) or using government-owned latrines (0.35%).

Table 5-45: Ownership of Latrine by the Household

Area	Self	Jointly	No Latrine	Government
Ward No. 40 & 41 of CCC	81.31%	17.76%	0.93%	0.00%
Karnaphuli	77.08%	22.53%	0.40%	0.00%
Anowara	30.88%	68.20%	0.00%	0.92%
Total	60.49%	38.82%	0.35%	0.35%

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022)

Among the census surveyed areas, CCC recorded the highest share of self-owned latrines at 81.31%, followed by Karnaphuli at 77.08%. In contrast, Anowara had a much lower proportion of self-owned latrines at 30.88%, while jointly used latrines were dominant, accounting for 68.20%.

Joint or shared use of latrines was relatively common in Karnaphuli and particularly high in Anowara, indicating greater dependence on shared sanitation facilities. Households without latrines were very limited, and no such cases were reported in Anowara.

Overall, the findings show that most households use either self-owned or shared latrines. However, the high dependence on jointly used latrines in Anowara suggest the need to improve access to private sanitation facilities for better hygiene, convenience, and household sanitation conditions.

5.4.6.4 Protein Intake

Protein helps in the growth, repair, and maintenance of human body. Table 5-46 shows the weekly protein intake pattern of household members in the study area, based on census data. Overall, most households consumed protein 3–4 days a week, accounting for 48.70%, followed by 25.65%

who consumed protein 1–2 days a week. About 24.44% of households consumed protein every day, while only 1.21% reported no protein intake during the week.

Table 5-46: Protein Intake per Week in Percentage

Area	1-2 days a week	3-4 days a week	Not a single day in a week	Every day of the week
Ward No. 40 & 41 of CCC	38.32%	47.66%	1.87%	12.15%
Karnaphuli	28.46%	52.17%	1.19%	18.18%
Anowara	16.13%	45.16%	0.92%	37.79%
Total	25.65%	48.70%	1.21%	24.44%

Source: Population and Housing Census 2022, Community Report (Bangladesh Bureau of Statistics, 2022)

In Anowara, daily protein[29] intake was the highers, with 37.79% of households members consuming protein every day. In Karnaphuli and Anowara, the majority of households consumed protein 3–4 days a week, representing 52.17% and 47.66%, respectively.

5.4.6.5 Common Diseases

Common diseases in study area are mainly waterborne diseases, respiratory problems, skin diseases, fever, diarrhoea, dengue, typhoid, jaundice, gastric problems, and seasonal flu. Due to the area's coastal and riverine setting, poor drainage, waterlogging, dense settlement, and possible sanitation challenges, water- and vector-borne diseases may occur more frequently.

The field survey identified common diseases is important because project activities may affect public health through dust, noise, traffic movement, waste generation, water pollution, drainage disruption, and pressure on local health services. Therefore, health-related baseline information should be considered in project planning, mitigation measures, community health awareness, and occupational health and safety management. Table 5-47 presented the common diseases of the study area.

Table 5-47: Comon Diseases of the Study Area (experienced in the last 6 Months)

Name of diseases	Male	Female	Total	Percentage
Cholera	5	-	5	0.87%
Diarrheal diseases (other than Cholera)	23	7	30	5.20%
Respiratory infections / Tuberculosis	31	6	37	6.41%
Dengue and Chikungunya	9	6	15	2.60%
Typhoid	10	4	14	2.43%
Hepatitis A and E	1	-	1	0.17%

[29] *Protein intake refers to fish, meat or egg.*

Malaria	1	-	1	0.17%
Skin infections/scabies	87	26	113	19.58%
Not applicable	295	63	358	62.05%

Source: Socio-economic survey April 2026

The accessibility of emergency services, such as ambulances, police and fire brigades, to both the communities and the LCTP sites, are crucial to meet safety regulations. According to the respondents in the Socio-Economic Survey, there are some emergency facilities close to the project site, but these often lack the capacity or specialism to deal with larger emergencies. For example, there are plenty of pharmacies in the area of influence (AoI) who can support with minor medical treatments, but all government owned hospitals are more than 5 kilometers away. The conservative assumption is that the police, ambulances and fire brigades need to come from outside the AoI (5 kilometers buffer around the project site) towards any emergency, resulting in the need to have enough capacity on the road network to facilitate these vehicles. From the Traffic Impact Study (Haskoning, 2026), it appears that this capacity is there during both the current situation and the modelled capacity shows the same results during construction and operation of LCTP.

5.5 Maps, Graphs and Figures

The maps, graphs, figures, photographs and other graphical presentations supporting the description and assessment of the existing environmental and socio-economic conditions of the study area are provided in their respective sections of this chapter. These include relevant maps showing the project location and the AoI, surrounding land use, as well as graphical and photographic representations of the baseline environmental, ecological and socio-economic conditions.

5.6 Recent Photographs of the Project Locations and Surroundings

Recent photographs of the project site and its surrounding areas are presented in this section to provide a visual representation of the existing site conditions and surrounding environment (Figure 5-85). Photographs of the three project blocks/sites have also been presented in Chapter 3: Project Description and Options, and the photographs below provide additional visual documentation of the project area and its surroundings. The photographs cover key features such as the existing land and shoreline conditions, Karnaphuli River and adjacent water areas, existing port and industrial facilities, access and transportation infrastructure, nearby settlements, vegetation and other relevant features. Each photograph is accompanied by an appropriate caption indicating the location and key feature shown.



Inside Block C



Inside Block-A



Inside Block C



Mangroves on riverside of Block-B



Block-A



Karnafuli River from Block-C



Khal No. 14 beside the Airforce School



Karnaphuli river near the project site



BWDB pump house in khal no. 14



Khal 14 at upstream of the pump house



Khal 14 at downstream of the pump house



Outfall of khal no. 14



Road and Bus stop near Block-C



Ghat No. 14



Boat Crossing at Ghat no. 14



Ghat on the opposite bank



Ghat No. 15



Ghat No. 15

Figure 5-85 Recent Photographs of the Project Locations and its Surroundings

5.7 Location of The Project

The Laldia Container Terminal (LCT) Project is located at Laldia Char, under Ward No. 41 of Chattogram City Corporation, on the western bank of the Karnaphuli River, close to its outfall into the Bay of Bengal. Administratively, the project site falls within Purba (East) Patenga Mouza under Patenga Thana (formerly Bandar Thana) of Chattogram District, Bangladesh. The latitude and longitude of the sites are presented in the following table and the location of project sites and the AoI are illustrated in the following figure. Moreover, a land use map of 5km radius AoI is presented in Section 5.3.

Table 5-48: Lattitude and longitude of the project sites

Blocks	Latitude	Longitude
Block-A	N22° 15'39.67"	E91° 49'43.22"
	N22° 15'35.71"	E91 4943.53"
	N22° 15'35.87"	E91° 49'53.38"
	N22° 15'39.94"	E91° 49'54.12"
Block-B	N22°15'06.24950"	N22°15'06.24950"
	E91-4943.99977"	N22°15'04.81276"
	E91°49'47.56549"	N22°15'11.75233"

	N22°15'11.75233"	E91 4951.38527"
	N22 1513.41600"	E91-49'47.40279"
	N22°15'08.49988"	E91°49'39.62865"
	N22°15'08.06857"	E91°49'39.46889"
	N22°15'06.66070"	E91°49'44.19827"
Block-C	N22°14'51.55041"	E91°49'27.29167"
	N22°14'48.29131"	E91 49'32.32619"
	N22°15'03.46298"	E91°49'46.27415"
	N22°15'07.37844"	E91°49'38.52801"

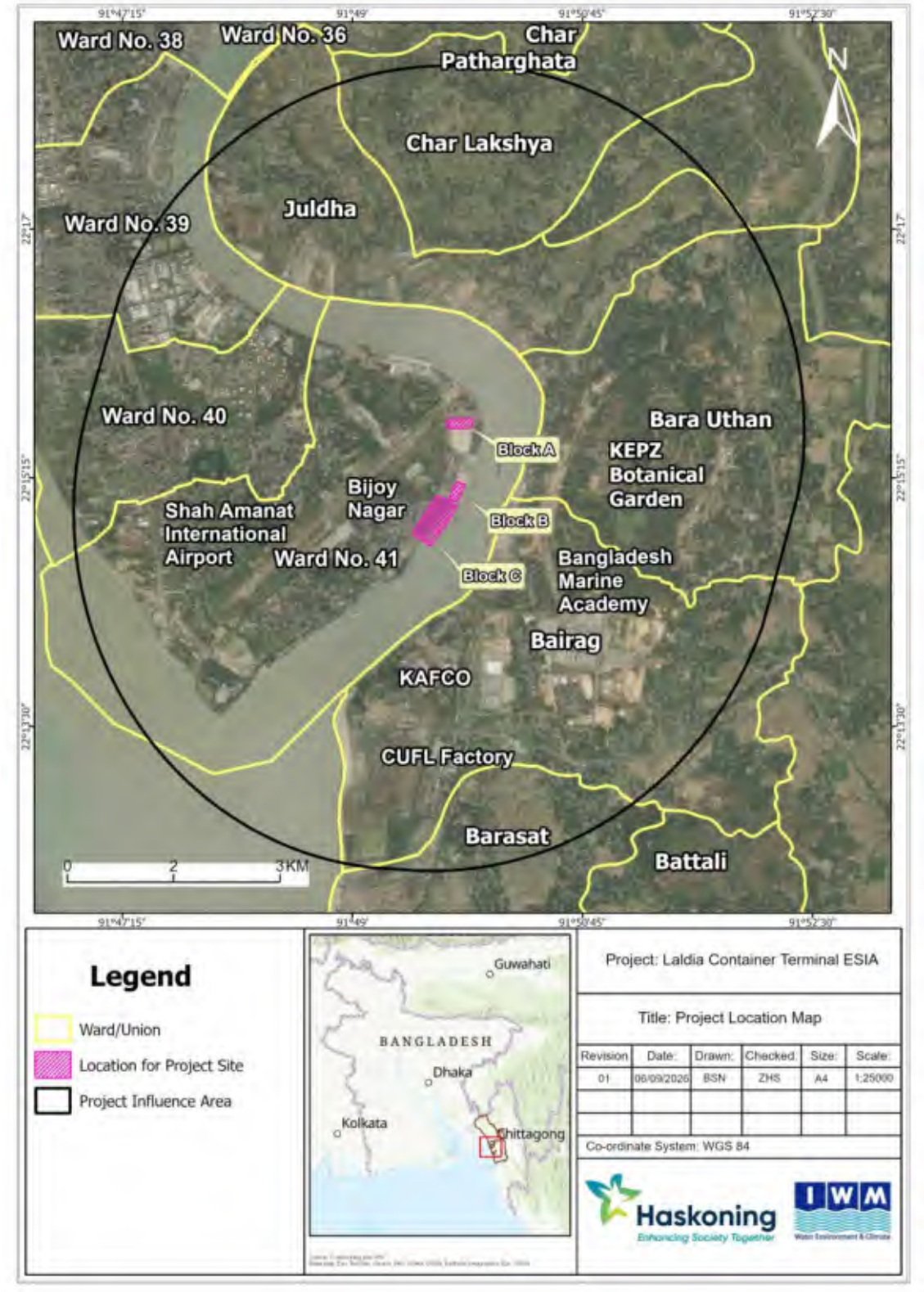


Figure 5-86: Location map of the study area showing the project sites and the AoI

The project site comprises a 49.15-acre concession area divided into three blocks. The location forms part of the wider Chattogram port area, where extensive port, industrial, commercial and

transportation activities have developed along the banks of the Karnaphuli River. The strategic location of LCT at the lower reaches of the Karnaphuli River provides direct access to the riverine and maritime transport network and facilitates its integration with the existing port and logistics infrastructure of Chattogram.

6 Stakeholder Consultations

6.1 Overview

Stakeholder consultation constituted a critical component of the Environmental and Social Impact Assessment (ESIA) process for the proposed Laldia Container Terminal Project (LCTP). The consultation process was undertaken to ensure meaningful engagement with project-affected communities, occupational groups, local institutions, government representatives, vulnerable people, and other interested stakeholders throughout the ESIA study.

The objectives of the stakeholder consultation process were to:

- Disseminate information regarding the Project scope, activities, and collect community concern and impacts;
- Understand community perceptions, concerns, priorities, and expectations;
- Identify potential risks and impacts from the perspective of local communities including representative of the local government institutions, local business owners, political leaders, community representatives, different occupational groups, schoolteacher, representative of youth groups, religious leader, women and vulnerable groups
- Obtain recommendations for mitigation and benefit enhancement measures;
- Facilitate transparent and inclusive decision-making; and
- Ensure compliance with applicable national regulations and international good practice requirements related to stakeholder engagement.

A comprehensive consultation program was implemented through Focus Group Discussions (FGDs), Community Consultations, Key Informant Interviews (KIIs), socio-economic survey and informal community interactions. The consultation process particularly emphasized participation of potentially affected and vulnerable groups. The social groups on whom the FGDs were conducted are shop owners, fishermen, truck/relevant labour unions, religious group, youth group, boatmen, womenfolk, adolescent girls, landless, ferry *ghat* workers and ferry users, vulnerable people (elderly people, persons with disability, chronically ill people).

Overall, stakeholder feedback indicates that while the proposed Project is expected to deliver economic benefits, including potential employment and regional infrastructure development, concerns remain predominant. Stakeholders emphasised that the Project may exacerbate existing pressures on livelihoods, mobility, water and drainage systems, fisheries, and community safety if not carefully designed and effectively managed. Strong expectations were expressed regarding transparent governance, adequate compensation, and the implementation of robust traffic, access, and environmental management measures.

While some stakeholders anticipate employment opportunities, concerns were raised about potential labour influx. There is a clear preference for prioritising local employment and ensuring that any influx of external workers is effectively managed to avoid adverse social impacts.

6.2 Methodology

The stakeholder consultation process was conducted using a participatory and inclusive approach consistent with national environmental requirements and in line with international ESIA standards. Multiple consultation techniques were applied to ensure broad representation of stakeholder perspectives across the Project's AoI.

6.2.1 Stakeholder Identification

Stakeholders were identified through field reconnaissance, socio-economic surveys, consultation with local representatives, community mapping, and review of existing socio-economic conditions within the Project area. Stakeholders included directly and indirectly affected communities, occupational groups, institutional representatives, and vulnerable populations.

6.2.2 Consultation Methods

A participatory and inclusive consultation approach was adopted to ensure that the views, concerns, and expectations of all relevant stakeholders were adequately captured during the Project assessment process. Multiple consultation methods were applied to collect qualitative and community-level information regarding the existing socio-economic condition, potential project impacts, local expectations, and suggested mitigation measures. The consultation process included the following methods:

FGDs

FGDs were conducted with different community groups, including fishermen, boatmen, ferry *Ghat* transport workers, shopkeepers, women, adolescent girls, youth group, landless, vulnerable and other occupational groups. These discussions helped identify community perceptions regarding the Project, existing livelihood patterns, anticipated environmental and social impacts, and possible mitigation measures. The FGDs also provided an opportunity to understand local priorities, community vulnerabilities, and expectations from the Project implementation.

Special attention was also given to occupational communities such as fishermen, farmers, ferry *ghat* transport workers, and small business owner whose livelihoods may be directly or indirectly affected by the Project. These dedicated sessions created a comfortable environment for participants to openly express their opinions, concerns, and recommendations without social barriers or hesitation.

Community Consultation Meetings / Public Consultation Meetings (PCMs)

Community Consultations were organized at accessible community locations with participation from local residents, previously relocated people from the Laldia Char, local government representatives, community leaders, teachers, businesspersons, and other multiple stakeholders. During these meetings, the Project objectives, proposed activities, anticipated impacts, and mitigation measures were presented and discussed openly. Participants were encouraged to

provide feedback, raise concerns, and suggest recommendations to improve Project planning and implementation.

Key Informant Interviews (KIIs)

KIIs were conducted with knowledgeable and influential individuals who possess specific information regarding the Project area and local socio-economic conditions. Key informants included representatives from related government organisations, local government institutions, different key high officials related the project along the Chittagong, Chittagong Development Authority (CDA), Chittagong Water Supply and Sewage Authority (CWASA) Bangladesh Water Development Board (BWDB), Roads and Highways Department (RHD) and other related government departments, business leaders, NGOs, religious leaders, transport operators, health workers, local elites, and representatives from relevant government agencies. These interviews provided valuable insights into local infrastructure, environmental concerns, community dynamics, disaster vulnerability, and development priorities.

Informal Consultations with Local Residents

Informal discussions were undertaken during field visits with local residents, roadside vendors, commuters, labourers, and other community members. These spontaneous interactions provided practical field-level information regarding local transportation systems, seasonal challenges, environmental conditions, and community expectations related to the Project.

Meetings with Community Leaders and Institutional Stakeholders

Informal meetings were held with local administrative officials, Ward Commissioners including local government institutions, community leaders, market committee members, and institutional stakeholders to discuss Project-related issues, implementation challenges, community concerns, and coordination requirements. These meetings also facilitated stakeholder engagement and strengthened local participation in the consultation process.

6.2.3 Information Disclosure

During consultation sessions, stakeholders were informed about:

- Project background and objectives;
- Proposed construction and operational activities;
- Potential environmental and social impacts;
- Previous land and livelihood concerns;
- Employment and economic opportunities;
- Community health and safety considerations; and
- Proposed mitigation and environmental management measures.

Consultations were conducted in locally understood languages to ensure accessibility and effective participation.

6.2.4 Documentation and Integration

Stakeholder comments, concerns, recommendations and expectations were systematically documented (in Minutes of the Meetings (MoM) and a stakeholder log) and reviewed as part of the ESIA process. Relevant findings from the consultations have been integrated into the impact assessment, mitigation planning, and development of the Environmental and Social Management Plan (ESMP).

6.3 Stakeholder Classification

Stakeholders engaged during the ESIA process were categorized according to their relationship to the Project, degree of influence, and level of potential impact exposure.

Project-Affected Communities: This category includes local households and communities residing within or near the Project's Area of Influence who may experience direct or indirect environmental and social impacts. These stakeholders include:

- Residents of surrounding communities;
- Previously displaced households from the Laldia area;
- Shop owners;
- Fishermen and boatmen;
- Ferry users and ferry *ghat* workers;
- Transport workers and labourers; and
- Nearby educational and residential communities.

Occupational and Livelihood Groups: Specific livelihood-dependent groups were consulted to understand potential economic and employment-related impacts, including:

- Fishermen groups;
- Truck and labour unions;
- Workers involved in port and related trade activities;
- Ferry and transport workers;
- Informal labour groups; and
- Small business owners.

Vulnerable and Marginalized Groups: Special consultation efforts were undertaken to engage groups potentially more vulnerable to project impacts or participation barriers, including:

- Women and adolescent girls;
- Landless households;
- Elderly persons; and
- Persons with disabilities or chronical illness.

Religious and Community Institutions: Community and cultural stakeholders consulted during the ESIA process included:

- Religious leaders;
- Mosque and temple representatives;

- Community leaders; and
- Social welfare representatives.

Government and Institutional Stakeholders: Relevant government authorities and local administrative representatives were also consulted to obtain institutional perspectives, regulatory guidance, and development-related feedback.

6.4 Consultation Sessions

A total of 12 Focus Group Discussions (FGDs) and three Public Consultation Meetings (PCMs) were conducted between March – May 2026 within the Project area and surrounding communities. See Figure 6-1: for the locations of these consultations.

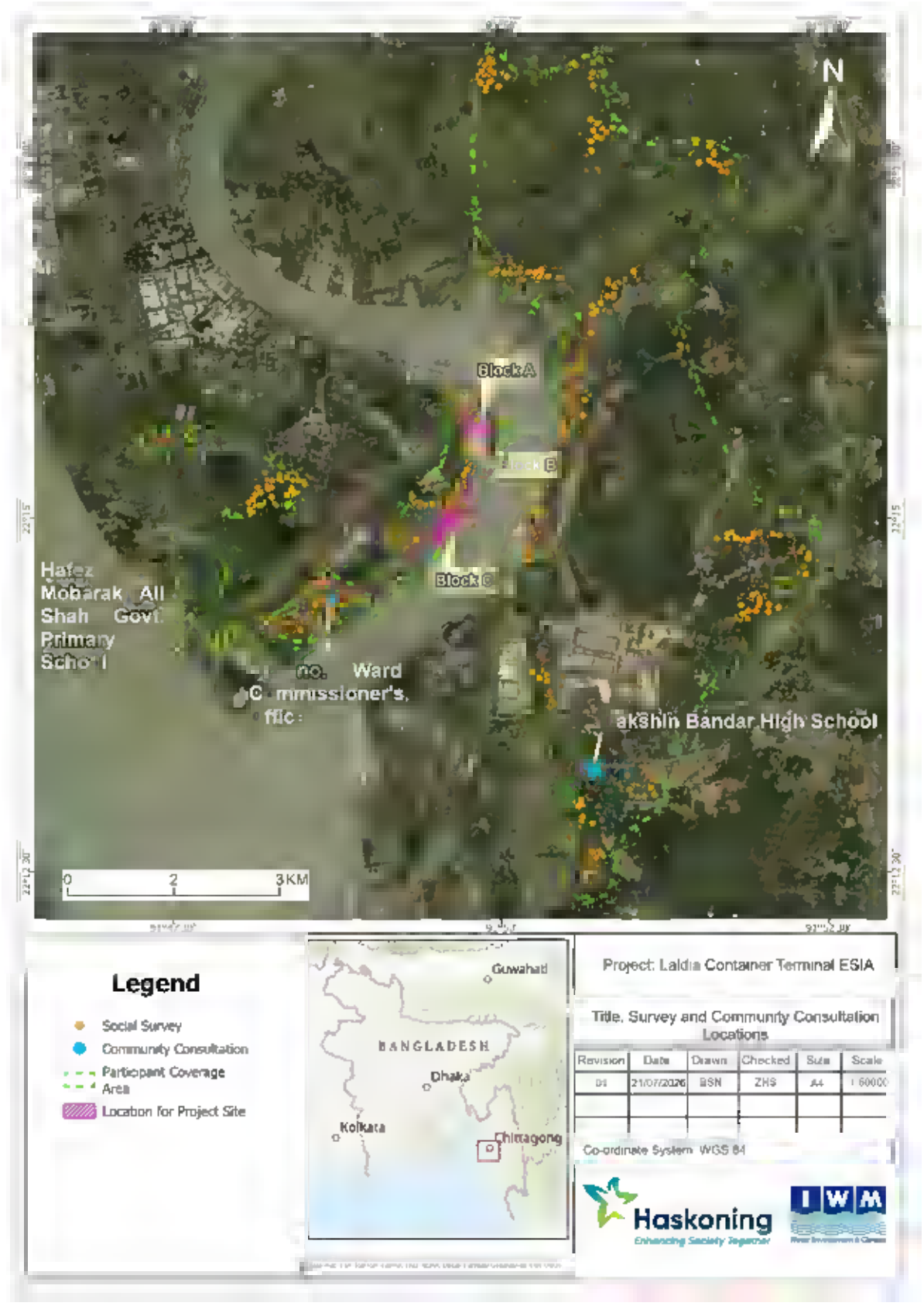


Figure 6-1: Locations of public consultations

A total of 194 participants attended the three community consultation meetings and a total of 145 stakeholders participated in the twelve FGDs. The list of participants with their phone numbers and signatures are given in Annex B3.

During the sessions, stakeholders provided extensive feedback and recommendations regarding environmental management, social impacts, labour practices, and community expectations on various aspects including likely impacts and potential mitigation measures. The key findings and suggestions from the consultation process are summarized below.

6.4.1 Community / Public Consultation Meetings

Public Consultation Meetings were organized to disclose project information to broader community groups and obtain feedback from local residents and stakeholders (Figure 6-2).

Table 6-1 provides an overview of the PCMs, including their location, number of participants and men to women ratio.

Table 6-1: Schedule of Public Consultation Meetings

Date	Type of Meeting	Duration	Location	No. of Participants		
				Men	Women	Total
23 April 2026	Community/ Public Consultation	11:00 AM-1.00 PM	Fulchari Para, Hafez Mubarak Ali Shah Government Primary School, South Patenga, Chattogram	49	26	75
23 April 2026	Community/ Public Consultation	3:30-5.00 PM	South Patenga, Chairman Bari, 41, Ward Commissioner's office premises, Patenga, Chattogram	57	12	69
25 April 2026	Community/ Public Consultation	11:00 AM-1.00 PM	Dhakkin Patenga High School, Port area, Karnaphuli, Chattogram	43	07	50
Total:				**149**	**45**	**194**



Figure 6-2: Photographs of the Community Consultation Meetings

During the consultation sessions, it was found that stakeholders were generally not opposed to the Project given the anticipated economic development opportunities, improved infrastructure, and potential employment generation. However, they expressed concerns about whether the Project can be delivered without worsening existing social, environmental, and infrastructure pressures in an already highly stressed area.

Several concerns were raised, including issues related to displacement livelihood restoration (particularly for households affected by previous developments), environmental degradation and

loss of green cover, deterioration of water quality and access to utilities, increased traffic congestion and road safety risks, disruption to ferry and fishing routes, insufficient labour rights and poor working conditions, community health and safety risks, and the potential damage to or destruction of cultural and religious sites

Section 6.5.1 elaborates on the suggestions, identified concerns and impacts in greater detail. It further presents stakeholder-suggested measures to address and, where necessary, mitigate these impacts.

6.4.2 Focus Group Discussions (FGDs)

The FGDs were conducted with specific stakeholder groups to facilitate detailed discussions regarding anticipated project impacts, environmental concerns, livelihood implications, labour issues, community expectations, and mitigation measures. Table 6-2 provides an overview of the FGDs, including their location, number of participants and men to women ratio.

Table 6-2: Schedule of Focus Group Discussions

Sl	Date	Stakeholder Group	Location	No. of Participants		
				Men	Women	Total
1	22 April 2026	Shop owners potentially impacted (Blocks A–C of the proposed Container Terminal Area)	15 No. *Ghat*, South Patenga, Ward No. 41	08	0	08
2	21 April 2026	Fishermen groups	12 No. *Ghat*, Ward No. 41, South Patenga	07	0	07
3	09 April 2026	Truck/ relevant labour unions	Ward No. 41, South Patenga	15	0	15
4	09 April 2026	Religious groups	Patenga, 09 April 2026	12	0	12
5	22 April 2026	Youth groups	Dhakkin Patenga, Ward No.41	13	0	13
6	09 April 2026	Boatmen groups	Dhakkin Patenga, Ward No.41	12	0	12
7	21 April 2026	Women groups	41 no. ward, South Patenga	0	10	10
8	08 April 2026	Adolescent girls	City Corporation High School, Dakkhin Patenga	0	10	10
9	26 April 2026	Landless households	Miazi Para, Ward 41	15	01	16
10	20 April 2026	Ferry *ghat* workers and ferry users	14 No. Ferry *Ghat*, Laldia	18	0	18
11	27 April 2026	Vulnerable groups (elderly persons, persons with	Dhakkin Patenga, Phulchari Para	10	0	10

Sl	Date	Stakeholder Group	Location	No. of Participants		
				Men	Women	Total
		disabilities, and chronically ill individuals)				
12	27 April 2026	Workers of Incontrade	Bijaynagar, Ward 41, Laldia	14	0	14
Total				**124**	**21**	**145**

During the FGDs, some stakeholders expressed strong interest in the successful implementation of the Project and expected it to generate positive and inclusive socio-economic benefits for local communities. Others, however, mostly raised concerns about the potential for the Project to worsen existing living conditions.

Participants frequently recommended ensuring adequate compensation and livelihood restoration for all affected people, particularly those residing within the proposed Project site. They emphasised the importance of prioritising local employment, skills development, women's empowerment, and transparent labour recruitment processes.

Stakeholders also highlighted the need for environmental protection, improved transportation systems, reliable utility services, enhanced healthcare, and strengthened disaster resilience measures. Continuous stakeholder engagement, an effective grievance redress mechanism, and equitable distribution of project benefits were considered essential for achieving sustainable and long-term development in the Project area.

Section 6.5.2 elaborates on the identified concerns and impacts in greater detail. It further presents stakeholder-suggested measures to address and, where necessary, mitigate these impacts.

6.5 Suggestions from Consultation Sessions

6.5.1 Issues Raised from Public Consultation Meetings

Displacement, Compensation, and Livelihood Restoration: Participants stated that households previously residing in the Laldia area were displaced during earlier development interventions without compensation or rehabilitation support. Community members reported that utility services, including water and electricity connections, were disconnected prior to eviction, creating pressure for residents to vacate the area. Some participants further alleged that enforcement measures were eventually applied to remove remaining residents.

Community representatives emphasized that approximately 700 families were displaced from the area and strongly recommended that any future project-related displacement must be accompanied by:

- Fair and transparent compensation;
- Adequate rehabilitation and resettlement measures;

- Livelihood restoration support; and
- Continuous engagement with affected households.

Cumulative Development Pressure: Participants highlighted that the area has already experienced multiple large-scale development projects, including:

- Coastal protection embankments;
- EPZ-related developments;
- Airport expansion;
- Naval facility expansion;
- Industrial developments; and
- Elevated expressway infrastructure.

Community members expressed concern that repeated infrastructure development has generated cumulative environmental and social pressures on local residents and resources.

Water Supply and Utility Concerns: Stakeholders raised concerns regarding the quality and accessibility of water supply services, as there are no underground drinking water facilities. Salinity is the main problem in the area, forcing people to buy bottled water for drinking purposes. On top of that, participants noted that financially capable households often purchase filtered water for domestic use, while economically disadvantaged residents rely on poor-quality supplied water for bathing and household purposes. Community members requested:

- Improved access to safe and affordable water;
- Better monitoring of water quality; and
- Protection of local water resources during Project implementation.

Environmental Degradation and Tree Plantation: Participants stated that previous development projects resulted in extensive tree cutting and reduction of local green cover without adequate replantation within the affected communities. According to local residents, increasing temperatures and worsening local climatic conditions are being experienced because of reduced vegetation. Community members strongly recommended that:

- Implementation of localized tree plantation programs;
- Reforestation within the Project area and surrounding communities; and
- Development of green buffer zones to improve environmental conditions.

Participants further stated that compensatory plantation activities conducted in other locations do not provide direct environmental benefits to the local area.

Employment and Economic Opportunities: Community representatives expressed concern that local residents were not adequately employed in previous development projects within the area, including earlier Karnaphuli Tunnel, and other related infrastructure works.

Stakeholders emphasized that:

- Local communities should receive priority employment opportunities;
- Recruitment processes should be transparent and fair;

- Local youth should receive vocational and technical training; and
- Economic benefits from development projects should directly support nearby communities.

Labour Rights and Contractor Management: Participants raised concerns regarding labour management practices under subcontractors and foreign contractors engaged in infrastructure projects. Community members stated that subcontractors are often less attentive to environmental and social safeguard requirements and may inadequately address worker welfare and community concerns. Specific concerns were raised regarding:

- Assignment of duties beyond workers' original job descriptions;
- Inadequate labour protections;
- Threats of dismissal for refusal to perform untrained tasks; and
- Allegations of verbal abuse, intimidation, and physical mistreatment of local workers.

Examples were provided where locally recruited drivers were reportedly pressured to operate heavy vehicles and specialized machinery beyond their training and competency levels. Community members emphasized the importance of:

- Compliance with labour laws and occupational safety requirements;
- Respectful treatment of workers;
- Proper skills-based job allocation;
- Monitoring of contractor practices; and
- Establishment of accessible worker grievance mechanisms.

Traffic, Access, and Community Safety: Stakeholders requested that the Project implement effective traffic and safety measures to minimize disruption to local communities and commuters. Recommendations included:

- Preparation of a traffic management plan;
- Restriction of heavy vehicle movement during school and peak commuting hours;
- Maintenance of pedestrian and ferry access routes; and
- Installation of safety signage and community awareness measures.

Community Health and Social Management: Participants recommended that the Project implement community health and awareness programs focusing on:

- Hygiene and sanitation;
- Water quality and public health;
- Communicable disease awareness, including STI/HIV/AIDS; and
- Emergency preparedness and response systems.

Protection of Cultural and Religious Sites: Stakeholders emphasized the importance of protecting mosques, temples, shrines, cemeteries, and other culturally significant locations from project-related disturbance. Participants requested that construction activities near sensitive sites be carefully managed in consultation with local religious and community leaders.

The findings and recommendations obtained through the stakeholder consultation process have been considered in the ESIA assessment and incorporated into the Environmental and Social Management Plan (ESMP) and associated mitigation measures for the Project.

6.5.2 Issues Raised from FGDs Sessions

Based on the FGDs conducted with different stakeholder groups, including fishermen, boatmen, transport labourers, women, youth, businessmen, vulnerable groups, religious leaders, landless households, and adolescent girls, the following overall sissues were identified fo:

Positive Perception of the Project and Expectations: Participants demonstrated a generally positive outlook toward the proposed project and welcomed potential improvements in infrastructure, employment opportunities, and local economic growth. However, they emphasized that these benefits will only be realized if proper safeguards, fair implementation practices, and meaningful community engagement are ensured throughout the project cycle.

Compensation, Displacement, and Livelihood Restoration: Stakeholders strongly emphasized that displacement must be accompanied by fair, transparent, and compliant compensation. Participants referred to past experiences of unaddressed displacement and stressed that affected households must receive proper rehabilitation support. They further recommended structured livelihood restoration programs to ensure long-term economic stability for displaced and affected families.

Employment, Skills Development, and Economic Inclusion: The participants highlighted the need to prioritize local employment opportunities for affected households, youth, women, fishermen, and other vulnerable groups during both construction and operation phases. They stressed transparent recruitment processes without intermediaries, fair wages, and equal opportunity access. Vocational training and technical skill development programs were also recommended to enhance employability and support alternative income sources.

Environmental Protection and Natural Resource Management: Participants expressed concern over environmental degradation linked to previous development activities, particularly loss of vegetation, river impacts, and waste-related issues. They recommended strengthened environmental safeguards, protection of fish habitats, proper waste management, and localized afforestation initiatives. Community members also emphasized the importance of maintaining ecological balance and improving local climate conditions through reforestation and green buffer zones.

Infrastructure, Utilities, and Basic Services: The FGDs participants identified significant gaps in access to safe drinking water, electricity, healthcare, and transport systems. They requested improved and affordable water supply solutions, better utility services, upgraded healthcare facilities, and strengthened emergency response systems. Effective traffic management, safe ferry operations, and reduced disruption during construction were also highlighted as key priorities.

Social Protection, Safety, and Governance: Participants stressed the importance of ensuring community safety and social protection, particularly for women and vulnerable groups, in the context of increased project-related activity and workforce influx. They recommended strict compliance with labour standards, prevention of harassment and exploitation, and establishment of worker and community grievance mechanisms. Continuous stakeholder engagement and transparent communication were identified as essential for maintaining trust and social stability.

Gender: It was stressed that women's participation in income-generating activities remains limited, with most women engaged in household responsibilities. Community safety, particularly for women and girls remains a serious concern due to eve-teasing, harassment, insecurity, and anti-social activities associated with unemployed youth and outside labour. Additionally, concerns were raised about trafficking of women and children, with participants mentioning incidents of missing children within the community. Additionally, gender-based violence, domestic conflicts and social inequalities were identified as major social challenges affecting women's empowerment and wellbeing.

6.6 List of Participants

Consultation meetings were conducted with relevant stakeholders, local communities, government agencies, port and industrial representatives, and other interested parties as part of the ESIA process. The consultations provided an opportunity to obtain views, concerns, suggestions and local knowledge regarding the proposed LCT Project and its potential environmental and social impacts. The list of participants, including their contact numbers and signatures, is provided in **Annex B3**. The participant lists or the attendance sheets are presented separately for the respective consultation meetings and FGDs.

6.7 Photographs

Photographs of the consultation meetings conducted as part of the ESIA process are presented in this section. The photographs provide visual documentation of the consultation activities and capture interactions between the project team, relevant stakeholders, local communities, government representatives and other participants. These photographs complement the consultation proceedings and records presented in this chapter and provide evidence of stakeholder engagement undertaken during the ESIA process.




Figure 6-3: Community meeting at Fulchori Para, Government Primary School on 23 April 2026




Figure 6-4: Community Meeting at 41 Ward Commissioner's Office, Patenga, Chattogram on 23 April 2026




Figure 6-5: Community meeting at Dhakkin Patenga High School, Port area on left bank (opposite bank of proposed sites) of Karnaphuli River on 25 April 2025



Figure 6-6: FGD Meeting with adolescent girls on 08 April 2026



Figure 6-7: FGD with Boatmen group, at Ghat No.15, on 09 April 2026



Figure 6-8: FGD with Ferry Ghat Workers



Figure 6-9: FGDs with religious leaders on 09 April 2026



Figure 6-10: FGDs with truck drivers on 09 April 2026



Figure 6-11: FGDs with local women on 09 April 2026



Figure 6-12: FGDs with local businessman on 09 April 2026



Figure 6-13: FGDs with local fishermen on 21 April 2026

7 Valued Environmental Components (VECs)

7.1 Introduction, overview and sensitivity of VECs

Valued Environmental Components (VECs) are defined as fundamental elements of the physical, biological, and social environment, including the ecosystem, ecosystem services, air, water, soil, terrain, vegetation, wildlife, fish and land use that may be affected by a proposed project. VECs may vary by project, industry and geographic region, to reflect the nature of the potential project effects and the environmental, economic, social, social, heritage and health context within which the project is implemented.

VECs were selected based on their environmental, social, cultural, economic and regulatory importance, together with their sensitivity or vulnerability to project-related impacts. Receptors considered to have high value, high sensitivity, legal protection, conservation significance, livelihood dependence, or stakeholder concern were identified as material VECs and taken forward for detailed assessment.

The 'effect pathway' needs to be understood before implementation of the project activities. Effect pathway refers to the cause-effect link between a project activity and a VEC. In some cases, the project-VEC interaction comprises a direct impact, while in others the project may affect the VEC indirectly, by causing changes in the natural or human environment on which the VEC depends.

For example, a project may alter water quality, which could adversely affect aquatic ecosystems, such as fish populations. This, in turn, may reduce fish catch and thereby affect associated livelihoods.

Sensitivity is assessed for each VEC based on the baseline conditions of the affected resource or population. The sensitivity of a VEC is based on the degree to which a VEC is resilient to change, its ecological or socio-economic importance, and the value attributed to them by stakeholders or applicable regulations/policies. For project-wide impacts that could potentially affect many or all environmental and social components, a conservative (precautionary) assumption has been made by assigning a high sensitivity rating. This ensures that the significance of such impacts is not underestimated where the specific affected VECs cannot be readily differentiated. The criteria used to assess VEC sensitivity are presented in Table 7-1.

Table 7-1: Criteria for the sensitivity of a VEC

Category	Description
High	VECs (physical, biological or social) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
Medium	VECs with limited capacity to absorb proposed changes or limited opportunities for mitigation.
Low	VECs with some capacity to absorb proposed changes or moderate opportunities for mitigation.

Category	Description
Negligible	VECs with good capacity to absorb proposed changes or good opportunities for mitigation.

Based on the baseline data presented in Chapter 5, the stakeholder engagement outcomes in Chapter 6 and established knowledge of the relevant environmental and social context, the identified physical, biological and social VECs are presented in Table 7-2, together with their assigned sensitivity levels. The following sections in this chapter provide a description for each VEC, the reason for selecting it as a VEC for this project, and the basis for its assigned sensitivity.

Table 7-2: VECs and their sensitivities

Category	VECs	Sensitivity
Physical component	Drainage hydrology	High
	River morphology	Medium
	Water and sediment quality[30]	Medium
	Ambient noise levels	Medium
	Ambient air quality	Medium
Biological component	Tidal mudflats	Medium
	Mangrove ecosystem	Medium
	Dolphins	High
	Fisheries resources	Medium
	Avifauna and migratory birds	Low
Social component	River crossing commuters and operators	High
	Road traffic	Low
	River traffic	Medium
	Livelihood, health and safety of communities	High
	Construction and Operation workers	High

7.2 Drainage Hydrology

Given its hydrological importance and the direct interaction between the proposed development and the existing drainage infrastructure, the drainage hydrology (in particular the functioning of *Khal 14*) has been identified as a VEC requiring detailed assessment in the ESIA. *Khal* No. 14, a primary drainage outlet, will be replaced with a box culvert to facilitate the construction of a platform connecting Blocks B and C, potentially limiting future access for desiltation (excavation)

[30] *Including groundwater quality*

and maintenance. The sensitivity is considered high, because of existing waterlogging issues and the crucial role that the *Khal* system has in managing stormwater drainage from the nearby community and airport area. In addition, the drainage system has verry little capacity to absorb reductions in hydraulic performance without increasing flood risk, while opportunities to fully mitigate potential impacts are constrained by the permanent modification of the drainage infrastructure and the long-term maintenance requirements of the culvert.

7.3 River morphology

River morphology is identified as a VEC because the Karnaphuli River is important for navigation, sediment transport, drainage and channel stability; and the proposed project activities, including dredging, reclamation and shoreline modification, may alter local flow patterns, erosion and sedimentation processes. The sensitivity of this VEC is considered medium because the river has some resilience to changes due to the presence of existing port and industrial infrastructure, while remaining susceptible to the risk of project-induced changes. Opportunities to mitigate impacts through engineering design and sediment management measures are available, but uncertainties remain regarding long-term morphological responses.

7.4 Water and Sediment Quality

Surface water and sediment quality is identified as VEC because they are essential for maintaining the ecological functioning of the Karnaphuli River and supporting fisheries, aquatic habitats, navigation and other ecosystem services. The sensitivity of this VEC is considered medium because of its importance for maintaining aquatic ecosystems, fisheries, and other uses; on the other hand, the river water and sediment quality is already influenced by existing port, industrial and urban activities and can accommodate limited short-term changes without substantial degradation. Furthermore, opportunities exist to mitigate potential impacts through good dredging practices, sediment management and pollution control measures, although some temporary changes in water and sediment quality may remain unavoidable during construction activities.

7.5 Ambient Noise Levels

Ambient noise levels have been identified as VECs because project activities may increase airborne noise, affecting nearby sensitive receptors, including residential areas, schools, mosques and local bird populations. The sensitivity of this VEC is considered medium because, although the area is already exposed to high noise levels from existing port, industrial, road, air traffic and vessel activities, sensitive human and ecological receptors remain vulnerable to additional noise and vibration due to project construction and operation activities. Opportunities to mitigate impacts through equipment controls, maintenance, screening and activity scheduling are available, although complete mitigation may not always be achievable, particularly during peak construction activities.

7.6 Ambient Air Quality

As the primary receptor of airborne emissions from project construction and operation activities, ambient air quality is considered a VEC because it directly influences nearby human and ecological receptors. Project activities, including dredging, earthworks, material handling and increased traffic and vessel movements, may generate particulate matter and gaseous pollutants, resulting in changes to ambient air quality. The sensitivity of this VEC is considered medium because, although baseline air quality is generally within applicable standards and the area benefits from favourable dispersion conditions, nearby sensitive receptors remain susceptible to temporary increases in pollutant concentrations. The receiving environment has some capacity to absorb short-term changes without substantial degradation, and opportunities exist to mitigate impacts through dust suppression, emissions controls, good equipment maintenance and traffic management measures, although temporary increases in pollutant levels may still occur during peak construction activities.

7.7 Tidal Mudflats

Tidal mudflats are considered a VEC because they provide important intertidal habitat for benthic organisms, fish, shellfish and foraging waterbirds, while also supporting local fishing activities. The mudflat in front of Block C and proposed replacement of a section of *Khal* No. 14 with a box culvert will result in the permanent loss of tidal mudflat.

The tidal mudflat VEC is assigned a medium sensitivity. This rating reflects the ecological and livelihood value of the habitat, while recognising that tidal mudflats are naturally dynamic estuarine environments that experience regular physical disturbance through tidal processes and sediment movement. The habitat has limited capacity to absorb permanent habitat loss within the Project footprint, but the ecological functions supported by the habitat are not considered irreplaceable at the AoI scale. Opportunities to mitigate direct habitat loss are limited and are primarily restricted to minimising the footprint of permanent works and avoiding unnecessary disturbance of adjacent mudflat areas during construction

7.8 Mangrove Ecosystems

Mangroves are considered a VEC because they provide important ecological functions, including habitat for benthic, aquatic and bird species, shoreline stabilization and nutrient cycling within the estuarine environment. The proposed replacement of the drainage channel with a box culvert will require the removal of a small number of mangrove trees, while nearby riverside trees may be at risk of accidental damage during construction and operation.

The mangrove ecosystem VEC is assigned a medium sensitivity. This rating reflects the ecological importance of mangroves, and the ecosystem functions they provide within the estuarine environment. At the same time, the mangrove that grow within the Project AoI occur in a highly

modified and disturbed industrial landscape. The mangrove trees have demonstrated a degree of resilience to existing anthropogenic pressures.

7.9 Dolphins

Dolphins have been identified as an important VEC due to their ecological importance, conservation status, and reliance on the aquatic environment of the Karnaphuli River. Two species are known to occur within the broader Project AoI: the Ganges River Dolphin (*Platanista gangetica*) and the Irrawaddy Dolphin (*Orcaella brevirostris*). Project activities of greatest relevance to dolphins include underwater noise generated during piling, dredging and vessel movements, as well as increased vessel traffic and collision risk. These activities have the potential to affect dolphin communication, navigation, foraging behavior, habitat use, breeding activities and movement patterns. Both species rely heavily on acoustic signals and echolocation to navigate, locate prey and communicate in the often-turbid waters of the estuary and river system.

The dolphin VEC is assigned high sensitivity. This rating reflects the high conservation value of the species, both of which are globally classified as Endangered. In addition, dolphins have little to no capacity to absorb changes to the underwater acoustic environment because they rely heavily on echolocation and sound-based communication for navigation, foraging and social interactions. Considering the conservation significance of these species, their dependence on acoustic cues, their limited resilience to underwater noise, and the limited opportunities for complete mitigation, a high sensitivity rating is considered appropriate.

7.10 Fisheries Resources

Fisheries resources constitute a key VEC due to their ecological importance and contribution to local livelihoods within the Karnaphuli River estuarine system. Project activities may affect fish and aquatic invertebrates, their feeding, breeding, nursery and migration habitats, and traditional fishing activities through changes to the aquatic environment and increased vessel movements.

The sensitivity of this VEC is considered medium. Fisheries resources in project AoI have shown a natural capacity to sustain itself in a highly modified and disturbed river and marine environment. Because of this, it is believed that there is some capacity to absorb changes that arise from the LCTP. The medium sensitivity rating therefore reflects the balance between the ability of fish populations to adapt to and recover from the existing levels of disturbance, and the ecological and socio-economic importance of fisheries resources within the Karnaphuli River estuarine system.

7.11 Avifauna and Migratory Birds

Avifauna, including migratory and nocturnal species, constitute a key VEC due to their ecological importance and dependence on the estuarine and coastal habitats within the Project AoI for

feeding, resting, and migration. Project activities may result in the loss of a small feeding habitat and cause disturbance from increased human activity, noise, lighting, and vessel movements.

The sensitivity of this VEC is considered low. Avifauna generally have a high capacity to absorb localized changes, as most species are highly mobile and are able to relocate to alternative feeding, resting, and roosting habitats within the wider estuarine and coastal environment. The immediate project area supports relatively low numbers of birds and does not provide extensive breeding, nesting, or critical habitat functions compared to nearby areas such as Majher Char and Parki Beach. The low sensitivity rating therefore reflects the relatively high capacity of avifauna to adapt to localised habitat loss and disturbance, together with the availability of mitigation measures and alternative habitats within the wider estuarine and coastal system.

7.12 River Crossing Commuters and Operators

River-crossing boat services and their users constitute a key VEC because they provide an essential transport link across the Karnaphuli River for nearby communities, including a large number of garment (mostly female) and other industrial workers who rely on *Ghat* 14 for daily commuting to their workplaces. The proposed project will require the permanent closure of *Ghat* 14, resulting in the relocation of river-crossing services and changes to existing travel routes and operations. The sensitivity of this VEC is considered high because a large number of daily users depend on this crossing. River-crossing commuters and operators have a limited capacity to absorb changes, as there are no practical alternatives that would not result in increased travel costs, longer journey times, inconvenience, or loss of income. Furthermore, opportunities to mitigate the predicted impacts are limited, as all available alternatives involve additional time and cost burdens for affected users and operators.

7.13 Road Traffic

Road traffic constitutes a key VEC because it is essential for local travel, economic activities and the mobility of residents. A separation has been made between the VEC Road Traffic and the impacts of increased road traffic on VEC Livelihood, health and safety of communities. In the former, traffic specific vulnerabilities are taken into account, referring to congestion, slowed down traffic, quicker deterioration of pavement, etcetera. When it comes to the vulnerabilities of the communities, for example in terms of safety, noise, dust and accessibility, the impacts of increased traffic vehicles due to the LCTP are delinked to the VEC Livelihood, health and safety of communities.

Project construction and operation will increase vehicle movements, particularly heavy trucks, which may affect traffic flow and road safety. The sensitivity of this VEC is considered low because the existing road network has sufficient capacity to accommodate the predicted increase in traffic, although localized and short-term disruptions may occur near site access points.

7.14 River Traffic

River traffic constitutes a key VEC because it is essential for navigation, freight transport, fishing activities and local passenger river-crossing services within the Karnaphuli River. Project activities may increase vessel movements, alter navigation patterns, and permanently relocate river-crossing services following the closure of *Ghat* 14, potentially affecting navigation efficiency and safety. The sensitivity of this VEC is considered medium because the river already accommodates high levels of vessel traffic and users have some capacity to absorb changes, although increased traffic and changes to navigation routes may create localized operational conflicts. However, opportunities for mitigation are relatively limited. While mitigation measures can help reduce operational disruptions and safety risks, they cannot avoid the increase in river traffic associated with the project.

7.15 Livelihood, Health and Safety of Communities

Community livelihoods, health, and safety constitute a key VEC because they are fundamental to the well-being, economic security and quality of life of nearby residents. Project activities may affect livelihoods, access to services and transport, public health and safety, visual impacts and community use of local resources and recreational areas. The sensitivity of this VEC is considered high because affected households and vulnerable groups may experience significant consequences as a result of disruptions to community well-being, safety, daily activities, and income sources. These factors reduce the ability of affected people to absorb change and adapt to project-related impacts. While opportunities exist to partly mitigate the predicted impacts through management measures, some residual effects may remain and cannot be avoided or easily mitigated.

7.16 Construction and Operation Workers

LCTP will generate job opportunities in the construction and operation phase. Construction and operation workers, including truck drivers, constitute a key VEC because they are directly involved in project activities and are routinely exposed to occupational hazards. Construction and operation activities may expose workers to risks associated with dredging, heavy equipment, vessel movements, hazardous materials, heavy traffic and prolonged exposure to a noisy working environment, which could affect their health, safety and well-being. The sensitivity of this VEC is considered high because workers are directly exposed to multiple occupational hazards throughout the project lifecycle and have limited separation from the sources of risk and therefore have limited capacity to absorb changes. There are opportunities to mitigate risks, but construction and operation workers will still be close to the sources of risk.

8 Impact Prediction and Evaluation

8.1 Methodology

As part of the ESIA, the potential impacts of the proposed Laldia Container Terminal project (LCTP) have been systematically identified, predicted and evaluated in accordance with the applicable national regulatory framework and international ESIA good practice.

The impact assessment follows a structured approach comprising:

i. identification of impacts;
ii. prediction of impact characteristics; and
iii. evaluation of impact significance.

Valued Environmental Components (VECs) have been identified and described in Chapter 7 based on the baseline conditions presented in Chapter 5 of this ESIA. This includes consideration of primary survey data, secondary information sources, regulatory standards and stakeholder engagement outcomes. The identified VECs represent environmental and social components that will potentially be affected by the proposed project.

Each VEC has been assigned a sensitivity level based the degree to which a VEC is resilient to change, and the value attributed to them by stakeholders or applicable regulations/policies.

Potential impacts have been identified across all relevant project phases (pre-construction, construction and operation). Impact prediction considers the characteristics of each impact, including its duration, geographical extent, nature, likelihood and magnitude. The impact significance is determined based on the combination of the sensitivity of the VEC and the impact magnitude.

8.1.1 Magnitude Criteria

The magnitude of an impact reflects the severity of change to baseline conditions resulting from a project activity. The assessment of magnitude is undertaken in a structured manner based on two steps. Firstly, the identified impacts are categorised as beneficial or adverse. Secondly, impacts are categorised as major, moderate, minor or negligible based on consideration of the following defined parameters:

- Temporal Aspect – ranging from short term to long term.
- Spatial Aspects – the geographical extent of the impact, defined as local, regional, national or global.
- Likelihood – classified as unlikely, likely and certain.

In the assessment of the magnitude, compliance with national standards is considered as well. Whenever national standards are not available, international best practices are considered. Criteria for determining impact magnitude are given below:

Table 8-1: Criteria for Determining Impact Magnitude

Category	Description (adverse impacts)
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or Good International Practice without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but minor change to the specific conditions assessed.

8.1.2 Evaluation of Impact Significance

Potential impacts are evaluated through a combination of the sensitivity of the corresponding VEC and the impact magnitude as elaborated above. Together, these factors are scored using an impact significance matrix given in Table 8-2.

Table 8-2: Impact evaluation matrix

Sensitivity	Magnitude						
		Negative			Positive		
		Major	Moderate	Minor	Minor	Moderate	Major
	High	Major	Major	Moderate	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Negligible	Negligible	Minor	Moderate

8.2 Project activities

For the purpose of the impact assessment, the project development is divided in three phases: pre-construction, construction and operation. In Section 3.5, an overview of the project activities is given. Below, a summary of these activities is given as input to the impact and risk assessment.

Pre-construction

In the pre-construction phase the necessary permits and approvals will be obtained, field surveys and stakeholder engagement will be conducted. Tender documents for the construction will be prepared and contractors will be selected, who will further prepare the detailed design. Temporary perimeter fencing will be erected with security facilities and project site offices.

Construction

The project involves substantial construction activities within the terminal area, including land development and ground improvement, dredging, reclamation and riverbank protection works along the Karnaphuli River, construction of quay walls, land reclamation to design levels, construction of a deck-on-piles for berth frontage, and berthing facilities, installation of cargo

handling equipment, development of internal roads and drainage systems, establishment of utility services, and construction of administrative, customs, and operational support facilities.

Operation

During the operational phase, the terminal handles both import and export containers, where export cargo is consolidated, stored, and loaded onto vessels, while import containers are unloaded, temporarily stored, and subsequently transported to inland destinations primarily by road.

The impacts arising from these activities are assessed across ecological, physicochemical and socio-economic components, with separate consideration of construction and operational phases. This chapter presents an evaluation of the potential significant impacts associated with the development and operation of the Laldia Container Terminal project.

8.3 Project Impacts

8.3.1 Introduction

The significance of potential environmental and social impacts identified for the Project is presented in the below sections and summary tables are given in Section 8.4. The subsections and the summary tables are organised according to the project phases in which the impacts are expected to commence. These phases include the **pre-construction, construction** and **operation** phases.

To focus the assessment on impacts requiring particular attention, only impacts assessed as having moderate or major significance are described in detail in the following sections. Impacts assessed as negligible or minor significance are presented in the corresponding tables but are not further elaborated upon.

Impacts are reported under the project phase in which they are first expected to occur. However, it should be noted that some impacts may persist beyond their initiating phase and continue into subsequent phases of the Project. For example, impacts originating during construction may continue into the operational phase, while certain operational impacts may remain throughout the life of the Project. The significance ratings and descriptions provided below should therefore be interpreted with consideration of the potential duration and continuation of these impacts across multiple project phases.

8.3.2 Impacts on Drainage Hydrology

Drainage hydrology in the Project Influence Area is governed by the interaction between monsoon rainfall, the local *khal* network, regulators and pumps, and the water level in the Karnaphuli River. Figure 8-1: (next page) shows the project area, the *Khals* and regulators within the area.

The catchment area is low-lying and drains through a series of *Khals*, including *Khal 14* between Blocks B and C, *Khal*-13 between Blocks A and B, and *Khal*-12 north of Block A. *Khal 14* is

connected upstream with *Khal*-15, which drains to the Karnaphuli River south of Block C. During intense rainfall, runoff can exceed the conveyance and storage capacity of the drainage system. In addition, when the Karnaphuli River water level is high, gravity drainage through the regulators is restricted and the gates must close to prevent tidal backflow. Pumps then support drainage to drain the stormwater to the river during high tide levels. A known issue in the area is waterlogging, which occurs frequently after rainfall events according to the socio-economic survey results and consultation with the Bangladesh Water Development Board (BWDB). Even temporary obstruction can lead to waterlogging and flooding, thereby affecting communities, airport-related land and access routes within the LCT Project Influence Catchment Area.

The main project-related impact pathway is the proposed connection of Block B and Block C over the existing drainage channel of *Khal 14* (see Chapter 3). The proposed coverage is to have a landfill with a culvert to replace the existing drainage channel. LCT Ltd. is working closely with BWDB during detailed design to align with the requirements for the drainage channel. Changing from the drainage channel to the culvert will permanently remove the retention capacity in the existing drainage channel and poses the risk of reducing the drainage capacity. The culvert is more sensitive to clogging and has less retention capacity. Without adequate design and maintenance provisions the project could reduce hydraulic conveyance, restrict inspection and maintenance access, increase sedimentation within the covered canal, and therefore exacerbate upstream waterlogging during rainfall events. Additionally, the water that can be stored within the drainage channel between the sluice gate and the existing culvert under the airport road will be stored in upstream locations, potentially increasing waterlogging depths. These issues are discussed during ongoing conversations between LCT Ltd. and BWDB.

A study has been performed to model the potential impacts of the project on the drainage hydrology. This was done by developing a coupled pluvial and hydrodynamic flood model using MIKE FLOOD. The model combines a one-dimensional representation of the local *Khal* drainage network with a two-dimensional floodplain model of the LCT Project Influence Catchment Area. Rainfall runoff was generated with MIKE NAM and then routed through the *khal* network. The downstream ends of the *khals* were connected to the Karnaphuli River, so the model could represent how tidal river levels affect gravity drainage, sluice gate operation and pump performance. The model uses a corrected Digital Elevation Map (DEM) referenced to Mean Sea Level.

For the post-project scenario, Block C was raised to the proposed terminal design level and the proposed *Khal 14* box culverts were included upstream and downstream of the existing regulator. The culverts match the opening of the existing sluice gate, resulting in a culvert of 3 m in width, and 1.8 m in height. The culvert upstream of the sluice gate has a length of 60 m and downstream is 100 m. Both culverts match the invert level (bottom level) of the sluice gate sill level.

The scenarios compare pre-project and post-project conditions for 2030 and 2050 under RCP8.5 rainfall conditions with a 1/20-year return period. For 2030, current tidal river water levels and

projected 2030 rainfall were used. For 2050, both the projected increase in rainfall intensity and an additional sea level rise was included in the model in the IPCC climate scenario RCP8.5 (high-emissions, worst-case). The upstream ends of the *khals* were modelled with zero inflow, while the downstream river boundary varied over time with the tidal water level. This allowed the model to assess when high Karnaphuli River levels restrict gravity drainage and cause backwater effects in the *khal* system, and whether LCTP changes drainage congestion, waterlogging or inundation patterns in the surrounding area.



Figure 8-1: Drainage canals and regulators in project catchment. 1 = Khal 12, 2 = Khal 14, 3 = Khal 15.

Figure 8-2: shows the local drainage arrangement of *Khal 14* between Block B and Block C. The purple line (4) indicates an existing culvert under Airport Road. This culvert is located upstream of the project site and is smaller in dimensions compared to the sluice gate (estimated dimensions are 1.5x1.2m). Based on the culvert dimensions and a Manning's roughness of 0.02, the theoretical conveyance capacity of the existing culvert is approximately 4–5 m³/s. In practice, this is likely much lower due to clogging of the culvert with waste materials, as was seen from field observations. Runoff from the upstream catchment must pass through this culvert before it can continue towards the drainage channel, regulator, pump station and the Karnaphuli River. Because the existing culvert has a limited opening and fixed invert level, it restricts the drainage to *Khal 14*. When the sluice gate is closed, the pumps are activated; these have a combined discharge capacity of approximately 0.56 m³/s (2 × 0.28 m³/s). This means that under high-tide conditions, when the sluice gate is closed and gravity drainage is restricted, the pump capacity becomes an even more stringent limitation on the overall hydraulic capacity of the system than the conveyance of the existing culvert.

In addition to the capacity of the pump, it can now pump freely into the drainage channel which will change into the pumps draining into the proposed culvert. In the current conditions, the pump discharges into a very wide-open channel, resulting in negligible downstream hydraulic resistance and some available storage volume. In the proposed new drainage design, the pumps discharge into the culvert that will likely be full of water due to high tide water levels. The culvert has significantly more drainage capacity than the total pump capacity, so friction losses from the flow are expected to be very small. However, the pump will no longer discharge into an open water body but into a pressurised, tide-influenced system. Therefore, the pump capacity may be slightly lower in the future condition, but based on the dimensions provided, this reduction is unlikely to result from the culvert size itself. The main difference may lead from the pumps discharging into tidal-influenced water bodies instead of free discharge.



Figure 8-2: Zoom-in Khal 14 drainage system. 1 & 3 = Khal 14 drainage channel, 2 = sluice gate and pumping station, 4 = existing culvert, 5 = upstream channel.

Figure 8-3: shows the modelled longitudinal water-level profile for *Khal 14* and upstream channels. The profile confirms the importance of the existing culvert under Airport Road as a drainage bottleneck. Even when the Karnaphuli River is at low tide and the river water level drops below mean sea level, water in *Khal 14* near the culvert cannot drain below the culvert invert level. As a result, water is held back upstream of the culvert.

