

**Addendum No. 1 to the**  
**Environmental Impact Assessment**  
**(January 2016 version)**  
**For the**  
**Dhaka Mass Rapid Transit Development Project**

**Prepared for**

**Dhaka Mass Transit Company**

**By NKDM**

**July 2016**



## I. Summary

This is Addendum No. 1 to the detailed design stage Environmental Impact Assessment (EIA) prepared for the Dhaka Mass Rapid Transit Development Project. The addendum introduces changes (additions, deletions and revisions) to specific content of the January 2016 version of the EIA, which in itself is an update of the 2011 Preparatory EIA.

There are 10 revisions contained in this addendum, which are described in the following section in the order of their appearance in the EIA report. A reference describing the nature of the revision is provided along with a page or section reference to the January 2016 version of the EIA, followed by a description of the change being made and a statement pertaining to its consequence. Additional changes may be necessary as the project progresses, to be addressed in further addenda.

## II. Revisions

### 1. Chapter 3, Sec. 3.3.2.2: Revision of Project Description (Track)

Details contained in this section were revised as follows:

- Vertical curve radius: 3,000 m (minimum); exceptional case 2,000m
- Minimum horizontal curve radius: 400 m (normal case), 180 m (extreme case in transit viaduct), 100 m (in depot)
- The following paragraphs (coming after "... Long Rail Method of Placement.") are added to replace those in the current description, as follows (replacement text provided to end of section):

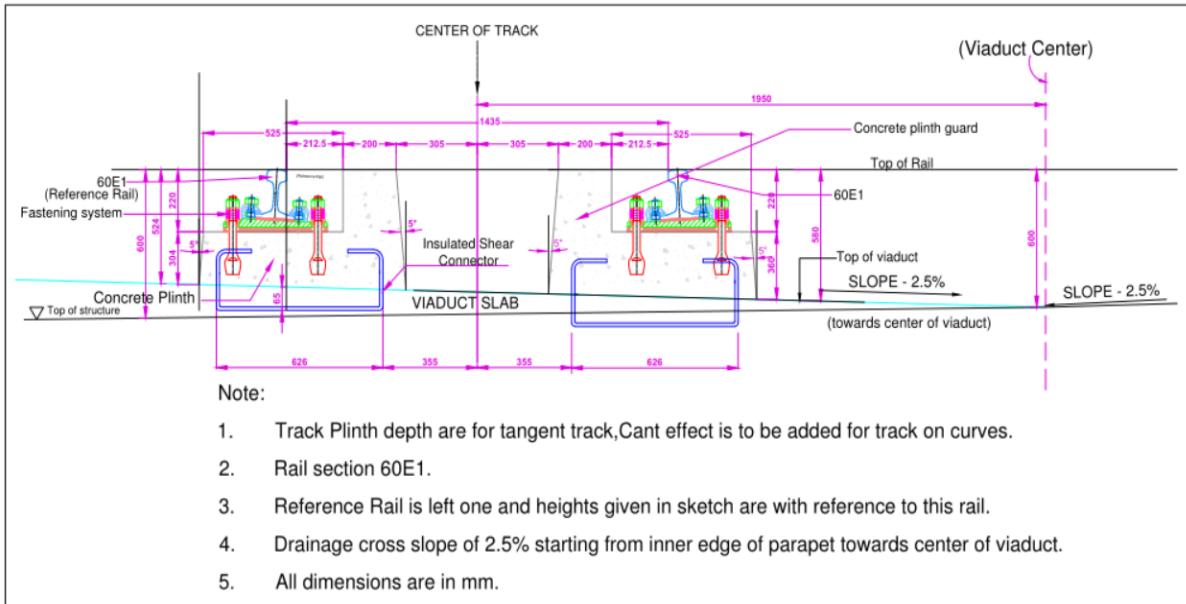
"Ballastless or direct fixation track will be installed along the viaduct. The rails are attached to a cast-in-situ concrete plinth/slab with derailment guards that rest on the box girder forming the viaduct by means of a baseplate assembly containing resilient pads. In areas requiring additional noise and structure borne noise/vibrations mitigation measures, Floating Slab Track (FST) by using Microcellular Polyurethane Elastomers (MPE) sheet with full surface support, which is installed between the track slab and viaduct along curves where the radius is less than 300 m. [Note Floating Slab Track (FST) is a more precise term for what was referred to in the EIA as "vibration-proof" or MSS track.]

