

Environmental Impact Assessment (EIA)

of

Xinyuan Storage Limited

Padmabila, Shakharigati, Jashore Sadar Upozila, Jashore

This EMP Report has been prepared by

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CHAPTER ONE
INTRODUCTION**1.1 BACKGROUND AND JUSTIFICATION OF THE PROJECT**

Xinyuan Storage Limited is a battery manufacturing, supplying, and exporting enterprise that began its journey in **2025** with the aim of supporting the country's fast-growing export-oriented industries. The company is now establishing a new unit at **Padmabila, Shakharihati, Jashore Sadar Upozila, Jashore**, to expand its operations and increase production capacity. This report has been prepared according to the approved TOR.

Xinyuan Storage Limited has entered the market with a strong determination to manufacture, supply, import, and export international-quality battery products. The proposed factory is designed with modern, state-of-the-art machinery and technology, and will be operated by a team of trained, enthusiastic, and professional human resources. The management team is not only highly skilled and experienced but also equipped with extensive industry knowledge and strong business acumen.

In today's competitive industrial landscape of Bangladesh, where customers demand high-quality products, shorter lead times, and flexible services at reasonable prices, Xinyuan Storage Limited is committed to meeting these requirements. The company strives to build long-term trust, ensure customer satisfaction, and maintain the highest standards of integrity.

The company's vision is to become one of the most prominent and reliable battery manufacturing, supplying, importing, and exporting enterprises in Bangladesh, recognized for its high-quality products and excellent services.

In every physical development, a project interacts directly or indirectly with various environmental components in complex ways, often producing significant impacts. It is therefore crucial to assess the direction and magnitude of these impacts in order to avoid unforeseen harmful consequences that may undermine both the intended benefits and the long-term sustainability of the project.

Recognizing these potential impacts, the project has been undertaken with due consideration of environmental protection and mitigation measures. The EIA study has been initiated to identify, predict, and evaluate the possible environmental impacts of the proposed housing project and to

recommend appropriate mitigation and environmental management measures in accordance with the Environmental Conservation Act (1995) and Environmental Conservation Rules (1997) of Bangladesh.

1.2 PROJECT DESCRIPTION

Xinyuan Storage Limited is a foreign investment company installing its factory located in Padmabila, Jashore. It supplies, imports battery accessories, recycle local used lead waste battery, assemble new battery and exports international-quality battery products. The chairman of the factory is Wang Wenqing. He is from China. The full address of the factory is Padmabila, Shakharigati, Jashore Sadar Upozila, Jashore.

The factory area is 350.23 decimal or 3.50 acre. In the scale of Square Feet, it is 1, 52,550.45 SFT. The type of land is null. The land has to be developed. It will be decorated with different production buildings, canteen shades, dining areas, ETP, APCS utility buildings, recreation centres, ponds, and greenery areas. Different machines and raw materials will be bought from the local and foreign markets. Some raw materials like lead positive plate will manufacture in the factory. The manpower will appoint approximately 80 skilled and unskilled people worker. The detail of the activities/production and facilities has been discussed in project descriptions.

1.3 REQUIREMENT OF EIA

The environment is composed of biotic & abiotic components. There is a dynamic equilibrium between these components. When a project is undertaken, the environment is disturbed. To maintain environmental balance, it is essential that the prospective impacts of the project on the natural environment are studied in a timely manner and remedial measures are taken to promote the sustainable and holistic development of the project.

An EIA should allow decision-makers to assess a project's impacts in all its phases. It should also allow the public and other stakeholders to present their views and inputs on the planned development. Furthermore, to be truly effective, an EIA must contribute to and improve the project design so that environmental as well as socio-economic measures are core parts of it. Information used in the EIA needs to be based on good data, use accepted methodological approaches, and be summarized in plain language that is understandable for decision-makers.

Finally, the EIA does not end with the granting of a license to operate. The approved procedures and design must be followed during the project's operations and construction, and on-going monitoring must be put in place for the duration of the project.

1.4 METHODOLOGY OF THIS EIA CONDUCT

The Environment and Social Impact Assessment study for the project has been carried out as per the requirements of the Environment Conservation Act and Rules, 1997. The environmental impact assessment study considers an area of 5 km around the project site as a study area. Reconnaissance surveys were conducted to identify environmental and social issues in the project area. A detailed desk-based literature survey was also undertaken, and relevant information was collected for environmental and social impact assessment.

Social surveys were also conducted by Waste Treatment and Environmental Consultancy (WASTTEC), and the project-affected campus was visited to collect information on the lifestyle, study, nature, and cultural aspects of the stakeholders. Various government departments and other agencies were contacted/visited to gather information relevant to the project or the project area.

Based on the proposed activities, impact analyses were carried out where potential direct and indirect impacts of the project activities have been considered. A detailed Environmental and Social Management and Monitoring Plan (ESMMP) has been formulated for the Project, where measures are proposed to mitigate adverse impacts along with recommended good practices.

The schematic diagram of methods of the study is given in the following Figure -1.1.

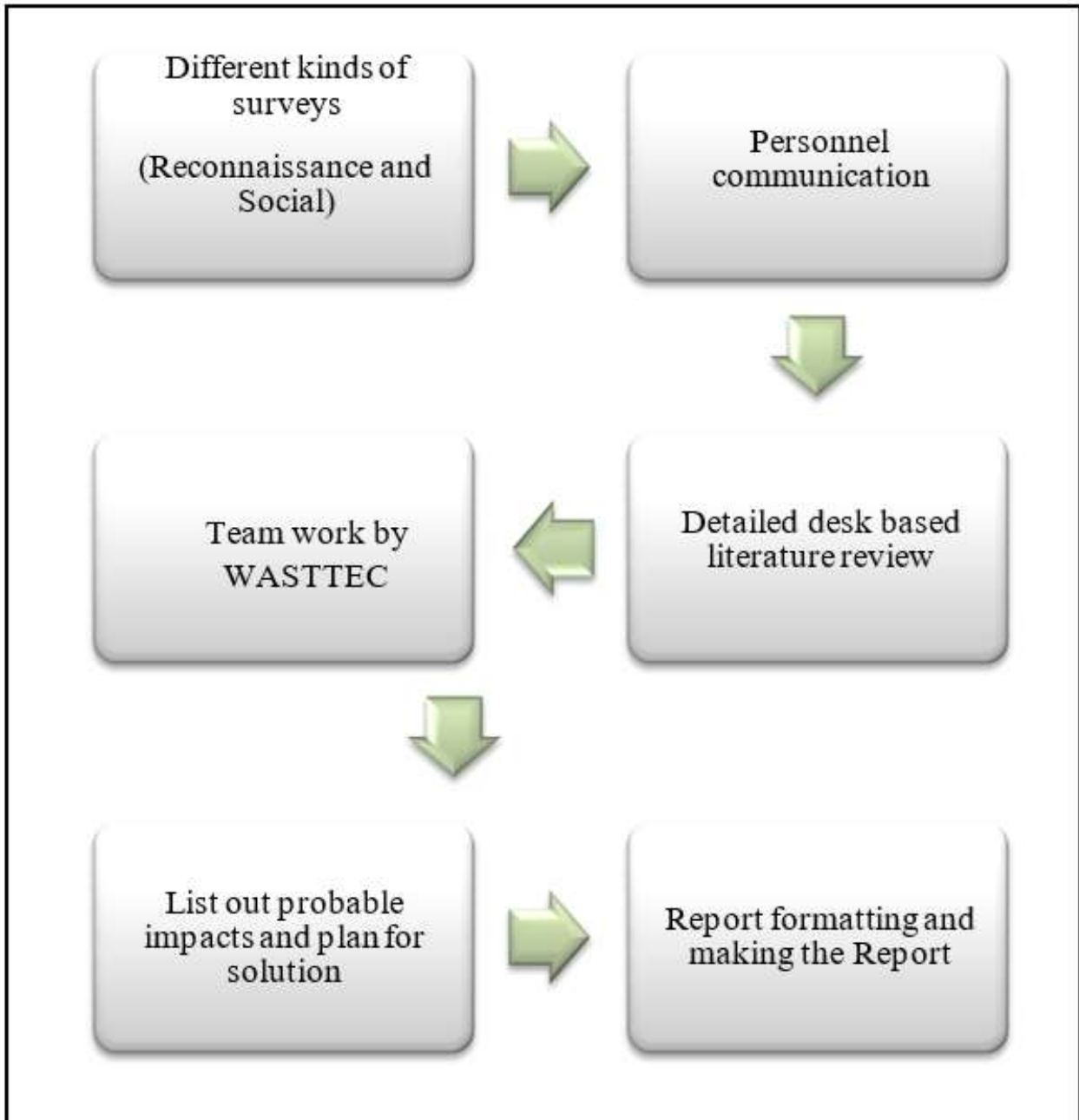


Figure 1.1: Schematic Diagram of Methodology of the Report

1.5 STUDY AREA

The study area has been identified for conducting an Environmental Impact Assessment (EIA) of the proposed Xinyuan Storage Ltd. project so that the potential environmental and socio-economic impacts arising during the construction and operation phases of the project can be properly assessed. The project is located in the Padmabila, Shakharigati, Jashore Sadar Upozila, Jashore

district. The site of Xinyuan Storage Limited is setting up the new establishment on 350.23 acres, or 3.50 acres, of land. On a square foot scale, it is 153500.45 square feet.

The study area includes the core area of the project and its surrounding (5-10 KM) impact area. The core area refers to the land within the defined boundaries of the project, where residential plots and buildings, internal roads, drainage systems, water supply, sanitation, electricity, and other utility facilities, and open space development activities will be implemented.

For impact assessment, a 1 km radius outside the project boundary has been identified as the primary impact area and a 5 km radius as the secondary impact area. This area includes surrounding settlements, agricultural land, a road communication system, ponds, canals, and a natural drainage system.

Baseline data on the physical environment (land use, soil, water, air, noise, and climate), biodiversity environment (plants and animals), and socio-economic environment (population, livelihoods, infrastructure, and public service facilities) of the study area have been collected and analysed. The study area identification and environmental assessment have been carried out following the applicable guidelines of the Environment Conservation Act, 1995, the Environment Conservation Rules, 2023, and the Department of Environment (DoE), Bangladesh.

1.6 SCOPE OF WORK

Based on the limitation, the scope of work in the future is the following:

- ❖ Further consultations with the local community and other key stakeholders of the project to understand public perception and their expectations from the project;
- ❖ Collection of additional secondary environmental, social, and demographic information;
- ❖ Collection of information about flora and fauna that required conservation/scientific interest through a primary ecological survey of the study area;
- ❖ Identification and review of the applicable standards and identification of key issues;
- ❖ Evaluation of potential social impacts of the Project and its components (including associated facilities as per the details available);
- ❖ Suggest appropriate institutional arrangements and capacity-building needs for the proper implementation of the environmental and social management plan during the pre-construction, construction, and operation phases.

1.7 LIMITATIONS

The environmental impact assessment study that has been prepared for the proposed project is largely based on the project information from the client, discussions with the local community and other stakeholders, and observations from various surveys and investigations undertaken in the project area and parameters. Professional judgment and subjective interpretation of facts have been applied for this study. Any change in project location, orientation, proposed plant components, or proposed project activities is likely to result in a variation of the impacts. It is to be noted that any technological advances during the course of construction and operation may change the impacts. The EIA report is prepared based on hypotheses and the proven impact of similar activity. Although the time & resource limitation calls for a more integrated report in the future. Some limitations will remain after all efforts because of the following reasons.

- ❖ First, it is difficult to predict which, if any, of the potential environmental and social issues identified will become actual problems in the future, as environmental regulations continually change, as do the enforcement priorities of the applicable governmental agencies involved.
- ❖ Second, even for problems currently identified, it is often difficult and sometimes impossible to accurately estimate the liabilities that may be involved in mitigating the problem(s), mitigating, and allocating liability for environmental issues are in a constant state of change. Furthermore, agency negotiations and the occasionally capricious and unpredictable nature of agency officials tasked with such negotiations tend to have a significant impact on liability for mitigating environmental issues.

1.8 EIA TEAM

A good, qualified, knowledgeable, and energetic team has prepared to participate in making this EIA report. They are experts in different fields of engineering, science, and sociology. During the preparation of this report, they have sat together, had a round table meeting, conducted a field visit, had a conversation with the client and people near the project, etc. The members of this EIA team are listed as follows.

Table 1.1: EIA Team

S.N	Name and Qualification	Educational Qualification	Experience	Area of Study
01	Md. Golam Mostafa (Environmental Analysis & Development)	B. Sc (Hons.) Chemistry M.Sc (Chemistry) & M.Sc (Environmental Science)	19 Years	Expert on Environmental Issues (EIA, ESIA, IHS, EMP/ESMP, ETP, ATP, STP, SWM, ESMF, CMS, Research on Environment, Industrial Wastewater Treatment, Environment monitoring, Solid waste management, Occupational Health & safety, Experts in Ecology, Hydrology, and Laboratory analysis for different environmental parameters 12 Research articles published in national and international journals.
02	MOHD NUR E ALAM SIDDIQUE Analytical & Environmental Laboratory (GECL).	B.Sc (Hons) M.Sc (SUST) M. Phil (DU) PhD Research Fellow (NU)	20 Years	An Expert on Environmental Issues ESMP, ESMF, CEMP, CESMMP, designer of WTP, ATP, ETP, STP, Industrial Wastewater Treatment, Environment monitoring, Solid waste management, Occupational Health & safety, Cleaner Production and Energy efficiency, Laboratory analysis for different environmental parameters, environmental education & awareness. Published 25 articles in national and international journals.

S.N	Name and Qualification	Educational Qualification	Experience	Area of Study
03	Md. Solaiman	B. Sc. (Hons.) M.Sc Chemistry Shah Jalal University of Science & Technology, Sylhet.	15 Years	Project Management, Environmental Health and Safety, Environmental Chemistry etc.
04	Pronab Kumar Debnath	Post Graduate Diploma in Disaster Management, M.Sc. in Engg., Dept. of Civil Engg., KUET	10 Years	Disaster Management, Design and Implementation of ETP, WTP, STP, Air Pollution Control System, Preparation and Conduct of IEE, EIA, EMP etc.
05	Subinoy Biswas Nayan	Ph. D Research Fellow (BUET) M.Sc. in Engg., Dept. of Civil Engg., KUET	6 Years	Biodiversity and Natural Resource Management and use, environmental pollution control and planning, Sewage Treatment
06	Jobaer Ahmed Saju	Ph. D Research Fellow (KUET) M.Sc. in Engg., Dept. of Civil Engg., KUET	6 Years	Air Pollution Control, Management, Design of Air Pollution Control Systems, Analysis of public consultation
07	Md. Selim Ahmed	<i>Bachelor of Urban and Regional Planning (BURP)</i>	6 Years	Urban and Regional Planning, City Design, Township Planning
08	Umma Salma Hashe	M.Sc. in Environmental Science, B.Sc. in Environmental Science, BUP	5	Natural Studies, Stake Holders Consultation, Drafting and Analysis, Environmental Management

S.N	Name and Qualification	Educational Qualification	Experience	Area of Study
09	Shanjida Haque Dola	B.Sc. in Civil Engg. (EUB) Diploma in Environmental Technology (DPI)	7	Experts in Mass Communication, Focus Group Discussion, Questionnaire Survey, etc.
10	Md. Nur-E-Alam	BBA, MBA NU	10	Report Drafting, Sampling, Human Resource Development Study, etc.
11	Anjan Kumar Adhikari	Diploma in Env. Tech., B.Sc. in Civil Engineering (ongoing)	2	Report Drafting, Printing, Binding

1.9 REPORT LAYOUT

This report consists of a total of Ten Chapters. The First Chapter is an introduction that provides information about the EIA, the organization, namely Xinyuan Storage Ltd., the consultant, and the consultancy and methodologies of the report. The Second Chapter is about the policy, legal, and institutional framework. Chapter Three comprises the basic data of the Xinyuan Storage Ltd. , the project area location, etc. The next Chapter, Four, includes the existing environment around the project. Chapter Five is a description of the plan of environmental impact assessment. Chapter Six is public consultation. How the authority manages the environmental degradation and the initiatives that will be taken for different activities by the project will be discussed in the next Chapter (Chapter 7). Chapter Eight has described mitigation measures based on environmental impacts. The Ninth Chapter is about environmental monitoring. Chapters Ten and the Final Chapter (Chapter 1) are about the neutralization plant and the conclusion of the report.

CHAPTER TWO**POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK****2.1 GENERAL**

The environmental issues are a very burning concern worldwide. In every sector of development have to be considered environmental issues now. However, the environmental concern did not start many years ago. This has been a matter of fervency since the 21st century. America is the pioneer of the environmental awareness worldwide. According to Gordon E. L. (2012), "United States began environmental movement in the 1960s and 1970s. In the United States today, environmentalism is not a singular movement. There is still a great deal of environmental activism, but in the past five decades environmental concerns have become more ingrained in the consciousness of the American population."

In Bangladesh, 1990 to 2000 some NGOs have been started work to addressing the issues of the environment. The BELA and BAPA are pioneers of them (Islam R., 2019). Now, the Bangladesh Government and many private & international agencies are providing excellent service to improve the environmental condition in the country. The first environmental legal initiative has been developed in the people republic of Bangladesh in 1977, which one was 'The Environment Pollution Control Ordinance, 1977' (Mohammad N., 2013). Successively, several environmental laws, rules & regulations, acts or amendments have been developed since 1990. The different types of national environmental legal, policy and institutional framework are given in the following discussion along with brief of international environmental initiatives.

2.2 LEGAL ENFORCEMENT AGENCIES

The national agencies are responsible for implementing national legislation. These agencies are formed with ministry, departments and boards. The proposed project must also comply with the relevant legislation and planning requirements of Bangladesh. Therefore, this chapter will discuss relevant environmental, building construction and residential development-related policies, rules, and acts to intervene in line with Government Policies and guidelines. Since a detailed study of all these rules and regulations would be both time and space-consuming, this section will only give a brief idea of those parts relevant to the proposed residential development project.

Table 2.1: List of National Agencies to Implement Environmental Issues

S.N.	Agency	Functions
1	Ministry of Environment & Forests and Climate Change (MoEFC) <i>(it is known as ministry of Environment and Forest)</i>	<p>The MoEFC is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental, forestry and Climate Change programs. It oversees all environmental matters in the country and is a permanent member of the Executive Committee of the National Economic Council.</p> <p>It plays a pivotal role as a participant of the United Nations Environment Program (UNEP).</p> <p>Its principal activities include:</p> <ul style="list-style-type: none"> Conservation & survey of flora, fauna, forests and wildlife; Prevention and control of pollution; Forestation & regeneration of degraded areas and protection of environment in the frame work of legislations.
2	Department of Environment (DoE)	<p>An Environment Pollution Control Board was setup under the Environment Pollution Control Ordinance, 1977. It underwent a series of subsequent restructuring and was finally renamed as Department of Environment in 1989. It is headed by a Director General appointed by the Government.</p> <p>The DoE through its head, divisional and district level offices conducts the following principal activities:</p> <ul style="list-style-type: none"> □□ Advising the Government to avoid such manufacturing processes, commodities and substances which are likely to cause environmental pollution; □ Advisory and issuing directions to the concerned person regarding the environmentally sound use, storage, transportation, import and export of a hazardous substance or its components;

		<ul style="list-style-type: none"> <input type="checkbox"/> Conducting inquiries and research activities on conservation, improvement and pollution of the environment and rendering assistance to any other authority/organization regarding the same; <input type="checkbox"/> Collection and publication of information about environmental pollution; <input type="checkbox"/> Issuing Location Clearance and Environmental Clearance Certificates to projects; and <input type="checkbox"/> Implementation of provisions of ECA and rules made there under.
3	Bangladesh Forest Department (BFD)	It was established under the MoEF and is responsible for identifying and declaring of certain areas as reserved or protected or private forest lands. It implements the provisions of Forest Act, 1927 and National Forestry Policy, 1994. It's also responsible for wildlife preservation and protection through implementation of Wildlife (Preservation & Security) Act, 2012.
4	Water Resources and Planning Organization (WARPO)	It was established under the Water Resources Planning Act, 1992. Its core functions include: Monitoring the implementation of National Water Management Plan (NWMP); Upkeep of water resource assessments; Maintenance, updating and dissemination of the National Water Resources Database (NWRD) and MIS; Secretariat to the National Water Resources Council (NWRC) and the Executive Committee of

5	Ministry of Fisheries and Livestock (MOFL)	<p>The main functions of the MOFL include: Preservation of fisheries resources;</p> <p>Fulfilling the requirement of animal protein through proper management and planned development;</p> <p>Increasing socio-economic conditions of fishermen Creating employment opportunities for rural unemployed and landless people.</p> <p>Expanding foreign exchange earnings by exporting fish and fishery products;</p> <p>Developing innovative technologies through research for fisheries development and preservation; and Protection of fishes through implementation of Protection and Conservation of Fish Act, 1950 as amended till date.</p>
5	Ministry of Labour and Employment (MOLE)	<p>It was established with following objectives: Creation of employment opportunity;</p> <p>Creation of semi-skilled and skilled manpower; Enhancement of productivity of factories by creating friendly working environment between workers & employers;</p> <p>Ensuring welfare of workers in different industrial areas;</p>

2.3 REAL ESTATE DEVELOPMENT ACT 2010

Prior to starting any real estate business in an area, the developer should be registered with the concerned authority. Each developer should improve, correct, re-approve, or renew the design from the concerned authority as per the **Private Housing Land Development Act 2004 and Dhaka Mega City Building Construction Rules, 2008**. The real estate development project should comply with the following conditions.

- All the civic facilities as per the Private Housing Land Development Act 2004 should be ensured for the real estate development project.

The layout plan should be approved by the concerned authority.

- Qualified architects, engineers, and technical persons, as per the Building Construction Act, of 1952 (Act No. II of 1953) need to develop and monitor the architectural and structure design.
- The architectural and structural design should follow the Dhaka Mega City Building Construction Rules, 2008 and the Bangladesh National Building Code. For other technical issues, an international code will be followed.
- The approved design cannot be changed without prior permission from the concerned authorities. Otherwise, a maximum 2 years of imprisonment or a maximum 10 lac taka of penalty or both will be enforced to the developer.
- In case of any type of deviation in the provision of utility services, the penalty will be a maximum of five lakh taka or a maximum of 1 year of imprisonment without labour.

2.4 BANGLADESH NATIONAL BUILDING CODE (BNBC) 1993/2006

The code intends to establish minimum standards for design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings within Bangladesh to safeguard health, property and public welfare. For the development of land for the construction of a building, the provisions of this Code shall apply to the entire development work.

Application for Development Works: Applications for permit for a development work shall be accompanied by a layout plan drawn on a scale of 1:500 or greater and containing the following information:

- A north arrow and a scale bar;
- The location of all proposed and existing roads and their dimensions;
- Dimensions of the plots, the building lines and setbacks;
- The location of utility services;
- The identification number, size, dimensions, and use of all the plots in a tabular form;
- Information in a summary form indicating the total area of the site, area utilized for roads, open spaces, and other public places;
- The means of access to each subdivision of the site.

The permit that has been obtained under this Code shall be valid for 5 years. For projects of exceptionally large magnitude, the Building Official may extend the time of such permit. On

the expiry of a permit, the owner shall obtain a fresh permit. Deviations from the approved plans may be permitted if approval for the deviation is obtained before undertaking the related work (HBRI 2006).

Occupancy Type and Size

Every building or portion thereof shall be classified according to its use or character of occupancy. A brief description of the nature of occupancy for residential projects is presented in Table 2.2.

Table 2.2: Nature of Use/Occupancy for Residential Project

Occupancy type	Sub-division	Nature of use or occupancy
Residential	A1	Detached single-family dwelling
	A2	Flats or apartments
	A3	Mess, boarding houses, dormitories, and hostels
	A4	Minimum standard housing
	A5	Hotels and lodging houses

Source: HBRI 2006

Residential Plot Size

- The minimum size of the plot shall be 65 m².
- Corresponding to each type of residential development the sizes of the plots and the corresponding minimum widths of road frontage of the plots shall be as specified in Table 2.3, provided that:
- Plots accessible by link roads shall be considered to have a frontage equal to its width,
- Plots of irregular shape abutting the road shall be considered to have a frontage equal to their average width parallel to the road.
- Residential buildings shall be located at a distance of at least 30 m from roads with heavy traffic, for example, highways, where the external noise is 90 dB or higher, and
- The total open area in a plot on which a building of residential, industrial, storage, hazardous or miscellaneous occupancy is constructed shall not be less than 33 per cent of the plot area.

Table 2.3: Plot Sizes and Corresponding Minimum Frontages for Various Types of Residential Development

Type of Residential Development	Plot Size (m ²)	Minimum Frontage (m)
Approved row-type houses	65 (Minimum size)	4.5
"	Over 65 to 135	7
Detached houses	65 (Minimum size)	5.5
"	Over 65 to 135	7
"	Over 135 to 200	8
"	Over 200 to 265	10
"	Over 265	Above 10
Semi-detached houses	135 (Minimum size)	7
"	Over 135 to 200	8
"	Over 200 to 265	10
"	Over 265	Above 10

Source: HBRI 2006

- The limitations of plot sizes and frontages imposed may be waived for approved low-income housing including site and service schemes.
- The minimum size of the plot for a group housing development scheme and other special requirements for group housing developments shall be specified or approved by the respective city development authority.

Public roads or means of access on which a residential plot abuts shall satisfy the minimum width requirements depending on the type of development and plot size specified in Table 2.4.

Table 2.4: Minimum Widths of Public Means of Access to Residential Plots

Type of Development	Plot Size (m ²)	Minimum Width of Access Road (m)	
		Existing ¹ Development	New ² Development
Approved row Type	65 (minimum size)	3.0	4.5
	Over 65 to 135	3.5	4.5
Detached	65 (minimum size)	2.5	4.75
	Over 65 to 135	2.5	6.0
	Over 135 to 200	2.5	7.5
	Over 200 to 265	2.5	9.0
	Over 265	Over 3.0	Over 9.0
Semi-detached	135 (minimum size)	2.5	6.0
	Over 135 to 200	2.5	7.5
	Over 200 to 265	2.5	9.0
	Over 265	Over 3.0	Over 9.0
Note :			
1. Existing Development - Any approved residential development already in existence on the date of promulgation of this Code, with roads and streets for which the area planning authority does not have any scheme for future widening			
2. New Development - Any new residential development implemented subsequent to the promulgation of this Code			

Source: HBRI 2006

Community Space for a Group of Buildings in One Plot

For all plots on which more than one residential or residential-cum-business building is constructed, community space at the rate of 5% of the total floor area of all the buildings shall be provided either within the buildings or outside the premises. Roofs of such buildings shall not be considered community open spaces.

2.5 BANGLADESH LABOR LAW 2006

Health Injury: No work-room in any establishment shall be overcrowded to an extent injurious to the health of the workers employed therein. In every establishment wherein more than ten workers are ordinarily employed in any place above the ground floor or explosive or highly inflammable materials are used or stored, effective measures shall be taken to ensure that all the workers are familiar with the means of escape in case of fire and have been adequately trained in the routine to be followed in such case.

Drinking water: In every establishment, effective arrangements shall be made to provide and maintain a suitable point for a sufficient supply of wholesome drinking water.

Latrines and urinals: In every establishment, enough latrines and urinals of prescribed types shall be conveniently situated and accessible to workers at all times.

Dangerous operations: Where any operation in an establishment exposes any person employed to a serious risk of bodily injury, poisoning, or disease, the government will make rules applicable to such establishment:

Specifying the operation and declaring it to be hazardous;

Prohibiting or restricting the employment of women, adolescents, or children in the operation;

Providing periodical medical examinations of persons employed;

Protect all persons employed in the operations or the vicinity of the places and place a notice specifying the usage and precautions regarding the usage of any corrosive chemicals.

First-aid appliances: In every establishment, provision should be made for readily accessible first-aid boxes or cupboards equipped with the contents prescribed by rules during working hours. The number of such boxes or cupboards shall not be less than one for every one hundred fifty workers ordinarily employed in the establishment.

Information about dangerous buildings and machinery: Where any worker finds that any machinery used by the workers in any establishment is in a dangerous condition that is likely to cause physical injury to any worker at any time, he shall inform the employer. If the

employer fails to take appropriate action on such information within three days and any injury is caused to any worker because of the use of such equipment, machinery or building, he shall be liable to pay compensation to the worker injured at a rate which may be double the rate of compensation payable for such injury as per this act.

2.6 ENVIRONMENTAL RULES AND REGULATION

2.6.1 ENVIRONMENTAL CONSERVATION ACT (1995, AMENDED IN 2000 & 2002)

The Bangladesh Environment Conservation Act of 1995 (ECA '95) is currently the main legislation about environmental protection in Bangladesh. It mainly includes environmental clearance, promulgation of standards for quality of air, water, noise, soil, standard limit for discharging and emitting waste and formulation and declaration of environmental guidelines. The Department of Environment (DoE) executes the Act under the leadership of the Director General (DG). Before any new project can start, as stipulated under the rules, the project promoter must obtain Environmental Clearance from the Director General. Failure to comply with any part of this Act may result in punishment of a maximum of 3 years imprisonment or a maximum fine of Tk. 300,000 or both.

