GWI'S APPLICATION FOR ENVIRONMENTAL AUTHORIZATION FOR THE CONSTRUCTION OF THE DIAMOND WATER TREATMENT PLANT

NAME OF PROJECT:	**Construction of 26 million litres per day (MLD) surface water treatment plant**
NAME OF DEVELOPER/ COMPANY:	**GUYANA WATER INCORPORATED**
CONTACT DETAILS:	**ARSHAD YACOUB** **PROGRAM MANAGER** **Mobile: 620-1904** **Email: arshady@guyanawaterinc.com**
DATE PREPARED AND BY WHOM.	**05th August 2025** **Arshad Yacoub**

ENVIRONMENTAL PROTECTION AGENCY
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1. **Detailed description of the proposed project:**

(i) **Physical location and its characteristics along with GPS coordinate/s; where applicable distances from the closest town, settlement, indigenous community, and nearby waterways such as creeks, rivers, closest town, etc; general/predominant land use (residential, tourism, agricultural, commercial, industrial, etc.) of the area; sensitive receptors (daycare facilities, schools, hospitals, etc.) likely to be affected by the proposed project; the relative abundance of natural resources in the area; and the non-disputed nature of the land.**

Guyana is located within the Inter-Tropical Convergence Zone (ITCZ) and is influenced by the El Nino Southern Oscillation (ENSO). The coastal plain of Guyana, where the Diamond Surface Water Treatment Plant will be located, experiences two wet and dry seasons, a primary and a secondary. Temperature within Region 4, ranges between 22.5°C and 31.9°C while rainfall ranging between 1,778mm and 2,800mm annually. The plant is located within the low coastal plains of Guyana, which is characterised by expansive flats, marches, and distinct sand ridges.

The Diamond Surface Water Treatment Plant (DSWTP) is located within the eastern extent of the Diamond community and falls within the coastal plain of Guyana. The site is located within proximity to the East Demerara Water Conservancy (EDWC), however, this is not considered a National Protected Area (NPA) nor is the site located within proximity to any recognised NPA.

The proposed site is located within an area designated for housing and industrial activities which comprised secondary vegetation as the area was historically sugarcane plantations.

	<50 meters	*50m - 100m*	*101m - 500m*	*501m - 1000m*	*>1km*
Sensitive ecosystems e.g. Wetlands/Mangroves			√		
Protected Areas					√
Major Waterways			√		
Sea Defence					√
Threatened or endangered flora and fauna					√
Residences		√			
Schools					√
Hospitals					√

(ii) A description of all feasible and reasonable alternatives.

An assessment of the groundwater resources within the Diamond area was done to determine whether this would be sufficient to meet the capacity of the plant. This assessment looked at the existing demand on the groundwater system as well as the projected demand of the new plant. An assessment was also completed on the sustainability of the East Demerara Water Conservancy (EDWC). Upon completion of this analysis, it was determined that it would be within the best interest of the coastal aquifer system to utilise the neighbouring surface water source within the EDWC.

Subsequent to this, a consultation was held with representatives of the Ministry of Housing and Water to identify the assigned land use and distribution as well as available sites for the plant. Taking the water resource analysis and consultations into consideration, a site was identified as being northeast of the community and within proximity of the EDWC.

(iii) Description of any existing baseline information on the physical (landscape, soil, water, air, the use of natural resources), ecological (flora and fauna), and social environment (economic and cultural aspects).

Physical Environment:

The proposed site is located within the low Coastal Plain, extensively flat terrain and covered by marshes. The soil formation is primarily clay as part of the Demerara and Coropina Clay formation of the coastal aquifer system. The site is located within the lower floodplain of the Demerara River which is influenced by natural features such as rivers, man-made canals, settlements and agricultural activities as a result the area is suspectable to flooding.

The East Demerara Water Conservancy (EDWC) falls within the Demerara River watershed. It is an earthen dam reservoir that receives runoff from the upper southern lands. The conservancy was established to aid in storage of water for irrigating the agricultural lands along the coast and the management of flood waters particularly in the capital city. It comprises large canals that direct water toward the coast or to the east and west for drainage.