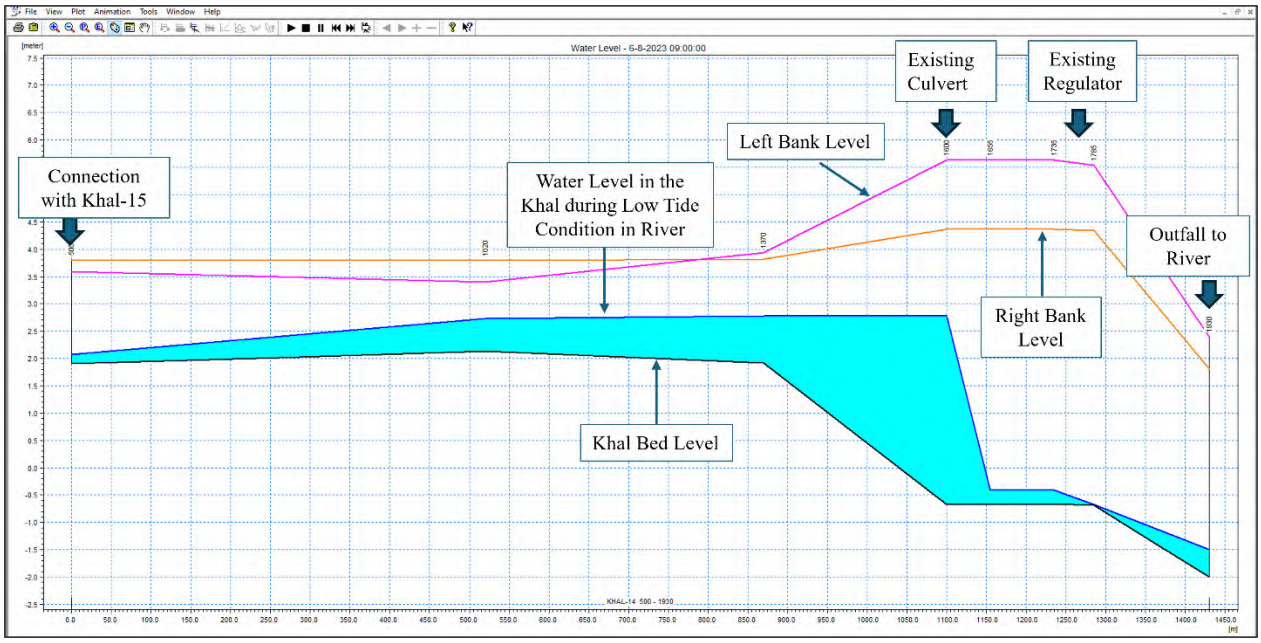


Figure 8-3: Longitudinal water-level profile for Khal 14 and upstream channels, showing the backwater effect upstream of the existing culvert.

The flood inundation maps for 2030 and 2050 show a similar spatial pattern pre- and post-project conditions (Figure 8-4). In both time horizons, flood depths are concentrated in existing low-lying areas, particularly in the nearby communities. The post-project maps do not show a significant increase in flood extent or depth compared with the corresponding pre-project maps. This is consistent with the model interpretation that implementation of the Project, including the proposed *Khal 14* new culvert arrangement, does not significantly change the hydraulic drainage conditions. The residual pluvial flooding is therefore primarily associated with existing catchment topography, current drainage conveyance capacity, downstream river levels, and the existing culvert bottleneck.

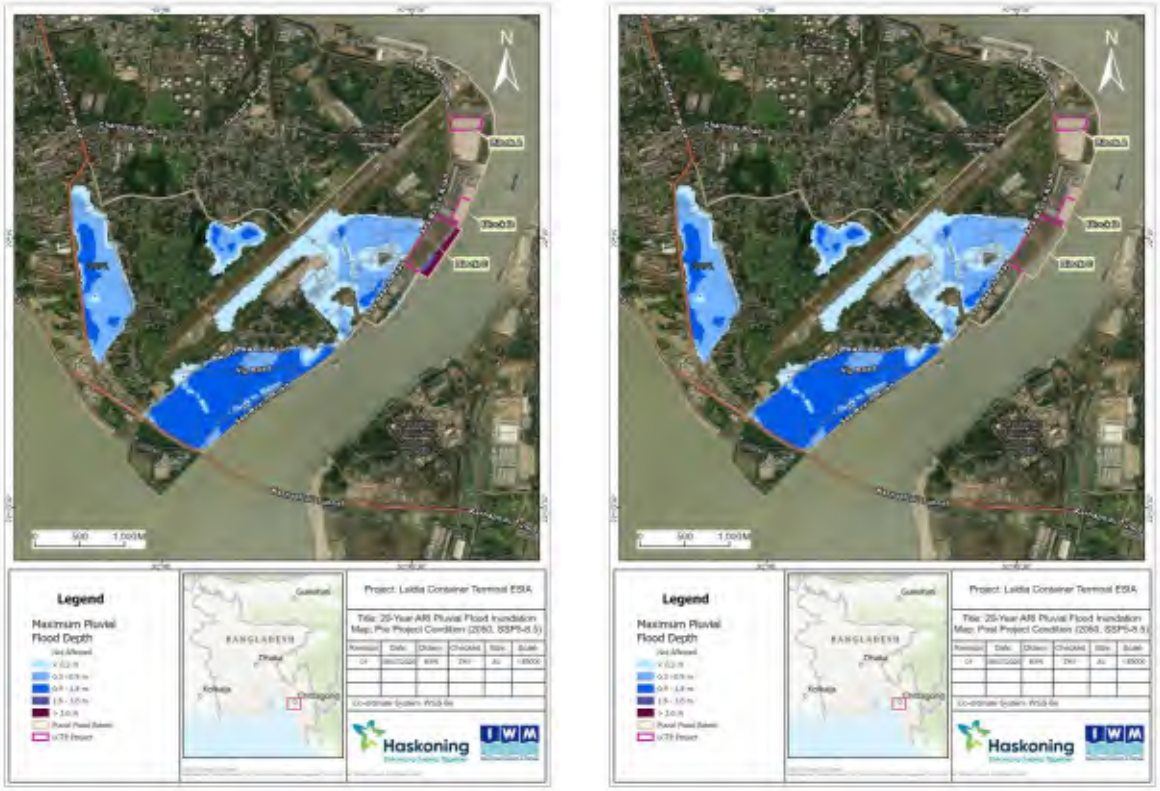
However, although the hydraulic capacity of the system is mainly determined by the existing culvert under the Airport Road, the retention capacity currently provided by the open section of the *Khal*-14 drainage channel will be lost as a result of the Project. During heavy rainfall events, or during periods when the sluice gate is closed and incoming water exceeds what the sluice gate and pumps can discharge, the water that is currently stored in the open channel will instead be stored in upstream locations. This will increase waterlogging depths or extend the duration of waterlogging in those upstream areas. The proposed box culvert will provide significantly less retention capacity than the existing open channel and therefore will not offer the same storage function.



2030 pre-project condition



2030 post-project condition



2050 pre-project condition

2050 post-project condition

Figure 8-4: Pluvial flood model results showing pre-project and post-project conditions for a RCP5-8.5 rainfall event with a return period of 20 years in 2030 and 2050

During **pre-construction**, demolition debris, removed topsoil and stored materials could enter nearby *khals* and obstruct local drainage. This would be a short-term, local, negative impact. Because the drainage system is already sensitive to blockage, the pre-mitigation significance is assessed as moderate.

During **construction,** the main risk relates to potential temporary or permanent restriction of *Khal*-14 drainage capacity while Block B and Block C are being connected. Based on the model results, the proposed arrangement is not expected to significantly increase inundation if the culvert design is implemented as modelled and if construction activities do not temporarily block the channel. However, the retention volume that is currently provided by the open section of *Khal*-14 will be lost, and this storage will be displaced to upstream locations. This may result in an increase in waterlogging depths or duration in those upstream areas during heavy rainfall events or when the sluice gate is closed and incoming flows exceed the discharge capacity of the pumps. Another important risk is the perceived waterlogging risk among local communities. As nearby communities already experience recurring waterlogging, residents upstream of the project site may attribute any increase in waterlogging to the LCTP, even if the hydraulic modelling indicates only limited changes at the catchment scale. This perception poses a risk of dissatisfaction and reduced community acceptance of the Project.

During **operation** (and **construction**), restricted access to the culvert for maintenance and cleaning works is another impact that arises. The access to the sluice gate and pumping station remains open during operation through a separate pathway but is likely to be temporarily restricted during construction activities, potentially limiting the ability of the responsible authority to operate or maintain the regulator. For the covered section of *Khal*-14, the design proposes manholes in the terminal deck to allow inspection and maintenance activities. However, once terminal operations are ongoing, access through these manholes will be limited to specific, pre-agreed periodic inspections to avoid conflicts with port activities and to ensure worker safety. Cleaning the culvert will also be more constrained than under current conditions, as entry into the covered channel will be more difficult and the use of mechanical cleaning equipment currently employed in the open channel will be restricted. Terminal operations may need to be temporarily paused during inspections or cleaning works to reduce safety risks. This impact is assessed as local and moderate before mitigation, because reduced or delayed access could hinder inspections, gate operation, pump operation, or emergency maintenance.

Sedimentation within the covered channel and culvert system represents an important residual risk. The Karnaphuli River and the connected drainage system carry suspended sediment and covered, or low-velocity reaches are prone to silt accumulation. If sedimentation is not actively managed, the effective flow area of the culvert and covered channel could reduce over time, meaning that the waterlogging conditions may exacerbate in practice.

In conclusion, the hydraulic modelling and baseline assessment indicate that the existing road culvert under Airport Road, rather than the proposed *Khal*-14 box culvert, is the primary constraint on drainage performance in this part of the catchment under gravity flow conditions. During the closure of the sluice gate, the pumping capacity becomes the major constraint in hydraulic capacity. The Project is not expected to materially increase waterlogging depths or extends, provided that the culvert is constructed in accordance with the modelled design and that temporary obstructions during construction are avoided. However, the retention volume that is currently available in the drainage channel will be lost and will be stored in upstream locations, causing localised waterlogging issues in other locations. The key residual concerns to be carried forward are: maintaining hydraulic capacity during construction; ensuring authority-approved access for inspection and cleaning of the sluice gate, pumping station, and covered culvert; periodic desilting and maintenance of the covered channel and culverts; exploring opportunities to support improvement or cleaning of the existing upstream road culvert where feasible; and transparent communication with nearby communities to address the perception that covering the drainage channel will increase waterlogging.

8.3.3 Impacts on River Morphology

Impacts on river morphology are expected during both the **construction** and **operational** phases of the project. During **construction**, dredging and reclamation activities may locally modify the riverbed profile, flow patterns and sediment transport processes. During operation, the presence

of the terminal infrastructure, the dredged berth pocket, maintenance dredging activities and large vessel movements may influence local hydrodynamic conditions and sedimentation patterns.

Capital dredging and land reclamation during **construction** will result in localised changes to flow pathways and sediment transport processes, potentially causing minor erosion and sediment deposition within the immediate project vicinity. However, these changes are expected to remain limited in spatial extent and are unlikely to affect the overall morphological stability of the Karnaphuli River. Overall, the impacts are expected to be localized but may persist over the long term if not properly managed through design and maintenance dredging strategies. A morphological model is developed to assess patterns of sediment transport, changes of erosion and deposition as the hydrodynamics of the Karnaphuli River is altered by the **construction** of the proposed terminal at Laldia. The study provides an understanding of existing morphological conditions and potential changes due to proposed development activities, including dredging, reclamation and navigation-related interventions. The results of the model coarse silt and fine silt fractions are presented in following figures (Figure 8-5 - Figure 8-9).

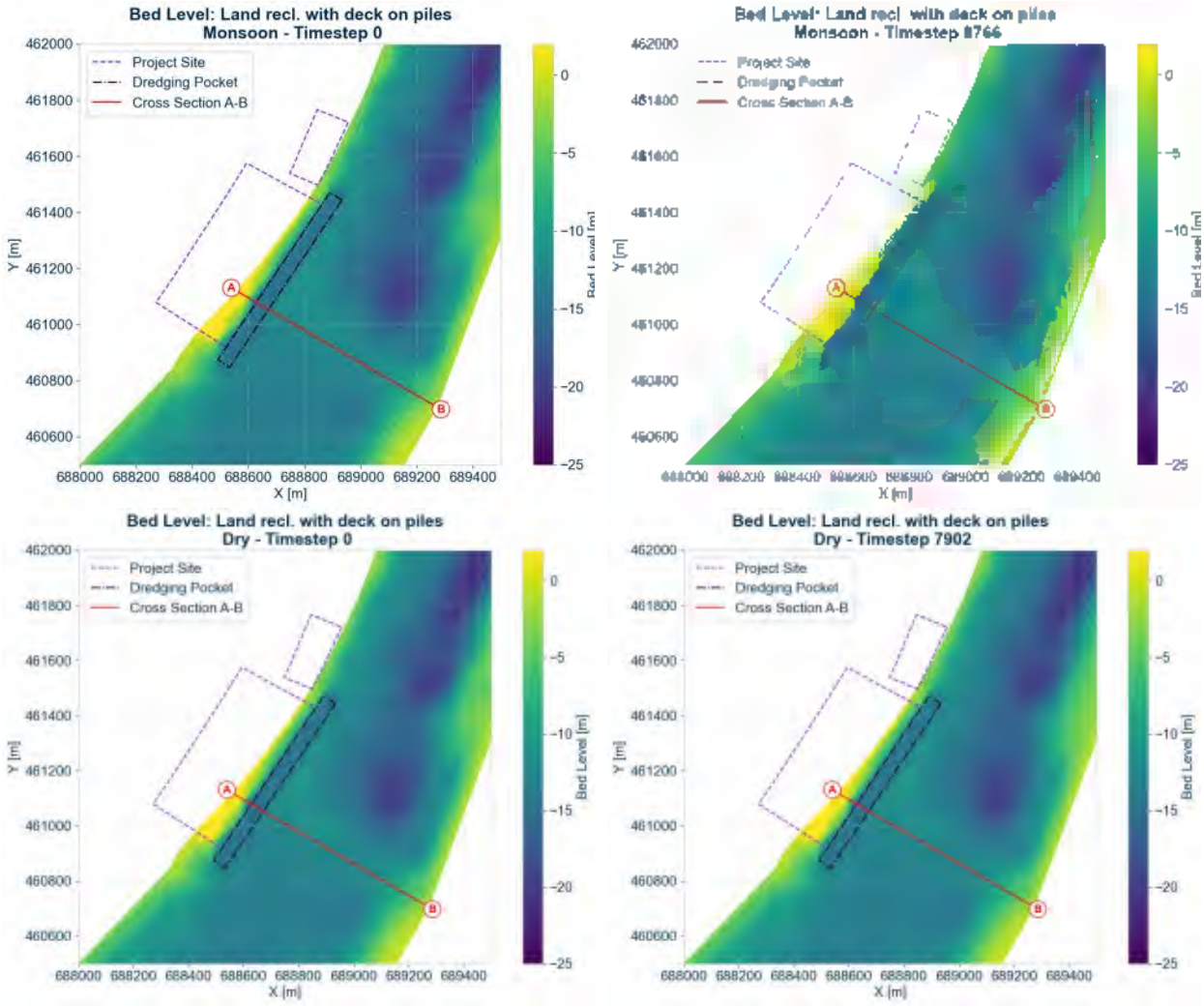


*Figure 8-5: The bed level at the start (left) and end (right) with **coarse silt** transport during one season month for proposed design. (monsoon season on the top and dry season on the bottom)*

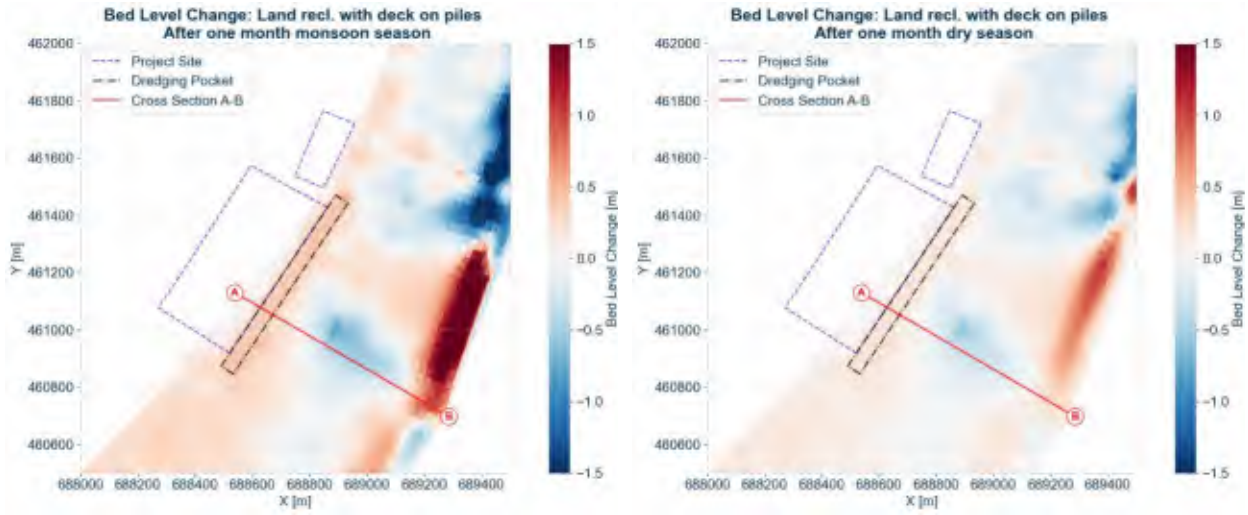


*Figure 8-6: Sedimentation (red) and erosion (blue) after one month of **coarse silt** transport during monsoon (left) and dry (right) conditions starting for the proposed design.*

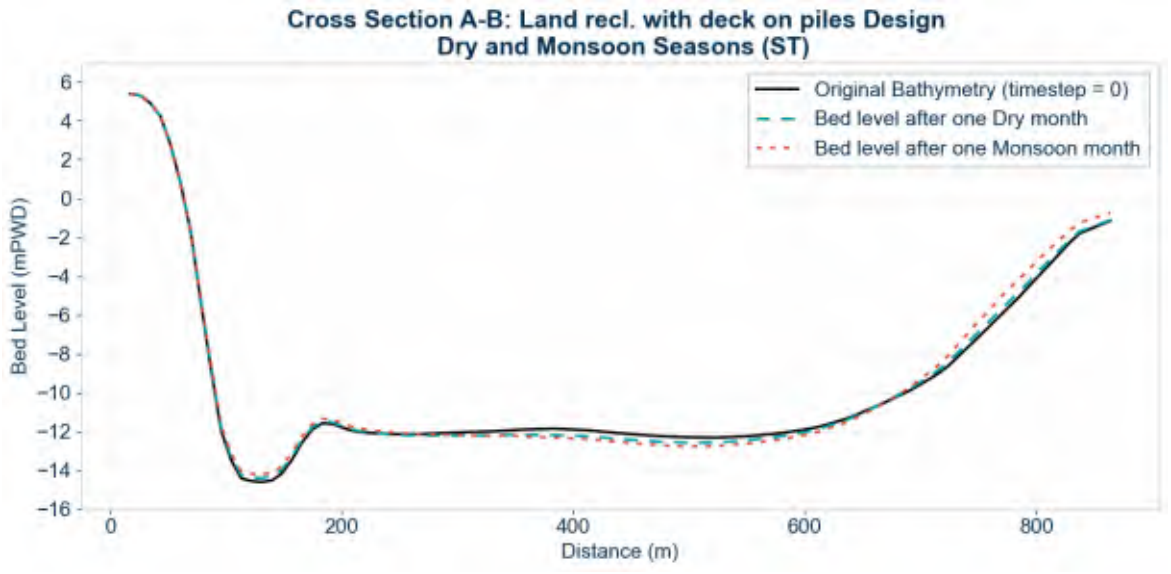


*Figure 8-7: Bed level change with proposed design after one month **coarse silt** transport during dry (blue) or monsoon (red) conditions at cross section A-B*

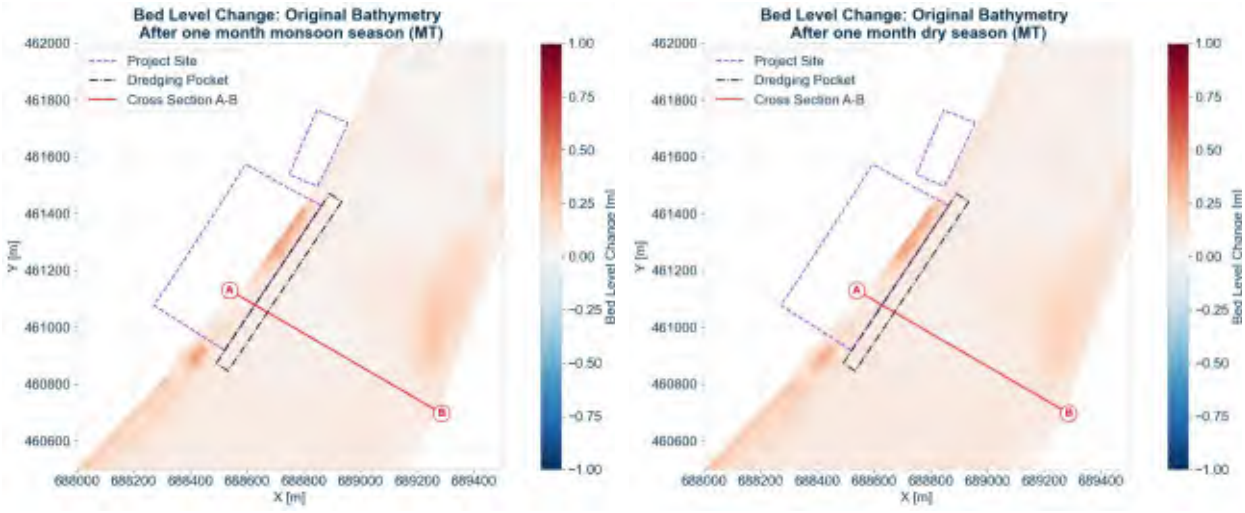


*Figure 8-8: Sedimentation (red) and erosion (blue) after one month of **fine silt** transport during monsoon (left) and dry (right) conditions starting with the original bathymetry.*

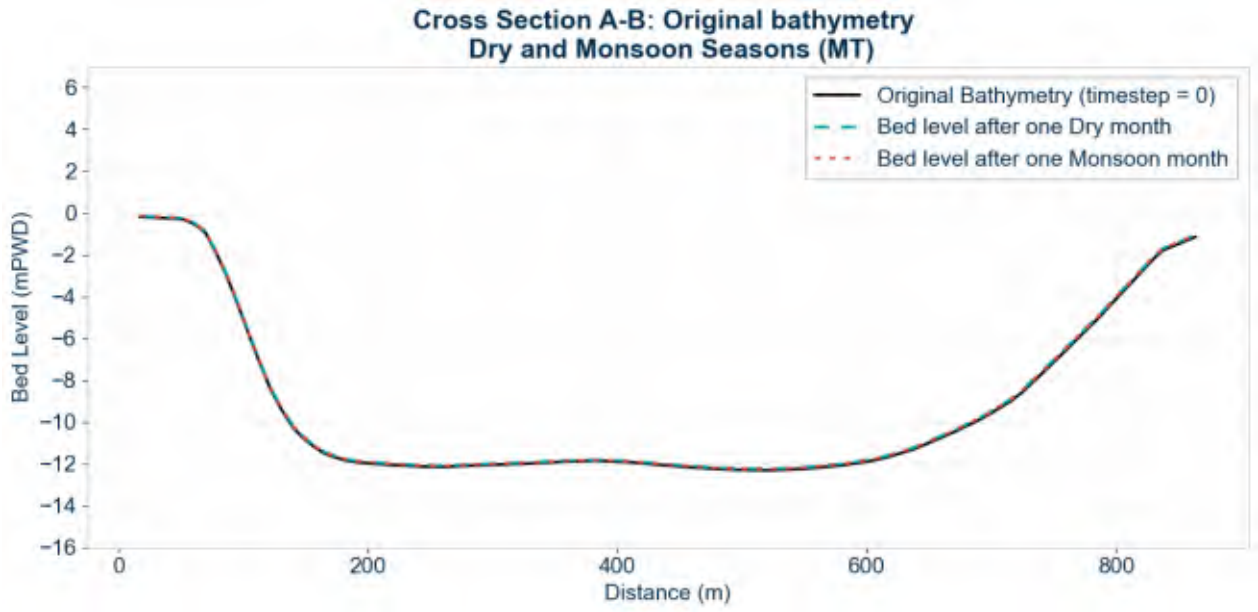


Figure 8-9: Bed level change of the original bathymetry after one month fine silt transport during dry (blue) or monsoon (red) conditions at cross section A-B.

The modelling results indicate that the main additional morphological effect of the proposed terminal is local sedimentation within the dredged berth pocket. Outside the immediate project area, bed level changes remain largely comparable to the present situation, including the southwest corner downstream of Block C. This suggests that the proposed design has only a limited influence on the wider river morphology. The simulations also indicate that the dominant erosion and deposition patterns in the river remain governed by the existing bathymetry and channel geometry.

For the **coarse silt** fraction, the proposed design results in clear backfilling of the dredged berth pocket. The modelled bed level increase is approximately 0.39 m/month during the monsoon

season and 0.19 m/month during the dry season. Assuming these rates remain representative over six months for each hydrological season, the estimated annual sedimentation volume in the dredged berth pocket is approximately 124,000 m³/year. For the **fine silt** fraction, the modelled backfilling is smaller, with bed level increases of approximately 0.07 m/month during the monsoon season and 0.09 m/month during the dry season, corresponding to an estimated annual sedimentation volume in the dredged berth pocket of approximately 35,000 m³/year. These results indicate that coarse silt transport contributes substantially more to berth pocket backfilling than the fine silt transport. The combined annual sedimentation volume in the dredged berth pocket is approximately 159,000 m³/year.

In the southwest corner directly downstream of Block C, the model results show accumulation of both coarse and fine silt. For coarse silt, the proposed design results in bed level changes that are almost equal to the original bathymetry, with approximately 0.16 m/month during the monsoon season and 0.06 m/month during the dry season. For fine silt, the modelled bed level increase is approximately 0.25 m/month during the monsoon season and 0.22 m/month during the dry season, which is only slightly higher than for the original bathymetry. These results indicate that the proposed design has limited influence on sediment accumulation in the southwest corner downstream of the project site.

The results show that the proposed design mainly causes local sedimentation within the dredged berth pocket, which will require periodic maintenance dredging. Bed level changes outside the berth pocket remain close to the present situation, and no significant impacts on the overall channel stability or navigational conditions are expected.

8.3.4 Impacts on Water and Sediment Quality

Surface water and sediment quality may be affected during the **pre-construction**, **construction** and **operation** phases of the Project. Potential impacts are associated with demolition and site preparation, dredging and dredged material disposal, construction runoff, wastewater generation, accidental spills and leaks, vessel operations and stormwater discharge from the terminal. The nature and duration of these impacts vary throughout the project lifecycle depending on the activities being undertaken.

Site preparation, land reclamation and ground improvement activities may generate sediment-laden surface runoff during rainfall events, resulting in localized increases in turbidity within the drainage channels and adjacent sections of the Karnaphuli River until exposed surfaces are stabilized. Various structures such as walls and topsoil will be removed from the project site (especially Block-C) which will generate waste that needs to be disposed of properly. Some of the demolition debris have values and can be sold for other beneficial uses. However, demolished or dismantled materials are likely to create adverse impact on the river water quality if they are not disposed safely as solid wastes or sold for reuse.

The construction materials on the land area may be washed away with surface runoff and deteriorate water quality of drainage canal and the Karnaphuli River. The discharge of untreated sewage from construction sites may also cause surface water pollution. Moreover, dredging activities will release a plume of fine sediment from riverbeds and the plume disperse over a significant distance by tidal currents at the point of dredging.

Dredging

The capital dredging in Karnaphuli River during the **construction** period and maintenance dredging during the **operation** period are likely to affect water quality primarily through the resuspension of bottom sediments and subsequent changes in the physical and chemical characteristics of the water column. The activity will increase turbidity and suspended solids, restrict light penetration, while also release nutrients, heavy metals and organic contaminants that may be present in the sediments. It should be noted that the baseline assessment presented in Chapter 5 indicates that turbidity levels in the Karnaphuli River are already elevated, as reflected by high Total Suspended Solids (TSS) concentrations that exceed the national surface water quality standards for fisheries. Resuspended organic matter and associated oxidation processes may lead to localized reductions in dissolved oxygen and increases in biochemical and chemical oxygen demand. Disturbance of anoxic sediments may further alter pH and redox conditions, and mixing of water layers can cause minor variations in salinity and temperature. Given the highly dynamic tidal regime of the dredging area in Karnaphuli River, characterized by strong currents and significant tidal fluctuations, these impacts are expected to be short-lived and spatially limited, as suspended materials will be rapidly dispersed and diluted within the estuarine system.

The sediment plume assessment (modelling results shown in Figure 8-10) indicates that dredging-related impacts are temporary, localized and largely controlled by tidal currents and hydrodynamic conditions. Under high-flow conditions, sediment plumes spread over a wider area, reaching up to approximately 1.0–1.5 km from the dredging site. Although the affected area becomes larger under high-flow conditions, sediment concentrations decrease more rapidly away from the source due to increased turbulent diffusion and dilution. This suggests that the environmental impact is spatially wider but less concentrated.

Figure 8-11 presents the statistical maximum extent of sediment plume dispersion under high flow and calm wind conditions. Accordingly, the maximum concentration obtained during the one-month simulation period is shown and the farthest reach of suspended sediment transport is highlighted. Owing to the stronger flow conditions, the plume spreads significantly farther than in the low flow scenario, with the maximum plume dispersion length extending approximately 11 km from the source area in the upstream side and 8 km in the downstream side. The figure therefore represents the maximum potential impact zone of suspended sediment transport within the study area under the simulated hydrodynamic conditions.

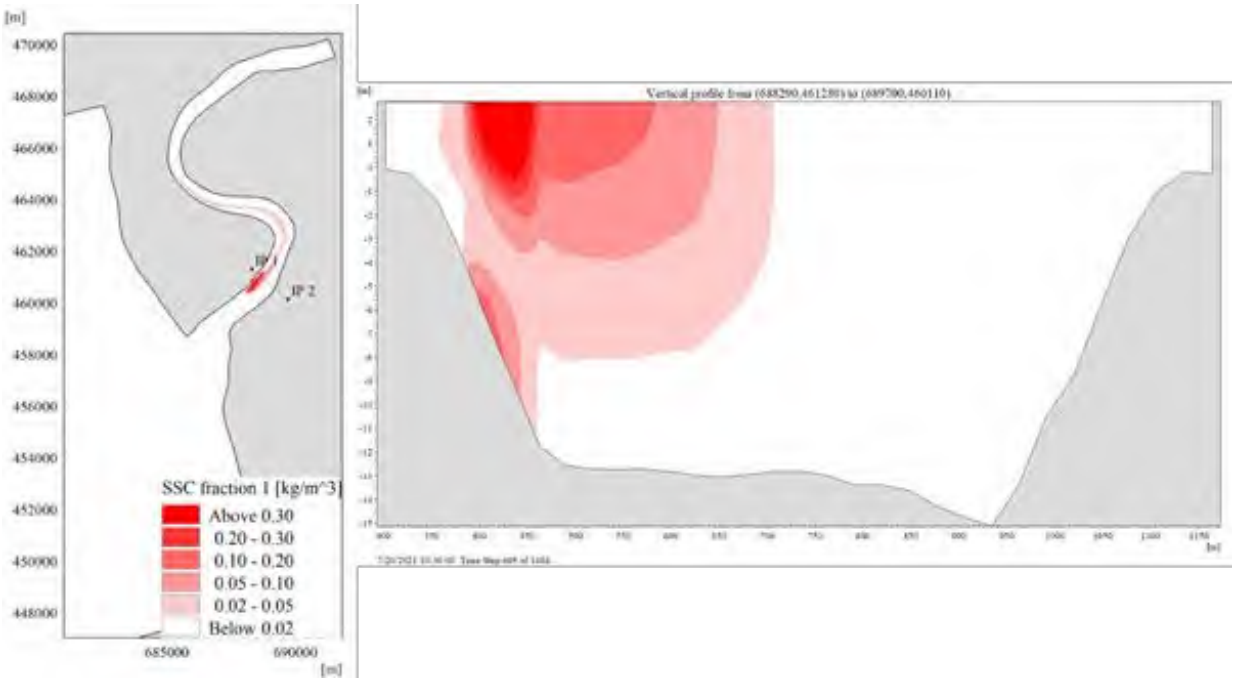


Figure 8-10: Plume dispersion across the depth High Flow Calm Wind Condition

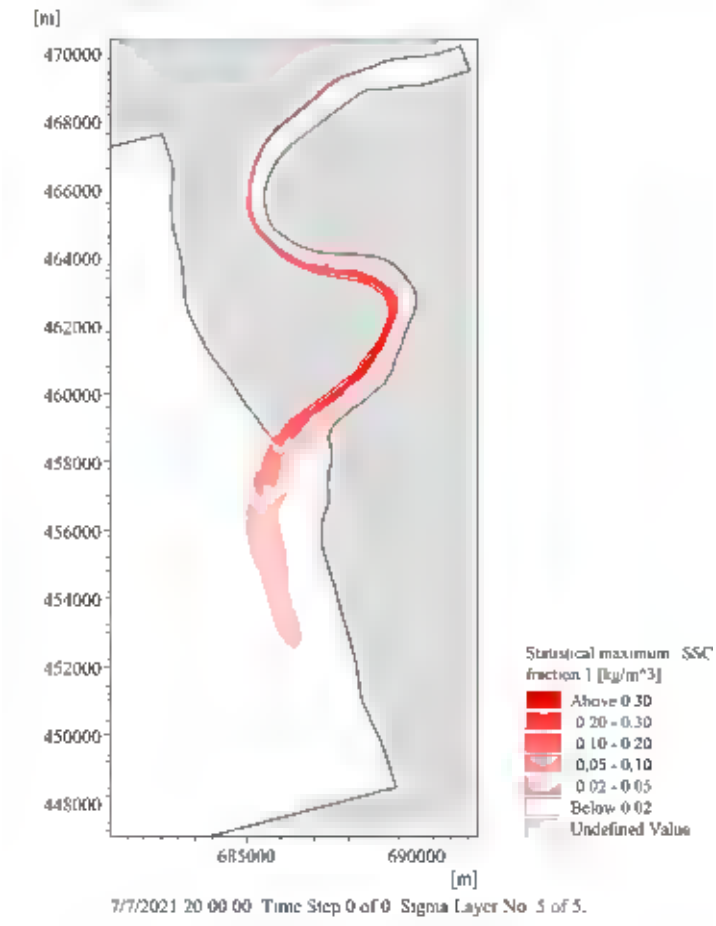


Figure 8-11: Statistical Maximum of Plume Dispersion in High Flow Calm Wind Condition

Under low-flow conditions (modelling results shown in Figure 8-12), plume dispersion remains more confined, generally within 0.8–1.0 km of the source, resulting in higher localized sediment concentrations. Due to limited vertical turbulence and weaker mixing, higher suspended sediment concentrations persist near the dredging source and within the lower water layers. Consequently, the environmental impact under low-flow conditions is more localized but potentially associated with higher short-term sediment concentrations close to the dredging zone.

Figure 8-13 shows the statistical maximum extent of plume dispersion simulated under low flow and calm wind conditions. This figure represents the maximum envelope of suspended sediment concentrations obtained during the entire simulation period and identifies the farthest area affected by plume transport. Due to the relatively weak current velocities associated with low flow conditions, the plume remains comparatively localized around the discharge point. The maximum plume dispersion length observed in this scenario is approximately 5.6 km downstream and 11 km upstream from the source area, indicating that sediment transport remains moderate under calm hydrodynamic conditions.

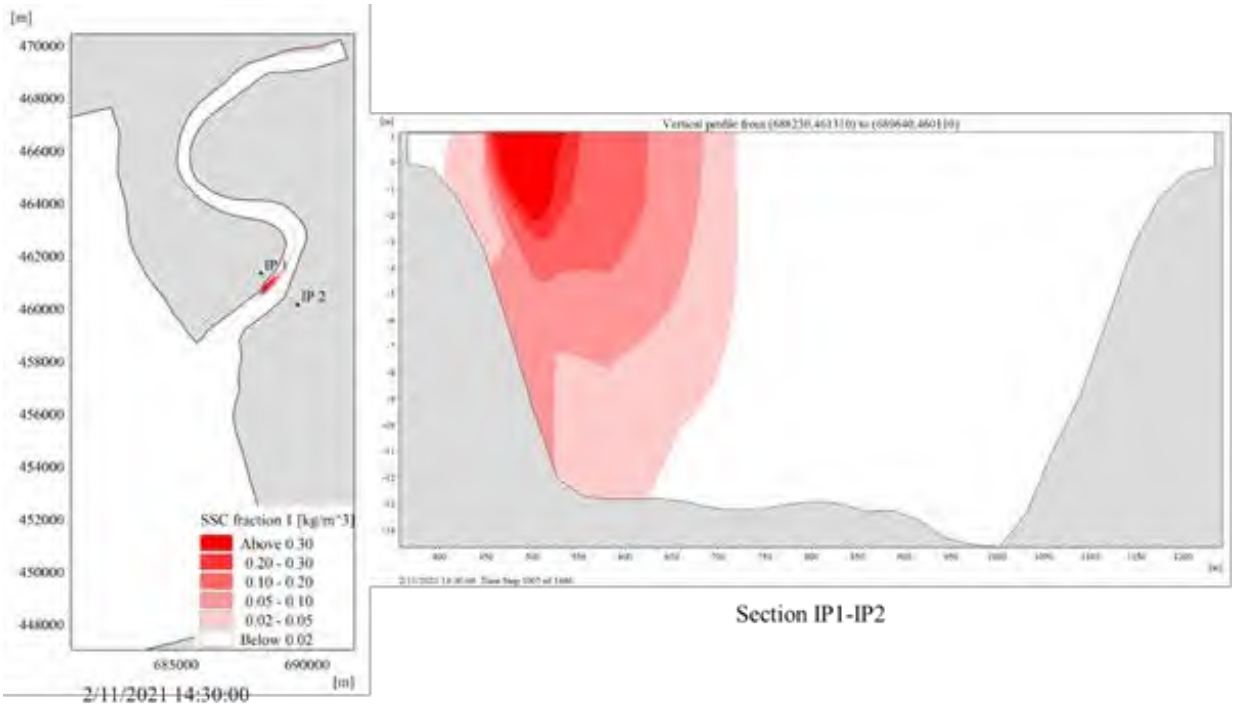


Figure 8-12: Plume dispersion across the depth Low Flow Calm Wind Condition

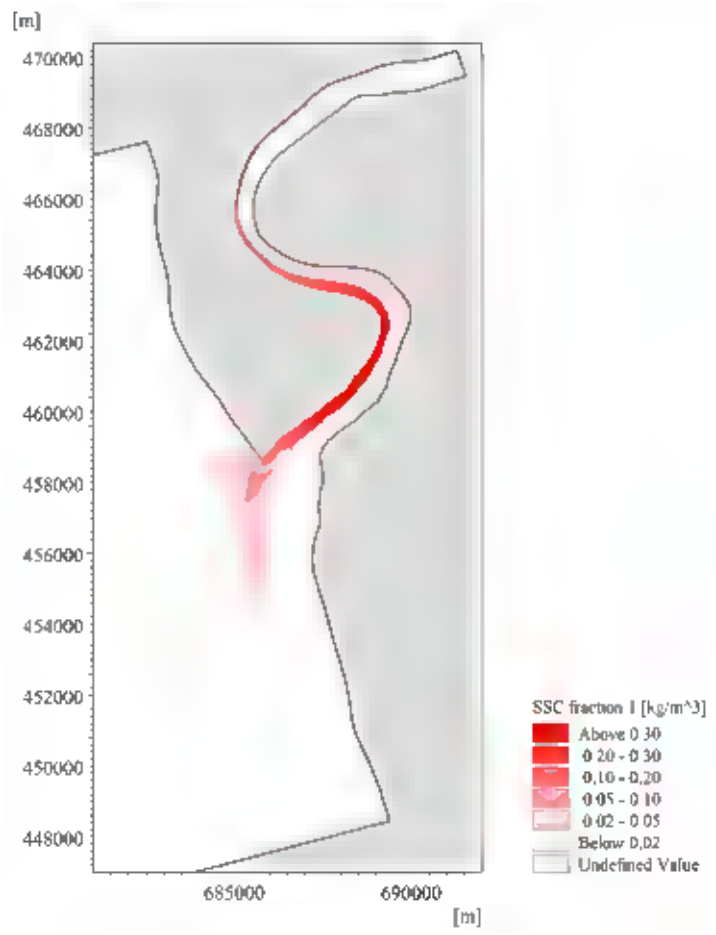


Figure 8-13: Statistical Maximum of Plume Dispersion in Low Flow Calm Wind Condition

The disposal of dredged materials at the designated disposal site may temporarily increase suspended sediment concentrations and alter water quality in the receiving environment, depending on the characteristics of the dredged material and prevailing hydrodynamic conditions. These effects are expected to be localized around the disposal area, including locations such as Char Bakalia, where disposal is expected to take place.

Overall, no significant long-distance and long-term sediment transport is expected and the impacts are anticipated to remain moderate and manageable through the implementation of appropriate dredging controls and monitoring measures.

Oil spill

An oil spill modelling study was undertaken for LCTP to evaluate the behaviour and fate of potential spills under representative hydrodynamic conditions in the Karnaphuli River. The oil spill modelling considered two potential spill sources associated with the Laldia Container Terminal: (i) continuous operational leakage of lubricating oil from vessel stern tubes, deck machinery and submerged machinery, and (ii) a worst-case accidental fuel spill of approximately 10,000 kg resulting from a transfer failure during bunkering at Block C. For each spill type, three hydrodynamic scenarios were modelled to represent different combinations of Karnaphuli River

discharge and tidal conditions, including low-flow/neap tide, low-flow/spring tide and high-flow/spring tide conditions, in order to assess the range of possible oil plume extents and dispersion patterns.

The heavy oil modelling due to accidental oil spill from bunkering results are illustrated in Figure 8-15 and Figure 8-15. The results indicate that the transport and distribution of suspended heavy oil are strongly influenced by tidal conditions and river discharge. Under neap slack conditions, the plume remains concentrated near the release point, whereas stronger tidal currents and monsoon-driven river flows increase plume dispersion, with the largest extent occurring during monsoon ebb tide due to enhanced downstream transport. While suspended oil spreads across a wider area, sedimented oil remains more localized, accumulating mainly along the riverbanks with minimal deposition in the main channel. The plume initially stays near the source before migrating downstream and becoming increasingly diluted, with suspended concentrations substantially reduced after approximately 90 minutes as oil settles. Sedimentation becomes evident after around 60 minutes, progressively increasing along the downstream flow path and persisting for the remainder of the simulation.

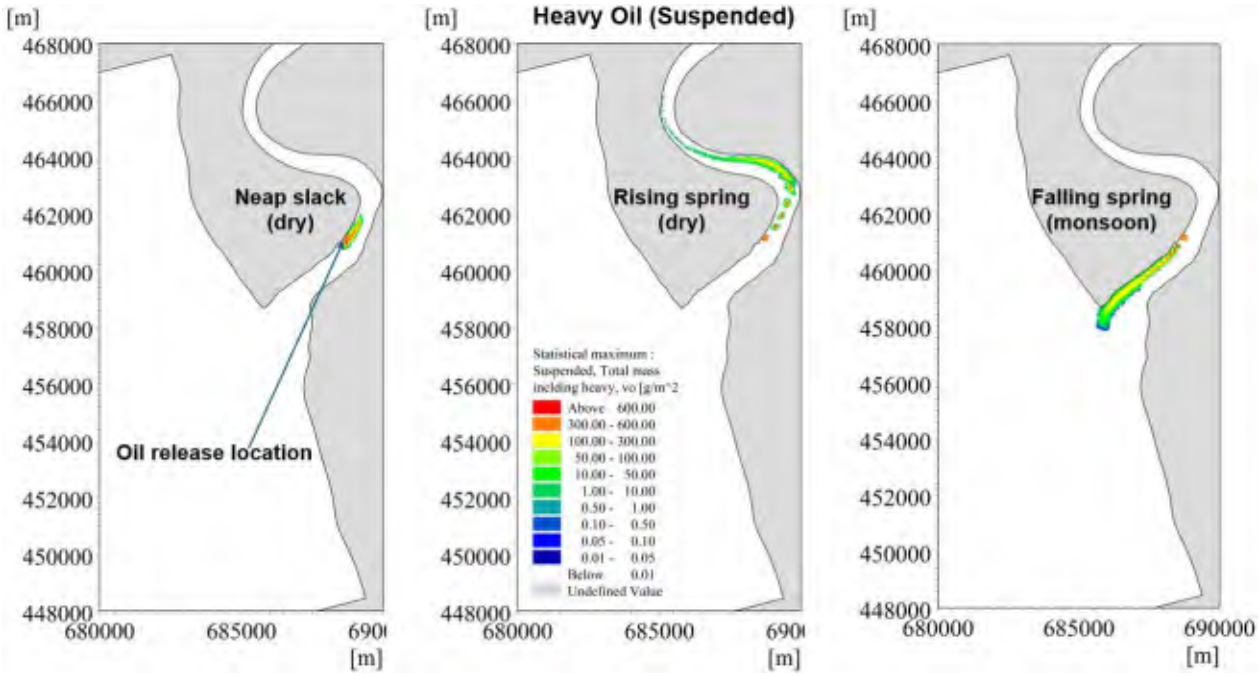


Figure 8-14: Maximum suspended total mass including all fractions of heavy oil plume for three (3) scenarios

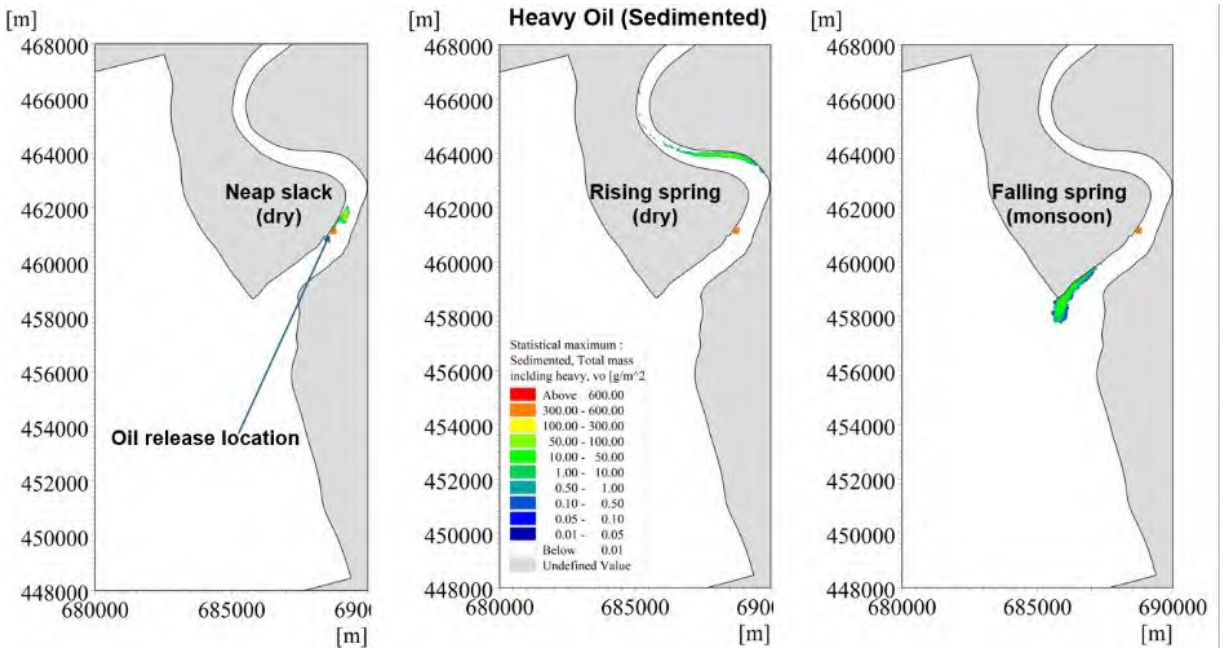


Figure 8-15: Maximum sedimented total mass including all fractions of heavy oil plume for three (3) scenarios

Figure 8-16 illustrates the modelling results for diesel oil which show that diesel oil is considerably more mobile than heavy oil, resulting in greater transport and dispersion under all conditions. The largest plume extent from accidental oil spill during bunkering occurs during the monsoon ebb tide, when high river discharge carries the oil far downstream and spreads it over a large section of the river. Following release, the plume progressively advects and disperses downstream, with concentrations decreasing due to dilution. Unlike heavy oil, diesel oil remains suspended for several hours, indicating a greater transport potential and larger area of influence.

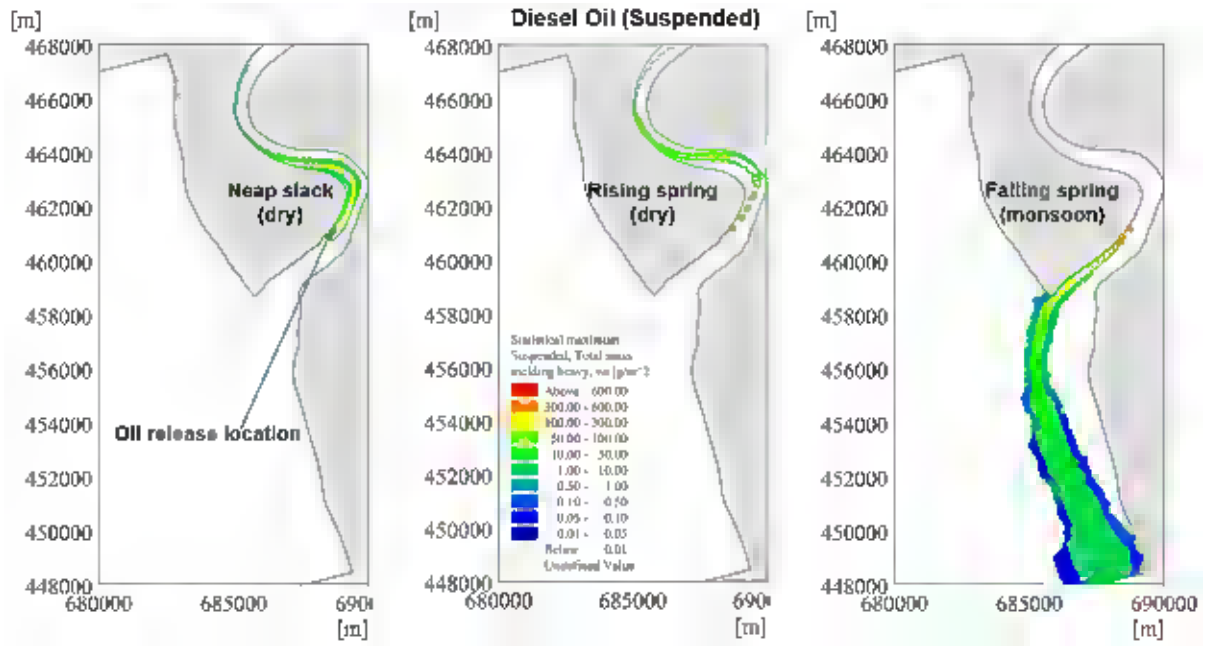


Figure 8-16: Maximum suspended total mass including all fractions of diesel oil plume for three (3) scenarios

The modelling results for lubricant oil (below in Figure 8-17) indicate that lubricating oil accidentally spilled during bunkering remains largely suspended and is transported along the navigation channel, with the greatest dispersion occurring during monsoon conditions. Limited but persistent deposition occurs along riverbanks and low-flow areas, where oil gradually accumulates over time. While tidal fluctuations cause periodic resuspension and settling, suspended oil remains the dominant fraction, highlighting the potential for both continued transport and long-term shoreline contamination.

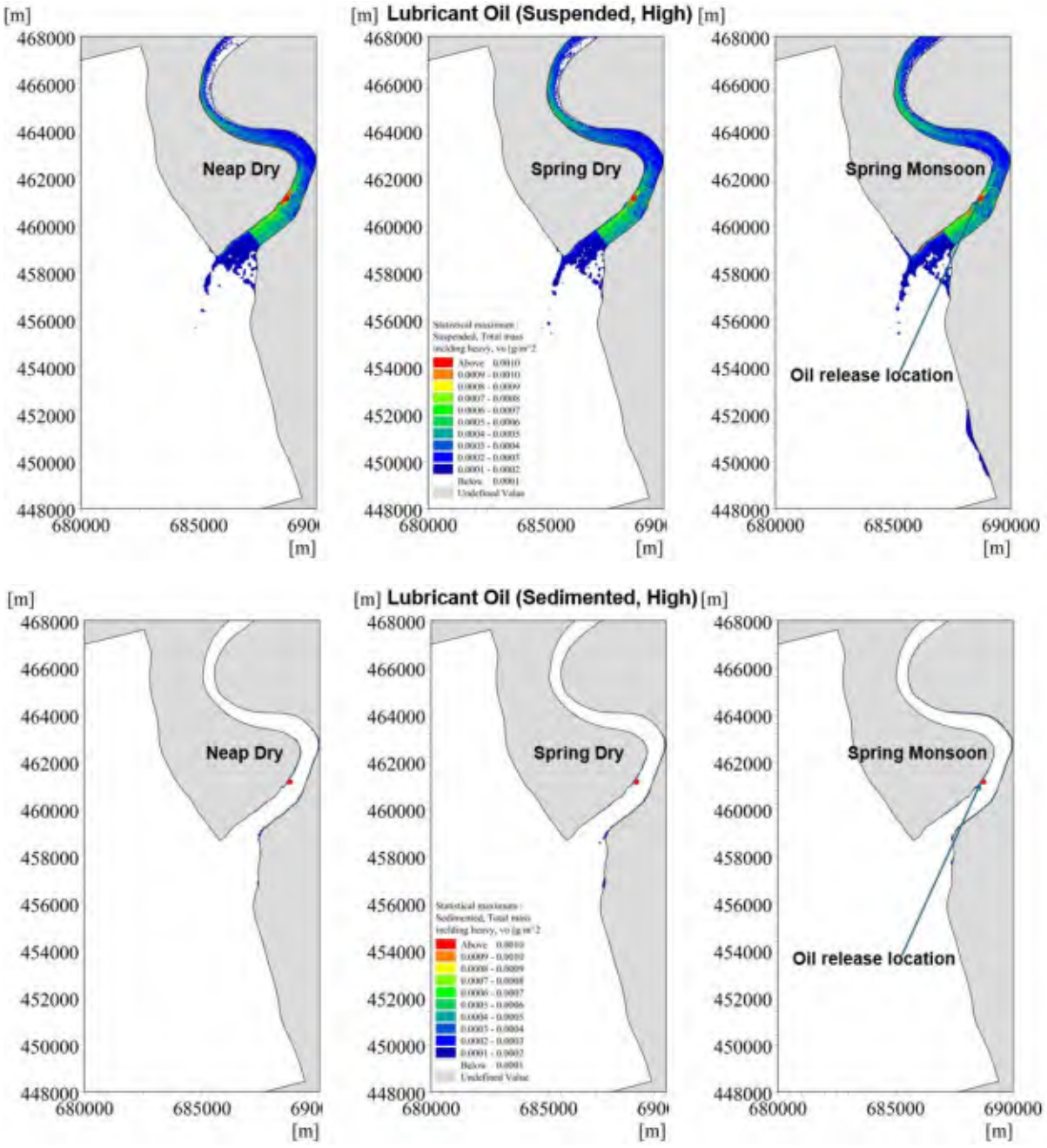


Figure 8-17: Maximum suspended (upper panel) and sedimented (lower panel) total mass including all fractions of lubricant oil plume for three (3) scenarios

Stormwater runoff

During **operation**, stormwater runoff from paved terminal surfaces may contain sediments, oil, grease, rubber particles, metals and other contaminants accumulated during dry periods. Discharge of the first flush of stormwater without appropriate management may temporarily reduce the quality of receiving waters in the Karnaphuli River.

Overall, impacts on surface water and sediment quality are expected to be predominantly localized, with most routine activities resulting in short-term changes. During the **pre-construction** phase, demolition waste may cause minor impacts if not properly managed. During the **construction** phase, site preparation, runoff, wastewater generation and washout of construction materials are expected to result in minor impacts, while capital dredging, disposal and reuse of dredged materials and accidental spills or leaks of fuel, lubricants and other hazardous substances may result in moderate impacts before mitigation. During the operation phase, routine activities, including maintenance dredging, disposal of dredged materials, domestic wastewater generation, and minor spills or leaks, are expected to result in minor impacts, whereas accidental oil spill incidents and contaminated stormwater discharge have the potential to cause moderate impacts before mitigation.

8.3.5 Impacts on Ambient Noise Levels

Ambient noise levels are likely to be impacted during the **construction** and **operation** phases of the Project. Noise will primarily be generated during the construction phase by piling, ground improvement, dredging, construction machinery operations and vehicle movements, while operational noise will arise from container handling cranes, truck, lorries as well as handling of containers.

A noise modelling study was conducted to predict construction and operation phase noise levels at nearby sensitive receptors, assess cumulative noise impacts against applicable standards, and support the identification of necessary mitigation measures for the proposed Laldia Container Terminal Project (see Annex C2). The results are summarized in Table 8-3.

The modelling considered terrain conditions, source characteristics, operational activities, traffic movements and receptor locations to predict noise propagation and prepare noise contour maps for the study area.

Three construction noise modelling scenarios were developed to represent the most significant noise-generating phases of the project during construction**,** considering overlapping activities, peak equipment deployment and simultaneous operations. Together, these scenarios capture the full range of potential construction noise impacts associated with major earthworks, reclamation, piling, quay construction and terminal infrastructure development. Under the worst-case construction scenario, cumulative noise levels within and adjacent to the project blocks and surrounding industrial areas are predicted to increase by up to approximately 2 dB(A) (highest inside Block-C) above baseline conditions as shown in Figure 8-18. Given the already elevated

industrial background noise levels, the additional contribution from construction activities is expected to be relatively minor and temporary.

A single operational noise modelling scenario representing the upper-bound throughput condition was developed to capture the worst-case operational noise impacts associated with cargo-handling equipment, terminal traffic and external road traffic. During the operational phase, cumulative noise levels are predicted to increase significantly above baseline conditions at receptors closest to the terminal especially in Block-C, Block-B and the residential area located directly opposite the Block-C boundary as shown in Figure 8-18. However, it is the worst possible scenario and no mitigation measure is assumed.

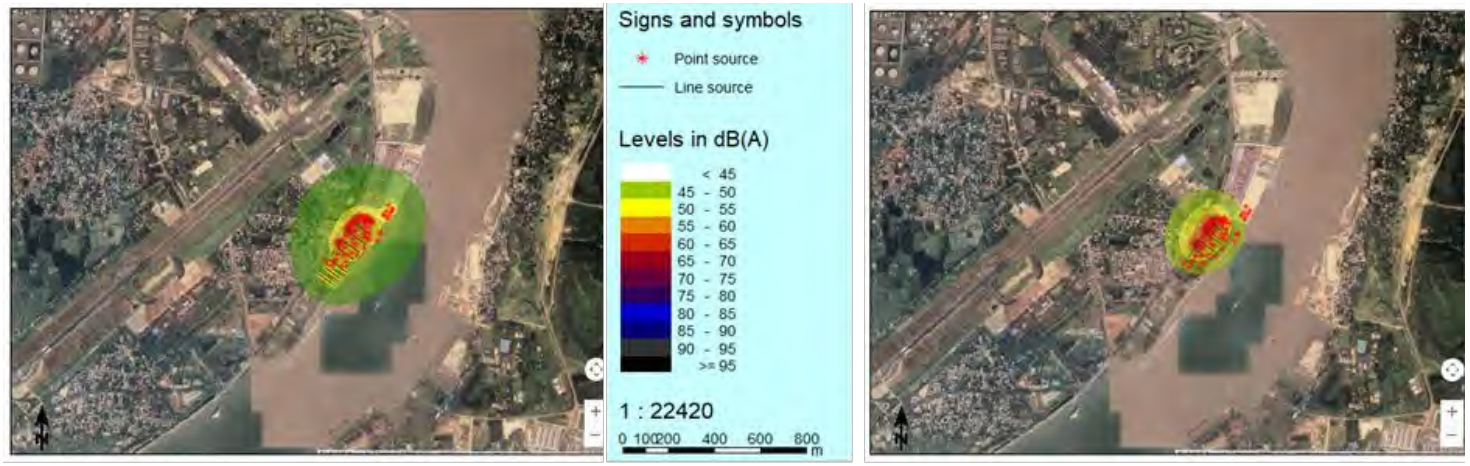


Figure 8-18: Maximum Noise Contour Maps in construction phase during daytime (left) and nighttime (right)

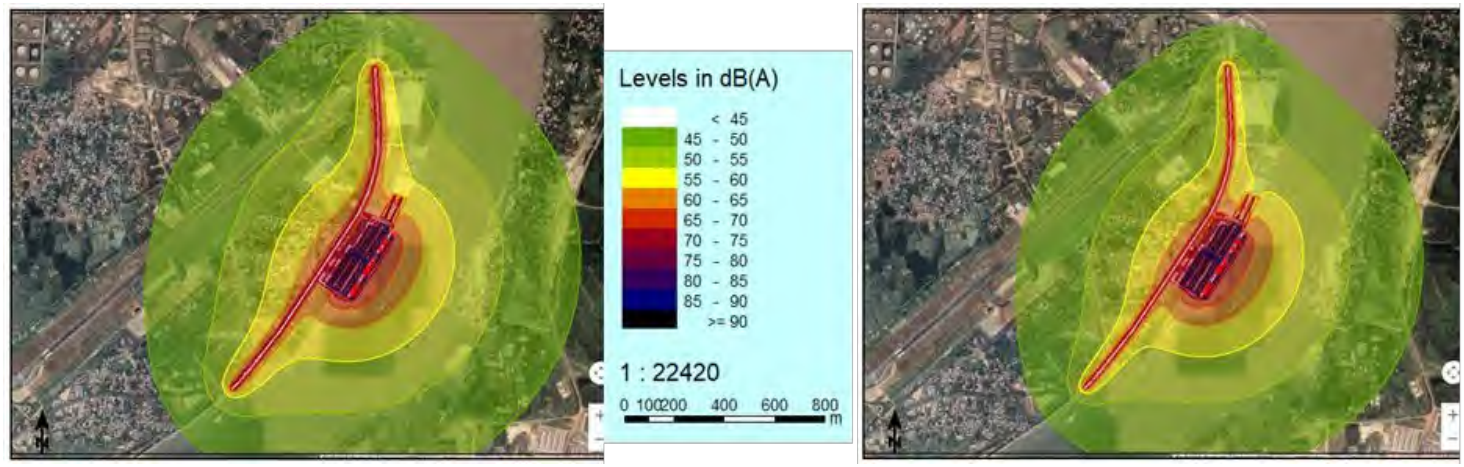


Figure 8-19: Maximum Noise Contour Maps in operation phase during daytime (left) and nighttime (right)

Table 8-3: Receiver Noise level Output for Operation phase

Location	Period	Background Noise Level	Predicted Noise Level	Cumulative Noise Level	NPCR-2025*	Category
R-1 (Bijoynagar-south)	Daytime	72.39	64.1	72.99	55	Residential
	Night-time	68.36	61.8	69.23	45	
R-2 (Bijoynagar-mid)	Daytime	67.37	67.0	70.20	55	Residential
	Night-time	63.80	64.8	67.34	45	
R-3 (Block-C)	Daytime	67.57	72.7	73.86	75	Industrial
	Night-time	62.42	71.2	71.74	70	
R-4 (Block-B)	Daytime	68.68	63.7	69.88	75	Industrial
	Night-time	62.16	62.6	65.40	70	
R-5 (Block-A)	Daytime	65.64	54.4	65.95	75	Industrial
	Night-time	60.65	51.9	61.19	70	
R-6 (Airport School)	Daytime	74.92	60.5	75.07	50	Educational /Silent Zone
	Night-time	68.38	59.0	68.85	40	

** Noise Pollution Control Rules, 2025*

The noise modelling indicates that baseline ambient noise levels within the project area are already elevated as a result of existing port operations, industrial activities, road traffic, vessel movements and, most notably, aircraft operations. Against this already noisy background, construction activities are expected to generate substantial additional noise from heavy machinery, piling works, earthmoving activities and increased vehicle movements. Prior to mitigation, these activities are anticipated to result in a major impact magnitude due to the intensity of the noise generated and the potential disturbance to nearby sensitive receptors, despite the temporary nature of the construction phase.