2.6.2 BANGLADESH ENVIRONMENT CONSERVATION ACT (AMENDMENT 2000)

This amendment of the Act focuses on (1) ascertaining responsibility for Compensation in cases of damage to ecosystems; (2) increased provision of punitive measures both for fines and imprisonment; and (3) fixing authority on cognizance of offences.

2.6.3 BANGLADESH ENVIRONMENT CONSERVATION ACT (AMENDMENT 2002)

This amendment of the Act elaborates on (1) restriction on polluting automobiles; (2) restriction on the sale and production of environmentally harmful items like polythene bags; (3) assistance from law enforcement agencies for environmental actions; (4) break up of punitive measures; and (5) authority to try environmental cases.

2.6.4 ENVIRONMENTAL CONSERVATION RULES, 1997

These are the first set of rules, promulgated under the Environment Conservation Act of 1995 (so far there have been three amendments to this set of rules - February and August 2002 and April 2003). These rules set (i) the National Environmental Quality Standards for ambient air, various types of water, industrial effluent, emission, noise, vehicular exhaust etc. The process

of obtaining clearance from the DoE is presented in Figure 2.1.

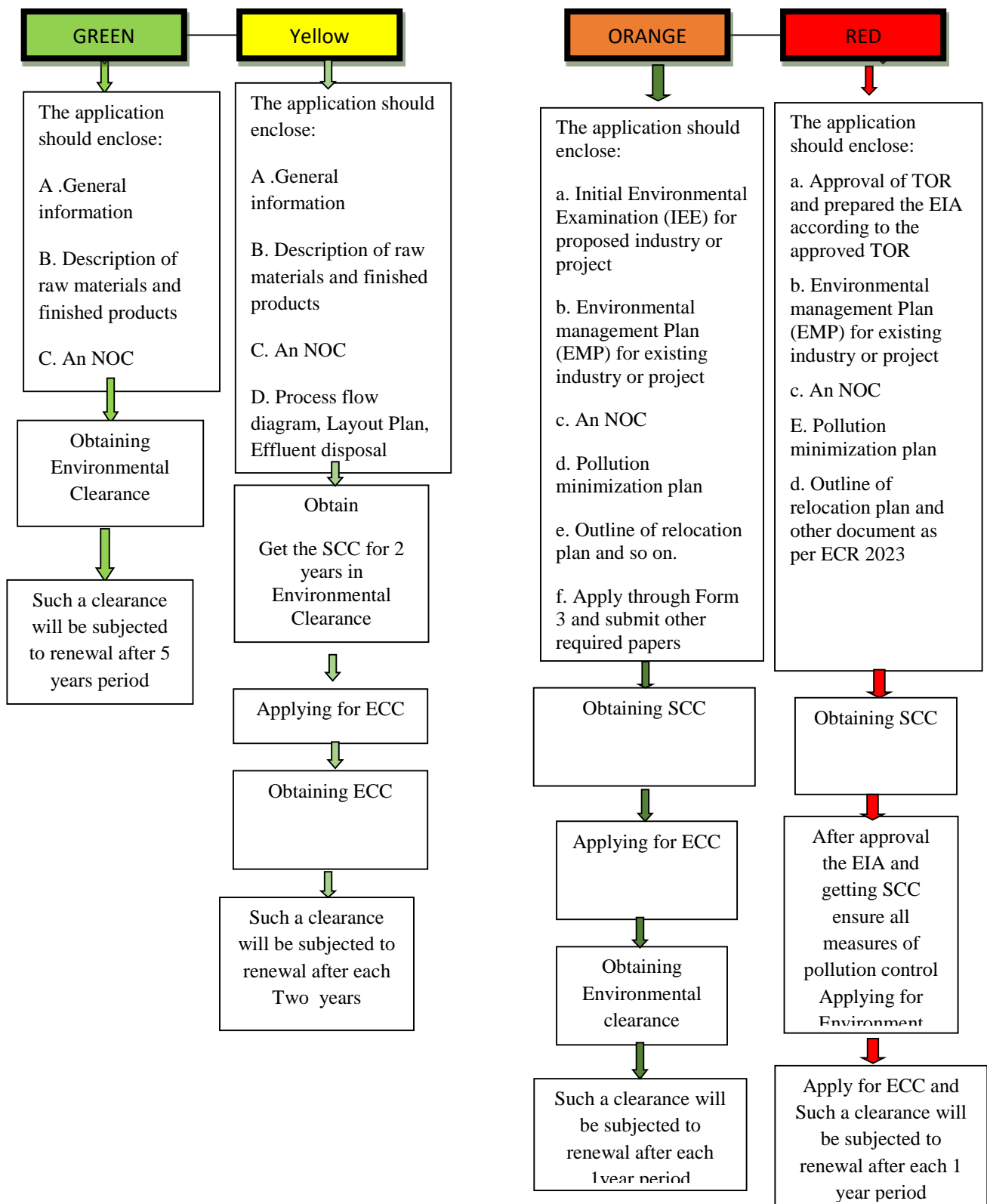


Figure 2.1: Schematic Diagram of the process to get Environmental Clearance Certificate

2.7 INTERNATIONAL AND NATIONAL ENVIRONMENTAL STANDARDS GUIDLINES

Bangladesh Environmental standards and guidelines relevant to the construction and operation of the project cover the following issues:

- ✓ Atmospheric emissions and ambient air quality;
- ✓ Water Quality
- ✓ Liquid effluent discharges to the marine environment.
- ✓ Noise emissions and ambient noise levels.

2.8 AMBIENT AIR QUALITY STANDARDS

Ambient quality guidelines refer to ambient quality levels primarily developed through clinical, toxicological, and epidemiological evidence (such as those published by the World Health Organization).

Table 2.5: Bangladesh Standards for Ambient air quality standards in Bangladesh from July 2022 and their comparison with WHO and US standards*.

Pollutants	Pollutants Observation Period	Bangladesh standard ($\mu\text{gm-3}$)	WHO guideline ($\mu\text{gm-3}$)	US standard ($\mu\text{gm-3}$)
Carbon Monoxide (CO)	8 hr	10000	10000	10000
	1 hr	40000	30000	40000
Lead (Pb)	Annual	0.5	0.5	0.15
NO _x	Annual	100	-	-
SPM	8 hr	200	-	-
PM 10	Annual	50	20	-
	24 hr	150	50	150
PM 2.5	Annual	15	10	15
	24 hr	65	25	35
Ozone O ₃	1 hr	235	-	235
	24 hr	157	100	157
Sulphur Dioxide	24 hr	80	-	78

PM = Particular matter in micron, SPM = Suspended particulate matter, NO_x = Oxides of Nitrogen

An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level that set by the mandated Environment Protection Agency (e.g., for Bangladesh Department of Environment) to protect public health. AQI values below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy- at first certain sensitive groups of people, then for everyone as AQI values get higher.

Purpose of AQI.

- Daily release of air quality conditions to the public
- Convey the health implications of air quality
- Protect public interest and take actions to reduce emissions
- Forecast air pollution level

In Bangladesh the AQI is based on 5 criteria pollutants; Particular Matter (PM10 and PM2.5), NO₂, CO, SO₂ and Ozone (O₃). The Department of Environment (DoE) has also set national ambient air quality standards for these pollutants. These standards aim to protect against adverse human health impacts. The AQI standard for Bangladesh is given as under.

Table 2.6: Approved Air Quality Index (AQI) for Bangladesh

Air Quality index (AQI) Range	Category		Color
	In English	In Bangla	
0-50	Good	Bhalo	Green
51-100	Moderate	-	Yellow Green
101-150	Caution	-	Yellow
151-200	Unhealthy	Ashasthykar	Orange
201-300	Very Unhealthy	Khub Ashasthykar	Red
301-500	Extremely Unhealthy	Ottanta Ashasthykar	Purple

Source: ECR, 1997

2.9 NATIONAL WATER QUALITY STANDARDS

Bangladesh national quality standard is available for both water and wastewater. The water quality standard for using different purpose and wastewater standard to discharge is given in the following table.

Table 2.7: Standards for Industrial Wastewater Discharge

Parameter	Unit	Location of Final Disposal (Max Limit without pH Value)		
		Inland Surface Water	Public Sewer	Coastal Area
Ammonium Nitrogen (as N)	mg/L	50	50	50
Ammonia (free ammonia)	mg/L	5	5	5
Arsenic (As)	mg/L	0.2	0.2	0.2
BOD ₅ 20oC	mg/L	30	250	100
Boron (B)	mg/L	2	2	4.0
Cadmium (Cd)	mg/L	2	1	2
Chloride (Cl ⁻)	mg/L	600	600	-
Chromium (Total Cr)	mg/L	0.5	1.0	1
COD	mg/L	200	400	250
Chromium (hexavalent Cr)	mg/L	0.1	2.0	1
Copper (Cu)	mg/L	3.0	3.0	3
Fluoride (F)	mg/L	2	15	15
Sulfide (S)	mg/L	1	-	5
Iron (Fe)	mg/L	3	3	3
Total Kjeldahl Nitrogen (N)	mg/L	100	-	100
Lead (Pb)	mg/L	0.1	1.0	2.0
Manganese (Mn)	mg/L	2	2.0	2
Mercury (Hg)	mg/L	0.01	0.01	0.01
Nickel (Ni)	mg/L	1.0	2.0	5
Nitrate (N molecule)	mg/L	10	-	20

Parameter	Unit	Location of Final Disposal(Max Limit without pH Value)		
		Inland Surface Water	Public Sewer	Coastal Area
Oil and Grease	mg/L	10	20	20
Phenol Compounds (C ₆ H ₅ OH)	mg/L	1.0	5	5
Dissolved Phosphorus (P)	mg/L	5.0	-	-
Radioactive Materials A. Gross-Alpha activity B. Gross-Beta activity	μCi/L	As determined by Bangladesh Atomic Energy Commission	-	-
pH		6-9	6-9	6-9
Selenium (Se)		0.05	0.05	0.05
Zinc (Zn)		5	15	15
Temperature	°C			
Suspended Solids (SS)	mg/L	100	500	100
Cyanide (CN)	mg/L	0.1	2.0	0.2
Total Residual Chlorine	mg/L	1.0	-	1.2
Bio Assay Test (Applicable for pesticide and pharmaceutical industry)		90% Fish remain Alive in 96 hours treated effluent.	90% Fish remain Alive in 96 hours treated effluent.	90% Fish remain Alive in 96 hours treated effluent.

Source: ECR -2023

Table 2.8: Standards for Drinking Water Quality

Sl.No.	Parameter	Unit	Standards
1	Fecal Coliform	CFU/100ml	0
2	Total Coliform	CFU/100ml	0
3	Free Residual Chlorine	Mg/l	0.20
4	Nitrate	Mg/l	45
5	Arsenic	Mg/l	0.05
6	Turbidity	NTU	5
7	Aluminum	Mg/l	0.20
8	Ammonia	Mg/l	1.50
9	Barium	Mg/l	0.70
10	Banezene	Mg/l	0.01
11	Boron	Mg/l	1.0
12	Cadmium	Mg/l	0.003
13	Calcium	Mg/l	75
14	Chloride	Mg/l	250*
15	Carbontetrachloride	Mg/l	0.005
16	1,1-Dichloroethene	Mg/l	0.03
17	1,2-Dichloroethene	Mg/l	0.03
18	Tetrachloroethane	Mg/l	0.04
19	Trichloroethane	Mg/l	0.02
20	Pentachlorophenol	Mg/l	0.009
21	2,4,6-Trichlorophenol	Mg/l	0.20
22	Chloroform	Mg/l	0.09
23	Chromium(total)	Mg/l	0.05
24	Color	Hazen unit	15
25	Copper	Mg/l	1.5
26	Cyanide	Mg/l	0.05
27	Fluoride	Mg/l	1.0
28	Hardness(as CaCo3)	Mg/l	500
29	Iron	Mg/l	0.3-1.0

30	Kjeldhl Nitrogen(total)	Mg/l	1.0
31	Lead	Mg/l	0.01
32	Magnesium	Mg/l	30-35
33	Manganese	Mg/l	0.4
34	Mercury	Mg/l	0.001
35	Nickel	Mg/l	0.05
36	Nitrite	Mg/l	1.0
37	Odor	-	Odorless
38	Oil and grease	Mg/l	0.01
39	pH	-	6.5-8.5
40	Phenolic compounds	Mg/l	0.002
41	Potassium	Mg/l	12
42	Radioactive materials (gross alpha activity)	Bq/l	0.1
43	Radioactive materials(gross beta activity)	Bq/l	1.0
44	Selenium	Mg/l	0.01
45	Silver	Mg/l	0.02
46	Sodium	Mg/l	200
47	Suspended particulate matters	Mg/l	10
48	Sulfide	Mg/l	0.05
49	Sulfate	Mg/l	250
50	Total dissolved solids	Mg/l	1000
51	Temperature	°C	20-30
52	Tin	Mg/l	2.0
53	Zinc	Mg/l	5.0
54	Aldrin/Dieldrin	Mg/l	0.03
55	Anionic Detergents	Mg/l	0.2

Source: ECR-2023

2.10 AMBIENT NOISE STANDARDS

The MoEF under the provisions of ECR, 1997 is responsible for laying down ambient noise standards. Noise Pollution (Control) Rules, 2006 were laid down by the Ministry through a Gazette notification dated September 7, 2006. Ambient noise standards established as per the provisions Rule 5(2) of the aforementioned Rules have been furnished in the following table.

Table 2.9: GoB Standard Noise Levels for Different Areas

Areas	Noise Levels dBA	
	Day time (6.00-9.00 pm)	Night time (9.00-6.00 am)
Calm area (hospital and school area)	45	35
Residential area	50	40
Mixed area (used for residential commercial and industrial purpose)	60	50
Commercial area	70	60
Industrial area	75	70

Source; ECR 1997.

CHAPTER THREE

PROJECT DESCRIPTION

3.1 INTRODUCTION

Xinyuan Storage Limited is a foreign investment company installing its factory located in Padmabila, Jashore. It supplies, imports battery accessories, recycle local used lead waste battery, assemble new battery and exports international-quality battery products. The chairman of the factory is Wang Wenqing. He is from China. The full address of the factory is Padmabila, Shakharigati, Jashore Sadar Upozila, Jashore.

The battery industry is a crucial part of the global energy and electronics landscape. It focuses on the production, development, and recycling of batteries—devices that store and release electrical energy through chemical reactions. As energy demands grow, particularly with the rise of renewable energy and electric vehicles (EVs), the battery industry is becoming increasingly vital. Batteries are essential in a wide range of industries. They are used in consumer electronics, electric vehicles, renewable energy storage, industrial machinery, and medical equipment. As global efforts to reduce carbon emissions increase, battery storage systems are also playing a key role in supporting solar and wind power.

It is going to start its factory, one of the best iconic factory in Bangladesh. Therefore, the company has already selected an area which previously was factory namely 'North-South Spinning Mill', the Xinyuan Storage Limited has been leased the land, and prepared a plan for its construction. The location of the factory is at village: Padmabila, P.O: Shakharigati, Jashore Sadar Upozila, Jashore. It is only about 180 KM from Dhaka but about 173 KM from the Department of Environment (DoE), Dhaka.

The factory area is 350.23 decimal or 3.50 acre. In the scale of Square Feet, it is 1, 52,550.45 SFT. The type of land is null. The land has to be developed. It will be decorated with different production buildings, canteen shades, dining areas, ETP, APCS utility buildings, recreation centers, ponds, and greenery areas. Different machines and raw materials will be bought from the local and foreign markets. Some raw materials like lead positive plate will manufacture in the factory. The manpower will appoint approximately 80 skilled and unskilled people worker. The detail of the activities/production and facilities has been discussed in foregoing sections.

3.2 PROJECT LOCATION AND SURROUNDING FEATURES

The factory of the Xinyuan Storage Limited is located at Padmabila, Shakharigati, Jashore Sadar Upozila, Jashore. It is near the Jashore Sadar. The latitude and longitude of the factory are 23.127555264941172 and 89.33327741068618 respectively. The location map of the factory with its surroundings is shown in the following figure that captured with the help of Google Maps and Google Earth. The distance of the factory of Xinyuan Storage Limited is about 175 km from the capital, Dhaka. It is only about 16.2 km from the Jashore District. The distance and direction map is given on the following.



Figure 3.1: The location map of the project

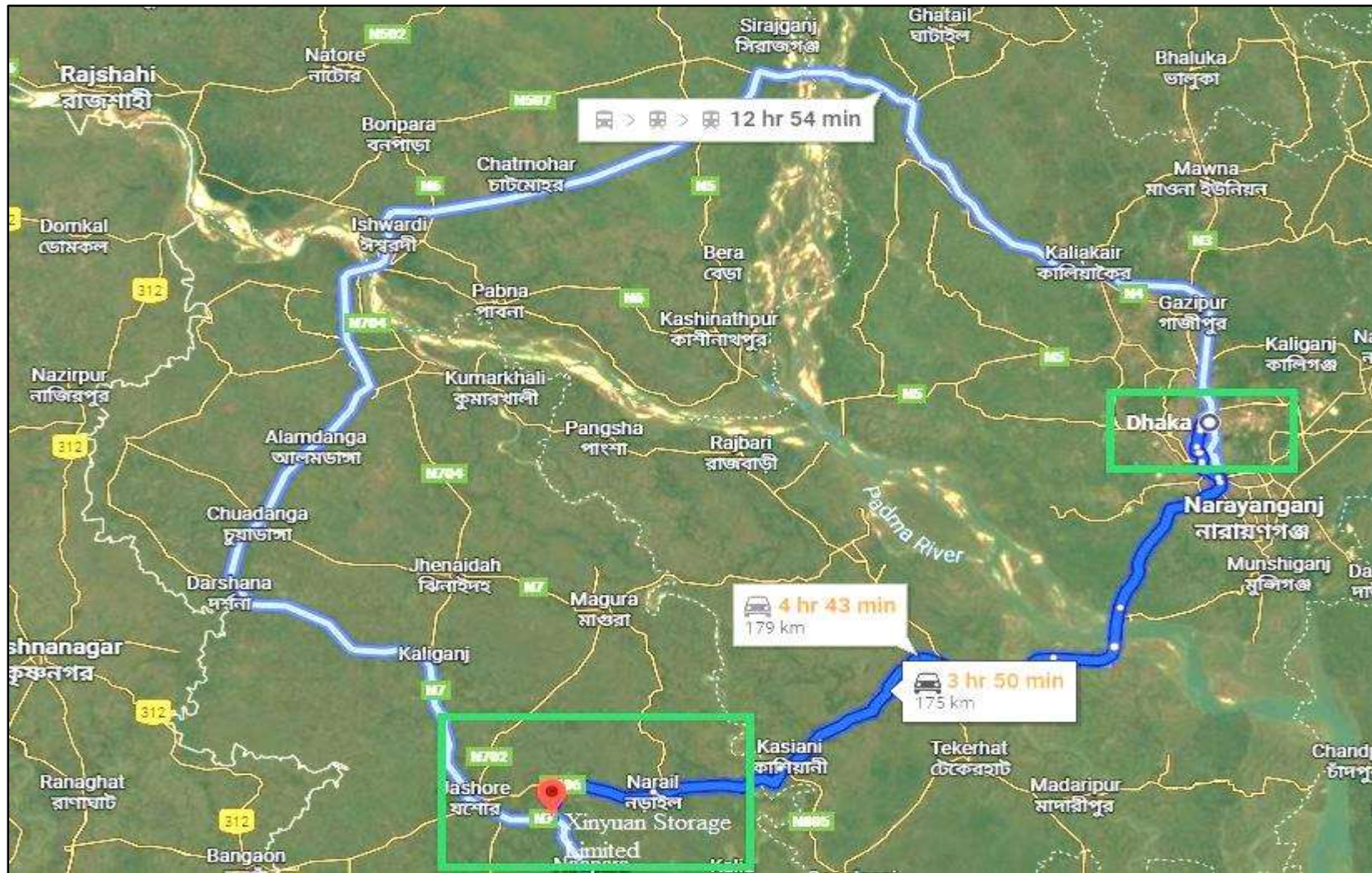


Figure 3.2: The Distance between Dhaka to the Project Area

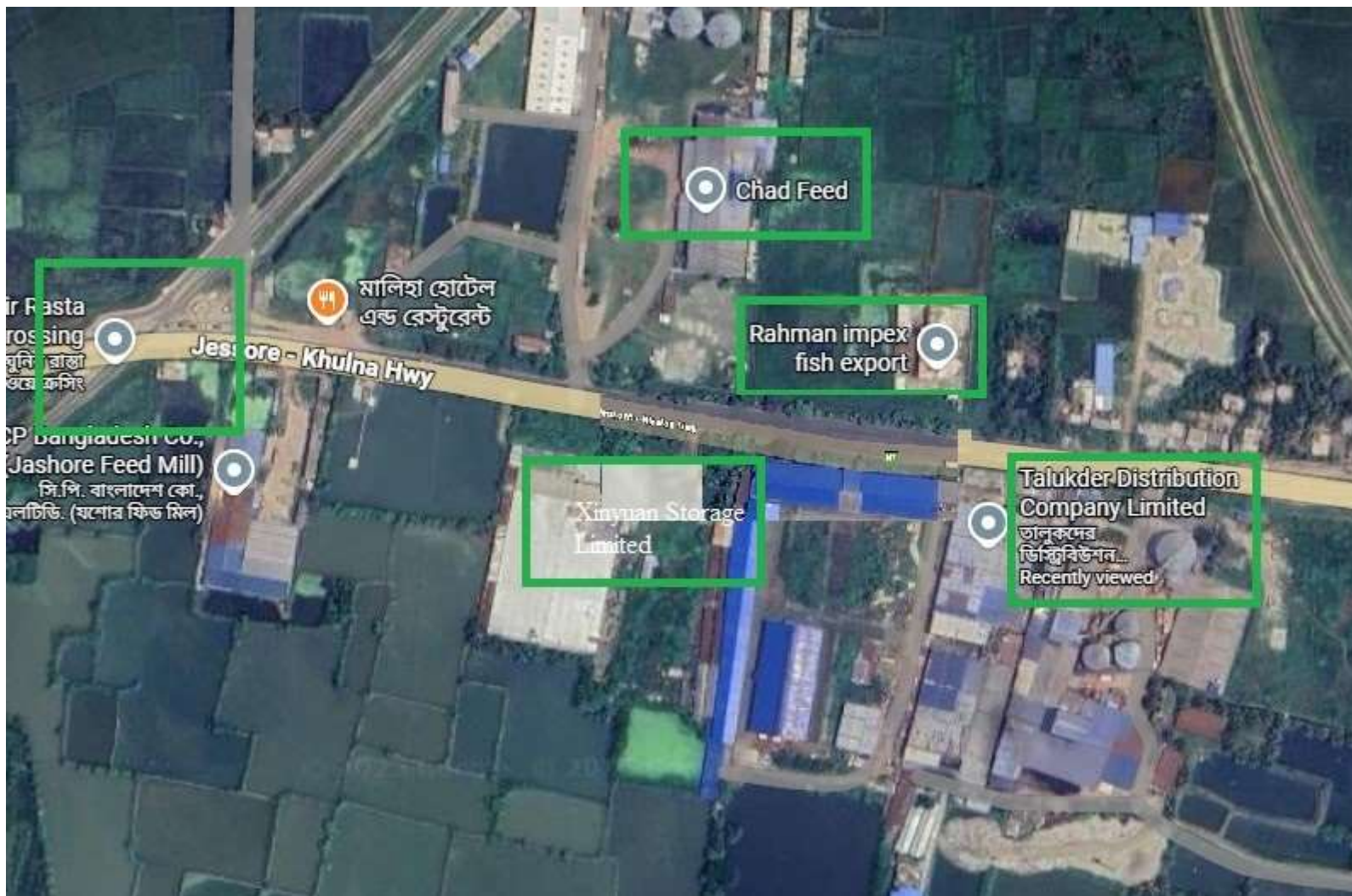


Figure 3.3: The Project Surroundings

The above photos show the project surroundings. The project is situated near roads, agricultural land, scattered residential areas, a local market, and industrial facilities. The Jashore-Khulna highway is along the east-west side of the project. The southern part of the project is mainly agricultural land. Some scattered residences & Factory are on the east side of the project. The remarkable industrial features are feed manufacturing, plastic, and Hollow Block. The names of the factories near the project area are M/S Chad feed, Talukder Distribution Company Limited, Rahman impex fish export ltd., Janani Hollow Block etc.

3.3 PRODUCTION PROCESS

3.3.1 BRIEF OF PRODUCTION PROCESS

The manufacturing process of a lead-acid battery from lead bar and other raw materials involves several steps like preparation of materials to the final assembly and charging of the battery. Below is a general overview of the production process.

3.3.2 GRID CASTING

- **Lead alloy preparation:** Lead is combined with other metals (like antimony or calcium) to form a lead alloy. This alloy is melted and poured into molds to form grids. In this factory lead alloy is not produced. Lead alloy is collected from outside of the factory.
- **Grid casting:** The molten lead alloy is cast into grids, which act as the support structure for the active material. These grids are designed to optimize electrical conductivity and mechanical strength.

3.3.3 PASTE PREPARATION AND APPLICATION

- **Lead oxide preparation:** Lead oxide (PbO) is produced by oxidizing molten lead. This is one of the key active materials in the battery.
- **Pasting:** Lead oxide is mixed with sulfuric acid and water to form a paste. This paste is then applied to the grids to form the and negative plates.

3.3.4 CURING AND DRYING

- **Curing:** After the grids are pasted, they undergo a curing process in a controlled environment. During curing, the plates develop the necessary chemical structure and mechanical strength. The process typically involves maintaining specific humidity and temperature conditions.
- **Drying:** The plates are then dried to remove excess moisture, making them ready for assembly.

3.3.5 PLATE FORMATION (INITIAL CHARGING)

- **Formation process:** The plates are immersed in sulfuric acid, and an electrical current is applied to initiate the chemical reactions that convert the lead oxide paste into active materials. This process turns the positive plates into lead dioxide (PbO_2) and the negative plates into spongy lead (Pb).
- This step essentially "activates" the plates, allowing them to store and discharge electrical energy.

3.3.6 SEPARATOR PLACEMENT

- Separators, typically made from materials like polyethylene are placed between the positive and negative plates to prevent short-circuiting while allowing ionic flow.

3.3.7 BATTERY ASSEMBLY

- **Casing and sealing:** The individual cells are placed inside a plastic case, and the case is sealed. Terminals are attached to connect the internal plates to the outside.
- **Filling:** The battery cells are filled with sulfuric acid electrolyte.

3.3.8 FINAL CHARGING AND TESTING

- **Initial charging:** The battery undergoes an initial charging cycle to fully form the active materials and ensure proper chemical reactions.

- **Testing:** The battery is tested for capacity, voltage, and performance to ensure it meets required specifications before it is shipped.

Each step in the process plays a crucial role in ensuring that the battery functions properly and has a long lifespan. The Process Flow Diagram of the lead acid battery manufacturing in detail is given in the following figure.

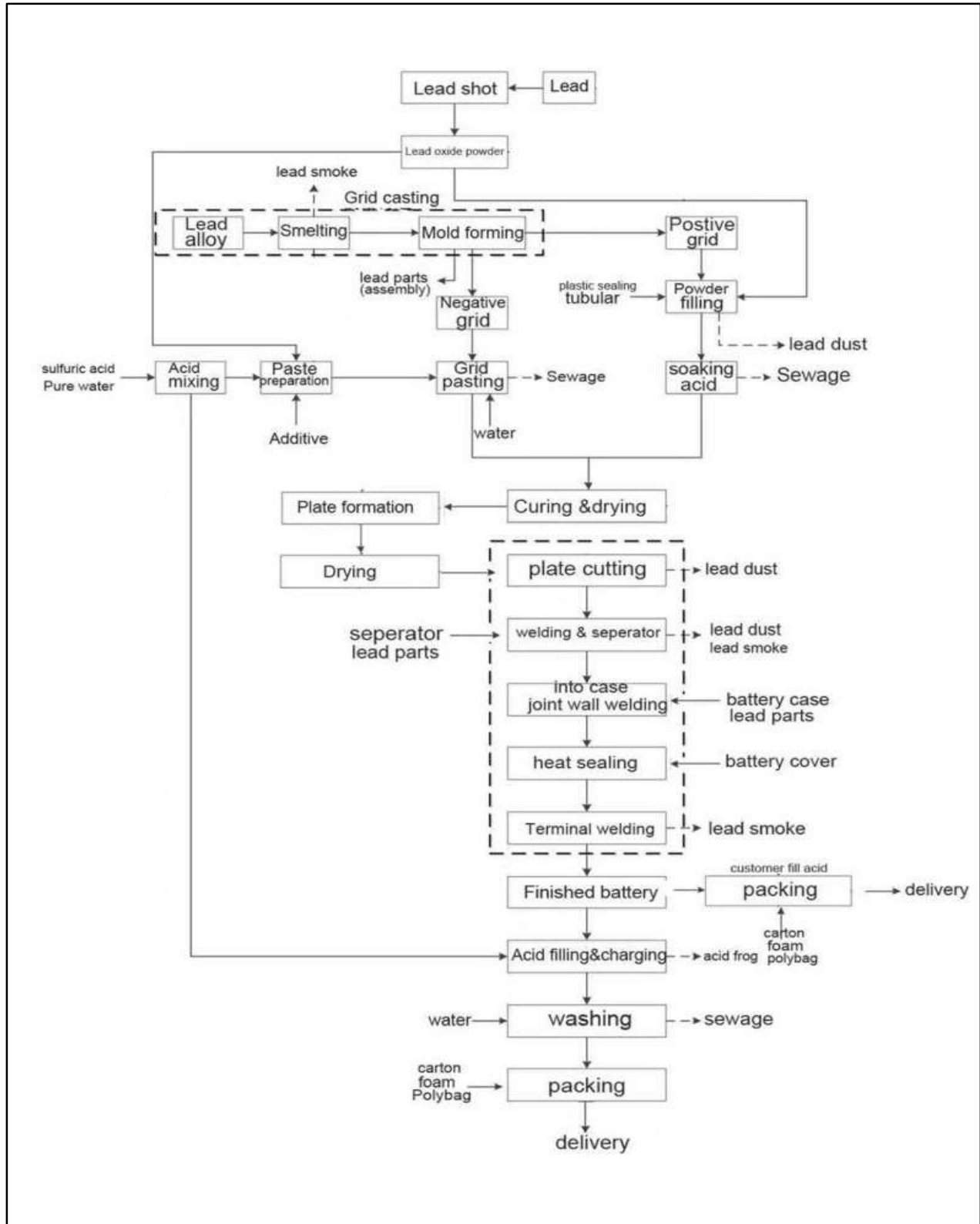


Figure 3.4: Lead Acid Battery Manufacturing Process

3.4 RAW MATERIAL LIST

The different kinds of raw materials, like Lead, Container Set, Plate, Separator, Glue, Chemicals, and Reagents, are used in the factory in the production of lead acid battery. The purified or treated water, acid, lead etc. are the main production materials for lead acid battery. As the factory crash used battery and make lead bar, therefore used battery also a raw material. The list of raw materials for battery manufacturing is given in the following.