Noise and vibration mitigation measures such as CWR Track and the FST systems help ensure that prescribed limits are not exceeded. Dhaka Metro alignment passes some locations where there are sensitive receptors and noise and vibration mitigation becomes necessary.

Preventive rail grinding during maintenance will remove irregularities in the railhead and gauge face to ensure smooth running and decreased noise and vibrations.

On curves of radius 500m and sharper, rail lubrication of outer rail gauge face is also planned by track side rail lubricators which will also reduce noise."

- Figure 3-7 is replaced with the following: (this changes the rail section from UIC54 to 60E1)



Consequence: Flattening of curvature results in a reduction in noise; otherwise the revision involves a clarification of terms (e.g. FST in place of MSS) and of fact (use of lubrication on outer rail gauge).

## 2. Chapter 3, Sec. 3.3.3: Stations (Table 3-4: Metro Stations Designated for Line 6)

Names for stations numbered 13 and 14 in this table have changed as follows:

- **TSC** is changed to **Dhaka University**
- **Press Club** is changed to **Bangladesh Secretariat**

Maps are likewise affected, specifically the map appearing opposite the Table of Contents, map appearing as Figure ES-1 (p. ES-ii), map appearing as Figure 3-1 (p. 20), map appearing as Figure 3-8 (p. 32) and maps at other locations in the report.

Consequence: Change made to reflect DMTC's preferred names for these stations.

## 3. Chapter 3, Sec. 3.3.3: Stations (Figures 3-9 – 3-11, architectural renderings of station exterior, interior and entry/exit facilities)

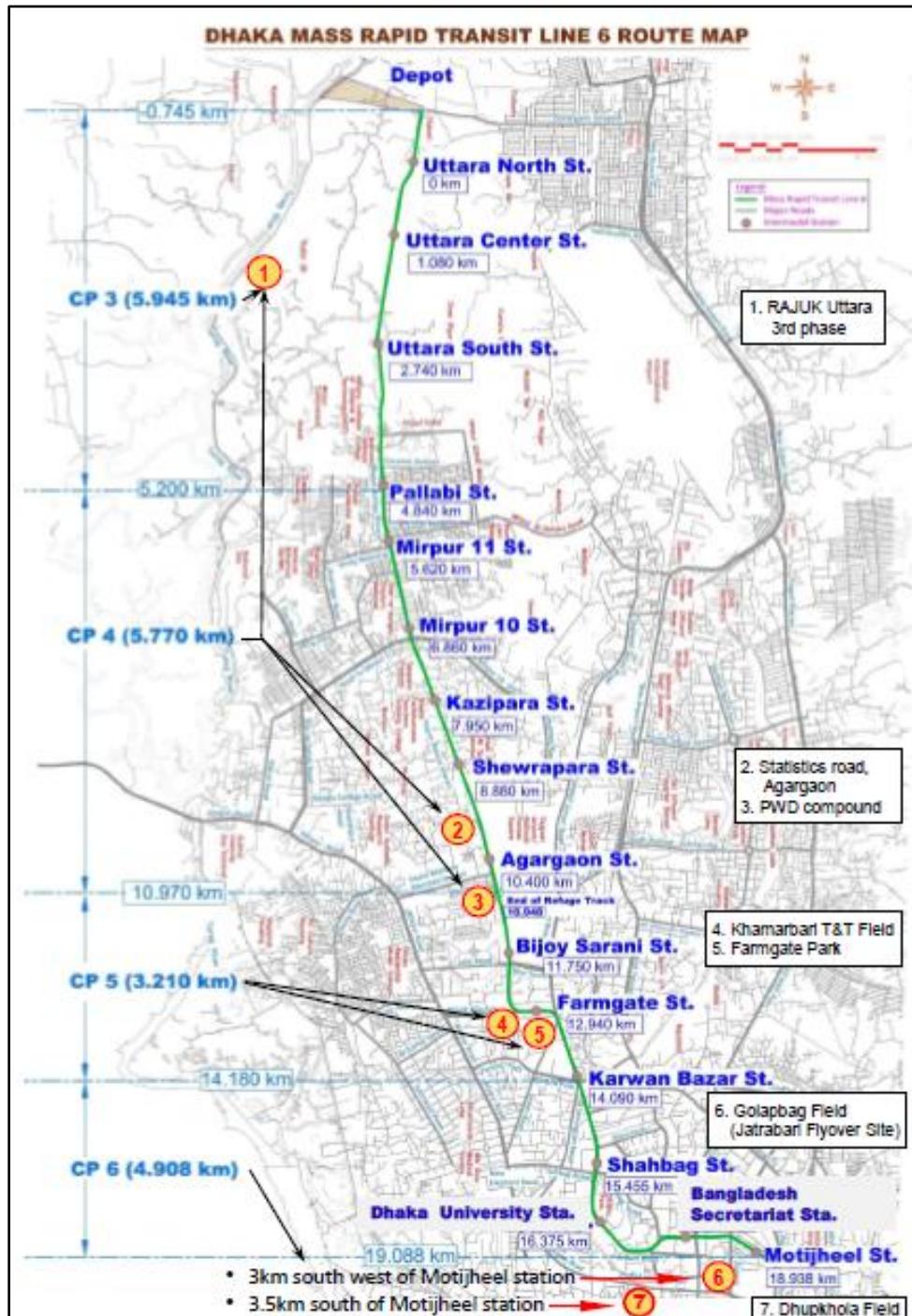
The roof line is being revised and these figures will be replaced; however the design has not been finalized and replacement figures are not yet complete. Architectural drawings will be provided in a future addendum once available.