During **operation**, the terminal will become a continuous source of noise through cargo handling activities, operation of terminal equipment, vessel berthing and loading/unloading operations, internal traffic movements and associated support activities. The sustained increase in noise levels, particularly at receptors located closest to the terminal, is expected to result in a major impact magnitude prior to mitigation, reflecting the long-term and continuous nature of operational noise emissions and their potential effect on nearby receptors.

8.3.6 Impacts on Ambient Air Quality

Ambient air quality may be affected during the **pre-construction, construction** and **operation** phases of the Project due to demolition, earthworks, dredging, material handling, vehicle and vessel movements, and terminal operations. Potential impacts are primarily associated with the generation of dust and emissions of combustion-related pollutants, resulting in localized changes to ambient air quality and increased exposure of nearby sensitive receptors.

Construction activities such as earthworks, site clearing, material handling, stockpiling and movement of heavy vehicles will significantly increase dust (PM_{10} and $PM_{2.5}$) generation, especially under dry and windy conditions, leading to localized deterioration of air quality within and around the project area. Particulate matter contains microscopic solids or liquid droplets that are so small that they can be inhaled and cause serious health problems. PM10 pose the greatest problems, because they can get deep into lungs, and some may even get into the bloodstream. Fine particles (PM2.5) are the main cause of reduced visibility (haze). Emissions of SOx, NOx, CO and PM2.5 from vessels, vehicles, and various types of construction equipment and generators are expected to affect local and regional air quality, while dust generated by construction activities has the potential to cause nuisance. Construction equipment and generators will also generate greenhouse gas (GHG) emissions that contribute to global climate change.

The construction dust risk assessment identified a high risk of impacts from construction activities in the absence of mitigation measures. Particular attention should be given to activities undertaken close to the site boundary, where the potential for off-site effects is greatest. Earthworks and trackout (i.e. the transfer of dust and soil from the construction site to surrounding communities by construction vehicles) represent the most significant sources of potential impact. Demolition and general construction activities may also generate dust emissions with the potential to adversely affect human health and amenity.

During **operation** phase, emissions of SOx, NOx, CO and PM2.5 from vessels, vehicles, operational equipment and generators will continue to affect air quality. Terminal operations will also emit GHGs that contribute to climate change, although GHG emissions are expected to be relatively limited given that most container-handling equipment will be electrically powered.

The cumulative effect of increased traffic flow, congestion at terminal entry and exit points, and continuous operational activities may lead to localized air quality degradation and intermittent exceedances of applicable standards, particularly during peak construction and operational periods, thereby increasing exposure risks for on-site workers and nearby residential and sensitive receptors due to prolonged inhalation of dust and combustion-related pollutants.

An air quality dispersion modelling assessment was undertaken for the operational phase to evaluate the potential effects of emissions from project-related road traffic and vessel activities on surrounding receptors. The modelling results indicate that project-related contributions to both short-term (24-hour and 1-hour average) and long-term (annual average) nitrogen dioxide (NO_2)

concentrations are expected to result in major adverse impacts at the majority of assessed receptors. These findings reflect the substantial influence of operational traffic and vessel emissions on local air quality conditions, particularly in areas already characterised by elevated baseline pollutant concentrations. In addition, the modelling identified major impacts at eight receptors due to vessel-related contributions to 1-hour average sulphur dioxide (SO_2) concentrations. The results highlight that vessel emissions are a key contributor to operational air quality impacts and demonstrate the need for the implementation of appropriate mitigation measures to minimise pollutant emissions and reduce potential effects on nearby sensitive receptors. The modelling results for NO2 and SO2 are presented in below figures.

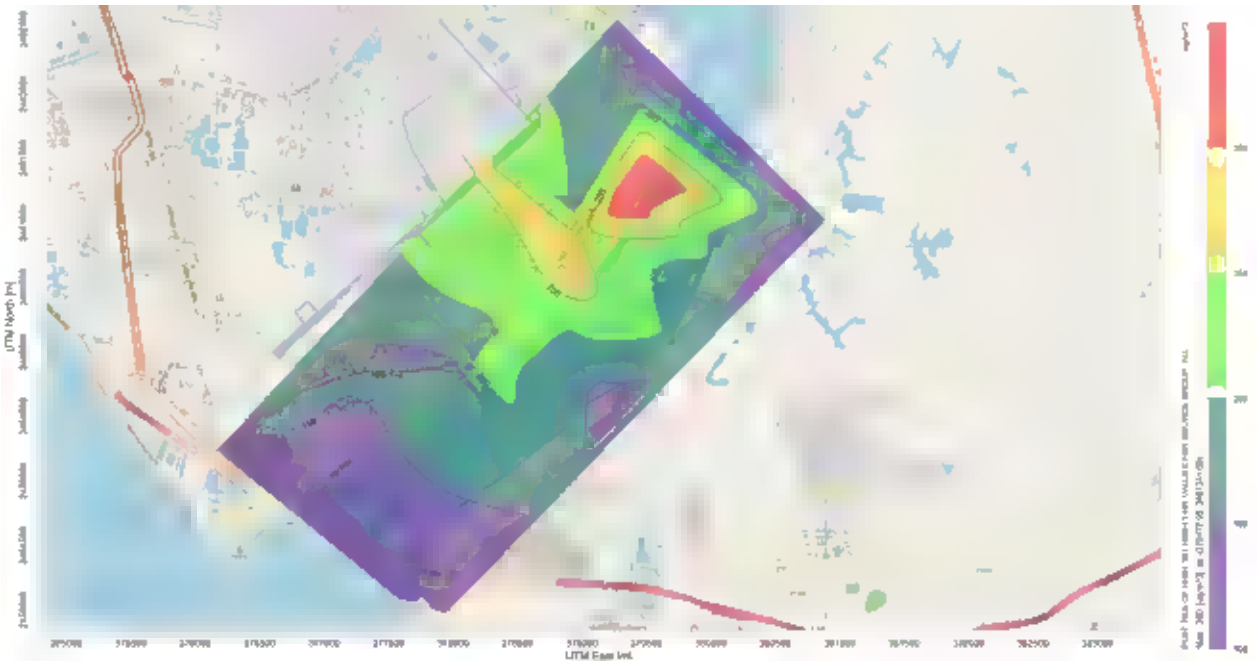


Figure 8-20: NO2 1-hour average

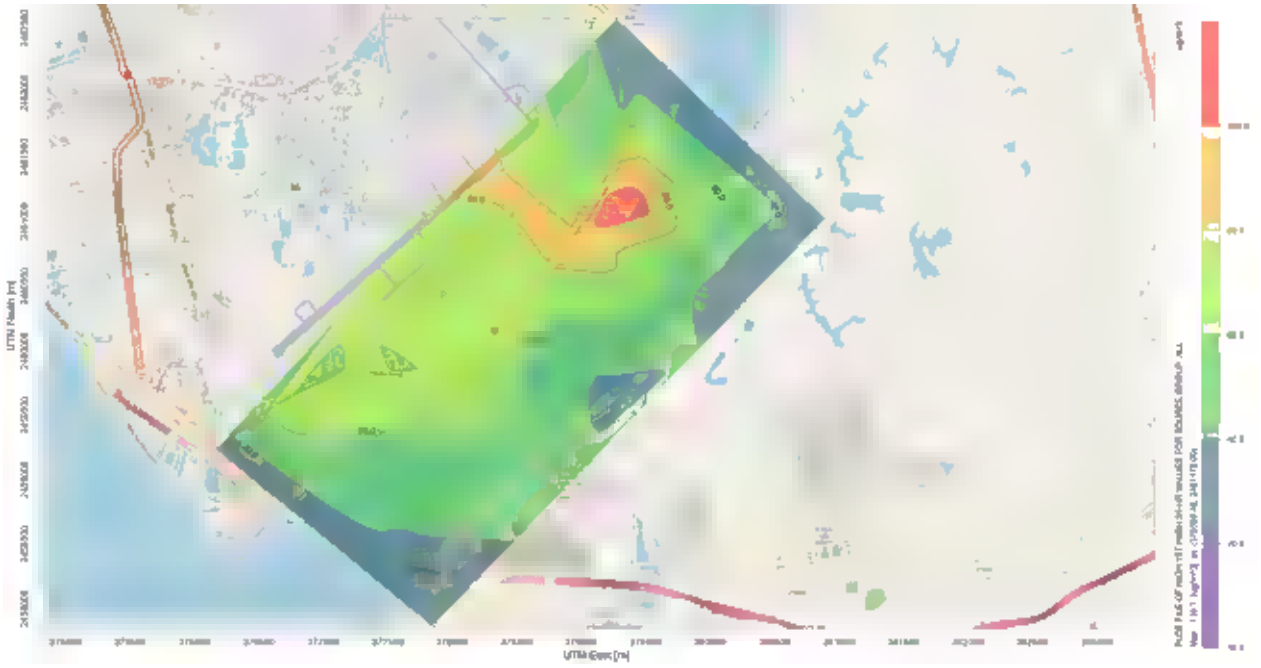


Figure 8-21: NO2 24-hour average

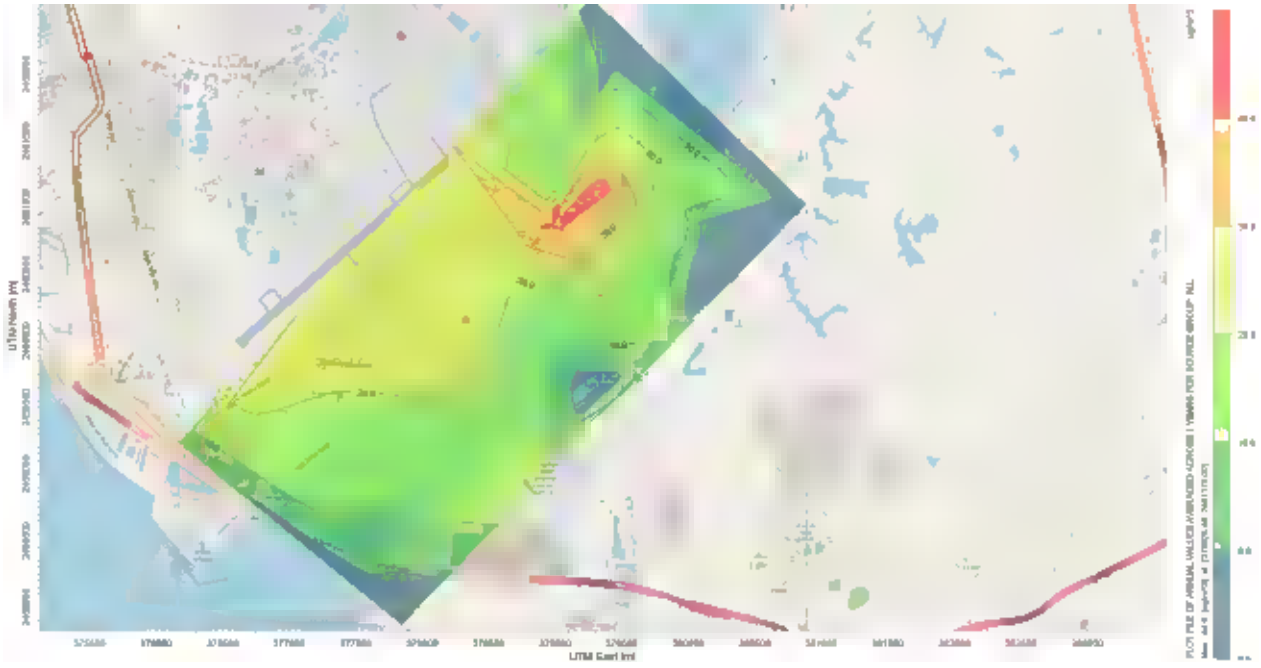


Figure 8-22: NO2 Annual average

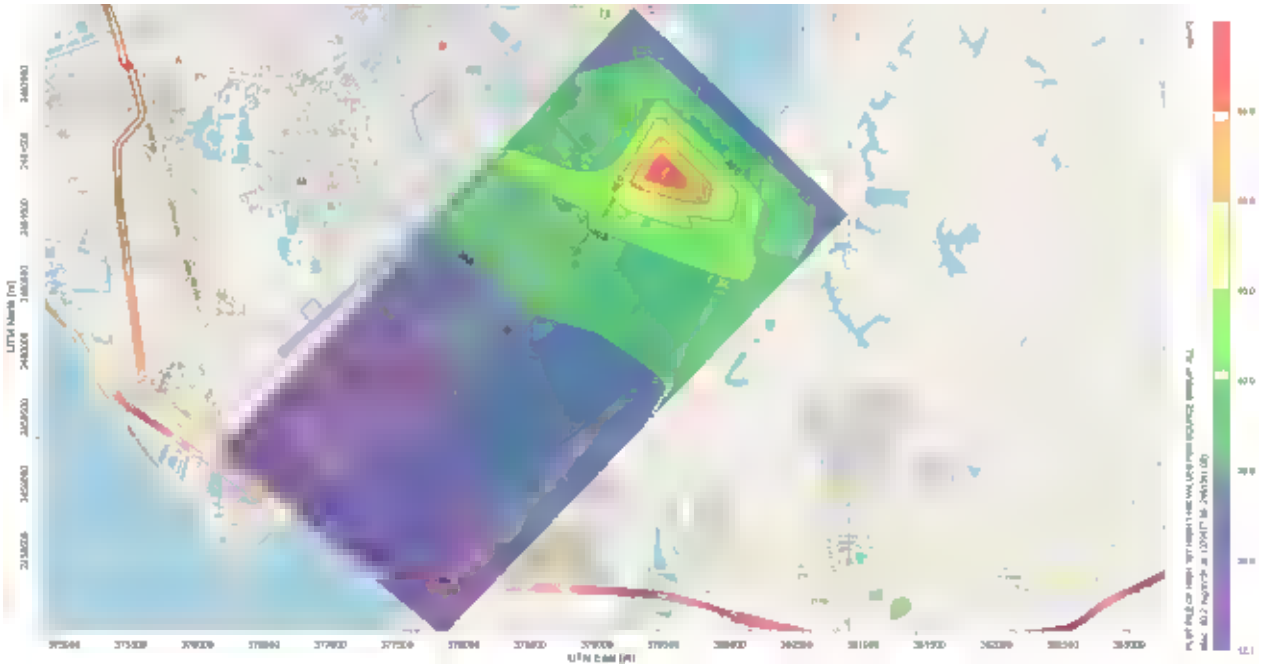


Figure 8-23: SO2 1-hour average

8.3.7 Impacts on Tidal Mudflats

Within the immediate project area, two small tidal mudflat units are present: (i) a narrow strip along the riverbank in front of Block C, exposed at low tide, and (ii) a small mudflat associated with the drainage channel (*Khal* No. 14) between Blocks B and C. The proposed land reclamation and associated infrastructure (land fill and box culvert replacing *Khal* No. 14, reclamation footprint, deck-on-piles, and berth pocket) will permanently convert these areas, resulting in the irreversible loss of the mudflat habitat currently present within the project footprint. Based on the indicative dimensions provided (the area lost at Block C, including reclamation area, deck-on-piles and berth pocket, has a total area size of 10.9 ha, the area is the drainage channel is approximately 0.6 ha), the directly affected mudflat area is limited in extent but will be completely lost where overlain by permanent structures and fill.

The affected mudflats currently provide habitat for benthic invertebrates, mudskippers and other intertidal organisms, and serve as feeding areas for fish and waterbirds during low tide. Their permanent loss will reduce local ecological functions, including feeding, nursery and shelter opportunities for aquatic organisms. However, the impact is expected to remain localized because the affected mudflats are relatively small, and larger, functionally similar tidal mudflat habitats, particularly the Majher Char and Parki Beach mudflats, are expected to remain unaffected. From the bird observation surveys done in February March and April 2026, it was recorded that there are no bird species solely dependent or feeding on this particular mudflat. Species currently using the small mudflats at Block C and *Khal* No. 14 are therefore expected to continue utilizing these nearby intertidal areas, indicating a degree of habitat redundancy at the landscape scale. However, it is noted that the mudflat areas in the lower Karnaphuli River are limited, and that

cumulative effects may still have an effect on species for their habitat, breeding, or feeding grounds.

Overall, the impact on tidal mudflats is assessed as local in spatial extent, permanent in duration, and of moderate magnitude before mitigation, reflecting the irreversible loss of a small but ecologically valuable intertidal habitat within the project footprint.

8.3.8 Impacts on Mangrove Ecosystem

Mangrove vegetation in the immediate project area occurs as a narrow, approximately two-metre wide strip along the riverbank protection wall of Block B, comprising Avicennia alba and Sonneratia apetala, as well as within the tidal creek (*Khal* No. 14) between Blocks B and C. The estimated number of mangrove trees in the drainage channel is in the range of 5 to 10 individuals.

During **construction**, the mangrove trees located within the existing drainage channel (*Khal* No. 14) between Blocks B and C will be removed to facilitate replacement of the channel with a landfill and a box culvert. Although limited in extent, these trees provide localized habitat, shoreline stabilization, and ecological functions within the estuarine environment. In addition, construction activities, including the movement of machinery, material handling, and work along the riverbank, may inadvertently damage the mangrove trees located along the riverside of Block B through physical disturbance or impacts to their root systems. However, these trees are overall expected to be preserved, with impacts limited to potential edge effects and localized stress rather than wholesale loss.

Ecological surveys conducted in February–April 2026 did not record any species that were solely dependent on these specific mangrove trees within the project footprint. The removal of 5 to 10 trees in *Khal* No. 14 will therefore lead to a permanent but highly localized loss of mangrove habitat, with no evidence of species-level dependence that would elevate the ecological significance beyond the immediate vicinity.

During **operation**, no direct impacts on mangroves are anticipated. However, accidental spills of fuel, oil, or other hazardous substances associated with terminal operations or vessel activities could be transported by tidal currents and affect the mangrove patches in front of Block B and at Majher Char. Such incidents could impair mangrove health by coating roots and sediments, reducing gas exchange, and affecting associated flora and fauna. These impacts are expected to be localized and are considered unlikely under normal operating conditions with appropriate spill prevention and response measures in place.

Overall, construction-related impacts on the mangrove ecosystem are assessed as local in spatial extent, permanent in duration for removal of the trees in *Khal* No. 14. Potential operational impacts from accidental pollution are assessed as local, temporary to long-term depending on spill severity, with low likelihood given standard operational controls.

8.3.9 Impacts on Dolphins

Dolphins may be affected primarily during the **construction phase** of the Project through underwater noise, temporary changes in water quality, and increased construction vessel movements.

Underwater noise from pile installation

Pile driving activities will generate high levels of underwater noise and vibration, which can cause temporary avoidance behaviour and displacement of dolphins from the vicinity of the project area. Ganges River dolphins (Platanista gangetica) are almost blind and rely almost exclusively on broadband echolocation clicks (typically 20–100 kHz, with peak energy 40–70 kHz) for navigation and foraging in turbid river channels (Jensen, 2013; Ladegaard, 2017; Sinha R. K., 2014). Piling noise can mask these echolocation signals, effectively impairing dolphins' ability to navigate, detect prey, and maintain orientation within the river channel. Mother–calf pairs are particularly vulnerable, as calves depend heavily on acoustic cues from their mothers for movement and foraging; disruption of these signals can reduce feeding success and increase the risk of separation (Smith B. D., Status and conservation of the Ganges River dolphin in Bangladesh, 1998; Sinha R. K., 2014). Calving can happen at any time of year but most births are thought to occur between October and March (RiverDolphins.org).

The repetitive and prolonged nature of piling may result in temporary displacement from preferred habitats and disruption of feeding, breeding, and movement corridors during the construction period, with noise propagating through water over distances of up to 20 km. For Ganges dolphins, if individuals are located downstream of the piling site during active works, the noise barrier may prevent them from moving upstream across the project area, potentially trapping them in more saline tidal waters outside their preferred freshwater to low-salinity habitat. For Irrawaddy dolphins (Orcaella brevirostris), which also rely on echolocation and tonal whistles for navigation and foraging in turbid estuarine environments (Jensen, 2013; Niu F. Y., 2019; Marten, 2000), piling noise can similarly reduce mobility and access to feeding areas, potentially trapping groups upstream of the project area and restricting the ability to exploit their common coastal and estuarian breeding and feeding grounds.

Dredging and sediment plumes

Dredging activities during **construction** and **operation** will generate underwater noise and disperse sediment plumes within the Karnaphuli River, which may extend to areas such as Gupta Bend during flood tides where high dolphin densities are observed. Elevated turbidity and sediment deposition may affect dolphin breeding and nursery grounds, although e.g. Ganges dolphins are adapted to turbid environments and rely on echolocation rather than vision, so increased turbidity alone is not considered a major direct impact on their navigation or foraging. However, dredging-related noise and changes in prey distribution due to sediment dynamics may still affect habitat utilization and foraging efficiency.

Increased vessel traffic and collision risk

Construction and operation vessel movements will increase local river traffic density, raising the risk of vessel strikes and behavioural disturbance to dolphins. River dolphin populations in the Karnaphuli–Sangu system continue to face pressures from increasing human disturbance (Smith B. D., Status and conservation of the Ganges River dolphin in Bangladesh, 1998; Richman, 2014; IUCN, 2022; IUCN, 2023). Increased vessel movements can compound these pressures, leading to habitat disturbances and increased risk of collisions.

Terminal operation

During **operation**, accidental fuel spills during bunkering and chronic releases of lubricating oil from vessels may degrade water quality and adversely affect aquatic habitats, including dolphins. Oil contamination may pose risks to dolphins through direct exposure and food-chain contamination. Increased vessel traffic, operational noise, lighting, and routine discharges may further contribute to habitat disturbance and ecological stress within the estuarine environment. These impacts are expected to be local to regional in spatial extent, long-term in duration, and of moderate impact magnitude before mitigation, with actual severity dependent on the frequency and magnitude of spills and the effectiveness of operational controls and spill response measures.

8.3.10 Impacts on Fisheries Resources

Fisheries resources and fishing activities may be affected during the **construction**, and **operation** phases of the Project. Potential impacts are primarily associated with dredging, piling, vessel movements, underwater noise, increased turbidity and sedimentation, temporary habitat disturbance, accidental pollution, and changes to fishing access and navigation within the Project area.

The **construction phase** represents the period of highest potential risk to fisheries resources due to in-water construction activities, vessel movement, dredging, displacement of fishing gear, and shoreline modification works. Potential impacts include:

- Temporary reduction in catch rates and displacement of fishing effort. Piling, dredging, and construction vessel movements will restrict access to certain fishing grounds and navigation routes, causing temporary inconvenience and potential loss of fishing time for small boats operating near active work zones.
- Disturbance of nursery and feeding habitats. Physical modification of riverbanks, shallow margins, and riverbed dredging may reduce the quality of nursery, feeding, and shelter areas used by juvenile fish, shrimp, and crab. These habitats are particularly important during the pre-monsoon and monsoon seasons when many species spawn and recruit in shallow, sheltered areas.
- Increased turbidity and sedimentation. Piling and dredging will generate elevated turbidity and suspended sediment concentrations, which may temporarily clog fish gills, reduce feeding efficiency, smother fish eggs and benthic organisms, and decrease the availability of benthic prey species. Suspended sediments can adhere to fish eggs, potentially reducing

oxygen exchange and hatching success. However, baseline conditions in the AoI already exhibit high natural turbidity, with dry season total suspended solids (TiSS) ranging from 176 mg/L to 706 mg/L, indicating that most fisheries species present are adapted to highly turbid environments. In addition, spawning activity within the immediate AoI is very limited for the species recorded, reducing the likelihood of significant effects on reproductive success from dredging-related turbidity alone.

- Migratory species. Hilsa (*Tenualosa ilisha*) is one of the most important commercial fish species. They migrate from coastal areas to freshwater reaches upstream for spawning, with peak migration occurring during July–August–September, just before their spawning period (IUCN, 2014). Juveniles are thought to migrate back down the estuary to the sea during March to April. Increased turbidity and sediment plumes from dredging may affect migration corridors of adult Hilsas to upstream areas. The Ganges shark (*Glyphis gangeticus*) is a viviparous species. There is no specific details regarding their reproduction period or frequency. However, evidence within the Glyphis genus suggests that they travel from marine environment to freshwater habitats to give birth to live young. It is not expected that they give birth within the project AoI.
- Underwater noise and vibration. Construction-related underwater noise and vibration may cause temporary avoidance behaviour among mobile fish species, particularly within the Karnaphuli River estuary and adjacent coastal waters. This can lead to short-term displacement from preferred feeding and spawning areas, potentially reducing catch rates in the immediate vicinity of the project. Piling operations, in particular, generate high-intensity impulsive sound that can cause behavioural disturbance, temporary threshold shifts, and habitat avoidance in fish, especially those close to the source (National Marine Fisheries Service, 2024). However, as dolphins are the most sensitive receptor to underwater noise in the AoI, noise management measures designed to protect dolphins are expected to also significantly reduce potential noise-related impacts on fisheries.
- Water quality and accidental pollution. Piling, dredging, and construction vessel movements may increase the risk of localized water contamination through sediment release and dispersion in water, accidental spills or leaks of fuel, lubricants, and other hazardous substances, which could temporarily affect fish, shellfish, and their habitats. Such incidents could cause acute toxicity or sub-lethal stress to fish and benthic organisms if not properly managed.

Prior to mitigation, the significance of these construction-phase impacts on fisheries resources is considered moderate to high, reflecting the combination of temporary habitat loss, access restrictions, and potential water quality degradation in an area already subject to multiple anthropogenic pressures.

During the operation phase, impacts are generally lower but may continue through increased navigation traffic, operational discharges, lighting, noise, and long-term habitat alteration near permanent structures. These factors may cause localized changes in fish distribution, continued access concerns for fishers, and cumulative pressure when combined with existing port and industrial activities. Periodic maintenance dredging may temporarily disturb fish feeding and breeding migrations by increasing turbidity and underwater noise, while localized degradation of benthic habitats may reduce the availability of food resources for demersal fish species.

Long-term impacts on fisheries resources are expected to remain localized and generally manageable. Operational activities may result in localized habitat modification within the terminal area and continued perception among fishers regarding reduced access to certain fishing locations adjacent to port facilities. There is also potential risk of water pollution from maintenance dredging, accidental spills, waste discharge, or operational runoff if environmental management and operational controls are not properly maintained. Such impacts could affect aquatic habitats and fisheries resources within nearby estuarine and coastal environments. Before mitigation, the significance of operational impacts on fisheries is considered moderate. Nevertheless, with effective environmental management systems, waste handling procedures, spill prevention measures, vessel control, and continued monitoring, the residual impact significance is expected to remain minor.

8.3.11 Impacts on Avifauna and Migratory Birds

Baseline ecological surveys conducted between February and April 2026 showed that the Project sites (Blocks A, B, and C) exhibited lower species richness and diversity compared to other sites in the wider AoI, reflecting habitat simplification and stronger anthropogenic influence associated with existing port and industrial activities. A separate monsoon baseline survey (DAR, 2025; Steckler, et al., 2016) reported 20 bird species in and around Block C in September 2025, when the site supported seasonal vegetation, grass, and rainwater-filled depressions that diversified habitat structure and bird assemblages. The main impact on these birds will be that the habitat on the project site will be lost and that the terminal operations will present nuisances to birds occurring in the local area.

Construction activities, including dredging, piling, site development, increased human presence, and vessel movements, will generate noise, vibration, dust, and artificial light that may temporarily disturb the feeding, resting, nesting, and movement of resident and migratory birds in the vicinity of the Project. The permanent loss of the tidal mudflat at Block C and the outfall of *Khal* No. 14 will reduce the availability of local feeding habitat and benthic prey resources for shorebirds and other waterbirds. Dredging may temporarily increase suspended sediment concentrations and alter benthic communities, resulting in localized reductions in prey availability for shorebirds. Dredging-related impacts on benthic fauna, although localized, can have longer-term effects on primary productivity and food resources in the river ecosystem and may extend beyond the immediate dredging site.

However, the immediate project area already supports relatively few birds due to existing industrial and port-related activities, and the species recorded during the dry season surveys are largely common, generalist, or opportunistic users of disturbed habitats. More extensive feeding and resting habitats within the wider AoI, including Majher Char and Parki Beach, will remain unaffected and are expected to continue supporting high numbers of resident and migratory birds. Impacts are expected to be localized, and birds are not expected to be solely dependent on the

project site for breeding or feeding. Consequently, construction impacts on avifauna are expected to be localized and temporary, with an overall minor impact magnitude before mitigation.

During operation, terminal activities, including cargo handling, vessel movements, and artificial lighting, may continue to generate localized noise and light disturbance to birds using nearby habitats. These disturbances may temporarily influence bird movement and habitat use, particularly for migratory species that may transit the area during seasonal movements. However, given the existing anthropogenic disturbance around the project site, the relatively limited use of the immediate Project area by birds, and the availability of more suitable feeding and resting habitats within the wider AoI, operational impacts are expected to remain localized and of negligible impact magnitude before mitigation.

There are also observations of the Indian Flying Fox (*Pteropus medius*), a large fruit bat occurring in the area (Least Concern according to IUCN's Red List and not threatened in Bangladesh[31]). Construction and operation of the terminal, including potential 24-hour activities such as night-time piling, dredging, and cargo handling, will generate elevated levels of artificial lighting and noise during periods when flying foxes are actively commuting and foraging. Bright, unshielded lighting and continuous night-time operations can create light and noise barriers that disrupt commuting routes between roosts and foraging areas, cause temporary avoidance of otherwise suitable habitat near the terminal, and increase stress levels in individuals exposed to intense illumination and noise at dusk and dawn.

8.3.12 Impacts on River crossing commuters and operators

The **construction** and **operation** of the proposed Laldia Container Terminal will directly affect the passengers and operators of the existing small boat river crossing activities within the Karnaphuli River, as the existing river crossing boats in the *Ghat* 14 between Block B and Block C will be occupied by the terminal facilities. This will therefore terminate their operations from this location. This will affect both the operators as well as the passengers from both sides. The *Ghat* will be closed in the **preconstruction phase** and will affect the people using and operating it from then onwards.

[31] RL-549.3-003-v.2.pdf



Figure 8-2: River crossing boats at ghat no. 14

Under routine operating conditions, the fleet completes approximately 150 one-way trips per day, with each boat carrying up to 20 passengers per trip, resulting in an average daily ridership of approximately 3,000 passengers (arrival and departure).

According to the surveyed respondents in the Socio-Economic survey (IWM/Haskoning, 2026), *Ghat* no. 12 and *Ghat* no. 14 are the most critical boarding points, collectively used by 5.2% of all respondents for their daily travel. Consequently, any project activities near these specific river boarding points could significantly disrupt the livelihoods of river crossing boat users.

The closure of the *ghat* will disrupt existing river crossing activities and create a negative impact for communities who are dependent on the transit location for travelling to their workplaces and daily activities across the river. The loss of the existing crossing point will increase travel distance and travel time and cost for commuting for regular passengers unless suitable alternative arrangements are established.

In addition, people working in *Ghat* 14, such as boatmen, ticket salesmen, and other *ghat*-related workers, are likely to experience adverse impacts on their livelihoods due to loss of income and reduced ferry operations associated with the closure of the existing *ghat* facility. The affected users of *ghat* 14 will be affected by the increase in traffic due to the project as well (see 8.3.13).

8.3.13 Impacts on Road Traffic

The project-related traffic volume in the **construction** and **operation** phase will add to the current traffic volume. This has the potential to affect road users, including the nearby communities, through increased congestion, a higher risk of traffic accidents, and disruptions to existing transport routes. The results from the Socio-Economic Survey (IWM, 2026) indicate that the population in the AoI relies heavily on non-motorised and public transport, with rickshaws (70%), buses (37%), and walking (33%) being the most common modes of travel. The high reliance on slow-moving vehicles and walking highlights the importance of maintaining road safety and

accessibility, as increased movements of construction vehicles and container trucks may disproportionately affect pedestrians, rickshaw operators and users.

The Road Traffic Impact Study highlighted that the current road capacity of the VIP Road/Airport Road corridor (Figure 5-65:) appears to be of sufficient capacity for the baseline traffic, with no major congestion issues observed in the existing situation. The absolute busiest hour is counted between 18:30 and 19:30. Roadside activities, including on-street parking and passenger loading/unloading, locally affect both road traffic flow and road safety and is considered a point of attention.

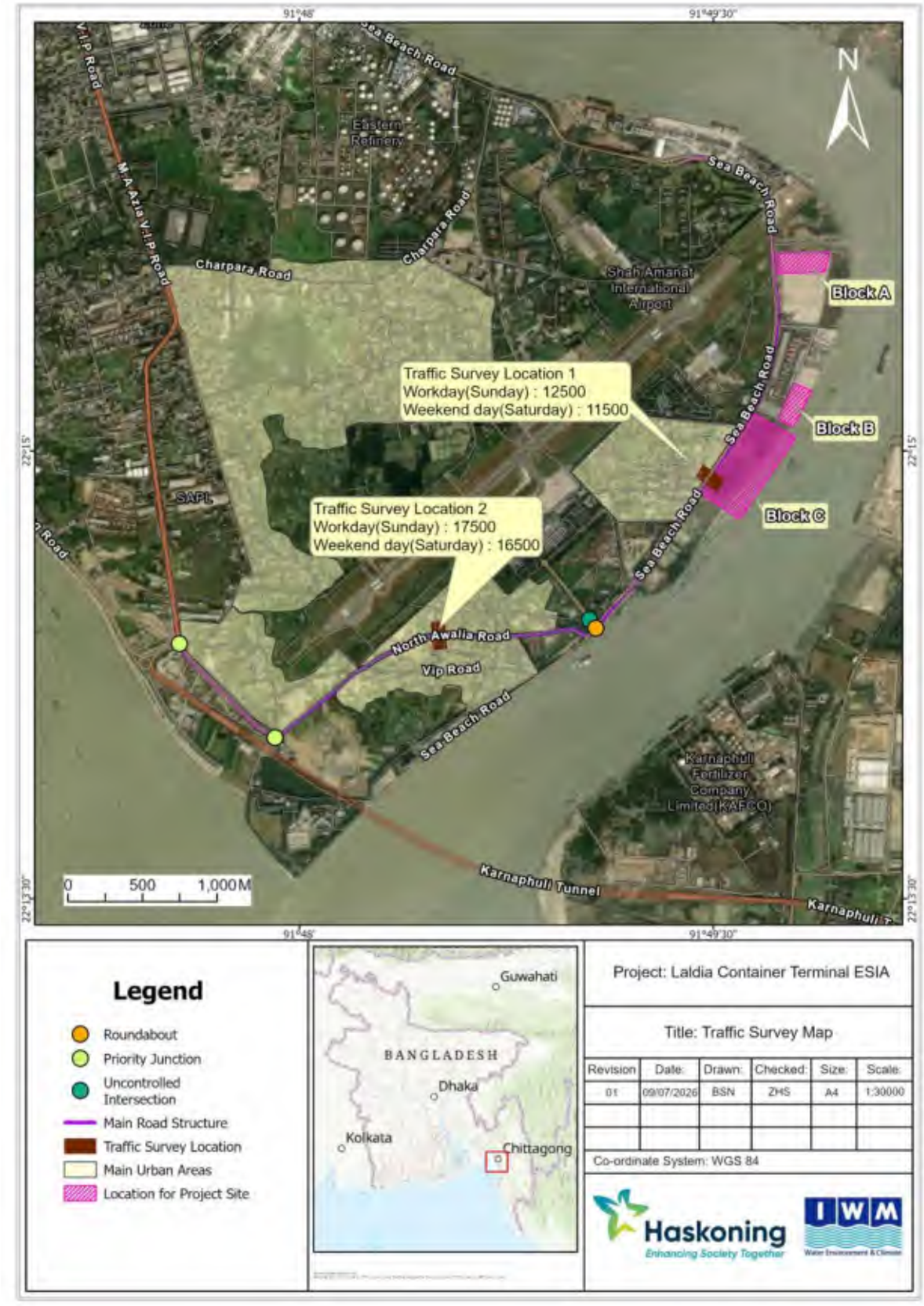


Figure 8-24: Traffic volumes in vehicles/day (rounded on nearest 100 vehicles)

During **construction**, it is expected, based on the DRAFT Environmental and Social Impact Assessment, that the road traffic flow is mostly impacted by the traffic generated from transporting employees, which is modelled to not to result in substantial road capacity constraints during the construction phase. This is based on the available spare capacity on the Airport Road / VIP Road corridor, as well as the expectation that construction road traffic will be distributed throughout the day. It is expected that a substantial proportion of bulk materials (including sand for reclamation works) will be transported by water. Therefore, it is expected that overall construction road traffic volumes will not result in capacity issues, however, occasional movements of oversized, slow-moving, or abnormal loads may be required during the construction phase. These movements are expected to occur infrequently and are therefore unlikely to materially affect the overall performance of the surrounding road network.

The Road Traffic Impact Study indicates that during **operation** the Airport Road / VIP Road corridor also has sufficient capacity to accommodate the additional traffic generated by the terminal during the operational phase. Under both the middle and upper throughput scenarios, the calculated traffic disturbance remains well below critical levels, indicating stable road traffic conditions and no structural capacity constraints. This also means that, when it comes to emergency services, the road capacity appears to remain of sufficient capacity to allow emergency services to navigate through the area.

Overall, the results of the Traffic Impact Study indicate that the terminal development will increase traffic volumes on the surrounding road network during construction and operation, but both the middle and upper scenarios remain below the capacity thresholds. This means that the surrounding road network is expected to be able to accommodate additional terminal-related traffic and to not result in additional congestion. Nevertheless, the increase in traffic is likely to still affect its surrounding communities, as traffic-related community health and safety risks are already raised as a concern by the communities. It can therefore be expected that an increase in traffic will increase these safety risks.

8.3.14 Impacts on River Traffic

The proposed Laldia Container Terminal is located within the busy navigation corridor of the Karnaphuli River, which is regularly used by lighter vessels, inland cargo vessels, fishing boats, passenger boats, and other local watercraft. **Construction** and **operational** activities using the river can influence existing river traffic movement, navigation safety, and access to traditional river routes due to increased vessel movement and marine activities within the river channel.

Narrowing of the Karnaphuli River channel in front of Block-C reduces the available navigational width for existing river traffic during **construction and operation**, which may result in limited manoeuvring space for lighter vessels, inland cargo vessels, fishing boats, ferries, and other local boats. This reduced navigation space may result in an increase in congestion, crossing difficulties, waiting time, and the risk of vessel collision, particularly during peak traffic periods and simultaneous movement of large container vessels. Moreover, it may alter local river flow patterns

and increase flow velocity and turbulence within the narrowed section, potentially creating navigation difficulties and manoeuvring challenges for existing river traffic, particularly smaller vessels and fishing boats.

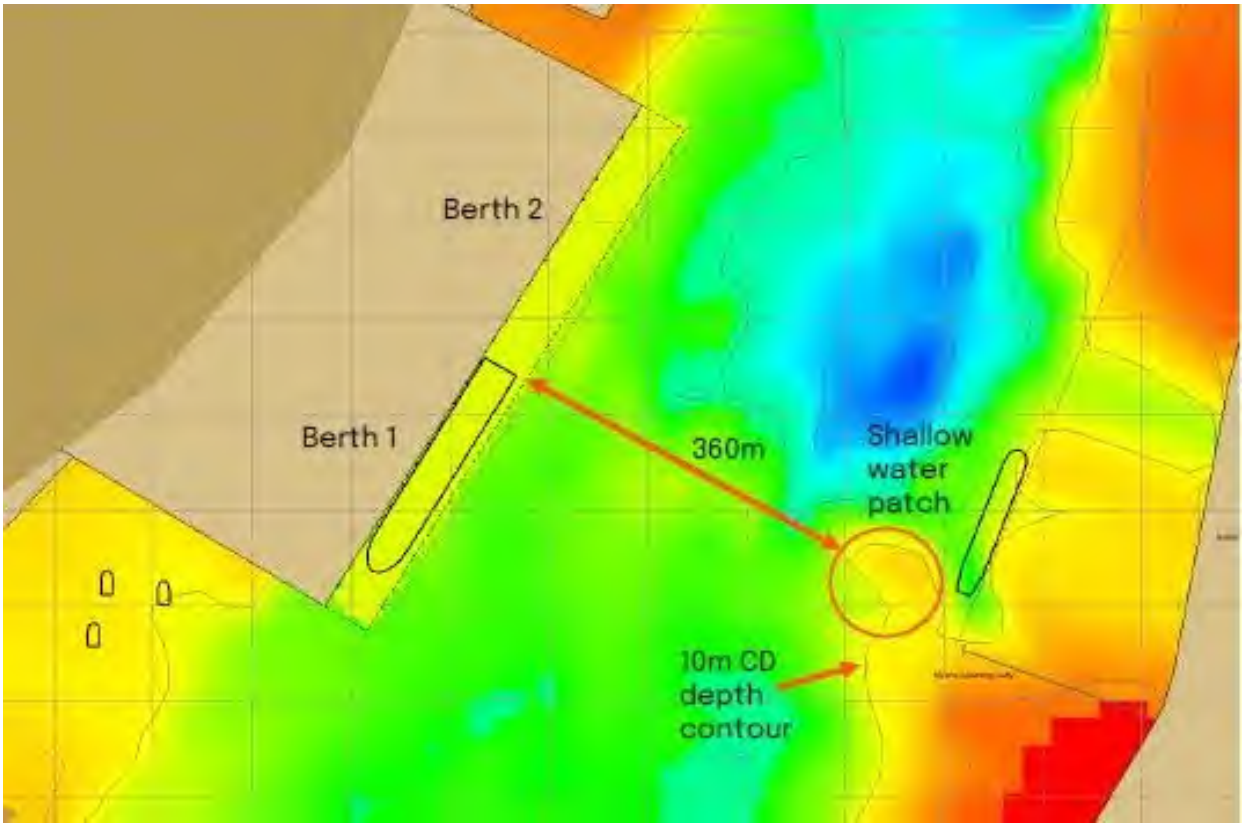


Figure 8-5: Narrowing of river by LCT terminal on reclaimed land and deck on piles (Source: HR Wallingford, 2024)

During **construction**, the movement of dredgers, sand barges, Piles (RC or PHC) and associated vessels will pose a risk to local river traffic.

Movement, berthing and manoeuvring of container ships may hamper and bring safety risks to existing river traffic during **operation**. Vessel manoeuvring simulations indicate that large container vessels turning and berthing at the proposed LCTP may temporarily occupy a significant portion of the navigation channel. This may increase vessel interactions and traffic congestion in the vicinity of the berth, resulting in a higher risk of navigational conflicts with passing vessels, tugboats, fishing vessels, and other river users during turning and berthing operations.

Summarized, the following impacts may occur. There will be increased congestion and interference within the navigation channel due to additional navigation generated by LCTP in the construction and operation phase. This may result in an increased risk of vessel collision, navigational safety hazards, and manoeuvring difficulties for small boats, particularly near the terminal and dredging areas. There may be temporary restriction or disruption of traditional navigation routes and fishing activities used by local communities. The generation of wake waves, localized turbulence, and delays in river transport movement can affect other vessels and river

users. This may result in increased pressure on existing river traffic management and navigation systems due to additional marine traffic activities.

8.3.15 Impacts on Livelihoods and Community Health & Safety

During the **pre-construction**, **construction** and **operation** phases of the project, impacts on livelihoods and community health and safety are expected. Effects described in this chapter can be more severe for vulnerable groups, including women, youth, the elderly, and persons with disabilities.

Economic Displacement

Economic Displacement will mainly take place during the **pre-construction** area to clear the Project footprint before **construction** can start, which includes displacement and access restrictions.

There is a residual impact from past physical and economic displacement of households from the project site, which can still be impacting the affected people and is considered a general concern in the communities around LCTP. This can impact the social licence to operate for LCT Ltd.

Activities Drainage Channel

As the land for Block B and C will be connected as part of the LCTP, the livelihood activities in the drainage channel will be economically displaced. There are multiple activities going on in the drainage channel, the displacement of these facilities may lead to a loss of income. Activities located in the channel are:

1. Shops/restaurants near the main road;
2. Sheds, which purpose is not confirmed, but (partly) used by construction works in the neighbourhood;
3. River crossing ticket selling point incl. resting accommodation for the operators;
4. Waste recycling activities;
5. Access to a passenger ferry crossing the river;
6. Access to moored (fishing) boats.

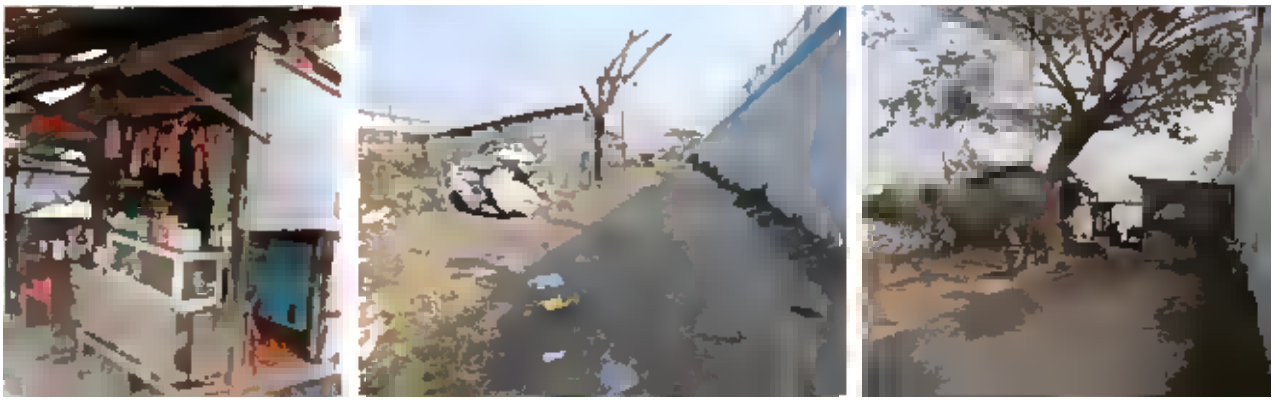


Figure 8-25: Activities drainage channel (source: ESIA team)

Bus stop Block C

The bus stop located in front of Block C will need to be relocated to accommodate the construction of the terminal outgate.



Figure 8-26: Bus stop in front of Block C (source: ESIA)

Fishing Activities

The potential reduction in fishing resources (described in 8.3.10) may negatively affect local fishermen. Fishing activities are primarily concentrated between *Ghat No. 10* and *Ghat No. 12*, where traditional boats, manual nets, and small-scale fishing gear are commonly used.

Additionally, artisanal fishing gear was observed in front of Block C and in the drainage channel, making use of a standing net on the mudflat. It was observed that one floating shed is present, probably for a fisher to stay during its fishing activities. It is not known how many people are dependent on this activity. These activities will be displaced as the terminal will be developed, because the terminal footprint will extend further into the river. Artisanal fisher(s) will no longer be able to make use of the area in front of Block C. In addition, several fishing boats currently situated near Block C will be displaced to allow for preparation and construction activities and the future operation of the terminal.



Figure 8-27: Fishing activities in front of Block C.

Incontrade Workers

As Block B and C will be merged, Incontrade workers will lose access to Block B during both the construction and operational phases, resulting in the loss of an area currently used for vegetable gardening and recreation. Additionally, the area of Block B is used by the communities and workers from Incontrade Ltd. to play cricket and enjoy the views on the river in the evening. Inside the Incontrade Ltd. building, accommodation is provided for workers, who currently have access to the open area south and east of the facility.



Figure 8-28: Open space used by workers from Incontrade for playing cricket and small gardens.

Mooring buoys CPA

A CPA-owned mooring buoy, currently used by several boats, is located in front of Block C. As the terminal development will extend into the water, the mooring buoy and associated vessels will need to be relocated to an alternative location.



Figure 8-29: CPA mooring buoy and vessels in front of Block C.

Electricity cable and water supply pipelines

Constructing the new electricity and water supply lines to reach the Project Site will result in (temporary) economic displacement. Physical displacement shall be avoided completely.

The electricity usage of LCTP, both during construction and operation, can affect the electricity capacity of the network, therefore impacting the economic activities in the area.

Table 8-4 presents the estimated number of affected assets resulting from the terminal development. An estimate of assets potentially affected by the electricity cabling could not be determined at this stage as this requires a more detailed design.

Table 8-4: Estimated number of affected assets

Assets	Location	Estimated number of assets	Temporary/Permanent Displacement
Laldia Container Terminal development works			
Shop	Block B	2	Permanent
Shop	Drainage Channel	1	Permanent
Waste segregation	Drainage Channel	1	Permanent
Shed	Drainage Channel	2	Permanent
Ticket office	Drainage Channel	1	Permanent
Resting spot of ticket office	Drainage Channel	1	Permanent

Ferry *ghat*	Drainage Channel	1	Permanent
Fishing gear	Block C (mud flats)	1	Permanent
Fishing gear	Drainage Channel	1	Permanent
Vegetable garden	Block B	1	Permanent
Vegetable garden	Block C (outside the wall)	5	Temporary/Permanent
Shop/Shed	Block C (outside the wall)	3	Temporary
Restaurant	Block C (outside the wall)	1	Temporary
Electricity Cabling works			
Shops	VIP road/Patenga Road/Shaheed Wassim Akram Flyover/Airport Rd./Patenga Rd.	Unknown	Temporary
Restaurants			
Other			

8.3.16 Other Impacts on Livelihoods

During **construction**, both positive and negative impacts can be expected on livelihoods. First, there will be (temporary) employment opportunities created for local skilled, semi-skilled and unskilled workers. Income-generating opportunities may increase for local transport workers, suppliers, contractors and (small) business operators. Additionally, local commercial activities including food shops, tea stalls, grocery shops, rental housing, sand traders and daily service businesses, may expand due to the increase in activities and potentially the workforce in the area. By hiring local workers for construction, they might increase their technical skills and practical experience through participation in construction activities. However, social tensions may arise if local communities perceive that employment opportunities, compensation measures, or livelihood restoration support are inadequate.

Secondly, construction of the LCTP could negatively affect cultural heritage (e.g. mosque near block A) and schools due to increased traffic risks, vibrations, dust and noise.

During **operation**, the project is expected to provide livelihood benefits by creating (long-term) employment opportunities in port operations, logistics, transport, security, maintenance, and other support services. However, LCTP will also bring negative impacts for livelihoods. Fishing activities near the terminal may be affected, with potential consequences for fisheries-dependent communities. During the FGD's, fishermen stated that household income is highly dependent on daily fishing activities, making their economic condition vulnerable to restrictions on fishing operations. Given the proximity of these fishing areas to the Project Site, fishermen operating in this zone may experience negative impacts from Project-related activities. Furthermore, increased demand for land and property in the project area may raise land values and rental costs, potentially affecting (low-income) households, tenants, and small businesses.

Impacts on Community Health & Safety

By conducting the stakeholder consultations, surveys, field visits and analysis, impacts on community health and safety were identified. These impacts are likely to occur during both construction and operation.

During **construction**, a number of negative impacts may occur. Construction activities may temporarily disrupt local road and river traffic movements and access, negatively affecting daily travel to markets, workplaces, schools, and health facilities. Increased traffic from heavy vehicles transporting construction materials may contribute to temporal congestion and elevate road safety risks for other road users (incl. school children, rickshaw operators and users and pedestrians, as well as other road users). Nearby living households and shops, schools, community facilities and cultural heritage (e.g. mosques) may experience nuisance impacts from dust, noise, and vibrations generated during construction.



Figure 8-30: Trucks near the mosque close to Block A

The influx from outside construction workers (incl. labour camps) places additional pressure on local infrastructure and public services, including roads, drainage system, sanitation facilities, housing, and other community resources (potentially resulting in higher prices). If local employment opportunities are perceived to be limited (which is experienced in previous projects), tensions may arise between local residents and incoming workers.

Gender Based Violence and Sexual Exploitation and Abuse (GBV & SEA-SH)

The influx of workers can contribute to increased levels of violence, sexually transmitted infections, and an increase in the consumption of alcohol and drugs within local communities. A predominantly male workforce living away from their families and 'normal' social environments may also lead to a rise in unplanned pregnancies, potentially resulting in a higher number of single-parent households and shifts in family structures. While labour influx may contribute to an overall increase in crime, incidents of violence and criminal activity targeting women and girls can be

particularly evident in contexts where gender inequalities in power and social norms already exist, and where governance and law enforcement capacities are limited. In areas with existing sexual and GBV concerns, the arrival of large numbers of workers may further exacerbate these issues.

During **operation**, port activities generate a range of community health and safety impacts. The regular movement of container trucks may increase traffic congestion on surrounding roads and access routes, leading to elevated road safety risks for pedestrians.

Additionally, communities located near the terminal may experience environmental nuisance impacts, including increased noise, dust, vibrations, air emissions, and artificial lightning associated with port operations and vehicle movements. In addition, the presence of the terminal infrastructure and the stack of containers will alter existing views and reduce visual amenity for residents of nearby apartment buildings. Furthermore, during the operation of the parts with overhead electricity cable, there could be radiation risks and the risk of cable snapping and poles falling over, affecting the health of communities living near or under the electricity cable.



Figure 8-31: Residential housing blocks across the road from Block C

River crossing boats at locations such as *Ghat* No. 14 frequently cross the main navigation channel, creating recurring interactions with commercial vessels transiting along the river. During periods of high traffic activity, both during construction and operation, these crossing movements may increase the risk of navigational conflicts and vessel interactions within the channel. The increased vessel traffic associated with the LCT project may affect the safety, mobility, and livelihoods of communities that depend on the Karnaphuli River. Additional commercial vessel movements may increase navigational conflicts, delays, and restrictions on river access, particularly at key crossing locations. These impacts may affect passenger transport, fishing

activities, and other river-based livelihoods, while also increasing safety risks for small vessels and river users.

Reduced river navigability or an increase in accidents affecting both passenger and commercial transport can have widespread impacts on multiple households within the AoI. Direct health and safety risks can occur from the increased risk of collisions with commercial and passenger traffic and additional waves due to the manoeuvring of the vessels.

As for road safety, there are currently several unsafe practices ongoing in the AoI, which cause safety issues for the inhabitants. Road safety was also highlighted during the Socio-Economic Survey as one of the main concerns resulting from the other port projects. The impact from the additional traffic generated from the project can result in additional safety concerns, especially for vulnerable road users such as children, elderly and people with disabilities, especially if they are pedestrians, rickshaw operators or users.

8.3.17 Construction and Operation Workers

Occupational health & safety issues could occur during the **construction**, **operation** and decommissioning common to those of most large infrastructure facilities.

During construction workers may face health risks from exposure to dust, hazardous chemicals, fuels, lubricants, and other construction materials. Construction activities involving heavy machinery, excavation works, lifting operations, and vehicle movements may increase the likelihood of occupational accidents, injuries, and fatalities. Additional risks may arise from fire, explosions, electrocution, accidental spills of hazardous substances, and security-related incidents. Workers may also be exposed to excessive noise, vibration, heat stress, adverse weather conditions, and, due to work near the river and over-water structures, an elevated risk of drowning. If the construction workers are not living in the AoI or close to the Project site, there is a risk that the contractor does not provide adequate living conditions (housing, food, water, waste disposal, et cetera).

During **operation** workers may continue to face health and safety risks related to exposure to hazardous substances such as fuels, lubricants, chemicals, cargo residues, and waste materials. Increased noise levels within the project area, particularly in Block C, together with prolonged exposure to vibration, heat, and adverse weather conditions, may negatively affect worker health and wellbeing. Operational activities involving container handling equipment, cranes, trucks, vessels, and other machinery may result in accidents causing injuries or fatalities. Workers may also be exposed to physical hazards associated with loading and unloading operations, maintenance work, work at height, and confined spaces. Furthermore, fire, explosions, electrical faults and outage, and accidental releases of hazardous materials present significant safety risks, while work in close proximity to berths, vessels, and the river increases the potential for slips, falls, and drowning incidents. Additionally, there is a risk of provision of poor working conditions (from

both LCT Ltd as well as from contractors due to poor wages, labour contracts, working conditions in the hiring of labour to save resources for both the construction and operation phase.

8.4 Evaluation of Impacts

As part of the environmental impact assessment process, an impact evaluation matrix is tailored specifically to the proposed Project, focusing on the potential environmental impacts during the **pre-construction**, **construction** and **operation** phases. The matrix examined the interaction of project activities with various Valued Environmental Components (VECs) of the environment as well as the significance of the impacts.

The anticipated impacts and their significance before adopting mitigation measures are subsequently characterized. The impacts and their significance during the pre-construction, construction and operation phases are presented in following tables for pre-construction, construction and operation respectively.