Groundwater within this area comprises the three known coastal aquifer system comprising the Upper Sands aquifer at 30 – 60 m, followed by the A Sands aquifer at approximately 150m and the B Sands aquifer at approximately 240m. The A and B Sands aquifers are predominantly utilities as a source. The Upper Sands is not utilised as this is saline with a high iron concentration.

Ecological Environment:

The proposed site for the plant was previously agricultural lands used for sugar can cultivation. It comprises degraded secondary vegetation. Surrounding vegetation within the Region comprises Wallaba and Dakama forests, Muri scrubs and savannah grasslands.

While the country itself has abundant wildlife including several endangered species, the area the site is located within an urbanised area and therefore has limited biodiversity. Within these urbanised areas, the spectacle caiman, which a common reptile species along with the common green iguanas is found throughout the area.

Social Environment:
The site is located within the Region 4, under the Golden Grove/ Diamond Place Neighbourhood Democratic Council (NDC). Region 4 accounts for approximately 40% of the total population of Guyana with an overall population density of three people per square kilometre. Region 4, given a low dependency ration is considered an economic hub with its access to employment opportunities and infrastructure.

(iv) Layout of the project, presented on a map with a scale relevant to the size of the development with the following details:

a. an accurate indication of the proposed site position, as well as, the positions of alternative site/s, if any; b. closest town/s, if any; c. names of major and minor access road/s to the site; d. identification of receiving waterbodies; e. identification of any existing or proposed intake and discharge structures; and f. identification of effluent/emission discharge points. The map shall also include a north arrow and a legend.

The proposed location as highlighted in Figure 1, *depicts the proximity of the proposed site to the EDWC along with the proposed raw water intake and raw water transmission.*

Figure 1 : Proposed plant location, site of raw water intake and raw water transmission

Figure 2 *highlights the extent of the service area to the northwest and south/ southeast of the water treatment plant. It also highlights the proximity of the proposed site to neighbouring communities, the capital city, Georgetown, and communities along the lower East Coast of Demerara, as well as the Demerara River and the Atlantic Ocean.*

Figure 2 : Proposed plant and neighbouring communities along the East Bank of Demerara and in relation to Georgetown

Figure 3 *highlights an extended view of the proposed plant location to the service area and the EDWC. It also highlights the location of the Hope Canal along the East Coast Demerara.*

Figure 3 : Major waterbodies to the proposed site including the East Demerara Water Conservancy, Demerara River, and Atlantic Ocean

2. A description of the design of the proposed which shall include:

(i) Design\construction drawings - specification of any structures, volume of expected pollutants, etc.

Figure 4 *depicts the proposed design of the Diamond Surface Water Treatment Plant. This design comprises several tanks to facilitate coagulation/ flocculation, sedimentations, filtration, sludge management, and storage tanks. The site is expected to include a main building as well as a chemical storage building.*

In addition to the water treatment plant, a grid-tied photovoltaic system with a capacity of 700 kWp will also be installed as a source of renewable energy to offset the consumption of the treatment plant.