SL	Raw Materials
1	Lead
2	Gunlet/ exhaust pipe
3	Separator
4	Container / box
5	Sulfuric acid
6	Packing / cartoon

3.5 MACHINERIES OF THE PROJECT

A battery factory utilizes a wide range of specialized machinery to ensure efficient and high-quality battery production. The process starts with electrode preparation machines, including slurry mixers, coating machines, drying ovens, and calendaring equipment to produce anode and cathode sheets. These are followed by cell assembly machines such as cutting machines, stacking or winding machines, tab welding units, and sealing systems. Next, electrolyte filling and sealing machines inject electrolyte and securely seal the battery cells. The batteries then go through formation and aging equipment, where they are charged and discharged under controlled conditions to activate their chemistry. Quality control is ensured using testing and inspection machines like OCV testers, leak detectors, and capacity testers. Finally, packing and labeling machines prepare the finished batteries for shipment.

The list of different machinery is attached in the annexure list.

3.6 LAND AND BUILDING DETAILS

The site of Xinyuan Storage Limited is setting up the new establishment on 350.23 acres, or 3.50 acres, of land. On a square foot scale, it is 153500.45 square feet. The land will be developed. It is located at Padmabila, Shakharihati, Jashore Sadar Upozila, Jashore, next to Jashore-Khulna highway (a little distanced from Singri Rail Station, Padmabila, Jashore Sadar Jashore).

This land is developing as per the factory requirement. The land is filling with sand before construction work starts. The land will be decorated with different production buildings, canteen shades, dining areas, ETP, APCS, utility buildings, recreation centers, ponds, and greenery areas.

The building details are given in the as table in the following

SL	Building/Construction Name	Area	Remark
1	Total Land Area	1,52,550.45 SFT	3.50 Acre or 350.23
2	Total Construction Area	1,38,682.231 SFT	Except only green space
3	Total Building Area (<i>brief as follows</i>)	1,29,533.95 SFT	Excluding road, drain etc.
4	Building 01: Factory Production Unit	1,09,450 SFT	For Production
5	Building 2: Factory Production Unit	11,188.736 SFT	Office, Laboratory etc.
6	Building 3: Wareroom	6334.546 SFT	
7	Building 4: Office Room	2560.499SFT	
8	ETP Area	3250SFT	
9	Pond Area	7000 SFT	
10	Total Green Area	28% of Total Area	
11	Assembling Area	2000 SFT	

3.7 PROJECT TIME SCHEDULE

The project completion schedule is presented in the following Table.

Table 3.1: Project Schedule

SL	Tasks	Date (Projected)
1	Land acquisition	2025
2	Land Development and Site Clearance	June 2025 to July 2026
3	Fancy work in the Site	June to December 2025
4	Recruitment of security and other service men	June to December 2025
5	Purchase of Construction Materials	July to August 2025
6	Start of Construction Work	July, 2025
7	Electricity and other utilities Service	August 2025
8	Plumbing Work	February, 2026
9	Production Machineries Setup	February 2026
10	Trial Production	April 2026
11	Start Final Production (full suing operation)	June 2026

Date is approximate according to the project planning

3.7.1 PRODUCTS WITH PRODUCTION CAPACITY

The production capacity of the project is as follows

Sl. NO	Name of Products	Capacity
1	Lead Acid Battery	800 pcs per day

3.8 UTILITY

3.8.1 POWER

The main source of electricity used in the factory is. The source of electricity is a grid line from BREB. Another source of electricity is the generator. Diesel will be used as fuel. The generator power is 880 KW of the project. The generator will use as a backup power source. A boiler of 4 tons capacity will be used in this factory. Initially, there will be no gas connection. The project proponent will try to get a gas connection. Fuel will be required for other purposes, like running vehicles.

3.8.2 WATER

Water is not only essential for any project, but it is also considered a component of the production. The total requirement of water for the project will be met through the deep tube wells of a total of 2. The withdrawal water will be used for production (battery charging, plate wash etc.), drinking, washing hands and mouths, and sanitation. The calculation of water requirement is drawn in the following table.

Table 3.2: Water Requirement for the Project

Water Requirement of Xinyuan Storage Ltd.	
Drinking Purpose Water Demand	
1. Total Manpower (including Admin, Management and Labor)	80 Persons X 2 Liters \approx 160 LPD = 0.16 m ³ /D
2. Sanitation Purposes (Sewage from sanitation activity)	80 Persons X 40 = 3200 LPD = 3.2 m ³ /D
3. Production Unit	
A. Lead Plaster Section	500 LPD = 0.5 m ³ /D
B. Plate Pasting Section	1500 LPD = 1.5 m ³ /D
C. Plate Formation Section	150,000 LPD = 150 m ³ /D
D. Cleaning/Washing and Others	6000 LPD = 6.0 m ³ /D
4. Gardening, Road Watering etc.	2000 LPD = 2.0 m ³ /D (considered)
	All together = 163.36 m³/day

3.8.3 EFFLUENT TREATMENT PLANT

The proposed factory will generate waste from battery manufacturing. The amount of waste generated is 335,000 liters/day, or 335 m³/day. Considering safety and open board, the amount of waste has been considered to be 348 m³/day or 14.5 m³/hour (operational period 24 hours). The final design has envisaged 15 m³/hour. The capacity of the ETP is 15 m³/hr. The brief of the ETP is in the Annexure.

Unit Operations at a Glance

Pre-Treatment

- a) **Oil separator Tank** - To remove Oil.
- b) **Equalization** - To homogenize of wastewater.

Primary Treatment

- b) **pH Reaction Tank-1** – To control the pH value of the effluent so that it is between 3 and 4.
- c) **pH Reaction Tank-2** - To control the pH value of the effluent so that it is between 5 and 6.
- d) **pH Reaction Tank-3** - To control pH value of the effluent
- e) **Flocculation** -To flocculate by coagulants.

Secondary Treatment

- a) **Primary clarifier Tank**- To intercept solid substances with density heavier than water and a larger particle size in sewage
- b) **Sludge Disposal** - To dispose the dried cake.

Tertiary Treatment

- a) **Filtration (Quartz Sand Filter and Activated Carbon Filter)** - To remove suspended fine particles from treated effluent.
- b) **Clean water reservoir**- To collect treated and standard reusable water.

The detail design drawing of the plant is given in the Annexure.

3.8.4 SEPTIC TANK

There are 80 people who will work in the factory. The maximum amount of sewage from human activity will generate $80 \text{ persons} \times 40 \text{ occupants} = 3200 \text{ LPD} = 3.2 \text{ m}^3/\text{day}$. This domestic wastewater or sewage is generated at the site, which is proposed to be treated in a septic tank and soak well, which will be located within the premises. The septic tank and soak well will be connected with all toilets and wash facilities to ensure treatment of all domestic wastewater from the site before disposal.

The sewage system (or sewerage) will be organized in the factory. The sewage system is such infrastructure that conveys sewage or surface runoff. For the surface run-off conveyors, the factory will have a PVC internal drainage line. The sewage will be conveyed by the plumbing system. The plumbing line will carry sewage, which is black water, and also grey water (wastewater from non-fecal activity). The carried sewage will be received by a septic tank. After the septic tank, a soak well will be set up, and sewage will be discharged by the soak well.

The drawing of the Septic tank is given below.

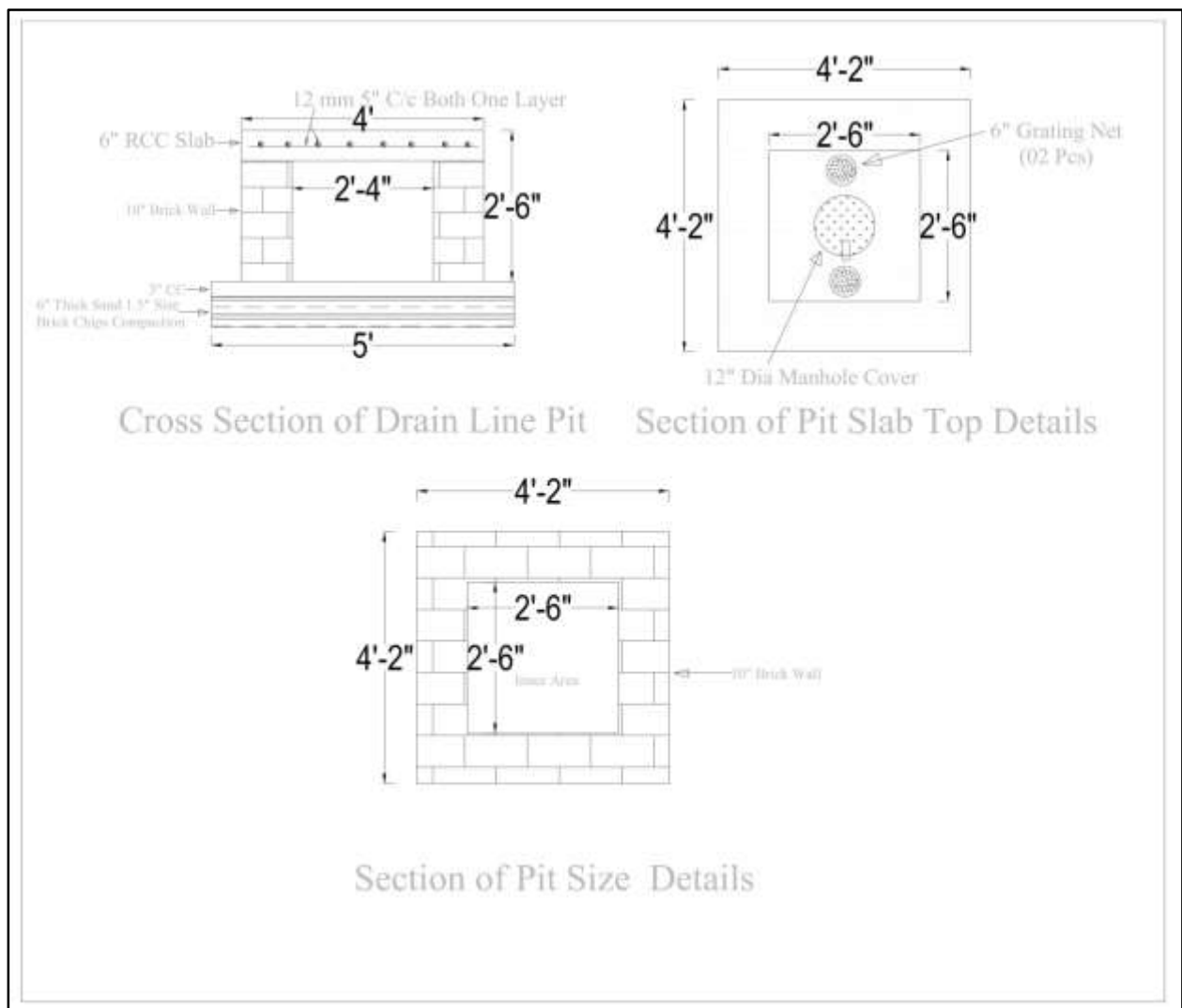


Figure 3.5: The drawing of the Septic tank

3.9 OTHER RELEVANT FACILITIES

3.9.1 EFFLUENT TREATMENT PLANT

The proposed factory will generate waste from battery manufacturing. The amount of waste generated is 335,000 liters/day, or 335 m³/day. Considering safety and open board, the amount of waste has been considered to be 348 m³/day or 14.5 m³/hour (operational period 24 hours). The final design has envisaged 15 m³/hour.

The effluent treatment method is conventional Activated Sludge Process (ASP). The design basis, drawing etc. has been attached in the Annexure.

3.9.2 AIR POLLUTION CONTROL SYSTEM

The factory will be installed an Air pollution Control System (APCS) for controlling air pollution. The system will equipped with equipped with cartridge filter, bag house, wet scrubbers and stake. This is designed from their mother land China. It has been designed to purify and clean polluted air, removing harmful substances such as lead dust, volatile organic compounds (VOCs), etc. before they are released into the environment. The detail of the APCS (Air Treatment Plant (ATP)) design basis drawing, etc., has been attached in the Annexure.

3.9.3 ROAD NETWORK OF THE PROJECT

The road network and/or system is suitable for the project. The road system can be divided into two main systems, namely, the internal road system and the external road system. Internal roads are constructed by RCC roads, brick-soling roads, etc. External roads are bituminous roads, which are mainly part of the national highway. The factory is located on the Jashore -Khulna highway. The project is located 4 meters in front of the Jashore-Khulna highway.

The factory-connected roadway image from Google Maps is shown below.

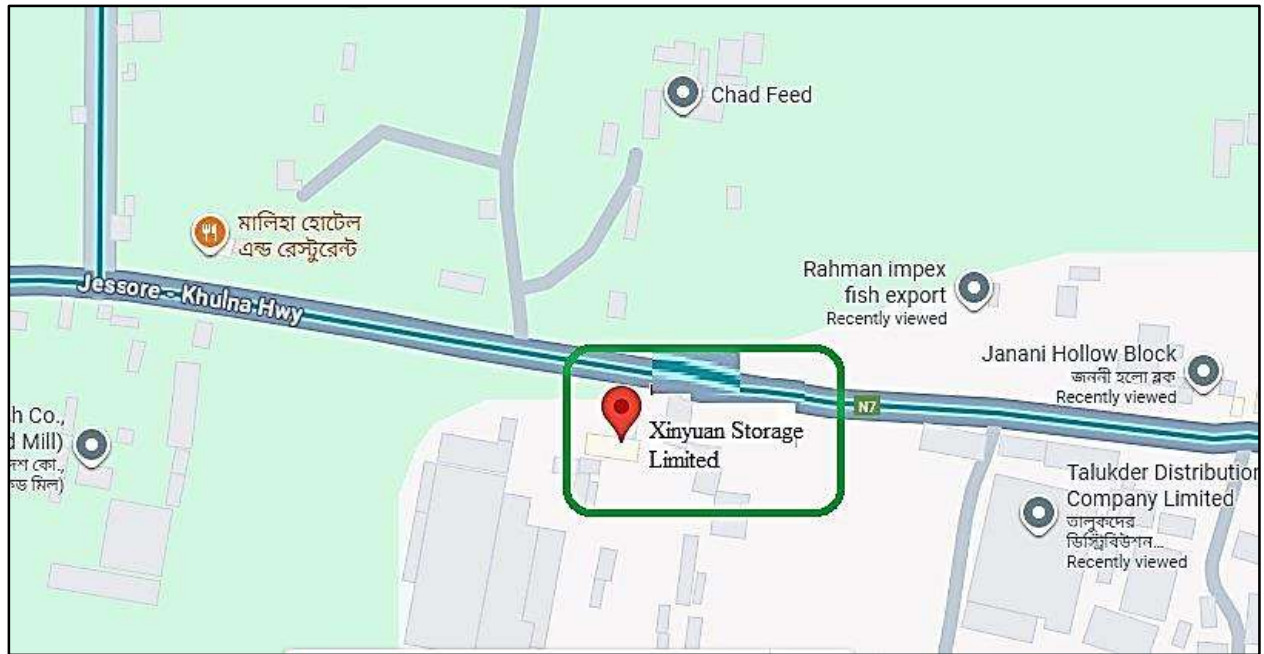


Figure 3.6: The factory-connected roadway

3.9.4 INTERNAL DRAINAGE FACILITIES

The factory has its own drainage plan for internal draining. The drainage system will be used for the drainage of storm water. The sewer system for sewage management was also designed for the proposed factory. The sewerage line will be constructed by PVC pipe. Internal drainage will be constructed by RCC. The internal drainage will meet at the public khal system of the factory. The wastewater from production will meet at the inlet of the ETP, and then it will be reused, and any excess amount of treated water will be discharged into the pond or khal nearby.

The drainage system is presented by a drawing in the following and in the Annexure also.

3.9.5 RAIN WATER HARVESTING

Industrial rainwater harvesting is a sustainable practice of collecting and storing rainwater for further use. The project will primarily plan to use 10,000 liter rainwater daily in the rainy season. The storage tank will 10,000 Liter and the water will pump to overhead tank after the filtration. The rain water harvesting will follow the bellow process.

- A. **Collection:** Rooftop surface will use as catchment to collect rainwater.
- B. **Filtration:** To remove debris, leaves, and other contaminants from the collected rainwater.
- C. **Storage:** The filtered rainwater will store in overhead tanks. It will locate above the ground level.
- D. **Distribution and Storage:** The harvested rainwater will use for different industrial purposes. It can be used in the Production processes, boiler feed water, toilet flashing, watering etc.

3.9.6 ZERO DISCHARGE PLAN AND 3R CONCEPT (REDUCE-REUSE-RECYCLE)

The project proponent has been given importance for the 3R plan, as 3R execution is must for the industrial existence. The project will have to achieved zero discharge in the near future. So, the proponent wants to make a plan from its beginning. The project will have an ETP of 15 m³/hr. After effluent treatment, the treated effluent will be reused for, gardening, floor washing, and road washing purposes as reuse and use in charging section as recycle of water. The desired quality of water will be achieved by advanced technology, which will be installed after the ETP.

Another important issue is the 3R plan. The project will reduce waste generation, reuse the materials, and recycle their waste where it is possible. The Reduce, Reuse, and Recycle plan and its activation will appear in every stage of the project. In both (construction and operation) phases of the project, the 3R plan has been ensured, and it will be continuous. The brief of the 3R is discussed in the following paragraphs.

REDUCE

It is important to determine the most suitable method to help preventing/reducing the negative consequences of the disposing methods on the environment, specifically on water, soil, air, and on human well-being. All utilities and products can be reduced of its consumption. The change of practice, reduce of waste generation and consumption may achieved reduce. A good planning and execution also lead to reduce. The project will train up its employee to reduce the resource uses and waste generation. Modern and edge technology will be used. Modern water saving fixtures and fittings will use in the plumbing system. These all will lead to reduce of 3R plan.

REUSE

Reuse of wastage material in the construction period will help the 3R implementation. Material which is left over the construction or wastage of the construction process will reuse for ground protection. The plastics and packaging materials will reuse somewhere and sale. After sailing these wastages will reuse most of the cases. The wastewater will have treated by the ETP and it will further treatment by advance technology of water treatment. Thus, it will reuse in different sectors of the project.

RECYCLE

Most of the cases, the factory does not through any solids or scraps item outside the factory boundary. Because lead dust is economical for the factory. The recyclable plastics, papers, metal after the production of the factory will be sold out. These sold materials will recycle in many factories or recycler. The factory will set up an ETP. The treated water will reuse and recycle in the factory. This factory will take measures for saving water, treatment of wastewater will take by the project proponent. A 3R concept and execution plan is attached in the Annexure part.

The detail Zero Discharge and 3R plan has been provided in the Annexure part of this report.

CHAPTER FOUR**BASELINE ENVIRONMENTAL CONDITIONS****4.1 PHYSICAL RESOURCES****4.1.1 GENERAL**

The baseline environmental condition of the project site serves as the basis for the identification, prediction, and evaluation of environmental impacts due to the project construction and operation. The baseline is the current environmental condition of the project site. The main objective of examining the present environment is to provide an environmental baseline against which potential impacts from construction and operational phases of any subproject can be compared (MGSP, 2018). A second important function of establishing a baseline for parameters such as air, noise, and water quality is to ensure that any problems arising from existing sources are not erroneously attributed to the project under study. The baseline environmental quality has been assessed through the field visit and secondary data study, along with the laboratory measurement of some environmental parameters.

This section describes the existing environmental status of the proposed project. The analysis was completed through the use of a combination of secondary data sources in addition to extensive on-ground reconnaissance and baseline studies to establish an understanding of the environmental and socio-economic baseline of the project area. Relevant data for this chapter were collected from:

- Secondary Sources: Data from literature reviews, maps, and monitoring reports;
- Primary Sources: This included gathering information from field surveys and laboratory analysis in the project study area.

The proposed project is situated in the Jashore District of Khulna, Bangladesh, at Village: Padmabila, P.O: Shakharigati, Jashore Sadar Upozila, Jashore. It is between 89.33327741068618 longitude and 23.127555264941172 latitude.

Jashore District, situated in the south-western region of Bangladesh, is part of the Khulna Division and holds significant historical, cultural, and economic importance. Covering an area of around 2,607 square kilometres, it shares a western border with India and is home to the country's busiest land port, Benapole, which facilitates major trade between Bangladesh and India. Jashore was the first district to be liberated during the 1971 Liberation War, making it a symbol of national pride. The district is rich in agriculture, producing crops like rice, jute, sugarcane, and the famous date palm molasses (patali gur). It is also culturally notable for being the birthplace of the renowned poet Michael Madhusudan Dutta, whose ancestral home in Sagardari is a major tourist attraction. With a growing literacy rate and improved infrastructure, Jashore continues to play a key role in the country's development.

Jashore District's upazilas each have unique historical and cultural backgrounds that contribute to the rich heritage of the region. The Jashore Sadar Upazila, home to the district headquarters, has long been an administrative and cultural center, especially during the British colonial period. Manirampur, one of the largest upazilas, is known for ancient archaeological sites and folklore. Sagardari village in Keshabpur Upazila is the birthplace of the legendary Bengali poet Michael Madhusudan Dutta, whose literary contributions are celebrated nationally. Sharsha Upazila, located on the Indian border, is historically significant for its role in cross-border trade and was a key point during the 1971 Liberation War, particularly through the Benapole border. Jhikargachha is notable for its traditional flower cultivation, while Abhaynagar, Bagherpara, and Chaugachha have rich agricultural histories rooted in jute, rice, and sugarcane farming. Together, these upazilas form a district deeply connected to Bangladesh's historical, literary, and economic development.

Jashore District is enriched by a network of rivers that nourish its fertile lands, support agriculture and fisheries, and connect rural communities. The major rivers flowing through the district include the Bhairab River, which passes through Jashore Sadar and Abhaynagar upazilas, and the Kopotakkho (Kobadak) River, which flows through Keshabpur and is famously mentioned in the poetry of Michael Madhusudan Dutta. The Chitra River runs through parts of Bagherpara and connects to the Narail district, while the Mukteshwari River meanders through Manirampur and Keshabpur. The Betna River flows near Sharsha and the Indian border, aiding local agriculture. In Manirampur and its surrounding areas, smaller rivers like the Buribhadra, Harihar, and Teka

4.1.2 TOPOGRAPHY

The geographical coordinates of Jashore District are approximately 23.1667° N latitude and 89.2167° E longitude, with an average elevation of about 21 to 25 feet (6.5 to 7.6 meters) above sea level. The topography within 2 miles of central Jashore exhibits very minimal elevation variation, with a maximum elevation change of around 20–30 feet and an average elevation above sea level of approximately 22 feet.

Within 10 miles, the elevation remains consistently flat, with only minor height fluctuations of up to 40–50 feet, typical of the alluvial floodplains in the Ganges Delta. Within 50 miles, the terrain continues to be predominantly low-lying and flat, with a maximum elevation change of around 60–80 feet, mainly due to natural levees along rivers and raised floodplains.

4.1.3 SOIL

The soil conditions of Jashore District are largely shaped by its location within the Ganges River Floodplain, resulting in predominantly alluvial soils that are highly fertile and suitable for intensive agriculture. These soils have developed over centuries through the deposition of silt, clay, and sand from rivers such as the Bhairab, Kapotakkho, Chitra, and Mukteshwari. The region features a variety of soil types, including young alluvium in the river basins, which is typically light-textured, well-drained, and rich in organic matter, making it ideal for cultivating crops like rice, jute, sugarcane, vegetables, and pulses. In contrast, the older alluvial soils found in slightly higher areas are heavier in texture (silty clay to clay loam), moderately fertile, and may require the application of chemical or organic fertilizers to maintain productivity. In the low-lying depressions (beels) and seasonally flooded areas, hydromorphic soils dominate. These soils are rich in organic material but often suffer from poor drainage and prolonged waterlogging during the monsoon season, which restricts crop choices to mostly wetland paddy. In some western parts of the district, especially around Manirampur and Keshabpur, patches of calcareous soils with higher pH levels are found, which can affect nutrient availability for certain crops. Despite its overall fertility, challenges such as seasonal waterlogging, soil nutrient depletion due to over-cultivation, and imbalanced fertilizer

use are emerging concerns that require sustainable soil and water management practices to maintain long-term agricultural productivity in Jashore.

4.1.4 METEOROLOGY

4.1.4.1 CLIMATE AND AVERAGE WEATHER

Jashore has a hot and humid tropical monsoon climate, characterized by a hot, humid, and overcast wet season and a warm, mostly clear dry season. The temperature typically ranges from a low of 55°F to a high of 96°F, rarely dropping below 50°F or exceeding 101°F. The hottest month is April, with an average temperature around 88°F, while January is the coldest at approximately 72°F. The region experiences significant rainfall, especially during the wet season, with August being the wettest month.

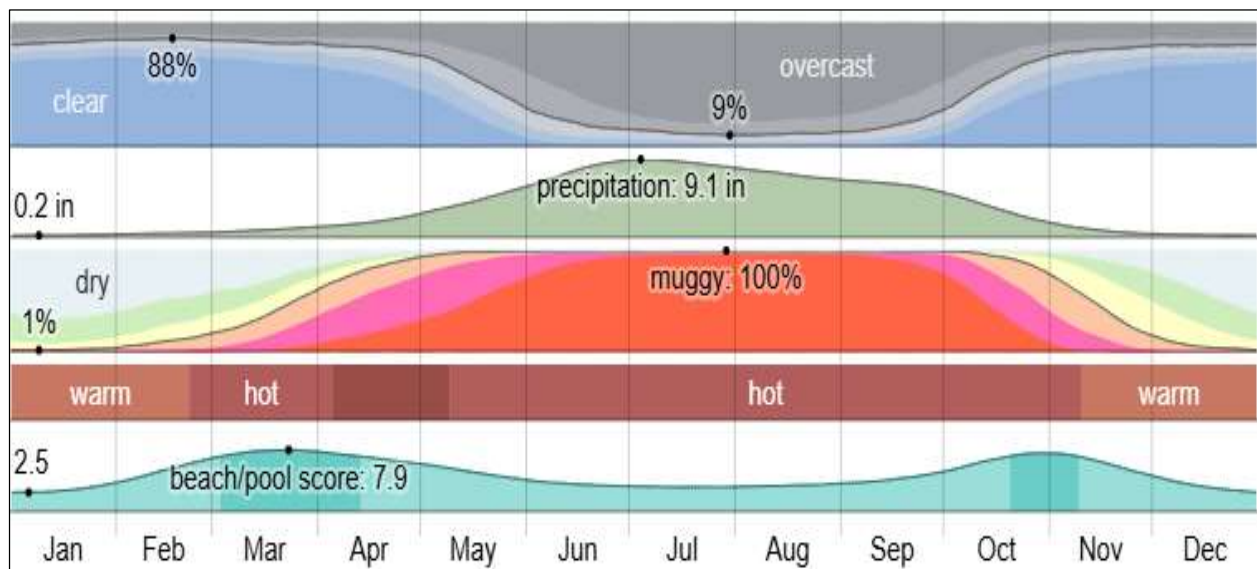


Figure 4.2: Climate in Jashore

Source: <https://weatherspark.com/>

4.1.4.2 TEMPERATURE

In Jashore District, the hot season lasts from around mid-March to late June (about 3.5 months), during which the average daily high temperature consistently exceeds 89°F (32°C). The hottest month is usually May, with average highs reaching around 92°F (33°C) and lows near 78°F (26°C).