Table 8-5: Potential impacts of pre-construction activities on the environmental and social components

Category	VEC	Sensitivity	Impact / Risks on VEC	Temporal Aspects	Spatial Aspects	Type of Impact	Likelihood	Magnitude	Significance (Before mitigation)
Physical environment	Drainage hydrology	High	Demolition debris, removed topsoil may enter the water in the *khal* and block the drainage function	Short term	Local	Negative	Unlikely	Minor	Moderate
	Water and sediment quality	Medium	Demolition waste may adversely affect river water and sediment quality if not properly managed, disposed of, or reused	Short term	Local	Negative	Unlikely	Minor	Minor
	Ambient Air Quality	Medium	Dust emissions generated by demolition activities associated with the preconstruction phase of the project, have the potential to cause nuisance	Short term	Local	Negative	Very Likely	Minor	Minor
Social environment	Livelihood, health and safety of communities	High	Economic displacement of Shops, Restaurants, Waste Segregation Activities and Workers' Sheds before start of construction.	Long term	Local	Negative	Certain	Major	Major
			Economic displacement of Artisanal Fishers and Fishing Structures at Block C and in the drainage channel before start of construction.	Long term	Local	Negative	Certain	Major	Major
			Relocation of mooring buoy in front of Block C and associated Economic displacement of CPA Mooring Buoy and Associated Vessel Uses before start of construction.	Long term	Regional	Negative	Certain	Moderate	Moderate
			Economic displacement caused by Utility Routing (Electricity, Water and Sewer Connections) before start of construction. Physical displacement is avoided.	Long term	Local	Negative	Certain	Major	Major
			Access to the blocks is restricted with additional (temporary) fencing and security personnel, affecting leisure activities on the blocks (e.g. playing cricket, kiting, enjoying the river view) for both the local community and workers at Incontrade.	Long term	Local	Negative	Certain	Minor	Moderate
			Job opportunities in security and fencing/wall construction	Short term	Local	Positive	Likely	Minor	Moderate
			Residual impact from past physical and economic displacement of households from the project site	Long term	Regional	Negative	Likely	Major	Major
	River crossing commuters and operators	High	Relocation of river crossing boat operations from *Ghat* no. 14 to other *ghats*	Long term	Regional	Negative	Certain	Major	Major
			River crossing commuters using *Ghat* no. 14 need to use other *ghats* leading to longer travel times and potential increase in fares	Long term	Regional	Negative	Certain	Major	Major
	Construction and Operation workers	High	Occupational health and safety risks for workers for wall and fence construction	Short term	Local	Negative	Likely	Minor	Moderate
All	All VECs	High (related to the most sensitive VEC)	Contractor is not sufficiently equipped and experienced to manage E&S risks	Short term	Local	Negative	Unlikely	Major	Major
			The preparation of the detailed design and the method statements provide an important opportunity to incorporate the outcomes of the update of the ESIA into the project development to avoid, mitigate or enhance impacts and risks identified.	Long term	Local / Regional	Positive	Certain	Moderate	Moderate

Table 8-6: Potential impacts of construction activities on the environmental and social components

Category	VEC	Sensitivity	Impact/ risks on VEC (Construction)	Temporal Aspect	Spatial Aspects	Type of Impact	Likelihood	Magnitude	Significance (Before mitigation)
Physical environment	Drainage hydrology	High	Joining Block-B and Block-C over the existing drainage channel (Khal No. 14) may cause upstream drainage congestion during monsoon.	Long term	Regional	Negative	Very Likely	Major	Major
			Maintenance and operational access by the regulator/pump operator will be restricted during construction	Short term	Local	Negative	Likely	Minor	Moderate
	River morphology	Medium	Dredging and land reclamation will cause localised changes to flow patterns and sediment transport, resulting in minor erosion and sedimentation in the vicinity of the project area. These changes are expected to remain limited in extent and will not affect the overall morphological stability of the Karnaphuli River.	Long term	Local	Negative	Very Likely	Minor	Minor
	Water and sediment quality	Medium	Site preparation, reclamation and ground improvement may result in runoff of sediments causing locally higher turbidity levels in the river locally	Short term	Local	Negative	Likely	Minor	Minor
			Untreated sewage spill may enter the river	Short term	Local	Negative	Unlikely	Minor	Minor
			The construction materials on the land area may be washed away with surface runoff and deteriorate water quality of drainage canal and the Karnaphuli River	Short term	Local	Negative	Unlikely	Minor	Minor
			Capital dredging will resuspend sediments and alter water quality parameters.	Short term	Local	Negative	Certain	Moderate	Moderate
			Spills and leaks of fuel, grease, lubricants and other hazardous substances from equipment/ dredgers into surface or groundwater from construction and dredging equipment	Short term	Local	Negative	Unlikely	Moderate	Moderate
			Disposal of dredged materials may affect water quality in other locations, such as Char Bakalia	Short term	Local	Negative	Likely	Moderate	Moderate
	Ambient air quality	Medium	Emissions (SOX, NOX, CO, PM2.5) from vessels, vehicles, various types of construction equipment, and generators will impact air quality	Short term	Regional	Negative	Certain	Minor	Minor
			Dust emissions generated by construction activities have the potential to cause nuisance	Short term	Local	Negative	Very likely	Moderate	Moderate
			Greenhouse Gas (GHG) emissions from construction equipment and generators will affect global climate	Long term	Global	Negative	Certain	Minor	Minor
	Ambient noise levels	Medium	Different types of construction activities (e.g. piling, ground improvement, construction machinery operations, vehicle movements etc.) will cause high level noise which cause nuisance and health risks to the neighbouring communities	Short term	Local	Negative	Certain	Major	Major
Ecological Environment	Tidal mudflat	Medium	The tidal mudflat in front of Block-C and the benthic habitats living there will be lost.	Long term	Local	Negative	Certain	Moderate	Moderate
	Mangrove ecosystems	Medium	The mangrove trees present in the drainage channel will be removed during the site clearing and permanently lost	Long term	Local	Negative	Certain	Minor	Minor
			The construction activities may affect the mangroves in front (riverside) of Block-B	Short term	Local	Negative	Unlikely	Minor	Minor
	Fisheries resources	Medium	Piling, dredging, vessel movement may pose risk for water contamination and underwater noise generation which may impact fisheries resources including the ability of migratory fish species to navigate through the Karnaphuli River. There is a risk of Increase in turbidity, suspended materials due to dredging and piling activities	Long term	Local	Negative	Very Likely	Moderate	Moderate
			Habitat degradation of benthic species (fish feed) and some fishes due to capital dredging activities	Short term	Local	Negative	Likely	Moderate	Moderate
	Dolphins	High	Piling, dredging and vessel movements cause underwater noise that affects the dolphins	Short term	Local	Negative	Very Likely	Major	Major

Category	VEC	Sensitivity	Impact/ risks on VEC (Construction)	Temporal Aspect	Spatial Aspects	Type of Impact	Likelihood	Magnitude	Significance (Before mitigation)
			Piling, dredging, construction vessel movement may pose risk for water quality which may impact dolphins. There is a risk of increase in turbidity, suspended materials due to dredging and piling activities	Short term	Local	Negative	Very likely	Moderate	Major
			Collision risk of construction vessels with dolphins.	Short term	Local	Negative	Unlikely	Major	Major
	Avifauna and migratory birds	Low	Construction activities generating noise, dust, light, may disrupt feeding, resting, nesting, and movement of avifauna and migratory birds near the Project area. Loss of mudflat (see above) will mean a loss of food resources for birds.	Short term	Local	Negative	Likely	Moderate	Minor
Social Environment	Road Traffic	Low	Possible minor (temporary) congestions (as per the traffic study, the road has substantial capacity to conclude that congestions are unlikely to happen, based on the expected traffic increase) and interruptions to the public road traffic due to the movement of vehicles with construction equipment and materials and the installation of electricity cable. Also through buses transporting employees.	Short term	Local	Negative	Likely	Moderate	Minor
	River traffic	Medium	The movement of dredgers, sand barges, Piles (RC or PHC) and associated vessels will pose a risk to local river traffic.	Short term	Regional	Negative	Likely	Moderate	Moderate
	Livelihood, health and safety of communities	High	Generation of work opportunities for local skilled/unskilled labour in construction activities as a result of the LCTP development	Short term	National	Positive	Likely	Minor	Moderate
			Opportunities for local vendors or restaurant/ shop owners to sell food/ goods to the construction workers	Short term	Local	Positive	Likely	Moderate	Moderate
			Opportunities for sand traders to buy and sell dredged material from LCTP and supply fill material	Short term	Regional	Positive	Likely	Minor	Moderate
			Fire or explosion risks from fuel, generators and construction equipment	Short term	Local	Negative	Unlikely	Moderate	Major
			Relocation of the pedestrian path and bus stops due to the construction of the entry and out gate affecting walking distance	Long term	Local	Negative	Likely	Minor	Moderate
			Construction and associated transportation may increase noise, dust, vibration, light, waste, wastewater, air emissions (dust, exhaust)	Short term	Local	Negative	Certain	Minor	Moderate
			Labour influx for construction potentially adds pressure on local infrastructure, housing, food, public services, public transport, waste and wastewater management	Short term	Local	Negative	Likely	Moderate	Major
			Increased truck traffic and transport activities for construction may result in road and navigational safety risks, and restricted community access.	Short term	Local	Negative	Likely	Moderate	Major
			Vulnerable groups, including women, youth, the elderly, and persons with disabilities, may face increased safety and security risks from labour influx, increase in road and river traffic, improper security personnel, displacement of ghat 14.	Short term	Local	Negative	Likely	Moderate	Major
			Risk of tensions between construction workers (due to labour influx) and community members, including women and young girls.	Short term	Local	Negative	Likely	Minor	Moderate
			Construction nuisance (traffic disruption, dust, noise, air emissions) from the development of electricity cable to LCTP	Short term	Local	Negative	Likely	Minor	Moderate
			Risk of damage to nearby cultural heritage, like mosque near block A due to vibrations, dust and nuisance due to noise.	Short term	Local	Negative	Likely	Minor	Moderate
		High	Occupational Health & Safety risks from e.g. working over water, at height, with heavy equipment, exposure to hazardous and chemical materials	Short term	Local	Negative	Likely	Major	Major

Category	VEC	Sensitivity	Impact/ risks on VEC (Construction)	Temporal Aspect	Spatial Aspects	Type of Impact	Likelihood	Magnitude	Significance (Before mitigation)
	Construction and Operation Workers		Risk of injuries and loss of lives in case of fire/explosions or other safety incidents during construction	Short term	Local	Negative	Unlikely	Major	Major
			Risk of providing poor wages, labour contracts, working conditions in the hiring of labour to save resources.	Long term	Regional	Negative	Unlikely	Major	Major
			Heat stress from increased paved area affecting workers' health and safety	Short term	Local	Negative	Likely	Moderate	Major
All	All VECs	High (related to the most sensitive VEC)	Obtain necessary regulatory permits and approvals before starting any construction work and operational activities to ensure that all regulations have been followed, and relevant regulators are informed.	Long term	Local / Regional	Positive	Likely	Moderate	Major
			E&S impacts in the supply chain for sourcing and transportation of construction material, disposal site for dredged material and solid waste, bunkering of construction vessels	Long term	(Inter)national	Negative	Likely	Major	Major
			Contractor is not sufficiently equipped to manage E&S risks	Long term	(Inter)national	Negative	Likely	Major	Major

Table 8.5: Potential impacts of project operation on the environmental and social components

Category	VEC	Sensitivity	Impact/risks on VEC (Operation)	Temporal Aspects	Spatial Aspects	Type of Impact	Likelihood	Magnitude	Significance (Before mitigation)
Physical environment	Drainage hydrology	High	Maintenance and operational access by the regulator/pump operator will be restricted during operation resulting from replacement of an open *khal* with a culvert beneath the terminal deck	Long term	Local	Negative	Likely	Minor	Moderate
			Replacement of the existing open drainage channel with a culvert beneath the terminal may increase the risk of restricted drainage, debris accumulation and reduced hydraulic capacity, resulting in waterlogging, flooding and drainage congestion in surrounding communities, particularly during monsoon periods and extreme rainfall events.	Long term	Local	Negative	Likely	Moderate	Major
	River morphology	Medium	The dredged berth pocket will generate ongoing sediment accumulation and a gradual reduction in water depth. As a result, frequent maintenance dredging will be required throughout the operational phase to maintain safe navigation and terminal operations.	Long term	Local	Negative	Likely	Major	Major
			Narrowed channel due to the terminal, maintenance dredging, and large vessel movement alter natural flow regimes, wave generation and sediment transport processes, potentially increasing localised erosion and sedimentation in the vicinity of the terminal (including areas on the other side of the river)	Long term	Local	Negative	Likely	Minor	Minor
	Water and sediment quality	Medium	Maintenance dredging will resuspend sediments, release contaminants (if present) and alter water quality parameters	Long term	Local	Negative	Likely	Moderate	Minor
			Disposal of dredged materials may affect water quality in other locations, such as Char Bakalia	Long term	Local	Negative	Unlikely	Minor	Minor
			Domestic waste and wastewater may pollute soil, groundwater and/or surface water if not treated/managed properly	Long term	Local	Negative	Likely	Minor	Minor
			Spills and leaks of fuel, grease and lubricants and other toxic hazardous substances from port equipment, trucks and dredgers and from hazardous cargo.	Long term	Local	Negative	Unlikely	Moderate	Moderate
			Risk of oil spill during bunkering of container vessels	Long term	Local	Negative	Unlikely	Major	Major
			Discharge of stormwater from the project site including first flush and potential pollutants into the river	Long term	Regional	Negative	Unlikely	Moderate	Moderate
	Ambient air quality	Medium	Emissions (SOX, NOX, CO, PM2.5 and PM10) from vessels, vehicles, various types of operational equipment, and generators will impact air quality	Long term	Regional	Negative	Certain	Moderate	Moderate
			Terminal operations will emit GHGs that contribute to climate change effects. However, as most handling equipment will be electrical, GHG emissions are relatively limited.	Long term	Global	Negative	Certain	Minor	Minor
	Ambient noise levels	Medium	Vessels, different types of container handling cranes, truck, lorries, handling of containers are likely to cause high level noise	Long term	Local	Negative	Certain	Major	Major
Ecological Environment	Fisheries resources	Medium	Maintenance dredging may generate sediment plumes that temporarily increase suspended sediment concentrations within fish migration pathways in the Karnaphuli River affecting the ability of migratory fish to detect migration cues and move through the area.	Short term	Local	Negative	Likely	Moderate	Moderate
			Maintenance dredging, container vessel movement generates underwater noise and risk of spills of chemicals/oil which may impact fisheries resources	Long term	Local	Negative	Likely	Moderate	Moderate
			Habitat degradation of benthic species (fish feed) and some fishes due to maintenance dredging activities	Short term	Local	Negative	Likely	Moderate	Moderate
	Tidal mudflats	Medium	Risk of spills of chemicals/oil which may impact surrounding tidal mudflats	Short ter,	Local	Negative	Unlikely	Moderate	Moderate

Category	VEC	Sensitivity	Impact/risks on VEC (Operation)	Temporal Aspects	Spatial Aspects	Type of Impact	Likelihood	Magnitude	Significance (Before mitigation)
Social Environment	Mangrove ecosystems	Medium	Risk of spills of chemicals/oil which may impact mangroves at the project site or at Majher Char downstream of the project area	Short term	Local	Negative	Unlikely	Moderate	Moderate
	Dolphins	High	Maintenance dredging, vessel movement may pose risk for water pollution and underwater noise generation which may impact dolphins	Long term	Local	Negative	Likely	Major	Major
			Risk of collision with vessels	Long term	Local	Negative	Unlikely	Major	Major
	Avifauna and migratory birds	Low	The terminal operation activities may affect birds due to noise and light pollution	Long term	Local	Negative	Likely	Minor	Negligible
			Possible (temporary) congestion and interruption to the surrounding road traffic due to the entry, exit, and parking of the container trucks and passenger vehicles generated by the terminal	Long term	Local	Negative	Very Likely	Moderate	Minor
	River traffic	Medium	Movement, berthing and manoeuvring of container ships may hamper and bring safety risks to existing river traffic and in particular operations at KDDL across the river	Long term	Local	Negative	Very Likely	Moderate	Moderate
			Vessel manoeuvring simulations indicate that large container vessels turning and berthing at the proposed LCT may temporarily occupy a significant portion of the navigation channel. This may increase vessel interactions and traffic congestion in the vicinity of the berth, resulting in a higher risk of navigational conflicts with passing vessels, tugboats, fishing vessels, and other river users during turning and berthing operations.	Long term	Local	Negative	Very Likely	Moderate	Moderate
			River crossing boats frequently cross the main navigation channel, creating recurring interactions with commercial vessels transiting along the river. During periods of high traffic activity, these crossing movements may increase the risk of navigational conflicts and vessel interactions within the channel	Long term	Local	Negative	Very Likely	Moderate	Moderate
			The increased vessel traffic associated with the LCT project may affect the safety, mobility, and livelihoods of communities that depend on the Karnaphuli River. Additional commercial vessel movements may increase navigational conflicts, delays, and restrictions on river access, particularly at key crossing locations such as river crossing *ghats*. These impacts may affect passenger transport, fishing activities, and other river-based livelihoods, while also increasing safety risks for small vessels and river users.	Long term	Local	Negative	Likely	Moderate	Moderate
	Livelihood, health and safety of communities	High	Increased truck traffic and transport activities associated with terminal operations may increase road safety risks for pedestrians, cyclists, motorists and other road users and may affect access to community facilities, ferry crossings and livelihoods that depend on safe movement within the Area of Influence.	Long term	Regional	Negative	Likely	Moderate	Moderate
			Community health & safety risks, including fire or explosion risks from fuel, hazardous cargo, or other operations from operations on the LCTP	Short term	Local	Negative	Very Unlikely	Moderate	Major
			Noise, visual impact of stacked containers and container vessel and lighting in the night coming from the operations on LCTP	Long term	Local	Negative	Very Likely	Moderate	Moderate
			Improved opportunities for export of products, supporting and improving economic activities at the national level	Long term	National	Positive	Certain	Major	Major
			Employment opportunities for skilled manpower as well as labour force in multiple jobs at the LCTP.	Long term	National	Positive	Likely	Major	Major
			Opportunities for local vendors or restaurant/ shop owners to sell food/ goods to staff and workers	Long term	Local	Positive	Certain	Moderate	Major

Category	VEC	Sensitivity	Impact/risks on VEC (Operation)	Temporal Aspects	Spatial Aspects	Type of Impact	Likelihood	Magnitude	Significance (Before mitigation)
	Construction and Operation workers	High	(Perceived) risks of electricity outage and reduced water supply to residents due to LCTP's power and water demand for operating an energy-intensive container terminal, as well as for water consumption for employees.	Long term	Regional	Negative	Likely	Moderate	Major
			Radiation and fire risks from overhead electricity cabling between Halishahar substation and LCTP to affect residents living nearby.	Long term	Local	Negative	Likely	Moderate	Major
			Vulnerable groups, including women, youth, the elderly, and persons with disabilities, may face increased safety and security risks from labour influx, increase in road and river traffic, improper security personnel.	Long term	Local	Negative	Not likely	Moderate	Major
			The increased vessel traffic associated with the LCT project may affect the safety, mobility, and livelihoods of communities that depend on the Karnaphuli River. Additional commercial vessel movements may increase navigational conflicts, delays, and restrictions on river access, particularly at key crossing locations near the river crossing ghats. These impacts may affect passenger transport, fishing activities, and other river-based livelihoods, while also increasing safety risks for small vessels and river users.	Long term	Local	Negative	Likely	Moderate	Moderate
			Potential conflict between staff and labour coming from outside of project area and communities near the port, which can result in potential conflicts resulting from competition for jobs and services, cultural differences, pressure on local infrastructure, and perceived unequal distribution of project benefits.	Long term	Local	Negative	Unlikely	Major	Moderate
			Occupational Health & Safety risks from working over water, at height, with heavy equipment, exposure to hazardous and chemical materials.	Short term	Local	Negative	Unlikely	Major	Moderate
			Opportunity for staff and labour to raise their capacity in working in an environment with good international industry practice E&S management.	Long term	Local / Regional	Positive	Likely	Moderate	Moderate
			High noise generated from operational works (from e.g. container handling operations, crane movements, truck traffic, vessel engines, reversing alarms, maintenance activities, loading/unloading and other mechanical equipment operating continuously within the terminal) especially in Block-C may have health impacts on the workers as well as the truck drivers	Long term	Local	Negative	Likely	Major	Major
			Pressure on freshwater availability from e.g. salinity intrusion or inadequate quality/treatment and potential restricted water supply for LCTP	Long term	Local	Negative	Likely	Minor	Moderate
			Heat stress from increased paved area and steel containers can affect worker health. Heat stress is exacerbated through the extensive paved container yards, asphalt roads, concrete surfaces, steel containers, limited shading, and high temperatures/humidity during terminal operations.	Long term	Local	Negative	Very Likely	Moderate	Major
All	All VECs	High	E&S impacts in the supply chain for water and electricity supply, wastewater treatment, truck fuelling, vessel bunkering, solid waste disposal, lashers organisation	Long term	Regional	Negative	Likely	Major	Major
			Contractors in the operation phase may not be sufficiently equipped to manage E&S risks	Long term	Regional	Negative	Likely	Major	Major

8.5 Cumulative impacts assessment

8.5.1 Overview

The ESIA includes a Cumulative Impact Assessment (CIA) to evaluate the combined effects of the Project together with past, existing and reasonably foreseeable developments within the wider area. The CIA assesses how multiple activities may collectively affect the VECs, including impacts that may not be significant when considering the Project in isolation. The assessment follows a structured and iterative process involving the identification of VECs, definition of assessment boundaries, review of other relevant developments and environmental drivers, establishment of baseline conditions and evaluation of cumulative impacts. Significant cumulative effects are then addressed through the application of the mitigation hierarchy, supported by stakeholder engagement, monitoring and adaptive management measures to promote sustainable and resilient outcomes.

8.5.2 Identification of VECs for the CIA

The first stage of the CIA identifies the valued environmental and social components (VECs) and defines the spatial and temporal boundaries of the assessment through stakeholder engagement. It considers the Project's full life cycle, area of influence and wider zones where cumulative impacts may occur, resulting in a defined set of VECs and assessment boundaries for the subsequent assessment. The identified VECs are listed in the below table in line with the VECs identified and defined in Chapter 7. The baseline conditions for the identified VECs are presented in Chapter 5 of this ESIA.

Table 8-7: Valued Environmental and Social Component (VECs) for the CIA

Category	VECs	Included in the CIA (Y/N)
Physical environment	Drainage hydrology	Yes
	River Morphology	Yes
	Water and sediment quality	Yes
	Ambient air quality	Yes
	Ambient noise Levels	Yes
Ecological environment	Tidal mudflats	Yes
	Mangrove ecosystem	Yes
	Dolphins	Yes
	Fisheries Resources	Yes
	Avifauna and Migratory Birds	Yes
Social environment	River crossing commuters and operators	No. This VEC is only related to the relocation of *Ghat* 14.

Category	VECs	Included in the CIA (Y/N)
	Road Traffic	Yes
	River Traffic	Yes
	Livelihoods and Community Health and Safety	Yes
	Construction and Operation workers	No. The VEC focusses on the workers at LCTP.

8.5.3 Identification of Surrounding Activities and Potential Impacts

The second phase of the CIA identifies other past, existing and reasonably foreseeable developments, as well as key environmental and social drivers, that may contribute to cumulative impacts on the identified VECs. Through a review and mapping of nearby projects and activities, the assessment establishes the wider context within which the Project will operate. The analysis indicates that the LCT area is characterised by a high concentration of existing and planned maritime, industrial and logistics developments, many located in close proximity to the Project, highlighting the potential for cumulative impacts and the need for coordinated impact management. The developments within the CIA study area are illustrated in Figure 8-32. Detailed information on each development, including its status, current and planned activities, distance from the Project and potential interactions with the identified VECs, is presented in Table 8-8.

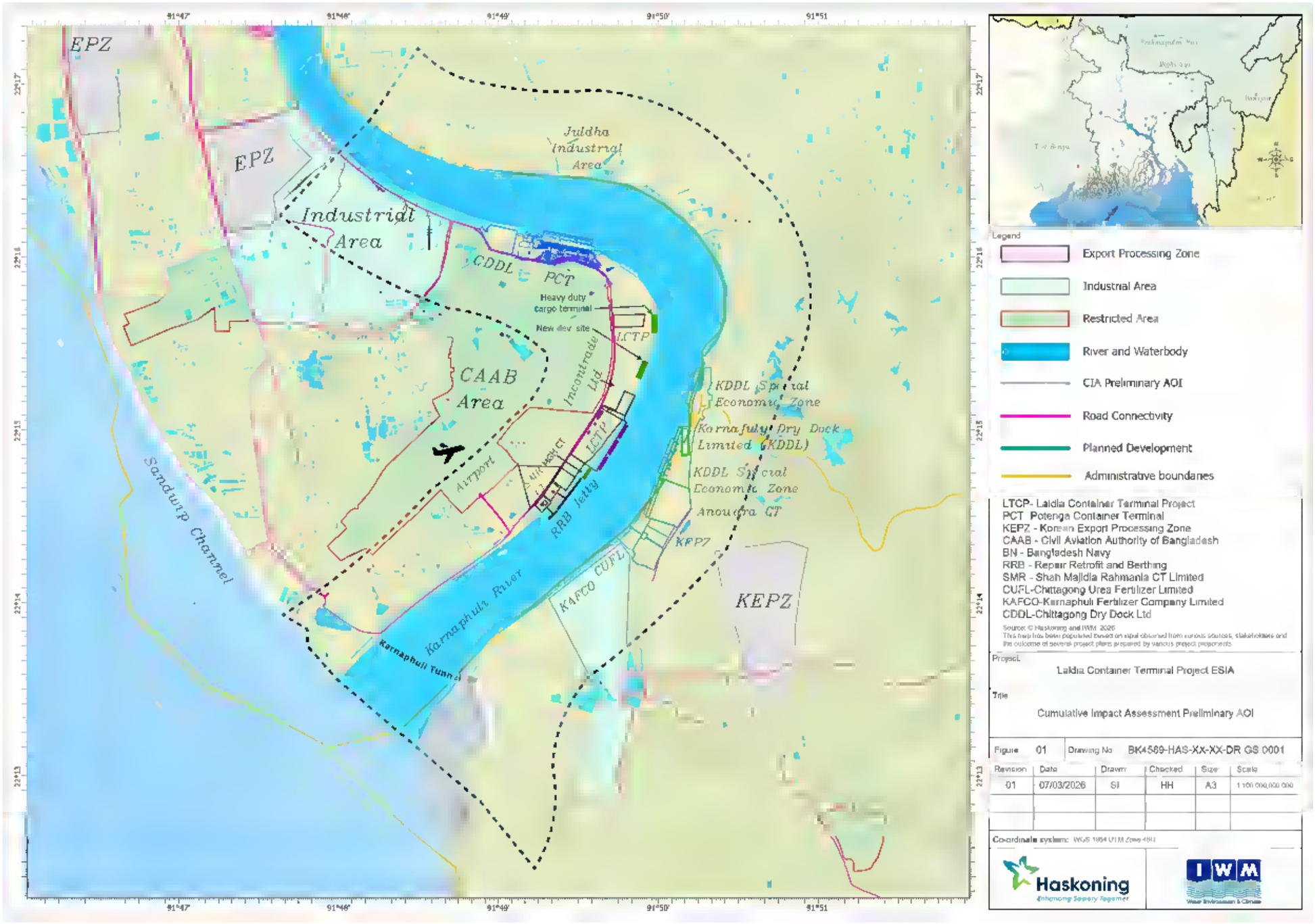


Figure 8-32: Developments within the study area of CIA

Table 8-8: List of developments included in the CIA and potential impacts on the VECs

Name	Distance to the LCT Area (Distance from Block C centre)	Project Owner	Status	Project activity summary and future plans	Potential environmental impacts on the VECs
Karnaphuli Dry Dock Ltd and Economic Zone	960 m	KDDL - Private owner	Ongoing Construction	The dry dock development includes two completed jetties, with two additional jetties and a potential special economic zone planned for the future. The project is expected to generate approximately 250 m³/day of wastewater for treatment, while air emissions are predicted to be low and noise impacts moderate. Site reclamation and dredging works have been undertaken, with dredged material reused for site dressing.	Potential impacts associated with the project include changes to river morphology from dredging activities, deterioration of water and sediment quality from operational discharges, and reductions in air quality due to vessel, equipment and generator emissions. Increased noise and vibration levels, together with habitat disturbance, may affect sensitive ecological receptors including dolphins, fisheries resources, and avifauna. Construction and operational activities will also increase road and river traffic, potentially affecting navigation and local transport networks. These environmental changes may, in turn, affect nearby communities through impacts on livelihoods, health, safety and overall quality of life. Potential cumulative impacts may arise because the dry dock development is located directly opposite the LCTP on the Karnaphuli River. The combined footprint of the two developments, together with associated dredging and vessel movements, could affect river morphology and reduce the effective navigation corridor, making navigational safety and vessel traffic management key cumulative impact considerations.
Anowara Container Terminal	1,115 m	Unknown	Planned for future development	A container terminal is in planning across the river from LCTP. The Project is still in planning stage.	A container terminal is planned on the opposite bank of the Karnaphuli River, directly across from the LCTP site. Although the development remains at the planning stage, its proximity to the Project means that potential cumulative impacts on river dynamics, navigation, and vessel traffic should be considered.
Korean Export Processing Zone (KEPZ)	1,280 m	BEPZA	Ongoing operation & planned expansion	Located on the southern bank of the Karnaphuli River, the KEPZ is a 2,492-acre industrial and export-oriented development established by Youngone Corporation of South Korea. The zone accommodates a range of manufacturing and industrial facilities and has planned future expansion, including additional factories, a 40 MW solar power project, an IT zone, and supporting infrastructure developments.	Potential impacts associated with the development include air emissions, increased noise levels, deterioration of water and sediment quality and loss of vegetation and biodiversity resulting from construction and industrial activities. In addition, land acquisition may affect agricultural land use and local livelihoods, creating socio-economic impacts on surrounding communities. In addition, as the development is located directly across the Karnaphuli River from the Project, cumulative impacts related to increased vessel traffic, navigational safety, and potential constraints on the available navigation corridor should be considered.
Potenga Container terminal	2,100 m	CPA and RSGT	Ongoing operation	Since commencing commercial operations in June 2024, the terminal has operated in conjunction with the South Container Yard (SCY), located approximately 3 km away. Key activities with the potential to generate environmental and social impacts include maintenance dredging of the Karnaphuli River, vessel navigation, berthing and cargo handling operations, container transport by road and river, and the management of wastewater, solid waste and hazardous materials associated with terminal operations.	Potential impacts associated with the development include air emissions, elevated noise levels, water and sediment pollution, waste generation and habitat disturbance resulting from ongoing activities. Increased logistics and transport activities may also contribute to traffic congestion and affect community health and safety. Given the port-related nature of the development, additional vessel and cargo movements may further increase pressure on local transport and navigation systems.

Name	Distance to the LCT Area (Distance from Block C centre)	Project Owner	Status	Project activity summary and future plans	Potential environmental impacts on the VECs
Incontrade Limited	200 m	Incontrade Limited	Ongoing operation	Incontrade Limited operates as an inland container depot and freight station, providing container handling, storage and logistics services that support import and export trade through Chattogram Port.	Potential impacts include increased air emissions mainly due to truck movements, noise, traffic congestion, wastewater and runoff generation, waste generation and community health and safety risks associated with logistics and container handling activities. Due to its proximity to the Project, cumulative impacts on local road traffic, air quality, noise levels and nearby communities may occur.
Bangladesh Navy RRB Jetty	500 m	Bangladesh Navy and Private owner	Ongoing operation and Planned development	There is an existing Jetty serving the purposes of Navy vessels. Additionally, potential Service Jetty construction and expansion is also planned.	Potential impacts include changes to river morphology and water quality associated with dredging and vessel operations, increased air emissions, noise and underwater noise, disturbance to aquatic ecology and fisheries and increased river traffic. Given its proximity to the Project, the jetty may also contribute to cumulative navigational safety risks and constraints on the available navigation corridor within the Karnaphuli River, affecting commercial and small craft vessel movements.
Shah Majidia Rahmania Container Terminal Limited	685 m	Private owner	Ongoing operation and planned development	Inland Container Depot development and operation	The inland container depot may contribute to cumulative impacts through increased truck traffic, container handling and logistics activities, resulting in elevated air emissions, noise levels, wastewater and runoff generation, waste production and risks of water/groundwater contamination from spills. Given its location adjacent to the Project, the combined operations of both facilities may increase pressure on the local road network and surrounding communities, leading to cumulative impacts on traffic congestion, community health and safety and local environmental quality.
Chittagong Urea Fertilizer Limited (CUFL)	1,126 m	Bangladesh Chemical Industries Corporation	Ongoing operation	CUFL manufactures urea fertiliser and ammonia using natural gas, supplying nitrogen-based fertilisers that support agricultural productivity and food security in Bangladesh. Based on information available on the company website, there are currently no plans for future expansion of the facility.	Located across the Karnaphuli River from the Project, CUFL has the potential to contribute to cumulative impacts on water quality, aquatic ecology, air quality, and nearby communities. Studies indicate that effluent discharges from the facility may increase concentrations of ammonia, nitrate, phosphate, BOD and COD while reducing dissolved oxygen levels in the river, potentially affecting aquatic habitats, fisheries resources and the overall health of the river ecosystem. Combined with Project-related activities, these discharges may increase cumulative pressures on water and sediment quality. Additional impacts may arise from air emissions, industrial traffic, noise and the handling of chemicals associated with fertiliser and ammonia production.
Karnaphuli Fertilizer Company Limited	1,720 m	International joint venture company	Ongoing operation	KAFCO produces ammonia and urea fertiliser using natural gas through an integrated manufacturing process. Its primary business is the production and supply of nitrogen-based fertilisers that support agricultural productivity and contribute to food security in Bangladesh. Based on information available on the KAFCO website, the facility is currently operating without any major planned expansion.	Located across the Karnaphuli River from the Project, KAFCO may contribute to cumulative impacts on water and sediment quality, air quality, aquatic ecology, and nearby communities through wastewater discharges, air emissions, industrial traffic and chemical handling. However, available information indicates that environmental risks are managed through wastewater treatment systems, Aspect Impact Analysis (AIA), Hazard Identification and Risk Assessment (HIRA), and a comprehensive HSE management framework, which help minimise potential impacts and support ongoing environmental protection.
Juldha Industrial Area	2,830 m	Private Owner	Planned for future development	The area comprises the Juldha 100 MW (Acorn) HFO power plant, along with multiple brick kilns located in the surrounding industrial area. 40 acres of land at Juldha is considered for this project. Petrochemical Industrial Hub / Special	The industrial area may contribute to cumulative impacts on air quality, human health, land resources and nearby communities. Emissions from HFO combustion and brick kiln operations can increase concentrations of particulate matter, sulphur oxides, nitrogen oxides and other pollutants, potentially affecting ambient air quality and increasing respiratory health risks. Additional impacts may include increased noise, industrial traffic, waste generation and potential effects on soil and water quality. In

Name	Distance to the LCT Area (Distance from Block C centre)	Project Owner	Status	Project activity summary and future plans	Potential environmental impacts on the VECs
				Economic Zone (SEZ). This is still under planning stage.	combination with Project activities, these developments may contribute to cumulative pressures on air quality, community health and safety and the overall environmental condition of the surrounding area.
Karnaphuli river maintenance dredging	Various locations	Bangladesh Navy and CPA	Ongoing operation and planned development	Ongoing maintenance dredging is undertaken throughout the Karnaphuli River and its connected canals to maintain navigational depths, remove accumulated silt and debris, improve drainage and support efficient port operations. Future plans envisage the transition to a continuous, technology-supported dredging programme with expanded coverage of river and canal networks, enhanced waste management measures, and integration with planned port expansion initiatives.	Maintenance dredging in the Karnaphuli River has the potential to create cumulative impacts when considered alongside Project-related dredging and marine activities. The combined effects may increase turbidity and sediment resuspension, affect water and sediment quality, alter river morphology and hydrodynamic conditions and disturb aquatic habitats. These changes could place additional pressure on fisheries resources, endangered dolphins and other aquatic biodiversity. Furthermore, the simultaneous operation of dredging activities and increased vessel movements may contribute to underwater noise, navigational constraints and cumulative impacts on river users and the overall ecological functioning of the Karnaphuli River.
Shah Amanat International Airport and Civil Aviation Authority of Bangladesh (CAAB) Area	Various locations	CAAB and Bangladesh Air force	Ongoing operation	CAAB Area Development and future expansion	The airport and port developments may collectively contribute to cumulative impacts on air quality, noise levels, traffic congestion and community health and safety. Combined aircraft, vessel, cargo handling and vehicle movements can increase emissions, noise, and transport-related pressures on nearby communities and infrastructure. Future expansion of the CAAB area may further intensify these impacts and increase land-use and operational interactions within the area. It should also be noted that part of the airport area drains into *Khal 14*, a drainage channel located within the Project footprint. Consequently, any future increase in airport capacity may alter existing drainage conditions and contribute cumulatively to changes in the area's drainage hydrology.
MGH Container Terminal	425 m	MGH group	Planned for future development	Container Terminal Development	A container terminal located adjacent to the Project may contribute to cumulative impacts on air quality, noise, water and sediment quality, and waste generation through combined construction and operational activities. Increased vessel and truck traffic may also elevate navigational safety risks, traffic congestion, and community health and safety concerns. Concurrent dredging, reclamation, and terminal operations could further increase pressure on river morphology, aquatic habitats, fisheries resources, dolphins and other ecological receptors within the Karnaphuli River system.
Area Next to Block B	Adjacent to Block B	Unknown	Planned for future development	Unknown	As the nature of the adjacent development is currently unknown, it may potentially contribute to cumulative impacts on air quality, noise, traffic, waste generation, water and soil quality and community health and safety. Given its immediate proximity to the Project, there is also potential for cumulative impacts on road and river traffic, navigational safety, and local infrastructure, although the significance of these impacts cannot be determined until further project information becomes available.
Area Next to Block A	Adjacent to Block A	Unknown	Planned for future development	Heavy Lifting Cargo terminal development	A heavy lifting cargo terminal located adjacent to the Project may contribute to cumulative impacts on air quality, noise levels and traffic through increased cargo handling activities, heavy equipment operation, and truck and vessel movements. Construction activities may also affect water and sediment quality, while operational activities could increase waste generation and the risk of spills. Given its proximity to the Project, the combined developments may increase pressure on navigational

Name	Distance to the LCT Area (Distance from Block C centre)	Project Owner	Status	Project activity summary and future plans	Potential environmental impacts on the VECs
					safety, road traffic, community health and safety and, where marine infrastructure is involved, aquatic habitats and fisheries resources.

8.5.4 Management of Cumulative Impacts

This final stage of the CIA focuses on the management of significant cumulative impacts identified for the valued environmental and social components (VECs). The objective is to ensure that cumulative risks associated with the Project and other existing, planned and reasonably foreseeable developments are effectively addressed through the application of the mitigation hierarchy, adaptive management and collaboration with relevant stakeholders.

The Project will apply the mitigation hierarchy by seeking, where practicable, to avoid, minimise, restore and offset cumulative impacts through project design as well as construction and operational controls. Project-specific mitigation and monitoring measures are presented in Chapter 9 of this ESIA Report; however, cumulative impacts often arise from the combined influence of multiple developments and cannot always be effectively managed by a single project acting alone. In such cases, cooperation and coordination with other project proponents, terminal operators, industrial facilities, government authorities and other relevant stakeholders will be essential.

Given the concentration of port, industrial, logistics and infrastructure developments within the Karnaphuli River area, cumulative impact management will focus particularly on river morphology and hydrodynamics, water and sediment quality, air quality, noise, aquatic ecology, fisheries resources, navigation and vessel traffic, road traffic, community health and safety, and other identified VECs. The Project will actively engage with relevant authorities and neighbouring developments, where feasible, to facilitate the exchange of environmental and operational information, promote coordinated planning, and support the implementation of regional environmental management initiatives.

Where project-level mitigation alone is insufficient to prevent unacceptable cumulative impacts, the Project will seek opportunities to participate in broader management and monitoring programmes. These may include coordinated approaches to dredging management, water quality monitoring, vessel traffic management, navigational safety, air quality and noise management, biodiversity protection and community engagement. The Project will also support the sharing of monitoring information, where appropriate, to improve understanding of cumulative effects and the effectiveness of management measures.

Recognising that future developments and environmental conditions may change over time, the CIA will be subject to periodic review and adaptive management. The status of nearby developments and any significant changes in project design, operational activities, environmental conditions or regional development plans will be monitored throughout the Project lifecycle. Where new information indicates the potential for additional cumulative impacts, the CIA will be updated, and appropriate mitigation and management measures will be reviewed and revised accordingly.

Through the implementation of project-specific mitigation measures, active stakeholder engagement, regional cooperation, monitoring and adaptive management, the Project will seek to

minimise its contribution to cumulative impacts and support the sustainable development of the Karnaphuli River area.

9 Environmental and Social Mitigation and Enhancement Measures

This section presents a summary of the principal mitigation measures proposed to avoid, minimise, mitigate or compensate for the environmental and social impacts identified for the Project. The discussion that follows focuses on the most significant impacts and the corresponding management measures for each project phase. Comprehensive details of all mitigation and management measures, together with associated responsibilities and implementation arrangements, are subsequently provided in Chapter 11 in Table 11-1, Table 11-2, and Table 11-3 for respectively the pre-construction, construction and operation phases. During the construction phase, LCT Ltd. shall ensure that all environmental and social mitigation measures and monitoring requirements identified in the ESIA are implemented through its contractors, consultants and construction supervision arrangements. LCT Ltd. shall oversee, verify and assure the effective implementation of these measures to avoid, minimise and mitigate adverse impacts and to enhance positive environmental and social outcomes.

During the operational phase, LCT Ltd. shall be responsible for implementing and maintaining the environmental and social mitigation measures and monitoring programmes applicable to terminal operations, including the ongoing assessment of performance and the implementation of any corrective actions required to manage impacts and achieve compliance obligations.

Environmental and social monitoring is covered in Chapter 10 of this ESIA Report.

9.1 Key impacts and related measures

9.1.1 Joining Block-B and Block-C over the existing drainage channel (Khal No. 14) may cause upstream drainage congestion during monsoon

The Project proposes to connect Block B and Block C by covering the existing section of *Khal 14* with a landfill and replacing the channel with a box culvert. Although the hydraulic modelling indicates that the proposed culvert arrangement is not expected to result in a material increase in flood extent or flood depth at the catchment scale, the conversion of an open drainage channel into a covered culvert introduces several risks that require specific design, operational and maintenance measures. These risks relate to potential drainage congestion, loss of channel storage volume, restricted maintenance access, sediment accumulation and stakeholder concerns regarding waterlogging. It should be noted that LCT Ltd. is in continuous contact with BWDB to align their detailed design process with the requirements from BWDB.

To evaluate potential impact of drainage, the design of the proposed culvert shall be informed by an engineering assessment supported by hydraulic calculations. The assessment shall demonstrate that the proposed fill, culvert dimensions, invert levels and associated drainage infrastructure do not increase upstream water levels, waterlogging duration, extent or drainage congestion under relevant rainfall and tidal conditions. The assessment should also show the

different pre- and post-project conditions in the scenario that the sluice gate is closed, and the pumps are draining the stormwater drainage. This scenario presents the case where the retention in the drainage channel that is currently there cannot be used, and the system depends on the retention capacity of the new culvert between the Airport Road and the sluice gate. Wherever feasible, the design should seek not only to maintain the existing drainage performance but also to improve hydraulic conditions within the catchment. If additional waterlogging or conveyance restrictions are identified during the modelling in the design process, the culvert configuration, dimensions or associated drainage measures shall be revised and reassessed through an updated engineering assessment supported by hydraulic calculations before construction proceeds.

Particular consideration shall be given to the interaction between the proposed culvert and the existing hydraulic constraints within the drainage system. The modelling indicates that the existing culvert under Airport Road represents the principal hydraulic bottleneck within the upstream catchment and currently limits drainage conveyance before runoff reaches *Khal 14*. Consequently, the proposed *Khal 14* culvert is not expected to become the controlling hydraulic restriction provided it is designed in accordance with the model assumptions. However, local communities already experience recurrent waterlogging and may perceive the covering of *Khal 14* as the cause of future waterlogging issues irrespective of the actual hydraulic performance.

The Contractor shall install and maintain automated water level monitoring equipment upstream of the *Khal 14* regulator/culvert during both construction and operation to verify actual water level conditions, validate hydraulic modelling assumptions and identify any adverse changes in drainage performance. Monitoring results shall be regularly reviewed against baseline conditions and model predictions, with investigations and corrective actions undertaken where elevated water levels, flooding, waterlogging or drainage congestion are identified. In addition, routine inspections of upstream drainage channels, culverts and accessible manholes shall be conducted to identify sediment accumulation, debris build-up, standing water, overtopping, backwater effects and other indicators of restricted flow. Where inspections reveal persistent ponding, elevated upstream water levels or drainage constraints associated with the *Khal 14* crossing and related drainage infrastructure, further hydraulic assessment and appropriate corrective measures shall be implemented.

The proposed drainage design shall also ensure that adequate provisions are incorporated for long-term inspection, maintenance and emergency intervention. Unlike the existing open channel, the proposed covered section will have limited physical access once terminal operations commence. Therefore, appropriately spaced inspection and maintenance manholes shall be incorporated into the culvert design and made accessible through the terminal deck. These access points shall allow routine inspections, monitoring of sediment accumulation, blockage identification and maintenance activities. The final arrangement shall be agreed with and approved by the competent authority (BWDB or CCC) and other relevant stakeholders, prior to commencement of construction.

Operational procedures shall facilitate periodic inspection and cleaning of the covered culvert by the responsible authority throughout the life of the Project. Access requirements, inspection frequencies, maintenance responsibilities and safety procedures should be formally defined in maintenance agreements and standard operating procedures. The culvert and associated access arrangements shall be designed to allow maintenance activities to be undertaken safely without disruption to terminal operations. Additionally, trash racks or similar structures upstream of the culvert could be installed to prevent clogging

Unrestricted access to the existing sluice gate and pumping station shall be maintained throughout construction and operation. These structures form critical components of the drainage management system and are required to regulate water levels during tidal conditions and rainfall events. Construction activities shall therefore be planned to avoid disruptions to gate operation, pump operation, inspections and emergency maintenance. Permanent access routes shall remain available for BWDB or CCC personnel and other authorised operators at all times.

To avoid increasing runoff into the upstream *Khal 14* drainage system, the drainage from the terminal plots shall be designed as a separate stormwater system. Runoff from Block B and Block C shall, as far as technically feasible, be discharged downstream of the *Khal 14* regulator or directly to the Karnaphuli River, rather than into the upstream section of *Khal 14* that drains the surrounding catchment. Any direct discharge to the river shall include appropriate stormwater treatment, such as sediment traps and oil-water separators where required.

9.1.2 Piling will generate underwater noise which impacts dolphins

Pile installation is one of the most significant construction activities from an ecological perspective due to its potential to generate underwater noise and vibration that exceed background levels. Depending on the piling method adopted, underwater noise may propagate considerable distances through the Karnaphuli River and adjacent coastal waters, potentially extending downstream into coastal habitats and upstream as far as Gupta Bend. The principal receptors of concern are the Ganges River dolphin (*Platanista gangetica*) and the Irrawaddy dolphin (*Orcaella brevirostris*), both of which rely heavily on acoustic signals for navigation, communication and prey detection in the naturally turbid waters of the estuary. Elevated underwater noise may interfere with echolocation, cause avoidance behaviour, temporarily displace animals from preferred habitats and potentially restrict movement through important river corridors. Fish species may also be affected through behavioural changes, avoidance of active work areas and temporary disruption of migration routes and feeding patterns.

The management of underwater noise from piling shall follow the mitigation hierarchy, with priority given to avoiding and reducing noise generation at source.

At this stage, the specific pile installation methodology has not been finalized and will be determined by the appointed Contractor based on detailed design, ground conditions, constructability considerations and equipment availability. A combination of vibratory pile driving

and impact hammering may be adopted, with vibratory methods potentially being used for the initial sections of pile installation within the softer near-surface sediments, followed by impact hammering to achieve the required penetration and bearing capacity. The relative proportion of vibratory and impact installation remains to be confirmed. Consequently, the underwater noise assessment has been undertaken on a precautionary basis, assuming the potential use of impact piling, while allowing the Contractor flexibility to select and justify the final installation methodology.

Regardless of the method selected, the Contractor shall demonstrate through design studies, underwater noise modelling and, where necessary, field verification measurements that the adopted piling approach and associated mitigation measures will not exceed the adopted underwater noise disturbance threshold of 145 dB SELss at approximately 200 m from the piling source. This threshold is based on studies of harbour porpoise (*Phocoena phocoena*) (Lucke K, 2009), a very high-frequency (VHF) cetacean, and is therefore considered the most appropriate available threshold for the Ganges River dolphin, which also possesses VHF hearing capabilities. The 200 m distance is based on the local river bathymetry and considers the river width after Project implementation, ensuring that a corridor remains available for dolphin movement without exceedance of the 145 dB SELss threshold. Where compliance cannot be demonstrated through the selected installation methodology alone, the Contractor shall incorporate appropriate noise attenuation, management measures and monitoring programmes, to achieve the required performance standard.

To verify compliance with this threshold, underwater noise monitoring shall be undertaken before (to establish background levels) and during piling activities, with measurements collected at locations including approximately 200 m from the piling source to confirm that received noise levels remain below the adopted disturbance criterion. This threshold has been adopted to minimise behavioural disturbance to the most sensitive aquatic receptor and is consistent with the application of marine mammal noise assessment methodologies described in the Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (National Marine Fisheries Service, 2024).

Compliance with this threshold shall be demonstrated through site-specific underwater acoustic modelling undertaken during construction planning. The modelling shall consider the proposed pile installation method, local bathymetry, water depths, sediment characteristics, tidal influences, any noise attenuation methods and sound propagation conditions within the Karnaphuli River and estuary. The selected construction methodology shall be supported by acoustic modelling demonstrating that underwater noise levels remain below the adopted threshold of 145 dB SEL_{ss} up to 200 m from the piling source. This source-control approach shall be prioritised over mitigation measures that rely on managing exposure of receptors after noise has already been generated.

Where acoustic modelling demonstrates that the adopted threshold can be achieved through the selected pile installation methodology or using noise attenuation methods, the Contractor shall

implement the proposed method and undertake verification monitoring during the installation to confirm compliance with modelled predictions.

Prior to commencement of piling works, the Contractor shall prepare and a MMMP for approval by LCT Ltd. This document shall present the selected pile installation methodology, underwater noise modelling results, mitigation measures, monitoring requirements, roles and responsibilities and adaptive management procedures. The MMMP shall focus on the protection of Ganges River dolphins as the most sensitive receptor within the Project Area of Influence. As the mitigation measures required to protect Ganges River dolphins are expected to be equally protective for Irrawaddy dolphins, fish populations and other aquatic fauna, separate underwater noise mitigation measures for these receptors are not anticipated to be necessary. The MMMP shall specifically address the peak calving season of the Ganges Dolphin during the months of April, May and June, when calves are dependent on the communication with their mothers through echolocation. Potential additional mitigation measures should be taken during this season to ensure that the noise limit is not exceeded in any location where a dolphin could occur.

Where modelling indicates that the disturbance threshold may still be exceeded, or where uncertainty remains regarding potential impacts on the Ganges River dolphin, the MMMP shall incorporate additional mitigation measures consistent with international good practice, including application of the JNCC guidelines[32] for minimising the impacts of underwater noise on marine mammals. These measures may include the establishment of exclusion zones around active pile installation methods locations, deployment of Marine Mammal Observers (MMOs), use of Passive Acoustic Monitoring (PAM) systems to supplement visual observations, deployment of Acoustic Deterrent Devices (ADDs) where appropriate, implementation of soft-start or ramp-up procedures, tidal restrictions and other project-specific controls identified through the risk assessment process.

Exclusion zones shall be established around pile installation operations based on the noise disturbance threshold of 145 dB SELss and the results of acoustic modelling. Piling or the alternative installation method shall not commence when dolphins are observed within the designated exclusion zone until the animals have voluntarily moved away and the area is clear of dolphins for 30 minutes. Particular attention shall be given to maintaining movement corridors for dolphins during piling activities. Prior to the commencement of piling, monitoring shall confirm that no Ganges River dolphins are present downstream of the Project area, where piling noise could restrict movement towards upstream freshwater habitats. Likewise, no Irrawaddy dolphins should be present upstream of the Project area, where piling noise could impede movement towards downstream estuarine and coastal habitats. If dolphins are observed in these locations, piling shall be delayed until the animals have moved clear of the affected area. Given the naturally turbid conditions within the Karnaphuli River and estuary, visual observations may not always be sufficient. Therefore, PAM should be used in conjunction with MMO to improve detection of dolphins.

[32] *Statutory nature conservation agency protocol for minimising the ris of injury to marine mammals from piling noise*

Where appropriate and approved as part of the MMMP, Acoustic Deterrent Devices (ADD) may be deployed prior to piling commencement, next to the piling location, to encourage dolphins to move away from the area before exposure to elevated noise levels. Similarly, a soft-start or ramp-up procedure of at least 20 minutes (following JNCC 2010) shall be implemented where technically feasible to provide dolphins and other mobile aquatic fauna with an opportunity to leave the area before full piling energy is reached.

The Project shall adopt an adaptive management approach whereby mitigation measures are reviewed and adjusted based on monitoring results and observed dolphin behaviour. If monitoring indicates that impacts are greater than predicted, additional mitigation measures shall be implemented[33]. While the Project will implement avoidance and mitigation measures to minimise impacts on Ganges River dolphins, it is recognised that residual impacts may remain due to underwater noise, vessel movements and other Project activities. Therefore, the project may explore opportunities, in consultation with relevant authorities and conservation organisations, to support Ganges River dolphin conservation initiatives within the Karnaphuli-Halda river system, or to share environmental monitoring data and lessons learned that could contribute to broader understanding of Ganges River dolphin ecology and conservation within the Karnaphuli-Halda river system. Any such initiatives would be voluntary, supplementary to the Project's mitigation commitments, and subject to agreement with the relevant institutions.

9.1.3 Residual impact from past physical and economic displacement of households from the project site

Over a period of approximately 50 years, the Laldia Char site was informally occupied by thousands of households lacking formal land titles. Three successive court-directed land clearance operations resulted in the removal of these households: Block B in 2005 (approximately 500 households), Block A in 2019 (approximately 250 households), and Block C in March 2021 (726 households according to 2016 data, although media reports suggest the actual number was considerably higher). In total, an estimated 6,000 or more people were physically displaced. LCT Ltd. is committed to implementing the Social Assistance Program (SAP) in partnership with CPA to address the potential residual impacts associated with historical land clearance within the concession area. The SAP is a contractual obligation designed as a retroactive Resettlement Action Plan (RAP). The SAP does not seek to retroactively comply with all procedural requirements of a pre-displacement RAP; rather, it focuses on corrective assistance, livelihood restoration, and vulnerability mitigation for displaced households. The SAP will be developed through a structured process involving stakeholder engagement, eligibility verification, grievance management and independent oversight. The program will provide appropriate assistance and support to eligible affected persons, with particular consideration for vulnerable groups and will seek to contribute to improved social and livelihood outcomes where feasible.

[33] *MANAGEMENT PLAN FOR THE GANGES RIVER DOLPHIN IN HALDA RIVER OF BANGLADESH | United Nations Development Programme*

The Program Elements of the SAP are:

- **Household Identification and Socio-Economic Profiling;** including a census of all PAPs across Blocks A, B and C. The process must reconstruct the affected population as accurately as possible. A vulnerability assessment must identify households facing economic hardship, gender-based disadvantages, disability, chronic illness, or social exclusion and these households must be prioritized for tailored support.
- **Residual Displacement Impact Assessment;** a detailed assessment of ongoing impacts resulting from past clearances, including physical displacement and housing loss, livelihood disruption, reduced access to essential services, social fragmentation, and economic vulnerability.
- **Socio-Economic Needs Assessment;** assessment of current household needs, income levels, and vulnerabilities to inform the design of targeted assistance.
- **Entitlement Framework and Compensation;** linking categories of affected persons and types of losses to the assistance provided.
- **Cut-Off Date;** Block-wise land clearance dates serve as the primary cut-off dates for eligibility
- **Stakeholder Engagement Plan;** specific for the purpose of the SAP
- **Grievance Mechanism (GM);** a dedicated part for the SAP in the existing GM.
- **Implementation Plan;** A time-bound implementation plan defining institutional roles (APMT, CPA, SAP Consultant, IEA, fiscal agent), resource allocation, budget, staffing, and coordination mechanisms.

9.1.4 Loss of river crossing boat operations at *Ghat 14*

The Project proposes to connect Block B and Block C by infilling the existing channel at *Ghat No. 14* and replacing it with a box culvert. As a result, the relocation of the river crossing boat currently operating at *Ghat No. 14* is unavoidable, leading to adverse impacts for users of this crossing service. The closure and relocation of the river crossing at *Ghat No. 14* will require approximately 3,000 daily users to adapt to revised travel routes and access arrangements. This may result in increased travel time and reduced convenience for some users accessing workplaces, schools and other livelihood-related activities. The Project shall implement appropriate measures to minimize disruption and maintain safe and reasonable accessibility for affected river crossing users throughout the transition period.

To address these potential impacts, engagement with the CCC is required to identify the most appropriate alternative arrangements and compensation measures for the affected communities and river crossing users. For example, the Project should share relevant information with the responsible authorities regarding anticipated changes in travel patterns due to the removal of the bus stop and the *Ghat no. 14*, to support their consideration of any measures that may be required to maintain safe accessibility and connectivity for affected users through alternative, safely designed crossing locations.

It is proposed to relocate the river crossing from *Ghat no. 14* to *Ghat no. 12* and *Ghat no. 15*, and to connect these two ghats to the original destinations of the displaced river crossing boat; 1) *Ghat*

no. 14 – East Side Boat Landing Station and 2) Marine Academy Jetty and Boat Landing Station (see Figure 9-1:). This would create two additional crossing routes from *Ghat no. 12* and *Ghat no. 15*.

As a complementary measure, the conditions at *Ghats no. 12* and *no. 15* should be improved, the safety of the ghat infrastructure should be enhanced, including the provision of facilities that allow users to enjoy the river view. These improvements would also serve as compensation for the loss of the river view previously enjoyed on Block B by the workers of Incontrade and the communities.

Both measures should be implemented in close coordination with, and subject to the approval of, the CPA and CCC, as LCT Ltd. is not authorized to undertake activities outside the concession area.

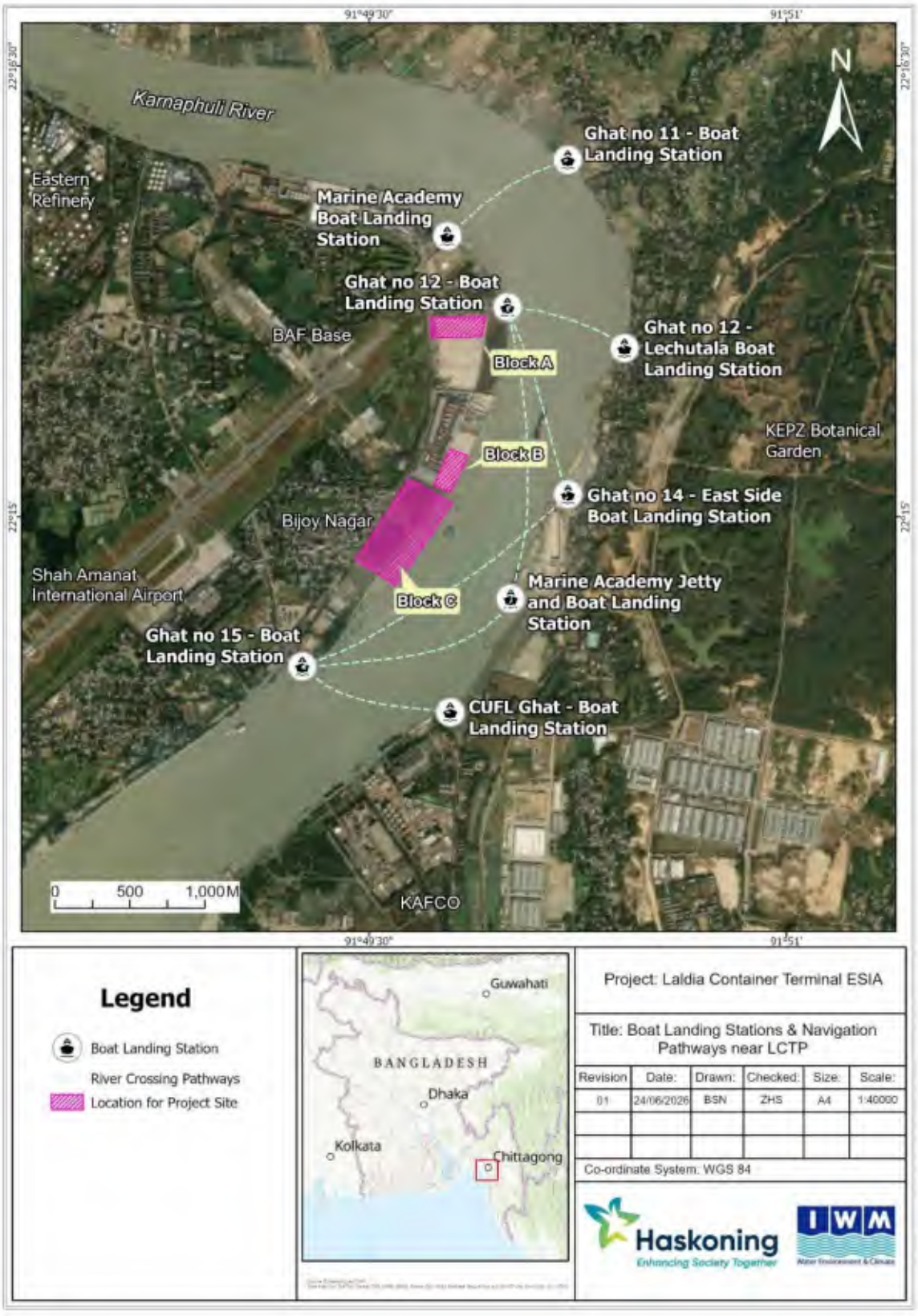


Figure 9-1: Suggestion for new river crossing pathways

9.2 Budget for Implementing the Mitigation Plan

A detailed budget is given in Chapter 11, section 11.12

10 Environmental and Social Monitoring Programme

10.1 Plan for Monitoring of Implementation of the Mitigation Measures (Pre-Construction, Construction and Operation Periods)

Ongoing monitoring of the physical, ecological and social environment within the Project site and surrounding area of influence is required. LCT Ltd. shall implement the monitoring programme described in this ESIA to verify impact predictions, assess the effectiveness of mitigation measures, identify any emerging issues and support adaptive management. Monitoring results shall be documented in periodic Environmental and Social Performance Monitoring Reports, which shall be submitted to the Department of Environment (DoE) in accordance with ECC requirements.

Environmental and social monitoring requires the establishment of measurable indicators that can be regularly monitored, assessed and evaluated over time to identify trends, detect changes from baseline conditions, and assess the effectiveness of mitigation and management measures.

Monitoring parameters, location and frequency for the VECs are given in Chapter 11 in Table 11-4, Table 11-5 and Table 11-6 for pre-construction, construction and operation phases, respectively.

10.2 Plan for Monitoring of the Project Impacts

Monitoring parameters, location and frequency for the VECs are given in Chapter 11 in Table 11-4, Table 11-5 and Table 11-6 for pre-construction, construction and operation phases, respectively.

10.3 Location of Mitigation Measures and Monitoring Site (Indicator Map and Photographs)

Mitigation Measures, Monitoring Locations and Indicative Maps are given in Table 11.1, 11.2, 11.3. Relevant photographs and Maps are given in Chapter 8, section 8.3.

10.4 Monitoring reporting

10.4.1 Monthly compliance reports

Contractor HSE Officers will prepare and submit a monthly compliance report which LCT Ltd. will consolidate with other relevant information for submission to DoE. The report will contain the compliance activities completed throughout the month and record the resolution of any issues that may have arisen. The reports shall contain the following information:

- Summary of compliance activities;
- The updated list of all ESHS issues that arisen during the reporting period;
- Follow up information on any past issues that are still being resolved;
- Photographs of project activities related to the implementation of ESMP mitigation measures.

10.4.2 Quarterly compliance reports

The Consultant will prepare and submit quarterly compliance reports to LCT Ltd., detailing the compliance activities completed during the period and tracking the resolution of any issues that may have arisen for the ongoing Project components. The Consultant will utilize the compliance checklists and monthly reports from the construction contractors to compile the quarterly report. The biannual report shall include the following information:

- Significant follow-up issues, actions, time frame and responsible parties;
- Introduction, reporting period and monitoring locations;
- Estimate of remaining construction and schedule;
- Summary of compliance activities;
- Progress made in ESMP implementation including key monitoring indicators such as waste management, health and safety practices, dust and noise control, water quality, environmental incidents and accidents, environmental awareness and training conducted, etc.;
- Site visits or other oversight activities by the consultants;
- The updated list of all ESHS incidents occurred during the project, including attached notices of non-compliance issues;
- Follow up information on any outstanding issues that are still being resolved.

10.5 Budget for Implementation of Environmental Monitoring Program

A detailed budget is given in Chapter 11, section 11.12

10.6 Methods and Schedule for Results review or Annual Auditing

To ensure transparency and ESMP compliance, an annual audit report of the project will be prepared by an independent third-party consultant. It will provide an independent or management-level assessment of the overall effectiveness of the ESMP and compliance over the entire year. It should evaluate trends, verify whether corrective actions have been effective, and identify improvements for the coming year.

Monitoring activities provide evidence for assessing the implementation and effectiveness of mitigation measures. A single monitoring parameter may be used to verify compliance with multiple mitigation measures where these measures address the same impact pathway or environmental or social receptor. Compliance scores shall therefore be assigned to individual mitigation measures.

The report can be organised under the following key sections:

- Executive Summary – key findings, overall compliance status, major issues identified, and main recommendations.
- Introduction and Audit Scope – audit objectives, reporting period, methodology, audit criteria (ESMP, permit conditions, national regulations, lender requirements), and areas audited.
- Project Overview – summary of project activities undertaken during the year and any significant changes to operations or construction activities.

- ESMP Implementation and Compliance – assessment of implementation of mitigation measures and compliance with legal requirements, permit conditions, and ESMP commitments.
- Environmental and Social Performance – summary of key monitoring results and performance trends, including waste management, air quality, noise, water and sediment quality, biodiversity, occupational health and safety, community health and safety, grievances, and stakeholder engagement.
- Incidents, Non-Compliance, and Corrective Actions – summary of environmental and social incidents, complaints, non-conformities, corrective actions taken, and status of outstanding issues.
- Conclusions and Recommendations – overall effectiveness of the ESMP, key lessons learned, improvement measures, and priorities for the following year.

11 Environmental and social management plan

11.1 Overview

This section provides the framework used to prepare the environmental and social management plan (ESMP) for the Project to mitigate potential negative environmental and social impacts, which may occur as a result of Project activities. This chapter also specifies the Contractor's and Operator's environmental obligations in performing the works to be carried out under the project. The methodology followed for preparing the ESMP consists of the following steps:

- Deriving mitigation/protection measures for identified impacts for each of the project activity and environmental component;
- Developing a mechanism (institutional arrangement) for monitoring the proposed mitigation measures;
- Estimating budget requirements for implementation mitigation and monitoring measures;
- Identifying responsibilities of various agencies involved in the Project for implementation, and
- Monitoring of mitigation measures.

The key components of ESMP are summarized below and each of these components is explained in detail in the following subsections:

- Mitigation plan
- Monitoring plan
- Management plans
- Enhancement plan
- Institutional arrangement
- Capacity building
- ESMP cost
- Residual impacts

11.2 Environmental impacts and mitigation measures

The (ESMP has been developed for the Project, aimed at mitigating potential environmental and social impacts arising from project activities. It also presents the roles and responsibilities of different parties in executing the project works; the implementation schedule; capacity building needs; and budget estimates for implementing the ESMP. The impacts and risks and related mitigation and enhancement measures for each VEC are presented in the tables below (Table 11-1, Table 11-2, and Table 11-3); and the monitoring of the VECs is included in Table 11-4 through Table 11-6.