Consequence: DMTC preferred the revised design; no environmental consequence.

## 4. Chapter 3, Sec. 3.3.6: Temporary Construction Sites: Replace the paragraph with the following:

"Eight locations have been identified for temporary construction facilities for use under contracts CP-3 – CP-6 (see the next section). Seven of these sites are confirmed, whereas the eighth site (Rayer Bazaar) is still under discussion. The seven confirmed sites are shown in Figure 3-12. Environmental aspects of these sites are evaluated in Chapter 6."

Replace Figure 3-12 with the following:



Consequence: temporary construction sites are necessary to facilitate construction; no added environmental impact.

#### 5. Chapter 6, Sec. 6.1.1: Length of Floating Slab Track (FST)

The length of Floating Slab Track (FST) was increased over the amount originally stated in the EIA to provide added sound and vibration resistance along additional lengths of the alignment. The amount stated in the EIA of 5,748 m was increased to 6,690 m, an increase of 822 m as follows: shortening of the overall length between Monipuripara and Khamabari by 58 m, lengthening the stretch at Farmgate by 402 m, and introducing FST at Karwan Bazar and Shabagh Stations 400 m and 380 m, respectively. This primarily affects Table 6-7 found in Sec. 6.1.1 in the EIA. The revised table is shown below.

**Table 6-7: Floating Slab Track (FST) Locations**

SI. NO.	BEGINNING OF FST	LOCATION	RADIUS OF CURVATURE IN m	END OF FST	LENGTH OF FST (m) (Two tracks) with minimum 15 m transition at each end	REMARKS
1	0K117m165	UTTARA Phase III	265	0K265m239	296	Upto Agargaon Station (1,890 m)
2	0K325m388	UTTARA Phase III	250	0K472m643	294	
3	3K385m000	Mirpur Cant	Cantonment & 150.5 m curve	4K035m000	1300	
4	12K185m000	Monipuripara & Khambari	S. Bhaban & 201.95 curve	12K740m883	1112	Beyond Agargaon to End of MRT Line-6 (4,800 m)
5	12K835m473	Farmgate Station	Farmgate Station & 201.95 Curve	13K324m334	978	
6	13K973m592	Karwan Bazar Station	Karwan Bazar Station	14K173m592	400	
7	15K354m250	Shahbag Station	Shahbag Station	15K544m250	380	
8	16K101m726	TSC Morh	201.95	16K260m187	316	
9	16K762m193	DoelChattar	240	17K006m459	488	
10	17K136m464	High Court	201.95	17K329m531	386	
11	17K383m544	KadamFoara	201.95	17K591m392	416	
12	18K372m063	Dainik Bangla	201.95	18K533m750	324	
<b>Total</b>					<b>6690</b>	

Consequence: increased use of FST reduces noise and vibration in sensitive areas resulting in an environmental benefit.

6. Chapter 6, Sec. 6.13.2: Temporary Construction Facilities/Sites and Locations

Replace the paragraph under the heading **Uttara** with the following:

“Vacant land adjacent to the embankment in Uttara is being provided by Rajuk under lease arrangement to DMTC for use as a temporary construction site. The 12 ha area is low in elevation, possesses poor soil conditions, and is subject to flooding. Contractors will need to fill and stabilize subareas designated for their use, which is divided into four parcels varying in size from 0.5 to 6 ha. These sites will be used to provide facilities for CP 3, 4, 7 and 8 contract bid packages.”