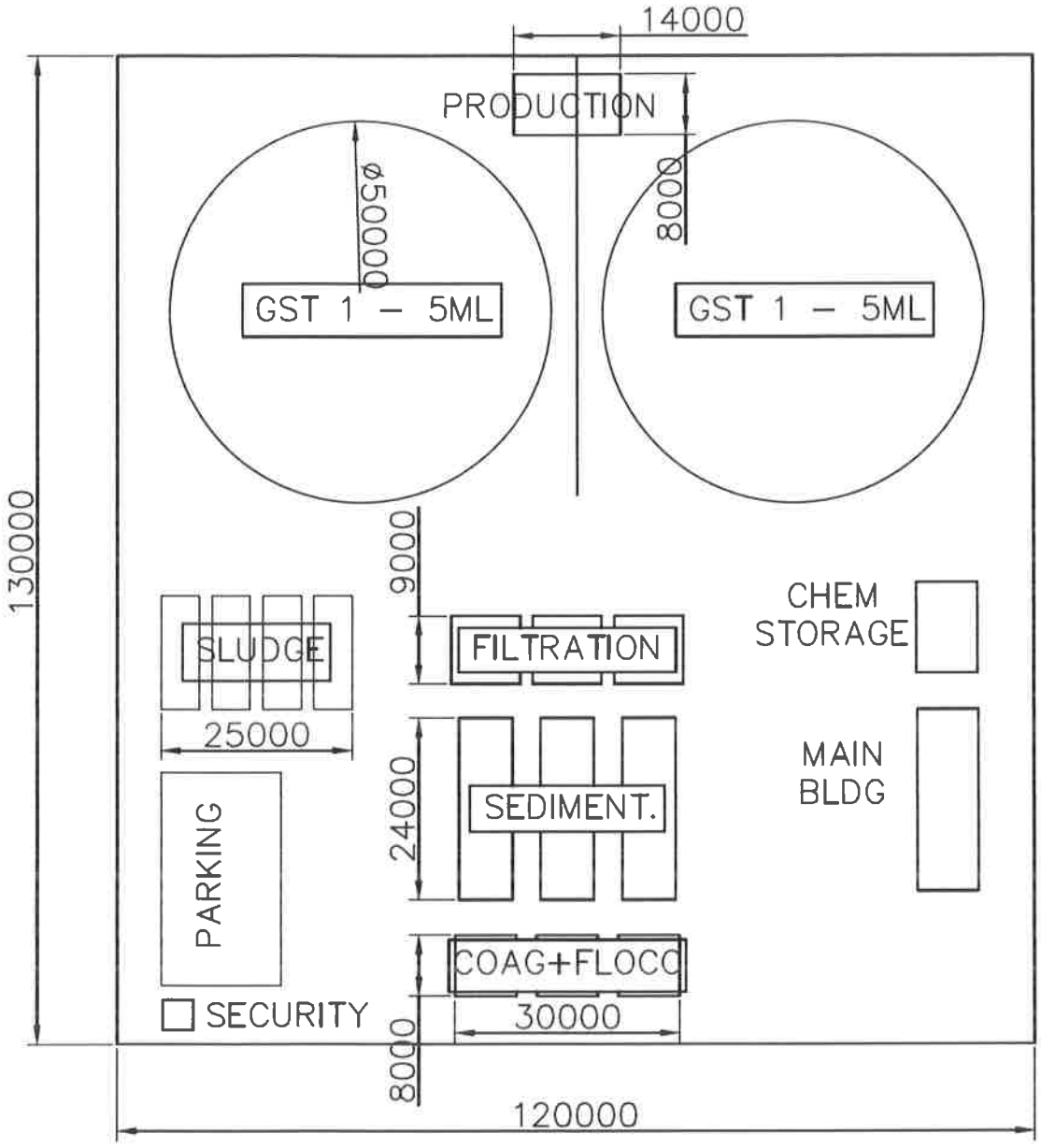

Figure 4 : Proposed design for the Diamond Surface Water Treatment Plant

Major pollutants that will be generated by the project are: solid waste, backwash water, and chemical residuals. Solid waste generated during the construction phase will comprise construction materials and domestic waste from personnel on site. During the operational between 3 – 5 persons are expected to be onsite on a daily basis for an estimated waste generation of 5 metric tons per year. The backwash water that will be generated as a result of the treatment process is expected to produce 475 MLD/ year of wastewater. Chemical residuals will be derived primarily from chemical packaging.

The waste generated during the construction and operational phases will be managed following a Waste Management Programme.

(ii) The project size, e.g. capital investment, number of employees projected for each stage of the project, rates of production, transportation route etc;

The proposed plant will have the capacity of 26 MLD (million litres per day) with a total capital investment of USD 20M for the water treatment plant and USD 1.3M for the solar farm. This 26 MLD plant, equivalent to 780,000 m^3/month, will serve the Little Diamond area to the northeast of the plant and the Diamond-Grove area south of the plant. This service area covers approximately 9,000 lots comprising residential and non-residential properties.

The project is expected to have two primary stages, construction and operation which are expected to have on average 30 persons during the construction phase and 4 during the operation of the plant.