Table 11-1: Environmental and Social Mitigation Measures during Pre-construction Phase

VEC	Impact / Risks on VEC	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD)	Timing of implementation of measures
Drainage hydrology	Demolition debris, removed topsoil may enter the water in the *khal* and block the drainage function	Moderate	The contractor shall maintain the drainage channel and sluice gate in a continuously unobstructed condition by preserving full hydraulic capacity, prohibiting storage of construction materials or waste within the drainage corridor, and installing appropriate containment and sediment-control measures to prevent rainfall runoff from transporting debris into the channel.	Negligible	Contractor	No additional cost	During pre-construction
			The contractor shall inspect the drainage channel, sluice gate, and associated infrastructure regularly and after storm events. Any debris, sediment accumulation, blockage, damage or condition that may restrict drainage performance shall be removed or rectified promptly. Where inspections identify restricted flow, sediment accumulation, blockage, flooding, ponding or drainage congestion attributable to construction activities, the Contractor shall investigate the cause and implement corrective actions		Contractor	No additional cost	During pre-construction
Water and sediment quality	Demolition waste may adversely affect river water and sediment quality if not properly managed, disposed of, or reused	Minor	Ensure that demolition debris is removed from active work areas on a daily basis, segregated and transferred to designated waste storage or consolidation areas. Debris shall be managed, recycled, reused or disposed of at approved waste management facilities at a frequency sufficient to prevent accumulation, maintain good housekeeping standards and prevent pollution of drainage channels, watercourses and the surrounding environment.	Negligible	Contractor	No additional cost	During pre-construction
			Provide bunding around areas where liquid waste may be generated to prevent leaking into river system.		Contractor	No additional cost	During pre-construction
			Ensure that appropriate clean-up materials are always available on site and that workers are familiar with their use.		Contractor	No additional cost	During pre-construction
			Any spillages to be cleaned up immediately.		Contractor	No additional cost	During pre-construction, at the time of the spill
Ambient Air Quality	Dust emissions generated by demolition activities associated with the preconstruction phase of the project, have the potential to cause nuisance	Minor	Implement a Dust Management Plan for demolition activities incorporating water spraying, speed restrictions, covered loads, wheel washing, stockpile management, and housekeeping to minimise dust generation and off-site migration. Dust suppression measures shall be maintained throughout demolition works and adjusted in response to site conditions, weather conditions, monitoring results and observed dust emissions.	Minor	Contractor	No additional cost	During pre-construction, during demolition activities
			Conduct PM_{10} monitoring at site boundaries and nearby sensitive receptors, and implement corrective actions where concentrations reach 25% of the Bangladesh 24-hour ambient air quality standard (37.5 µg/m³) or indicate a risk of exceeding the Bangladesh 24-hour PM_{10} standard of 150 µg/m³. Monitoring, corrective actions and community complaints shall be recorded and reported monthly.		Contractor	Included in the construction budget	During pre-construction, during demolition activities
Livelihood, health and safety of communities	Economic displacement of Shops, Restaurants, Waste Segregation Activities and Workers' Sheds before start of construction.	Major	**Applicable for all economic displacement impacts for different groups and locations as given below** Avoid economic displacement as much as possible in the design and location of the components of the project (such as with associated facilities like the routing of electricity supply, even though the LCTP may not have any direct management control over the implementation of these associated facilities).	Moderate	LCT Ltd.	No additional cost	During pre-construction
			Applicable for all economic displacement impacts for different groups and locations as given below Establish and maintain a grievance mechanism for economically displaced persons to record, track, investigate, and resolve concerns related to relocation, compensation, business interruption with defined response timeframes, documented outcomes, and regular monitoring of grievance resolution effectiveness.		LCT Ltd.	Depends on the number of affected households	During pre-construction and to be followed up all-throughout the Project lifecycle
			Applicable for all economic displacement impacts for different groups and locations as given below Provide compensation and reasonable support for demonstrable and verified relocation costs, temporary business interruption, and proven loss of income directly attributable to Project activities, including assistance to re-establish businesses or alternative income-generating activities where required. Compensation should be in accordance with applicable Bangladesh legal requirements and established local practice for economic displacement.		LCT Ltd.	Depends on the number of affected assets and households and whether displacement occurs	During pre-construction
			In addition, communicate the cut-off date clearly and in a timely manner to affected persons. Develop and implement a Business Relocation Support Plan to facilitate relocation of affected businesses and activities, provide reasonable assistance to re-establish operations at alternative locations, and compensate demonstrable relocation costs and temporary business interruption losses where applicable.		LCT Ltd.	Costs are dependent on the number of PAPs	During pre-construction

VEC	Impact / Risks on VEC	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD)	Timing of implementation of measures
	Economic displacement of Artisanal Fishers and Fishing Structures at Block C and in the drainage channel before start of construction.	Major	Identify and engage affected fishers prior to displacement, establish alternative fishing access or relocation arrangements where feasible, and provide compensation for demonstrable temporary losses directly attributable to Project activities.	Moderate	LCT Ltd.	No additional cost	During pre-construction
	Relocation of mooring buoy in front of Block C and associated Economic displacement of CPA Mooring Buoy and Associated Vessel Uses before start of construction.	Moderate	Coordinate with CPA and affected users to relocate the mooring buoy to a CPA-approved alternative location prior to construction activities affecting the existing buoy location. Prior to relocation, undertake an HSSE assessment of the proposed location to confirm its suitability with respect to navigational safety, marine operations, environmental protection and emergency response requirements. Ensure that the relocated buoy maintains operational functionality and continuity of vessel operations, bunkering activities, navigational safety and emergency access requirements.	Minor	CPA	No additional cost	Prior to construction.
	Economic displacement caused by Utility Routing (Electricity, Water and Sewer Connections) before start of construction. Physical displacement is avoided.	Major	Avoid economic displacement as much as possible in the design and location of the components of the project (such as with associated facilities like the routing of electricity supply, even though the LCTP may not have any direct management control over the implementation of these associated facilities).	Moderate	Contractors for the water supply and electricity cabling works and LCT Ltd.	No additional cost	During pre-construction
			Minimise economic displacement through routing optimisation during detailed design, undertake stakeholder consultation once alignments are confirmed, and provide appropriate compensation and relocation assistance for any demonstrable temporary economic losses caused by utility installation works.		Contractors for the water supply and electricity cabling works and LCT Ltd.	Depends on the number of affected assets and households and if temporary displacement	During pre-construction and to be followed up all throughout the Project life
			For temporary impacts associated with utility installation works, and where avoidance is not possible, affected people be given the option to return to the same location after construction or relocate nearby, and be able to retrieve and move all their assets.		Contractors for the water supply and electricity cabling works and LCT Ltd.	No additional costs	After the specified works are finalized
	Access to the blocks is restricted with additional (temporary) fencing and security personnel, affecting leisure activities on the blocks (e.g. playing cricket, kiting, enjoying the river view) for both the local community and workers at Incontrade.	Moderate	Allow Block B to be accessible to communities until construction activities commence in the area. Engage the communities at least 2 weeks before closure of the Block to manage expectations. The road north of Incontrade can continue to provide access to the northern part of Block B until such time when it will be closed for a third-party activity north of Block B use.	Minor	Contractor	No additional costs	During pre-construction
			Engage with Incontrade and its workers to understand the importance of the existing leisure area and vegetable gardens to worker wellbeing and food supply, and where the loss of access results in a demonstrable impact, identify and provide suitable alternative locations for recreation and community gardening, or alternative measures agreed with affected workers.		Contractor and LCT Ltd.	No additional costs	During pre-construction and construction
			In collaboration with the Chattogram City Corporation (CCC) and relevant local organisations, identify and provide access to suitable alternative recreational facilities for community members and support the organisation of sports and social activities (e.g., cricket and football) to maintain opportunities for recreation, social interaction, and community wellbeing.		Contractor and LCT Ltd.	6,000 USD	During pre-construction
	Job opportunities in security and fencing/wall construction	Moderate	Optimize local employment opportunities for security, fencing and wall construction activities by requiring contractors to source unskilled and semi-skilled workers from Chattogram wherever suitably qualified workers are available, while giving preference to workers from communities within the Project Area of Influence (AoI).	Moderate	Contactor and LCT Ltd.	No additional costs	During pre-construction and construction
	Residual impact from past physical and economic displacement of households from the project site	Major	Formulate and implement the retrospective Social Assistance Programme (SAP) to mitigate the impacts from past displacements.	Moderate	LCT Ltd.	Budget for SAP will be developed. LCT Ltd. is committed to implement the programme	SAP Plan to be implemented during construction and completed before Terminal operations. LCT responsibility.
River	Relocation of river crossing boat operations from *Ghat* no. 14 to other *ghats*	Major	Coordinate with Chattogram City Corporation (CCC), Chittagong Port Authority (CPA), boat operators and affected users to identify and implement suitable alternative river crossing arrangements following the	Moderate	LCT Ltd.	No additional costs	Prior to relocation of river crossing operations

VEC	Impact / Risks on VEC	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD)	Timing of implementation of measures
			closure of *Ghat* No. 14. Preference should be given to relocating services to *Ghats* No. 12 and 15 with connections to the existing landing points on the eastern bank to maintain or improve river crossing connectivity.				
			In consultation with the CCC, CPA and local communities, improve infrastructure and passenger facilities at *Ghats* 12 and 15, including safe access, waiting areas, lighting, weather protection and community spaces that allow residents and commuters to continue enjoying access to and views of the Karnaphuli River following the closure of *Ghat* 14.		LCT Ltd.	200,000 USD per *ghat*, so 400,000 USD in total	Prior to relocation of river crossing operations
			Provide compensation and transition support to boat operators and other parties adversely affected by the relocation of river crossing operations. Compensation shall be based on demonstrated and verifiable actual financial losses attributable to the relocation, including loss of income and additional operating costs in accordance with applicable legal requirements. The compensation and support shall be designed to ensure that the relocation does not require ferry operators to increase passenger fares solely as a result of Project-related increases in travel distance, operating costs or other relocation-related expenses. Normal fare adjustments driven by inflation, market conditions, fuel price fluctuations, regulatory changes or other factors unrelated to the Project may continue to occur.		LCT Ltd.	Dependent on the actual financial losses	During pre-construction, construction, and operation
	River crossing commuters using *Ghat* no. 14 need to use other *ghats* leading to longer travel times and potential increase in fares	Major	Coordinate with CCC and relevant transport providers to improve public transport access to *Ghats* No. 12 and 15, including suitably located bus stops, rickshaw stands and safe drop-off/pick-up areas to minimise additional travel time and inconvenience for river crossing users.	Moderate	LCT Ltd.	No additional costs	Prior to relocation of river crossing services
			Upgrade pedestrian access and crossing facilities at the entrances to *Ghats* No. 12 and 15, including appropriate signage, lighting, traffic calming measures, marked pedestrian crossings and other road safety measures to reduce the risk of traffic accidents for river crossing users.		LCT Ltd.	20,000 USD implementation and 5,000 USD coordination	Prior to relocation of river crossing services
			Coordinate with CCC and river crossing operators to provide safe, accessible and efficient replacement river crossing services, including consideration of vessels with improved safety features, reduced waiting times and enhanced accessibility for persons with disabilities, older persons, and other vulnerable users.		LCT Ltd.	Coordination costs 5,000 USD, implementation cost depend on the outcomes.	Prior to relocation of river crossing services
Construction and Operation workers	Occupational health and safety risks for workers for wall and fence construction	Moderate	Implement and maintain a contractor HSSE management programme for wall and fence construction activities that requires contractors to develop and implement HSSE procedures, safe work method statements, training, supervision and incident reporting processes.	Minor	Contractor and LCT Ltd.	No additional costs	During pre-construction
All VECs	Contractor is not sufficiently equipped and experienced to manage E&S risks	Major	Include relevant HSSE considerations in contractor selection and evaluation processes, taking into account the contractor's experience, resources and demonstrated capability to manage HSSE risks associated with construction activities in environments with environmental and social sensitivities. Require contractors to maintain adequate HSSE competence and resources commensurate with the nature, scale and complexity of the works and include appropriate HSSE requirements and obligations within construction contracts.	Minor	LCT Ltd.	No additional costs	Prior to pre-construction
			Construction contracts shall include appropriate HSSE requirements, obligations, performance expectations, reporting requirements and provisions for monitoring and managing HSSE risks associated with the works, including implementation of applicable commitments, mitigation measures and management plans arising from the ESIA and associated project environmental and social management documentation.		Contractor and LCT Ltd.	No additional cost	Prior to pre-construction
	The preparation of the detailed design and the method statements provide an important opportunity to incorporate the outcomes of the update of the ESIA into the project development to avoid, mitigate or enhance impacts and risks identified.	Moderate	Establish a process for coordination between the LCT Ltd. technical and HSSE teams, the appointed FIDIC Engineer and the Contractor's engineering design team to ensure that applicable ESIA commitments, mitigation measures and management plans are incorporated into the detailed design, construction planning and method statements.	Major	Contractor and LCT Ltd.	No additional cost	Prior to pre-construction

Table 11-2: Environmental and Social Mitigation Measures during Construction Phase

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
Drainage hydrology	Joining Block-B and Block-C over the existing drainage channel (Khal No. 14) may cause upstream drainage congestion during monsoon.	Major	The proposed *Khal* 14 culvert, fill placement and associated drainage infrastructure shall be subject to hydraulic and flood modelling to demonstrate that the works do not increase upstream water levels, flooding frequency, ponding, drainage congestion or conveyance restrictions during monsoon and other representative design storm events. The modelling shall compare existing and proposed conditions and demonstrate that the proposed design maintains or improves drainage performance relative to the existing situation. Where modelling identifies any increase in upstream water levels, flooding, waterlogging, ponding, drainage congestion or flow restrictions, the design shall be revised and re-modelled until compliance is demonstrated. LCT Ltd. shall continue consultation with the Bangladesh Water Development Board (BWDB) during the design development and review process. The Contractor shall install and maintain automated water level monitoring equipment upstream of the regulator/culvert to verify actual water level conditions during construction and operation and to support validation of the hydraulic modelling assumptions. Monitoring results shall be reviewed against baseline conditions and model predictions. Where monitoring identifies water levels or drainage conditions materially worse than those predicted, the cause shall be investigated and appropriate corrective measures implemented.	Minor	LCT Ltd/.PMSC	Part of construction cost. Design will comply with drainage requirements.	Design phase
			Confirm through hydraulic modelling that the proposed *Khal* 14 crossing, culvert and associated works do not increase upstream water levels, flooding frequency or drainage congestion relative to baseline conditions. The hydraulic modelling shall assess the effects of the proposed works under representative rainfall, monsoon and design flood events and compare existing and proposed drainage conditions. Where modelling identifies any increase in upstream water levels, flooding, ponding, surcharge conditions, drainage congestion or flow restrictions, the design shall be optimised and re-modelled before construction to demonstrate that the adverse effect has been eliminated or reduced to an acceptable level. The Contractor shall undertake routine inspections of upstream drainage channels, culverts and accessible manholes to identify drainage restrictions and verify drainage performance assumptions used in the hydraulic modelling. The Contractor shall inspect for sediment accumulation, debris build-up, standing water, overtopping, backwater effects and other evidence of restricted flow and undertake maintenance or corrective actions where required. Where inspections identify persistent ponding, elevated upstream water levels or evidence of drainage congestion attributable to the *Khal* 14 crossing or associated culverts, the Contractor shall undertake further hydraulic assessment and implement corrective measures.		LCT Ltd. and Contractor	Contract cost	During construction and operation
	Maintenance and operational access by the regulator/pump operator will be restricted during construction	Moderate	Include manholes in the culvert design that are accessible through the terminal deck for regular inspections. The design needs to be approved by the Bangladesh Water Development Board before any construction works start.	Minor	Contractor	Contract cost	Before construction
			The culvert design shall provide safe access for routine inspection, maintenance and cleaning. Terminal operations shall cooperate with and facilitate authorised inspection and maintenance activities, including implementing appropriate traffic management and work controls to ensure the safety of maintenance personnel		LCT Ltd.	Project costs	During construction and operation

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			The Contractor shall ensure that the sluice gate, pumping station, regulator structure and all associated access routes remain accessible at all times to authorised operations and maintenance personnel for inspection, operation, maintenance, cleaning and emergency response activities. Where construction activities have the potential to restrict access, the Contractor shall implement temporary access arrangements, traffic management measures and work controls to maintain safe and uninterrupted access throughout the construction period. Any temporary access restrictions shall be communicated in advance to the facility operator and shall not prevent operation of the drainage infrastructure during rainfall, flood or emergency events.		LCT Ltd.	Project costs	During construction and operation
River morphology	Dredging and land reclamation will cause localised changes to flow patterns and sediment transport, resulting in minor erosion and sedimentation in the vicinity of the project area. These changes are expected to remain limited in extent and will not affect the overall morphological stability of the Karnaphuli River.	Minor	The Contractor shall prepare and implement a Dredging and Reclamation Method Statement that is aligned with the approved Project Dredging Management Plan and permit conditions. The Method Statement shall describe the proposed dredging methodology, dredging sequence, equipment selection, sediment handling and disposal arrangements, measures to manage sediment plumes and erosion/sedimentation effects, environmental monitoring requirements and adaptive management actions to be implemented if monitoring identifies effects beyond those predicted in the ESIA. The Contractor shall undertake hydrographic bathymetric surveys of the approved dredging area before commencement of capital dredging and following completion of capital dredging. The Contractor shall conduct surveys using appropriately calibrated hydrographic survey equipment operated by a suitably qualified survey contractor. Survey data shall be processed to generate bathymetric charts, contour plots and digital terrain models and shall be compared against the approved dredging design levels and tolerances. The Contractor shall retain all survey data, maps, models and survey reports and shall document any deviations from the approved design. Where surveys identify over-dredging, under-dredging or other deviations from the approved design, the Contractor shall investigate the cause and implement corrective actions where required.	Minor	Contractor	Contract costs	Prior to and during construction
			The Contractor shall undertake and document visual riverbank condition inspections at monitoring locations located 500 m upstream and 500 m downstream of the construction area on the same riverbank as the Project works, or at alternative locations agreed with LCT Ltd where access or site conditions make these locations unsuitable. The Contractor shall install permanent survey markers or beacons at each monitoring location to enable inspections and photographic records to be undertaken consistently from the same locations and viewing directions throughout the construction period. The Contractor shall establish baseline conditions before commencement of dredging and construction activities through photographic documentation of the monitoring locations. Visual inspections shall be undertaken by a suitably qualified environmental representative from shoreline and, where appropriate, vessel-based vantage points. Geo-referenced photographic records shall be obtained during each inspection using a GPS-enabled camera, tablet or mobile device and compared against baseline conditions and previous monitoring records. Where safe and permitted, drone surveys should be undertaken to supplement visual inspections and provide aerial documentation of riverbank condition and sediment deposition patterns. The Contractor shall maintain inspection records, photographic evidence and supporting documentation and include the results in monthly environmental monitoring reports.		Contractor	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
Water and sediment quality	Site preparation, reclamation and ground improvement may result in runoff of sediments causing locally higher turbidity levels in the river locally	Minor	Where monitoring identifies significant Project-related riverbank erosion, bank instability, sediment deposition, sand bar formation or navigation obstructions, the Contractor shall investigate the cause and implement appropriate corrective measures. Undertake hydrographic surveys following completion of capital dredging and thereafter as required to verify predicted sedimentation rates and identify unexpected deposition or erosion. Runoff from earthworks, exposed soil surfaces and other sediment-generating construction activities shall be directed through appropriately sized sediment control measures, such as settlement ponds, sediment basins or equivalent treatment systems, where required by the drainage design and site conditions. These controls shall be designed, operated and maintained to reduce flow velocities and promote settlement of suspended sediments prior to discharge to the drainage system or Karnaphuli River. Accumulated sediment shall be inspected regularly and removed as necessary to maintain the design treatment capacity. Runoff from earthworks, exposed soil surfaces and other sediment-generating construction activities shall be directed through appropriately sized sediment control measures, including settlement ponds, sediment basins or equivalent treatment systems, where required by the drainage design and site conditions. The Contractor shall design, operate and maintain sediment control measures to reduce flow velocities and promote settlement of suspended sediments before discharge to the site drainage system, *Khal* 14 drainage channel or the Karnaphuli River. The Contractor shall inspect sediment control measures regularly and remove accumulated sediment as necessary to maintain the design storage volume and treatment capacity. The Contractor shall maintain all drainage channels, settlement structures, conveyance systems and discharge points in an effective operating condition throughout the construction period. Where water quality monitoring identifies deterioration attributable to construction runoff, the Contractor shall inspect sediment and erosion control measures, identify the cause and implement corrective actions without delay. The Contractor shall maintain records of inspections, maintenance, sediment removal activities, monitoring results and corrective actions and include these in environmental monitoring reports.	Minor	Contractor Contractor	Contract costs Contract cost	During construction During construction
	Untreated sewage spill may enter the river	Minor	The Contractor shall comply with the Laldia Container Terminal Waste Management Plan and implement waste management measures consistent with its requirements. The Contractor shall minimise waste generation, segregate waste at source, store waste in designated areas and ensure that waste is collected, transported, recycled, treated and disposed of through appropriately licensed and authorised facilities. The Contractor shall use only waste disposal and treatment facilities holding the required permits, licences and approvals. The Contractor shall maintain records demonstrating lawful waste transport, treatment and disposal and shall retain copies of all waste manifests, permits, licences and disposal receipts. Where monitoring identifies deterioration in water quality attributable to dredged material storage or disposal activities, the Contractor shall investigate the cause and implement corrective actions.	Negligible	Contractor and LCT Ltd.	Contract costs	Prior to and during construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			LCT Ltd. shall undertake due diligence reviews and periodic audits of waste contractors and waste management facilities. Where temporary sanitation, wastewater collection or treatment systems are required for construction activities, the Contractor shall install, operate and maintain such systems and ensure that treated effluent and sludge comply with the applicable requirements of the Environment Conservation Rules (ECR) 2023 before discharge or disposal. The Contractor shall collect, contain, convey and treat sewage through appropriately designed, constructed and maintained sanitation and wastewater infrastructure. Sewage collection, storage and treatment systems shall be routinely inspected and maintained to prevent leaks, overflows and unauthorised discharges. Any sewage spill, overflow or system failure shall be immediately contained, cleaned up and reported. The Contractor shall investigate the cause and implement corrective actions to prevent recurrence.		Contractor	Contract cost	During construction
			The Contractor shall implement the sewage collection, storage, treatment and disposal requirements of the Laldia Container Terminal Waste Management Plan and maintain records demonstrating compliance. The Contractor shall monitor and maintain records of sewage collection, storage, transport, treatment and disposal activities to verify that sewage is managed through approved facilities and in accordance with applicable regulatory requirements. Any deficiencies, spills, overflows or non-compliances identified during monitoring shall be investigated and corrective actions implemented promptly.		Contractor	Contract cost	During construction
	The construction materials on the land area may be washed away with surface runoff and deteriorate water quality of drainage canal and the Karnaphuli River	Minor	The Contractor shall store construction materials in designated storage areas located and managed to prevent materials, sediments, contaminants or runoff from entering water bodies, drainage channels or stormwater systems. Storage areas shall be maintained in a stable condition and appropriate containment or cover shall be provided where there is a risk of material loss, erosion, leakage or pollution.	Negligible	Contractor	Contract cost	During construction
			The Contractor shall cover, contain or otherwise protect stockpiles of soil, sand, aggregate and other fine materials susceptible to wind or water erosion to prevent off-site migration and sediment release. The Contractor shall install, inspect and maintain silt fences, sediment traps and temporary drainage controls, where required based on the location and nature of the works, to control sediment runoff and prevent the discharge of sediment-laden water to drainage systems, water bodies and adjacent areas.		Contractor	Contract cost	During construction
			The Contractor shall submit the proposed erosion and sediment control measures, including the location and design of silt fences, sediment traps, temporary drainage controls and other sediment management measures, to the Engineer for review and approval prior to installation. Following approval, the Contractor shall install, inspect and maintain the approved controls throughout the construction period and repair, replace or upgrade any controls that are damaged, ineffective or no longer suitable for the prevailing site conditions.		Contractor	Contractor cost	During construction
			The Contractor shall maintain good housekeeping standards across all work areas, including the prompt collection of waste, removal of surplus materials and proper storage of construction materials. Any spilled soil, aggregate, chemicals, fuels, cement, concrete or other materials shall be contained and cleaned up immediately and contaminated materials shall be collected and disposed of in accordance with the Laldia Container Terminal Waste Management Plan		Contractor	Contractor cost	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			The Contractor shall implement stormwater and erosion control measures to prevent sediments, construction materials and other pollutants from being transported by surface runoff into the drainage canal or the Karnaphuli River in line with Stormwater Management Plan. Measures shall include appropriate drainage controls, stabilisation or covering of stockpiles, designated material storage areas, inspection of runoff control measures after rainfall events and prompt rectification of any failures. Monitoring and management requirements shall be incorporated into the Contractor's Stormwater and Erosion Control Method Statement.		Contractor	Contract costs	Prior to and during construction
	Capital dredging will resuspend sediments and alter water quality parameters.	Moderate	The Contractor shall implement dredging activities in accordance with the Laldia Container Terminal Dredging Management Plan and all applicable permit conditions. The Contractor shall prepare and implement an Adaptive Dredging and Reclamation Method Statement that describes the proposed dredging methodology, equipment, sequencing of works, dredged material handling procedures, environmental controls, monitoring arrangements and corrective actions. The Method Statement shall be consistent with the requirements of the approved Dredging Management Plan. Prior to commencement of dredging and reclamation activities, the Contractor shall submit a Dredging and Reclamation Method Statement to the Engineer for review and approval. The Contractor shall undertake dredging activities in a manner that minimises sediment resuspension, sediment plume generation and deterioration of water quality. Where monitoring indicates unexpected deterioration in water quality attributable to dredging activities, the Contractor shall investigate the cause and implement corrective actions, which may include modification of dredging methods, sequencing of works, dredging intensity or other operational controls.	Minor	Contractor	Contract costs	Prior to and during dredging activities
			Prior to commencement of dredging campaign, the Contractor shall verify the chemical and physical characteristics of the sediments to be dredged in accordance with the project Dredging Management Plan and applicable regulatory requirements. The assessment shall confirm the suitability of the dredged material for the proposed reuse, beneficial use, transport and disposal option and shall be submitted to LCT Ltd. and the relevant authorities, as required, prior to commencement of dredging activities.		Contractor	Contract costs	During construction, prior to capital dredging
			Implement the Dredging Management Plan and associated environmental controls to minimise adverse effects on fisheries resources, including: limiting the duration and footprint of dredging activities where practicable; scheduling dredging to avoid sensitive fish breeding and migration periods where reasonably practicable and supported by Fisheries Department guidance; monitoring turbidity and suspended sediment concentrations during dredging and comparing results with model predictions; implementing adaptive management measures where monitoring indicates impacts materially greater than predicted; maintaining communication with local fishing communities and the Department of Fisheries throughout dredging activities; investigating and responding to fisheries-related grievances through the Project grievance mechanism; and implementing spill prevention and pollution control measures to prevent deterioration of water quality.		Contractor	The associated costs are covered under Fisheries Resources VEC Contract costs	During construction and prior to dredging

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			If monitoring indicates sediment concentrations substantially exceeding model predictions, unexpected fish mortality, significant fisheries grievances or evidence of project-related impacts on fisheries resources, the Contractor shall review dredging methods and implement corrective actions, including modification of dredging operations, equipment, sequencing or temporary suspension of activities where necessary.				
	Spills and leaks of fuel, grease, lubricants and other hazardous substances from equipment/ dredgers into surface or groundwater from construction and dredging equipment	Moderate	The Contractor shall ensure that all construction plant, dredging equipment and vehicles are maintained in accordance with the manufacturer's specifications and kept in a clean and serviceable condition. Equipment shall be routinely inspected for leaks, damage and signs of deterioration, with particular attention given to fuel systems, hydraulic systems, hoses, fittings and other components containing oils or fluids. Any leaks or defects shall be repaired promptly and defective equipment shall not be operated until repairs have been completed. Fuel storage tanks and temporary storage areas for fuels, lubricating oils, hydraulic fluids and other hazardous liquids shall be provided with secondary containment of sufficient capacity to contain potential spills and prevent releases to soil, surface water and drainage systems.	Minor	Contractor	Contract costs	During construction
			The Contractor shall undertake a risk assessment to identify locations where fuels, lubricants, hydraulic fluids and other hazardous substances are stored, transferred, used or refuelled. Based on the findings of the assessment, appropriate secondary containment shall be provided at locations where spills or leaks may occur. Spill response equipment and materials appropriate to the types and volumes of hazardous substances present shall be maintained at strategic locations identified through the risk assessment and shall be readily accessible at all times. Personnel responsible for handling hazardous substances or responding to spill incidents shall receive appropriate training in spill prevention, containment, clean-up and reporting procedures. All spills shall be contained and cleaned up promptly using appropriate spill response equipment and contaminated materials shall be managed and disposed of in accordance with the Laldia Container Terminal Waste Management Plan.		Contractor	Contract costs	During construction
			The Contractor shall develop and implement a Spill Prevention and Response Procedure that clearly defines roles, responsibilities, reporting requirements and response actions for spills and leaks of fuels, lubricants, hydraulic fluids and other hazardous substances. The Contractor shall undertake a spill risk assessment to identify locations where hazardous substances are stored, transferred, handled or used and shall provide appropriate spill response equipment and materials at these locations. Personnel responsible for handling hazardous substances or responding to spills shall be trained in spill prevention, containment, clean-up and reporting procedures. Spill response equipment shall be readily available at all times and all spills and leaks shall be contained, cleaned up and reported promptly.		Contractor	Contract costs	During construction
			The Contractor shall prepare and implement a Pollution Prevention and Control Method Statement describing the measures to prevent, detect, contain and respond to spills and leaks of fuel, oils, lubricants, chemicals and other hazardous substances associated with construction and dredging activities. The Method Statement shall include requirements for fuel storage, secondary containment, equipment inspection and maintenance, refuelling activities, spill response equipment, spill reporting, personnel training and corrective actions. The Contractor shall inspect construction plant, dredging equipment, fuel storage areas and transfer locations regularly and promptly repair any leaks or defects identified.		Contractor	Contract costs	Prior to and during construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			Appropriately sized spill response equipment shall be available at all fuel storage locations, refuelling areas, vessels, dredgers and other locations where hazardous substances are stored or handled. Any spill or leak shall be immediately contained, cleaned up, reported and investigated. The Contractor shall implement corrective actions to prevent recurrence.				
			The Contractor shall prepare and implement a Hazardous Materials Management Method Statement describing the procedures for the procurement, transport, storage, handling, use and disposal of fuels, oils, lubricants, chemicals and other hazardous materials required for the Works. The Method Statement shall identify hazardous materials used on site, storage requirements, secondary containment measures, inspection requirements, spill prevention controls, refuelling procedures, waste handling requirements, emergency response arrangements and corrective actions. Hazardous materials shall be stored in designated areas with appropriate secondary containment and protection from rainfall, flooding and unauthorised access. The Contractor shall maintain an inventory of hazardous materials on site and keep current Safety Data Sheets (SDS) available for all hazardous substances. The Contractor shall inspect hazardous material storage areas routinely and immediately rectify any deficiencies identified. Any leak, spill or unauthorised release of hazardous materials shall be immediately contained, cleaned up, reported and investigated. The Contractor shall implement corrective actions to prevent recurrence.		Contractor	Contract costs	Prior to and during construction
	Disposal of dredged materials may affect water quality in other locations, such as Char Bakalia	Moderate	The Contractor shall manage, transport, reuse and dispose of dredged material in accordance with the Dredging and Dredged Material Management Policy 2025, applicable permit conditions and the Dredging Management Plan. The proposed reuse or disposal location shall be submitted to CPA and other relevant authorities, as required, for review and approval prior to commencement of dredging activities. The Contractor shall maintain records of dredged material volumes, transport routes and final reuse or disposal locations.	Minor	Contractor	Contract costs	During construction
			The Contractor shall undertake a documented assessment of opportunities for the beneficial reuse of dredged material prior to commencement of dredging activities and include the assessment within the Dredging and Reclamation Method Statement. The assessment shall evaluate the suitability of dredged material for beneficial reuse having regard to geotechnical characteristics, material quality, engineering requirements, Project demands, environmental and social considerations, regulatory requirements and permitting constraints. Where the assessment demonstrates that dredged material is suitable for beneficial reuse and all necessary approvals can be obtained, the Contractor shall maximise beneficial reuse opportunities to the extent practicable before considering disposal. The Contractor shall provide clear justification within the Dredging and Reclamation Method Statement for any dredged material that is not proposed for beneficial reuse. Dredged material that is demonstrated to be unsuitable for beneficial reuse, or for which beneficial reuse is not reasonably practicable, shall be transported, handled, stored, reused or disposed of only at approved locations and in accordance with applicable permit conditions, regulatory requirements and the approved Dredging and Reclamation Method Statement.		Contractor	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			Prior to commencement of the capital dredging campaign, the Contractor shall verify the physical and chemical characteristics of the sediments to be dredged in accordance with the Dredging Management Plan and applicable regulatory requirements. The assessment shall confirm the suitability of the dredged material for the proposed reuse, beneficial use, transport or disposal option and shall be submitted to LCT Ltd., CPA and other relevant authorities, as required, prior to commencement of dredging activities.		Contractor	Contract costs	During construction
			The Contractor shall remove vegetation, roots, debris and any waste materials from the Block C site prior to earthworks and reclamation activities. Cleared vegetation, debris and waste shall be managed and disposed of in accordance with the Laldia Container Terminal Waste Management Plan. Suitable uncontaminated soil materials may be reused within the Project, where practicable and technically suitable.		Contractor	Contract costs	During construction
			The Contractor shall dispose of dredged material only at reuse or disposal locations approved by CPA and other relevant authorities, as required. Prior to commencement of dredging activities, the Contractor shall demonstrate that the proposed disposal or reuse location is suitable for the volume and characteristics of the dredged material and is managed in accordance with the Dredging Management Plan and applicable regulatory requirements. Records of dredged material quantities, transport and final disposal or reuse locations shall be maintained.		Contractor	Contract costs	During construction, prior to dredging
Ambient air quality	Emissions (SOX, NOX, CO, PM2.5) from vessels, vehicles, various types of construction equipment, and generators will impact air quality	Minor	The Contractor shall minimise air emissions from vessels, vehicles, construction plant, equipment and generators through appropriate equipment selection, preventive maintenance and efficient operation. The Contractor shall ensure that plant and equipment is maintained in accordance with manufacturer specifications and promptly repair equipment generating excessive exhaust emissions. The Contractor shall minimise idling of vehicles, generators and construction equipment when not in active use. The Contractor shall implement measures to reduce fuel consumption and associated emissions, including efficient work planning, optimisation of vehicle and vessel movements and avoidance of unnecessary equipment operation. The Contractor shall prepare and implement an Air Emissions Control Method Statement describing the procedures for equipment maintenance, emission inspections, management of excessive smoke emissions, idling controls, fuel management, monitoring requirements and corrective actions. The Contractor shall undertake continuous real-time monitoring of $PM_{2.5}$ and PM_{10} concentrations using calibrated ambient air quality monitoring equipment at designated monitoring locations. The Contractor shall conduct daily visual inspections for excessive exhaust emissions from vehicles, vessels, generators and construction equipment. The Contractor shall inspect equipment maintenance records, emission inspection records and idling control records to verify compliance with the requirements of the Air Emissions Control Method Statement. The Contractor shall review, record and investigate all air quality complaints and grievances. Where monitoring identifies elevated particulate concentrations, visible emissions or complaints attributable to construction activities, the Contractor shall investigate the cause and implement corrective actions to reduce emissions and prevent recurrence.	Minor	Contractor	Contract costs t	Prior to and during construction
			The Contractor shall maintain vehicles, construction plant, generators and dredging equipment in accordance with the manufacturer's specifications and shall not operate equipment that		Contractor	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			emits excessive visible exhaust emissions. Operators shall be trained to identify and report abnormal emissions, equipment defects and maintenance requirements. Engines shall be switched off when not in use, where safe and practical to do so, and unnecessary idling shall be minimised. Equipment identified as having emission-related defects shall be repaired promptly or removed from service until repairs have been completed.				
			Drivers and equipment operators shall be trained in fuel-efficient operating practices, including reducing unnecessary idling, avoiding excessive acceleration and ensuring vehicles and equipment are operated in accordance with the manufacturer's specifications to minimise fuel consumption and exhaust emissions.		Contractor	Contract costs	During construction
	Dust emissions generated by construction activities have the potential to cause nuisance	Moderate	The Contractor shall minimise dust generation from site clearance, vegetation clearing, earthworks, material handling, stockpiles, haul roads and vehicle movements. The Contractor shall minimise disturbance of exposed soil surfaces and limit vegetation clearing, earthworks, material handling activities and the extent of exposed soil to the minimum area required for the Works. The Contractor shall implement dust control measures, including enforcing speed limits on unpaved roads and construction areas, covering or otherwise securing vehicles transporting soil, sand, aggregate and other friable materials and controlling vehicle movements on unpaved surfaces. The Contractor shall implement dust suppression measures, including watering of exposed surfaces, stockpiles and haul roads, where visible dust emissions are observed or where activities have the potential to cause nuisance at sensitive receptors. The Contractor shall promptly clean up spilled materials and maintain good housekeeping practices to minimise dust generation. Where monitoring or inspections identify excessive dust emissions or dust nuisance beyond the site boundary, the Contractor shall investigate the cause and implement corrective actions.	Minor	Contractor	Contract costs	During construction
			The Contractor shall monitor site conditions and implement enhanced dust suppression measures during periods when weather conditions or construction activities increase the potential for dust generation. Such measures may include water spraying, covering stockpiles, reducing exposed working areas, covering transported materials and controlling vehicle movements on unpaved surfaces.		Contractor	Contract costs t	During construction
			The Contractor shall minimise the volume and duration of stockpiling of soil, sand, rock and other friable materials to that required for the works. Stockpiles shall be kept to the minimum practicable height and footprint and protected using appropriate dust control measures, such as water spraying, covering or surface stabilisation, where there is a risk of dust generation.		Contractor	Contract costs	During construction
			The Contractor shall locate stockpiles away from water bodies, drainage channels, stormwater inlets and overland drainage paths and shall minimise the height, footprint and duration of stockpiling to that required for the works. Stockpiles shall be stabilised and managed to prevent wind erosion, sediment runoff and dust generation through the use of appropriate controls such as covering, water spraying, surface stabilisation, perimeter sediment controls and diversion of clean surface water away from the stockpile. Stockpiles shall be inspected regularly and following significant rainfall events, and any deficiencies shall be rectified promptly.		Contractor	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
Ambient noise levels	Greenhouse Gas (GHG) emissions from construction equipment and generators will affect global climate	Minor	The Contractor shall minimise greenhouse gas emissions from construction activities by maintaining plant, vehicles, generators, vessels and dredging equipment in accordance with manufacturer specifications, minimising unnecessary idling, implementing fuel-efficient operating practices and optimising work planning, material transport and equipment utilisation to reduce fuel consumption. The Contractor shall monitor fuel consumption associated with construction activities and investigate opportunities to improve fuel efficiency and reduce greenhouse gas emissions where practicable. Where excessive fuel consumption or abnormal equipment performance is identified, the Contractor shall investigate the cause and implement corrective actions.	Minor	Contractor	Contract costs	Prior to and during construction
			The Contractor shall maintain records of fuel consumption for major construction plant, generators, vehicles and dredging equipment and shall report this information to the Engineer.		Contractor	Contract costs	During construction
	Different types of construction activities (e.g. piling, ground improvement, construction machinery operations, vehicle movements etc.) will cause high level noise which cause nuisance and health risks to the neighbouring communities	Major	The Contractor shall minimise noise emissions from piling, ground improvement works, construction plant, generators, vehicles and other construction activities through appropriate work planning, equipment maintenance and implementation of noise control measures. The Contractor shall maintain construction equipment, generators and vehicles in accordance with manufacturer specifications and promptly repair equipment generating abnormal or excessive noise. The Contractor shall locate stationary noise-generating equipment, including generators, compressors and pumps, as far as practicable from nearby residential areas and shall utilise acoustic enclosures, mufflers, silencers or other manufacturer-approved noise attenuation devices where supplied with the equipment. The Contractor shall restrict high-noise construction activities, including piling and ground improvement works, to approved construction working hours and shall avoid simultaneous operation of multiple major noise-generating activities in close proximity to residential areas where this can reasonably be achieved through work planning. The Contractor shall provide advance notification to affected communities of planned piling, ground improvement works and other temporary high-noise construction activities. The Contractor shall investigate all substantiated community complaints related to construction noise, identify the source of the noise and implement corrective actions where Project activities are determined to be the cause. Where monitoring identifies Project-related noise levels that exceed applicable Project criteria or where repeated noise-related complaints are received, the Contractor shall investigate the cause and implement additional noise control measures.	Moderate	Contractor	N Contract costs	Prior to and during construction
			The Contractor shall maintain construction plant, vehicles, generators and equipment in accordance with the manufacturer's specifications to minimise unnecessary noise emissions. The Contractor shall plan and manage construction activities to reduce prolonged or unnecessary operation of noisy equipment, minimise simultaneous operation of multiple high-noise plant where practicable and switch off equipment when not in use, where safe and practical to do so. Particularly noisy activities shall, where practicable, be scheduled to avoid night-time periods and times of known community sensitivity, such as religious observances and other community events. Equipment identified as defective or generating abnormal noise shall be repaired promptly or removed from service until repairs have been completed.		Contractor	Contract costs	During construction
			Prior to commencement of piling works, the Contractor shall evaluate the proposed piling methodology and identify opportunities to reduce underwater noise, vibration and other		Contractor	Contract costs	During construction, prior to piling

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			environmental impacts where technically feasible and compatible with the design requirements. The selected piling methodology shall be justified in the Piling Method Statement and submitted to the Engineer for review and approval prior to commencement of piling activities.				
			Prior to commencement of ground improvement works, the Contractor shall assess the potential noise, and vibration impacts of the proposed ground improvement methodology on nearby communities, structures and sensitive receptors. Where dynamic compaction is proposed, the Contractor shall implement appropriate controls, including work planning, equipment management, monitoring and community notification, to minimise noise and vibration impacts.		Contractor	N Contract costs	During construction
			The Contractor shall establish a pre-construction noise and vibration baseline at sensitive community receptors identified in consultation with LCT Ltd. and the Engineer. Based on the baseline findings, the Contractor shall implement a noise and vibration monitoring programme throughout the construction period at agreed monitoring locations representative of the nearest affected communities and other sensitive receptors. Monitoring results shall be reviewed regularly to assess the effectiveness of mitigation measures and, where monitoring identifies Project-related increases above baseline conditions or generates substantiated community complaints, the Contractor shall investigate the cause and implement appropriate corrective actions to reduce noise and vibration impacts.		Contractor	Contract costs	During construction
Tidal mudflat	The tidal mudflat in front of Block-C and the benthic habitats living there will be lost.	Moderate	LCT Ltd. shall minimise the footprint of reclamation and permanent infrastructure within the tidal mudflat area to the extent practicable through optimisation of the project layout and construction methodology.	Moderate	LCT Ltd.	Project cost	Prior to construction
			The Contractor shall confine all reclamation, dredging, construction activities, equipment movements and material storage to the approved construction footprint and shall not disturb mudflat areas outside the areas authorised for the works. Temporary work areas shall be limited to the minimum extent required for construction and any unnecessary disturbance of adjacent mudflat habitat shall be avoided.		Contractor	Contract costs	Prior to construction
			LCT Ltd. Shall evaluate the biodiversity values of the tidal mudflat. In addition, a Critical Habitat Assessment shall be completed. The results should show the ecological value of the affected tidal mudflat habitat and the significance of Project-related habitat loss. Based on that, biodiversity mitigation measures shall be developed and implemented in accordance with the mitigation hierarchy, irrespective of whether the habitat is determined to qualify as Critical Habitat. Where residual biodiversity impacts remain after implementation of avoidance and minimisation measures, LCT Ltd. shall identify and implement appropriate conservation, restoration, enhancement and/or biodiversity offset measures commensurate with the significance of the residual impact		LCT Ltd.	Cost of preparation of Critical Habitat Assessment: 60,000 USD Project cost	Prior to construction
			Recognising that permanent loss of tidal mudflat habitat and associated benthic communities is unavoidable as a result of the Project, LCT Ltd. shall evaluate the technical, ecological, regulatory and practical feasibility of achieving no net loss of biodiversity through habitat conservation, restoration, enhancement or biodiversity offset measures within the Karnaphuli		LCT Ltd.	Project Cost	Plan developed and implemented prior to the removal of the habitat

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
Mangrove ecosystems			River system. Subject to the outcome of these assessments, collaborate with relevant authorities and conservation organisations to identify suitable opportunities for tidal mudflat conservation, restoration and/or creation and implement appropriate measures to address residual impacts, including defined objectives, implementation arrangements, monitoring requirements and performance criteria.				
	The mangrove trees present in the drainage channel will be removed during the site clearing and permanently lost	Minor	LCT Ltd. shall minimise the removal of mangrove trees and mangrove habitat through optimisation of the final design, site layout and construction methodology. Only mangrove trees that cannot reasonably be avoided shall be removed.	Minor	LCT Ltd.	Project Cost	Prior to removal of the habitat
			LCT Ltd. shall evaluate the biodiversity value of the mangrove trees to be removed. In addition, a Critical Habitat Assessment shall be completed. The results should show the ecological value of the mangrove habitat and the significance of Project-related habitat loss. Based on that, biodiversity mitigation measures shall be developed and implemented in accordance with the mitigation hierarchy, irrespective of whether the habitat is determined to qualify as Critical Habitat.		LCT Ltd.		Plan developed and implemented prior to the removal of the habitat
			Where residual biodiversity impacts remain after implementation of avoidance and minimisation measures, LCT Ltd. shall identify and implement appropriate conservation, restoration, enhancement and/or biodiversity offset measures commensurate with the significance of the residual impact				
			Recognising that permanent loss of some mangrove habitat is unavoidable, LCT Ltd. shall evaluate opportunities for mangrove conservation, restoration, enhancement and/or biodiversity offsets within the Karnaphuli River system. The assessment shall consider ecological suitability, technical feasibility, regulatory requirements, long-term management arrangements and measurable biodiversity outcomes. Subject to the outcome of these assessments, collaborate with relevant authorities and conservation organisations to identify suitable opportunities for mangrove conservation, restoration and/or creation and implement appropriate measures to address residual impacts, including defined objectives, implementation arrangements, monitoring requirements and performance criteria.		LCT Ltd.	Cost for habitat restoration/compensation measures to be determined following feasibility evaluation of offset program. Project costs	Plan developed and implemented prior to the removal of the habitat
	The construction activities may affect the mangroves in front (riverside) of Block-B	Minor	The Contractor shall demarcate and protect all mangrove habitat located in front of Block B and adjacent to construction work areas prior to commencement of works. Construction materials, waste, temporary facilities, equipment, vehicle movements and construction activities shall be confined to designated work areas and shall not encroach into mangrove habitat. No storage, refuelling, maintenance activities, waste disposal, vegetation clearance or unauthorised access shall occur within or adjacent to protected mangrove areas. The Contractor shall routinely inspect mangrove protection measures and promptly rectify any damage, encroachment or non-compliance. The Contractor shall ensure that construction activities do not result in physical damage, vegetation loss, excessive sediment deposition, erosion or deterioration of retained mangrove habitat.	Minor	Contractor	Contract cost	During construction
			The Contractor shall protect mangrove habitat located on the riverside of Block B from direct damage resulting from construction activities, vehicle movements, material storage, waste disposal, sediment deposition and accidental spills.		LCT Ltd.	Project cost	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			The Contractor shall clearly demarcate mangrove protection areas before commencement of construction activities and shall prohibit unnecessary access, vegetation clearance, material stockpiling and equipment operation within these areas. The Contractor shall implement erosion, sediment and pollution control measures to prevent adverse effects on adjacent mangrove habitat. Where construction activities result in damage to mangrove vegetation or habitat, the Contractor shall investigate the cause and implement corrective actions to prevent further impacts.				
			The Contractor shall demarcate and protect mangrove areas adjacent to Block B prior to commencement of works. Construction activities, equipment movements, material storage and temporary works shall be planned and undertaken in a manner that avoids direct disturbance, damage or encroachment into mangrove habitat. Where works are required adjacent to mangrove areas, the Contractor shall implement appropriate protection measures and maintain a clearly defined exclusion zone between construction activities and the mangroves.		Contractor	Contract cost	During construction
			The Contractor shall minimise disturbance to natural habitats by confining construction activities to the approved Project footprint. Any temporary disturbance to habitats outside permanent Project infrastructure shall be reinstated following completion of the works, where practicable, to restore pre-construction habitat conditions.		LCT Ltd.	Project Cost	During construction
Fisheries resources	Piling, dredging, vessel movement may pose risk for water contamination and underwater noise generation which may impact fisheries resources including the ability of migratory fish species to navigate through the Karnaphuli River. There is a risk of Increase in turbidity, suspended materials due to dredging and piling activities	Moderate	The Contractor shall plan, sequence and execute dredging activities in an efficient manner to minimise the duration and spatial extent of disturbance to aquatic habitats, water quality and other sensitive receptors. Dredging activities shall be scheduled to avoid fisheries-sensitive migration, spawning and juvenile dispersal periods for Hilsa and Indian major carp, to the extent technically feasible and operationally practicable. Dredging activities shall, where technically feasible and operationally practicable, be scheduled to minimise overlap with periods during which migratory fish species are expected to move through the Karnaphuli River and Project Area. Particular consideration shall be given to the principal Hilsa migration period (July-September) and periods when eggs, larvae and juveniles of Indian major carps may be transported through the Karnaphuli-Halda system (approximately April-July). Where practicable, dredging shall also avoid the annual Government of Bangladesh Hilsa brood-stock protection period. Dredging during these periods shall be avoided, unless the contractor demonstrates that dredging during these periods cannot reasonably be avoided due to navigational safety, operational necessity or other overriding operational constraints. Where dredging is required during any fisheries-sensitive period, the Contractor shall implement turbidity monitoring, sediment plume monitoring, fisheries stakeholder engagement and adaptive management measures in accordance with the Biodiversity Management Plan and Dredging Management Plan.	Minor	Contractor	Contract costs	During dredging activities
			Where dredging activities are undertaken during identified fisheries-sensitive migration periods, the Contractor shall implement a turbidity and sediment plume monitoring programme to verify that dredging-induced turbidity and sediment plume do not create a barrier to fish migration[34]. The objective for this monitoring is to ensure that fish migration behaviour is not		Contractor	Contract costs	During dredging activities

[34] *It is acknowledged that the species using the estuary are adapted to high levels of turbidity given the nature of the estuary and that there are several other factors that would affect turbidity levels (including changes due to seasonal characteristics (monsoon conditions) and anthropogenic factors (maintenance dredging and vessel movements)). This results in several difficulties with setting triggers and thresholds that would be appropriate and effective. The monitoring strategy should therefore be implemented as an adaptive monitoring and management strategy to take account of the findings of the monitoring, other activities within the estuary and consultation with local fisherfolk (via a local fisheries consultant).*