The cool season in Jashore spans roughly from mid-December to late January (about 1.5 months), when the average daily high temperature stays below 78°F (25.5°C). The coldest month is typically January, with average lows around 57°F (14°C) and highs near 76°F (24°C).

Overall, Jashore experiences a tropical climate with warm to hot temperatures for most of the year, moderated by the winter months when temperatures become mild and comfortable.

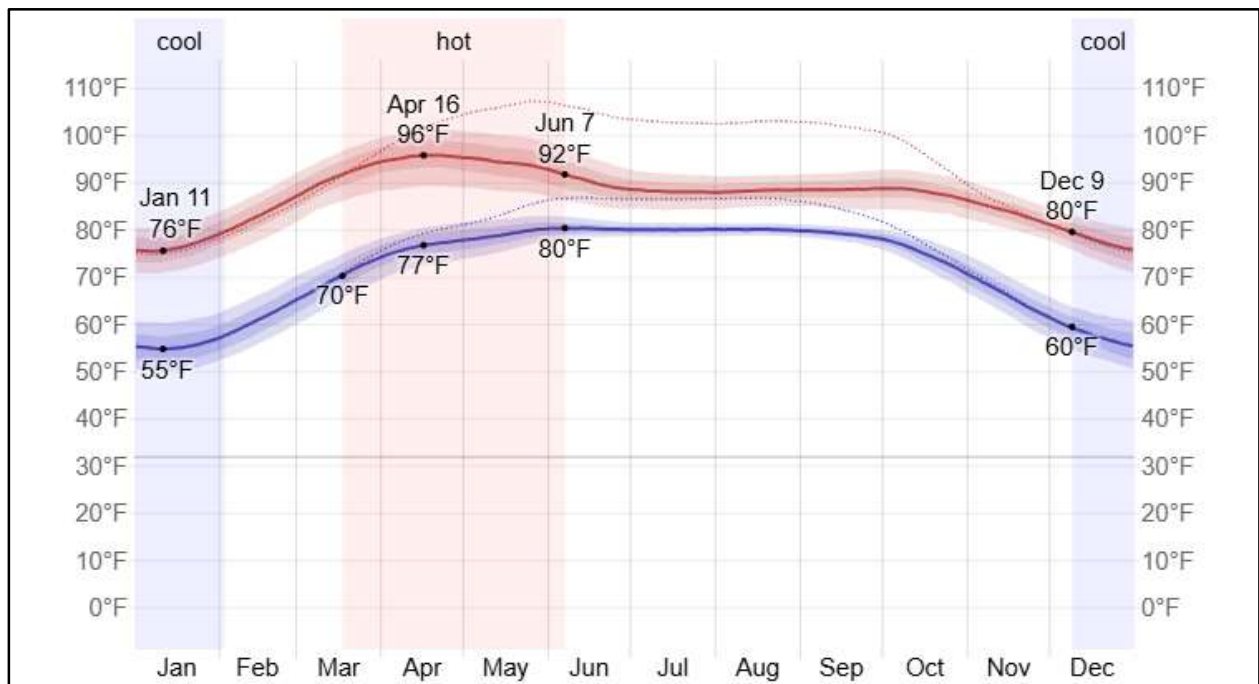


Figure 4.3: Average High and Low Temperature in Jashore

Source: <https://weatherspark.com/>

4.1.4.3 PRECIPITATION AND RAINFALL

CLOUDS

The average percentage of the sky covered by clouds experiences extreme seasonal variation over the course of the year. The clearer part of the year in Jashore begins around October 11 and lasts for 7.3 months, ending around May 20. The clearest month of the year in Jashore is February, during which on average the sky is clear, mostly clear, or partly cloudy 87% of the time. The cloudier part of the year begins around May 20 and lasts for 4.7 months, ending around October 11. The cloudiest month of the year in Jashore is August, during which on average the sky is overcast or mostly cloudy 90% of the time.

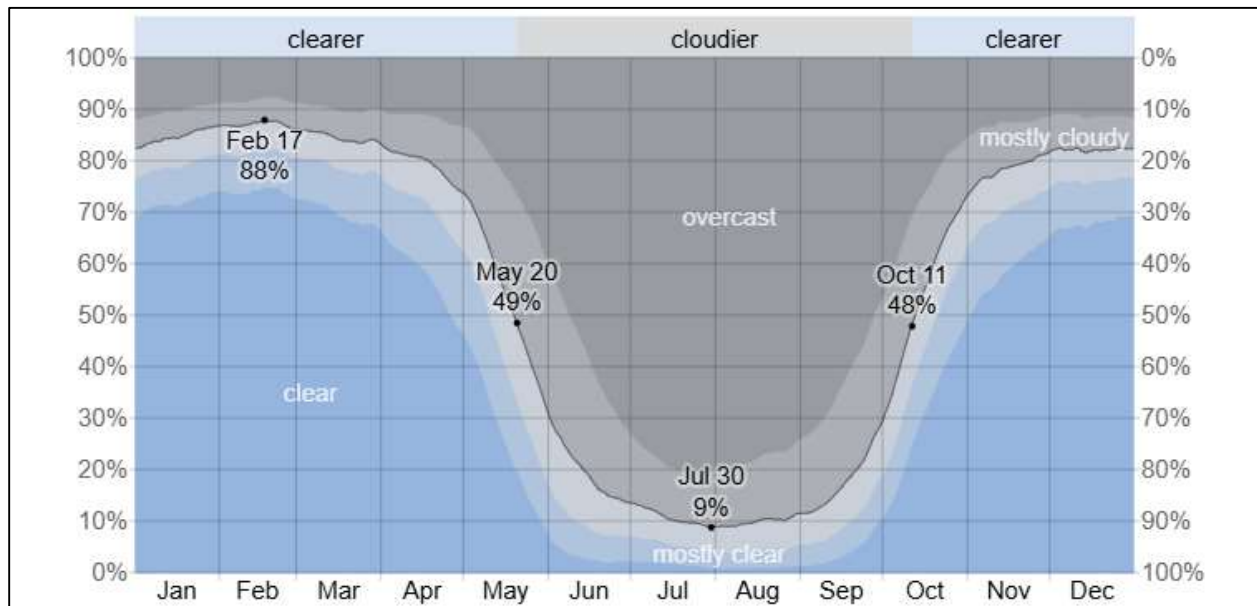


Figure 4.4: Cloud Cover Categories in Jashore

Source: <https://weatherspark.com/>

PRECIPITATION

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Jashore varies very significantly throughout the year. The wetter season lasts 5.2 months, from May 3 to October 10, with a greater than 36% chance of a given day being a wet day. The month with the most wet days in Jashore is July, with an average of 21.3 days with at least 0.04 inches of precipitation.

The drier season lasts 6.8 months, from October 10 to May 3. The month with the fewest wet days in Jashore is December, with an average of 0.8 days with at least 0.04 inches of precipitation.

Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Jashore is July, with an average of 21.3 days. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 70% on July 7.

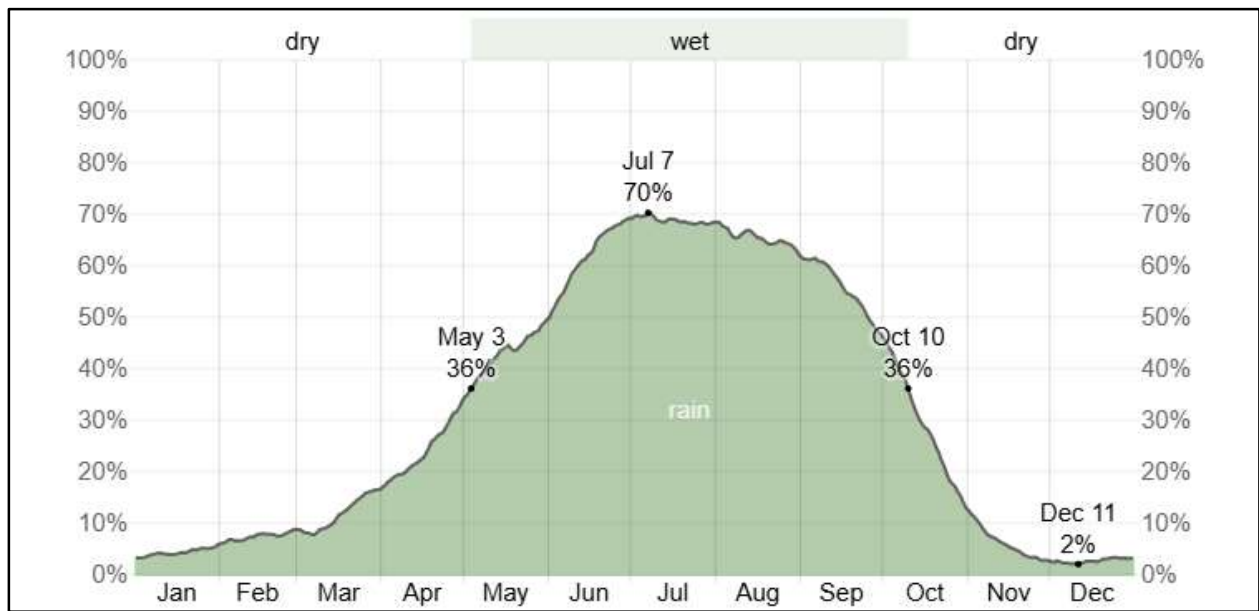


Figure 4.5: Daily Chance of Precipitation in Jashore

Source: <https://weatherspark.com/>

RAINFALL

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Jashore experiences extreme seasonal variation in monthly rainfall.

The rainy period of the year lasts for 9.3 months, from February 17 to November 26, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Jashore is July, with an average rainfall of 8.8 inches.

The rainless period of the year lasts for 2.7 months, from November 26 to February 17. The month with the least rain in Jashore is January, with an average rainfall of 0.3 inches.

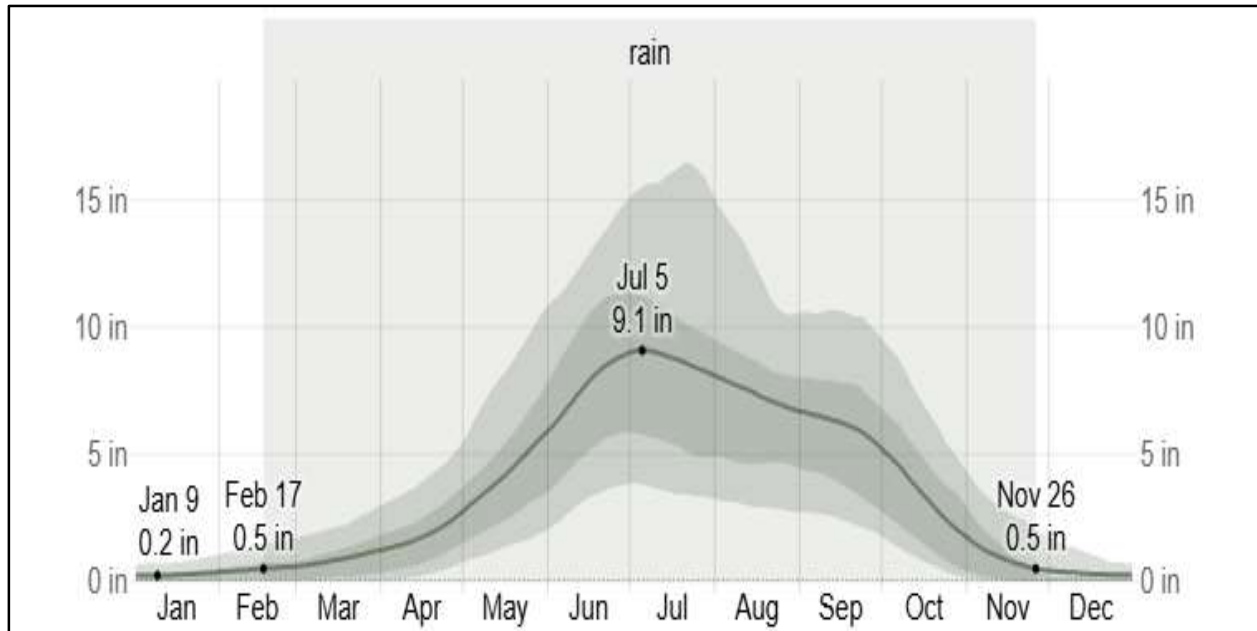


Figure 4.6: Average Monthly Rainfall in Jashore

Source: <https://weatherspark.com/>

4.1.4.4 HUMIDITY

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night. Jashore experiences extreme seasonal variation in the perceived humidity.

The muggier period of the year lasts for 8.5 months, from March 9 to November 24, during which time the comfort level is muggy, oppressive, or miserable at least 26% of the time. The month with the fewest muggy days in Jashore is January, with 0.5 days that are muggy or worse.

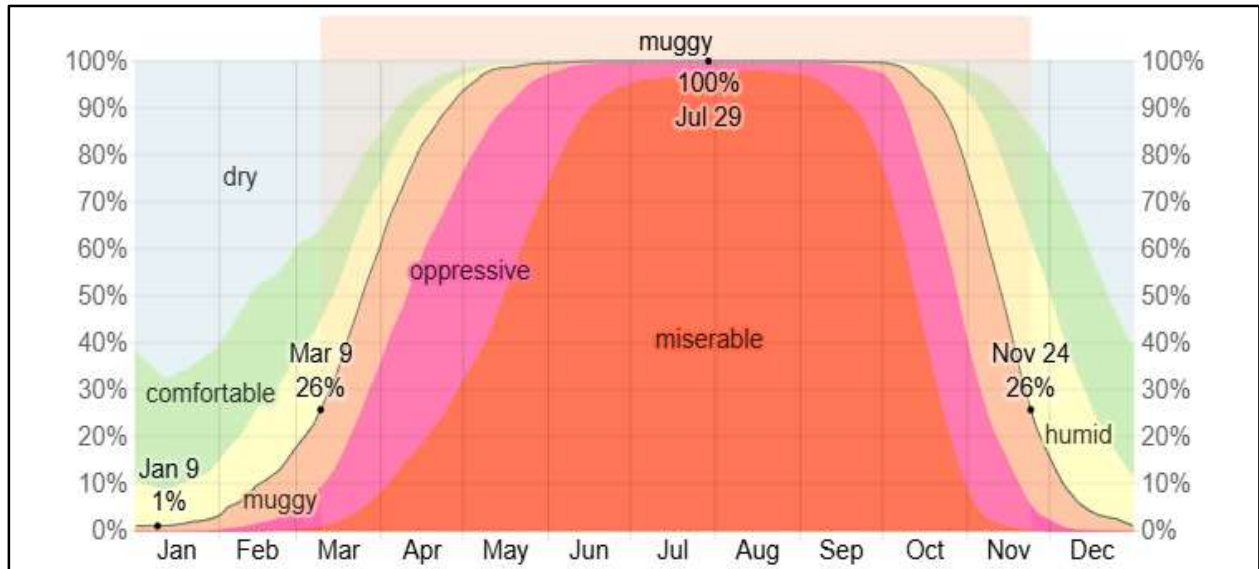


Figure 4.7: Humidity Comfort Levels in Jashore

Source: <https://weatherspark.com/>

4.1.4.5 WIND

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages. The average hourly wind speed in Jashore experiences significant seasonal variation over the course of the year.

The windier part of the year lasts for 5.3 months, from March 26 to September 4, with average wind speeds of more than 7.1 miles per hour. The windiest month of the year in Jashore is June, with an average hourly wind speed of 9.1 miles per hour.

The calmer time of year lasts for 6.7 months, from September 4 to March 26. The calmest month of the year in Jashore is October, with an average hourly wind speed of 4.9 miles per hour.

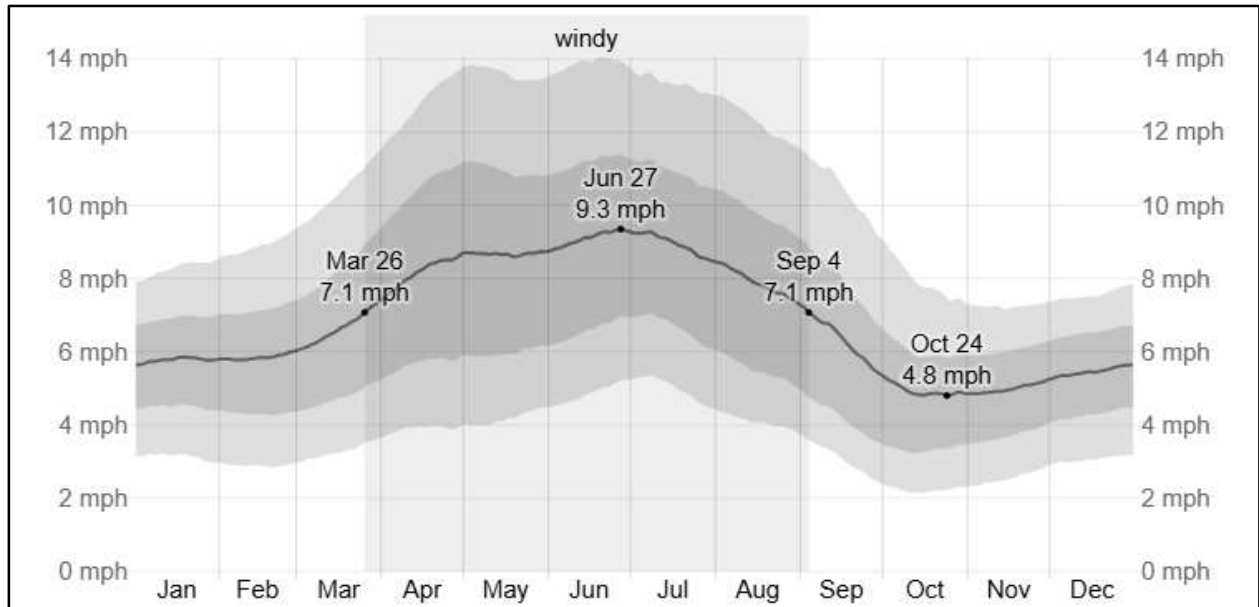


Figure 4.8: Wind Direction in Jashore

Source: <https://weatherspark.com/>

4.2 ECOLOGICAL RESOURCES

FLORA

The Jashore district's flora mostly resembles that of other neighboring districts. This area used to be densely occupied by numerous native plants, but the amount of native vegetation there is now drastically reduced as a result of the relentless destruction of vegetation for the purpose of increasing human occupancy.

The main agricultural crops in Jashore District include rice, jute, wheat, sugarcane, and a wide variety of vegetables and fruits. Rice is the most important staple crop, cultivated in three seasons—Aus, Aman, and Boro. Jute is a major cash crop, traditionally known as the "golden fiber" of Bangladesh, and is widely grown in the district due to favorable soil conditions. Other notable crops include wheat, maize, and mustard, which are mostly grown during the Rabi (winter) season. Jashore is also well known for its high-yield vegetable production, including cauliflower,

cabbage, tomato, eggplant, potato, and onion. In addition, fruits such as mango, banana, papaya, jackfruit, and guava are abundantly produced. The district is particularly famous for its date palms, which are tapped in winter to produce sweet date juice and molasses. Due to its fertile land and good irrigation, Jashore plays a significant role in the agricultural economy of Bangladesh.

Jashore District is home to a wide variety of trees due to its fertile soil and favorable climate. Among the most common are fruit-bearing trees such as mango, jackfruit, banana, guava, papaya, and date palm. These trees are widely planted in homesteads and orchards, and they play an important role in both local diets and the rural economy. Timber and shade trees are also prevalent, including mahogany, rain tree, neem, and sissoo, which are commonly planted along roadsides and around villages. Indigenous trees like banyan, peepal, kadam, and debdaru add to the natural greenery and cultural heritage of the region. Overall, the diverse tree population in Jashore supports the environment, provides economic benefits, and enhances the beauty of the landscape.

There are several gardens in the city of Jashore that provide natural beauty and recreational spaces for residents and visitors. These gardens offer a peaceful environment where people can relax, walk, and enjoy fresh air. Among them, Jess Garden Park and Town Hall Park are popular spots within the city, known for their greenery, seating areas, and open space. The Children's Park (Shishu Udyan) is especially loved by families for its play areas and child-friendly atmosphere. Although located on the outskirts, the famous flower gardens of Godkhali near Jashore are also visited like public gardens, attracting people with their colorful displays of roses, marigolds, and other flowers. These green spaces play an important role in enhancing the livability and charm of the city.

FAUNA

MAMMALS

Mammals of the Jashore region of Bangladesh, located within the Jashore Sloth Bear Sanctuary, include the sloth bear (a key species for the sanctuary), various rodents like bandicoot rats and palm squirrels, and possibly other wild species such as the leopard, sambar, blue bull, wild boar, porcupine, jungle cat, Asian palm civet, caracal, Indian wolf, and striped hyena.

BIRDS

Jashore district, a wide variety of bird species can be found throughout the year. The district is home to many resident birds that live there year-round, such as the Oriental Magpie-Robin, Common Myna, House Sparrow, and Black Drongo. Additionally, during the winter months, numerous migratory birds visit Jashore's wetlands and water bodies, including ducks, cormorants, and various waders. Overall, the number of bird species observed in Jashore district is estimated to be several dozens, with about 30 to 50 different types commonly recorded, depending on the season and habitat. The rich diversity is supported by the district's varied environments, including wetlands, agricultural fields, and urban areas.

REPTILES AND AMPHIBIANS

Different species of fresh water tortoises and turtles such as pond tortoise (*Melanochelys trijuga*), reacock soft shell turtle (*Trionyx hurum*), common roof turtle species of lizard like house lizard (*Hemidictylus brooki*), wall lizard (*Hemidictylus frenatus*), yellow water monitor (*Varanus flaviscens*), striped skink, grey land monitor etc. are also found.

The poisonous snakes include common cobra (*Naja naja*), rat snake (*Ptyas mucosus*), common krait (*Bungarus caeruleus*), banded krait (*Bungarus fasciatus*) and common blind snake. Amphibians like skipper frog (*Rana cynaphyctis*), bull frog (*Rana tigerina*), cricket frog (*Rana limnocharis*) and toad (*Bufo melanosticus*) are also found in this area.

FISHES

Fishes are caught in the ponds, rivers, creeks and beels of the district. The popular edible fishes are hilsa (*Hilsa ilisha*), ruhi (*Labeo rohita*), catla (*Catla catla*), mrigel (*Cirrhinus mrigala*), kalbaush (*Labeo calbasu*), sarpunti (*Puntius sarana*), chital (*Notopterus chitala*), airh (*Mystus aor*), pabda (*Ompok pabda*), bacha (*Eutropichthys vacha*), pangas (*Pangasius pangasia*), koi (*Anabas testudineus*), shing (*Heteropneustes fossilis*), magur (*Clarius batrachus*) etc. Beside fish, invertebrates like prawn (*Palaemon carcinus*), shrimp (*Palaemon malcolmsoni*) and crabs are also available here.

Moreover, some exotic fishes like telapia (*Oreochromis mossambicus*), nilotica (*Oreochromis niloticus*), silver carp (*Hypophthalmichthys molitrix*), grass carp (*Cteopharyngodon idella*) etc. have also been introduced in the District.

4.3 SOCIAL AND CULTURAL RESOURCES

4.3.1 DEMOGRAPHY

According to the 2022 Census of Bangladesh, Jashore District had 798,032 households and a population of 3,076,144, with an average of 3.79 people per household. Among the population, 510,121 (16.58%) inhabitants were under 10 years of age. The population density was 1,180 people per km². Jashore District had a literacy rate (age 7 and over) of 77.07%, compared to the national average of 74.80%, and a sex ratio of 1,018 females per 1,000 males. Approximately 23.39% of the population lived in urban areas.

The Annual Average Growth Rate (AAGR) for the entire Jashore district is not readily available in the provided search results, but it does show a decline in the national population growth rate, from 2.48% in 1974 to 1.59% in 2001, and mentions high urban growth rates in some areas of Bangladesh, with Jashore's urban growth being slower than other cities. (Figure-4.10).

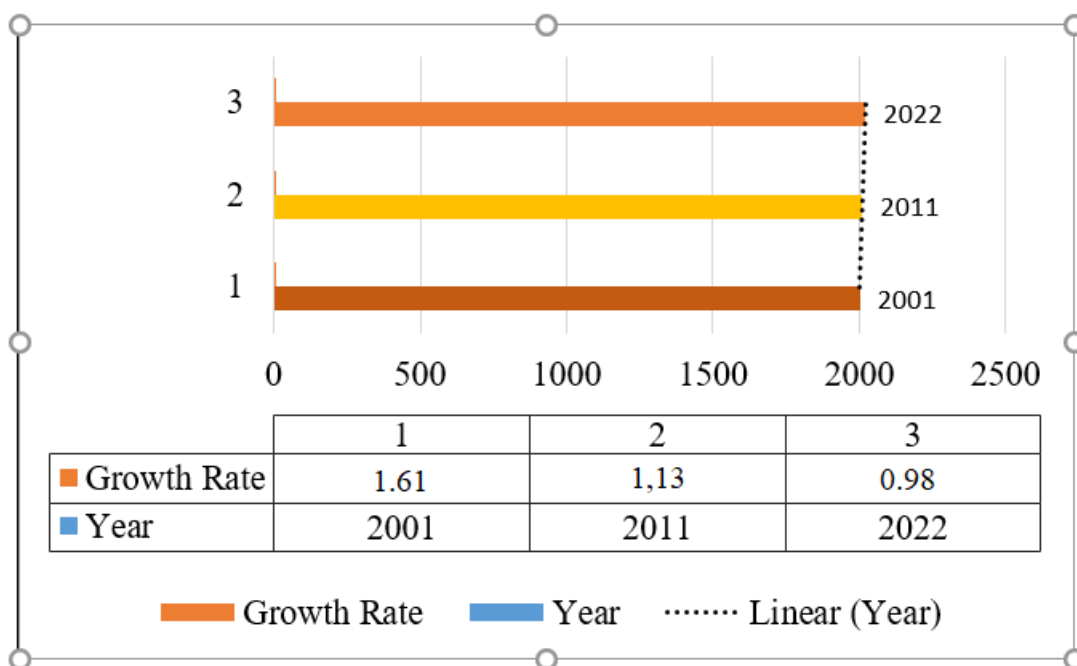


Figure 4.9: Annual Average Growth Rate of Population

The total ethnic minority population and the percentage of Jashore District is display in Table 4.1. It is seen from the table that out of the total population, the ethnic minority accounts for 10.19%. In case of males and females, the rate is 10.19% and 10.19% respectively.

Table 4.1. Ethnic Minority Population

Total		Male		Female	
Ethnic Minority Population	Percentage of Total Population	Ethnic Minority Population	Percentage of Total Population	Ethnic Minority Population	Percentage of Total Population
313592	10.19	156800	10.19	156792	10.19

Figure 4.10 shows the percentage distribution of the population by religion. In 2022, 89.62% of the total population was Muslim, 10.19% Hindu, and 0.19% other religions. Whereas in 2011, the percentages were 88.48%, 11.22%, and 0.30% for Muslim, Hindu, and others, respectively.



Figure 4.10: Population by Religion (%)

4.3.2 SETTLEMENT AND HOUSING

The total number of households and household size by category. It is to be noted that the total number of households in 2011 was 2,764,547, which increased to 3,076,144 in 2022. However, the average household size in 2011 was 4.74, which decreased to 3.79 in 2022.

Table 4.2 delineates the total number of households and household size by location. According to the 2022 census, Jashore district had 798,032 households and a population of 3,076,144, with an average household size of 3.79. About 23.39% of the population lived in urban areas. It was found that the total number of households in rural areas was 611,372 and in urban areas 186,660. The average household size in rural areas was 3.8 and 3.7, respectively.

Table 4.2. Number of Households and Household Size by Location (Rural and Urban)

Number of Households			Household Size		
Total	Rural	Urban	Total	Rural	Urban
798032	611372	186660	3.79	3.8	3.7

4.3.3 PUBLIC UTILITIES

SANITATION

Table 4.3 portrays the percentage distribution of households by type of toilet facilities. It is observed from the table that the highest percentage of households (70.2%) has toilet facilities with safe disposal by flushing/pouring water, followed by pit latrines with slab/ventilated improved latrines/composting latrines (15.00%). It can be noted that as low as 0.28% of households do not have any toilet facility (open defecation/no latrine available)

Table 4.3: Type of Toilet Facilities (%)

Total	Safe Disposal with Flushing/Pouring Water	Unsafe Disposal with Flushing/Pouring Water	Pit Latrine with Slab/Ventilated Improved Latrine/Composting Latrine	Pit Latrine Without Slab/Open Pit	Kutcha/Open/Hanging Latrine (Permanent/Temporary)	Open Defecation/No Latrine Available
100.00	70.2	10.92	15.00	2.17	1.43	0.28

DRINKING WATER

Table 4.4 shows the percentage distribution of households by main source of drinking water. It is seen that among the main sources of drinking water, tube well (deep/shallow) provides the highest percentage (91.84%), followed by piped (supply) water (9%), bottled water (0.43%), well (0.03%), pond/river/canal/lake (0.04%), rainwater (0.01%), and others (0.17%).