(iii) Activities associated with all development stages from construction to closure: a. operation and production processes and alternative design/s considered; b. a guide for all stages of the project from raw material to the finished product; and c. technical description of the proposed project's process/activity accompanied by a Process Flow Diagram/s;

Activities of the construction stage

The initial stages of construction will take three sub-phrases: work preparation, main work, and work demobilisation. This will involve land clearing, levelling, and sand filling of the site with white sand to levels specified in the design drawings. Piling will be completed in preparation for the laying of the foundation for the various units within the plant including the contact tank, filters, groundwater storage tanks and buildings. Following the completion of the foundation works, construction of the various components of the treatment facility including contact tanks, coagulations, flocculation, sedimentation and filtration units will commence constructed from either concrete or glass fused to steel. The other buildings, including the operators, control and chemical storage rooms will be constructed using standard hollow concrete blocks. In addition to the construction of the major components of the treatment facility, ancillary works will also be completed including pipe works, electrical and electromechanical works, sludge ponds, and fencing will be completed.

Construction of the solar panel arrays will commence with installation of the foundation blocks that will support the frames for the panels. The panels will subsequently be installed and electrical works to connect them to the national grid.

Operation and production processes

The treatment process follows a conventional treatment of surface water. Raw water is brought to the plant from the East Demerara Water Conservancy (EDWC) into a contact tank where alum and lime are added for the process of coagulation and filtration to take place. The process of sedimentation follows to allow the precipitated iron particles to settle. The water then passes through filter tanks before being sent to ground storage tanks.
The system will be supported by booster pumps throughout from the intake, backwashing pumps, and distribution pumps.
The solar farm will have low operational requirements once installed apart from routine checks and maintenance.

Technical description of the proposed project activity
A conventional surface water treatment process will be employed. This envisages the use of a coagulant, alum, with lime for pH control, followed by flocculation, sedimentation, and filtration to remove turbidity and colour from the raw water.

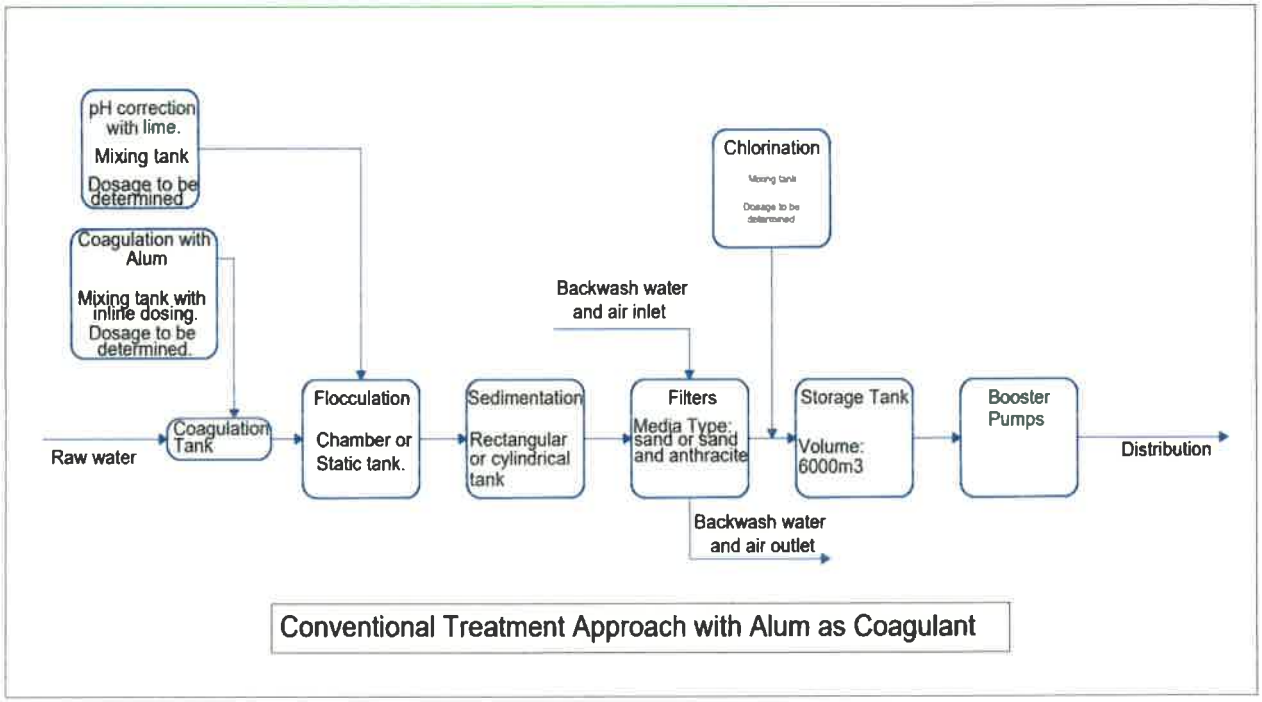

Figure 5 : Process flow diagram of the Diamond Surface Water Treatment Plant

(iv) Use of Natural Resources: approximate quantities of raw materials required at each stage of the project and their possible sources;