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			adversely significantly affected by project activities (including dredging, placement or disposal of dredged material and reclamation activity) such that it would affect the population numbers and spawning behaviour further up the estuary or affect the migration of juveniles back down the estuary and out to sea. The key species for the estuary are considered to be Hilsa (important as a commercial species for many of the local communities along the estuary) and Indian major carp (important as a food source for the Gangetic dolphin). Consultation with the local fisherfolk may result in additional species also considered to be important. The thresholds would apply during all periods of migration both up and down the estuary, with the migration of the juveniles out to sea being more important as they will be more sensitive to suspended sediment levels. The Contractor shall establish ambient turbidity conditions at representative reference locations that are not influenced by Project-related activities. Where turbidity exceeds 10% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations, the Contractor shall investigate the cause. If the exceedance is considered to be due to project activities, then management actions should be taken to ensure that the turbidity levels do not rise to the threshold level. If monitoring identifies turbidity levels exceeding 20% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations and the exceedance is attributable to Project-related activities, the Contractor shall implement additional corrective actions to reduce turbidity inducing activities to ensure that the levels return to below the threshold within eight hours of the exceedance. The Contractor shall undertake regular consultation with fishermen and fishing communities via an appropriately qualified local fisheries consultant, throughout the turbidity inducing activities related to the project to verify the continued occurrence and movement of migratory fish species through the Project area. Where monitoring, consultations or grievances indicate potential disruption to fish migration attributable to Project activities, the Contractor shall investigate the cause and implement adaptive management measures. Should it be clear that fish are still migrating through the turbidity plumes caused by the project and there have been exceedances of the threshold then the thresholds (intensity and/or duration) could be adjusted with agreement of the fisheries consultant (in consultation with the fisherfolk). Available satellite imagery shall be used, where practicable, to support interpretation of sediment plume behaviour and verification of monitoring results				
			Engage with fishermen, fishing communities and relevant authorities throughout dredging and marine construction activities to identify and address Project-related fisheries concerns. Fisheries-related grievances, complaints and observations shall be recorded, investigated and reviewed alongside water quality and sediment plume monitoring results. Where investigations identify Project-related impacts on fisheries resources or fish migration, corrective actions and adaptive management measures shall be implemented and communicate the outcome of investigations to affected stakeholders.		LCT Ltd.	Project cost	During construction
			The Contractor shall implement spill prevention, pollution control and underwater noise mitigation measures specified in the Biodiversity Management Plan, Dredging Management Plan. Construction vessels, dredgers, piling equipment and associated marine plant shall be inspected and maintained to minimise underwater noise generation and prevent releases of fuels, oils, lubricants and other hazardous substances to the aquatic environment. All spills and pollution incidents shall be reported, investigated and addressed through corrective		Contractor	Contract costs t	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			actions. Where monitoring, fisheries observations, consultation findings or grievances indicate Project-related impacts on fisheries resources attributable to underwater noise, pollution incidents or marine construction activities, the Contractor shall investigate the cause and implement additional mitigation measures.				
	Habitat degradation of benthic species (fish feed) and some fishes due to capital dredging activities	Moderate	The Contractor shall confine dredging activities to the approved dredging footprint and shall plan and execute dredging works in a manner that minimises unnecessary disturbance of the riverbed and the generation of suspended sediments. The Contractor shall implement the water quality monitoring requirements of the approved Dredging Management Plan and, where monitoring indicates that dredging activities are generating excessive sediment mobilisation or that mitigation measures are not performing effectively, shall modify dredging methods or operating practices to reduce environmental impacts.	Minor	Contractor	Contract costs	During dredging activities
Dolphins	Piling, dredging and vessel movements cause underwater noise that affects the dolphins	Major	The Contractor shall appoint suitably qualified underwater acoustics and marine fauna specialists to develop and implement an underwater noise and dolphin monitoring programme during piling activities. The programme shall integrate underwater noise monitoring and passive acoustic monitoring (PAM) to assess underwater sound levels and dolphin occurrence and behaviour. Monitoring shall be undertaken at two locations: one monitoring station located near Block C and a second representative location selected by the appointed specialists. The second location shall provide comparison with conditions outside the area of highest underwater noise exposure and shall take account of tidal movements and dolphin habitat use. The underwater acoustics specialist shall determine the appropriate monitoring equipment, deployment methods and survey design. The PAM system(s) shall be capable of recording piling-generated underwater sound for acoustic assessments and detecting dolphin vocalisations within the frequency range relevant to dolphin presence and activity in the Karnaphuli River. The monitoring methodology shall be developed with consideration of local tidal conditions, vessel traffic, navigational constraints, water depth, background noise levels, dolphin movement patterns, and the risk of damage to or loss of monitoring equipment. Prior to the commencement of piling activities, the underwater acoustics specialist shall undertake baseline underwater noise monitoring to characterise existing acoustic conditions within the Project Area and adjacent dolphin habitat. The Contractor shall record the timing, location, duration and operational characteristics of piling activities to enable underwater noise measurements and dolphin observations to be correlated with specific construction activities.	Moderate	Contractor	Contract costs	During construction
			The Contractor shall demonstrate, through site-specific underwater noise monitoring, that piling activities do not exceed a single-strike sound exposure level (SELss) of 145 dB at 200 m from the piling source, thereby minimising the potential for disturbance to Ganges River dolphins. The appointed marine mammal specialists shall review underwater noise monitoring results on a regular basis and report findings to LCT Ltd. and the Engineer. Where monitoring identifies exceedance of the underwater noise threshold or evidence of significant disturbance to dolphins or other aquatic fauna, the Contractor shall investigate the cause and implement corrective actions. Additional mitigation measures may include: • Modification of piling methods. • Adjustment of piling sequences.		Contractor	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			• Restrictions on piling during periods of elevated dolphin presence. • Implementation of underwater noise attenuation measures. • Other measures recommended by the appointed specialists and approved by LCT Ltd. and the Engineer.				
			Prior to the commencement of piling works, the Contractor shall prepare and implement a Marine Mammal Mitigation Protocol (MMMP) in accordance with the Biodiversity Management Plan. The MMMP shall be approved by a marine mammal expert via LCT Ltd. before piling activities commence. Qualified Marine Mammal Observers (MMOs) shall undertake boat-based visual monitoring during piling activities to identify dolphins and other aquatic fauna within the Project Area. Observations shall include the location, number, distance and direction of animals relative to piling activities, together with any observable behavioural responses. The MMMP shall define: • Underwater noise thresholds. • Exclusion zones. • MMO. • PAM. • Acoustic Deterrent Devices (ADDs), where demonstrated to be appropriate and effective. • Soft-start or ramp-up procedures for piling activities. • Restrictions on piling during tidal conditions associated with increased dolphin presence. • Additional underwater noise mitigation measures demonstrated to reduce disturbance to dolphins. Data collected through MMO observations and PAM shall be used to support implementation of the dolphin monitoring programme and to inform adaptive management throughout the construction phase. The underwater noise mitigation measures have been developed primarily with consideration of the Ganges River dolphin, as it represents the most sensitive receptor in the Project Area of Influence due to its restricted riverine habitat, dependence on echolocation, and limited ability to avoid disturbance compared to more mobile coastal cetaceans. The same mitigation measures shall be applied to Irrawaddy dolphins and are expected to provide an equivalent or greater level of protection for this species. An adaptive management plan shall be adapted to alter the mitigation measures during construction if deemed over precautionary or under-precautionary. An adaptive management approach shall be implemented throughout construction. Mitigation measures may be refined where monitoring demonstrates that measures are either overly precautionary or insufficient to adequately protect dolphins and other aquatic fauna.		Contractor	Contract costs	During construction
			Implement measures to avoid and minimise impacts on Ganges River dolphins through the management of underwater noise, dredging activities, vessel movements and water quality. Review and strengthen mitigation measures where construction or operational activities result in unanticipated impacts on dolphins or their habitat.		Contractor	Contract costs t	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
	Piling, dredging, construction vessel movement may pose risk for water quality which may impact dolphins. There is a risk of increase in turbidity, suspended materials due to dredging and piling activities	Major	Adhere to the dredging management plan. The Contractor with the dredging company shall prepare and implement a Dredging Management Plan (DMP) following the Dredge Material Disposal Policy 2025 and in coordination with the CPA.	Moderate	Contractor	Contract costs	During construction
	Collision risk of construction vessels with dolphins.	Major	Ensure that somebody on board of the vessel has done a training on marine mammal observing (e.g. from JNCC). The person would be responsible for ensuring that vessels are aware of any dolphins present in an area where a vessel is manoeuvring and can avoid interactions.	Moderate	Contractor	Contract costs	Prior to and during construction
			The Contractor shall ensure that at least one person per shift on dredging and other relevant construction vessels has received appropriate training in aquatic fauna identification, sighting and reporting procedures. The training shall include an understanding of internationally recognised good practice for fauna observation and protection, including relevant principles contained within JNCC guidance and shall incorporate locally relevant training for the Karnaphuli River system. As a minimum, personnel shall be able to identify key aquatic fauna species of conservation importance, including the Ganges River Dolphin, communicate sightings to vessel crews and support the implementation of applicable operational controls to minimise the risk of vessel interactions with aquatic fauna.		LCT Ltd.	Project cost	Yearly during construction
			Apply speed limits that reduce the risk of interactions with marine fauna in the AoI of the project (if feasible, limit to 10 km/hr).		Contractor	Contract costs	During construction
Avifauna and migratory birds	Construction activities generating noise, dust, light, may disrupt feeding, resting, nesting, and movement of avifauna and migratory birds near the Project area. Loss of mudflat (see above) will mean a loss of food resources for birds.	Minor	An adaptive monitoring and management plan should be developed to ensure that appropriate actions are taken when necessary and that, at other times where the risk is not present or at a low level, activities can proceed. This reduces the potential for increasing the duration of construction which could then affect other sensitive receptors.	Minor	Contractor	Contract costs	During construction
			Use coloured (warmer) lights to avoid effects on nocturnal fauna (e.g. bats).		Contractor	Contract costs	During construction
			The adaptive plan should include monitoring for any birds and bats in the area and if they are showing signs of disturbance then action can be taken to reduce the noise levels or install barriers to reduce noise reaching the affected area.		Contractor	Contract costs	During construction
			The local area is already subject to high levels of noise from the airport and other activities in the area and measures should be applied where the disturbance is due to the specific activity rather than for all sources of noise.		Contractor	Contract costs t	During construction
Road traffic	Possible minor (temporary) congestions (as per the traffic study, the road has substantial capacity to conclude that congestions are unlikely to happen, based on the expected traffic increase) and interruptions to the public road traffic due to the movement of vehicles with construction equipment and materials and the installation of electricity cable. Also through buses transporting employees.	Minor	Consider waterborne transport where feasible to reduce road traffic impacts.	Minor	Contractor	Contract costs	During construction
			Prepare and implement a Traffic Method Statement in line with Project's Traffic Management Plan		Contractor	Contract costs	Prior to construction
			Provide adequate signage, warning lights, reflective barriers, and flagmen where construction traffic interfaces with the public.		Contractor	Contract costs	During construction
			Integrate the following measures in the contracting phase for the drivers of the vehicles: Ensure the usage of the designated main routes and avoid any unnecessary rerouting into busy communities; Schedule deliveries during off-peak traffic periods and outside school opening and closing and prayer times.		Contractor	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			The Contractor shall identify and map sensitive community receptors and social infrastructure located along project access routes, including schools, childcare facilities, clinics, hospitals, religious buildings, markets and other community gathering locations. Traffic management measures shall be implemented to minimise risks and disturbance to these receptors, including the use of designated vehicle routes, speed limits, traffic marshals where required, appropriate signage and coordination with local authorities regarding foreseeable periods of increased community activity where practicable.		Contractor	Contract costs	During construction
			Communicate planned large transport movements that may affect local communities or sensitive receptors, including schools, clinics, hospitals, religious buildings and markets, sufficiently in advance to allow appropriate planning and risk mitigation.		Contractor	Contract costs	During construction
			Ensure all project vehicle operators receive site-specific training on applicable road traffic regulations, speed limits, safe driving practices, navigational safety requirements and measures to minimise noise, dust and community disturbance. Refresher training shall be provided periodically and when significant traffic-related incidents or non-conformances occur.		Contractor	Contract costs	During construction
			Provide awareness training to project workers and where appropriate, local communities on road safety risks associated with construction traffic, including safe use of roads, pedestrian safety, vehicle blind spots, crossing points, speed awareness and measures to reduce the risk of traffic-related incidents.		Contractor	Contract costs	During construction
			Switch off vehicle engines, generators, pumps and other mobile or stationary equipment when not in active use, where safe and operationally practicable, to reduce unnecessary fuel consumption, exhaust emissions, noise and disturbance to nearby communities.		Contractor	Contract costs	During construction
River traffic	The movement of dredgers, sand barges, Piles (RC or PHC) and associated vessels will pose a risk to local river traffic.	Moderate	Optimise the volume of imported construction materials by maximising the use of suitable locally available sources and minimising transport distances where practicable. Preference shall be given to waterborne transport where technically, environmentally and commercially feasible to reduce road traffic impacts, emissions and community disturbance. The anticipated road and water transport split shall be defined in the Construction Traffic Management Plan and performance monitored through monthly ESMP reporting.	Minor	Contractor	Contract costs t	During construction
			Coordinate barge and vessel movements with relevant port, harbour and navigation authorities and where practicable, schedule transport activities to avoid peak river traffic periods in order to minimise navigational congestion, disruption to river users and associated safety risks.		Contractor	Contract costs t	During construction
			Install temporary navigation markers, buoys, and warning signs around construction areas.		Contractor	Contract costs t	During construction
			Prior to sourcing and transporting materials from offsite locations, the Contractor shall review proposed navigation routes to identify navigational constraints, safety risks, sensitive receptors, congestion hotspots, permitting requirements and potential impacts on other river users. Transport routes and logistics arrangements shall be selected and managed to minimise safety, environmental and community impacts, where practicable.		Contractor	Contract costs	During construction
			Coordinate vessel movements with CPA in access channel and BIWTA for inland navigation of barges to avoid river bottlenecks		Contractors / LCT Ltd.	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
Livelihood, health and safety of communities	Generation of work opportunities for local skilled/unskilled labour in construction activities as a result of the LCTP development	Moderate	The Contractor shall maximise the use of local labour, suppliers and services where suitable skills, resources and capacity are available within the Project Area of Influence. The Contractor shall monitor and periodically report to LCT Ltd on local employment and local procurement performance against agreed project objectives.	Moderate	Contractors	Contract costs	Prior to and during construction
	Opportunities for local vendors or restaurant/ shop owners to sell food/ goods to the construction workers	Moderate	-				
	Opportunities for sand traders to buy and sell dredged material from LCTP and supply fill material	Moderate	-				
	Fire or explosion risks from fuel, generators and construction equipment	Major	The Contractor shall develop and implement an Emergency Response Procedure (which shall include scenarios for fire incidents) and coordinate emergency response arrangements with relevant municipal emergency services. Where construction activities present a credible risk to nearby communities, the Contractor shall communicate relevant emergency information to affected stakeholders and conduct periodic emergency response exercises involving relevant responders, as appropriate.	Moderate	Contractor	Contract costs	Prior to and during construction
	Relocation of the pedestrian path and bus stops due to the construction of the entry and out gate affecting walking distance	Moderate	In coordination with CCC and relevant transport authorities, identify and implement suitable permanent bus stop locations and pedestrian connections affected by the construction of the terminal entry and exit gates. The design shall seek to maintain safe and convenient access to community areas, public transport services and river crossings, including connectivity to *Ghats* 12 and 15 where relevant.	Minor	LCT Ltd.	Project cost	During construction
			Where bus stops, pedestrian pathways or access routes are temporarily disrupted by construction activities, provide and maintain safe alternative routes and facilities. Temporary measures shall include appropriate signage, barriers, lighting where necessary and traffic marshals or crossing attendants as required to protect pedestrian safety and maintain community access during the transition period.		Contractor and LCT Ltd.	Contract costs	During construction
	Construction and associated transportation may increase noise, dust, vibration, light, waste, wastewater, air emissions (dust, exhaust)	Moderate	See air quality and noise measures above.	Minor	Contractor	Contract costs	During construction
			The Contractor shall identify construction activities that present a credible risk of significant impacts to communities, including increased traffic, noise, vibration, dust, access restrictions or safety hazards. Where such risks are identified, the Contractor shall provide advance notification to affected stakeholders through appropriate communication channels and communicate the nature, location, duration and expected impacts of the activity, together with relevant mitigation measures.		Contractor	Contract costs	During construction
			The Contractor shall identify activities that present a credible risk of significant noise, vibration, air emissions or community disturbance and, where practicable, schedule such activities to minimise impacts during night-time hours, weekends, public holidays and recognised prayer times. The Contractor shall maintain a forward construction schedule for these activities and		Contractor	Contract costs t	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			provide advance notification to potentially affected communities through appropriate communication channels.				
			The Contractor shall implement controls to minimise noise, dust, vibration, light spill, exhaust emissions, waste and wastewater impacts on nearby communities, schools, mosques and other sensitive receptors. Controls shall include good housekeeping, preventive maintenance of plant and equipment, dust suppression, management of construction lighting, appropriate scheduling of particularly disruptive activities where practicable and prompt correction of activities generating unnecessary nuisance emissions.		Contractor	Contract costs	During construction
			Implementation of the Project grievance mechanism for external stakeholders (including community members and other affected persons) and a differentiated response mechanism for Gender-Based Violence and Harassment (GVBH for specific sexual exploitation, abuse and harassment cases.		LCT Ltd.	Contract costs	During construction
			The Contractor shall maintain plant, vehicles and generators in accordance with manufacturer specifications, promptly repair defective equipment, implement dust suppression where visible dust emissions occur, direct construction lighting away from neighbouring communities, segregate and dispose of waste through licensed facilities, and install, operate and maintain temporary wastewater collection and treatment systems. Any effluent discharge or sludge disposal shall comply with the ECR 2023. Where monitoring or inspections identify non-compliance or nuisance impacts, the Contractor shall implement corrective actions.		Contractor	Contract costs	Prior to and during construction
	Labour influx for construction potentially adds pressure on local infrastructure, housing, food, public services, public transport, waste and wastewater management	Major	Optimise the use of locally available labour where feasible to support local employment and reduce the need for non-local workers.	Moderate	Contractor	Contract costs	During construction
			Optimise the use of locally available labour where feasible and implement workforce management measures to minimise potential impacts on local communities, public services, housing, traffic and other local infrastructure arising from Project-related workforce activities.		Contractor	Contract costs t	During construction
			The Project shall implement workforce planning and management measures to minimise potential impacts on local communities, public services, housing, traffic and other local infrastructure associated with Project-related workforce activities, including optimising the use of locally available labour where feasible.		Contractor	Contract costs	During construction
			The Contractor shall implement the requirements of the Laldia Container Terminal Waste Management Plan and ensure that waste and wastewater generated by the construction workforce are collected, stored, transported, treated and disposed of through authorised facilities with sufficient capacity to receive the waste streams generated by the Project. The Contractor shall provide and maintain adequate waste storage, sanitation and wastewater collection facilities for the construction workforce throughout the construction period. The Contractor shall routinely inspect and maintain waste and wastewater infrastructure to prevent leaks, overflows, uncontrolled discharges and conditions that may result in increased demand on local waste and wastewater services. Where inspections or monitoring identify deficiencies in waste or wastewater management, including inadequate capacity, leaks, overflows, unauthorised disposal or uncontrolled discharges, the Contractor shall investigate the cause and implement corrective actions.		Contractor	Contract costs	Prior to construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
	Increased truck traffic and transport activities for construction may result in road and navigational safety risks, and restricted community access.	Major	The Contractor shall assess construction traffic risks associated with the movement of workers, equipment and materials and shall implement appropriate traffic management measures to protect the safety of workers, community members and other road users. The Contractor shall provide advance notice of construction activities that may result in temporary road closures, traffic disruptions or changes to access arrangements for nearby communities and road users.	Moderate	Contractor	Contract costs	Prior to and during construction
			The Contractor shall manage Project-related vehicle parking and holding areas to minimise obstruction of public roads, access routes and neighbouring properties. Construction vehicles shall use designated parking and staging areas where provided and shall not obstruct traffic flow or access to adjacent properties.		Contractor	Contract costs t	During construction
			The Contractor shall provide road safety training to all project vehicle operators. Training shall highlight local traffic conditions and hazards, including interactions with pedestrians, cyclists, rickshaws, informal transport users and roadside vendors, as well as driving under adverse conditions such as heavy rainfall, flooding, poor visibility and damaged road surfaces. Refresher training shall be provided periodically and following significant traffic incidents.		Contractor	Contract costs	During construction
			The Contractor shall prepare a risk assessment based on the construction schedule, anticipated traffic movements and transport routes. Based on the findings of the assessment, the Contractor shall install and maintain traffic signage and wayfinding measures at locations where driver confusion, route deviation, traffic conflicts or safety risks may occur. This shall include, as applicable, signage at key decision points on approach roads, haul routes, site access points, gate entrances, road crossings and other high-risk locations identified by the assessment. The Contractor shall periodically inspect signage and implement corrective actions where monitoring identifies ineffective traffic management, driver confusion or unauthorised vehicle movements.		Contractor	Contract costs	During construction
			The Contractor shall prepare a road and river navigation traffic risk assessment based on the construction schedule, anticipated traffic movements and material transport requirements and shall implement appropriate traffic management measures to protect the safety of workers, pedestrians, river users and other road users. Traffic management measures shall be proportionate to the identified risks and shall include the deployment of trained traffic control personnel at site access points, road crossings and other high-risk locations during activities that generate elevated traffic risks, such as abnormal load movements, peak material deliveries, interfaces with public roads, pedestrian crossings or periods of congestion.		Contractor	Contract costs	During construction
			The Contractor shall minimise the number of connection points to public roads, where practicable, to reduce traffic conflicts, improve traffic management and minimise risks to road users and nearby communities.		Contractor	Contract costs	During construction
			The Contractor shall monitor the condition of public roads used by project traffic and, where project activities contribute to deterioration of the road surface, implement timely maintenance or repair measures in coordination with the relevant authority.		Contractor	Contract costs	During construction
			The Contractor shall establish, communicate and enforce speed limits for all project vehicles, with enhanced controls in areas of increased risk, including road crossings, schools, markets, community access points, bus stops and locations with significant pedestrian or roadside activity.		Contractor	Contract costs	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
	Vulnerable groups, including women, youth, the elderly, and persons with disabilities, may face increased safety and security risks from labour influx, increase in road and river traffic, improper security personnel, displacement of ghat 14.	Major	The Contractor shall ensure vehicles are fitted with reversing alarms, cameras and functioning lights. Ensure all vehicles possess valid registration, insurance, and fitness certificates. Secure all loads properly to prevent shifting during transport.	Moderate	Contractor	Contract costs	During construction
			Contractor: The Contractor shall monitor Project-related traffic volumes, traffic generation and traffic conditions on roads used by construction traffic and report the results to LCT Ltd. **LCT Ltd.:** LCT Ltd. shall review the monitoring results against the assumptions and forecasts used in the Traffic Impact Assessment and determine whether additional traffic management or pedestrian safety measures are required, including on the VIP Road.		Contractor and LCT Ltd.	S Contract costs	During construction
			In collaboration with the road authorities, investigate these options if safety in the area decreases: Introduce a priority-controlled layout for the main roads for safety; Introduce zebra crossings at appropriate locations along the VIP Road to provide pedestrians with priority when crossing the road and to improve pedestrian permeability and accessibility across the corridor; Create pedestrian path along VIP Road. Ensure safe road crossings at the *Ghats* with the river crossing facilities, as there will likely be an increase in road crossings at those points with the closure of *Ghat* 14.		LCT Ltd.	Project costs	During construction
			Implement measures to prevent and respond to Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH), including workforce awareness training, a worker Code of Conduct, effective reporting and grievance mechanisms, investigation and corrective action processes and engagement with relevant support services where required.		Contractor	Contract costs	Prior to and during construction
			The Contractor shall maintain safe alternative access to *Ghat* 14 users and implement appropriate road, river and pedestrian safety controls. The Contractor shall ensure Project traffic and vessels do not obstruct public access routes, ferry operations or community landing points. The Contractor shall enforce a Worker Code of Conduct and ensure workers and security personnel interact respectfully with community members. LCT Ltd. shall maintain a community grievance mechanism and provide advance notice of access, traffic and navigation changes.		Contractor and LCT Ltd.	Contract costs	Prior to and during construction
			Implement measures to prevent and address trafficking in persons and forced labour risks, including responsible recruitment practices, prohibition of worker-paid recruitment fees, worker awareness programmes accessible grievance mechanisms, contractor oversight and procedures for reporting, investigating and responding to potential cases.		Contractor	Contract costs t	During construction
			Implementation of the Project grievance mechanism for external stakeholders (including community members and other affected persons) and a differentiated response mechanism for Gender-Based Violence and Harassment (GVBH for specific sexual exploitation, abuse and harassment		LCT Ltd.	Project cost	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
	Risk of tensions between construction workers (due to labour influx) and community members, including women and young girls.	Moderate	The Contractor shall develop, implement and enforce a Worker Code of Conduct (CoC) for all employees, subcontractors and security personnel, setting out required standards of behaviour for interactions with local communities and prohibiting gender-based violence (GBV), sexual exploitation and abuse (SEA), sexual harassment (SH), discrimination and other forms of misconduct. All personnel shall sign the CoC and receive mandatory induction and refresher training on community engagement protocols, community sensitivities, and the prevention and reporting of GBV/SEA/SH risks. The Contractor shall establish procedures for reporting, investigating and addressing breaches of the CoC, including confidential grievance mechanisms accessible to workers and community members. Appropriate disciplinary and corrective actions shall be implemented for non-compliance. LCT Ltd. shall monitor implementation through regular audits and review of training records, signed CoCs, grievances, incidents, investigations and corrective actions, with monitoring focused on compliance outcomes rather than training delivery alone.	Moderate	Contractor	Contract costs	During construction
	Construction nuisance (traffic disruption, dust, noise, air emissions) from the development of electricity cable to LCTP	Moderate	The Contractors for the electricity shall prepare a separate HSE plan to manage traffic, air emissions and noise and vibrations and communicate the schedule of the works to the communities.	Moderate	Contractors for electricity supply works	Contract costs	During construction
			Implementation of grievance mechanism for external stakeholders (including community members and other affected persons) and specific sexual exploitation, abuse and harassment responsive grievance mechanism.		LCT Ltd.	Project cost	During construction
	Risk of damage to nearby cultural heritage, like mosque near block A due to vibrations, dust and nuisance due to noise.	Moderate	The Contractor shall prepare a Chance-Find procedure	Minor	Contractor	Contract costs	During construction
			The Contractor shall prepare and implement a noise and vibration method statement		Contractor	Contract costs	Prior to and during construction
			The air emissions and noise and vibrations method statements from the Contractor shall specifically include provisions for cultural heritage. Where required by local regulations or agreed with relevant authorities, schedule high-noise or particularly disruptive construction activities to minimise disturbance during weekends, public holidays and designated prayer times.		Contractor	Contract costs	During construction
Construction and Operation workers	Occupational Health & Safety risks from e.g. working over water, at height, with heavy equipment, exposure to hazardous and chemical materials	Major	The Contractor shall prepare and implement work-specific Method Statements for all construction activities with the potential to result in occupational health and safety risks, including working over water, working at height, lifting operations, excavation, confined space entry, hot work, operation of heavy equipment and the storage, handling and use of hazardous substances. The Method Statements shall comply with the APM Terminals HSSE Specification, permit conditions, ESIA commitments and other applicable Project requirements. The Method Statements shall identify activity-specific hazards, applicable control measures, competency requirements, personal protective equipment requirements, inspection requirements, monitoring requirements, emergency response arrangements and corrective actions. Method Statements shall be submitted to the Engineer for review and approval prior to commencement of the relevant activity. The Contractor shall implement the approved Method Statements and ensure that all personnel undertaking the works are trained, competent and comply with their requirements.	Minor	Contractor	Contract costs	Prior to and during construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			The Contractor shall undertake routine inspections of work activities, equipment, tools, lifting appliances, work-at-height systems, hazardous substance storage areas and safety controls and shall correct identified deficiencies without delay. All health and safety incidents, including High Potential Incidents (HiPo) and near misses shall be investigated and corrective actions implemented to prevent recurrence.				
	Risk of injuries and loss of lives in case of fire/explosions or other safety incidents during construction	Major	The Contractor shall prepare and implement a Fire Prevention and Emergency Response Method Statement for construction activities with the potential to result in fire, explosion or other major safety incidents. The Method Statement shall comply with the Project Emergency Response Plan, the APM Terminals HSSE Specification, applicable legal requirements and permit conditions. The Method Statement shall identify activity-specific fire and explosion hazards associated with the works, define the fire prevention and control measures to be implemented, specify firefighting and emergency response equipment requirements, establish inspection and maintenance requirements for fire protection equipment, define personnel training requirements, identify emergency response roles and responsibilities and specify incident reporting and corrective action requirements. The Contractor shall provide and maintain appropriate firefighting equipment and emergency response equipment at locations identified through the activity risk assessment. Firefighting equipment shall be readily accessible, clearly identified, routinely inspected and maintained in an operational condition. The Contractor shall ensure that personnel involved in activities presenting fire or explosion risks are trained in the requirements of the Fire Prevention and Emergency Response Method Statement and relevant emergency response arrangements. Emergency drills shall be undertaken periodically to verify the effectiveness of the emergency response arrangements and corrective actions implemented where deficiencies are identified.	Minor	Contractor	Contract costs	Prior to and during construction
	Risk of providing poor wages, labour contracts, working conditions in the hiring of labour to save resources.	Major	The Contractor shall maximise the use of locally available labour where feasible and implement workforce management measures to minimise potential impacts on local communities associated with Project-related employment activities. The Contractor shall ensure that all workers employed by the Contractor, subcontractors and labour providers receive written terms of employment in a language and form they understand before commencing work. The terms of employment shall clearly state, as applicable, the worker's role, wages, working hours, overtime arrangements, rest periods, leave entitlements, benefits, deductions, duration of employment, disciplinary requirements and conditions for termination. The Contractor shall pay workers accurately, in full and within the agreed payment period. Wage rates, benefits, working hours, overtime payments and deductions shall comply with applicable labour legislation, contractual requirements and the communicated terms of employment. The Contractor shall maintain employment contracts, attendance records, working-hour records, payroll records and evidence of wage payments sufficient to demonstrate compliance. Unauthorised or unexplained deductions from workers' wages shall be prohibited. The Contractor shall provide and maintain working conditions and worker welfare facilities that comply with applicable legal requirements, the APM Terminals HSSE Specification and Project requirements. The Contractor shall routinely inspect working conditions and promptly correct deficiencies affecting worker health, safety, welfare or employment rights.	Minor	Contractor	S Contract costs	Prior to and during construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
	Heat stress from increased paved area affecting workers' health and safety	Major	Where the Contractor, a subcontractor or a labour provider provides or arranges accommodation for construction workers, the Contractor shall prepare and implement a Worker Accommodation Plan before the accommodation is occupied. The plan shall define the requirements for accommodation capacity, sleeping arrangements, potable water, sanitation, washing facilities, ventilation, lighting, fire safety, emergency arrangements, waste management, security, privacy, maintenance, inspection and grievance management. Worker accommodation shall be inspected before occupation and throughout its use and deficiencies shall be corrected within an agreed timeframe. The Contractor shall establish and maintain an accessible worker engagement and grievance mechanism for all Contractor, subcontractor and labour-provider personnel. Workers shall be informed of the mechanism during induction and shall be able to raise concerns confidentially and without retaliation. The Contractor shall register, investigate and resolve worker grievances within defined timeframes, communicate outcomes to affected workers and maintain records of grievances and corrective actions. Workers shall retain access to other judicial or administrative remedies available under applicable law.	Minor	Contractor	Contract costs	During construction
			Implement measures to manage climate-related risks to the workforce and project activities, including heat stress prevention and response measures, provision of drinking water, shaded rest areas, work-rest regimes, weather monitoring, worker awareness training and adjustment of work activities during periods of extreme heat or other severe weather conditions.		Contractor	Contract costs	During construction
			The Contractor shall provide and maintain adequate potable drinking water points and shaded rest areas at all active construction work locations, welfare facilities and construction labour camps. Drinking water and rest facilities shall be readily accessible to workers and truck drivers throughout the working day. The Contractor shall routinely inspect and maintain these facilities to ensure they remain available, hygienic and suitable for use throughout the construction period.		Contractor	Contract costs	During construction
			The Contractor shall implement heat stress management measures for all personnel working outdoors, including truck drivers waiting to load, unload or access the site. Adequate potable drinking water shall be continuously available at active work areas, rest locations and driver waiting areas. Shaded or cooled rest areas shall be provided at appropriate locations throughout the construction site and at designated truck holding or waiting areas. The Contractor shall implement work-rest regimes, provide heat stress awareness training and adjust work activities where necessary during periods of elevated heat stress risk. Any heat stress-related illness, injury or near miss shall be reported, investigated and corrective actions implemented to prevent recurrence.		Contractor	Contract costs	During construction
All VECs	Obtain necessary regulatory permits and approvals before starting any construction work and operational activities to ensure that all regulations have been followed, and relevant regulators are informed.	Major	LCT Ltd. shall obtain all applicable regulatory permits, licences, approvals and authorisations required for the construction and operation of the Project prior to commencement of the relevant activities. LCT Ltd. shall establish and maintain a permit register identifying all permit conditions, mitigation requirements, compliance obligations, approval requirements and reporting commitments applicable to the Project. Relevant permit conditions and obligations shall be communicated to Contractors, subcontractors and other responsible parties and incorporated into applicable method statements, procedures and work activities. LCT Ltd. shall monitor compliance with permit conditions throughout the construction period and implement corrective actions where non-compliances or permit breaches are identified.	Major	LCT Ltd.	Project cost	During construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
	E&S impacts in the supply chain for sourcing and transportation of construction material, disposal site for dredged material and solid waste, bunkering of construction vessels	Major	The Contractor shall procure construction materials, manage dredged material reuse or disposal, dispose of solid waste and undertake vessel bunkering activities only through suppliers, contractors and facilities that hold the required licences, permits and approvals. Prior to engagement, the Contractor shall undertake environmental and social due diligence of suppliers and service providers associated with construction material sourcing, dredged material management, waste management and vessel bunkering activities to verify legal compliance and identify material environmental and social risks. The Contractor shall maintain records demonstrating the origin of construction materials, destination of dredged material, waste disposal locations and bunkering arrangements and shall periodically audit high-risk suppliers and service providers. Where environmental, social or legal non-compliances are identified, the Contractor shall implement corrective actions or discontinue use of the supplier or service provider if the deficiencies are not rectified within an agreed timeframe.	Moderate	Contractor	Project cost	Prior to and during construction
			The Contractor shall preferentially source suitable reclamation material from locations that minimise environmental, social and logistics impacts, where practicable. Where the Contractor proposes to source reclamation material from offshore or seabed borrow areas, the Contractor shall undertake a comprehensive Risk Assessment and submit it to LCT for review and approval prior to commencing extraction activities. The assessment shall evaluate potential environmental and social impacts, including effects on marine ecology, biodiversity, fisheries, water quality, sediment transport, navigation, livelihoods, cultural heritage and cumulative impacts, and shall identify appropriate mitigation measures.		Contractor	Contract costs	Prior to and during construction
	Contractor is not sufficiently equipped to manage E&S risks	Major	LCT Ltd. shall establish and implement a contractor and subcontractor management system to verify compliance with the APM Terminals HSSE Specification, permit conditions, contractual requirements and ESIA commitments. The system shall include competency and resource assessment during procurement, review of Contractor method statements, inspections, audits, performance monitoring, management of non-conformances and verification of corrective action implementation. LCT Ltd. and the Engineer shall monitor Contractor and subcontractor performance throughout the construction period and require corrective actions where deficiencies in environmental, social, health or safety performance are identified.	Minor	LCT Ltd.	Project cost	Prior to construction
			The Contractor shall prepare work-specific environmental, social, health and safety method statements for all major construction activities with the potential to result in environmental, social, health or safety impacts. The method statements shall comply with the APM Terminals HSSE Specification, applicable regulatory requirements, permit conditions and ESIA commitments and shall identify the activity-specific risks, mitigation measures, monitoring requirements, responsibilities, inspection requirements and corrective actions applicable to the works. Method statements shall be submitted to the Engineer for review and approval prior to commencement of the relevant activity. The Contractor shall implement the approved method statements and ensure that personnel undertaking the works are trained in and comply with their requirements.		Contractor	Contract costs	Prior to construction
			The Contractor shall prepare work-specific method statements for all major construction activities that have the potential to result in environmental, social, health or safety impacts. Method statements shall identify the relevant environmental and social risks associated with the activity, define the mitigation and control measures to be implemented, specify monitoring requirements, establish responsibilities and identify corrective actions to be taken where non-compliances or adverse impacts are identified. Method statements shall be consistent with		Contractor	Contract costs	Prior to construction

VEC	Impact/ risks on VEC (Construction)	Significance (Before mitigation)	Mitigation, enhancement and compensation measures	Significance (After mitigation)	Responsible party	Costs estimate for implementation of measures (USD for entire construction period)	Timing of implementation of measures
			applicable regulatory requirements, permit conditions, ESIA commitments and approved Project management plans and shall be submitted to the Engineer for review and approval prior to commencement of the relevant activity. The Contractor shall implement the approved method statements and ensure that personnel undertaking the works are trained and competent in their requirements.				

Table 11-3: Environmental and Social Mitigation Measures during Operation Phase

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
Drainage hydrology	Maintenance and operational access by the regulator/pump operator will be restricted during operation resulting from replacement of an open *khal* with a culvert beneath the terminal deck	Moderate	The terminal and culvert design shall incorporate permanent maintenance access arrangements to enable safe inspection, operation and maintenance of the culvert and regulator throughout the operational life of the Project. LCT Ltd. shall demonstrate that maintenance personnel, equipment and materials required for routine and emergency maintenance can safely access all relevant sections of the culvert. Where monitoring identifies water levels materially higher than hydraulic model predictions, prolonged elevated water levels, or evidence of flooding, waterlogging, ponding, drainage congestion or restricted flow upstream of the regulator/culvert, the cause shall be investigated. Appropriate corrective measures shall be implemented. The effectiveness of corrective measures shall be verified through follow-up monitoring.	Minor	Operator/LCT Ltd.	No additional cost	The design shall be approved prior to construction. Maintenance access provided during the project lifecycle
			The terminal operator shall maintain safe and unrestricted access to the existing sluice gate, pumping station, culvert access points and associated drainage infrastructure throughout the operational life of the Project.		Operator /LCT Ltd.	No additional cost	During operation
	Replacement of the existing open drainage channel with a culvert beneath the terminal may increase the risk of restricted drainage, debris accumulation and reduced hydraulic capacity, resulting in waterlogging, flooding and drainage congestion in surrounding communities, particularly during monsoon periods and extreme rainfall events.	Major	The terminal and culvert operation shall incorporate measures to minimise the risk of drainage congestion, debris accumulation and restricted flow within the drainage system. Where agreed with BWDB and CCC, LCT Ltd. shall support the evaluation and implementation of appropriate debris management and stormwater attenuation measures, including debris interception structures (e.g. trash screens) and retention or detention facilities upstream of the existing culvert under the Airport Road. LCT Ltd. shall coordinate with BWDB and CCC regarding inspection, operation and maintenance requirements for the drainage system, including arrangements for debris management and drainage performance during the monsoon season.	Minor	LCT Ltd.	No additional cost	Prior to operation
River morphology	The dredged berth pocket will generate ongoing sediment accumulation and a gradual reduction in water depth. As a result, frequent maintenance dredging will be required throughout the operational phase to maintain safe navigation and terminal operations.	Major	Develop and implement a frequent maintenance dredging programme together with CPA to maintain the berth pocket and associated vessel manoeuvring areas at the approved operational design depths required for safe navigation and terminal operations.	Moderate	LCT Ltd.	No additional cost	Develop programme prior to operation and implement throughout the Project lifecycle
			Prior to disposal of maintenance dredged material, LCT Ltd. shall assess opportunities for the beneficial reuse of dredged sediment. The suitability of dredged material for beneficial reuse shall be evaluated considering sediment characteristics, environmental requirements, engineering suitability, transport requirements and applicable regulatory approvals.		Operator /LCT Ltd.	No additional cost	Prior to dredging activities throughout the Project lifecycle
			Undertake periodic bathymetric and hydrographic surveys of the berth pocket and associated navigation areas to quantify sedimentation rates, identify areas of accelerated infilling and verify maintenance of the required operational water depths. Survey results shall be reviewed to identify spatial and temporal patterns of sediment accumulation and to optimise the timing, frequency and extent of maintenance dredging activities.		Operator /LCT Ltd.	No additional cost	During operation
	Narrowed channel due to the terminal, maintenance dredging, and large vessel movement alter natural flow regimes, wave generation and sediment transport processes, potentially increasing localised erosion and sedimentation in the vicinity of the terminal (including areas on the other side of the river)	Minor	LCT Ltd. shall monitor riverbank stability, channel morphology, erosion and sedimentation patterns within the area potentially influenced by the terminal footprint, maintenance dredging activities and vessel movements. Where project activities are identified to contribute to increased erosion or sedimentation, appropriate corrective measures shall be developed and implemented in consultation with CPA and relevant authorities	Minor	Operator /LCT Ltd.	No additional cost	During operation
Water and sediment quality	Maintenance dredging will resuspend sediments, release contaminants (if present) and alter water quality parameters	Minor	The Operator with the dredging company shall prepare and implement the Dredging Management Plan (DMP) following the Dredge Material Disposal Policy 2025 and in coordination with the CPA. Maintenance dredging shall be planned and undertaken to minimise the resuspension and dispersion of sediments and associated contaminants.	Minor	Operator /LCT Ltd.	Cost for preparation of the plan:13,500 USD	During operation
	Disposal of dredged materials may affect water quality in other locations, such as Char Bakalia	Minor	Dredge material disposal according to the Dredging and Dredge Material Disposal Policy 2025 and in coordination with the CPA.		Operator /LCT Ltd.	No additional cost	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
			Disposal shall be planned and undertaken to minimise the resuspension and dispersion of sediments and associated contaminants.				
			Prior to disposal of maintenance dredged material, LCT Ltd. shall assess opportunities for beneficial reuse of dredged sediment within the Project or by third parties. Where dredged material is demonstrated to be suitable for beneficial reuse and all required approvals have been obtained, the material shall be made available.		Operator /LCT Ltd.	No additional cost	During operation
			Twice a year, LCT Ltd. shall undertake sediment sampling and laboratory analysis to determine the physical and chemical characteristics of material proposed for dredging. The results shall be used to assess the suitability of dredged material for beneficial reuse, transport, treatment or disposal and to identify any management measures required during dredging operations.		Operator /LCT Ltd.	See monitoring cost	During operation
			The maintenance dredger shall only transport dredged material to disposal or reuse facilities that hold all required permits, licences and approvals applicable to the acceptance and management of dredged material. Prior to commencement of disposal activities and annually thereafter, the Operator shall verify and document that the receiving facility maintains environmental and social management systems appropriate to the nature and scale of its activities. LCT Ltd. shall undertake periodic independent audits of selected disposal and reuse facilities to verify compliance with Project requirements. Where audits identify non-compliance, disposal or supply arrangements shall be suspended until corrective actions have been implemented and verified.		CPA and LCT Ltd.	No additional cost	Prior to disposal activities throughout the Project lifecycle
	Domestic waste and wastewater may pollute soil, groundwater and/or surface water if not treated/managed properly	Minor	The Operator shall comply with the LCT Ltd. waste and wastewater management plan describing the methods to reduce, segregate, treat and dispose of waste and wastewater. The Operator shall only use waste treatment and disposal facilities that hold all permits, licences and approvals required to accept and manage the relevant waste streams. LCT Ltd. shall audit the waste facilities. Where audits identify non-compliance, use of the affected facility shall be suspended until corrective actions have been implemented and verified	Minor	Operator /LCT Ltd.	Cost of preparation of the plan: 10,000 USD	Prior the operation
			Prior to connection to the CWASA sewer network, the Operator shall install, operate and maintain temporary wastewater collection, conveyance and treatment systems with sufficient capacity to manage all wastewater generated by terminal operations. The wastewater treatment system shall be operated to achieve compliance with applicable discharge and sludge management requirements of ECR 2023.		Operator /LCT Ltd.	Capital cost: 250,000 USD Annual O&M cost: 50,000 USD	Prior to connection to the CWASA sewer network
			The Operator shall collect, contain, convey and treat sewage through appropriately designed, constructed, operated and maintained sanitation and wastewater infrastructure. Sewage collection, storage, pumping and treatment systems shall be routinely inspected and maintained to prevent leaks, overflows, blockages and unauthorised discharges. Any sewage spill, overflow, leak or system failure shall be immediately contained, cleaned up and reported.		Operator /LCT Ltd.	No additional cost	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
	Spills and leaks of fuel, grease and lubricants and other toxic hazardous substances from port equipment, trucks and dredgers and from hazardous cargo.	Moderate	The operator shall ensure that all equipment and vehicles are maintained in accordance with the manufacturer's specifications and kept in a clean and serviceable condition. Equipment shall be routinely inspected for leaks, damage and signs of deterioration, with particular attention given to fuel systems, hydraulic systems, hoses, fittings and other components containing oils or fluids. Ensure that appropriate clean-up equipment is available on site and that all users are familiar with its usage and storage location. Any leaks or defects shall be repaired promptly and defective equipment shall not be operated until repairs have been completed. Fuel storage tanks and temporary storage areas for fuels, lubricating oils, hydraulic fluids and other hazardous liquids shall be provided with secondary containment of sufficient capacity to contain potential spills and prevent releases to soil, surface water and drainage systems.	Minor	Operator /LCT Ltd.	No additional cost	During operation
			The Operator shall develop and implement a Pollution Prevention and Control Management Plan covering fuels, lubricants, hydraulic fluids, chemicals, hazardous substances and hazardous cargo handled during terminal operations. The Plan shall define requirements for storage, handling, transfer, inspection, maintenance, spill prevention, housekeeping, incident reporting and corrective actions.		Operator /LCT Ltd.	Cost of preparation of the plan: 3,000 USD	Prior to and during operation
			The Operator shall prepare and implement a Hazardous Materials Management Plan describing the procedures for the procurement, transport, storage, handling, use and disposal of fuels, oils, lubricants, chemicals and other hazardous materials required for the Works. The Plan shall identify hazardous materials used on site, storage requirements, secondary containment measures, inspection requirements, spill prevention controls, refuelling procedures, waste handling requirements, emergency response arrangements and corrective actions. Hazardous materials shall be stored in designated areas with appropriate secondary containment and protection from rainfall, flooding and unauthorised access. The operator shall maintain an inventory of hazardous materials on site and keep current Safety Data Sheets (SDS) available for all hazardous substances. The operator shall inspect hazardous material storage areas routinely and immediately rectify any deficiencies identified. Any leak, spill or unauthorised release of hazardous materials shall be immediately contained, cleaned up, reported and investigated. The Contractor shall implement corrective actions to prevent recurrence.		Operator /LCT Ltd.	Cost of preparation of the plan: 10,000 USD	Prior to and during operation
			Develop appropriate contingency plan. The Plan shall define spill notification requirements, response procedures, responsibilities, reporting requirements, containment measures and remediation requirements for releases of fuels, oils, lubricants, chemicals and hazardous cargo. Appropriate spill response equipment shall be maintained at locations where hazardous materials are stored, transferred or handled. Personnel involved in handling hazardous substances shall receive training in spill prevention, spill response procedures and use of spill response equipment. All spills, leaks and releases shall be reported, investigated and documented. Corrective actions shall be implemented to prevent recurrence.		Operator /LCT Ltd.	No additional cost	Prior to and during operation
	Risk of oil spill during bunkering of container vessels	Major	Bunkering of vessels shall not be undertaken at the LCTP berth, within the terminal area, or within areas under the operational control of LCT Ltd. The operator shall ensure that bunkering is not undertaken at the Project site.	Minor	Operator /LCT Ltd.	No additional cost	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
Ambient air quality	Discharge of stormwater from the project site including first flush and potential pollutants into the river	Moderate	Waste materials, fuels, oils, lubricants, chemicals and other potentially polluting substances shall be stored, handled and transferred within designated areas designed to prevent releases to stormwater drainage systems and receiving waters. Any spill or leak with the potential to enter the stormwater drainage system shall be contained, cleaned up and reported immediately.	Moderate	Operator /LCT Ltd.	No additional cost	During operation
			Stormwater drainage systems serving operational areas with the potential for hydrocarbon contamination shall be fitted with appropriately designed oil-water separators prior to discharge to the receiving environment. Oil-water separators shall be operated, inspected, maintained and cleaned to ensure continued treatment performance. Where inspections or monitoring identify inadequate treatment performance, equipment malfunction, excessive oil accumulation or evidence of contaminated stormwater discharges, the Operator shall investigate the cause and implement corrective actions.		Operator /LCT Ltd.	No additional cost	Prior to operation and during operation
			The Operator shall prepare a Storm Water Management Plan. The Plan shall identify potential sources of stormwater contamination, including fuel and chemical storage areas, vehicle and equipment maintenance areas, waste management areas, cargo handling areas and other operational activities with the potential to generate contaminated runoff. The Plan shall define stormwater collection, treatment, inspection, maintenance, monitoring, incident response and corrective action requirements.		Operator /LCT Ltd.	Cost of preparation of the plan: 9,000 USD	Prior to operation
	Emissions (SOX, NOX, CO, PM2.5 and PM10) from vessels, vehicles, various types of operational equipment, and generators will impact air quality	Moderate	The Operator shall prepare and implement an Air Emissions Management Plan. The Air Emissions Plan shall identify sources of air emissions associated with vessels, trucks, terminal equipment, generators and other operational activities and shall define measures for emissions reduction, equipment maintenance, idling control, monitoring, reporting and corrective actions	Minor	Operator /LCT Ltd.	Cost of preparation of the plan: 4,500 USD	Prior to and during operation
			The Operator shall inspect, maintain and operate vehicles, generators, cranes, dredging equipment and other combustion-powered equipment in accordance with manufacturer specifications to minimise exhaust emissions. Equipment exhibiting visible excessive exhaust emissions, abnormal engine performance or fuel system leaks shall be removed from service until the defect has been repaired. Unnecessary idling of vehicles and equipment shall be prohibited except where required for operational, safety or equipment-specific reasons. Contractors operating vehicles within the terminal shall comply with the Project's idling and vehicle emissions requirements.		Operator /LCT Ltd.	No additional cost	During operation
	Terminal operations will emit GHGs that contribute to climate change effects. However, as most handling equipment will be electrical, GHG emissions are relatively limited.	Minor	LCT Ltd. shall evaluate the technical and economic feasibility of installing solar photovoltaic systems on terminal buildings, and other suitable structures during detailed design and operation. Where demonstrated to be technically feasible and operationally compatible, solar photovoltaic systems shall be installed and maintained to reduce reliance on grid electricity and associated greenhouse gas emissions.	Minor	LCT Ltd.	No additional cost	Prior to and during operation
			The Operator shall prepare and implement a GHG Management Plan. The GHG management plan shall define the methodology for quantifying, monitoring, reporting and managing GHG emissions associated with terminal operations, including electricity consumption, fuel consumption by vehicles and equipment, generators, refrigerants and other significant emission sources. Annual GHG emission calculations, performance and emission reduction initiatives shall be reported internally and externally in accordance with applicable Project reporting requirements.		Operator /LCT Ltd.	Cost of preparation of the plan: 5,000 USD	Prior to and during operation
Ambient noise levels	Vessels, different types of container handling cranes, truck, lorries, handling of containers are likely to cause high level noise	Major	The Operator shall prepare and implement a Noise and Vibration Management Plan. The Noise and Vibration Management Plan shall identify operational noise sources, determine appropriate noise thresholds, based on ambient levels, establish noise monitoring requirements, define noise control measures and specify requirements for complaint management, incident investigation and corrective actions. The Operator shall minimise noise emissions from vessels, container handling equipment, cranes, generators, trucks, lorries and other terminal operations through appropriate equipment selection,	Moderate	Operator /LCT Ltd.	Cost of preparation of the plan: 14,000 USD	Prior to and during operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
			using low-noise equipment, avoiding old or poorly maintained machinery and implementing regular maintenance programmes for all vehicles and equipment, operational controls and implementation of noise reduction measures. In addition, generators and heavy-duty machinery will be fitted with manufacturer-approved acoustic enclosures to minimise noise emissions				
Fisheries resources	Maintenance dredging may generate sediment plumes that temporarily increase suspended sediment concentrations within fish migration pathways in the Karnaphuli River affecting the ability of migratory fish to detect migration cues and move through the area.	Moderate	LCT Ltd. shall prepare and implement a Biodiversity Management Plan (BMP) covering construction and operation. The BMP shall identify fisheries-sensitive receptors, migratory fish species, migration periods, monitoring requirements, consultation requirements, sediment plume management requirements and adaptive management measures applicable to dredging activities. The BMP shall define procedures for responding to monitoring exceedances, fisheries-related grievances and observations of potential disruption to fish migration.	Minor	LCT Ltd. /LCT Ltd.	Cost of preparation of the plan: 37,000 USD	Prior to operation
			The dredging company shall minimise the duration of each maintenance dredging campaign to the extent reasonably practicable. Dredging activities shall be scheduled to avoid fisheries-sensitive migration, spawning and juvenile dispersal periods for Hilsa and Indian major carp, to the extent technically feasible and operationally practicable. Dredging activities shall, where technically feasible and operationally practicable, be scheduled to minimise overlap with periods during which migratory fish species are expected to move through the Karnaphuli River and Project Area. Particular consideration shall be given to the principal Hilsa migration period (July-September) and periods when eggs, larvae and juveniles of Indian major carps may be transported through the Karnaphuli-Halda system (approximately April-July). Where practicable, dredging shall also avoid the annual Government of Bangladesh Hilsa brood-stock protection period. Dredging during these periods shall be avoided, unless the dredging company demonstrates that dredging during these periods cannot reasonably be avoided due to navigational safety, operational necessity or other overriding operational constraints. Where dredging is required during any fisheries-sensitive period, the Contractor shall implement turbidity monitoring, sediment plume monitoring, fisheries stakeholder engagement and adaptive management measures in accordance with the Biodiversity Management Plan and Dredging Management Plan.		Dredging Contractor /LCT Ltd./CPA	No additional cost	During dredging activities
			Where dredging activities are undertaken during identified fisheries-sensitive migration periods, the Operator shall implement a turbidity and sediment plume monitoring programme to verify that dredging-induced turbidity and sediment plume do not create a barrier to fish migration. The objective for this monitoring is to ensure that fish migration behaviour is not adversely significantly affected by project activities (including dredging, placement or disposal of dredged material and reclamation activity) such that it would affect the population numbers and spawning behaviour further up the estuary or affect the migration of juveniles back down the estuary and out to sea. The key species for the estuary are considered to be Hilsa (important as a commercial species for many of the local communities along the estuary) and Indian major carp (important as a food source for the Gangetic dolphin). Consultation with the local fisherfolk may result in additional species also considered to be important. The thresholds would apply during all periods of migration both up and down the estuary, with the migration of the juveniles out to sea being more important as they will be more sensitive to suspended sediment levels. The Operator shall establish ambient turbidity conditions at representative reference locations that are not influenced by Project-related activities. Where turbidity exceeds 10% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations, the Operator shall investigate the cause. If the exceedance is considered to be due to project activities, then management actions should be taken to ensure that the turbidity levels do not rise to the threshold level. If monitoring identifies turbidity levels exceeding 20% above ambient conditions at all monitoring stations across the width of the estuary at either the upstream or downstream locations and the exceedance is attributable to Project-related activities, the Operator shall implement additional corrective actions to reduce turbidity inducing activities to ensure that the levels return to below the threshold within eight hours of the exceedance. The Operator shall undertake regular consultation with fishermen and fishing communities via an appropriately qualified local fisheries consultant, throughout the turbidity inducing activities related to the project to verify the continued occurrence and movement of migratory fish species through the Project area. Where monitoring, consultations or grievances indicate potential disruption to		Operator /LCT Ltd.	See monitoring cost	During dredging activities

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
			fish migration attributable to Project activities, the Operator shall investigate the cause and implement adaptive management measures. Should it be clear that fish are still migrating through the turbidity plumes caused by the project and there have been exceedances of the threshold then the thresholds (intensity and/or duration) could be adjusted with agreement of the fisheries consultant (in consultation with the fisherfolk).Available satellite imagery shall be used, where practicable, to support interpretation of sediment plume behaviour and verification of monitoring results				
			The Operator shall maintain a mechanism for receiving, recording and responding to fisheries-related grievances, complaints and observations from fishermen and fishing communities. Where investigations indicate that Project activities may be contributing to disruption of fish migration or other fisheries-related impacts, the Operator shall implement appropriate adaptive management measures and corrective actions and communicate the outcome of the investigation to affected stakeholders		LCT Ltd./CPA	No additional cost	During dredging activities
	Maintenance dredging, container vessel movement generates underwater noise and risk of spills of chemicals/oil which may impact fisheries resources	Moderate	The operator shall implement spill prevention and pollution control measures during maintenance dredging and vessel operations to prevent releases of fuels, oils, lubricants and other hazardous substances to the aquatic environment. Dredging vessels and associated marine equipment shall be inspected and maintained to prevent leaks and spills. Spill response equipment shall be available during dredging activities and all spill incidents shall be reported, investigated and addressed through corrective actions. The Operator shall minimise underwater noise associated with maintenance dredging and vessel movements by maintaining equipment in good working condition, avoiding unnecessary vessel manoeuvring and limiting vessel speeds within operational areas where safe and practicable.	Minor	Dredging Contractor//LCT Ltd./CPA	No additional cost	During dredging activities
	Habitat degradation of benthic species (fish feed) and some fishes due to maintenance dredging activities	Moderate	The Operator shall ensure that the dredging company confines dredging activities to the approved dredging footprint and shall plan and execute dredging works in a manner that minimises unnecessary disturbance of the riverbed and the generation of suspended sediments. The dredging company shall implement the water quality monitoring requirements of the approved Dredging Management Plan and, where monitoring indicates that dredging activities are generating excessive sediment mobilisation or that mitigation measures are not performing effectively, shall ensure that dredging methods or operating practices are modified to reduce environmental impacts.	Minor	Operator /LCT Ltd.	No additional cost	During operation
Tidal mudflats	Risk of spills of chemicals/oil which may impact surrounding tidal mudflats	Moderate	Bunkering of vessels shall not be undertaken at the terminal berth, within the terminal area or within areas under the operational control of LCT Ltd. The Operator shall prepare and implement a Pollution Prevention and Control Management Plan. Any spill, leak or release with the potential to affect tidal mudflats, intertidal habitats or other sensitive environmental receptors shall be immediately contained, reported and investigated. Corrective actions shall be implemented to prevent recurrence.	Minor	Operator /LCT Ltd.	Included in costs for Pollution Prevention and Control Management Plan and Biodiversity Management Plan	Prior to and during operation
Mangrove ecosystems	Risk of spills of chemicals/oil which may impact mangroves at the project site or at Majher Char downstream of the project area	Moderate	The Operator shall implement the Pollution Prevention and Control Management Plan and Spill Prevention and Response Plan to prevent releases of fuels, oils, lubricants, chemicals and other hazardous substances that may affect mangrove habitats at Majher Char. Any spill or release with the potential to affect mangrove habitats shall be immediately contained, reported and investigated. Appropriate corrective actions shall be implemented and the effectiveness of corrective actions shall be verified through follow-up inspections	Minor	Operator /LCT Ltd.	Included in costs for Pollution Prevention and Control Management Plan and Biodiversity Management Plan	Prior to and during operation
Dolphins	Maintenance dredging, vessel movement may pose risk for water pollution and underwater noise generation which may impact dolphins	Major	The Operator shall prepare and implement a Biodiversity Management Plan, Dredging Management Plan and Pollution Prevention and Control Management Plan to minimise underwater noise, suspended sediment generation and contamination of dolphin habitat during maintenance dredging and vessel operations. Dredging vessels and associated marine equipment shall be inspected and maintained to prevent leaks, spills and unnecessary underwater noise generation. Spill response equipment shall be available during maintenance dredging activities and all spills and pollution incidents shall be reported, investigated and addressed through corrective actions. Where monitoring, dolphin observations, fisheries consultations, grievances or pollution incidents indicate potential Project-related impacts on dolphins or dolphin habitat, the Operator shall investigate the cause and implement adaptive management measures.	Moderate	Dredging Contractor//LCT Ltd./CPA	Included in costs for Dredging Management Plan, Pollution Prevention and Control Management Plan and Biodiversity Management Plan	During dredging activities