Consequence: Temporary Construction Facilities facilitate construction; no added environmental impact.

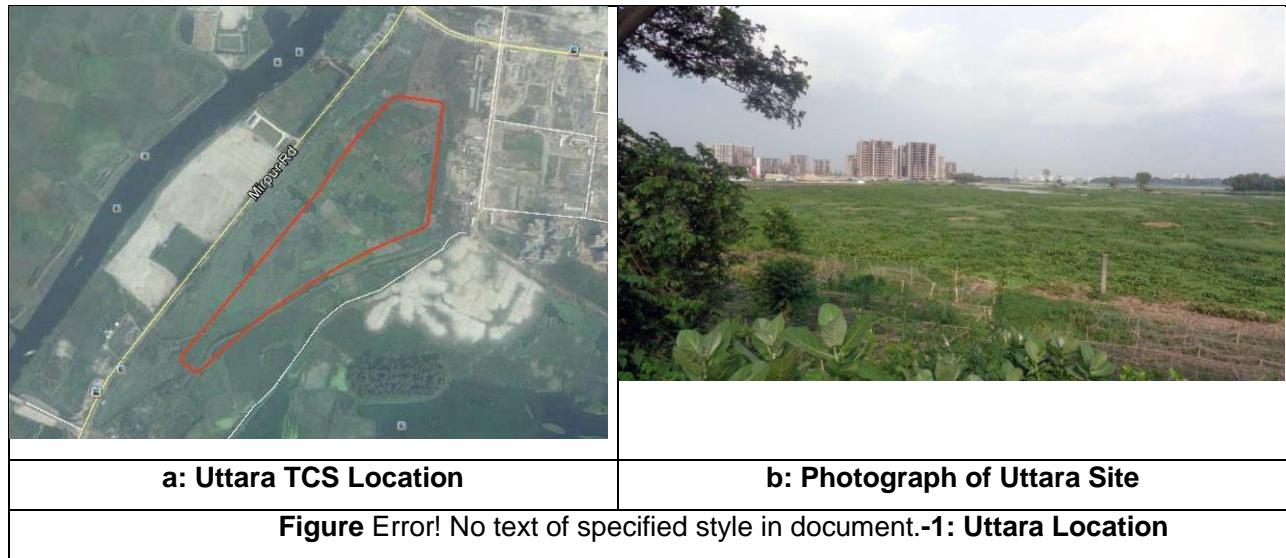
7. Chapter 6, Sec. 6.13.3: Temporary Construction Facilities/Potential Impacts and Mitigation Measures; Replace the text and figures under the heading **Uttara** with the following:

“The area is undeveloped and low-lying. Significant soil improvement and filling will be needed. This activity is typical in Uttara Phase III, and is necessary to alter the existing land configuration and make the land suitable for human use. Still, land filling can affect any existing natural resource values and can alter and inhibit drainage.

Natural Resource Values: The site, while low-lying, holds no valued natural resources. The land has been under constant occupancy for various types of local agricultural use and is slated for development by Rajuk along with other land in Uttara Phase III and is included in the overall development plan for Rajuk.

Drainage: The site will drain to the west into the canal that parallels the embankment and thence to the inlet pond for the Goranchatbari Pump Station that discharges into the Turag River. Other small khals bracket the area on the east that discharge to DigunKhal, which also flows to the pump station. So long as the main drainage canals are not encroached upon by filling, there is no impact on drainage. The following precautions are necessary to maintain water quality in the drainage canals:

- Maintain a 10 m buffer zone between site development and open water; maintain grasses and hedges in the buffer zone to filter runoff into the lake.
- Segregate drainage at the site; fabrication activities, aggregate/materials storage and roads will be enclosed by berms, slot drains or other controls to direct storm water runoff to no more than three outfall locations. Develop sheet runoff in remaining areas.
- An independent monitoring group will sample outfalls quarterly; TSS shall not exceed 100 mg/L.



The general provisions of the environmental management plan (EMP, next chapter) apply to other aspects of this facility.”

Consequence:Temporary Construction Facilities facilitate construction; no added environmental impact.