The only natural resource that will be consumed by the plant will be primarily during the operational phase of the project. This is the primary raw material for the Diamond Surface WTP which is water and will be abstracted from the EDWC. Approximately 26 MLD will be abstracted.

During the construction phase water will be trucked to the site in varying amounts depended on the need.

(v) Source of utility services such as water supply and treatment options, energy/electricity and communication facilities;

The primary water source for the plant will from surface water from the East Demerara Water Conservancy. As a result, treatment will comprise conventional treatment process for surface water sources. Energy will be supplied by the local provider via the national grid but will be supported by the installation of a photovoltaic system with a capacity of 700 kWp which will be grid-tied to offset the energy consumption of the plant.

(vi) Waste production: types of waste, the monthly quantity/volume of waste managed (generated, stored, transported), the volume of effluent to be discharged along with a chemical analysis indicating the effluent's composition and methods of waste disposal/treatment. Potential locations for recovery/disposal sites shall be identified with justifications for the site selection;

Through the treatment process, lime and alum residues may be generated. These will be managed using the appropriate procedures outlined in the Waste Management Programme.

The treatment process is proposed to include backwashing of the filters. This backwash water is predominantly water with precipitated iron particles derived from the treatment process. This backwash water will be discharged into sludge ponds where the precipitated iron is allowed to settle, overtime the accumulated material is dredge and transported via trucks to the Haags Bosch Landfill.

Solid waste generated at the site will be stored in appropriate receptacles and disposed of at the Haags Bosch Landfill.

(vii) The duration of the project for each phase; and

The project is expected to last a total 52 years with 2 for construction and the remaining 50 years being the life of the water treatment plant and 25 years for the solar farm.

(viii) Decommissioning plan (where applicable).

The decommission of the water treatment plant forms part of the ESA/ESMP. It entails the systematic removal of all installations utilised during the project life. Materials that can be recycled or reused will be donated while those designated as waste will be disposed of, following the guidelines set by the EPA, to the approved sites.

3. Potential Impacts and their Significance

An assessment of the potential impacts of the proposed development and its significance in relation to:

(i) the extent of the impact or the area of influence: the geographical area that may be affected by the proposed activity and the manner in which the various aspects of the environment: physical (landscape, soil, water, air, the use of natural resources), ecological (flora and fauna), and social (economic and cultural aspects) may be impacted;

a. *Impacts to Land/Soil:*

The greatest impact on land/ soil will be during the construction phase, particularly during the main works and work demobilisation. Activities that are expected to impact the land/ soil include land clearing, civil works, construction of the sedimentation tanks, filtration systems, storage reservoirs, and intake structures as well as during the demobilisation when equipment and waste materials are removed from the sire. This impact is expected to reduce significantly during the operational phase of the project.

b. *Impacts to Water (both ground and surface):*

Impacts to ground and surface water will be experienced during the construction and operational phases. During construction, the preliminary and civil works are expected to impact the soil water. Surface water will be impacted since this is the primary source of water for the plant, which will take place primarily in the operational phase as water is abstracted for treatment.

(ii) the transfrontier nature of the impacts i.e. does it cross country borders or boundaries;

The impacts of this project will not be cross country or transboundary.

(iii) the magnitude and complexity of the impacts;

The magnitude of the impact of the project on water resources are considered negative ranging from low to medium with cumulative impacts over time during the operational phase. While the impacts to soil are also considered negative, with a medium magnitude and non-cumulative as this is only expected to happen during the construction phase.

(iv) the probability of the impacts;

The probability of impacts on both water and soil are expected to be medium.