Table 4.4: Main Sources of Drinking Water (%)

Total	Tape/ Pipe (Supply)	Tube well (Deep/ Shallow)	Bottled Water/ Water Jar	Well	Pond/ River/ Canal/ Lake	Spring	Rain Water	Others
100.00	7.64	91.84	0.43	0.03	0.04	0.00	0.01	0.17

ELECTRICITY

Table 4.5 provides the percentage distribution of households by main sources of electricity. The table indicates that 99.30% of the households use electricity from the national grid as the main source. It can be noted that only 0.31% of households use solar electricity and 0.13% other sources (e.g. generator). As high as 99.30% of households enjoy electricity while a very insignificant percentage of households (0.25%) do not have that facility (BBS.,2022).

Table 4.5: Main Sources of Electricity (%)

Total	National Grid	Solar	Others	No Electricity
100.00	99.30	0.31	0.13	0.25

4.3.4 CULTURAL RESOURCES

LITERATURE

Jashore District has a rich legacy of cultural literature and heritage. According to the district portal, its traditions include Nakshi katha (decorated quilts), local sweets like date-juice cakes and molasses, and crafts, all of which feature in district history documents. The district is also famous for being the birthplace of Michael Madhusudan Dutt (Sagardari, Keshobpur), whose seminal

works (e.g., Meghnādabadh Kābya, Sharmishtha, and Padmaboti) are central to Bengali literature and are often cited in local literary histories. Another key cultural institution is Prachya Sangha, a multi-dimensional cultural institute established in 2013; it publishes, exhibits, and promotes works related to Eastern philosophy, literature, history, and traditions.

FESTIVALS

Jashore District is culturally vibrant and celebrates a variety of religious, literary, seasonal, and community festivals throughout the year. One of the most prominent is the Madhu Mela, held every January in Sagardari village to commemorate the birth anniversary of the famous Bengali poet Michael Madhusudan Dutt. This week-long fair features book stalls, folk performances, dramas, rural games, and discussions about Madhusudan's literary legacy. Another major celebration is Durga Puja, observed with great enthusiasm across the district in October, where hundreds of mandaps (temporary shrines) are erected and decorated, attracting thousands of visitors during the five-day festival. The Flower Festival, held annually in February at Godkhali in Jhikargacha Upazila, highlights the district's floriculture heritage through flower exhibitions, cultural performances, and stalls selling local floral products. Additionally, End-of-the-Year Fairs take place in different parts of Jashore, featuring traditional crafts, date molasses, pottery, and rural handicrafts, promoting the local economy and artisan community. These festivals not only preserve the rich cultural traditions of Jashore but also serve as important platforms for social bonding and local tourism.

The city also celebrates Pahela Falgun, the first day of spring and the month of Falgun in the Bengali calendar, in a lavish way. Women traditionally wear yellow saris to celebrate this day, which is marked by a festive celebration. This event is additionally referred to as Basanta Utsab (Spring Festival). On the first day of the Bengali year's month of Agrahayan, the harvest festival known as Nabanna is often observed with food, dance, and music. The birthdays of Kazi Nazrul Islam and Rabindranath Tagore are commemorated on separate days as Rabindra Jayanti and Nazrul Jayanti, respectively.

4.4 ECONOMIC DEVELOPMENT

The economy of Dhaka is the largest in the Peoples Republic of Bangladesh, contributing \$162 Jashore has been experiencing notable economic growth in recent years, driven by diversified industrialization, infrastructure investment, and agricultural modernization. A key upcoming project is the Jashore Export Processing Zone (EPZ) in Abhaynagar Upazila, spanning about 503 acres; once fully operational (from late 2026), it aims to attract roughly US\$2 billion in foreign direct investment (FDI), generate about US\$2.4 billion in annual exports, and create around 150,000 direct and 300,000 indirect jobs.

Another significant sector is light engineering, especially the automotive and spare parts industries, which are gradually substituting imports and supplying a large share of the country's demand locally; this sector is also seen as a pillar for local employment and skills development.

In agriculture, there is a major project worth ~Tk 171.32 crore aimed at expanding high-value crop production, promoting safe crop practices, and creating youth and women agricultural entrepreneurs, which is expected to transform subsistence agriculture into more commercial forms.

Additionally, local fairs like the Light Engineering Fair bring together producers, academia, and government, helping to stimulate innovation, standardization, and market linkages.

Overall, Jashore's economic development strategy is anchored in industrial expansion, infrastructural improvements (such as the EPZ), agricultural diversification, and the fostering of small & light industries to enhance employment, trade, and local livelihoods.

4.5 ENVIRONMENTAL QUALITY

4.5.1 AMBIENT AIR QUALITY

The ambient air quality has been measured in an environmental laboratory. The sample has been collected by a gravity sample collector. Then it has been measured using different methods of

analysis. The different ambient air quality parameters are Suspended Particulate Matter (SPM), Particulate Matter 2.5 and 10, Carbon Monoxide, Lead (Pb), Oxides of Nitrogen, Oxides of Sulphur, and Ozone. The sample collection duration was 8 hrs. The pictorial view of sample collection is given in the following image set.

The result was found SPM is 134 $\mu\text{g}/\text{m}^3$, the PM10 is 75, and PM2.5 is 43 $\mu\text{g}/\text{m}^3$, respectively. The other gases, such as SO₂ and NO₂, were measured at 13.3 and 21.1 $\mu\text{g}/\text{m}^3$, whereas the results for O₃, Pb, and CO were 34, 0.17, and 248 $\mu\text{g}/\text{m}^3$, respectively. The test result is provided in the following pages (after the sample collection images) and in the Annexure.

4.5.2 SURFACE WATER QUALITY

Surface water quality of the project and nearby area has been measured from a third party. The sample source was a canal nearby. The grab sample collection method was used to collect sample. Five parameters have been measured, which are Total Dissolved Solids (TDS), Suspended Solids (SS), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD). The result has been found TDS – 421 mg/l, SS – 26 mg/L, DO – 4.2 mg/l, BOD – 12 mg/l, and COD 32 mg/l. The sample collection images and the result card is shown in the following.

4.5.3 GROUND WATER QUALITY

Ground water quality also measured along with surface water quality. The source of sample was ground water which was collected from submergible pump or deep tube well of the project. The grab sampling method was used to collect sample. There are seven parameters are measured. These are pH, TDS, Iron, Alkalinity, Hardness, Chloride, Arsenic etc. The result was found pH – 7.45, Iron 0.1 mg/l, Alkalinity 34 mg/l, Hardness 37 mg/l, Chloride 48 mg/l and Arsenic < 0.001 mg/l. The result card and sampling picture is shown in the following.

4.5.4 AMBIENT NOISE LEVEL

The ambient noise level also measured as environmental parameters. The project site is located by the Jashore- Khulna highway and thus sometimes noise is found high because of vehicular horn. The third party has been measured the noise level around the project. The noise was measured between 6 AM to 9 PM. The noise has been found 65.7, 59.2, 65.9, 63.8 dBA of East, West, South and North respectively. The result and pictorial presentation of measurement is shown in the following figure.



Figure 4.11: Gravimetric Sample Collector for Ambient Air Quality Measurement



Figure 4.12: Surface Water Sample Collection



Figure 4.13: Ground Water Sample Collection



Figure 4.14: Ambient Noise Measurement



Figure 4.15: Result Card of Ambient Air Quality of the Project



Figure 4.16: Result Card of Ground Water Quality of the Project



Figure 4.17: Result Card of Surface Water Quality of the Project



Results of Ambient Noise Level Assessment Report

Name of the Industry : Xinyuan Storage Limited.
 Address of the Industry : Padmabila, Shakharihati, Sadar, Jashore, Bangladesh.
 GPS Coordinate : 23.127017°N, 89.333318°E
 Description of Sample : Ambient Noise Level Assessment (Outside Area).
 Data Collection Date : 11th September, 2025.
 Reporting Date : 20th September, 2025.

Description of analysis

SN	Sample Location	GPS Coordinate	Site Condition	Concentration present (LAeq) dBA	
				Day time	Night Time
01	West Side	23.127543°N, 89.333297°E	(Construction Phase)	59.2	
02	East Side	23.126282°N, 89.333215°E		65.7	
03	South Side	23.127174°N, 89.333535°E		65.9	
04	North Side	23.127440°N, 89.333426°E		63.8	
Bangladesh Noise Pollution (Regulation and Control) Rules 2006 ("SRO no 212-law/2006")				Day Time	Night Time
Industrial area				75	70
Commercial Area				70	60
Mixed Area				60	50
Residential Area				55	45
Silent Area				50	40
World Bank/IFC Standard				Day Time	Night Time
Industrial				70	70
Residential; Intitutional; Educational				55	45

All units are in (LAeq) dBA. Note: This noise data was usually accomplished by – Lurton Sound Level Meter (Model – 4012).
Note 1: Bangladesh Noise Pollution (Regulation and Control) Rules 2006.
Note 2: IFC/WB EHS Guideline: Noise Management dated April 30, 2007 gives, Noise level guideline for Residential; institutional and educational receptors in daytime (07:00 to 22:00) and night time (22:00 to 07:00) as 55 and 45 one hour Leq dBA respectively. For Industrial and Commercial receptors it is 70 one hour Leq dBA for both night and day time.
Note 3: Area categories are: A: Silent zone, B: Residential area, C: Mixed area (mainly residential area, and also commercial and industrial areas), D: Commercial area, and E: Industrial area.
Note 4: "Day" and "Night" of Bangladesh Noise Standards indicate 6 AM to 9 PM, and 9 PM to 6 AM respectively.

Comments: The standard level of ambient noise has set up by (Regulation and Control) Rules 2006 (Bangladesh Gazette "SRO no 212-law/2006"). According to the DOE & Bangladesh Gazette the perfect sound condition for Bangladesh is 50 dB for the daytime [6 am to 9 pm] and 40 dB for the night [9 pm to 6 am] in silent areas, 55 dB for the daytime and 45 dB for the night in residential areas, 60 dB for the daytime and 50 dB for the night in mixed areas (residential, commercial and industrial localities), 70 dB for the daytime and 60 dB for the night in commercial areas and 75 dB for the daytime and 70 dB for the night in industrial areas.


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4.18: Result Card of Ambient Noise Quality of the Project

CHAPTER FIVE**IDENTIFICATION, PREDICTION AND EVALUATION OF ADVERSE ENVIRONMENTAL IMPACTS****5.1 IDENTIFICATION AND PREDICTION OF ENVIRONMENTAL IMPACTS**

Several significant impacts on the environment will appear due to the both construction and operation of the project. Such impacts may be direct, indirect or ultimate for the purposes project which will discuss or identify as detail in the EIA report. These potential impacts (whether direct, indirect or ultimate), will be assessed based on their magnitude (short-term or long-term) and effect/impact (positive or negative). Impacts has been discussed as follows.

- (i) Impacts arising during the **construction phase**, and
- (ii) Impacts arising during the **operation phase**.

The proposed project may result in the following impacts on the physical environment: (It will detail discuss in the EIA report)

- **Ambient Air Quality:** Construction and operational activities may generate dust and emissions, which may affect local ambient air quality.
- **Ambient Noise Environment:** Noise generated from construction equipment, vehicles, and operational machinery may increase ambient noise levels in the surrounding area.
- **Surface and Groundwater:** Construction activities and operational wastewater generation may affect surface water and groundwater quality if not properly managed.
- **Land Use Pattern:** The project may cause a change in existing land use from its current condition to industrial/storage use.
- **Soil Quality and Fertility:** Earthworks, material handling, and potential spills may affect soil characteristics and fertility.
- **Vegetation:** Site preparation and construction activities may lead to the removal of limited trees or vegetation within the project area.
- **Forest and Wildlife:** The project may have negligible to minor impacts on forests and wildlife, as the site is located in a non-ecologically sensitive area.

5.2 SIGNIFICANT IMPACTS

The proposed project is expected to generate several significant environmental impacts during both the construction and operational phases. These impacts may be direct, indirect, or cumulative in nature. For the purpose of this IEE, all potential impacts—whether direct, indirect, or cumulative—have been assessed based on their magnitude (short-term or long-term) and their nature (positive or negative). In general, the impacts can be categorized into two broad groups: (i) impacts arising from project construction, and (ii) impacts arising from project operation.

The key environmental and social components that may be affected include:

- Ambient air quality
- Ambient noise levels
- Surface and groundwater resources
- Land use patterns
- Soil quality and fertility
- Trees and vegetation
- Forests and wildlife habitat
- Employment opportunities
- Public health and safety

A summary of the potential impacts (prior to the application of mitigation measures) resulting from both the construction and operation phases of the project is presented in the following table.

Table 5.1: Potential Impacts due to the Project Construction and Operation

A		General					
No.	Impacts	Negative		Positive		No Impact	Significance
		Short Term	Long Term	Short Term	Long Term		
A1	Displacement of People					√	-
A2	Change of Land use					√	-
A3	Loss of trees/vegetation					√	-
A4	Shifting of utilities	√					(-) 1
A5	Impact on archaeological property					√	-
B		Construction Phase					
No.	Impacts	Negative		Positive		No Impact	Significance
		Short Term	Long Term	Short Term	Long Term		
B1	Pressure on local infrastructure				√		(+) 1
B2	Impact on local surface water quality	√					(-) 1
B3	Impact on air quality (including dust generation)	√					(-) 2
B4	Noise pollution	√					(-) 1
B5	Traffic congestion	√					(-) 1

B6	Disposal of construction debris/material	√					(-) 1
B7	Public health and safety	√					(-) 1
B8	Social Impact			√			(+) 2
C	Operational Phase						
No.	Impacts	Negative		Positive		No Impact	Significance
		Short Term	Long Term	Short Term	Long Term		
C1	Change in ambient air quality		√				(-) 2
C2	Increase in noise level		√				(-) 2
C3	Impact due to the wastewater discharge		√				(-) 2
C4	Water withdrawal or ground water deficit		√				(-) 1
C5	Impact due to the solid waste		√				(-) 1
C6	Local Employment				√		(+) 2
C7	Increment in green cover (as it is green project)				√		(+) 1
C8	Economic Growth in the local area				√		(+) 1
C9	New Employment Opportunity				√		(+) 1

(Impact has been shown without any mitigation measures)

Significance score of impacts denoted as bellow

L= Low Impact, Score -1, M = Mid Impact, Score -2, H = High Impact, Score -3, No Impact = -

5.3 DETAILS OF ADVERSE IMPACT ON PHYSICAL ENVIRONMENTD

5.3.1 LAND USE

The impacts on land use will be similar during both the construction and operational phases. Local land patterns will be altered, particularly due to landfilling activities at the project site. As a result, the existing land use will change. However, the impacts are expected to be short-term and primarily limited to the construction period.

Construction of the factory often requires clearing land, which may lead to deforestation or the destruction of natural habitats. This loss of vegetation can disrupt ecosystems, displace wildlife, and contribute to soil erosion.

5.3.2 CONTAMINATION OF SOIL

Soil contamination may occur if solid waste, such as garbage, oil spillages from machinery, cement residue (during construction phase), sewage, or other construction debris, is not properly managed. Although the probability of soil contamination from this project is relatively low, it cannot be ignored. Construction vehicles, in particular, pose a risk of oil leakage or spillage. These impacts are temporary and will occur only during the construction phase.

5.3.3 WATER QUALITY AND DEGRADATION

Groundwater impacts are expected to be minimal, limited to small-scale extraction for construction activities. However, surface water may be affected through:

- Chemical contamination from construction materials such as cement, paint, and fuel/oil leaks from machinery.
- Increased siltation caused by surface runoff, especially following vegetation clearance and the stockpiling of raw materials such as sand.

The project requires only a limited volume of water for activities such as concrete mixing and curing. The extracted water will not be significant in volume and will not contain toxic substances.

5.3.4 IMPACT ON AIR QUALITY

Air quality may be temporarily degraded during construction due to fugitive dust emissions and exhaust gases from construction vehicles and machinery. The impacts will be localized and are not expected to affect the wider surrounding environment. Major dust sources include:

- Site clearance and operation of heavy equipment.
- Transportation and handling of construction materials such as sand and cement.
- Stockpiling of excavated soil and other construction processes.

5.3.5 NOISE POLLUTION

Noise is one of the most undesirable consequences of construction activity. While the level of discomfort is subjective, common impacts include interference with communication and sleep disturbance. Noise levels near the site may exceed permissible residential standards. Short-term noise impacts may occur due to:

- Concreting and mixing.
- Foundation excavation, particularly if drilling is used.
- Operation of construction plants and movement of heavy vehicles (e.g., cranes).

5.3.6 TRAFFIC CONGESTION

The project area is not located in a densely populated commercial or residential zone, so traffic impacts will be minimal and short-term. Temporary congestion may occur during peak hours when construction materials are delivered. The movement of heavy trucks transporting materials has the potential to cause localized traffic build-up.

5.3.7 STACKING AND DISPOSAL OF CONSTRUCTION MATERIALS

Construction will generate a considerable volume of solid waste, primarily in the form of construction debris. If unmanaged, this can lead to environmental impacts. Typical waste streams include excavated soil, metals, plastics, paper, brick chips, and stone chips. Proper waste management practices will therefore be essential.

5.3.8 PUBLIC HEALTH AND SAFETY

If not properly managed, the generation of waste, sewage, fugitive dust, and gaseous emissions during construction may negatively impact public health and safety. Workers engaged in construction activities will be directly exposed, but nearby communities may also be affected. Proper mitigation measures, including occupational health and safety standards, are required to minimize risks such as chemical exposure, poor ventilation, and unsafe working conditions.

5.4 IMPACTS DURING OPERATION PHASE

5.4.1 WASTEWATER GENERATION AND IMPACT

During operation, wastewater will be generated primarily from battery assembling and charging activities. In particular, the charging unit requires continuous water flow, resulting in the production of large volumes of acidic wastewater with a pH of 2–3. Additional sources include cooling water and floor washings. If untreated, this wastewater poses a severe threat to the environment, damaging nearby flora and fauna due to its corrosive and toxic nature. The overview of effluent generation according to their ETP design document is given in the following.

Lead Plaster Section = 0.5 m³/D

Plate Pasting Section = 1.5 m³/D

Plate Formation Section = 150 m³/D

Factory cleaning and others = 6 m³/D

This amount of untreated effluent will make serious impact on environment in the area.

5.4.2 SOLID WASTE

The production process generates various solid wastes, including plastic scraps, metal scraps, cardboard, and particularly lead-containing waste. Improper disposal of these materials can result in soil and water contamination, adversely affecting ecosystems and public health.

5.4.3 AIR ENVIRONMENT

Air pollution during operation may result from:

- **Lead emissions:** Lead dust and fumes generated during battery manufacturing can contaminate air, soil, and water, posing severe risks to human health and ecosystems if not controlled. Wastewater containing lead, sulfuric acid, and other heavy metals also presents hazards if untreated.
- **Acid mist and emissions:** Generated from smelting or charging units, which may degrade local air quality.
- **Vehicular emissions:** Carbon dioxide (CO₂) and other exhaust gases from poorly maintained vehicles may contribute to local air pollution.

Without proper emission controls, wastewater treatment, and solid waste management, these impacts could be severe.

5.4.4 NOISE ENVIRONMENT

Noise impacts during operation are expected to be minor, primarily from vehicular activity and generator use. The project will use generators and boiler, each fitted with canopies to reduce sound levels. Enclosing the generator room will further mitigate noise impacts, ensuring compliance with standards.

5.4.5 HAZARDOUS WASTE STREAMS

In addition to solid waste, operational activities will also produce hazardous waste streams such as lead mist, packaging waste, and chemical residues. Improper handling or disposal may lead to long-term contamination of soil and water resources.

5.4.6 TRAFFIC ENVIRONMENT

Operation of the factory will increase local traffic due to the movement of raw materials, finished goods, and employees. While the surrounding road network can accommodate this, the increased use of heavy vehicles may put additional pressure on local infrastructure.

CHAPTER SIX**SOCIAL IMPACT ASSESSMENT****6.1 SOCIO ECONOMIC ADVANTAGES**

The project is expected to generate several positive social impacts in the project area. Most of these benefits relate to economic growth, improved livelihoods, and community development. Direct and indirect employment opportunities, an increase in local business activities, and a contribution to the national GDP are some of the key positive outcomes.

The development will include construction of factory buildings, office buildings, production sheds, parking facilities, and recreational areas. In addition, the project will stimulate commercial activities in the surrounding area. Secondary or spill-over infrastructure improvements may include road upgrades, drainage systems, and an improved aesthetic environment. Local communities will benefit from new employment opportunities and the supply of construction materials and services. Overall, the project will support the development of local physical infrastructure.

6.2 ECONOMIC GROWTH IN THE AREA

Employment opportunities will be generated during both the construction and operational phases. Local workers will be employed as daily laborers, security staff, support staff, production workers, and office personnel, depending on their qualifications. During the construction phase, local laborers will benefit from steady employment for approximately 2–3 years. Whereas in the operation phase, the factory will employ about 80 workers. Among them, the most of the workers will seek from the local area.

The establishment of the factory will have positive multiplier effects on the local economy. Benefits will include improvements in transportation services, increased market activities, enhanced household income, and higher land values in the surrounding area. The project will

stimulate local businesses, create employment, and generate additional facilities, leading to improved economic and social conditions in the locality.

6.3 PARTICIPATION AND FACILITIES OF STAKE HOLDERS

Participations and Facilities of stake holders in the both project cycle like during the construction, and Operation phase. Local communities will benefit through direct employment in masonry, carpentry, and building works. Local suppliers, such as hardware shops, cement distributors, and sheet metal vendors, will also benefit from increased demand. In this way, the project will provide both direct and indirect economic benefits to the surrounding community.

In the operational phase, the project will have long-term positive social impacts. The influx of workers and related development will boost consumption of local goods and services, thereby expanding the local economy. Priority will be given to hiring labor from within the project influence area, which will enhance community development. Additionally, the project will contribute to the national economy through increased employment and industrial growth, thereby supporting the country's GDP.

6.4 IMPACTS ON LIFE QUALITY OF STAKEHOLDERS

The words Impact on Life Quality of Stakeholders' means how the project activities are impacted on the stakeholder's livelihood. To ongoing the discussion, stakeholders are identifying first. Herewith the stakeholders are identifying and the write the impacts later on.

- Local residents of Padmabila and Bosundia area
- Project employees and contractual workers
- Transport operators and suppliers
- Nearby small businesses and service providers
- Local institutions (schools, mosques, markets)
- Vulnerable groups (elderly, women, low-income households)

In the different dimensions, the local people or stakeholders will get the positive impact on their life. In the followings the impacts are presented.

a) Employment and Income Generation

- Direct jobs during construction and operation phases
- Indirect employment (transport, food supply, maintenance services)
- Increase in local purchasing power

b) Local Economic Development

- Growth of nearby shops and services
- Increased land value in surrounding areas
- Improvement in local infrastructure (road access, electricity reliability)

c) Skill Development

- Technical and operational training opportunities
- Improved long-term employability of local workforce

6.5 CULTURAL INFLUENCES

Potential Positive Cultural Impacts

a) Economic Stability Supporting Cultural Continuity

Improved employment and income opportunities may enhance household stability, allowing families to continue traditional practices and participate in religious and cultural events.

b) Community Development

Improved access roads and infrastructure may facilitate easier participation in social and religious activities.

c) Corporate Social Responsibility (CSR) Opportunities

The project may support local cultural events, educational institutions, or community welfare initiatives, strengthening community relations.

Potential Negative Cultural Impacts

a) Disturbance to Religious or Social Activities

Construction noise or increased vehicle movement may temporarily disturb prayer times, local gatherings, or cultural events.

b) Influx of External Workers

If not properly managed, the presence of outside workers may create minor social or cultural adjustment issues within the local community.

c) Risk to Cultural Sites (If Any Exist Nearby)

Although no major archaeological or heritage sites are identified in the immediate project area (subject to field verification), accidental impacts during construction cannot be entirely ruled out

6.6 POTENTIAL NEGATIVE IMPACTS ON LIFE QUALITY**a) Noise and Traffic Disturbance**

- Increased truck movement may create traffic congestion
- Noise during loading/unloading operations
- Possible disturbance to nearby households and institutions

b) Air Quality and Dust

- Dust generation during construction phase
- Emissions from transport vehicles

c) Safety Risks

- Increased road accident risk due to heavy vehicle movement
- Occupational health and safety risks for workers

d) Social Stress

- Temporary inconvenience during construction
- Community concerns regarding environmental risks

CHAPTER SEVEN
PUBLIC CONSULTATION**7.1 GENERAL**

“Public Consultation” or “Public Hearing” refers to the process by which the concerns of local affected people and others who have a plausible stake in the environmental impacts of the project or activity are ascertained to take into account all the material concerns in the project or activity design as appropriate. The process of public participation and consultation was endorsed by United Nations Conference on the Environment and Development (UNCED) in 1992. Public consultation is a process involving relevant stakeholders for disclosing information; enhance to identify environmental and social impacts, their opinion and local obstacle related to the project. Stakeholder consultation, if conducted in a participatory and objective manner, is a means of enhancing project sustainability. In the project, public consultation has been carried out during the environmental assessment studies.

The objective of the public consultation was:

- To identify and address concerns of all interested and affected parties of the project area.
- To provide a means to identify and resolve issues before plans are finalized and development commences, thus avoiding public anger and resentment and potentially costly delays.
- To encourage transparency and inculcate trust among various stakeholders to promote cooperation and partnership with the communities and local leadership.

7.2 METHODOLOGY

In recognition of the diversity within any community, it is very important to obtain a clear understanding of the different stakeholders and to analyse their capacity and willingness to be

involved in some or all of the project and its planning process. There are different types of methods for public consultation. However, the adopted methods are as follows:

- Focus Group Discussion
- Stakeholder Meeting
- Questionnaire Survey

Firstly, interviewers talked to the people roaming in the area of the Bosundia, Rupdia, Padmabila or nearby the Xinyuan Storage Limited. They expressed their opinion regarding this project. It was questionnaire surveys. A set of question ask to the stakeholder and they verbally made answer. Finally, took their name/phone number and sign in some case. The Focus Group Discussion (FGD) was conducted by considering a group of people who influence the area.

7.3 INFORMATION DISCLOSURE AND CONSULTATIONS

The consultation process during the formal meeting was carried out in Bengali language. During these meetings, a simple, non-technical, description of the project was given, with an overview of the project's likely human and environmental impact. This was followed by an open discussion allowing participants to voice their concerns and opinions. In addition, to provide communities with information on the proposed project, their feedback was documented during the primary stakeholder consultation. The issues and suggestions raised were recorded in field notes for analysis and interpretation.

7.4 FINDINGS FROM THE FOCUS GROUP DISCUSSION

The following findings have been raised from the consultation:

1. Employment opportunities have been created for the project period.
2. Local community has increased their small commercial activities for the project.
3. Local women empowerment is happening by getting scopes to increase food commerce in limited.
4. Crime or violent situations are being decreased as a class of people will live in the area and local people are getting busy with economical and livelihood activity.

5. Local schools and villagers aren't benefitted from CSR activity or there is a lack of practice of CSR.
6. As vehicles like trucks are carried dry sand, it must create air pollution in the area.
7. No cultural influence may occur in the area. Cultural influence will more integrity.

7.5 OUTCOMES OF THE QUESTIONNAIRE SURVEY

A questionnaire survey was conducted in concerned area in order to exhibit the actual scenario of mass people thinking. Total 10 Nos. questionnaires survey was carried out among the local family/people of the project area. 6 respondents out of 10 were male while 4 respondents found female. People from various professions such as service holder, businessman, day labour, entrepreneur, house wife, teacher, rickshaw puller, driver, student, etc. were considered during the survey period. However, all the respondent was found in between adult age. The survey consists of four group of question headed toward the extraction of legit information. The question groups were Biophysical and Resource Use, Social and Cultural, Health and Safety and Economic & Fiscal.

❖ BIOPHYSICAL AND RESOURCE USE

Biophysical and resource use section contains three (3) specific questions. First question was about the increasing scenario of air pollution because of Lead Bar Smelting and Grid Casting Formation in the project area. Figure 1 presents the response of the respondents regarding increasing level of air pollution due to production. There are 65 % of the total respondent agreed that the unprotected lead smelting for grid casting process is increasing the air pollution level. On the other hand, 35 % respondents replied negative to response of similar question. Second asking of this section was "Is it make any noise and air pollution due to the vehicular movement for products and raw materials transportation-loading-unloading?" The respondent answered directly 'NO'. Majority of the participant told 'NO' because they did not see (yet) the heavy vehicular movement or truck in the area. The project proponent informed, raw materials are carried by big size vehicle and therefore, vehicular movement is limited for the materials transportation. The question no 3 was "Is biodiversity damages due to the land development?" The answer was mixed. Somebody told - no loss or damages due to the development. Somebody think about it and answered 'yes'. In the area

the factory establishment was before in the same point as it was a factory previously and the authority of the Xinyuan Storage Ltd. Contract for the establishment. The chart/graph of the questionnaire survey set 1 is given below.

