



**GWI'S APPLICATION FOR ENVIRONMENTAL AUTHORIZATION FOR THE
CONSTRUCTION OF FIVE WATER TREATMENT PLANTS**

NAME OF PROJECT: Construction of five water treatment plants inclusive of the installation of transmission mains and drilling of potable water Wells.

NAME OF DEVELOPER/COMPANY: GUYANA WATER INCORPORATED

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PROJECTS**

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DATE PREPARED AND BY WHOM. May 10, 2023 (Arshad Yacoub)

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 has a wet tropical climate with average air temperature between 25°C and 27°C annually in most regions. The average annual precipitation across the country is 2,416.69mm, with greater rainfall inland compared to the coastal region. The Project sites are all located in the coastal region within regions 2,3,4, 5 and 6. Subsequently, they experience moderate levels of rainfall, with northern sites having greater rainfall than southern sites, with moderate annual temperatures. The country is rarely affected by tropical storms and hurricanes but is prone to floods and droughts.

All project sites are located within the Northern Province. Given the location of the project sites in the coastal plain, it is likely that much of the basement geology is veneered by recent marine, estuarine, or fluvial sediment deposits. Similarly, soils at the project sites are mostly wet clay soils consisting of marine, estuarine or riverain sediments. Topography at all project sites is low and flat (elevations between 1 to 5m above sea level).

The aquifers of Guyana are in the coastal basin. The three main aquifers are the “upper” sand, the “A” sand, and the “B” sand (deepest) aquifers. The “A” sand aquifer is the principal water source for Georgetown and the coastal lowlands and while the B Sand aquifer is also utilized, it is not done to the same extent. Threats to coastal aquifers include inappropriate land use within the recharge areas (namely, agriculture and housing) and over pumping of groundwater which could result in salt-water intrusion on coastal aquifers. It was, however, hypothesized that saline intrusion of groundwater in Guyana may not be an immediate threat given the depth of the aquifer in Guyana compared to Suriname.

Groundwater testing was conducted at groundwater wells at project sites in February 2022 as part of the Project. Results showed that turbidity and iron were above the WHO standard at all sites while color, ammonia, manganese, and total coliforms were higher than the WHO standard at some sites.

None of the project sites are located within any National Protected Areas (NPAs). All sites within the proposed scheme of works are disturbed sites on lands classified as cultivated or residential and as Class I-II good to moderate agricultural lands. Rice and sugar production are high in project regions and so it is expected that there would be low biodiversity and limited original vegetation at project sites. where development of the original lands has occurred.

The GPS co-ordinates of the locations of the proposed water treatment plants are as follows are attached for your information.

1. *Maria's Delight*
2. *Wakenaam*
3. *Leguan*
4. *Bath*
5. *Adventure*

There are no surrounding activities at any of the proposed treatment plant sites with the exception of Leguan and Wakenaam where there are domestic buildings which will not posed any risk during construction and operation of the plants. The sites are generally flat and with predominantly clay soil. The proximity of sensitive receptors are as follows:

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

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

It is customary and recommended for several reasons that a Water Treatment Plant should be close to the production site, in this case the groundwater Wells. And there are several reasons as to why this is preferred.

Alternative sites were considered and after the analysis these sites were recommended because they will be in the vicinity of good producing Wells.

(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).

The area is generally flat with predominantly clay soil covered by vegetation. There will be little to no environmental impact from the proposed plant since minimal clearance of vegetation or no disturbance of water bodies is required. Land clearing of secondary vegetation primarily grass, will be completed as part of the preparatory works to construct the foundation. Sensitive ecosystems e.g. Wetlands/Mangroves, Protected Areas, Major Water Courses and Threatened or endangered flora and fauna are all located more than 1km away.

(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.

See attached proposed layout for the five proposed Water Treatment Sites.

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

Project Summary Guide

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

There is one on-site personnel to generate solid waste as consumables. These consumables are stored in refillable containers. The estimated solid waste generation is 0.4015 metric tons per year.

As it relates to the proposed water treatment plants, any solid waste generated on site is disposed of at the proposed landfill sites. The treatment process includes backwashing of the filters. Backwash water is primarily water with precipitated iron particles from the treatment process. Backwash water is discharged into the sludge ponds and will be allowed to settle and over time when the pond is exhausted the materials will be trucked away to a landfill site.