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
Avifauna and migratory birds	Risk of collision with vessels	Major	The Operator shall implement vessel operation procedures to minimise the risk of collision with Ganges River dolphins and other aquatic fauna. The operator shall ensure that somebody on board of the vessel has done a training on marine mammal observing (JNCC-aligned training or equivalent, supplemented by local river dolphin identification). The person would be responsible for ensuring that vessels are aware of any dolphins present in an area where a vessel is manoeuvring and can avoid interactions.	Moderate	Operator /LCT Ltd.	2,500 USD	During operation
			The Operator shall provide annual marine mammal awareness raising to all personnel involved in vessel movements. Training shall cover dolphin identification, collision avoidance procedures, reporting requirements, and operational measures to minimise disturbance and injury to marine mammals during vessel movements and manoeuvring activities.		Operator /LCT Ltd.	No additional cost	Yearly during operation
	The terminal operation activities may affect birds due to noise and light pollution	Negligible	LCT Ltd. Shall prepare and implement a Biodiversity Management Plan (BMP) n covering construction and operation. The BMP shall define monitoring requirements, adaptive management procedures, reporting requirements and corrective actions for avifauna and bats occurring within the Project Area of Influence.	Negligible	LCT Ltd./CPA	Included in costs for Biodiversity Management Plan	Prior to operation
			Noise impacts and light disturbance shall be reduced by using low-noise equipment, avoiding old or poorly maintained machinery and implementing regular maintenance programmes for all vehicles and equipment and implementing the noise and lighting controls specified in the Biodiversity Management Plan. In addition, generators and heavy-duty machinery will be fitted with insulation or enclosed to minimise noise emissions. Operational lighting shall be directed towards work areas and designed to minimise light spill into adjacent habitats, to the extent practicable		Operator /LCT Ltd.	No additional cost	During operation
			An adaptive monitoring and management plan should be followed (given in the Biodiversity Management Plan) to ensure that appropriate actions are taken when necessary and that, at other times where the risk is not present or at a low level, activities can proceed. The adaptive plan should include monitoring for any birds and bats in the area and if they are showing signs of disturbance then action can be taken to reduce the noise levels or light disturbance. The local area is already subject to high levels of noise from the airport and other activities in the area and measures should be applied where the disturbance is due to the specific activity rather than for all sources of noise or light pollution.		Operator /LCT Ltd.	No additional cost	During operation
	Possible (temporary) congestion and interruption to the surrounding road traffic due to the entry, exit, and parking of the container trucks and passenger vehicles generated by the terminal	Minor	Minimise impacts on surrounding road users through optimisation of terminal access arrangements and by limiting the number of access and egress points to those required for safe and efficient operation.	Minor	Operator /LCT Ltd.	No additional cost	Prior to and during operation
			The Operator shall prepare and implement a Road Traffic Management Plan for the operational phase. The Plan shall include traffic circulation arrangements, access management measures, parking management measures, traffic safety requirements, stakeholder communication requirements and procedures for responding to traffic-related complaints and incidents. Terminal access, vehicle movements and parking arrangements shall be managed to minimise congestion and disruption to surrounding road users.		Operator /LCT Ltd.	Cost of preparation of the plan: 10,000 USD	Prior to operation
			Prohibit on-street parking associated with terminal activities and provide adequate designated parking and waiting areas within the Project site or other approved locations. Traffic control personnel shall be deployed during the initial operational ramp-up period and during periods of peak traffic demand where required to maintain the safe and efficient movement of vehicles. Where monitoring identifies recurring congestion, traffic-related complaints or traffic safety incidents attributable to Project activities, the Operator shall investigate the cause and implement corrective actions.		Operator /LCT Ltd.	No additional cost	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
River traffic			Ensure all project vehicle operators receive site-specific training on applicable road traffic regulations, speed limits, safe driving practices, navigational safety requirements and measures to minimise noise, dust and community disturbance. Refresher training shall be provided periodically and when significant traffic-related incidents or non-conformances occur. Vehicles accessing the terminal shall comply with applicable roadworthiness and safety requirements, including the maintenance of lights, brakes, seat belts and other safety-critical systems. The Operator shall implement and enforce a maximum vehicle speed limit within the terminal and along designated Project access routes, as defined in the Road Traffic Management Plan.		Operator /LCT Ltd.	No additional cost	During operation
			The Operator shall engage with relevant traffic management authorities to coordinate traffic management and road safety measures associated with terminal operations, including the installation and maintenance of appropriate traffic control and directional signage on-site and, where agreed with the relevant authorities, on surrounding public roads. Appropriate directional signage shall be installed and maintained to guide vehicles to and from the terminal gates, minimise unnecessary search traffic and support the safe and efficient movement of vehicles. The Operator shall inform local communities and road users of potential traffic impacts and relevant safety precautions. Road safety awareness activities shall be undertaken for nearby communities and schools to promote safe road use and reduce the risk of traffic-related incidents associated with terminal operations.		Operator /LCT Ltd.	5,000 USD	During operation
	Movement, berthing and manoeuvring of container ships may hamper and bring safety risks to existing river traffic and in particular operations at KDDL across the river	Moderate	Coordinate vessel arrivals, departures, and manoeuvring activities with Karnaphuli Dry Dock Limited (KDDL) and CPA to minimize navigation conflicts, vessel interactions and congestion within the constrained navigation corridor between the LCT site and the dry dock facility. Vessel movements shall be planned to minimise interference with existing river traffic and maintain safe navigation within constrained sections of the river. Where monitoring identifies recurring congestion, navigation conflicts, near-miss incidents, vessel queuing or substantiated navigational complaints attributable to terminal operations, the Operator shall investigate the cause and implement corrective actions. Corrective actions may include modification of vessel scheduling arrangements, changes to operational procedures, enhanced communication protocols or additional traffic management measures.	Moderate	Operator /LCT Ltd.	No additional cost	During operation
	Vessel manoeuvring simulations indicate that large container vessels turning and berthing at the proposed LCT may temporarily occupy a significant portion of the navigation channel. This may increase vessel interactions and traffic congestion in the vicinity of the berth, resulting in a higher risk of navigational conflicts with passing vessels, tugboats, fishing vessels, and other river users during turning and berthing operations.	Moderate	The Operator shall coordinate with the Chattogram Port Authority (CPA), vessel pilots and other relevant river users during the arrival, departure, turning and berthing of large container vessels. Temporarily restrict or control vessel movements within the immediate vicinity of the LCT during the turning and berthing of large container vessels, where considered necessary by CPA and the vessel pilot. The Operator shall communicate planned vessel movements to relevant stakeholders and maintain appropriate coordination procedures during vessel manoeuvring operations.		Operator /LCT Ltd.	No additional cost	During operation
			Consult with CPA to enhance the navigational safety of local vessels, river crossings, and small craft operating in the project area. In coordination with CPA, the Operator shall support the provision and maintenance of appropriate navigational safety measures, which may include navigation lights, channel markers, radar reflectors, communication equipment and other navigation aids considered necessary for safe vessel movements.		Operator and LCT Ltd.	5,000 USD	During operation
	River crossing boats frequently cross the main navigation channel, creating recurring interactions with commercial vessels transiting along the river. During periods of high traffic activity, these crossing movements may increase the risk of navigational conflicts and vessel interactions within the channel	Moderate	Coordinate with CPA, ferry operators, small craft operators and other relevant river users to minimise navigational conflicts between river crossing vessels and commercial shipping within the Project Area of Influence. In coordination with CPA, the Operator shall support to enhance the navigational safety of local vessels, ferries, and small craft operating in the project area through the support of provision of appropriate navigation aids, including navigation lights, radar reflectors, communication equipment.	Moderate	Operator and LCT Ltd.	See above	During operation
			Coordinate with CPA in engagement with small craft operators to promote safe navigation practices and improve awareness of commercial vessel movements within the navigation channel.		Operator and LCT Ltd.	See above	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
			All vessel interaction incidents, navigational conflicts and near-miss events involving Project-related vessels, ferries, fishing vessels or other river users shall be recorded, investigated and reported. Investigation findings shall be used to identify root causes, monitor trends and improve navigational safety procedures. Where monitoring identifies recurring navigation conflicts, near misses, complaints or other navigational safety concerns, the Operator shall investigate the cause and implement corrective actions. Corrective actions may include revised vessel movement procedures, additional communication measures, enhanced navigation aids or other traffic management measures.		Operator /LCT Ltd.	No additional cost	During operation
	The increased vessel traffic associated with the LCT project may affect the safety, mobility, and livelihoods of communities that depend on the Karnaphuli River. Additional commercial vessel movements may increase navigational conflicts, delays, and restrictions on river access, particularly at key crossing locations such as river crossing *ghats*. These impacts may affect passenger transport, fishing activities, and other river-based livelihoods, while also increasing safety risks for small vessels and river users.	Moderate	LCT Ltd. shall prepare and implement a River Traffic Management Plan for terminal operations. The Plan shall include vessel movement procedures, communication protocols, stakeholder engagement requirements, navigational safety measures and procedures for responding to navigation-related complaints and incidents. LCT Ltd. shall maintain regular communication with ferry operators, fishing communities, and other river users.	Moderate	Operator and LCT Ltd.	Together with road traffic management plan as given above	Prior to and during operation
			Coordinate with CPA to advance notification of major vessel movements, awareness programmes for local operators, and temporary traffic controls during large vessel manoeuvres should be adopted. Temporary traffic management or navigation control measures shall be implemented during large vessel manoeuvring operations where required by CPA or identified through the River Traffic Management Plan.		Operator and LCT Ltd.	No additional cost	During operation
			Project-related navigational risks, vessel movement arrangements and applicable safety measures shall be disclosed to affected communities. Navigation-related complaints, incidents and near-miss events involving commercial vessels, ferries, fishing vessels or other river users shall be recorded, investigated and reported. Investigation findings shall be used to identify root causes, monitor trends and improve navigational safety procedures. Where monitoring identifies recurring navigation conflicts, delays, restrictions on river access, safety concerns or livelihood impacts attributable to Project-related vessel movements, LCT Ltd. shall investigate the cause and implement corrective actions. Corrective actions may include revised vessel scheduling, enhanced communications, additional traffic management measures or other navigational safety controls.		Operator /LCT Ltd.	No additional cost	During operation
Livelihood, health and safety of communities	Increased truck traffic and transport activities associated with terminal operations may increase road safety risks for pedestrians, cyclists, motorists and other road users and may affect access to community facilities, ferry crossings and livelihoods that depend on safe movement within the Area of Influence.	Moderate	Prepare and implement a traffic and road management plan, including community Health & Safety (see above). Integrate the measures during the contracting phase of the transporting companies (see above). The Operator shall monitor traffic generation, traffic volumes, traffic incidents and road safety performance during the operational phase and review the effectiveness of traffic management measures.	Minor	Operator /LCT Ltd.	See above	Prior to and during operation
			The Operator shall provide training and awareness programmes for drivers regarding applicable traffic regulations, speed limits, designated routes, pedestrian safety, safe driving practices and measures to minimise risks to local communities. Road safety awareness programmes shall be undertaken for local communities, schools and other community facilities located within the Area of Influence. Topics shall include safe road use, pedestrian safety, vehicle blind spots, crossing behaviour and risks associated with increased truck traffic.		Operator /LCT Ltd.	7,000 USD	During operation
			Appropriate directional and traffic safety signage shall be installed and maintained to guide vehicles to and from the terminal, minimise unnecessary traffic movements and improve road safety. Traffic control personnel shall be deployed during periods of peak traffic demand and where monitoring identifies traffic safety concerns associated with terminal operations.		Operator /LCT Ltd.	No additional cost	During operation
			Monitor the condition of public roads used by Project-related traffic and, in coordination with the relevant road authorities, incorporate Project-related road wear and pavement deterioration into applicable road maintenance and asset management programmes. Where monitoring identifies material deterioration attributable to Project-related traffic, the Operator shall engage with the relevant authorities regarding appropriate maintenance interventions.		Operator /LCT Ltd.	See monitoring cost	During operation
			Monitor pedestrian movements and road safety conditions along VIP Road and at locations where pedestrians access ferry services and river crossing facilities. In consultation with the relevant road		Operator /LCT Ltd.	See monitoring cost	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
			authorities, the Operator shall periodically assess whether additional pedestrian safety measures are required.				
			Monitor and validate actual traffic generation and traffic volumes during the initial operational phase. The results shall be used to assess the accuracy of forecast assumptions and determine whether additional traffic management or road safety measures are required.		Operator /LCT Ltd.	See monitoring cost	During operation
			In collaboration with the road authorities, investigate these options if safety in the area decreases: Introduce a priority-controlled layout for the main roads for safety; Introduce zebra crossings at appropriate locations along the VIP Road to provide pedestrians with priority when crossing the road and to improve pedestrian permeability and accessibility across the corridor; Create pedestrian path along VIP Road. Ensure safe road crossings at the Ghats with the river crossing facilities, as there will likely be an increase in road crossings at those points with the closure of Ghat 14		Operator /LCT Ltd.	No additional cost	During operation
	Community health & safety risks, including fire or explosion risks from fuel, hazardous cargo, or other operations from operations on the LCTP	Major	The Operator shall prepare a Community Health and Safety Management Plan. The Plan shall identify potential risks to neighbouring communities, river users, commuters and other external stakeholders arising from terminal operations and shall define mitigation measures, monitoring requirements, communication procedures and corrective actions.	Moderate	Operator /LCT Ltd.	Cost of preparation of the plan: 10,000 USD	Prior to operation
			The Operator shall prepare, implement and maintain an Emergency Response Plan. The plan shall be covering credible operational emergency scenarios, including fires, explosions, fuel spills, hazardous cargo incidents, vessel incidents and other events with the potential to affect surrounding communities, river users and the environment. Emergency response procedures shall be periodically tested through drills and exercises. Lessons learned shall be incorporated into updates of the Emergency Response Plan.		Operator /LCT Ltd.	Cost of preparation of the plan: 15,000 USD	Prior to and during operation
			The Operator shall prepare and implement a Fire Emergency Response Plan addressing prevention, detection, notification, response and evacuation procedures for fire and explosion scenarios associated with terminal operations, fuel storage and handling of hazardous cargo. Fire protection systems, firefighting equipment and emergency response resources shall be inspected, maintained and tested at defined intervals.		Operator /LCT Ltd.	Cost of preparation of the plan: 10,000 USD	Prior to and during operation
			The Operator shall introduce an Address & General Alarm / Emergency Communications /Mass Notification System – to enable timely notification for neighbouring communities, small craft, fishermen, and commuters in case of safety incidents potentially affecting health and safety in the surrounding area.		Operator /LCT Ltd.	5,000 USD	During operation
	Noise, visual impact of stacked containers and container vessel and lighting in the night coming from the operations on LCTP	Moderate	The Operator shall implement noise and light management measures to minimise disturbance to neighbouring communities and other sensitive receptors. Noise-generating equipment shall be maintained in good working condition and, where required, fitted with appropriate noise attenuation measures such as acoustic enclosures, silencers, mufflers, vibration isolation systems and noise barriers. Reversing alarms shall be selected and operated to minimise unnecessary noise (for example with hisser-sissers) while maintaining operational safety. Operational lighting shall be directed towards work areas and designed to minimise light spill beyond the terminal boundary. Lighting systems shall be operated only where required for safety and operational purposes and shall incorporate adaptive controls where practicable.	Minor	Operator /LCT Ltd.	50,000 USD for capital investment and 5,000 USD for yearly maintenance	Prior to and during operation
			Operator shall consider in the lay-out of the operations, locating components generating emissions (generators, lights, dust, exhaust) away from the neighbouring communities, schools, mosques and other sensitive receptors. The Operator shall maintain and enhance landscape screening and vegetation within the Project area where practicable to reduce visual impacts and improve the appearance of the terminal.		Operator /LCT Ltd.	No additional budget	During operation
			Coordinate with CCC and neighbouring communities to develop and implement a community-led wall painting and visual enhancement programme to reduce the visual impacts of terminal infrastructure on nearby residential areas. The design, artwork and implementation approach shall be developed in consultation with affected communities and shall reflect local preferences where practicable. The Operator		Operator /LCT Ltd.	5,000 USD	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
			shall maintain the painted walls and other visual enhancement measures in good condition throughout the operational phase and address deterioration or damage where necessary.				
			Coordinate with CCC and relevant stakeholders to enhance and maintain the vegetation in the central dividing strip of the public road in front of Block C. Vegetation enhancement measures shall aim to improve visual screening of terminal activities and infrastructure, reduce visual disturbance to nearby communities and contribute to improvements in the local streetscape environment. The Operator shall periodically review the effectiveness of vegetation screening and, where practicable, implement additional planting or landscape enhancement measures in consultation with CCC and affected communities.		Operator /LCT Ltd.	5,000 USD	During operation
			The Operator shall maintain an accessible grievance mechanism for external stakeholders, including neighbouring communities, commuters, river users and other affected persons. The grievance mechanism shall include procedures for receiving, recording, investigating and responding to complaints relating to noise, lighting, visual impacts, traffic and other operational nuisances.		Operator/LCT Ltd.	No additional costs	During operation
			Operator shall prepare and implement a communication plan and inform the public regularly on planned activities with expected increase in intensity of the operations, traffic and emissions through the appropriate media.		Operator /LCT Ltd.	Cost for preparation of the plan:5,000 USD 1,000 USD for implementation of the plan annually	During operation
	Improved opportunities for export of products, supporting and improving economic activities at the national level	Major	Monitoring of export and economic development in Bangladesh and enhancing contribution of LCTP to this development	Major	LCT Ltd.	No additional cost	During operation
	Employment opportunities for skilled manpower as well as labour force in multiple jobs at the LCTP.	Major	The Operator shall make a Local Content Plan to maximize the use of local workforce, suppliers, and resources in projects while ensuring compliance with regulatory and corporate requirements. Strive for a 50% of employees from the AoI of the project.	Major	Operator /LCT Ltd.	Preparation of the plan: 10,000 USD 1,000 USD for implementation of the plan annually	Prior to and during operation
	Opportunities for local vendors or restaurant/ shop owners to sell food/ goods to staff and workers	Major					
	(Perceived) risks of electricity outage and reduced water supply to residents due to LCTP's power and water demand for operating an energy-intensive container terminal, as well as for water consumption for employees.	Major	LCT Ltd. shall coordinate with BPDB and CWASA regarding the electricity and water supply requirements of the Project to support planning and implementation of the associated utility infrastructure. The objective shall be to ensure, to the extent practicable, that Project-related demand for electricity and water does not adversely affect the availability or reliability of supply to surrounding communities. LCT Ltd. shall provide timely information regarding forecast electricity and water demand and shall implement measures to promote efficient use of electricity and water during terminal operations. Where stakeholder engagement, monitoring or information provided by BPDB, CWASA or relevant authorities indicates that Project-related utility demand may be contributing to electricity supply interruptions or reduced water availability for surrounding communities, LCT Ltd. shall engage with the relevant utility providers to investigate the issue and identify appropriate management measures within its sphere of influence.	Moderate	LCT Ltd.	5,000 USD	Prior to operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
	Radiation and fire risks from overhead electricity cabling between Halishahar substation and LCTP to affect residents living nearby.	Major	LCT Ltd. shall coordinate with BPDB to promote the safe design, operation and maintenance of the electricity transmission infrastructure developed to serve the Project, with the objective of preventing adverse impacts on nearby communities. LCT Ltd. shall engage with BPDB to verify that appropriate safety controls are maintained, including inspection and maintenance programmes, vegetation management, maintenance of safety clearances, access restrictions and emergency response arrangements. LCT Ltd. shall communicate relevant transmission-line safety information to potentially affected communities where appropriate and shall maintain a mechanism for receiving, recording and responding to community grievances and concerns relating to the Project-associated transmission infrastructure. Where grievances, incidents or information provided by BPDB indicate a potential community health or safety impact that may be attributable to the Project-associated transmission infrastructure, LCT Ltd. shall engage with BPDB to investigate the cause and identify appropriate management measures within its sphere of influence.	Minor	Operator and LCT Ltd.	5,000 USD	During operation
	Vulnerable groups, including women, youth, the elderly, and persons with disabilities, may face increased safety and security risks from labour influx, increase in road and river traffic, improper security personnel.	Major	The Operator shall prepare and implement a Gender Action Plan. The Plan shall include measures to promote equitable access to Project benefits, identify and address risks affecting women and other vulnerable groups and define monitoring and reporting requirements.	Moderate	Operator /LCT Ltd.	5,000 USD for preparation of the plan	Prior to and during operation
			The Operator shall prepare and implement a Sexual Exploitation and Abuse Plan and a Gender Based Violence Action Plan. The Plan shall define awareness measures, reporting mechanisms, referral pathways, training requirements, survivor-centred response procedures and corrective actions.		Operator /LCT Ltd.	Cost for preparation of the plans: 10,000 USD	Prior to and during operation
			The Operator shall prepare and implement a Community health & safety Plan addressing risks associated with labour influx, road traffic, river traffic, interactions between workers and communities, and risks to vulnerable groups including women, youth, the elderly and persons with disabilities.		Operator /LCT Ltd.	Cost for preparation of the plan: 10,000 USD	Prior to and during operation
			The Operator shall prepare and implement a Security Management Plan, including The Voluntary Principles on Security and Human Rights (VPSHR), The International Ship and Port Facility Security (ISPS) Code and Good Practice Handbook: Use of Security Forces: Assessing and Managing Risks and Impacts (IFC)		Operator /LCT Ltd.	Cost for preparation of the plan: 30.000 USD	Prior to and during operation
			The Operator shall prepare and implement a Trafficking in Person risk assessment and, where risks are identified, develop and implement appropriate mitigation measures.		Operator /LCT Ltd.	Cost for preparation of the plan: 5,000 USD	Prior to and during operation
			The Operator shall maintain accessible grievance mechanisms for community members, including confidential reporting channels for GBV, SEAH and trafficking-related concerns. Where monitoring, grievances, incidents or stakeholder engagement indicate Project-related safety, security, GBV, SEAH or trafficking risks affecting vulnerable groups, the Operator shall investigate the cause and implement corrective actions.		Operator/LCT LTd.	No additional cost	Throughout the Project lifecycle
	The increased vessel traffic associated with the LCT project may affect the safety, mobility, and livelihoods of communities that depend on the Karnaphuli River. Additional	Moderate	LCT Ltd. shall prepare and implement a River Traffic Management Plan for terminal operations. The Plan shall define vessel movement procedures, communication protocols, traffic management measures, stakeholder engagement requirements, navigational safety measures and procedures for responding to	Minor	Operator and LCT Ltd.	See traffic management Plan given above	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
Construction and Operation workers	commercial vessel movements may increase navigational conflicts, delays, and restrictions on river access, particularly at key crossing locations near the river crossing ghats. These impacts may affect passenger transport, fishing activities, and other river-based livelihoods, while also increasing safety risks for small vessels and river users.	Major	navigation-related complaints and incidents. LCT Ltd. shall maintain regular communication with ferry operators, fishing communities, and other river users regarding Project-related vessel movements and navigational safety issues.	Moderate			
			Coordination with CPA to minimise navigational conflicts between commercial vessels, ferry services, fishing vessels and other river users. Where practicable, advance notification of major arrivals, departures and manoeuvring activities shall be provided to ferry operators, fishing communities and other potentially affected river users.		Operator /LCT Ltd.	No additional cost	During operation
			Project-related navigational risks, vessel movement arrangements and applicable safety measures and mitigation measures shall be disclosed to affected communities, ferry operators, while incidents and near-miss events should be monitored, investigated, and reported to support the continuous improvement of navigational safety.		Operator /LCT Ltd.	No additional cost	During operation
			Navigation-related complaints, incidents and near-miss events involving ferries, fishing vessels, small craft and other river users shall be recorded, investigated and reported. Investigation findings shall be used to identify root causes, monitor trends and improve navigational safety procedures. Where monitoring, stakeholder engagement, complaints or incident investigations identify Project-related impacts on river access, community safety, passenger transport or river-based livelihoods, LCT Ltd. shall investigate the cause and implement corrective actions and adaptive management measures.		Operator /LCT Ltd.	No additional cost	Druing operation
	Potential conflict between staff and labour coming from outside of project area and communities near the port, which can result in potential conflicts resulting from competition for jobs and services, cultural differences, pressure on local infrastructure, and perceived unequal distribution of project benefits.	Moderate	The Operator shall prepare, implement and enforce a Worker Codes of Conduct to all employees, contractors and subcontractors. The Code of Conduct shall define acceptable including awareness raising on community sensitivities, training prevention and responding to risks of gender-based harassment and sexual exploitation	Minor	Operator /LCT Ltd.	No additional cost	During operation
	Occupational Health & Safety risks from working over water, at height, with heavy equipment, exposure to hazardous and chemical materials.	Moderate	The Operator shall perform a Quantitative Risk Assessment (QRA)/ Hazard and Operability (HAZOP) study for bulk fuel storages & dangerous goods/cargo stored. The findings shall be incorporated into facility design, operational procedures, emergency response arrangements and risk control measures.	Minor	Operator /LCT Ltd.	Cost for preparation of the plan: 9.000 USD	Prior to operation
			The Operator shall prepare an OHS risk assessment and prepare and implement an Occupational Health and Safety (OHS) Management Plan. The Plan shall identify occupational hazards associated with working over water, working at height, lifting operations, vehicle and equipment operation, hazardous materials, confined spaces, electrical systems and emergency situations, and shall define mitigation measures, monitoring requirements, training requirements, emergency response procedures and corrective actions. Safe work procedures, permit-to-work systems, personal protective equipment, competency requirements and task-specific risk assessments shall be implemented for high-risk activities. All occupational health and safety incidents, near misses and non-conformances shall be recorded, investigated and reported. Where investigations identify deficiencies in risk controls, the Operator shall implement corrective actions and review the effectiveness of existing control measures.		Operator /LCT Ltd.	Cost for preparation of the plan: 9,000 USD 5,000 USD for implementation of the plan annually	Prior to operation
	Opportunity for staff and labour to raise their capacity in working in an environment with good international industry practice E&S management.	Moderate	The Operator shall prepare and implement a Labour Management Plan that is aligned with international good industry practice and includes measures for workforce training, skills development, and awareness of environmental, social, health and safety requirements for terminal operations.	Moderate	Operator /LCT Ltd.	Cost for preparation of the plan: 3,500 USD 1,000 USD for implementation of the plan annually	Prior to operation
	High noise generated from operational works (from e.g. container handling operations, crane movements, truck	Major	Implement noise control measures, including acoustic enclosures, silencers, mufflers, vibration isolation, and temporary noise barriers or other appropriate noise attenuation measures, and shall maintain equipment in good working condition to minimise noise generation at the source.	Moderate	Operators /LCT Ltd.	Given above	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
	traffic, vessel engines, reversing alarms, maintenance activities, loading/unloading and other mechanical equipment operating continuously within the terminal) especially in Block-C may have health impacts on the workers as well as the truck drivers		Minimise worker exposure to high noise levels through task planning, job rotation, restricted access to high-noise areas, and scheduling of noisy activities where practicable.		Operators /LCT Ltd.	No additional cost	During operation
			Provide and enforce the use of appropriately rated hearing protection (earplugs, earmuffs, or dual protection where required) n areas where occupational noise exposure may exceed applicable exposure limits.		Operators /LCT Ltd.	No additional cost	During operation
			Conduct workplace noise monitoring and personal exposure monitoring to verify compliance with occupational exposure limits and identify areas requiring additional controls. Where monitoring identifies exceedance of applicable occupational noise exposure limits or indicates that existing controls are not effectively reducing noise exposure, the Operator shall investigate the cause and implement additional mitigation measures.		Operators /LCT Ltd.	No additional cost	During operation
			Implement a hearing conservation programme, including baseline and periodic audiometric testing for workers routinely exposed to high noise levels.		Operators /LCT Ltd.	No additional cost	During operation
			Train workers on noise hazards, the correct use and maintenance of hearing protection, and the importance of reporting excessive noise or defective equipment.		Operator /LCT Ltd.	No additional cost	During operation
			Truck drivers and other visitors entering designated high-noise areas shall be informed of applicable noise hazards and required control measures, including the use of hearing protection where required and compliance with posted safety signage and traffic controls.		Operator /LCT Ltd.	No additional cost	During operation
	Pressure on freshwater availability from e.g. salinity intrusion or inadequate quality/treatment and potential restricted water supply for LCTP		Develop and implement a multi-source water supply strategy comprising primary, supplementary and contingency water sources to maintain a reliable water supply for terminal operations and worker welfare during periods of reduced supply, salinity intrusion or deterioration in source water quality. (e.g. reuse of treated wastewater).		Operator /LCT Ltd.	No additional cost	During operation
			Provide and maintain adequate on-site water storage capacity for the terminal (indicatively 2–5 days of demand) to buffer temporary supply interruptions and maintain continuity of essential operations and worker welfare facilities.		Operator /LCT Ltd.	No additional cost	During operation
			Integrate rainwater harvesting systems, where practicable, to supplement water supply for suitable non-potable applications on the terminal.		Operator /LCT Ltd.	Rainwater harvesting system for approximately 7,000–8,000 m² of roof area: 50,000 USD (lumpsum)	Prior to operation
			Integrate treated wastewater reuse for non-potable applications on the terminal, where technically feasible and consistent with applicable regulatory requirements.		LCT Ltd.	Treated wastewater reuse infrastructure: 60,000 USD (lumpsum)	
			Include on-site polishing treatment (e.g. filtration and disinfection) to address potential deterioration in the quality of water supplied to the terminal and ensure water intended for human consumption complies with applicable standards.		LCT Ltd.	Included in wastewater reuse infrastructure cost	Prior to operation
	Heat stress from increased paved area and steel containers can affect worker health. Heat stress is exacerbated through the extensive paved container yards, asphalt roads, concrete surfaces, steel containers, limited shading, and high temperatures/humidity during terminal operations.		Prepare and implement a Climate Change Risk Management Plan (CCRMP) including heat protocols. Where monitoring identifies recurring heat stress incidents, heat-related illnesses or ineffective heat controls, the Operator shall investigate the cause and implement additional mitigation measures.		Operator /LCT Ltd.	Cost for preparation of the plan: 7,500 USD	Prior to operation
			Provide sufficient shaded resting areas, drinking water points, protective clothing (hats) and shall implement work-rest arrangements during periods of elevated heat stress..		Operator /LCT Ltd.	No additional cost	During operation

VEC	Impact/risks on VEC (Operation)	Significance (Before mitigation)	Mitigation, enhancement and compensation measure	Significance (After mitigation)	Responsible party	Cost estimate for implementation of measures (USD per year)	Timing of implementation of measures
			In Block A, create a shaded area by building a canopy above the trucks, where possible, taking height restrictions into account. Additionally, incorporate solar panels and rainwater harvesting (see above).		Operator /LCT Ltd.	50,000 USD (lumpsum)	Prior to operation
			The Operator shall incorporate vegetation, landscaping and other passive cooling measures, where practicable, to reduce heat accumulation within the terminal and improve thermal comfort in working areas.		Operator /LCT Ltd.	5,000 USD	Prior to operation
			The Operator shall provide access to air-conditioned or otherwise cooled recovery areas for personnel experiencing heat stress symptoms and shall implement procedures for the identification, reporting and management of heat-related illness.		Operator /LCT Ltd.	No additional cost	During operation
	E&S impacts in the supply chain for water and electricity supply, wastewater treatment, truck fuelling, vessel bunkering, solid waste disposal, lashers organisation	Major	The Operator shall prepare and implement a Supply Chain Management system in place, including environmental, social, labour, health and safety requirements for suppliers, contractors and service providers associated with terminal operations.. The Operator shall undertake environmental and social due diligence and audit the key suppliers in their E&S performance. Where audits, incidents, grievances or regulatory actions identify significant environmental, social, labour or health and safety non-compliances within the supply chain that may be linked to Project activities, the Operator shall investigate the issue and implement appropriate corrective actions within its sphere of influence.	Moderate	Operator /LCT Ltd.	5,000 USD	Prior to and during operation
All VECs	Contractors in the operation phase may not be sufficiently equipped to manage E&S risks	Major	LCT Ltd. shall prepare and implement a Contractor/Subcontractor Management System in place, that defines environmental, social, health and safety requirements applicable to all contractors and subcontractors engaged during terminal operations.	Moderate	LCT Ltd.	5,000 USD	Prior to and during operation
			Contractors shall prepare activity-specific method statements and operational procedures for major operational activities in accordance with applicable legal requirements and Project standards. Method statements shall identify environmental, social, health and safety risks and define the control measures, monitoring requirements, responsibilities and corrective actions applicable to the activity. Method statements shall be reviewed and approved by LCT Ltd. prior to commencement of the relevant activity and shall be updated where significant changes occur in operational practices, equipment or risk profiles.	Moderate	Operator /LCT Ltd.	No additional cost	Prior to operation

Table 11-4: Environmental and Social Monitoring Plan during Pre-construction Phase

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (USD)
						Implemented by	Supervised by	
Physical environment	Drainage hydrology	High	Water level measured using automated water level monitoring equipment.	Upstream of the Khal 14 regulator.	Continuous monitoring at 10-minute intervals during pre-construction. Monitoring data reviewed and reported monthly indicating possible water level increases caused by obstructions.	Contractor	BWDB / LCT Ltd.	1,000 USD
			Visual inspection of the drainage condition, indicating: • Evidence of drainage congestion. • Evidence of ponding and standing water. • Sediment accumulation. • Debris accumulation or blockage. • Evidence of backwater effects and restricted flow. • Flooding frequency and extent.	Culverts (inspected via manholes), drainage channels and drainage infrastructure; upstream drainage areas of the crossing.	Inspection of drainage channel to identify possible obstructions conducted monthly during construction with weekly inspections during the monsoon period (July to September). Inspections should also be done within 24 to 48 hours following significant rainfall events.	Contractor	BWDB / LCT Ltd.	Included in the Contractor budget
	Ambient Air Quality	Medium	PM_{10} concentration Evidence of compliance with equipment maintenance requirements Evidence of compliance with vehicle, vessel and equipment idling controls Community Health and Safety Inc register	PM_{10}: Block A, Block C and the nearest residential receptor opposite Block C. (Same locations as the baselines)	Continuous PM_{10} concentration measurements Monthly for review of maintenance records, emission inspection records and idling control records	Contractor	LCT Ltd.	Included in the construction phase monitoring cost for air quality
Social environment	Livelihood, health and safety of communities	High	Livelihood parameters (e.g. income, expenses, employment) of Persons affected by economic displacement		1 month after economic displacement and then every half year for 3 years	LCT Ltd.	-	To be determined, when number of PAPs are identified.
			Number of grievances received and resolved		Monthly	LCT Ltd.	-	Included in GRM budget
			Compliance with the approved Relocation Plan Percentage of economically displaced persons/businesses receiving compensation for verified relocation costs and documented periods of project-related business interruption prior to displacement		Monthly during relocation activities	LCT Ltd.	-	No additional costs
			Number of eligible affected fishermen receiving compensation or relocation arrangements Loss or increase in income of fishing activities of affected fishermen that can be related to project activities		1 month after economic displacement and then every half year for 3 years	LCT Ltd.	-	To be determined, when number of PAPs are identified.
			Compliance with the approved Relocation Plan Livelihood parameters (e.g. income, expenses, employment) of Persons affected by economic displacement		Monthly during relocation activities	LCT Ltd.	-	To be determined, when number of PAPs are identified.
			Visual inspection on health and safety issues and monitor CHS incidents	Inside the terminal sites, including dust suppression areas and fuel/flammable	Daily CHS inspections	Contractor	LCT Ltd	Included in contractor's budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (USD)
						Implemented by	Supervised by	
			Visual inspection to ensure dust suppression measures are in place Visual inspection whether fuel and other flammable materials are stored safely Monitor contractor compliance through regular internal employment, reporting, monitoring and audits.	material storage areas at the project site.	Monthly review of inspection findings, complaints and corrective actions			
			Monitoring as specified in the SAP	As defined in the SAP.	Defined in SAP	LCT Ltd.	-	Defined in SAP
	Construction and Operation workers	High	Number of grievances from workers registered	Terminal sites and workforce locations	Monthly	LCT Ltd.	-	No additional cost
			Monitoring if personal protective equipment is used during work	Work areas inside the terminal sites	Daily	Contractor	LCT Ltd.	No additional cost
			Monitor contractor HSSE performance through inspections, audits and corrective action	Contractor work areas inside the terminal sites	Monthly	LCT Ltd.	-	No additional cost

Table 11-5: Environmental and Social Monitoring Plan during Construction Phase

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
Physical environment	Drainage hydrology	High	Water level measured using automated water level monitoring equipment, including peak water levels during rainfall and monsoon events, duration of elevated water levels, evidence of flooding, waterlogging, ponding or drainage congestion, and comparison of monitored water levels with hydraulic model predictions and baseline conditions. The monitoring should indicate: • Evidence of drainage congestion. • Evidence of ponding and standing water. • Surcharge conditions. • Sediment and/or debris accumulation or blockage • Evidence of backwater effects and restricted flow • Flooding frequency and extent • Changes in drainage conditions compared with baseline conditions	Upstream of the Khal 14 regulator/culvert. Upstream drainage channels, manholes, culverts and drainage infrastructure; upstream drainage areas of the crossing.	• Continuous water level monitoring at 10-minute intervals during construction. • Continuous water level monitoring at 10-minute intervals throughout the first monsoon season following completion of the Khal 14 culvert and associated drainage works. • Water level monitoring data reviewed and reported monthly. • Inspection of drainage channel to identify possible obstructions conducted monthly during construction with weekly inspections during the monsoon period (July to September). Inspections should also be done within 24 to 48 hours following significant rainfall events. • Comparison of monitored water levels against baseline conditions and hydraulic model predictions undertaken monthly and following significant rainfall, flood or high-water events. • Drainage channel inspections following completion of the Khal 14 crossing and associated drainage works and during the first monsoon season following completion of the works	Contractor	BWDB, LCT Ltd/CPA.	9,000 USD
	River morphology	Medium	• Pre and post dredging bathymetries • Dredged channel dimensions compared with the approved dredging design. • Dredged bed elevations compared with the approved dredging design. • Evidence of over or under dredging. • Evidence of unplanned changes in riverbed morphology	Approved dredging area (pre- and post-dredging bathymetry and riverbed levels).	• Once immediately before commencement of capital dredging. • Once immediately following completion of capital dredging.	Contractor	LCT Ltd/CPA.	30,000 USD

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Evidence of riverbank erosion, including undercutting, scour, slumping and loss of bank material. • Evidence of riverbank instability, including cracks, exposed roots, vegetation loss and changes in bank profile. • Sediment accumulation and deposition along riverbanks. • Formation, enlargement or migration of sand bars. • Observable changes in riverbank condition compared with baseline conditions. • Evidence of sediment deposition that may affect drainage, adjacent land uses, infrastructure or navigation channels.	Riverbanks and nearshore areas within the dredging Area of Influence, including sand bars.	• Prior to commencement of dredging to establish baseline conditions. • Weekly during active dredging operations. • Within 48 hours following significant storm, flood or high-flow events. • Upon completion of dredging activities. • Monthly during the monsoon and post-monsoon period (June to November) where active dredging is not taking place.	Contractor	LCT Ltd./CPA	30,000 USD
	Water and sediment quality	Medium	• Turbidity (NTU) and Total Suspended Solids (TSS) in receiving waters. • Visual evidence of sediment plumes, water discolouration or sediment deposition. • Evidence of erosion, overtopping, bypassing or failure of sediment control measures. • Condition, sediment accumulation and remaining treatment capacity of settlement ponds, sediment basins and other sediment control measures.	Receiving waters upstream and downstream of active discharge locations. Settlement ponds, sediment basins and other sediment control measures on site.	• Once prior to commencement of major earthworks, reclamation and ground improvement activities to confirm baseline conditions. • Weekly during periods when earthworks, fill placement, ground improvement or other sediment-generating activities are underway. • Within 24 hours following any heavy rainfall event that results in site runoff. • Following any failure, overtopping, bypassing or significant malfunction of a sediment control measure. • Following any significant uncontrolled runoff event or community complaint related to discoloured water or sedimentation. • Upon completion of major earthworks and reclamation activities	Contractor	LCT Ltd./CPA	20,000 USD
			• **Physical water quality parameters:** temperature, turbidity, salinity, electrical conductivity (EC), total dissolved solids (TDS) and total suspended solids (TSS). • **Chemical water quality parameters:** pH, nitrate, sulphate, phosphate, arsenic (As) and oil and grease.	The same six baseline measurement locations	• Once before commencement of capital dredging to establish baseline conditions. • Every two weeks during capital dredging activities.	Contractor	LCT Ltd./CSC	17,000 USD

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• **Water quality indicator parameters:** dissolved oxygen (DO), biochemical oxygen demand (BOD_5) and chemical oxygen demand (COD).		• For turbidity (NTU and TSS) see frequency at fisheries resources VEC			
			Sediment quality (same parameters as measured as part of baseline measurements)	The same six baseline measurement locations.	Once before the commencement of capital dredging	Contractor	LCT Ltd./CSC	9,000 USD
	Ambient air quality	Medium	$PM_{2.5}$ and PM_{10} concentration	Block A, Block C and the nearest residential receptor opposite Block C. (same locations as the baselines)	• Continuous throughout the construction period for $PM_{2.5}$ and PM_{10} monitoring. • Daily during active construction for visual inspections of exhaust emissions. • Monthly for review of maintenance records, emission inspection records and idling control records	Contractor	LCT Ltd./CSC	135,000 USD (including all air quality and noise measurements)
			• Number and nature of air quality complaints and grievances potentially related to construction activities • Evidence of excessive exhaust smoke emissions from vehicles, vessels, generators and construction equipment • Evidence of compliance with equipment maintenance requirements • Evidence of compliance with vehicle, vessel and equipment idling controls	Construction site, vehicles, vessels, generators and construction equipment.				
			• Evidence of dust deposition. • Number of dust-related complaints or grievances received. • Condition and effectiveness of dust suppression measures. • Compliance with vehicle speed limits. • Compliance with requirements for covering loads during transport	Construction site, haul roads and unpaved roads.	• Daily visual inspections during earthworks, site clearance and other dust-generating activities. • Weekly inspection of dust suppression measures and haul roads. • Following periods of strong winds or dust complaints. • Monthly review of dust-related complaints, inspection findings and corrective actions.	Contractor	LCT Ltd../CSC	
			• Fuel consumption by construction plant, vehicles, generators, vessels and dredging equipment • Estimated greenhouse gas emissions associated with construction activities, calculated from recorded fuel consumption. • Evidence of excessive idling, unnecessary equipment operation or abnormal fuel consumption	Construction site and dredging area (plant, vehicles, generators, vessels and dredging equipment).	• Fuel consumption records maintained continuously throughout the construction period. • Monthly calculation and review of greenhouse gas emissions. • Monthly review of fuel efficiency performance and corrective actions.	Contractor	LCT Ltd../CSC	
	Ambient noise levels	Medium	Equivalent continuous sound level (LAeq), Maximum sound level (LAmax) and Maximum A-weighted fast response sound level (LAFmax).	Block B, Block C and the residential area opposite Block C.	• Continuous noise monitoring at Block B, Block C and the residential area	Contractor	LCT Ltd../CSC	

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Number of noise-related complaints or grievances received. • Compliance with approved working hours for high-noise activities. • Evidence of implementation and effectiveness of noise-control measures.	Project sites and the residential area opposite Block C.	opposite Block C throughout major construction activities. • Continuous monitoring during piling, ground improvement works and other high-noise activities. • Monthly review of monitoring results, complaints and corrective actions. • Additional monitoring following substantiated community complaints regarding construction noise.			
Ecological environment	Tidal mudflat	Medium	• Abundance, density and species composition of benthic macroinvertebrate communities. • Species richness and diversity of benthic macroinvertebrate communities. • Physical sediment quality parameters: particle size distribution and total organic carbon (TOC). • Area of tidal mudflat permanently affected relative to the approved Project footprint. • Evidence of disturbance to mudflat habitat outside the approved construction footprint • Completion of the evaluation of biodiversity value and the Critical Habitat Assessment and implementation of any resulting mitigation, restoration, enhancement and/or offset requirements.	Two monitoring locations within the remaining mudflat habitat in the Project Area of Influence. Mudflat habitat outside the approved construction footprint.	Annually during February/March throughout the construction period. Monitoring shall be undertaken during February/March to maintain consistency with the baseline surveys and to allow comparison of benthic community composition, abundance and diversity under comparable seasonal conditions. This monitoring period also coincides with the period when mudflat habitats support overwintering and migratory shorebirds that depend on benthic organisms as a food source and occurs prior to the onset of monsoon-driven changes in hydrology, sediment transport and estuarine conditions.	Contractor	LCT Ltd../CSC	1,800 USD
	Mangrove ecosystems	Medium	• Area (ha) of existing mangrove habitat present. • Area (ha) of mangrove habitat retained. • Area (ha) of mangrove habitat permanently affected. • Condition of the retained mangrove habitat, including evidence of vegetation stress, die-back, erosion, sediment deposition, physical damage, changes in canopy condition and changes in the extent of mangrove habitat. • Evidence of Project-related deterioration of retained mangrove habitat.	Mangrove habitat along the Block B riverbank protection wall. Block C reclamation area and the area between Blocks B and C.	• Once prior to commencement of construction for establishment of baseline mangrove extent and condition along the Block B riverbank protection wall and within the mangrove habitat located between Blocks B and C.	Contractor	LCT Ltd../CSC	Included in Contractor's budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Number and outcomes of consultations with relevant government authorities, conservation organisations and other stakeholders.		• **Quarterly construction monitoring** = existing Block B mangroves and the impact area between Blocks B and C. Quarterly during construction to monitor the extent, condition and retention of mangrove habitat along the Block B riverbank protection wall and to verify that disturbance outside approved impact areas has not occurred. Quarterly during construction to monitor the extent of mangrove habitat loss within the approved construction footprint in Block C and the area between Blocks B and C. • **Six-monthly and annual ecological monitoring** = only applies if a future compensation/restoration site is identified following the CHA and feasibility assessment. Every six months during the first three years following implementation of mangrove conservation, restoration, enhancement or offset measures at the approved compensation site(s). • As required during development of compensatory measures for consultation with government authorities, conservation organisations and other stakeholders. • Once prior to implementation of any approved mangrove conservation, restoration, enhancement or offset measures at the selected compensation site(s) to			

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
					establish baseline ecological conditions. • Annually thereafter at the approved compensation site(s) until the approved objectives, performance criteria and success criteria have been achieved. • Following any incident, spill, storm event, unauthorised encroachment or damage affecting the mangrove habitat. • Upon completion of construction activities.			
			• Completion of an evaluation of the biodiversity value of the mangrove trees. Additionally, where an off-site conservation, restoration, enhancement, creation or biodiversity offset site is determined to be required, appropriate and feasible based on the outcome of these assessments, the specific monitoring parameters, performance criteria, success criteria and monitoring frequency shall be defined as part of the feasibility assessment and any subsequent approved management, restoration or offset strategy. • Completion of the feasibility assessment evaluating options for achieving no net loss of biodiversity. • Evidence that the technical, ecological, regulatory and practical feasibility of mangrove conservation, restoration, enhancement and/or biodiversity offset measures has been evaluated.	Mangrove habitat at Block B and between Blocks B and C; potential conservation, restoration or offset sites within the Karnaphuli River system, where appropriate.	Once prior to commencement of construction.	Contractor	LCT Ltd../CSC	Included in Contractor's budget
	Fisheries resources	Medium	• Number of fisheries-related complaints or grievances received. • Number of fishermen reporting disruption to fishing activities attributable to Project activities. • Areas and duration of restricted access to fishing grounds resulting from Project activities.	Affected fishing communities and fishing grounds subject to restricted access.	• Quarterly consultation with affected fishermen throughout the construction period. • Additional consultation following significant complaints, incidents or changes in dredging or piling activities.	LCT Ltd/./CSC.	CPA	Included in the GRM budget
			If dredging activities are conducted during fisheries sensitive periods as given in the ESMP: • Ambient turbidity (NTU). • Site-specific relationship between turbidity (NTU) and Total Suspended Solids (TSS) • Turbidity (NTU) and estimated TSS • Percentage increase in turbidity relative to ambient conditions.	Within 100 m of the active dredging location at mid water depth at three locations across the river width. Reference locations outside the influence of dredging.	• Once prior to the first dredging activity, establish the site-specific relationship between turbidity (NTU) and TSS • Continuous real-time NTU measurements during	Contractor	LCT Ltd../CSC	Included in Contractor's budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Occurrence of turbidity levels exceeding the 10% trigger level (with reports of management actions taken and their effectiveness to reduce the levels below the trigger). • Occurrence of turbidity levels exceeding the 20% threshold level (with reports of management actions taken to reduce the levels below the threshold). • Width of unaffected river corridor available for fish movement. • Spatial extent of the sediment plume. • Evidence of continued occurrence and movement of migratory fish species based on consultation with fishermen and fishing communities. Information obtained through these consultations shall be used to identify potential disruption to fish migration, trigger investigation where concerns are raised, and support adaptive management measures. Sources of information shall include, but not be limited to: o Reports from fishermen (through the fisheries consultant) indicating fish migratory movements and any other sources of potential disruption to fish migration, to be established prior to commencement of any turbidity inducing activities. o Reports from fishermen (through the fisheries consultant) on the success or issues with fish migration during and after project activities that could interfere with migration. o Records of consultations with the Fisheries Department regarding observed impacts on fisheries resources attributable to Project activities.	Upstream and downstream monitoring locations across the width of the estuary.	active dredging and reclamation activities • Daily review of data during active dredging • Daily review of satellite imagery where available • Following any significant spill, dredging incident or abnormal monitoring result. • Once following completion of capital dredging. • Weekly consultation of fishermen during active dredging activities • Consultation with the Fisheries Department annually during construction and following any significant fisheries-related complaint, incident or observed impact. • Investigation of turbidity increasing sources following any exceedance of the 10% trigger level and undertaking measures to reduce turbidity levels if the monitoring shows that there is an exceedance of the values across the width of the estuary. • Implementation of increased corrective actions (over and above those implemented following exceedance of the 10% trigger) to reduce turbidity immediately following confirmation of a Project-related exceedance of the 20% trigger level across the width of the estuary at either the upstream or downstream monitoring locations. Should there still be an exceedance using the 20% trigger then the project related activity should cease unless it can be shown that the threshold			

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
					level is too sensitive and that fish are still migrating through the estuary (following discussion with local fisherfolk). • Review of available satellite imagery throughout the dredging period as imagery becomes available to confirm that the surface plume is indicating that the plume is remaining within the boundaries of the predicted modelling (accepting that the image will only show the surface plume and not the plume within the water column). • Additional consultations where monitoring or observations indicate potential disruption of fish migration.			
	Dolphins	High	• **Underwater noise parameters:** peak sound pressure level, root mean square sound pressure level, single-strike sound exposure level and cumulative sound exposure level. • Compliance with the underwater noise threshold of 145 dB SELss. • Dolphin acoustic detections recorded through Passive Acoustic Monitoring. • Presence, number, distribution, location, distance and direction of movement of dolphins relative to piling activities. • Observable changes in dolphin behaviour, including changes in movement, surfacing, foraging or avoidance patterns during piling. • Presence of other aquatic fauna. • Piling activity type, location, duration and timing associated with each underwater noise measurement or dolphin observation. • Number and nature of underwater noise threshold exceedances or significant dolphin disturbance events.	Two PAM monitoring locations. Piling area; underwater noise threshold assessed at 200 m from the piling source.	• Baseline underwater noise monitoring before commencement of piling. • Targeted PAM and MMO monitoring during piling activities and periods of highest underwater noise generation. • Continuous underwater noise recording during monitored piling periods where the selected equipment and deployment method allow. • MMO surveys prior to commencement of piling each day and throughout monitored piling periods in accordance with the Marine Mammal Mitigation Protocol. • Additional monitoring following any underwater noise threshold exceedance, significant	Contractor	LCT Ltd./CSC.	250,000 USD

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
					dolphin disturbance event or change in piling method. • Monitoring upon completion of piling to confirm post-piling acoustic conditions.			
	Avifauna and migratory birds	Low	• Bird abundance, species richness and species composition. • Presence and abundance of migratory, resident, threatened and conservation-priority bird species. • Bird habitat use, including feeding, roosting and nesting activity. ○ Evidence of disturbance attributable to construction activities.	Three representative bird habitats within the Project Area of Influence.	One day at each habitat during each month of Feb-Apr; this will be carried out once every year during construction	Contractor	LCT Ltd./CSC.	81,000 USD
Social Environment	Road traffic	Low	Road traffic survey (same as baseline survey) Traffic composition by vehicle type. Peak-hour traffic volumes. Average daily traffic (ADT) Evidence of Project-related changes in traffic volumes, traffic composition or congestion relative to baseline conditions	Two road traffic survey locations (same as baseline survey).	• Six times in every year (for 24-hour) at intense traffic moments: • Each monitoring round shall include ○ One weekday ○ One weekend	Contractor	LCT Ltd../CSC	72,000 USD
	River traffic	Medium	Counting two-way river traffic volume, vessel size & type Vessel size and vessel type. Peak-hour river traffic movements. Evidence of Project-related changes in river traffic volumes, vessel composition or navigation activity relative to baseline conditions.	Ghat–15.	• Six times in every year (for 24-hour) at intense traffic moments • Each monitoring round shall include ○ One weekday ○ One weekend	Contractor	LCT Ltd../CSC	45,000 USD
	Livelihood, health and safety of communities	High	• Number of grievances (related to river crossing commuters and operators, or local content) registered and addressed • Number of contractors' workers from AOI • % percentage of good/services sourced from AOI	Area of Influence (AOI); communities, river crossing commuters and operators.	Monthly review of grievance records, employment records and procurement records	LCT Ltd/./CSC.	-CPA	Included in GRM budget
			Number of commuters using the new ferry routes Trends in ferry usage relative to pre-relocation conditions	New ferry routes from Ghats 12, 15 and Badalpura Ghat.	Monthly collection and review	Contractor-	LCT Ltd./CSC. -	Included in Contractor's budget Included in SAP budget
			Number and nature of grievances registered and addressed and analysis of topics, events, locations which generate more grievances Percentage of grievances resolved within the specified timeframe Recurring grievance themes requiring corrective action	Project-affected communities; grievance locations as recorded in the grievance register.	Grievances recorded upon receipt Monthly review of grievance trends, corrective actions and resolution status	LCT Ltd./CSC.	-CPA	Included in GRM budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			Visual evidence of community health and safety risks (CHS register) Implementation of dust suppression measures.	Within and around the construction site.	Daily CHS inspections Monthly review of inspection findings, complaints and corrective actions	Contractor	LCT Ltd../CSC	Included in Contractor's budget
			Number and proportion of employees from the Area of Influence, wider Chattogram District and wider Bangladesh, and value and proportion of expenditure on goods and services procured from suppliers within the Area of Influence, wider Chattogram District and wider Bangladesh.	Area of Influence, wider Chattogram District and wider Bangladesh (records review).	Monthly	LCT Ltd/./CSC.	-CPA	No additional cost
			• Socio-economic conditions, including livelihoods, income, employment, access to services, community perceptions and project-related impacts collected through a social survey (min. 384 sample size)	Area of Influence (minimum sample size 384).	• Two times: • Once after one year from start of construction • Once before start of operation	Contractor	LCT Ltd././CSC	50,000 USD
			• Solid waste and wastewater generation by the construction workforce. • Waste storage and wastewater collection capacity and utilisation. • Waste accumulation, littering, leaks or uncontrolled discharges. • Waste and wastewater collection, treatment and disposal records. • Complaints and corrective actions.	Workforce waste storage, sanitation and wastewater facilities at the construction site. Authorised waste treatment and disposal facilities.	Monthly inspection of waste storage, sanitation and wastewater facilities. Monthly review of waste and wastewater records. Following any leak, overflow, spill, uncontrolled discharge or substantiated complaint. Quarterly audit of compliance with the Waste Management Plan.	Contractor	LCT Ltd././CSC	Included in Contractor's budget
			• Project traffic volumes. • Community traffic congestion and pedestrian crossing conditions. • Number and nature of traffic-related complaints and grievances. • Traffic incidents attributable to Project activities. • Effectiveness of traffic management measures.	VIP Road and adjacent community areas, including pedestrian crossing points.	Monthly during the first six months of construction. Following any significant traffic incident or substantiated traffic-related complaint.	Contractor	LCT Ltd././CSC	The cost of monitoring is covered under Road Traffic VEC
			• Community access restrictions resulting from construction activities. • Traffic, navigation and pedestrian safety controls in place. • Number and nature of access-related grievances. • Status of corrective actions.	Construction site access points and surrounding community access routes.	• Weekly during construction. • Following incidents, access changes or substantiated grievances. • Monthly review of complaints and corrective actions.	Contractor	LCT Ltd/./CSC.	Included in Contractor's budget
			• Percentage of workers who have signed the Worker Code of Conduct. • Number of personnel trained on the Worker Code of Conduct. • Number and nature of Code of Conduct violations. • Number and nature of community grievances related to worker behaviour.	Construction site and nearby communities.	• Prior to commencement of work for all personnel. • Monthly review of training records and Code of Conduct compliance.	Contractor	LCT Ltd././CSC	Included in Contractor's budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Contractor compliance with workforce management requirements.		• Monthly review of community grievances and complaint trends. • Quarterly Contractor compliance inspections and audits by LCT Ltd. • Following any substantiated complaint, serious incident or breach of the Worker Code of Conduct.			
	Construction and Operation workers	High	• Approved Method Statements for high-risk construction activities. • OHS inspections and identified deficiencies. • OHS incidents, injuries, near misses and dangerous occurrences. • Non-conformances and corrective action closure. • Availability and proper use of PPE and safety-critical equipment. • Safe management of hazardous/flammable materials. • Training, competency and authorisation for high-risk work.	Construction work areas, including areas for working at height, working over water, lifting operations and hazardous material storage.	• Prior to commencement of each construction activity requiring an approved Method Statement. • Daily inspection of active high-risk work activities. • Weekly inspection of lifting equipment, fall protection equipment, lifesaving equipment, hazardous material storage areas and other safety-critical equipment. • Monthly occupational health and safety inspections and audits. • Monthly review of incidents, near misses, non-conformances and corrective actions. • Following any occupational health and safety incident, dangerous occurrence, near miss or significant non-conformance. • Following any significant change in work methodology, equipment, site conditions or Project requirements.	Contractor	LCT Ltd././CSC	Included in Contractor's budget
			Monitoring of personal protective equipment is used during work	Construction work areas.	Daily	Contractor	LCT Ltd././CSC	Included in Contractor's budget
			• Availability and condition of firefighting equipment and emergency response equipment. • Implementation of fire prevention controls. • Number of emergency response drills completed. • Number of fire incidents, emergency response activations, significant near misses and non-conformances.	Fuel storage areas, workshops, generators, hot-work locations and hazardous material storage areas.	• Prior to commencement of each construction activity presenting a fire or explosion risk. • Monthly inspection of firefighting equipment,	Contractor	LCT Ltd././CSC	Included in Contractor's budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Status of corrective actions arising from inspections, drills and incidents.		emergency response equipment and fire prevention controls. • Prior to initial use of fuel storage areas, workshops, generators, hot work locations, hazardous material storage areas and temporary facilities. • Quarterly emergency response drills throughout the construction period. • Monthly review of training records, inspections, incidents, near misses and corrective actions. • Following any fire incident, explosion incident, emergency response activation, significant near miss or non-conformance. • Following any significant change in construction activities, hazardous material inventory, fuel storage arrangements or emergency response requirements.			
			• Verification that contractors, subcontractors and labour providers have appropriate labour-management arrangements in place. • Evidence that workers have received written terms and conditions of employment. • Compliance with wage payment, overtime payment and working-hour requirements. • Condition of worker welfare facilities and accommodation. • Number and nature of worker grievances and labour-related non-conformances.	Worker welfare facilities and Contractor-provided or Contractor-arranged worker accommodation.	• Before mobilisation of each Contractor, subcontractor or labour provider to verify that appropriate labour-management arrangements are in place. • Before each worker commences work to verify that written terms of employment have been provided and communicated. • Monthly review of payroll records, working-hour records, overtime payments, deductions and evidence of wage payments. • Monthly inspection of working conditions and	Contractor	LCT Ltd././CSC	Included in Contractor's budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
					worker welfare facilities throughout construction. • Before occupation of any Contractor-provided or Contractor-arranged worker accommodation.			
			• Condition and availability of drinking water supplies. • Availability and condition of shaded rest areas and welfare facilities. • Number and nature of worker welfare complaints. • Number and nature of welfare-related incidents and corrective actions.	Drinking water points, shaded rest areas, welfare facilities and labour camp amenities.	• Daily inspection of drinking water points and shaded rest areas during construction. • Weekly inspection of welfare facilities and labour camp amenities. • Following any heat stress-related illness, first aid case, near miss or worker complaint. • Monthly review of inspection findings, incidents, complaints and corrective actions. • Prior to and during periods of extreme heat or heatwave conditions.	Contractor	LCT Ltd././CSC	Included in Contractor's budget
All	All VECs	High (related to the most sensitive VEC)	• Status of permits, licences and approvals. • Compliance with permit conditions and reporting requirements. • Number and nature of permit non-compliances, regulatory notices and corrective actions.	All construction activities requiring a permit, licence or approval.	• Prior to commencement of each activity requiring a permit, licence or approval. • Monthly review and update of the permit register. • Monthly inspection of compliance with applicable permit conditions. • Quarterly permit compliance audits. • Following any permit non-compliance, regulatory inspection, regulatory notice or significant change in Project activities. • In accordance with the reporting and notification requirements specified within the relevant permits and approvals.	Contractor	LCT Ltd././CSC	Included in Contractor's budget
			• Validity of licences, permits and approvals held by suppliers, contractors, waste contractors, disposal facilities and service providers. • Compliance status of suppliers and service providers.	Suppliers, material sources, dredged material reuse/disposal facilities, waste	• Prior to engagement of construction material suppliers, dredged material reuse or disposal facilities,	Contractor	LCT Ltd../CSC	Included in Contractor's budget

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Material traceability, waste disposal and dredged material management records.	contractors and bunkering providers.	waste contractors and bunkering providers. • Prior to approval of new material sources, disposal facilities or service providers. • Quarterly review of supplier licences, permits and compliance status. • Quarterly audits of high-risk suppliers and service providers. • Continuous maintenance of material traceability, dredged material reuse/disposal and waste disposal records throughout the construction period. • Following any environmental incident, regulatory non-compliance, significant grievance or change in supplier, disposal facility or service provider.			
			• Contractor and subcontractor compliance with Project HSSE requirements. • Number and nature of incidents, non-conformances and corrective actions. • Status of corrective action implementation.	All Contractor and subcontractor work areas.	• Prior to Contractor and subcontractor mobilisation. • Prior to commencement of each major construction activity requiring an approved method statement. • Monthly Contractor and subcontractor HSSE inspections. • Quarterly HSSE audits of Contractor and subcontractor compliance. • Monthly review of non-conformances, incidents and corrective action status. • Following any significant environmental, social, health or safety incident, regulatory non-compliance or serious breach of Project requirements	Contractor	-LCT Ltd/./CSC	No additional cost

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Estimated Monitoring costs (for 3-year construction period)
						Implemented by	Supervised by	
			• Availability and implementation of approved Method Statements. • Compliance with Method Statement requirements. • Number and nature of Method Statement non-conformances and corrective actions.	All major construction activities.	• Prior to commencement of each major construction activity. • Monthly inspection and audit of compliance with approved method statements during construction. • Following any significant environmental, social, health or safety incident, non-conformance or material change in construction methodology. • Monthly review and reporting of non-conformances, corrective actions and method statement implementation performance.	Contractor	LCT Ltd/./CSC	Included in Contractor's budget

Table 11-6: Environmental and Social Monitoring Plan during Operation Phase

Category	VEC	Sensitivity	Monitoring parameters for VEC	Monitoring location	Frequency monitoring	Responsible Organization for monitoring		Monitoring costs (USD per year)
						Implemented by	Supervised by	
Physical environment	Drainage hydrology	High	Water level measured using automated water level monitoring equipment, including peak water levels during rainfall and monsoon events, duration of elevated water levels, evidence of flooding, waterlogging, ponding or drainage congestion, and comparison of monitored water levels with hydraulic model predictions and baseline conditions.	Upstream of the Khal 14 regulator/culvert. Access routes to the culvert, regulator, sluice gate, pumping station and associated drainage infrastructure.	Continuous water level monitoring at 10-minute intervals for the first 3 years of operation, with monthly review and reporting of monitoring data. Quarterly inspection of access routes, culvert access points and drainage infrastructure. For debris accumulation and blockage: Monthly inspection under usual conditions. Weekly inspections during the monsoon season. Additional inspections within 24-48 hours following significant rainfall or flooding events. Immediate investigation and follow-up monitoring where water levels exceed hydraulic model predictions. Continuous review of complaints, incidents, grievances, exceedances and non-conformances. Additional monitoring following incidents, complaints, grievances, exceedances.	HSE team	BWDB	Included in operation budget
	River morphology	Medium	Records of maintenance dredging activities undertaken, including volumes, frequency and dredge levels. Pre and post dredging bathymetry. Dredged bed dimensions, side slopes and elevations. Sedimentation rates and spatial distribution of sediment accumulation. Records of sediment characterisation, contaminant testing and beneficial reuse assessments. Evidence that beneficial reuse opportunities have been assessed for each dredging campaign. Compliance with applicable regulatory approvals and disposal requirements for dredged material.	Approved dredging area, berth pocket and associated navigation areas.	Verification of maintenance dredging programme with CPA prior to commencement of operations and review annually thereafter. Bathymetric and hydrographic surveys of the berth pocket and navigation areas at least quarterly during operation or more frequently where sedimentation rates require additional monitoring. Riverbank stability and channel morphology inspections semi-annually and following the monsoon season. Annual review of long-term erosion, sedimentation and channel morphology trends	Operator	LCT Ltd	Included in operation budget

					using survey and monitoring data. Continuous review of complaints, incidents, grievances, exceedances and non-conformances.			
			Riverbank condition, including evidence of erosion, scour, instability, slumping or bank retreat. Changes in channel morphology, riverbed levels and sedimentation patterns relative to baseline. Number of incidents, complaints, grievances, exceedances or non-conformances related to navigation safety, dredging activities, sediment management, erosion or river morphology changes. Records of investigations and corrective actions undertaken.	Riverbanks and channel within potentially affected areas.	Monitoring of riverbank conditions and channel morphology: Prior to commencement of dredging to establish baseline conditions. Weekly during active dredging operations. Within 48 hours following significant storm, flood or high-flow events. Upon completion of dredging activities. Monthly during the monsoon and post-monsoon period (June to November) where active dredging is not taking place. Continuous review of complaints, incidents, grievances, exceedances and non-conformances.	HSE team	LCT Ltd	Included in operation budget
	Water and sediment quality	Medium	Turbidity levels and suspended sediment concentrations during dredging and disposal activities. Visual evidence of sediment plumes, sediment dispersion and water quality deterioration associated with dredging or disposal operations. Evidence that dredging methods and operational controls are being implemented to minimise sediment resuspension and contaminant dispersion. Number of dredging-related incidents, spills, complaints, grievances, regulatory exceedances or non-conformances. Evidence that corrective actions have been implemented.	Dredging and disposal areas.	Turbidity and suspended sediment monitoring during active dredging and disposal operations. Visual inspection for sediment plumes and evidence of excessive sediment dispersion during active dredging and disposal activities Monthly review of dredging records, sediment management records, disposal records, audit findings, complaints and monitoring results during periods when dredging activities are underway Immediate investigation where monitoring identifies excessive sediment resuspension, elevated contaminant concentrations, significant sediment plumes, permit non-compliance or adverse environmental effects.	HSE team	LCT Ltd.	Included in operation budget

					Continuous review of complaints, incidents, grievances, exceedances and non-conformances.			
			Physical water quality parameters: temperature, turbidity, salinity, electrical conductivity (EC), total dissolved solids (TDS) and total suspended solids (TSS). Chemical water quality parameters: pH, nitrate, sulphate, phosphate, arsenic (As) and oil and grease. Water quality indicator parameters: dissolved oxygen (DO), biochemical oxygen demand (BOD_5) and chemical oxygen demand (COD).	Same as Baseline locations	Once before commencement of maintenance dredging to establish baseline conditions. Once after maintenance dredging. For turbidity (NTU) see frequency at fisheries resources VEC	HSE team	LCT Ltd	8,000 USD
			Groundwater quality (pH, salinity, EC, DO, temperature, Mineral oil, BTEX, Chlorinated hydrocarbons, metals, Ca, Mg, Na, K, Fe, Mn, Cl, F, Br, SO4).	Same as Baseline locations	Annually for three years after start of operations. After three years decide on the frequency based on the results.	HSE team	LCT Ltd	20,000 USD for installing the wells (once) 12,000 USD for each monitoring round per year
			Sediment quality (As, Cr, Hg, Pb, oil & grease, PAHs).	Karnaphuli River: upstream of the terminal, outfall of the drainage channel, in front of Block C, and downstream of the terminal.	Twice every year: Once during Feb/Mar (dry season) Once during Jul/Aug (wet season) After two years decide on the frequency based on the results.	HSE team	LCT Ltd	12,000 USD
			Physical characteristics of dredged sediment, including grain size distribution, moisture content and other parameters relevant to reuse, transport and disposal. Chemical characteristics of dredged sediment, including contaminants relevant to the proposed reuse or disposal route and applicable regulatory requirements	Dredged material from maintenance dredging.	As above, twice every year Review of sediment quality assessment results prior to approval of the dredged material management, reuse or disposal plan	HSE team	LCT Ltd.	Included in the sediment quality budget
			Records demonstrating waste segregation, storage, collection, treatment and disposal in accordance with the approved management plan Number and type of waste facility audits completed and audit findings. Availability, condition and operational performance of temporary wastewater collection, conveyance and treatment systems prior to connection to the CWASA sewer network Volume of wastewater generated, treated and discharged Effluent quality parameters measured against applicable ECR 2023 discharge requirements (e.g. pH, BOD, COD, TSS, oil and grease, faecal coliforms and other applicable parameters). Sludge generation, handling, storage, transport and disposal records, including compliance with ECR 2023 requirements. Evidence that all waste and wastewater treatment and disposal facilities used by the Project hold valid permits, licences and approvals applicable to the waste streams received	Terminal waste management and wastewater systems (collection, pumping and treatment) up to connection to the CWASA sewer network. Waste and wastewater treatment and disposal facilities used by the Project.	Daily operational inspections of waste management, wastewater treatment, pumping and sewage collection systems. Annual audits of waste management facilities Verification of wastewater collection, conveyance and treatment capacity prior to commencement of operations and prior to connection to the CWASA sewer network Routine effluent quality monitoring in accordance with ECR 2023 permit requirements and approved monitoring programme (typically monthly or as permit conditions require).	HSE team	LCT Ltd.	Included in operation budget

					Monthly review of wastewater volumes, treatment performance, sludge management records and waste transfer documentation. Annual verification of permit validity for facilities used on an ongoing basis.			
			Evidence that all fuels, oils, lubricants, chemicals, hazardous substances and hazardous cargo are stored, handled and transferred in accordance with the approved management plans. Number of identified leaks and defects and time taken to complete repairs. Availability, condition and accessibility of spill response equipment Records of spill response drills and training exercises completed. Hazardous material inventory records maintained and updated immediately upon receipt of hazardous materials. Availability and currency of Safety Data Sheets (SDS) for all hazardous substances stored or used. Condition of hazardous material storage areas, including secondary containment systems, security measures, weather protection and signage. Evidence that all spills and releases are reported, investigated, documented and closed out through corrective actions. Number and percentage of relevant personnel trained in spill prevention, spill response and hazardous materials handling. Compliance with prohibition of bunkering activities. Condition and operational performance of oil-water separators serving potentially contaminated operational areas. Number of complaints, grievances, incidents, regulatory exceedances, permit violations or non-conformances related to hazardous materials, spills, stormwater management or pollution control.	Designated storage, handling and transfer locations for hazardous materials within the terminal area and areas under the operational control of LCT Ltd. Stormwater systems and oil-water separators.	Hazardous material inventory updated upon receipt and reviewed monthly. Weekly inspections of equipment, storage areas, secondary containment and spill response equipment. Monthly inspections of hazardous material storage areas, stormwater systems and oil-water separators. Monthly review of maintenance, spill and corrective action records. Annual audits, training and spill response exercises. Immediate monitoring following spills, leaks, contaminated discharges or equipment failures. Monthly controls of conditions of oil-water separators Additional monitoring following complaints, exceedances, non-conformances or significant operational changes.	HSE team	LCT. Ltd.	Included in operation budget
	Ambient air quality	Medium	Compliance with equipment maintenance schedules and inspection requirements. Number of vehicles, generators, cranes and other equipment inspected and maintained. Evidence of excessive exhaust emissions, smoke, fuel leaks or defective equipment. Number of defective equipment items removed from service and repaired. Compliance with vehicle and equipment idling controls. Ambient concentrations of PM2.5, PM10, SOx, NOx Number of complaints related to dust, exhaust emissions or air quality. Number of air quality incidents, exceedances or non-conformances. Evidence of corrective actions and their effectiveness.	Block A, Block C and the residential area opposite Block C (ambient PM2.5, PM10, SOx, NOx). Terminal vehicles, generators, cranes and other equipment.	Weekly inspections of vehicles, equipment and generators. Monthly review of maintenance records, inspection findings and idling compliance. Immediate inspection and investigation following complaints, visible excessive emissions, exceedances or equipment failures. Follow-up monitoring to verify effectiveness of corrective actions. Quarterly monitoring of ambient concentrations for the first 3 years of operation then the monitoring frequency shall	HSE team	LCT Ltd	45,000 USD

					be adjusted depending on the monitoring results Bi-annual review of monitoring results, trends, complaints and effectiveness of mitigation measures. Additional review and assessment following any substantiated air quality complaint or cluster of complaints.			
			Completion of solar PV feasibility assessment and implementation of identified feasible measures Installed solar PV capacity (kWp) and electricity generated from solar PV (kWh/year) Total energy consumption (electricity and fuel) Annual Scope 1 GHG emissions from fuel combustion in vehicles, generators and terminal equipment (tCO_2e/year). Annual Scope 2 GHG emissions from purchased electricity consumption (tCO_2e/year). Fuel consumption by source and equipment type GHG emissions intensity per TEU handled (tCO_2e/TEU) Number of non-conformances or corrective actions related to GHG management and reporting. Evidence that corrective actions have been implemented and are effective.	Terminal (electricity and fuel consumption records). Solar PV installation, where installed.	Monthly recording of electricity and fuel consumption data. Annual calculation and reporting of Scope 1, Scope 2 and total GHG emissions. Annual review of GHG emissions intensity and emissions reduction initiatives. Annual inspection and maintenance of solar PV systems, where installed. Additional monitoring following significant operational changes, energy consumption increases, non-conformances or implementation of major emission reduction measures. Follow-up monitoring to verify effectiveness of corrective actions.	Consultant	LCT Ltd	
	Ambient noise levels	Medium	Equivalent continuous sound level (LAeq), Maximum sound level (Lamax), and Maximum A-weighted fast response sound level (LAFmax). Number of noise monitoring results exceeding established thresholds. Number of vehicles, generators, cranes and other equipment inspected and maintained in accordance with maintenance requirements. Evidence that acoustic enclosures are installed, maintained and functioning effectively. Number of equipment items exhibiting excessive noise or vibration and removed from service for repair. Number of noise-related complaints, grievances, incidents and non-conformances. Evidence that corrective actions have reduced noise levels and prevented recurrence.	Block B, Block C and the residential area opposite Block C. Noise-generating equipment and acoustic enclosures at the terminal.	Quarterly noise monitoring for the first 3 years of operation then the monitoring frequency shall be adjusted depending on the monitoring results Monthly inspections of noise-generating equipment, acoustic enclosures and maintenance records. Monthly review of complaints, incidents and monitoring results. Additional monitoring following complaints, exceedances, equipment failures or significant operational changes. Follow-up monitoring to verify effectiveness of corrective actions.	HSE Team	LCT Ltd	