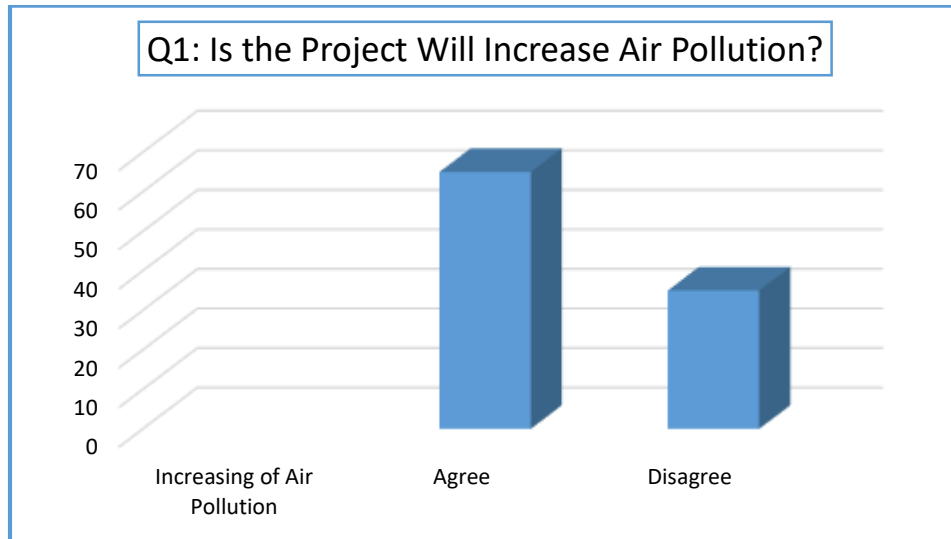


Figure 7.1: Column Chart of Q1

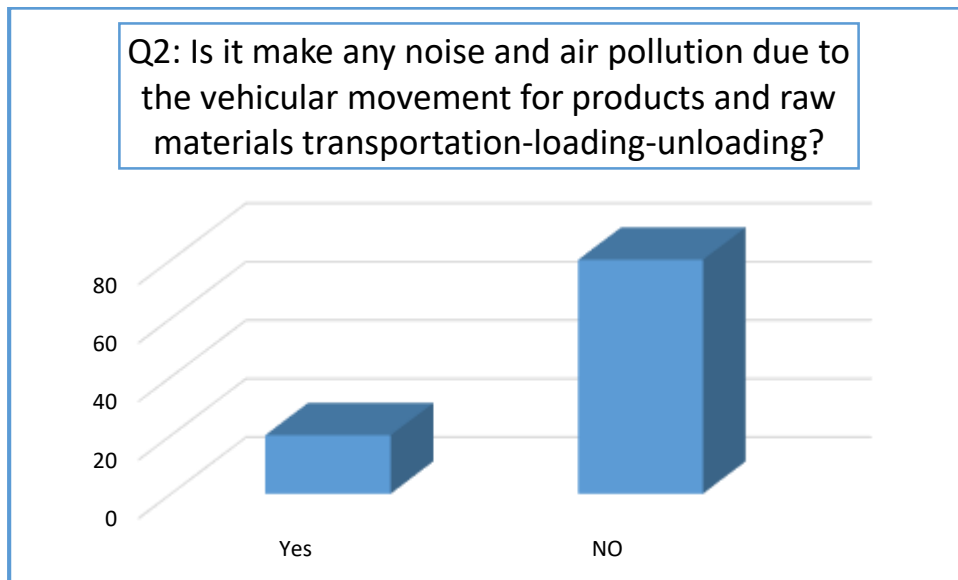


Figure 7.2: Column Chart of Q2

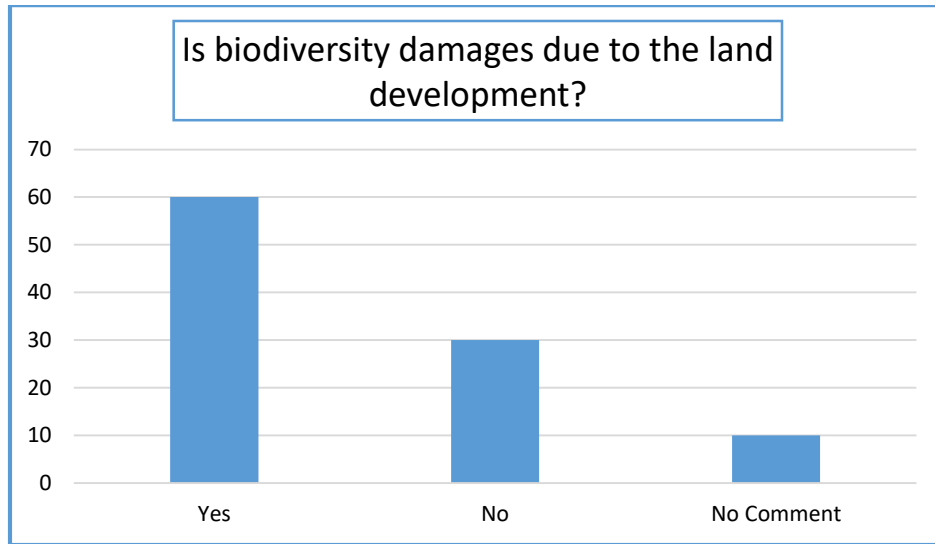


Figure 7.3: Column Chart of Q3

❖ **SOCIAL AND CULTURAL**

Impacts on social and cultural environment of the land development project are incorporated in this section of questionnaire survey. Respondent discloses their opinion based on negative and positive impact of the project on local communities.

The question was “Is there any positive impact of the project on local communities?” Figure 7 exhibits the response of people considering the positive impact of the project. 43 % respondent identified the increasing level of income due to this project, 16 % said increasing of business and 30 % claimed the increasing scenario of local people’s employment. Most importantly, 11 % respondent mentioned anti-terrorism as a positive impact of the project.

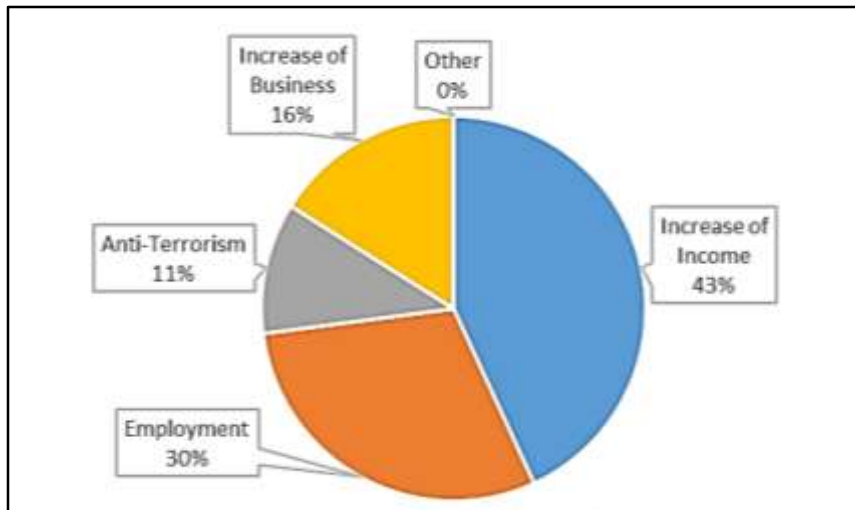


Figure 7.4: Positive Impact of the Project

❖ HEALTH AND SAFETY

Health and safety of working people and local people near the project area, is a great concern. Therefore, this questionnaire survey included disease profile, expense for disease, sufficient medical support and any other hassle occurred due to the project establishment. The Figure 10 was plotted regarding these four mentioned points and response of peoples are presented in the same. Disease profile Said that people are suffering from fever, cough, diarrhoea and asthma. 59 % of respondent mentioned suffering common fever is major concern and 12 % mentioned suffering from cough. In response to the monthly or yearly expense for disease, 71 % people said they expense 500 to 1000 Tk while 29 % claimed 1000 to 5000 Tk. Third consideration of this section was sufficient or adequate medical support in the project area. There are 88 % respondent found to be satisfied with proposed factory only the 6 % disagreed and another 6 % people found to avoid this question. The last asking was regarding any kind of hassle or fight occurring due to the project. In response to this specific question, 41 % respondent said that they are experiencing hassle while 24 % said no and another 35 % people mentioned other issues relating to this segment.

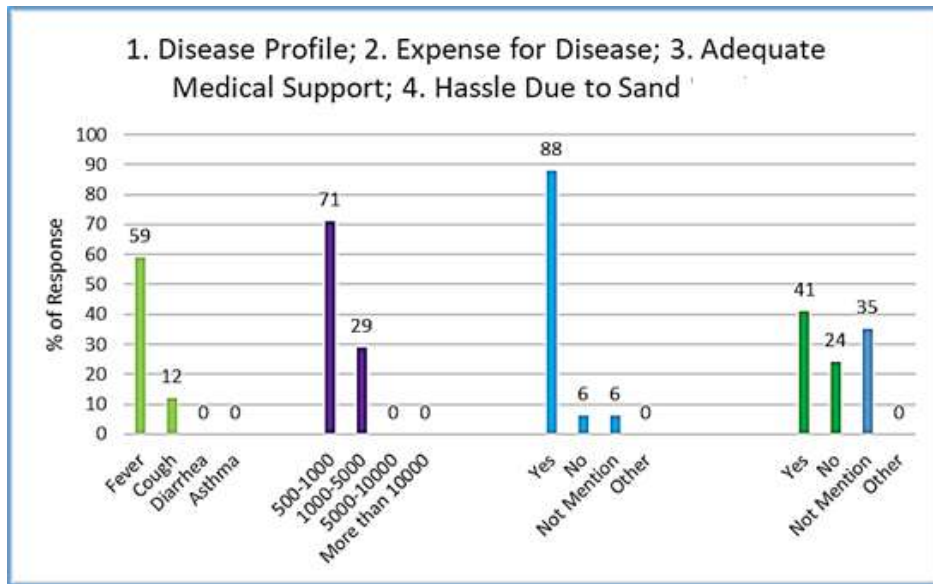


Figure 7.5: Disease Profile; Expense for Disease; Adequate Medical Support; Hassle Due to Sand Filling on local community

❖ **ECONOMIC AND FISCAL**

Economic and fiscal issues are incorporated in this section where three specified segments are mentioned. The segments are economic benefit of local people for the project, threatening the present economy of the local people and incremental employment due to increasing of civilization. The economic benefit of local people due to the project is presented in Figure 7.6 where all the participated people left their opinion as “Yes” which reflects the economic benefit of local people.

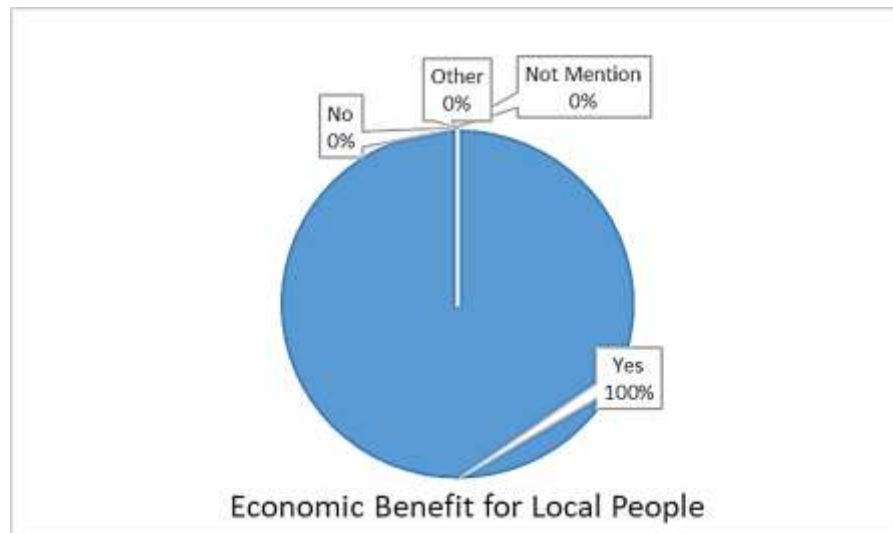


Figure 7.6: Economic Benefit for Local People

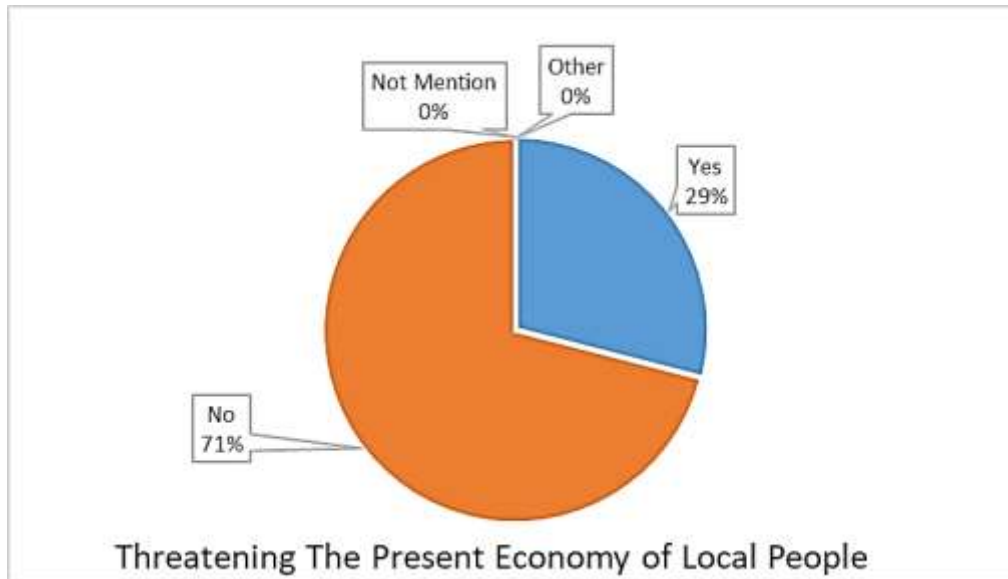


Figure 7.7: Threatening the Present Economy of Local People

The response of people regarding threats to present economy of local community is presented in Figure 12. There are 71 % respondent said that there is no threatening towards their present economy while 29 % responded as “yes”. The last consideration of this section was about incremental employment due to increasing sand mining. Figure 13 presents the response of people regarding this specific matter. There are 100 % of total respondent agreed that they are experiencing incremental employment due to increasing sand mining.

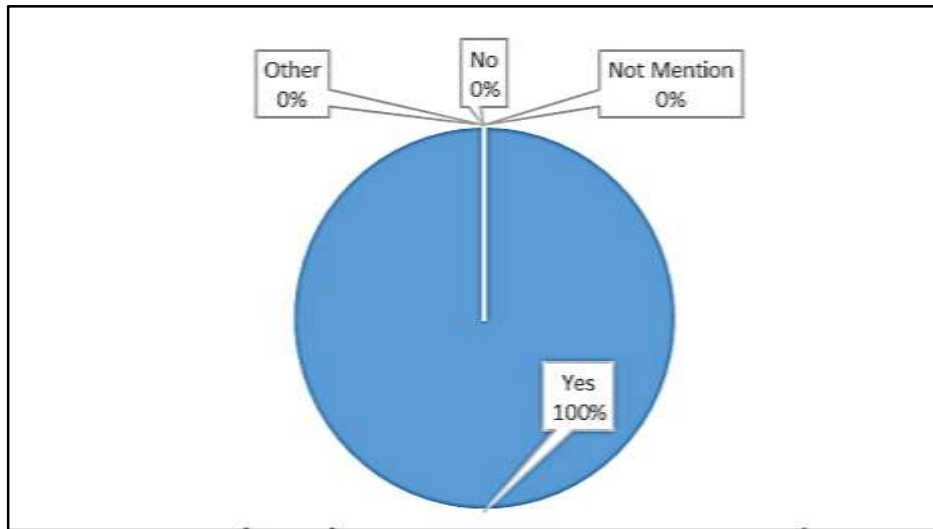


Figure 7.8: Incremental Employment Due to Increasing Sand Filling

The list of the people attend in the FD and Questionnaire survey is given in the Annexure.

CHAPTER EIGHT**MITIGATION MEASURES OF ADVERSE IMPACTS****8.1 MITIGATION MEASURES OF ADVERSE IMPACTS DURING THE CONSTRUCTION PHASE**

The mitigation Measures of Adverse Impact during the Construction Phase of the Project is Given in the Following Table.

Table 8.1: Anticipated Construction Phase Impacts and Mitigation Measures

S.N.	Anticipated Adverse Impacts	Possible Mitigation Measures
1	Land acquisition and social disturbance	<ul style="list-style-type: none"> • Acquire land through transparent negotiation at fair market value. • Avoid displacement of vulnerable households. • Maintain access roads for local communities during construction.
2	Dust generation from earthwork and material handling	<ul style="list-style-type: none"> • Regular water sprinkling on exposed soil and haul roads. • Cover sand, cement, and fine materials during transport. • Avoid on-site crushing of materials.
3	Noise and vibration from construction machinery	<ul style="list-style-type: none"> • Restrict noisy activities to daytime only. • Maintain machinery to reduce excessive noise. • Provide ear protection to workers.
4	Surface water contamination from runoff	<ul style="list-style-type: none"> • Construct temporary drainage and sediment traps. • Store fuel, oil, and chemicals in paved and bonded areas.

S.N.	Anticipated Adverse Impacts	Possible Mitigation Measures
		<ul style="list-style-type: none"> • Prevent discharge of untreated wastewater to nearby water bodies.
5	Construction solid waste and debris	<ul style="list-style-type: none"> • Segregate reusable and non-reusable materials. • Dispose debris at designated sites approved by local authority. • Prohibit open burning of waste.
6	Groundwater abstraction for construction	<ul style="list-style-type: none"> • Minimize groundwater use. • Avoid over-extraction; monitor usage.
7	Worker health and safety risks	<ul style="list-style-type: none"> • Mandatory PPE (helmet, gloves, boots, masks). • Provide first aid facilities and trained personnel. • Ensure safe scaffolding and electrical connections.
8	Labor camp wastewater generation	<ul style="list-style-type: none"> • Provide temporary septic tank and soak pit. • Ensure proper sanitation facilities.
9	Traffic congestion and accident risk	<ul style="list-style-type: none"> • Schedule material transport during off-peak hours. • Use trained drivers and maintain vehicles properly.

8.2 MITIGATION MEASURE OF ADVERSE IMPACTS DURING THE OPERATIONAL PHASE

This section is critical due to lead handling, sulphuric acid use, air emissions, and hazardous waste generation. The mitigation measures in the operational period is given in the following.

Table 8.2: Anticipated Construction Phase Impacts and Mitigation Measures

S.N.	Anticipated Adverse Impacts	Mitigation Measures
1	Lead dust emission from plate manufacturing and pasting section	<ul style="list-style-type: none"> • Install bag filter / dust collection system in lead oxide and grid casting sections (include in APCS). • Maintain negative pressure in production areas. • Regular housekeeping and vacuum cleaning (no dry sweeping).
2	Acid mist emission from battery formation and electrolyte filling	<ul style="list-style-type: none"> • Install acid mist scrubber system (include in APCS). • Provide proper ventilation system. • Use corrosion-resistant ducts and stacks.
3	Wastewater containing low pH and lead contamination	<ul style="list-style-type: none"> • Install Effluent Treatment Plant (ETP) including neutralization, coagulation-flocculation, sedimentation, and filtration. • Maintain final discharge pH 6–9. • Ensure treated effluent complies with ECR 2023 standards.
4	Hazardous sludge generation (lead-bearing sludge)	<ul style="list-style-type: none"> • Dewater sludge using filter press. • Store in hazardous waste storage area with concrete floor and roof. • Send to authorized lead recycler or smelter.
5	Acid spillage risk	<ul style="list-style-type: none"> • Provide acid-resistant flooring. • Install spill containment bunds in electrolyte storage area. • Emergency neutralization using lime/alkali.
6	Solid waste such as rejected plates, lead scrap	<ul style="list-style-type: none"> • Recycle internally in smelting process. • Maintain proper inventory of lead materials.
7	Occupational lead exposure	<ul style="list-style-type: none"> • Mandatory PPE (respirator, gloves, apron, safety goggles).

S.N.	Anticipated Adverse Impacts	Mitigation Measures
		<ul style="list-style-type: none"> • Periodic blood lead level monitoring of workers. • Separate clean and contaminated zones. • Provide shower and change room facility.
8	Noise from machinery	<ul style="list-style-type: none"> • Install vibration pads under heavy equipment. • Provide ear protection.
9	Fire and explosion risk (battery charging area)	<ul style="list-style-type: none"> • Ensure adequate ventilation to prevent hydrogen gas accumulation. • Install gas detectors and fire extinguishers (CO₂ / dry chemical). • No smoking policy inside plant.
10	Storm water contamination	<ul style="list-style-type: none"> • Separate storm water drainage from industrial drainage. • Avoid mixing contaminated water with rainwater.

CHAPTER NINE**ENVIRONMENTAL MANAGEMENT & MONITORING PLAN****9.1 ENVIRONMENTAL MANAGEMENT PLAN AND ITS IMPLEMENTATION**

In the context of a project, an Environmental Management Plan (EMP) is concerned with the implementation of the measures necessary to minimize or offset adverse impacts and to enhance beneficial impacts. All the measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh.

Potential impacts will be associated with the operation of the existing facilities that can be identified in the foregoing section. The following management plans will have been proposed only for managing the environmental situations arising from the operation of the facilities. Since occupational health hazards & emergencies, air, water & aquatic, and solid waste are the major environmental concerns, only the following management plan will be proposed here, and it will be implemented by the management of the organization.

- Emission Control and Management Plan (ECMP)
- Water and Wastewater Management Plan (WWMP)
- Solid Waste Management Plan (SWMP)
- Noise Management Plan (NMP)
- Occupational Health & Safety Management Plan (OHSMP)
- Fire & Emergency Management Plan (FEMP)
- Disaster Management Plan

9.2 EMISSION CONTROL AND MANAGEMENT PLAN (ECMP)

For **Xinyuan Storage Limited**, air emission is the most significant environmental concern due to lead processing and electrolyte handling operations. The objective of the **Emission Control and Management Plan (ECMP)** is to ensure that emissions such as sulfur dioxide (SO₂), acid mist, particulate matter (including lead particles), and other greenhouse gases remain within the

permissible limits set by national environmental standards. Major emission sources include acid fumes from the battery charging and formation sections, lead fumes from grid casting and melting operations, exhaust from diesel generators, and fugitive dust from material handling and packing processes. To control these emissions, the factory will install appropriate **air pollution control systems** such as acid mist scrubbers, bag filters, and proper ventilation systems. Stack height will be maintained as per regulatory requirements, and all fuel-fired equipment will be regularly maintained to minimize SO₂ and GHG emissions. Continuous on-site air quality monitoring, routine inspection of pollution control devices, strict housekeeping practices, and compliance with licensing conditions will ensure effective air emission management and protection of the surrounding environment. The actions will take by the project authority during both construction and operation phase is given below.

Air Pollution and Dust Control Plan

Construction Stage

Operation Stage

Crashing machine will be tried to avoid and alternative time scheduling maintain.	# It will be provided proper canopy and enclose the generator room.
It will be bought stone and brick chips instead of breaking it at the site.	# Stakeholders encourages doing not burn trash.
Water will sprinkle twice a day to minimize the dust pollution.	# Several numbers of Exhaust Fan and points for air temperature control and fresh air enter the factory will provide.
Enclose the construction site.	# Sprinkle of water before sweep the premises or floors (if anytime).
Cover the all materials and chemicals at the site.	# Operate 24/7 day operation of APCS.
Unfit vehicle will not allow to enter at the site	# The detail of APCS is given in the annexure and lay out plan is given in the following Figure 6.1.

9.3 WATER AND WASTEWATER MANAGEMENT PLAN (WWMP)

The Water and Wastewater Management Plan (WWMP) aims to ensure sustainable water use, prevent contamination of surface and groundwater, and maintain full compliance with national environmental standards (ECR 2023). As the factory handles sulfuric acid and lead-containing materials, wastewater management is a critical environmental safeguard.

Water will be used mainly for electrolyte preparation, plate washing, floor cleaning, cooling, domestic purposes, and limited utility services. The followings are the sources of the wastewater generation:

- Acid spillage and electrolyte handling areas
- Plate washing and formation sections
- Floor wash from lead-handling areas
- Equipment cleaning
- Domestic wastewater from sanitary facilities

The management plan has been presented below.

Effluent and Wastewater Management Plan

Construction Stage

- # The site will be enclosed with a corrugated sheet or in another way.
- # Workers will be instructed to use minimum water and spoilage.
- # Solids from used lead battery is crashed and chips are use to extract lead. After that, the solids they sold to the third party after a period.
- # Proper drainage system has been undertaken in the project to drainage wastewater and runoff.
- # Proper storage of cement, sand, and chemicals.

Operation Stage

- # The number of septic tanks and soak-wells has been considered to manage sewage treatment.
- # Encourage the use of minimum water and wastage of water.
- # Install an ETP before going to the production. Recruit several ETP operators and in-charge, provide training to them, and ensure proper operation of the ETP.
- # Maintain a water balance chart to monitor daily consumption.
- # Prevent leakage in pipelines through routine inspection and maintenance.

9.4 SOLID WASTE MANAGEMENT PLAN (SWMP)

The Solid Waste Management Plan (SWMP) is designed to ensure the safe handling, storage, recycling, and disposal of solid wastes generated during construction and operation of the battery manufacturing facility. As the plant handles lead and sulfuric acid, particular emphasis is given to hazardous waste management to prevent soil, water, and air contamination. The source of dust in the factory is given below.

- Lead scrap and rejected plates
- Lead oxide dust from bag filters
- ETP sludge containing lead
- Acid-contaminated absorbents and cleaning materials
- Used filters and PPE contaminated with lead

The management plan is given in the following.

Solid Waste Management Plan

Construction Stage

- # It will be provided required number of dustbin(s) at the site to throw garbage and other trash.
- # Personnel and workers will be instructed to ‘do not throw any waste anywhere except bin(s).’
- # Arrangement of the aliment (meal) will be away from the site.
- # All bins will be covered.
- # Debris and construction materials will be deposited in a safe and distant place from the roadside and construction site.

Operation Stage

- # The authority will raise awareness among the stakeholders to use the dust bins. Dust bin will be covered.
- # Solid waste from ETP in the form of sludge will be burnt in the furnace for extracting of lead so far.
- # Solid dust from APCS will store and use again for its managed according to the sludge management guideline. # Regularly sweep the floors and premises with your own sweeper.

9.5 NOISE MANAGEMENT PLAN

The management of noise in the factory is given in the following.

Noise Control/Management Plan

<u>Construction Stage</u>	<u>Operation Stage</u>
Use low noise generating machineries	Canopying the generator (Room lamination)
Enclose the site	
Using ready mix concrete instead of concrete mixing in the site.	Internal traffic system controlling Use PPE for worker (who involve in high noise generating area)

9.6 OCCUPATIONAL HEALTH & SAFETY MANAGEMENT PLAN

Occupational health and safety is a worldwide concern nowadays. Every industry should give the highest importance to occupational health and safety. The worth of life cannot be measured by price. According to the World Health Organization (WHO), "Occupational health deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards." It is the multidisciplinary field of safety, health, and welfare. The project will face emergency situations like fire, natural calamities, accidents, etc. All these situations and general production-related activities need some measures for health and safety issues.

Occupational Health & Safety Management Plan

<u>Construction Stage</u>	<u>Operation Stage</u>
# All workers are obliged to use PPE's.	# Provide proper sanitation facilities among the stakeholders.
# All personnel and engineers also obliged to use PPE's when they enter the site.	# Follow the environmental management plans for all of the aspects described in this chapter.
# Proper coverage and enclose the site.	
# The project authority will provide compensation the injured workers.	
# It will be recruited a required numbers of safety inspector.	
# It will provide proper sanitation for all workers and related people.	

9.7 FIRE & EMERGENCY MANAGEMENT PLAN (FEMP)

If a small fire cannot be extinguished with the use of a portable extinguisher or a fixed extinguishing system, or the smoke presents a hazard to the operator, then leave the fire area, ensure the fire department has been notified, and wait in a safe area for the fire department. Attempting to extinguish a fire is a voluntary act. Only persons who are properly trained and feel confident in the use of a portable extinguisher should contemplate their use. Improper use of a portable extinguisher can lead to severe injury or death. The Fire Management Plan of the Factory is Given in the Following.

Fire Safety and Management Plan

Construction Stage

In case of fire, there is sand and water has been kept available at the site. The fire safety and civil defence address and number keep in the project authority and respondent.

Extra surveillance provides for the combustible materials and fire.

Regular inspection of the site.

It will be discouraged to any combustible work at the site.

Operation Stage

Numbers of portable fire extinguishers will be provided.

Discourage stakeholders to any combustible work.

The contact number of fire safety and civil defence will be hanged on the wall where easily it will be visible to the stakeholders.

Number of fire safety measures will be taken in each development functions. These measures include hose pipes, fire alarms, storage.

9.8 DISASTER MANAGEMENT PLAN

In order to facilitate effective emergency preparedness and response, a complete Disaster Management Program should be established. This will include training programs for staff members and volunteers, installation and maintenance of emergency equipment, and instituting a command centre.

The authorities of Xinyuan Storage Limited will arrange different training and awareness programs for the respective groups of employees. Training programs may be arranged regarding waste management, case studies, disaster risk management, factory safety, etc. Such programs indeed will make the employees more resourceful and active. The compliance department of the factory will arrange the program periodically.