- (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 square area in acres for each of the proposed sites are as follows:

1. ***Maria's Delight –***
2. ***Wakenaam -***
3. ***Leguan -***
4. ***Bath -***
5. ***Adventure-***

The total capital investment for the proposed projects is approximately US\$70M. This entails the production and distribution of 6.5 MLD, 2MLD, 2MLD, 13MLD and 13MLD at Maria's Delight, Wakenaam, Leguan, Bath and Adventure respectively.

During construction there will be approximately 30 persons at each project site.

- (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;

The various stages of the project which will be common to all sites are as follows:

The plants are basically iron removal plants so more or less the same treatment process is involved except for the sites at Leguan and Wakenaam where pressure filtration will be done instead of gravity filtration.

The initial stages of the construction will involve clearing and sand filling of the project site. The site will be filled with white sand to the levels as per the drawings. There will be a significant amount of filling so as to prevent the site from flooding. After the sand filling is completed, piling works will be commenced as per the detailed foundation layout. Following the piling works, preparation will be made for the installation of rebars and formworks. Once completed concrete pouring will take place for the contact tank, filters and ground storage tanks. Following the completion of all sub structure works, construction of the superstructure will commence. The contact tank and filters will be constructed of concrete and the storage tank from glass fused to steel. The operator's quarters and the Motor Control Centre will be constructed from regular hollow concrete blocks. The contact tanks, filters, storage tanks and building represent the major infrastructure works but there also be ancillary works such installation of piping between the various tanks, electrical and electro mechanical works such as the installation of distribution pumps and chlorine dosing pumps. Additionally, a sludge pond will also be constructed of concrete to store all of the iron flocs from the water and this will be removed from time to time based on the sludge buildup.

Operation stage:

The dominant treatment process among the five plants is as follows: aeration – oxidation - filtration - disinfection and then storage. There will be some amount of aeration taking place without the presence of an actual aerator and this happens when the contact tank is being fed with ground water. The water will remain in the tank for 25 minutes and then flows by gravity to the filters where iron flocs not settled out in the contact will be filtered out in the filter. Upon leaving the filter the filtered water goes to the storage tank and during the process chlorine is being injected. There will also be a booster pump station which will extract the filtered water from the storage tank and pump it into the distribution

network. This will be done on a continuous basis to maintain a certain amount of pressure in the network.

Process flow diagram attached.

- (iv) Use of Natural Resources: approximate quantities of raw materials required at each stage of the project and their possible sources;
- (v) Source of utility services such as water supply and treatment options, energy/electricity and communication facilities;
- (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;

There is one on-site personnel to generate solid waste as consumables used during the process are stored in refillable containers. The estimated solid waste generation is 0.4015 metric tons per year. Glass, silicon and polymer back sheeting (at the end of the design life of the project) will be disposed in accordance to Guyana Environmental Protection Agency's (EPA) guidelines.

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

The project duration for the five plants is 24 months from the date of the instruction to proceed.

- (viii) Decommissioning plan (where applicable).

Not applicable. As these will be new capital investment works.

4. 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:*

There is minimal impact on the soil from the existing infrastructure disturbances will only be done during excavation and pile driving.

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

The aquifer which is the water bearing zone will not be impacted as the this is more than 400 ft. which is way below the depth of the of the piling.

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

The identified impacts will not cross country borders.

- (iii) the magnitude and complexity of the impacts;

The impacts from the project will be restricted to the confines of the proposed water treatment plant's compound.

- (iv) the probability of the impacts;

Low.

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

a. *Impacts to Land/Soil:*

- *Land not used for infrastructure will be covered with vegetation to reduce the compaction*
- *Increase drainage within the compound.*

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

- *Groundwater abstraction is capped to meet the capacity of the plant in order to maintain the levels.*
- *Backwash water is discharged into nearby surface waterways.*

- (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.

This project will not pose any cumulative impacts with other projects.

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

No economic or social risks were identified for the proposed project and negligible environmental impacts were identified.

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

Please see the ESIA for more information on this.

7. 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***

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

To provide same potable water in compliance with WHO guidelines to the residents at a minimum level of service of 5m at the end of the network on a continuous basis.