8. Chapter 8, Sec. 8.4.2: Change in costs associated with Environmental Protection Measures accounted for in Design, as shown in Table 8-4 and reflected in Table 8-9, related to increasing the amount of Floating Slab Track (described above) and extending the noise barrier over the full length of the viaduct.

Entries in Table 8-4 changed to:

Operations Noise and Vibration Abatement	
Use of floating slab track (FST) (estimated 6,690 m)	3,429 lakh Tk
Use of noise barriers	208 lakh Tk

In the paragraph following Table 8-4, the number 3,018 is changed to 3,842.

Entries in Table 8-9 changed as follows (table reproduced in entirety):

**Table 8-9: Summary of EMP Costs (Lakh Taka, current 2015)**

	One-time-only	Annual Recurring
Environmental Design Features with Costs Identified	3,686	
ERD Operations and Equipment Costs	52	61
DMTC Preliminary Activities	14	
Construction Contractor Costs	1,739	21
Operations Activities (DMTC)		206
Total Cost	5,491	288
<b>Total Costs by Party</b>		
Design Innovation Costs	3,686	
Contractor Costs	1,739	21
DMTC Costs	66	267
<b>Total Costs by Period</b>		
Preconstruction Period	3,700	
Construction Period	1,739	21
Operations Period	52	267

Consequence: increase in cost due to increased use of FST; justified due to the added environmental benefit.

9. Chapter 8, Sec. 8.5.1: Summary of Project Standards (add units to table)

Construction equipment brought onto the job will comply with IN-BS-1 exhaust emissions standards:

		Gm/kWh			
Ref.	Year	CO	HC	NOx	PM
IN-BS-1	2000	4.5	1.1	8.0	0.36

Note: IN-BS-1 is Bharat Stage 1 emission standards instituted by the Government of India.

Consequence: Revision needed due to correction of fact. No environmental consequence.

10. Appendix 2: Environmental Construction Specification, Sec. 2.6.5:

Replace the paragraph with the following:

“The Contractor will submit an application to, and obtain consent from, the local concerned authority (for example DNCC, DSAC, Parliament, PWD, cantonment authority, and others as necessary) for the

removal and trimming of trees in public right-of-ways. Applications must be accompanied by information on numbers, locations, and sizes as reported in the EIA or determined by onsite inspection, and photographs, as necessary to document the scope of removal. Compensatory planting maybe required in conformance with the general specifications. In line with the EIA report (Jan 2016) and its subsequent amendments, the type, locations and spacing for replanting will be determined by the engineer. It is anticipated that about 1,000 trees will be planted under the contract.”

Consequence: procurement convenience; allows tree replanting to be included in the contract bid price.

### III. Addendum Summary

Ten (10) revisions have been submitted in this Addendum involving deletions, additions, corrections and clarifications of fact, for reasons ranging from improved environmental performance to greater utility in project implementation and client preference. These are recapped in the following table. None of the changes introduced cause an increase environmental impact, whereas three of the items bring about greater environmental benefit.

<u>Seq.No.</u>	<u>Short Description</u>	<u>Page/Sec. Ref</u>	<u>Consequence</u>
1.	Revision of Project Description (Track)	<u>Sec. 3.3.2.2, pp. 29–30</u>	Reduction in noise; clarification of terms and of fact
2.	Stations (name change)	<u>Chapter 3, Sec. 3.3.3</u>	DMTC's preferred names for these stations
3.	Station roof design	<u>Chapter 3, Sec. 3.3.3</u>	Preferred design
4.	Temporary Construction Sites	<u>Chapter 3, Sec. 3.3.6</u>	Facilitates construction; no added environmental impact
5.	Length of Floating Slab Track	<u>Chapter 6, Sec. 6.1.1</u>	Reduces noise and vibration; environmental benefit
6.	Temporary Construction Facilities Sites and Locations	<u>Chapter 6, Sec. 6.13.2</u>	Same as item 4
7.	Temporary Construction Facilities Potential Impacts and Mitigation Measures	<u>Chapter 6, Sec. 6.13.3</u>	Same as item 4
8.	Change in costs	<u>Chapter 8, Sec. 8.4.2</u>	Increase in cost due to increased use of FST
9.	Summary of Project Standards	<u>Chapter 8, Sec. 8.5.1</u>	Correction of fact
10.	<u>Environmental Construction Specification</u>	<u>Appendix 2, Sec. 2.6.5</u>	Procurement convenience