The detail of the ETP and APCS is given in the Annexure

CHAPTER TEN**MONITORING AND FOLLOW-UP PLAN****10.1 ENVIRONMENTAL MONITORING PLAN**

During the monitoring phase, the proposed mitigation/enhancement measures are monitored to see whether they are working well. Under this monitoring plan, different types of monitoring works, such as Water Pollution, Air Pollution, Noise pollution, etc., will be monitored periodically to measure the pollution level of the specified location within the project and the surrounding area. The main objective of environmental monitoring is to detect impacts in the early phase of project activity to provide adequate corrective action before it is too late. Other objectives of monitoring are to provide feedback on the accuracy of impact prediction, effectiveness of mitigation measures and provide guidance for readjustments during project implementation and operation. Environmental monitoring thus helps to ensure the effectiveness of environmental mitigation measures, compliance with environmental standards, and to facilitate changes required in project design and operation. According to the monitoring data, improved and further mitigation measures may be needed for more effective maintenance and control of pollution levels within the DoE recommended level.

10.2 OBJECTIVES OF MONITORING PROGRAM

The main objective of environmental monitoring is to detect impact in the early phase of project activity in order to provide adequate corrective actions before it is too late. Other objectives of monitoring are to provide feedback on the accuracy of impact prediction, effectiveness of mitigation measures and provide guidance for readjustments during project implementation and operation. Environmental monitoring thus helps to ensure the effectiveness of environmental mitigation measures, compliance with environmental standards and to facilitate on changes required in project design and operation.

10.3 MONITORING REQUIREMENT

- ✓ Environmental monitoring is an essential tool in relation to environmental management as it provides the basic information for rational management decisions. The prime objectives of monitoring are:
 - ✓ To check whether mitigation and benefit enhancement measures are actually being adopted and are providing effective results in practice.
 - ✓ To provide a means whereby impacts which were subject to uncertainty at the time of preparation of the EIA, or which were unforeseen, can be identified, and steps to be taken to adopt appropriate control measures.
 - ✓ To provide information on the actual nature and extent of key impacts and the effectiveness of the mitigation measures, which, through a feedback mechanism, can be taken into account in the planning and execution of similar projects in the future.
 - ✓ Monitoring the environmental condition in a two-way manner. One he/she can physically observe or check different activities, another way is the measurement of different parameters in the prescribed method.
- Visual observation or checking, coupled with inquiries, Physical measurement of selected parameters

10.4 MONITORING INDICATORS AND FREQUENCY

Environmental monitoring requires set of indicators that could be conveniently measured, assessed and evaluated periodically to observe the trends of change in base line environmental quality. The following indicators and schedule will be monitoring.

Table 10.1: The Monitoring Indicator and Schedule

S.N.	Sector / Component	Monitoring Parameters	Method / Instrument	Location	Frequency	Responsibility
1	Effluent Treatment Plant (ETP)	pH	pH meter	Inlet & Outlet	Daily	ETP Operator/In-Charge
		Flow rate	Flow meter	Outlet	Daily	ETP Operator/In-Charge
		TSS	Laboratory analysis	Outlet	Weekly	ETP Operator/In-Charge
		BOD	Laboratory analysis	Outlet	Monthly	ETP Operator/In-Charge
		COD	Laboratory analysis	Outlet	Monthly	ETP Operator/In-Charge
		Lead (Pb)	AAS / Lab analysis	Outlet	Monthly	ETP Operator/In-Charge
		Sludge quantity	Record keeping	Sludge storage area	Monthly	ETP Operator/In-Charge
2	Air Pollution Control System (APCS) (Bag Filter, Scrubber)	Particulate Matter (PM)	Stack monitoring kit	Stack outlet	Half Yearly	APCS Operator/In-Charge
		Lead (Pb) in emission	Stack sampling	Stack outlet	Half Yearly	APCS Operator/In-Charge
		Sox, NOx, CO ₂ , CO etc.	Stack monitoring	Stack outlet	Half Yearly	APCS Operator/In-Charge
		Pressure drop across bag filter	Gauge reading	APCS unit	Weekly	Maintenance Team
		Scrubber pH	pH meter	Scrubber tank	Daily	Operator

S.N.	Sector / Component	Monitoring Parameters	Method / Instrument	Location	Frequency	Responsibility
3	Ambient Air Quality	PM _{2.5} , PM ₁₀	Air sampler	Plant boundary (4 sides)	Quarterly	APCS Operator/In-Charge
		Lead (Pb)	Air sampler	Plant boundary	Quarterly	APCS Operator/In-Charge
		SO ₂ , NO _x	Gas analyzer	Plant boundary	Quarterly	APCS Operator/In-Charge
4	Workplace Air Quality	Lead dust concentration	Personal air sampler	Production floor	Quarterly	APCS Operator/In-Charge
		Acid mist	Air sampling	Charging section	Quarterly	APCS Operator/In-Charge
5	Noise Level	dB(A)	Sound level meter	Production area & boundary	Quarterly	EHS Officer
6	Drinking Water Treatment Plant	pH	pH meter	Drinking water outlet	Monthly	Lab Technician
		TDS	TDS meter	Outlet	Monthly	Lab Technician
		Microbiological parameters	Lab test	Outlet	Quarterly	Approved Lab
7	Occupational Health	Blood Lead Level (BLL)	Medical test	Lead-handling workers	Every 6 months	Authorized Medical Facility
		PPE compliance	Inspection checklist	Production floor	Daily	Safety Officer

CHAPTER ELEVEN**ALTERNATIVES TO REDUCE NEGATIVE IMPACTS AND REDRESS GRIEVANCE
METHODS****11.1 ALTERNATIVES TO REDUCE NEGATIVE IMPACTS**

For Xinyuan Storage Limited, alternatives to reduce negative environmental impacts were considered during project planning, technology selection, and operational design. Since lead-acid battery manufacturing involves handling of lead compounds and sulfuric acid, priority has been given to cleaner production techniques and pollution prevention at source rather than relying only on end-of-pipe treatment. The alternative plans are brief as follows.

11.1.1 ALTERNATIVE SITE CONSIDERATION

The selected site is located in an industrial-compatible area with adequate road access and sufficient buffer distance from dense residential settlements. Alternative locations closer to residential zones were avoided to minimize potential exposure to airborne lead, acid mist, and industrial noise.

11.1.2. ALTERNATIVE TECHNOLOGY AND PROCESS SELECTION

- Adoption of semi-automated grid casting and pasting systems to reduce manual handling and fugitive lead dust.
- Installation of closed lead oxide transfer systems instead of open material handling.
- Use of high-efficiency bag filters and wet scrubbers rather than simple exhaust systems to significantly reduce particulate and acid mist emissions.
- Provision of neutralization-based ETP with chemical precipitation for lead removal instead of direct discharge.

11.1.3. ALTERNATIVE FUEL AND ENERGY OPTIONS

- Use of low-sulfur fuel for generators to minimize SO₂ emissions.
- Energy-efficient motors and equipment to reduce greenhouse gas emissions.
- Consideration of rooftop solar panels for partial energy demand reduction.

11.1.4. ALTERNATIVE WASTE MANAGEMENT APPROACH

- Internal recycling of lead scrap instead of external disposal.
- Dewatering of sludge using filter press to reduce volume before safe disposal.
- Segregated drainage system to prevent contamination of storm water.

11.1.5. ALTERNATIVE WATER MANAGEMENT OPTIONS

- Reuse of treated wastewater for non-process applications.
- Minimization of floor washing through dry cleaning and vacuum systems.

11.1.6. GREEN BUFFER ALTERNATIVE

Development of a multi-layer green belt to act as a natural air pollution barrier instead of relying solely on mechanical control systems.

Through these alternatives, the project has prioritized pollution prevention, resource efficiency, occupational safety, and regulatory compliance. The selected options represent the most environmentally feasible and technically practical solutions for minimizing negative impacts while maintaining operational efficiency.

11.2 ZERO DISCHARGE AND 3R PLAN

Xinyuan Storage Limited will implement a Zero Discharge approach through proper design and operation of the Effluent Treatment Plant (ETP), as no separate STP is required due to limited manpower for the facility. The objective is to ensure that no untreated industrial wastewater is released into the surrounding environment and that treated water is reused to the maximum extent feasible within the premises.

All industrial wastewater generated from plate washing, floor cleaning, electrolyte handling areas, and equipment washing will be collected through a segregated drainage network and directed to the ETP. The treatment process will include neutralization, chemical precipitation for lead removal, coagulation–flocculation, sedimentation, and filtration. The treated effluent will be monitored regularly to ensure compliance with national discharge standards.

To achieve practical zero discharge:

- Treated water will be reused for floor washing, charging section, and other non-contact applications.
- Storm water and industrial wastewater will be strictly separated.
- Acid spills will be neutralized at source to prevent excess loading on the ETP (if possible).
- Sludge generated from the ETP will be dewatered and stored safely as hazardous waste, preventing any secondary contamination.

Through these measures, the facility will prevent contamination of surface water, soil, and groundwater, ensuring environmentally sound operation.

3R Plan (Reduce, Reuse, Recycle)

The 3R strategy will be integrated into daily operations to minimize environmental footprint and resource consumption.

A. Reduce

- Minimize water use through controlled cleaning practices.
- Reduce lead dust generation by adopting closed material handling systems.
- Use energy-efficient machinery to reduce fuel and electricity consumption.
- Optimize raw material use to minimize scrap generation.

B. Reuse

- Reuse treated ETP water for internal non-process activities.
- Reuse packaging materials where feasible.
- Reuse lead scrap internally in the production cycle.

C. Recycle

- Recycle rejected plates and lead scrap within the manufacturing process.
- Send recyclable non-hazardous waste (paper, plastic, metal) to authorized recyclers.

- Dispose of hazardous waste such as lead-bearing sludge only through approved recycling or treatment facilities.

11.3 REDRESS GRIEVANCE

The Grievance Redress Mechanism (GRM) is established to provide a transparent, accessible, and timely process for addressing concerns or complaints from local communities, workers, and other stakeholders regarding environmental, health, and safety issues related to the project. The objective is to resolve grievances efficiently, maintain good community relations, and ensure regulatory compliance.

11.3.1. SCOPE OF GRIEVANCES

The GRM will cover issues related to:

- Air emissions (dust, acid mist, odor)
- Noise and vibration
- Wastewater discharge or drainage problems
- Solid and hazardous waste management
- Occupational health and safety concerns
- Traffic and public safety issues

11.3.2. GRIEVANCE SUBMISSION PROCESS

Stakeholders may submit complaints through:

- Written application to factory management
- Complaint register maintained at the factory gate/office
- Telephone or designated contact person
- Email communication (if available)

A visible signboard will display contact details for lodging complaints.

11.3.3. GRIEVANCE HANDLING PROCEDURE

1. **Registration:** All complaints will be recorded in a Grievance Register with date, name (if provided), contact details, and nature of complaint.
2. **Acknowledgment:** The complainant will receive acknowledgment within 3 working days.
3. **Investigation:** The Environmental, Health & Safety (EHS) Officer will investigate the issue and identify corrective measures.
4. **Resolution:** Appropriate corrective action will be taken within a reasonable timeframe (typically within 7–15 working days depending on the nature of the issue).
5. **Feedback:** The complainant will be informed about the action taken.
6. **Documentation:** All records will be maintained for review by regulatory authorities.

11.3.4. MONITORING AND REPORTING

- Quarterly review of grievance records.
- Inclusion of grievance summary in environmental monitoring reports.
- Continuous improvement of environmental management practices based on feedback received.

CHAPTER TWELVE**CONCLUSION AND RECOMMENDATION**

From the EIA report, it is clear that the proposed project is associated with both positive and negative environmental and social impacts in both construction and operational phase. Xinyuan Storage Limited will follow the different guidelines that mentioned in this report. The management will follow the environmental management plan and mitigations that described. The project has some negative impacts on environment, which can overcome or minimize by ensuring mitigation measures. The main pollution will be associated with untreated wastewater discharge from the facilities.

The nature of the factory or industry type, major pollutants are lead dust or lead acid fumes as air pollutant and also as water pollutant. The effluent contains low pH and untreated effluent can make digester in the nearby crop field, wetland, water reservoir etc. That is why the proper treatment is required. The factory is constructing the 15 m³/hr and it is close loop system or full recycled in production. It should be maintained that no water out or discharge outside the factory.

Air pollution control is another important issue such factories. The factory will ensure the air pollution control system. The details of the APCS has been discussed in the above chapters.

In the bottom line, the followings shall be undertaken:

- All solid waste materials and debris resulting from construction activities shall be disposed of at approved dumpsites and according to local and international regulations.
- The proponent shall acquire all relevant approvals from relevant authorities. Before going to its full swing operation.
- All the construction materials like sand, brick and stone chips should be sourced/procured from the legalized dealers.
- Construction activities shall be undertaken only during the day.

- Once earthworks have been done, restoration of the worked areas shall be carried out immediately by backfilling, professional landscaping/levelling and planting of low grass in open areas. This will also include restoration of any quarries and borrow pits.
- Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of rubbing metal bodies.
- All the material will be covered during the construction work.
- Aerial emissions shall be controlled in the operation areas into bag houses.
- Safety measures for the worker during the both construction and operation phase of the project.
- Compliance with the existing laws and regulations shall be upheld at all times. Registrar will be maintained for the ETP.
- Canopy will be ensured for highly noise generating machineries.
- APCS should be operates/running 24 hours as production running time.
- ETP should be operate properly, maintain pH level and test daily effluent parameter daily.
- All the solid waste generated in the production process should be kept and sale to the third party or incinerate where require.
- Workers health is most risk or vulnerable in such factory. Therefore, factory management should regular health check-up and health insurance for those workers.
- The above environmental management plans shall be adopted and applied as the basis for addressing environmental and social aspects throughout the project cycle with necessary amendments as may be found appropriate. In this connection, it will be the guiding tool for future audits and monitoring exercises.

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ANNEXURE

1. Environmental Parameters Test Report
2. Public Consultancy Signature Sheet and Image
3. Factory Layout Plan
4. Details of the ETP
5. Details of the APCS

XINYUAN STORAGE LTD. Public Consultation

স্থান:

তারিখ: ২৮.০২.২০২৬

সময়: ৪.০০ পিএম

ক্রমিক	নাম/ঠিকানা ও মোবাইল নম্বর	বয়স	লিঙ্গ		স্বাক্ষর
			পুরুষ	মহিলা	
১.	আব্দুল হক আব্দুল কাদের	৬৫	✓		Abdul
২.	মোঃ কামরুল হক	৩২	✓		Kamil
৩.	মোঃ হান্নান/তামিম	৫০	✓		Hannan
৪.	মোঃ জিয়াব হোসেন	৬৫	✓		Zia
৫.	মোছাঃ সিক্কু আক্তার			✓	Sikku
৬.	মোছাঃ রুগা বেগম			✓	Ruga
৭.	মোঃ ইম্রান হোসেন		✓		Imran
৮.	রুমিয়ার খাতুন				
৯.	মোঃ ইব্রাহিম বাব্ব		✓		Ibrahim
১০.	মোছাঃ ফারজিয়া			✓	Fariha
১১.	মোঃ বাজোদ হান্নান	৩৩	✓		Bajod
১২.	লাবনী			✓	Lavni
১৩.	মোঃ মাহবুব রহমান				
১৪.	মোঃ মোস্তাফিজ হান্নান	২৮	✓		Mustafiz
১৫.	মোঃ ইকবাল হান্নান				Iqbal
১৬.	মোঃ জিমান হান্নান		✓		Jaman



XINYUAN STORAGE LTD. Public Consultation

স্থান:

তারিখ: ২৮.০২.২০২৬

সময়: ৪:৩০ পিপ্রম

ক্রমিক	নাম/ঠিকানা ও মোবাইল নম্বর	বয়স	লিঙ্গ		স্বাক্ষর
			পুরুষ	মহিলা	
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১৮	স্রো: সুপ্রভা কান্তি				স্রো: সুপ্রভা কান্তি
১৯	মোহাঃ নাসরিন			✓	নাসরিন
২০	বাস্তি		✓		বাস্তি
২১	স্রো: জুলেখা			✓	জুলেখা
২২	লিখন			✓	লিখন
২৩	স্রো: মাসুমা			✓	মাসুমা
২৪	৬ বায়েল				বায়েল
২৫	স্রো: সুমি			✓	সুমি
২৬	বায়েল				বায়েল
২৭	স্রো: স্নিগ			✓	স্নিগ

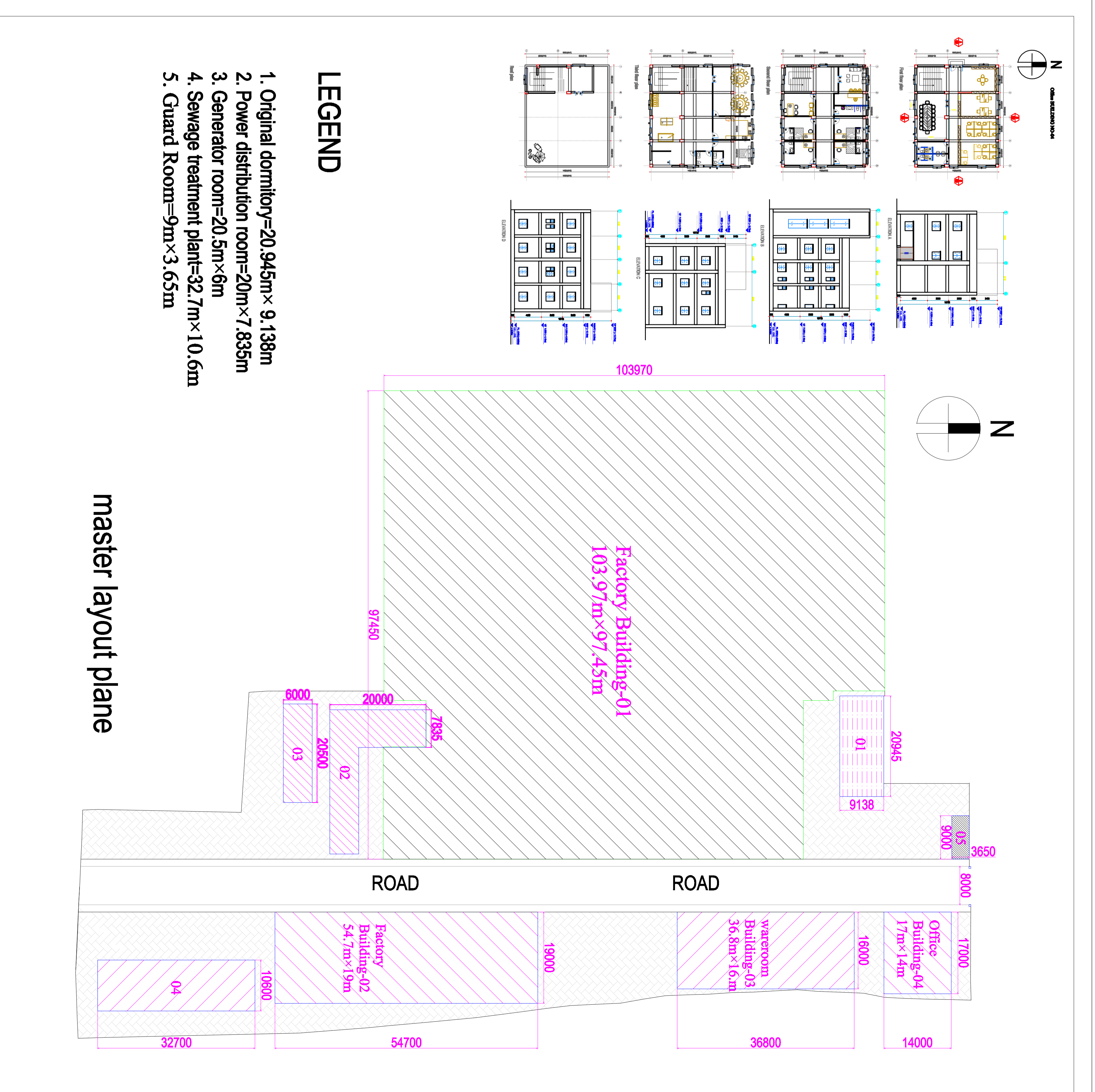
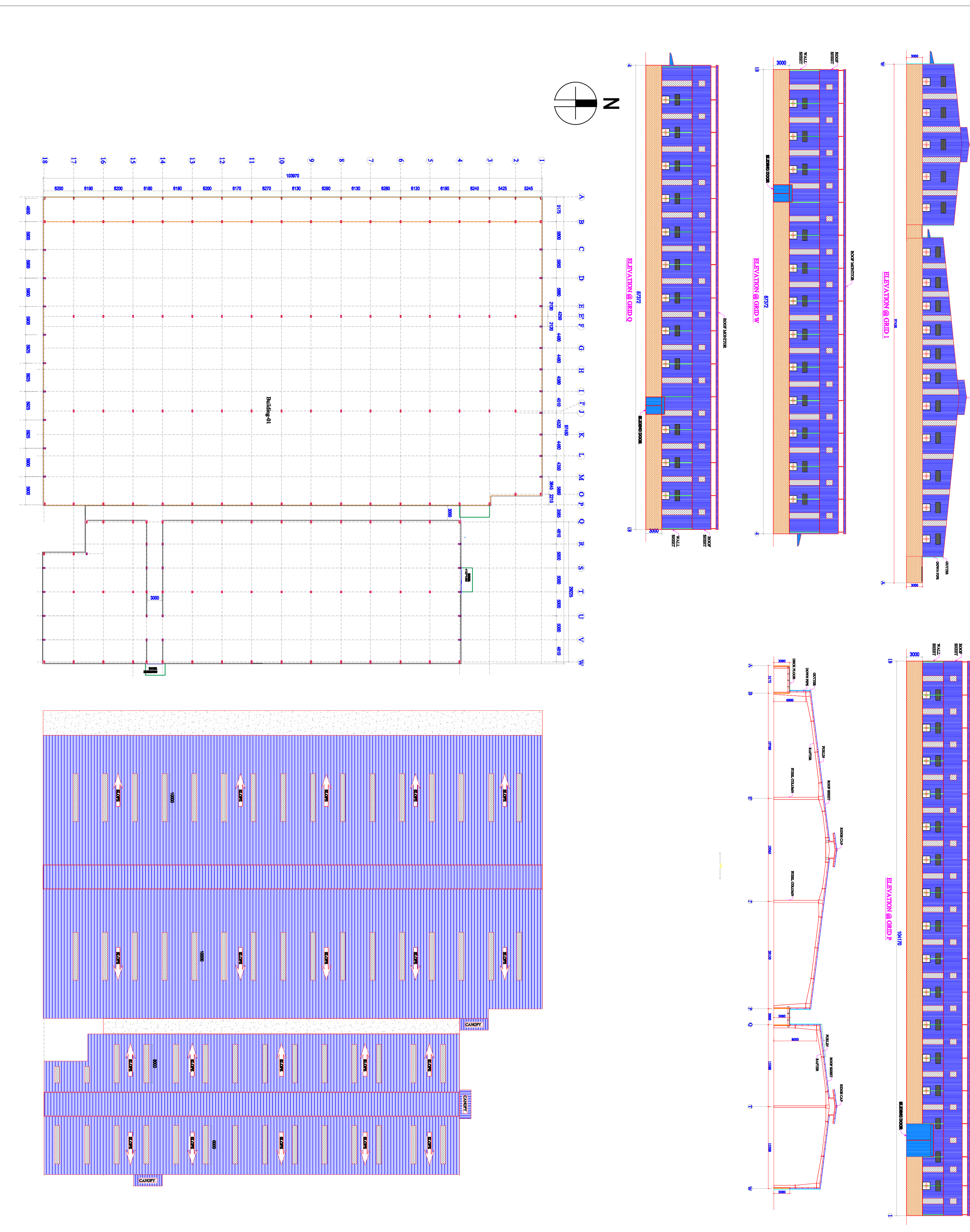
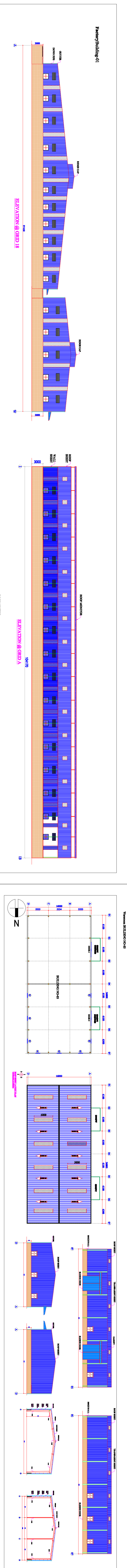
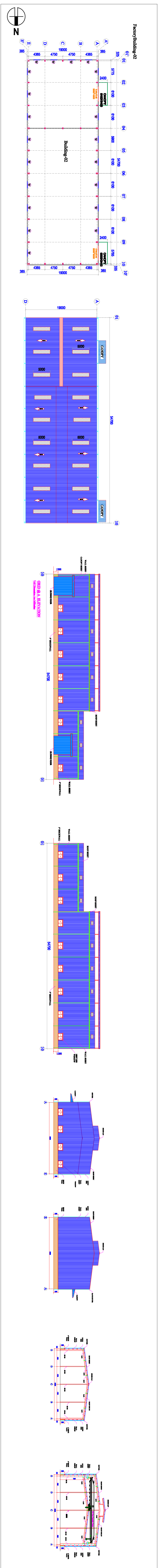




Figure: Public Consultancy



Figure: Public Consultancy



CLIENT: XINWUAN STORAGE LIMITED		DRAWING TITLE			
PROJECT NAME & LOCATION: Jessor to Khatna Highway Road, Dag No. 402, Vill: Padmabla, PO: Shakhargati, Union: Bosumdia P S, Kowali Thana, Jessor					
CONSIDERATION		DESIGN ENGINEER:			
Wind Speed	—km/hr	ENGR. MD. ZARRAN RAKIB B.Sc in CIVIL ENGG. (NSU)	CHECKED BY:		
Dead Load on Floor	Varying			MD. SHAHEDUZZAMAN B.Sc. ENGG. CIVIL (CUET) MHFB-39192	
Live Load on Roof	Varying				
Live Load on Roof	— Psf				
Exposure	—				
DRAWN BY:		REVISION No.			
MITHUN CHANDRA DAS		Submission No.			
SCALE		Sheet No.			
Not to scale					
DATE					
04-07-2025					
		SHUNFENG MACHINERY INDUSTRY CO. LTD. Green Orlando, (5th Floor) 42/4, Progati Shartam, Baridhara Dhaka -1212, Bangladesh.			

XINYUAN STORAGE LIMITED
LEAD ACID BATTERY PROJECT

RE-CYCLE ETP DESIGN CALCULATION & DRAWING,
CAPACITY -15m³/H

**PROJECT LOCATION: PADMABILA, SHAKHARIGATI, BASHUNDIA,
SADAR, JASHORE., JESSORE SADAR, JASHORE, BANGLADESH**

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XINYUAN STORAGE LIMITED

WATER CONSUMPTION IN THE MANUFACTURE OF LEAD ACID BATTERY

Lead acid battery manufacturing includes following sections which will have sewage.

1. lead plaster Section. Factory will use lead powder and sulfuric acid to make lead plaster; there will be some cooling water for sulfuric acid mixing.
2. Plate pasting Section.
3. Plate formation section. Production will use cooling water.
4. Factory clean water & other sections.

The follow form shows the total sewage consumption when factory become maximum production quantity.

SL.	Name of section	No. of Machine/Section	Total water Consumption m3/(Daily)
1	Lead plaster Section	1	0.5 m3
2	Plate pasting Section	1	1.5 m3
3	Plate formation section.	40	150m3
4	Factory cleaning water & other sections	-----	6 m3
Total Sewage consumption			158 m3

So, Total amount of wastewater = $158\text{m}^3/\text{Day} = 6.583\text{m}^3/\text{hr}$.

We should maintenance the ETP regularly, so with safety margin, we have ensured $15\text{m}^3/\text{hr}$. and $360\text{m}^3/\text{day}$ flow rate of the present recycle ETP Capacity.

The ETP will run on **acid-base neutralization, coagulating sedimentation and depth filtration process** and will comprise of equipment's that have 100% recyclable in toilet flushing, gardening & process (zero discharge) facility.