(v) the duration, frequency and reversibility of the impacts:

a. Land/Soil:

- *Impacts to land/ soil are expected to include conversion, erosion, sediment runoff, and/or pollution*
- *The duration of these impacts is expected to be transitory*

b. Water (both ground and surface):

- *Impacts to water are expected to be primarily from abstraction*
- *The duration of this is expected to be transitory*

(vi) Cumulative impacts with other projects: additional surveys and assessment may be required to determine whether existing projects in combination with the proposed project will have a significant cumulative effect on the receiving environment.

The only impact expected to be cumulative is that on water resources as this is the primary raw material for the plant and which will be taken from the East Demerara Water Conservancy.

4. Description of proposed environmental management and mitigation measures for all environmental, ecological and social impacts.

Several programmes have been identified to aid in the mitigation of the potential impacts as a result of the project. These include:

a. Land/Soil:

- *Chemical Management Programme, specifically for the chemical, fuel and oil storage*
- *Contingency to which includes spill preparedness*
- *Effluent Management Programme*
- *Pest and Vector Control Programme*
- *Erosion Control Programme*

b. Water (both ground and surface):

- *Effluent Management Programme*
- *Chemical Substance Management Programme*
- *Adequate sanitation systems for personnel*
- *Adequate drainage systems*
- *Materials management within the project area*

c. Wildlife

- *Flora and Fauna Management Programme*
- *Restrict vegetation removal to designated areas*
- *Land restoration where applicable*

d. Socioeconomic

- *Information and Community Participation Programme*
- *Road Safety and Traffic Management Programme*
- *Socio-Environmental Training Programme*

5. A summary of minutes of any public consultations/ meetings held by the Project proponent with key stakeholders expressing their views and opinions.

A Public Consultation was held on the 15th April 2025 at the Aurelia Eco Lodge, Great Diamond, East Bank Demerara supported virtually via Microsoft Teams meeting. Preparation for the consultation included a detailed stakeholder mapping process which identified persons to be engaged including institutional stakeholders, infrastructure and services, environmental and health, educational, gender and minority organisations, as well as civil society stakeholders. The stakeholder mapping covered the direct and indirect area of influence of the Diamond Surface Water Treatment Plant. The consultation was hosted by GWI in collaboration with the IDB consultant. A Board Director gave opening remarks while the Project Manager gave an overview of the Coastal Water Treatment Programme. This was followed by a detailed presentation on the ESIA by the consultant. Questions raised included why groundwater monitoring was included in the ESIA since the WTP is intended to utilise a surface water source, to which it was noted that this was regarding potential groundwater contamination. It was noted that given the hydrogeological formation, it was unlikely that spills on the surface would impact the coastal aquifer system. There was also a query about the impact of the solar energy source proposed for the project. It was noted that this would account for approximately 80% of the energy requirement of the plant. Head of the Water Treatment Infrastructure Unit gave closing remarks and encouraged persons to share information about the plant and submit any queries they have on the project.

More information on the Stakeholder Consultation can be found in the ESIA for.

6. **A description of any assumptions, uncertainties and gaps in knowledge.**

Main pre-conditions and assumptions:

- *Land is suitable for the stated purpose*
- *Government's support to sustain the investment*
- *Adequate funding will be put in place to support the full implementation*
- *Willingness of contractors to bid and execute the project within the proposed budget*
- *Those trained will be retained to operate the plant*

7. **A non-technical summary of the project (a summary of what the project is about in layman's language that clearly describes your project).**

Guyana has been rapidly growing with an increasing demand for land for residential and non-residential purposes. To meet this demand, lands have been developed along the East Bank of Demerara, including the area extending from Little Diamond to Grove. As a part of this development, infrastructural works are required including the provision of water. With this mandate in mind, GWI has embarked on the design and construction of a water treatment to serve this area.

This plant has been designed at a capacity of 26 MLD to meet the demand of the service area. The primary source of water for the plant will be the East Demerara Water Conservancy (EDWC), as such the treatment process will be a conventional surface water system including, coagulation, flocculation, sedimentation, and filtration. The treated water will be stored in two large ground storage tanks before being distributed to the service area.

The plant will be powered by the national grid, however, to offset this consumption, a 700 kWp photovoltaic system will be installed at the plant site. This will aid in reducing the Company's carbon footprint and contribute towards the renewable energy generation of the country.