Ecological environment	Fisheries resources	Medium	Number of fisheries-related complaints or grievances received. Number of fishermen reporting disruption to fishing activities attributable to Project activities. Areas and duration of restricted access to fishing grounds resulting from Project activities.	Affected fishing communities and fishing grounds subject to restricted access.	Grievances recorded and reviewed upon receipt. Investigation initiated following receipt of a fisheries-related grievance Quarterly consultation with affected fishermen throughout the construction period. Additional consultation following significant complaints, incidents or changes in dredging or piling activities.	HSE Team	LCT Ltd.	2,000 USD
			If dredging activities are conducted during fisheries sensitive periods as given in the ESMP: Ambient turbidity (NTU). Site-specific relationship between turbidity (NTU) and Total Suspended Solids (TSS) Turbidity (NTU) and estimated TSS Percentage increase in turbidity relative to ambient conditions. Occurrence of turbidity levels exceeding the 10% trigger level (with reports of management actions taken and their effectiveness to reduce the levels below the trigger). Occurrence of turbidity levels exceeding the 20% threshold level (with reports of management actions taken to reduce the levels below the threshold). Width of unaffected river corridor available for fish movement. Spatial extent of the sediment plume. Evidence of continued occurrence and movement of migratory fish species based on consultation with fishermen and fishing communities Reports from fishermen (through the fisheries consultant) indicating fish migratory movements and any other sources of potential disruption to fish migration, to be established prior to commencement of any turbidity inducing activities. Reports from fishermen (through the fisheries consultant) on the success or issues with fish migration during and after project activities that could interfere with migration. Records of consultations with the Fisheries Department regarding observed impacts on fisheries resources attributable to Project activities.	Within 100 m of the active dredging location at mid water depth at three locations across the river width. Reference locations outside the influence of dredging. Upstream and downstream monitoring locations across the width of the estuary.	Once prior to the first dredging activity every year, to establish the site-specific relationship between turbidity (NTU) and TSS Continuous real-time NTU measurements during active dredging activities Daily review of data during active dredging Daily review of satellite imagery where available during active dredging Following any significant spill, dredging incident or abnormal monitoring result. Weekly consultation of fishermen during active dredging activities Consultation with the Fisheries Department annually for the first three years of operation and following any significant fisheries-related complaint, incident or observed impact. Additional consultations where monitoring or observations indicate potential disruption of fish migration.	HSE team	LCT Ltd.	2,000 USD
	Tidal mudflats	Medium	Abundance, density and species composition of benthic macroinvertebrate communities. Species richness and diversity of benthic macroinvertebrate communities. Physical sediment quality parameters: particle size distribution and total organic carbon (TOC). Evidence of disturbance to mudflat habitat outside the approved project footprint	Two monitoring locations within the remaining mudflat habitat in the Project Area of Influence.	Annually during February/March to maintain consistency with baseline surveys and enable comparison of benthic community composition, abundance, diversity and sediment quality under comparable seasonal conditions. Following three years of operational monitoring,	HSE Team	LCT Ltd	1,000 USD

					monitoring results and trends shall be reviewed to determine whether the monitoring frequency remains appropriate. Monitoring frequency may be revised where results demonstrate stable conditions and no evidence of Project-related impacts.			
					Annual inspection of mangroves near Block B by a specialised expert Six-monthly ecological monitoring: only applies if a future compensation/restoration site is identified following the CHA and feasibility assessment. Every six months during the first three years following implementation of mangrove conservation, restoration, enhancement or offset measures at the approved compensation site(s).			
	Mangrove ecosystems	Medium	Area (ha) of existing mangrove habitat present. Area (ha) of mangrove habitat retained. Area (ha) of mangrove habitat permanently affected. Condition of the retained mangrove habitat, including evidence of vegetation stress, die-back, erosion, sediment deposition, physical damage, changes in canopy condition and changes in the extent of mangrove habitat. Evidence of Project-related deterioration of retained mangrove habitat.	Mangroves near Block B (riverbank protection wall); Block C reclamation area and the area between Blocks B and C.	As required during development of compensatory measures for consultation with government authorities, conservation organisations and other stakeholders. Once prior to implementation of any approved mangrove conservation, restoration, enhancement or offset measures at the selected compensation site(s) to establish baseline ecological conditions. Annually thereafter at the approved compensation site(s) until the approved objectives, performance criteria and success criteria have been achieved. Following any incident, spill, storm event, unauthorised encroachment or damage affecting the mangrove habitat.	HSE Team	LCT Ltd.	Included in operation budget
	Dolphins	High	Dolphin observations recorded by trained vessel personnel during maintenance dredging and vessel operations.	Dredging and vessel operation areas (observations from Project vessels)	Continuous observations by a dedicated person on the vessel of dolphins during	HSE Team	LCT Ltd	Included in operation budget

			Evidence of dolphin avoidance behaviour, displacement, altered movement patterns or other observable behavioural responses associated with vessel activities. With any collisions with marine mammals; monitor the number and nature of dolphin injury, mortality, collision or near-collision incidents involving Project-related vessels. Implementation status of any dolphin conservation, habitat enhancement, research, awareness, restoration, offset or other biodiversity measures if required Percentage of people employed by the Operator that work on the vessels having the awareness training on marine mammal collisions		maintenance dredging and vessel operations Recording and investigation of all dolphin injury, mortality, collision or near-collision incidents upon occurrence. Following any significant spill, pollution incident, dolphin mortality event or substantiated complaint relating to dolphins. Six-monthly review of monitoring results to identify trends and determine whether additional mitigation measures are required. Monitor implementation status of dolphin conservation measures every six months after implementation for three years. Following the initial three-year period, monitoring frequency shall be reviewed based on performance against objectives, monitoring results and consultation with relevant stakeholders, and adjusted as appropriate. Additional monitoring where monitoring results indicate that objectives, performance criteria or success criteria are not being achieved. Annual awareness training			
	Avifauna and migratory birds	Low	Bird abundance, species richness and species composition. Presence and abundance of migratory, resident, threatened and conservation-priority bird species. Bird habitat use, including feeding, roosting and nesting activity. Evidence of disturbance attributable to operational activities, including noise, lighting, traffic and vessel movements.	Three representative bird habitats within the Project Area of Influence.	One survey day at each monitoring location during February, March and April (9 days total). Monitoring shall be undertaken once after three years of operation. Additional monitoring shall be undertaken where observations, complaints or other monitoring results indicate potential Project-related impacts on bird populations or habitat use.	HSE Team	LCT Ltd	27,000 USD once after three years of operation
Social Environment	Road traffic	Low	Road traffic survey (same as baseline survey) Traffic composition by vehicle type. Peak-hour traffic volumes. Average daily traffic (ADT) Evidence of Project-related changes in traffic volumes, traffic composition or congestion relative to baseline conditions	Two road traffic survey locations (same as baseline survey).	Once in the second year of operation (for 24-hour, two times): One weekday, one weekend day	Consultant	LCT Ltd.	12,000 USD once in the second year of operation

			Report road traffic incidents with trucks coming from and going to the LCTP	Roads used by trucks to and from the LCTP.	When an incident happens	LCT Ltd.	-	Included in operation budget
	River traffic	Medium	Report river traffic incidents with Maersk vessels	River and navigation areas used by Maersk vessels.	When incident happens	LCT Ltd.	CPA	Included in operation budget
			Counting two-way river traffic volume, vessel size & type Vessel size and vessel type. Peak-hour river traffic movements. Evidence of Project-related changes in river traffic volumes, vessel composition or navigation activity relative to baseline conditions.	Ghat–15.	Once in the second year of operation (for 24-hour, two times): One weekday, one weekend day.	Consultant	CPA	5,000 USD once in the second year of operation
			Number of grievances (related to river crossing commuters and operators) registered and addressed	River crossing points used by commuters and operators.	Monthly review of grievance records	LCT Ltd.	CCC	Included in operation budget
			Number of commuters using the new ferry routes Trends in ferry usage relative to pre-relocation conditions	New ferry routes from Ghats 12, 15 and Badalpura Ghat.	Monthly collection and review	LCT Ltd.	CCC	Included in operation budget
	Livelihood, health and safety of communities	High	Number of grievances (including GBV/SEA-SH grievances through specific grievance mechanism)) registered and addressed and analysis of topics, events, locations which generate more grievances Percentage of grievances resolved within the defined timeframe.	Project-affected communities and workforce; grievance locations as recorded in the grievance register.	Monthly review of grievance records	LCT Ltd.	-	Included in operation budget
			Visual evidence of community health and safety risks (CHS register)	Within and around the terminal site.	Daily CHS inspections Monthly review of inspection findings, complaints and corrective actions	LCT Ltd.	-	Included in operation budget
			Number and nature of community health and safety incidents attributable to Project activities. Number and nature of emergency incidents with the potential to affect communities. Results of emergency response drills involving external stakeholders. Functionality of emergency communication and warning systems.	Terminal and surrounding communities; emergency communication and warning systems.	Monthly	HSE Team	LCT Ltd.	Included in operation budget
			Number and nature of traffic incidents involving Project-related vehicles and community members, pedestrians, cyclists or other road users. Number and nature of traffic-related community grievances and complaints. Pedestrian movements and road safety conditions. Number of driver training sessions and community road safety awareness activities completed. Number and status of investigations and corrective actions implemented in response to traffic incidents, complaints or road safety concerns.	VIP Road, ferry access points and other key crossing locations.	Traffic incidents and community grievances shall be recorded and investigated upon occurrence. Pedestrian movements and road safety conditions at VIP Road, ferry access points and other key crossing locations shall be reviewed quarterly during the first three years of operation. Driver training records and community road safety awareness activities shall be reviewed annually. Traffic generation and traffic volumes shall be validated once during the first year of	HSE team	LCT Ltd.	Included in operation budget

					operation to confirm traffic forecasts and determine whether additional traffic management or road safety measures are required. Additional monitoring shall be undertaken following any significant traffic incident, substantiated community complaint or recurring road safety concern.			
			Number and nature of community grievances or complaints relating to electricity supply interruptions, voltage fluctuations, water supply interruptions or reduced water availability potentially associated with Project operations. Number and outcomes of consultations with BPDB, CWASA and relevant authorities regarding Project-related electricity and water demand. Annual electricity and water consumption by the terminal. Evidence of implementation of water and energy efficiency measures.	Terminal (electricity and water consumption); communities in the Area of Influence.	Community grievances relating to electricity and water supply shall be recorded and reviewed upon receipt. Electricity and water consumption data shall be reviewed annually. Consultation with BPDB, CWASA shall be done bi-annually during the first three years of operation	HSE team	LCT Ltd.	Included in operation budget
			Socio-economic conditions, including livelihoods, income, employment, access to services, community perceptions and project-related impacts collected through a social survey (min. 384 sample size)	Area of Influence (minimum sample size 384).	Once after 3 years from start of operation	Social consultant	LCT Ltd.	25,000 USD once after 3 years from start of operation
	Construction and Operation workers	High	Visual inspection on health and safety measures reported in CMP Visual inspection to ensure dust suppression measures are in place Visual inspection whether fuel and other flammable materials are stored safely	Terminal site, including dust suppression areas and fuel/flammable material storage areas.	Monthly	HSE Team	LCT Ltd	Included in operation budget
			Percentage of personnel who have signed the Worker Code of Conduct. Number of personnel trained on the Worker Code of Conduct. Number and nature of Code of Conduct violations. Number and nature of community grievances related to worker behaviour. Compliance with workforce management requirements.	Terminal site and nearby communities.	Prior to commencement of work for all personnel. Monthly review of training records and Code of Conduct compliance. Monthly review of community grievances and complaint trends. Following any substantiated complaint, serious incident or breach of the Worker Code of Conduct.	Operator	LCT Ltd.	Included in operation budget
			Number of grievances from workers registered and addressed and analysis of topics, events, locations which generate more grievances	Terminal workforce; grievance locations as recorded in the grievance register.	Monthly	LCT Ltd.		Included in operation budget
			Monitoring if personal protective equipment is used during work	Work areas at the terminal.	Daily	HSE Team	LCT Ltd	Included in operation budget

			Number and duration of water supply interruptions affecting terminal operations or worker welfare facilities. Water quality at points of use, including compliance with applicable drinking water standards.	Terminal operations and worker welfare facilities (water points of use).	Monthly	HSE team	LCT Ltd.	Included in operation budget
			Availability and condition of shaded rest areas, drinking water stations and cooled recovery areas. Implementation of work-rest regimes and other heat stress control measures during periods of elevated temperature.	Shaded rest areas, drinking water stations and cooled recovery areas at the terminal.	Heat stress control measures shall be reviewed during periods of elevated temperature and extreme heat conditions	HSE team	LCT Ltd.	Included in operation budget
	All VECs	High	Number and percentage of key suppliers, contractors and subcontractors audited against environmental, social, labour, health and safety requirements	Key suppliers, contractors and subcontractors.	Prior to any engagement with contractors and thereafter annually	HSE team	LCT Ltd.	Included in operation budget

The monitoring measures specified in the table above shall be implemented during the first three years of the operational phase. If the monitoring results indicate that no significant adverse effects are occurring, the monitoring frequency may be reduced thereafter, subject to regulatory requirements and approval where applicable.

11.3 Environmental surveillance, monitoring and auditing

Environmental Surveillance refers to leading indicators such as regular observation and supervision of project activities to identify immediate environmental issues or non-compliance during implementation. It is usually routine and field-based, focusing on whether mitigation measures are being properly followed. The following surveillance will be followed:

- Daily visual inspection of storage and housekeeping activities, workplace health and safety survey
- Weekly inspection and surveillance of drinking water and sanitation

Environmental and social monitoring is an integral component of the ESIA process and is undertaken to verify the effectiveness of proposed mitigation measures, assess compliance with applicable regulatory and project requirements and identify any unforeseen adverse effects. Monitoring enables adaptive management by providing timely information to support corrective actions and continuous improvement throughout the project lifecycle.

The environmental and social monitoring programme presented in Chapter 10 has been developed to ensure that project activities are implemented in accordance with the commitments made in the ESIA, ESMP and national legislation. Monitoring will be undertaken during the relevant project phases and will focus on the following key areas:

- Physical Environment Monitoring: Monitoring of environmental parameters that may be affected by project activities, including air quality, noise generation, water quality, sediment quality, waste management, resource consumption and other relevant physical environmental aspects.
- Biological and Ecological Monitoring: Monitoring of terrestrial, aquatic, and marine ecosystems, including habitats, flora, fauna, biodiversity-sensitive receptors and the effectiveness of biodiversity conservation and habitat protection measures.
- Occupational Health and Safety (OHS) Monitoring: Monitoring of workplace health and safety performance, including implementation of safety procedures, incident and near-miss reporting, training, use of personal protective equipment (PPE) and compliance with relevant health and safety requirements.
- Community Health, Safety and Security Monitoring: Monitoring of potential risks and impacts on neighbouring communities, including traffic safety, hazardous materials management, emergency preparedness and response, security arrangements and community exposure to environmental nuisances such as noise, dust and vibration.
- Social Performance Monitoring: Monitoring of social commitments and mitigation measures related to labour and working conditions, stakeholder engagement, grievance management, land access, livelihood restoration, vulnerable groups, cultural heritage and other social impact management requirements.
- Compliance Monitoring: Verification of compliance with applicable legal requirements, permit conditions, lender standards, ESIA commitments and project-specific environmental and social obligations.

Environmental Auditing refers to periodic and formal evaluation of the overall environmental performance of the project, including compliance with laws, standards, permit conditions, and the effectiveness of mitigation and management measures. Audits are generally more comprehensive and review-based than surveillance or monitoring. These will be reported in the annual audit report.

11.4 Contingency Plan

A Contingency Plan is a course of action designed to help a project team respond in an effective, organized and coordinated manner during a significant future emergency event or situation that may or may not happen such as natural or manmade disasters. A contingency plan or Emergency response plan is an essential part of risk management. There are various uncertainties which may occur during the project period for which contingency plan is required. These uncertain situations may be of any of the following categories:

- Emergencies such as fire, accidents, explosion or any medical emergency
- Natural disasters such as flood, earthquake or storm
- Other external factors such as manmade disaster, leakage of pollutants into water, oil spills, etc.

A Contingency Plan is developed to prevent and respond to operational, medical, fire, environmental, and security emergencies across project sites and phases. Each scenario is assessed based on its impact severity, risk level, required contractor actions, external medical or emergency support needs, and the corresponding employer escalation level.

The Plan applies to the Employer, Main Contractor, subcontractors, suppliers, vendors, consultants, service providers, visitors, and any other third parties performing work or operating within Project-controlled areas, including all temporary and permanent facilities such as work sites, offices, workshops, warehouses, laydown areas, accommodation facilities, marine interfaces, utilities, access roads, and associated infrastructure. It applies throughout the Project lifecycle.

Th Plan forms the foundation for the development and implementation of detailed emergency response procedures, emergency resource arrangements, training programs, drills, exercises, and continuous improvement activities.

11.4.1 Assessment of Emergency Resilience of the Project

The Laldia Container Terminal is a fully electrified greenfield container terminal on the Karnaphuli River in Chattogram. Its construction and operation involve heavy lifting equipment, electrical systems, fuel and gas storage, hazardous materials, pollution control systems and a large workforce, so abnormal and emergency situations are possible. The project therefore has to be prepared for them, and this contingency plan has been prepared to help the project team respond in an effective, organised and coordinated manner during a significant future event or situation that may or may not happen.

The plan sets out the contingency requirement for abnormal and emergency situations and is to be read with the Project Emergency Preparedness and Response Plan (EPRP), the Environmental Management Plan (EMP) and the approved ESIA commitments. Where documents differ, the more stringent requirement applies.

Table 11-7: Contingency planning requirements and where they are addressed

Sl.	Requirement (Contingency Planning)	Where addressed in this plan
1	Plan for abnormal and emergency situations: equipment failure, fire, gas leak, explosion of hazardous materials, failure of pollution control equipment	Section 3 and Table 2 (scenarios 1 to 5)
2	Procedures and measures to be adopted in an emergency	Section 4 (emergency response procedure), Table 2 and Table 3
3	Safety arrangements for working staff and the general public	Section 5 and Table 4
4	Organisations and persons to contact during an emergency and to inform afterwards	Section 6 and Table 5
5	Safety awareness enhancement and educational programmes	Section 7 and Table 6

11.4.2 Contingency Plan for Emergency Management

Contingency plans are an essential part of risk management. Abnormal and emergency situations may occur during the construction, commissioning and operation of the terminal for which a contingency plan is required. This plan covers the following:

- Failure of machinery and equipment used in the production (cargo handling) process
- Fire
- Gas leak
- Explosion of hazardous materials
- Failure of pollution control equipment

This contingency plan is developed to prevent and contain these situations and limit their effect on people, the environment and operations. The contingency plan, including the emergency equipment, personnel and drills it requires, should be included in the Contractor's costs.

11.4.3 Abnormal and Emergency Situations Covered

Below table sets out the contingency measures for each of the five situations before, during and after the event. Responsibility follows the EPRP: the Contractor controls the incident and gives first aid, and the Employer oversees, coordinates ambulances, hospitals and external authorities, and manages all external communication.

Table 11-8: Contingency Plan

Sl.	Emergency / Uncertainty	Contingency Measures		
		Before Event	During Event	After Event

Sl.	Emergency / Uncertainty	Contingency Measures		
1	**Failure of machinery or equipment in the production process (STS cranes, eRTGs, lifting equipment, power supply and critical utilities)**	• Planned preventive maintenance, inspection and load testing; certified operators • Keep standby equipment, emergency isolation and backup power arrangements • Define safe exclusion zones around lifting and handling equipment • Equipment failure procedures and emergency stop arrangements known to operators	• Stop the activity; make equipment safe and isolate energy sources • Secure the area and keep people clear; rescue and first aid if anyone is injured • Report to the Contractor Incident Commander (CIC) and Employer HSE • Switch to standby equipment or alternative arrangements to keep operations safe	• Inspect and repair before restart; competent person sign-off • Identify the root cause and review the maintenance plan • Assess any impact on operations; record and report the event
2	**Fire (offices, workshops, warehouses, fuel storage, electrical panels)**	• Fire prevention planning and measures; Fire Risk Assessment and Fire Emergency Response Plan (FERP) • FSCD approvals and NOCs for temporary facilities; detection, alarm, extinguishers, hydrants and fire water/foam provision • Hot work controlled by Permit to Work; monthly fire drills • Fire wardens, assembly points and evacuation routes in place	• Raise the alarm; suspend project activities • Immediately notify Fire Service (FSCD) through the CIC, with the Employer informed at the same time • Fire wardens evacuate and sweep zones; headcount at muster points; no re-entry • Isolate power and fuel if safe; carry out emergency firefighting and rescue; determine source of fire	• Revisit and revise the fire prevention plan and FERP • Clear debris safely after the incident • Complete investigation, corrective actions and Employer-approved report
3	**Gas leak (LPG, welding and industrial gas cylinders, fuel vapour)**	• Store and handle cylinders and fuels as per Hazardous Materials Management Procedures • Gas detection equipment; leak checks; ventilation of enclosed spaces • Remove ignition sources from storage areas	• Raise the alarm; stop work and remove ignition sources • Evacuate upwind or crosswind; isolate the supply if safe • Notify FSCD where there is a risk of fire or explosion; give first aid and arrange medical care for anyone exposed	• Test the atmosphere and declare the area safe before re-entry • Find and repair the cause of the leak • Revise storage and handling controls
4	**Explosion of hazardous materials (fuel, chemicals, dangerous**	• Hazardous materials inventory, segregation and bunded storage • Safe distances and exclusion zones;	• Raise the alarm; evacuate to assembly points and set exclusion zone	• Make the area safe; assess structural and environmental damage • Preserve evidence; investigate; clean up

Sl.	Emergency / Uncertainty	Contingency Measures		
	goods in storage or yard)	dangerous goods handling procedures • Emergency response procedures for the materials stored; PPE and firefighting equipment ready	• Notify FSCD, Police and Employer HSE immediately; give first aid • Warn neighbouring facilities and, where required, the public • Contain any spill or fire runoff and protect drains and the river	and dispose of waste lawfully • Review the hazardous materials management plan
5	**Failure of pollution control equipment (silt curtains, oil booms, drainage and sediment controls, dust suppression, wastewater treatment)**	• Inspect and maintain pollution control equipment per the EMP; keep spares • Monitor water quality, sediment and dust; follow the mitigation measures in the EMP	• Stop or reduce the activity that causes the release • Install temporary controls (booms, curtains, barriers); isolate drains • Notify CIC and Employer HSE	• Repair or replace the failed equipment before restarting • Employer notifies Department of Environment (DoE) and other authorities as required • Review monitoring and maintenance frequency

11.4.4 Procedures and Measures to be Adopted in an Emergency

The following sequence applies to every emergency listed in the above table. Scenario-specific actions add to these steps.

- **Discover and alarm:** the person who finds the emergency checks for hazards, keeps themselves safe and raises the alarm by radio or manual call point.
- **Report:** the witness reports to the Contractor Incident Commander (CIC), who immediately escalates to the Employer Project HSE Specialist. The Project HSE Specialist briefs the Project HSE Manager, who briefs the Project Director and HQ.
- **Assess and classify:** the CIC classifies the event using the EPRP Emergency Classification and Escalation Matrix and activates the Incident Command Post.
- **Respond:** emergency response teams, first aiders and fire wardens deploy; isolate the hazard if safe; stop affected work; set an inner cordon.
- **Evacuate and account:** personnel go to assembly points; wardens report headcounts; missing persons are reported to the CIC. No one re-enters until the CIC declares all clear.
- **Rescue and treat:** rescue casualties, give first aid and stabilise; hand over to the Employer medical response system for ambulance and hospital transfer.
- **Contain:** stop the source and contain fire, spill or release; protect drains and the river.
- Notify and escalate: the CIC calls emergency services for life-threatening events; the Employer notifies authorities and manages media and public communication. Reporting is made in StarDOM.
- **Recover:** after authorisation, assess damage and site safety, repair, restore and resume work.

- **Review:** investigate, record corrective actions, share lessons learned and update this plan.

Table 11-9: Escalation of emergencies

Event	Escalation level	Response
Equipment failure without injury, hot work spark fire	Local reporting	Handled on site; recorded in StarDOM
Small electrical fire, pollution control failure with limited release, equipment failure with injury	Regional notification (Level 1 to 2)	Site response; clinic or hospital transfer if needed; Regional CMT informed
Fuel fire, warehouse fire, gas leak with exposure, hazardous materials release	HQ CMT (Level 1 to 2)	Full emergency activation; FSCD and ambulance; Project Director and HQ informed
Explosion, multi-zone fire, mass casualty	Corporate CMT (Level 0)	Site-wide emergency activation; multi-agency response; Corporate CMT convened

11.4.5 Safety Arrangements for Working Staff and the General Public

The following arrangements protect both the workforce and people outside the site who could be affected by an emergency.

Table 11-10: Safety arrangements

Arrangement	For working staff	For the general public and neighbours
Muster and evacuation	• Designated assembly points at each work front, signposted and kept clear • Fire wardens sweep zones and report headcounts to the Chief Fire Warden • No re-entry until the CIC declares all clear	• Exclusion zone set by the CIC around the incident • Security keeps emergency access lanes clear and controls the gate • Visitors and drivers directed to muster or held at the gate
Alarm and warning	• Sirens, radios, public address and manual call points; alarms tested on schedule • Weather warnings relayed to all work fronts	• Warning given to neighbouring facilities and nearby community through the Employer when an emergency could affect them • Barriers, signage and megaphones where needed
Protection and rescue	• PPE for all workers and for response personnel • Gas detectors and rescue equipment suited to the hazards on site	• Nearby facilities warned through the Employer if smoke, gas or an explosion hazard could reach them • Traffic control and site isolation to keep public roads clear for responders
First aid and medical care	• Trained first aiders and first aid kits at work locations • Casualty stabilisation and handover to the Employer medical response system (ambulance, hospitals, medical evacuation)	• Casualty hospital transfer coordinated by the Employer • Public casualties given first aid and referred to emergency services

Communication and information	• Emergency contact lists and radio channels displayed at all work fronts • Reporting through StarDOM and the Incident Notification Chart	• Public and media communication only through the Employer corporate communications function • Community grievance channel used to answer concerns after an event

11.4.6 Organisations and Persons to be Contacted and Informed

Below table lists whom to contact during an emergency and whom to inform afterwards. Phone numbers are to be taken from the Emergency Contact List (Annex 1 of the EPRP) and displayed at every work front. Calls to FSCD, ambulance and police to save life are made without delay by the CIC, with the Employer informed at the same time. All other regulatory and external notifications are made by the Employer, in line with the EPRP.

Table 11-11: Organisations to be contacted during and after an emergency

Organisation / person	Contact during emergency	Inform afterwards	Typical trigger
Contractor Incident Commander / Emergency duty	Contacted first by the witness or supervisor	Prepares the incident report and investigation	All emergencies
Employer Project HSE Specialist and Project HSE Manager	Informed immediately by the CIC	Receives interim and final reports; reviews corrective actions	All emergencies
Project Director and Senior HSE Business Partner (HQ), CMT levels	Briefed by the Project HSE Manager as the escalation matrix requires	Receives investigation findings and lessons learned	Serious, high and critical incidents
Bangladesh Fire Service and Civil Defence (FSCD)	Called by the CIC at once (national emergency number 999)	Fire reports, drill records and approvals updated	Fire, explosion, gas leak, rescue
Ambulance service and designated hospitals (Apollo Imperial, Evercare, under evaluation by the Employer)	Mobilised by the Employer after the CIC requests it	Casualty status and transfer records filed	Injury or illness needing care beyond first aid
Police and Industrial Police	Called for fatalities, serious accidents, explosion, civil disturbance	Statements and records supplied through the Employer	As required by law or severity
Chittagong Port Authority (CPA) and Vessel Traffic Service (VTS)	Contacted through the Employer when an emergency affects port or river operations	Informed of closure, restart and any hazard left behind	Fire, explosion or release that affects the port or river
Department of Environment (DoE)	Contacted through the Employer for major releases	Notified of pollution control failures and pollution incidents	Pollution control failure, release to land or water

Organisation / person	Contact during emergency	Inform afterwards	Typical trigger
DIFE (labour and occupational safety)	-	Notified of reportable injuries and fatalities through the Employer	Workplace injuries and fatalities
Neighbouring facilities (for example RSGT, Navy, Airport, BPDB)	Warned through the Employer when affected	Told when the emergency is over	Fire, gas or explosion risk outside the site

11.4.7 Safety Awareness and Educational Programmes

Awareness and education make the plan work in practice. The Contractor delivers the programmes below, keeps records of attendance and competence, and makes them available to the Employer. The Employer may require additional drills or training at any time.

Table 11-12: Safety awareness and education programmes

Programme	Content	Frequency	Audience
Site induction	Hazards, alarms, muster points, reporting and stop-work authority for every worker and visitor	Before starting work	All personnel
Toolbox talks	Task-specific emergency actions, fire prevention, gas and hazardous material handling, equipment safety	Daily or weekly	Work crews
Emergency drills and exercises	Fire, gas leak, explosion, equipment failure, pollution control failure, medical and evacuation scenarios; communication and escalation tested	At least one per month per active site (12 fire drills a year)	ERT, wardens, supervisors, workforce
Emergency team training	First aid and CPR, firefighting, rescue, spill response and incident command, as set in the competency matrix	Initial, then refresher	ERT, first aiders, wardens
Community awareness	Project hazards, warning signals and what to do if an emergency affects the neighbourhood	At least yearly and after major changes	Neighbouring communities and facilities, through the Employer
Signage and information boards	Muster points, emergency contacts, hospital routes and safety messages	Continuous	Workers and visitors

11.4.8 Monitoring and Review

The effectiveness of this Plan will be ensured through regular monitoring, auditing, review and continual improvement measures, including the following:

- Monthly internal audits, routine inspections and drills, and quarterly independent external audits.
- Review of this plan after any significant incident, drill finding, change of project scope, or on Employer instruction.

- Corrective actions tracked to closure with evidence, and lessons learned shared with all contractors.

11.5 Waste and waste water management

The Waste and wastewater Management Plan establishes the requirements and controls for the identification, segregation, handling, collection, storage, transport, recycling, recovery and disposal of wastes generated during the construction and operational phases of the Laldia Container Terminal (LCT) Project. The Plan defines the management approach for each waste stream and provides a framework to ensure that waste is managed in a safe, compliant and environmentally responsible manner throughout the Project lifecycle. It further establishes the requirements for waste minimisation, recycling and recovery, waste tracking and reporting, contractor management, employee awareness and training, and the implementation of appropriate engineering and operational controls to prevent pollution and protect human health and the environment. This Plan applies to LCT Ltd., all Contractors, Subcontractors, Vendors, Waste Service Providers and any non-routine activities undertaken within the Project area.

The Plan follows the waste management hierarchy, categorises the different waste and wastewater streams (hazardous and non-hazardous), waste collection, labelling, storage, segregation and transportation to final disposal.

11.6 Biodiversity Management

The Biodiversity Management Plan (BMP) has the objective to protect biodiversity and encourages the measurement and monitoring of clearly stated biodiversity targets. The objective is to minimise impacts from the Project and, where possible, to enhance biodiversity. The BMP is a practical document developed and used by the site management team to maintain or improve biodiversity values during the construction and operational phases, and to determine risks and opportunities before construction and operation of the terminal begins. The development of the BMP focused on identifying, evaluating, conserving (and if possible, enhancing) the relevant aspects of biodiversity. It covers management actions for habitats as well as species.

11.7 Labour management

The Labour Management Plan (“LMP”) sets out how labour and working conditions will be managed for all workers engaged on the Laldia Container Terminal Project (“the Project”), across the construction and operations phases. The Plan applies to workers directly employed by LCT Ltd., as well as to workers engaged through contractors, subcontractors, and labour recruitment or manning agencies (“third-party labour”).

The objective of this LMP is to ensure that all workers on the Project are treated fairly, work in safe conditions, and are afforded the rights and protections set out in Bangladesh law and in the international standards to which the Project is committed.

The Plan will contain human resources policies and procedures for recruitment, employment contracts and terms and conditions, working hours, non-discrimination, occupational health & safety, communication, workers' grievance mechanism and prevention of child and forced labour, sub-contractor management and training and capacity building.

11.8 Gender

Gender equality is not only a fundamental human right but a necessary foundation for sustainable and inclusive economic development. Large-scale infrastructure projects such as LCTP have the potential to create both opportunities and risks for women and other gender-diverse individuals — in the workforce, in supply chains, and in surrounding communities.

A Gender Action Plan establishes LCTP's commitments, plan of action, and accountabilities to promote gender equality and prevent Gender-based Violence and Harassment across all phases of the project. The Plan will contain provisions to mainstream gender into recruitment and employment, non-discrimination in hiring and, health and safety and equal pay and benefits.

11.9 Organization structure

11.9.1 Environmental, health and safety organization

Laldia Container Terminal Limited (LCT Ltd)

Laldia Container Terminal Limited (LCT Ltd) is accountable for the environmental and social (E&S) management of the Laldia Container Terminal Project (LCTP) through the pre-construction, construction and operation phases, in accordance with the Environment Conservation Rules (ECR) 2023. LCT Ltd. will have dedicated staff responsible for overseeing the implementation of the ESIA and ESMP, as shown in Table 11-13. The Project HSE Manager will report directly to the LCT Ltd's Project Director and will assist the LCT Ltd. project leadership on all matters relating to environmental and social management and monitor the environmental and social performance of the Main Civil Works and the Buildings Contractors. The LCT Ltd will compile and submit periodic environmental and social monitoring reports in accordance with the reporting requirements under ECR 2023.

Table 11-13: LCT/APMT Project E&S Management Structure

Sl. No.	Position	Number	Duration
1	Head of Portfolio, Project Execution	1	Through pre-construction & construction periods
2	Project Director (liaison with DoE and Government of Bangladesh authorities on E&S and permitting matters)	1	Full pre-construction and construction periods
3	Managing Director, LCT Ltd.	1	Full pre-construction, construction and operations periods
4	Engineering Lead	1	Full pre-construction and construction period

Sl. No.	Position	Number	Duration
5	Project Health, Safety and Environmental Manager	1	Full pre-construction, construction and operations periods
6	Construction Manager	1	Full pre-construction and construction period
7	Environmental Engineer	1	Full pre-construction, construction and operations periods
8	Security Lead	1	Full pre-construction, construction and operations periods
9	SAP Manager (see below)	1	Full pre-construction and construction periods

Chittagong Port Authority (CPA)

CPA will support LCT Ltd. in the development of the Project, following the CA. They will also be engaged in the maintenance dredging at the berth of LCTP. Some of the measures (e.g. the relocation of the mooring buoy near the project site) are the responsibility of CPA. Further CPA will monitor the progress and quality of the work. deploys resources for oversight; operates a grievance redressal unit for matters falling outside LCTL's scope; maintains transparent communication with affected communities.

Department of Environment (DoE)

DoE reviews the ToR for the ESIA (see Annex A) and this ESIA and ESMP report and issues a Site and Environmental Clearance Certificate for construction and operation of project. DoE performs environmental and social monitoring and enforcement of the provisions of the Certificates, based on environmental and social monitoring reports of LCT Ltd.

Consultants

It is expected that different consultants will be engaged in different project stages to support LCT Ltd. in the management and monitoring of the environmental and social aspects of the Project.

An ESIA consultant (Haskoning with IWM and BUET) is implementing the ESIA process and prepared this ESIA and ESMP Report. Also, they will prepare the final ESIA and ESMP incorporating the suggestions of the different stakeholders.

It is expected that consultants will be engaged to implement certain mitigation measures (e.g. measures to mitigation impacts on dolphins), as described in chapter 9, and perform and report monitoring measures (e.g. monitoring of social changes), as included in chapter 10.

A Social Action Program (SAP) to address residual social and livelihood impacts arising from historical land clearance at Laldia Char, requires separate consultants to prepare the SAP and to monitor its implementation.

Contractors

The Main Civil Works Contractor and the Building Works Contractor are required under the Project HSSE Specification (APMT-PE-HSSE-SPC-001, Rev.14) to maintain dedicated, competent

environmental, health, safety and social personnel on Site for the full duration of the Works covered by that infrastructure scope, as set out in Table 11-14.

Table 11-14: Main Civil Works & Building Contractors E&S Staff

Sl. No.	Position	Number	Duration
1	HSSE Manager	1	Full duration of the Works
2	Environmental Site Manager / Officer	1	Full duration of active works
3	Social and Community Liaison Officer	1	Full duration of the Works

LCT Ltd. will also engage a FIDIC Engineer and a Construction supervision Consultant (CSC) to manage and supervise construction contractors. Staffing under these consultancies is identified in the table below.

Table 11-15: FIDIC Engineer & Construction Supervisor Consultants E&S Staff

Sl. No.	Position	Number	Duration
1	FIDIC Engineer -HSSE Manager	1	Full duration of the Works
2	FIDIC Engineer - Environmental Manager	1	Full duration of active works
3	FIDIC Engineer - Social and Community Liaison Officer	1	Full duration of the Works
4	Construction Supervisor - Environmental Site Manager	1	Full duration of active works
5	Construction Supervisor – HSSE Site Manager	1	Full duration of the Works

11.9.2 Implementation and oversight structure

Environmental and social management and mitigation plan of the project requires a multidisciplinary approach with consolidated and coordinated efforts from a number of agencies. The contractor is responsible for implementation of ESMP during construction works. A Consultant is expected to be hired and will be primarily responsible for supervision of monitoring of the implementation of the ESMP.

CPA and DoE have a role in the monitoring of the progress of the Project and the implementation of the provisions in the SCC and ECC.

11.10 Training

Training and awareness are key components of effective E&S risk management during project implementation. LCT Ltd. retains overall accountability for ensuring that all project activities are carried out in compliance with applicable E&S requirements and that contractors and subcontractors fulfil their respective contractual obligations. Relevant E&S policies, management plans, procedures and standards will be communicated to all personnel involved in the project and incorporated into contractor management processes. Appropriate training and awareness programmes will be delivered to project personnel and contractors to strengthen understanding of E&S requirements and support effective implementation of mitigation and management measures.

The project-specific E&S training programme will be developed prior to the commencement of relevant project activities and updated as necessary throughout the project lifecycle. Training content and delivery will be periodically reviewed to ensure continued alignment with project requirements and regulatory obligations.

General environmental and social awareness training

All Project personnel, including contractors and subcontractors, will receive HSSE training which will include E&S awareness training to ensure a clear understanding of project-related risks, applicable legal requirements, labour and working conditions, grievance mechanisms and relevant E&S policies and procedures. Ongoing awareness will be maintained through regular communication and the display of key project policies, codes of conduct and grievance mechanisms at accessible locations. Training will also cover emergency preparedness and response relevant to project activities, including potential environmental, health, safety and community-related incidents. Emergency response exercises will be conducted as appropriate and lessons learned will be incorporated into training programmes and management procedures to support continual improvement.

Environmental and social issues training

All personnel and visitors entering project sites will receive a site induction covering key site hazards, emergency procedures, evacuation arrangements and muster points. In addition, role-specific and specialist training will be provided as required through formal training sessions and toolbox talks. Key training topics shall include:

- Environmental and Social Management
  - Project E&S requirements, policies, ESMP procedures
  - Awareness of significant environmental and social risks and mitigation measures
  - Waste management, pollution prevention and environmental protection practices
  - Safe handling, storage, transfer and spill response for fuels and chemicals
- Occupational Health and Safety
  - Use of PPE and safe systems of work, including permit-to-work procedures
  - Safe driving, traffic management and transportation safety
  - Electrical safety, lockout/tagout (LOTO), working at height, lifting operations, excavation safety, machinery safety and hazardous material handling
  - Emergency preparedness and response procedures relevant to project activities
- Labour and Working Conditions
  - Workers' rights, employment conditions, Code of Conduct and grievance mechanisms
  - Awareness of ethical behaviour and workplace responsibilities
- Gender and Community Issues
  - Gender equality awareness
  - Prevention of gender-based violence and harassment (GBVH)
  - Community health and safety considerations relevant to project activities
- Specialist Training

- Training for supervisors and personnel with specific E&S responsibilities; spill response teams, emergency response personnel and other designated workers
- Marine Mammal Observer training from e.g. JNCC (see Chapter 10)
- Additional specialist training identified through role-based training needs assessments

All organisations involved in the Project will maintain a training matrix and training programme to ensure personnel receive the competencies required for their roles. The training matrices of individual organizations will be reviewed and approved by LCT Ltd. Training may be delivered by qualified internal staff or approved external providers and will be periodically reviewed and updated as necessary.

11.11 Stakeholder engagement and grievance mechanism

Stakeholder engagement and consultation is one of the key components of the ESIA process to reach and inform key stakeholders, especially those in the Project area of influence through the stakeholder engagement activities. The identified stakeholders, consultation activities, focus group discussions and their outputs are summarized in Chapter 6.

The project company is required to establish an effective and accessible grievance mechanism as part of the stakeholder engagement, information disclosure and consultation. A grievance mechanism is a structured process designed to address complaints and concerns from stakeholders. External stakeholders can use the grievance mechanism through different channels.

The Community GRM for the Laldia Container Terminal (LCT) Project and sets out the processes by which project-affected communities, host communities, previously displaced persons, and other external stakeholders may raise concerns, complaints, or grievances regarding the Project's environmental, social, safety, or operational impacts. The procedure describes the seven-step grievance process, consisting of receipt of grievance, acknowledgement, assessment and categorisation, investigation and consultation, resolution and notification, appeal, and closure and follow-up. It also defines grievance access channels, roles and responsibilities. In addition, the procedure includes requirements relating to non-retaliation and confidentiality, GBV and SEA/SH grievances, monitoring, reporting and continuous improvement, community awareness, access to external remedies, and procedure review and update.

11.12 Budget implications

11.12.1 Budget for implementation of measures

For successful implementation of ESMP, provision of appropriate budget shall be in place. The mitigation measures are presented in Chapter 9 of this ESIA; including the breakdown of budget for implementation of mitigation measures. The costs associated with compliance with the ESMP requirements shall be deemed to be included within the Contractor's scope of work, except where specific provisions are expressly identified in the ESMP tables. The table below summarises the

cost items associated with implementing the proposed mitigation measures throughout the successive phases of the Project. Costs for the pre-construction and construction phases are presented for the full duration of each phase. During the operation phase, however, some mitigation measures involve one-off expenditures, while others incur recurring annual costs. These costs are presented separately in Table 11-16.

Table 11-16: Costs associated with implementation of mitigation measures

Summed capital costs of planning and implementation of measures									Summed costs of annual activities for implementation of measures (USD)		
Preconstruction			Construction			Operation			Operation		
Definition	Cost (USD)	Cost (BDT)	Definition	Cost (USD)	Cost (BDT)	Definition	Cost (USD)	Cost (BDT)	Definition	Cost (USD)	Cost (BDT)
Establishing recreational facilities for communities	6,000	740,000	Preparing the Critical Habitat Assessment	60,000	7,400,000	Preparing Operation Phase Management Plans	265,000	33,125,000	Operating the temporary WW system	50,000	6,150,000
Improving infrastructure and passenger facilities at Ghats 12 and 15	400,000	50,000,000	Training of personnel on marine mammal observing	6,000	740,000	Establishing temporary wastewater treatment infrastructure	250,000	31,000,000	Training the personnel on marine mammal observations	2,500	310,000
Upgrading pedestrian access and crossing facilities at the entrances to Ghats No. 12 and 15	25,000	3,100,000	Preparing the Chance-Find procedure	2,000	246,000	Implementation of noise and light management measures	50,000	6,150,000	Engaging with relevant traffic management authorities	5,000	615,000
Coordinating with CCC and river crossing operators	5,000	615,000	Preparing the contractor and subcontractor management system	10,000	1,230,000	Establishing rainwater harvesting systems	50,000	6,150,000	Consulting with CPA to enhance the navigational safety of local vessels	5,000	615,000
						Establishing treated wastewater reuse infrastructure	60,000	7,400,000	Training and awareness programmes for drivers regarding applicable traffic regulations	7,000	875,000
						Creating a shaded area by building a canopy in Block A	50,000	6,150,000	Establishing Address & General Alarm / Emergency Communications /Mass Notification System	5,000	615,000
						Incorporating vegetation, landscaping and other passive cooling measures	5,000	615,000	Implementing noise and light management measures yearly maintenance	5,000	615,000
						Establishing Supply Chain Management system	5,000	615,000	Implementing a community-led wall painting and visual enhancement programme	5,000	615,000
						Installing groundwater monitoring wells	20,000	2,460,000	Enhancing and maintaining the vegetation in the central dividing strip of the public road	5,000	615,000
						Bird survey	27,000	3,324,000	Implementation of Management Plans	8,000	984,000
						Road traffic survey	12,000	1,500,000	Coordinating with BPDB and CWASA regarding the	5,000	615,000

Summed capital costs of planning and implementation of measures									Summed costs of annual activities for implementation of measures (USD)		
Preconstruction			Construction			Operation			Operation		
Definition	Cost (USD)	Cost (BDT)	Definition	Cost (USD)	Cost (BDT)	Definition	Cost (USD)	Cost (BDT)	Definition	Cost (USD)	Cost (BDT)
									electricity and water supply requirements o		
						River traffic survey	5,000	615,000	Coordinating with BPDB to promote the safe design, operation and maintenance of the electricity transmission infrastructure	5,000	615,000
						Socio-economic survey	25,000	3,100,000			
SUM	**436,000**	**54,455,000**		**78,000**	**9,616,000**		**824,000**	**102,204,000**		**107,500**	**13,239,000**

11.12.2 Budget for implementing the environmental monitoring program

The monitoring plan should include regular reviews of the impacts that cannot be adequately assessed before the start of the works, or which arise unexpectedly, along with appropriate measures to mitigate any negative impacts and/or enhancing beneficial impacts. In Chapter 10 of this ESIA, the main environmental parameters to be monitored are outlined together with timing of the monitoring work and the recommended frequency of monitoring together with the costs of monitoring activities.

It should be noted that all analysis should be done in an accredited environmental engineering laboratory. All monitoring activities are the responsibility of the contractor or operator. Table 11-17 below summarises the monitoring costs associated with the various phases of the Project. For the pre-construction and construction phases, the monitoring costs are presented for the full duration of each phase. For the operation phase, monitoring costs are presented on an annual basis to reflect their recurring nature.

Table 11-17: Costs associated with monitoring activities

Costs associated with monitoring activities								
Preconstruction			**Construction**			**Operation**		
Definition	**Cost (USD)**	**Cost (BDT)**	**Definition**	**Cost (USD)**	**Cost (BDT)**	**Definition**	**Cost (USD)**	**Cost (BDT)**
Continuous monitoring of water level upstream of the Khal 14	1,000	125,000	Continuous water level monitoring	9,000	1,125,000	Water Quality monitoring	8,000	1,000,000
			Pre- and post-dredging bathymetry surveys	30,000	3,750,000	Groundwater quality monitoring	12,000	1,500,000
			Erosion and sedimentation monitoring	30,000	3,750,000	Sediment quality monitoring	12,000	1,500,000
			Turbidity monitoring	20,000	2,500,000	Air quality and noise monitoring	45,000	5,625,000
			Water quality monitoring	17,000	2,125,000	Grievance management for fisheries	2,000	250,000
			Sediment quality monitoring	9,000	1,125,000	Turbidity monitoring	2,000	250,000
			Air quality and noise monitoring	135,000	16,875,000	Habitat monitoring (tidal mudflat)	1,000	125,000
			Monitoring of habitat conditions - tidal mudflats	1,800	225,000	NA	NA	NA

			Monitoring activities for dolphins including underwater noise monitoring, PAM survey, MMO surveys etc.	250,000	31,250,000	NA	NA	NA
			Bird surveys	81,000	10,125,000	NA	NA	NA
			Road traffic surveys	72,000	9,000,000	NA	NA	NA
			River traffic surveys	45,000	5,625,000	NA	NA	NA
			Socio-economic surveys	50,000	6,250,000	NA	NA	NA
SUM	**1,000**	**125,000**		**749,800**	**93,725,000**		**82,000**	**10,250,000**

* For pre-construction and construction phases, the monitoring cost cover the duration of the entire phase, while in operation the monitoring cost is given as annual cost.

11.13 Methods and schedule for results review or auditing

During the pre-construction, construction and operation phases of the project, environmental and social monitoring is essential to ensure compliance with regulations and promote sustainable development. Environmental and social indicators include air quality, noise level, water quality, soil quality, waste generation, drainage congestion and water logging, riverbank erosion, aquatic ecology as well as health and safety.

These indicators need to be monitored closely during all phases of the project. Monitoring methodologies involve baseline studies to establish pre-project conditions, regular monitoring through scheduled observations and measurements, participatory monitoring involving local communities, and systematic reporting to inform stakeholders and guide decision-making. These practices help in mitigating adverse effects and ensuring positive outcomes for both the environment and society. The monitoring indicators and methodology are clearly discussed in Chapter 10.

All monitoring results are reviewed and audited through monthly and six-monthly compliance reporting and annual auditing to ensure effective implementation of the ESMP) and compliance with applicable standards and regulations. The reports summarize monitoring findings, compliance status, corrective actions, and recommendations for improvement. The reporting requirements are detailed in Chapter 10 of this ESIA report.

12 Conclusion and Recommendations

12.1 Conclusions

This ESIA has assessed the potential environmental and social impacts associated with the pre-construction, construction and operation phases of the proposed Laldia Container Terminal Project. The assessment was undertaken in accordance with the applicable requirements of the Government of Bangladesh, including the ECR 2023, relevant sector regulations and guidelines and recognised good industry practice.

The positive environmental and social impacts of the Project are potential national and regional economic growth by improving international trade since it adds approximately 800,000 TEU per year of new handling capacity, with a maximum design capacity of approximately 1,400,000 TEUs in annual container-handling capacity per year, significantly easing congestion at Chattogram Port and allowing larger vessels to dock directly, which shortens shipping lead times for key exports like garments. It will generate direct jobs at the terminal and indirect roles across logistics and supply chain sectors, while introducing international operating and safety standards through global expertise. Additionally, it will potentially generate business for local shop owners or businessmen. Moreover, it is expected that the Project will incorporate energy-efficient technologies, computerized gate/yard monitoring and modern environmental management practices to reduce overall carbon intensity compared to older port infrastructure. However, with the implementation of the mitigation measures described in this ESIA, most adverse impacts are expected to be reduced to acceptable levels, allowing the Project to proceed sustainably.

The Project has the potential to generate several significant environmental and social impacts, particularly in relation to drainage modification, river morphology, maintenance dredging, air quality, noise, underwater noise, dolphins, fisheries resources, livelihood impacts from the displacement of the river crossing at Ghat-14 and community health and safety. In addition, the Project will contribute to cumulative impacts within the Karnaphuli River industrial and port corridor, particularly where multiple developments interact increasing pressures on physical, ecological and social receptors.

The VECs are defined as fundamental elements of the physical, biological and social environment that are likely to be impacted by the Project activities. The VECs identified are drainage hydrology, river morphology, water and sediment quality, ambient noise levels, ambient air quality, tidal mudflats, mangrove ecosystem, dolphins, fisheries resources, avifauna and migratory birds, river crossing commuters and operators, road traffic, river traffic, livelihood, health and safety of communities and construction and operation workers.

An ESMP has been formulated to mitigate the negative impacts and enhance the positive impacts of the project on the VECs during various phases (Pre-construction, Construction and Operation) to acceptable levels. Moreover, public consultations, including questionnaire survey, Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) are organized in addition to the

preparation of a Social Assistance Program as per GoB to address resettlement and compensation issues.

To ensure that these enhancement, mitigation and compensation measures are implemented effectively and that adverse impacts are avoided, the ESMP shall be incorporated into the Project contract documents together with adequate budget allocations, including dedicated line items for the preparation and implementation of contractor-specific environmental and social management plans. Environmental and social monitoring programmes shall be implemented throughout the construction and operational phases to: (i) verify the impact predictions presented in the ESIA; and (ii) assess the effectiveness of the proposed mitigation and management measures. The monitoring indicators include, as a minimum, monitoring of drainage performance (water levels), river morphology and bathymetry, water and sediment quality, groundwater quality, air quality, ambient and underwater noise, dolphin presence, mangrove and avifauna conditions, road and river traffic, socio-economic conditions, livelihood restoration, stakeholder grievances and community and occupational health and safety indicators. Monitoring shall be undertaken by the Contractor during construction and by the Operator during operation, with results reviewed through regular compliance reporting, independent audits and adaptive management processes. Most potential impacts are short-term and can be avoided or reduced through implementation of the proposed mitigation measures. However, some moderate residual impacts are anticipated, including increases in ambient noise levels, permanent loss of intertidal mudflat habitat, underwater noise risks to dolphins, economic displacement associated with relocation of small shops and restaurants, relocation of river crossing operations from Ghat No. 14, labour influx, increased fire and spill risks, increased truck and vessel movements and additional pressure on local infrastructure and utility services.

Subject to the full implementation of the mitigation measures, monitoring requirements and management commitments presented in this ESIA, LCTP can proceed and DoE may issue necessary environmental clearances to such a nationally important project. LCT Ltd. will implement the ESMP in accordance with the mitigation, monitoring and management commitments in this ESIA and will comply with legal and administrative requirements of the GoB through the pre-construction, construction and operation phases of LCTP.

12.2 Recommendations

The following recommendations are based on the baseline scenario, likely impacts of the Project on the VECs, environmental and social guidelines, regulations and policies and stakeholder consultations:

- The detailed design of the *Khal 14* culvert shall be developed in coordination with BWDB and supported by hydraulic modelling to ensure that the Project does not increase upstream flooding, drainage congestion or waterlogging.

- A Marine Mammal Mitigation Protocol shall be implemented during piling activities, including low-noise installation methods, acoustic monitoring and biodiversity protection measures to minimise impacts on Ganges River and Irrawaddy dolphins.
- LCT Ltd. shall implement the Social Assistance Program (SAP) to address residual impacts associated with historical displacement and support livelihood restoration for eligible affected households.
- Measures to maintain river-crossing accessibility shall be developed in coordination with CPA and CCC to minimise impacts resulting from the closure of *Ghat No. 14*.
- Contractors and operators shall implement the ESMP, including the required management plans, monitoring programmes, stakeholder engagement activities and grievance mechanisms throughout the Project lifecycle.
- LCT Ltd. shall maintain adequate environmental and social management capacity, training programmes and emergency preparedness measures to ensure effective implementation of ESIA commitments and continuous improvement of environmental and social performance.
- LCT Ltd. and the contractors shall abide by relevant environmental rules, regulations including workers' and community health and safety aspect, prevention of air, noise and water pollution and protection of aquatic fauna and flora.

13 References

AEC Illuminazione. (n.d.). *Ports and intermodal LED lightning: tourist and commercial seatports* .

Antar Sarkar, S. A. (2025). *Olive Ridley Turtle (Lepidochelys olivacea) bycatch along the Cox's Bazar Coast of Bay of Bengal, Bangladesh: Insights from fishermen and local communities.* Journal of Earth and Ocean Science (JEOS) Vol : 02, Issue: 01 .

Arnob, S. H. (2020). *Lead Time Optimization of RMG Sector Supply Chain in Bangladesh.* Supply Chain Insider| ISSN: 2617-7420 (Print), 2617-7420 (Online), 4(1).

Bangladesh Bureau of Statistics. (2022). *Population and Housing Census 2022.* Statistics and Information Division, Ministry op Planning.

Bangladesh Forest Department . (2022). *Report on aquatic biodiversity / dolphin status in Bangladesh.* Government of Bangladesh.

Bangladesh Forest Department. (2022). *Status and distribution of aquatic mammals in Bangladesh.*

Bangladesh, G. o. (2023). Environmental Conversation Rules.

cGanga and NMCG. (2021). *ECOLOGY AND CONSERVATION OF DOLPHINS (CETACEANS) IN GANGA RIVER BASIN.* National Mission for Clean Ganga.

CPA. (2025). *Overview 2025.* Chittagong Port Authority.

CPA. (2026). *Karnaphuli River Handbook of Tide Tables 2026*. Retrieved from https://objectstorage.ap-dcc-gazipur-1.oraclecloud15.com/n/axvjbnqprylg/b/V2Ministry/o/office-cpa/2024/12/c75706b2874d42089ea337b4a86e83d2.pdf

CWASA; World Bank, Grontmij, Aqua, IWM. (2016). Updated Drainage Master Plan Draft.

DAR. (2025). *APMT Laldia Terminal - Results of monsoon environmental baseline surveys (BG25115-0100D-RPT-PM-01 REV). In Association with JPZ Consulting (Bangladesh) Ltd.*

Hossain, M. M. (2013). *Present status of conservation and management of sea turtle in Cox's Bazar district, Bangladesh.* Mesopotamian Journal of Marine Sciences, 28(1), 45-60.

Hossain, M. S., Biswas, M., Hossain Khan, M. S., Shetu, D. Y., Biswas, P., & Sultana, Z. (2026). Quantitative assessment of active tectonics of Chittagong–Tripura Fold Belt, Bengal Basin, Bangladesh. *Geosystems and Geoenvironment, 5*(2). Retrieved from https://doi.org/10.1016/j.geogeo.2026.100493

HR Wallingford. (2024). *Laldia Terminal Maritime Technical Feasibility.*

HR Wallingford. (2025). *Laldia Terminal Extreme Wave and Water Level Analysis.*

IUCN. (2014). *Migration, Spawning Patterns and Conservation of Hilsa Shad (Tenualosa ilisha) in Bangladesh and India.*

IUCN. (2022). *Platanista gangetica. The IUCN Red List of Threatened Species 2022.*

IUCN. (2022). *Platanista gangetica. The IUCN Red List of Threatened Species 2022.*

IUCN. (2023). *Orcaella brevirostris. The IUCN Red List of Threatened Species* .

IUCN. (2023). *Orcaella brevirostris. The IUCN Red List of Threatened Species 2023.*

Jensen, F. H. (2013). *Clicking in shallow rivers: short-range echolocation of Irrawaddy and Ganges river dolphins in a shallow, acoustically complex habitat.* PloS one, 8(4), e59284.

Jirka, C. (2022). *Response of chironomids to key environmental factors.* Water, 14(19), 3100.

JNCC. (n.d.). *Capitella capitata in enriched sublittoral muddy sediments.* Joint Nature Conservation Committee.

Kabir, R. A. (2021). *Congestion at Chittagong seaport: Causes and consequences.* Innovation Journal of Social Sciences and Economic Review, 3(3), 13-21.
Kawasaki, T. L. (2023). *Geospatial transition of port hinterland considering intermodal service frequency: A case study in Bangladesh.* Journal of Transport Geography, 108, 103549.
Khan, M. S. (2019). *EPASIIAE survey report on Ganges River dolphin in the Halda River (2018–2019).*
Khan, M., Hossain, M., & Chowdhury, K. (2017). *Geomorphic implications and active tectonics of the Sitapahar anticline - CTFB, Bangladesh.*
Ladegaard, M. (2017). *Biosonar and echolocation in river dolphins.*
LCT Ltd. . (2025). *Technical Feasibility Report Volume One: Laldia Container Terminal Project (LCTP).*
LCT Ltd. (November 2025). *Technical Feasibility Report, Laldia Container Terminal Project (LCTP),.*
Liebherr. (n.d.). *Rubber tyre gantry cranes*. Retrieved from https://www.liebherr.com/en-int/maritime-cranes/products/port-equipment/rubber-tyre-gantry-cranes-5391552
Lledo, J. (n.d.). *Container Ship Maersk Northampton Working with Containers Cranes*. Retrieved from https://www.dreamstime.com/container-ship-maersk-northampton-working-containers-cranes-docked-port-algeciras-spain-image104638646
Lucke K, S. U. (2009). *Temporary shift in masked hearing thresholds in a harbor porpoise (Phocoena phocoena) after exposure to siesmic airgun stimuli.* Journal of the Acoustical Society of America 125, 4060-4070.
Marten, K. S. (2000). *Acoustic signals of Irrawaddy dolphins (Orcaella brevirostris).* Journal of the Acoustical Society of America, 108(5), 2531–2540.
McLusky, D. S. (2004). *The estuarine ecosystem: Ecology, threats and management.* Oxford University Press.
Minton, G. (2017). *Review of the conservation status of the Irrawaddy dolphin.*
National Marine Fisheries Service. (2024). *Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts.* NOAA Technical Memorandum NMFS-OPR-71 .
Niu, F. Q. (2019). *Echolocation clicks of free-ranging Irrawaddy dolphins (Orcaella brevirostris) in Trat Bay, the eastern Gulf of Thailand.* The Journal of the Acoustical Society of America, 145(5), 3031-3037.
Niu, F. Y. (2019). *Echolocation clicks of free-ranging Irrawaddy dolphins (Orcaella brevirostris) in Trat Bay, the eastern Gulf of Thailand.* Third Institute of Oceanography, Ministry of Natural Resources; Marine and Coastal Resouces Research and Development Center.
Richman, N. I. (2014). *To see or not to see: investigating detectability of Ganges River dolphins using a combined visual-acoustic survey.* PLoS One, 9(5), e96811.
Sinha, R. K. (2014). *Ganges River dolphin movement and ecology.*
Sinha, R. K. (2014). *The Ganges River dolphin: Ecology and conservation.*
Smith, B. D. (1997). *Status and conservation of the Irrawaddy dolphin in Bangladesh.* Wildlife Conservation Society.
Smith, B. D. (1998). *Status and conservation of the Ganges River dolphin in Bangladesh.*
Smith, B. D. (2002). *River cetaceans and habitat use in South and Southeast Asia.* Encyclopedia of Marine Mammals.

Smith, B. D. (2006). *Abundance of Irrawaddy dolphins (Orcaella brevirostris) and Ganges river dolphins (Platanista gangetica gangetica) estimated using concurrent counts made by independent teams in waterways of the Sundarbans mangrove forest in Bangladesh.* Marine Mammal Science, 22(3), 527-547.

Specialty Precast. (2025). *Box Culvert Explained: Precast Concrete Culverts for Drainage Systems*. Retrieved from https://specialtyprecast.com.au/what-is-a-box-culvert-2/.

Steckler, M. S., Mondal, D. R., Akhter, S. H., Seeber, L., Feng, L., Gale, J., . . . Howe, M. (2016). Locked and loading megathrust linked to active subduction beneath the Indo-Burman Ranges. *Nature Geoscience*.

Streetview, G. (2024). *Google Streetview* .

SURVEY2000. (2026). *Topographic & Conduit Survey Report; Laldia Container Terminal.* Chittagong.

Swinton, J. a. (2009). *"Platanista gangetica" (On-line), Animal Diversity Web.* https://animaldiversity.org/accounts/Platanista_gangetica/.

Turukmane, R. G. (2019). *Prefabrication vertical drain for soft soil consolidation.* Technical Textiles International, 62(1), 27-29.

Uddin, e. a. (2025). Geospatial Exploration of Drinking Water Quality in the Coastal Region of Bangladesh: A Case Study from Paikgacha, Khulna. *Environmental Forensics*.

United Nations in Bangladesh. (2025). *hree out of four women in Bangladesh experience violence, Bangladesh Bureau of Statistics survey finds*. Retrieved from https://bangladesh.un.org/en/303253-three-out-four-women-bangladesh-experience-violence-bangladesh-bureau-statistics-survey [bangladesh.un.org]

Wakid, A. (2018). *Ecology and conservation of river dolphins in South Asia.*

Wu, P. C. (2022). *Subsidence in coastal cities throughout the world observed by InSAR.* Geophysical Research Letters, 49(7), e2022GL098477.

WWF. (2021). *Ganges River dolphin conservation status and distribution.* World Wide Fund for Nature.