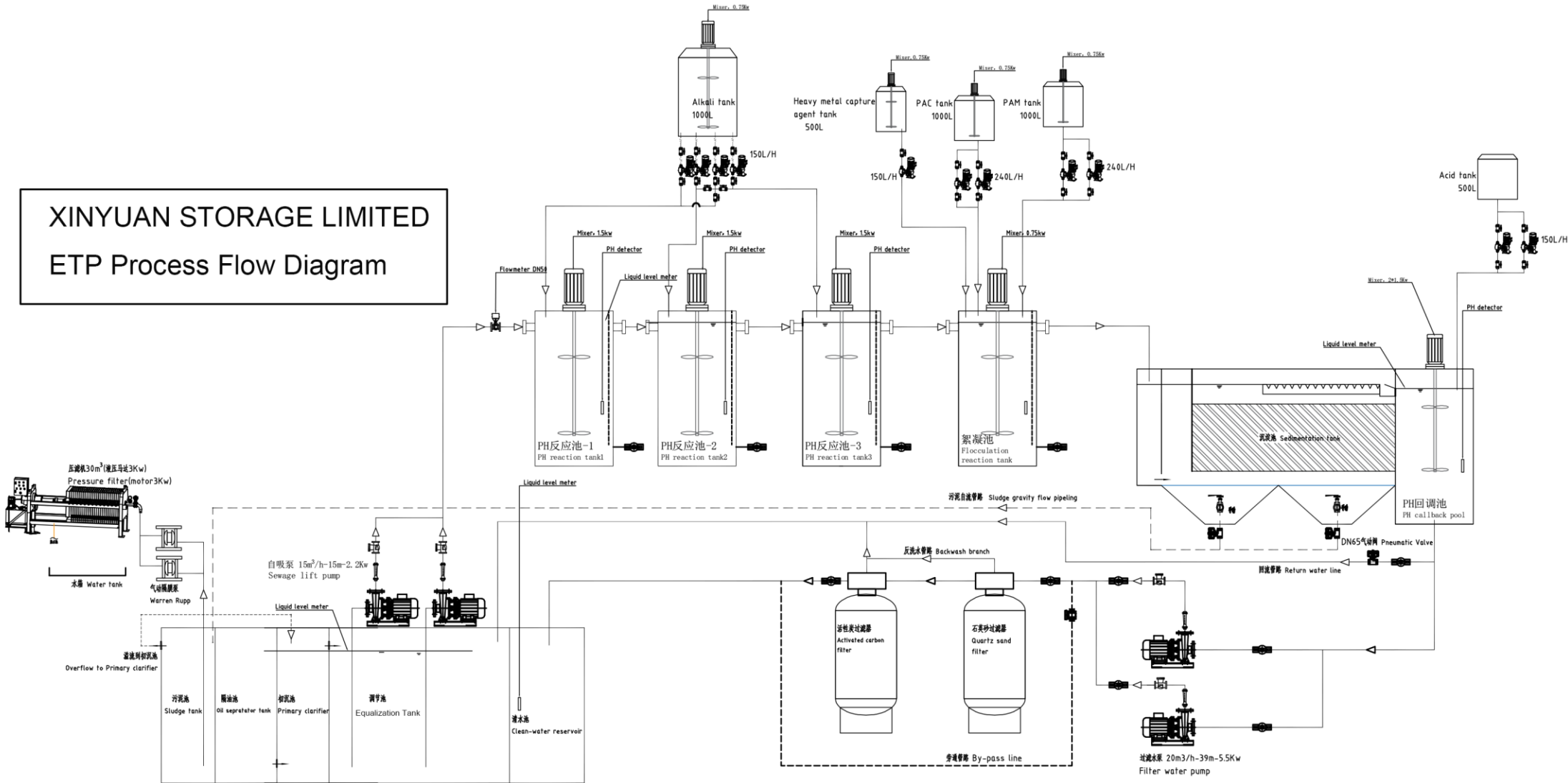
As per ECR'2023 Bangladesh Standard for Waste Water from Lead Acid Battery Manufacturing Industry, discharging to inland surface water is as following :

PH	TSS (mg/L)	Lead (mg/L)
6.5-8.5	50	0.1

The treated effluent water of course complies with the standards stated by the Bangladesh Department of Environment.

The process flow diagram is in next page.

XINYUAN STORAGE LIMITED ETP Process Flow Diagram



钢筋混凝土池
Reinforced concrete sewage Pool

XINYUAN STORAGE LIMITED

**RE-CYCLE EFFLUENT TREATMENT PLANT (ETP),
Capacity-15m³/h**

TANK SIZE, VOLUME, HRT

SN.	Name of Tank	Dimension	Volume of Water(m ³)	Retention Time (Hours)
1	Oil separator tank	10X4X3meters	120 m ³	8hours
2	Primary clarifier tank	10X6X3meters	180 m ³	12hours
3	Equalization tank	10x10x3meters	300 m ³	20hours
4	pH reaction tank -1			
	pH reaction tank -2			
	pH reaction tank -3			
5	Flocculation reaction tank			
6	Sedimentation tank			
7	pH callback-pool			
8	Quartz sand filter			
9	Activated carbon filter			
10	Sludge tank	----	60 m ³	
11	Clean water reservoir	----	240 m ³	16hours

XINYUAN STORAGE LIMITED
DESIGN DESCRIPTION & CALCULATION FOR ETP-
Capacity-15m³/h

1. Oil separator tank

The raw sewage from different places in the factory will flow into the oil separator tank through drains. The sewage will flow into the oil separator tank from **the top inlet mouth** and flow out from the bottom outlet mouth. Due to the low density of oily components in sewage, the oily components will be intercepted when the sewage flows out from the bottom outlet mouth. We will regularly clean it and handle it properly.

Design calculation for **Oil separator tank**:

Sewage influent flow, $Q=6.583\text{m}^3/\text{hr} = 158\text{m}^3/\text{Day}$

The retention time is taken as 8 hours, then volume of **Oil separator tank** should be no less than $6.583\text{m}^3/\text{hr} \times 8\text{hours} = 52.664 \text{ m}^3$.

Including safety factor, the volume of Oil separator tank is 120 m^3 in our design, so the design is satisfactory.

2. Primary clarifier tank

The primary clarifier tank is used to intercept solid substances with density heavier than water and a larger particle size in sewage. The primary clarifier tank size is very big so that water flow inside is slow and solid components with high density and large particle size

precipitate in the tank due to slow water flow. The rest sewage will flow into next process.

Design calculation for **Primary clarifier tank:**

Sewage influent flow, $Q=6.583\text{m}^3/\text{hr.}= 158\text{m}^3/\text{Day}$

The retention time is taken as 12hours, then volume of **Primary clarifier tank** should be no less than $6.583\text{m}^3/\text{hr} \times 12\text{hours}=78.996 \text{ m}^3$.

Including safety factor, the volume of primary clarifier tank is 180 m^3 in our design, so the design is satisfactory.

3. Equalization tank

The equalization tank is mainly used to regulate water volume, balance machine load and stabilize water quality parameters. We just calculated the total sewage is $158\text{m}^3/\text{Day}$, but the influent flow is not always same each hour, so the equalization tank can keep the water inside when some influent is bigger. By another hand when factory maintenance the ETP, also should need a tank to stock the sewage.

So including the safety factor, the volume of the equalization tank is 300 m^3 in our design. It almost can keep 2days sewage, **the design is satisfactory.**

4. PH reaction tank

There are 3 PH reaction tanks in our design. The sewage from lead-acid battery factories is generally acidic. So the PH reaction tanks are mainly used to gradually adjust sewage from acidic to slightly alkaline in order to facilitate the precipitation of heavy metal compounds in an alkaline state.

The PH reaction tank-1 is used for significantly adjust the PH value of sewage. If the PH value of the sewage is less than 3, the PLC senses and starts the NO.1 NaOH dosing pump, adjusts the dosage through the metering pump, and automatically starts the mixer, and adjusts the amount of alkali added according to the PH meter detection value in the tank. Finally ensure that the PH value of the sewage remains between 3 and 4.

The PH reaction tank-2 is used to further adjust the PH value of sewage to 5-6. Of course, the PLC adjusts the amount of NaOH added to metering pump based on the feedback data from the internal PH detector.

The PH reaction tank-3 is used to adjust the PH value of sewage to slightly alkaline range of around 9 because heavy metal compounds have the lowest solubility in slightly alkaline aqueous solutions and are more likely to precipitate.

There are 2pcs sewage lift pump which capacity is 15m³/h per hour

(one is running and one for backup) taking sewage from sewage clarifier tank to PH reaction tanks to make sure sewage treatment capacity 15m³/h. **So, the design is satisfactory.**

5. Flocculation reaction tank

This is a very important process. The sewage flow into the flocculation reaction tank after PH reaction tank. At this point, coagulants PAM, flocculant PAC, and heavy metal capture agent will be added externally. Under the stirring of the mixer, PAC, PAM, and heavy metal capture agent will undergo physical and chemical reactions with pollutants in the wastewater. Among them, heavy metal capture agents are used for chemical reactions, causing heavy metal ions in sewage to react with capture agent related ions, generating insoluble compounds in water; The flocculant PAC is used to turn suspended particles in sewage into flocs, while the coagulant is used to further condense the flocs into easily sedimentable clusters for the next step of precipitation.

The sewage enters the sedimentation tank after passing through the flocculation reaction tank.

6. Sedimentation tank

The main function of sedimentation tank is to separate solid particles from sewage through gravity sedimentation. There are inclined pipes in the tank to increase the sedimentation area. The sludge at bottom of sedimentation tank will flow into sludge tank through gravity flow pipe.

7. PH callback Pool

PH callback Pool is mainly used to adjust the pH value of sewage, making it roughly neutral.

8. Quartz sand filter

Quartz sand filters mainly work through physical filtration to remove solid substances from sewage. There are certain pores between quartz sand particles, and when water containing impurities passes through the quartz sand layer, suspended particles in the water will be intercepted by the quartz sand particles. At the same time, heavy metal capture agents and NaOH were added to the front-end water body. These two agents form precipitates with lead, and the lead compounds in the water form suspended particles. Quartz sand filters can effectively intercept and remove them.

The quartz sand filter will undergo backwashing at regular intervals.

During the backwashing process, water flows in the opposite direction through the filter layer, causing the filter layer to expand and suspend.

The filter layer is cleaned by hydraulic shear force and particle collision friction force, and the dirt inside the filter layer is discharged.

9. Activated carbon filter

Activated carbon filters are mainly used to remove organic matter from sewage, and their main functions include the following aspects:

- (1) Adsorb some organic matter in water with an adsorption rate of about 60%. Activated carbon particles have a large number of micropores and gaps with an average pore size of 20-50 angstroms, and have a huge specific surface area, usually reaching 500-1500m²/g. Due to the fact that the molecular diameter of organic matter is generally slightly less than 20-50 angstroms, activated carbon has a significant effect on the adsorption of organic matter, thereby reducing the content of organic matter in water.
- (2) Remove odors. The heavy metal capture agent added to the front-end water body contains functional groups with volatile or irritating odors, or produces odorous by-products (sulfur compounds, thiol substances) during the reaction with heavy metals. These substances often have special and unpleasant odors, and as long as the molecular size of these odorous substances is suitable for the pore structure of activated carbon and can generate adsorption force with the surface of activated carbon, they can be adsorbed. At the same time, it can effectively remove the earthy and moldy odors generated by microbial activity in water.
- (3) Adsorption of heavy metal Pb. Although activated carbon is not as effective in removing heavy metals as specialized heavy metal ion exchange resins and other materials, it can still adsorb some heavy metals to a certain extent. For some heavy metals that exist in

particle or gel form, activated carbon can intercept them through physical adsorption.

(4) Other functions. In addition, due to the presence of oxygen-containing functional groups such as hydroxyl groups on the surface of activated carbon, it has a strong catalytic effect on oxidants in water and a strong denitrification effect. In addition, the activity can also remove odors, color, and residual turbidity in water.

10. Sludge Tank

The sludge tank is mainly used to store the sludge collected from the sedimentation tank, allowing the sludge in the sludge water to concentrate here for the next step of sludge treatment. There is a Pressure filter connected with the Sludge tank. Pressure filter is mainly used to remove water from sludge. The water will go back again to the Primary clarifier tank, and the Dried sludge in the form of cake is manually collected from the sand drying bed and packed the cake into gunny bag. The cake filled gunny bags to be store in a protected store room nearby ETP site for six months or until further development of the fate of cake management found.

11. Clean water reservoir

The clean water reservoir is mainly used to collect treated and standard

reusable water.

Design calculation for **clean water reservoir**:

Sewage influent flow, $Q=6.583\text{m}^3/\text{hr}.= 158\text{m}^3/\text{Day}$

The retention time is taken as 16hours, then volume of **clean water reservoir** should be no less than $6.583\text{m}^3/\text{hr} \times 16\text{hours}=105.328 \text{ m}^3$.

Including safety factor, the volume of clean water reservoir is 240 m^3 in our design, so the design is satisfactory.

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Description of various chemicals for ETP Dozing

The requirements quantity of various chemicals in the ETP is automatically calculated by the detector inside according to the sewage. Please check the following description of the effects of various chemicals.

1. Heavy metal capture agent.

Heavy metal capture agents are mainly used to remove heavy metal ions from sewage. There are various heavy metal ions in the sewage from lead acid battery, especially Pb^{2+} is the main heavy metal ion.

Heavy metal capture agents can convert these free heavy metal ions into compounds that are not soluble in water through chemical reactions, thereby separating them from water and achieving the goal of reducing the content of heavy metals in water, meeting Bangladesh environment standards, and reducing environmental pollution.

2. Sodium hydroxide (NaOH)

Sodium hydroxide (NaOH) is used to neutralize acidic components in sewage, making it neutral or weakly alkaline. Meanwhile, OH^- and CO_3 ions can also be used to remove some heavy metal ions

3. PAC (Polyaluminum Chloride) & PAM (Polyacrylamide)

PAC is an inorganic polymer coagulant that primarily functions to rapidly precipitate suspended particles in water. It can not only adsorb these particles, but also cluster them together through bridging to form larger flocs, which facilitate subsequent filtration and separation. In addition, PAC can also adjust the pH value of water and improve water quality.

PAM (Polyacrylamide) is an organic polymer flocculant. Its strength lies in the ability to reverse the surface charge of suspended particles, so that particles can attract each other and gather together. The flocs formed by PAM are usually more stable and have a faster settling rate.

4. Alkali Neutralizer - Sulfuric Acid

After sedimentation treatment, the pH value of the sewage is slightly alkaline. At this time, a small amount of sulfuric acid solution can be added to adjust it to near the neutral value

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LEAD ACID BATTERY PROJECT

AIR TREATMENT PLANT
(ATP)
DESIGN SCHEME

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AIR POLLUTION IN THE MANUFACTURE OF LEAD ACID BATTERY

Lead acid battery manufacturing includes following sections which will maybe have air pollution.

1. Grid casting section. There some oven to smelt the lead and cast the battery grid, so there is some **lead smoke** come out when smelting the lead.
2. Battery assembly Section. When factory make assembly of the batteries, should use welding gun by lead bar, there is some **lead smoke** come out. Meanwhile some lead powder will drop off from battery plate and become to **lead dust**.
3. Lead Powder filling Section. There is some **lead dust** come out when filling lead powder in the battery tubulars in this section.
4. Plate formation and charging section. When start to charge the battery plate, there is some **acid fog** come out.

So, there are 3 sources of air pollution: **lead smoke, lead dust and acid fog**.

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AIR TREATMENT PLANT (ATP) -General Description

The harmful gases generate from the factory will be treated by the installed ATP. The ATP is China technology and it is scrubbing system.

1. **Web scrubber**

A wet scrubber system is one type of scrubber that is used to remove harmful materials from industrial exhaust gases known as flue gas before they are released into the environment. It is the original type of scrubbing system, and utilizes a wet substance to remove acidic gases.

2. **Dry Scrubber**

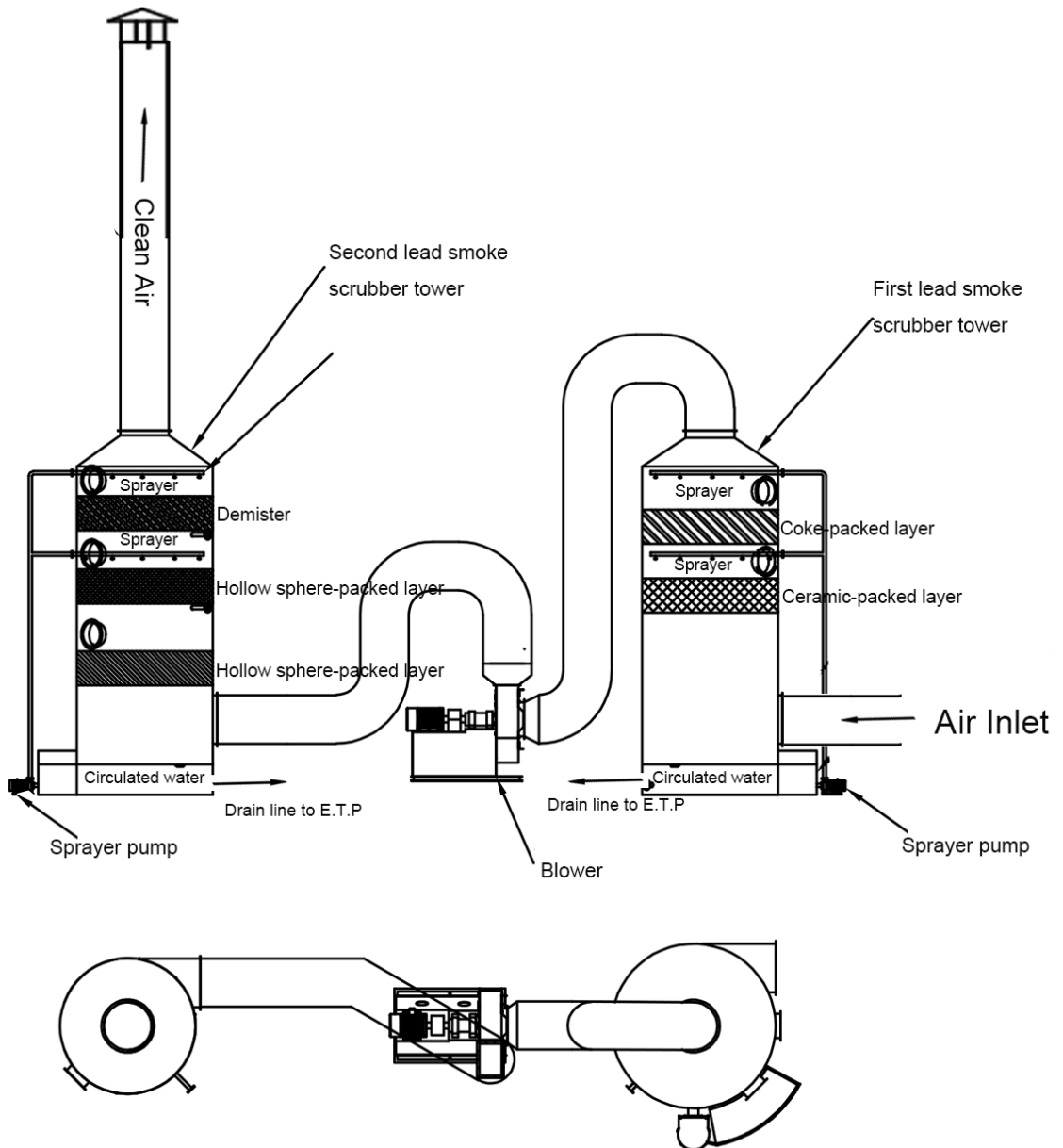
Dry scrubber or scrubbing systems are used in the majority of modern plants like XINYUAN STORAGE LIMITED and are notable for being able to get rid of pollutants and contaminants in exhaust gas. While dry scrubbers purify the gas with dry substances, these systems work almost exactly like wet scrubbers. The device that's connected to the scrubber will spray a selection of dry reagents directly into the gas stream, which allows for the removal of any harmful pollutants or a complete changing of a contaminant into another substance.

There are eight parallel spray type wet scrubbers for plate formation section (charging section), one wet scrubber for grid casting section and 5 dry scrubbers for battery assembly section and lead powder filling section as Air Treatment Plant.

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AIR TREATMENT PLANT (ATP) -Lead Smoke from
Grinding casting and battery assembly section

ATP Process Flow Diagram



This system has two lead smoke scrubber towers, each divided into different stages.

The inlet of lead smoke containing air adopts a circular inlet, and large particles of dust are swept by first stage air and throw it into the bottom tank.

In the lead smoke scrubber towers, particulate-laden air pass into a chamber where it contacts liquid spray produced by spray nozzles. Towers are placed in vertically waste gas flow paths. The liquid spray is directed counter to the gas flow, in the same direction as the gas flow, or perpendicular to the gas flow. The gas flow enters at bottom of the tower and flows upward. Water sprays downward from nozzles. Water droplets capture particles suspended in the gas flow through impaction, interception and diffusion. The towers rely primarily on particle collection by impaction; they have high collection efficiencies for coarse PM.

There are some different packed bed layers containing packing materials such as coke, ceramic and hollow sphere in these lead smoke scrubber towers. Water is sprayed across the top of the packed layer and trickles through the packing materials. Gas enters packed layer and types of packing materials. They are able to reduce odor and pollutant gases to low residual concentrations.

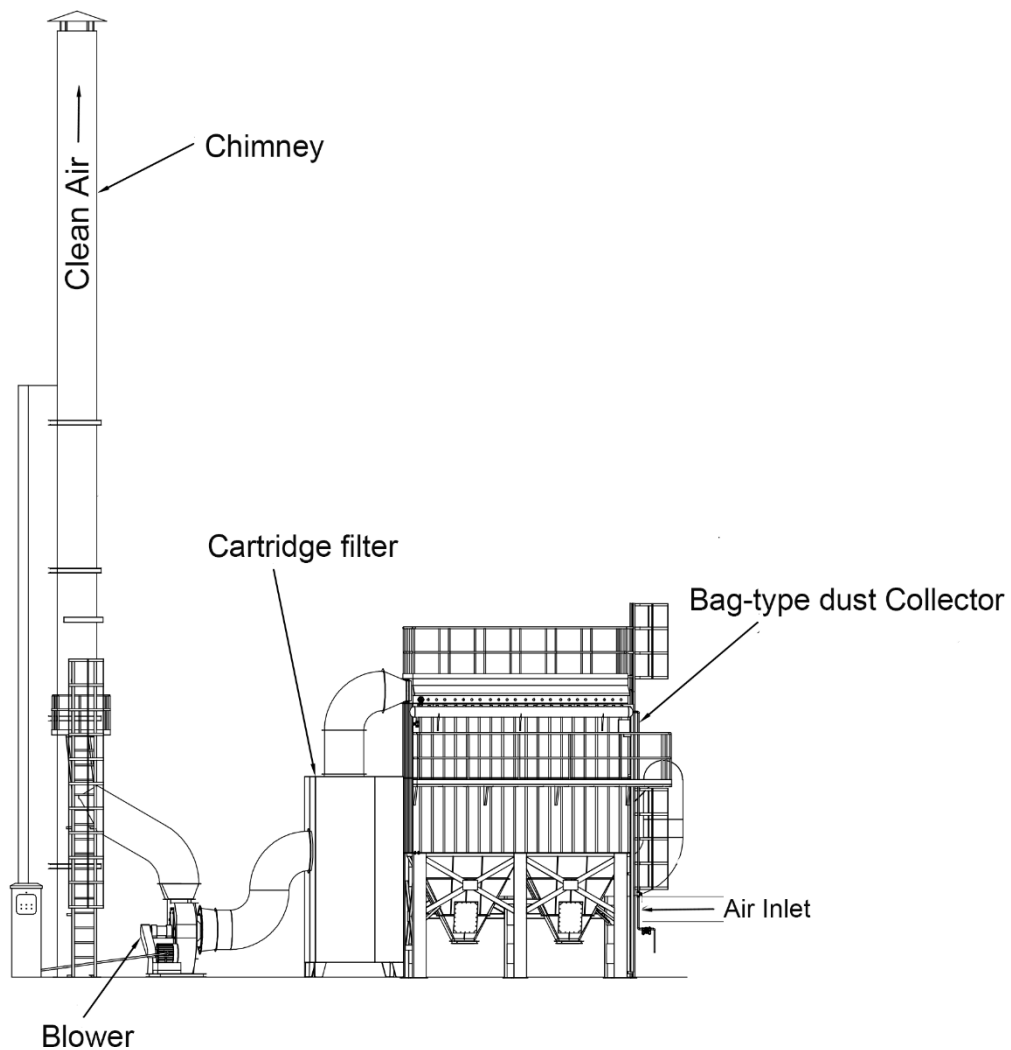
The cleaned gas stream passes through a mist eliminator near to top where entrained moisture is removed prior to discharge by the

chimney. Scrubbing liquor (waste water) is collected at bottom and discharged to the drain line connected to the E.T.P. The water will be recycled through the E.T.P.

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AIR TREATMENT PLANT (ATP) -Lead dust from battery assembly and lead powder filling section

ATP Process Flow Diagram



The system of ATP for lead dust is dry scrubber system. It mainly includes bag-type dust collector, cartridge filter, blower and chimney.

1. Bag-Type Dust Collector

Bag-Type Dust Collector utilizes the filtering effect of fiber fabric to filter dusty gases. When the dusty gas passes through the bag, the dust is trapped on the surface of the bag, and the purified gas side is discharged through the bag. As dust accumulates on the surface of the bag, regular cleaning is required to ensure the normal operation of the dust collector.

2. Cartridge Filter

The gas will go inside the cartridge filter after the Bag-Type dust Collector. Cartridge filter dust collector composed a cartridge filter as a filtering element. After the dusty gas enters the dust collector hopper, due to the sudden expansion of the airflow cross-section and the effect of the airflow distribution plate, some coarse particles in the airflow settle in the hopper under the action of dynamic and inertial forces; After the dust particles with fine particle size and low density enter the dust filter chamber, they deposit on the surface of the filter material through a combination of Brownian diffusion and screening effects. The purified gas

enters the clean air chamber and is discharged through the chimney and blower.

3. Blower.

The blower is another component that the main function is air flow. The blower extracts air from the dust collector and flows to the gas chimney.

4. Chimney

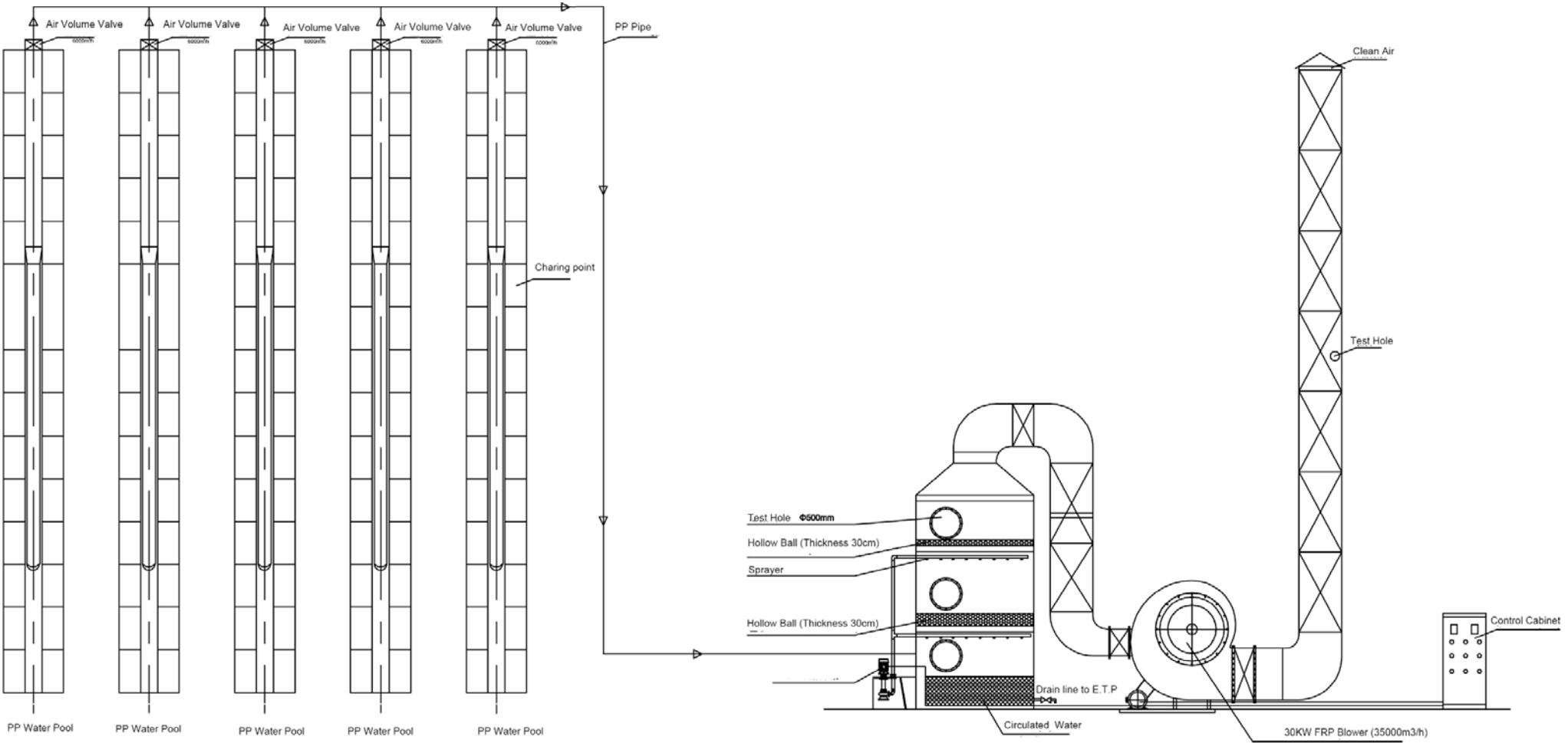
The tall vertical chimney is in the system. The clean air will be discharged by the chimney.

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AIR TREATMENT PLANT (ATP) -Acid fog from Plate formation and charging section

The system of ATP for acid fog is wet scrubber system. We also call it as spray type scrubber system. It mainly includes spray tower, FRP Blower and the chimney. Each spray tower can connect with five charging lines depending on the air volume of the blower. The principle is the same as the ATP of lead smoke so we will not explain again here.

ATP Process Flow Diagram(Spray type scrubber system)



The polluted air from Xinyuan storage Limited all are treated through ATP settled in the factory before discharge. The factory design meets the environmental requirements of Bangladesh. It will be a pollution-free factory .