Government of Guyana – Inter-American Development Bank

Guyana Water Incorporated (GWI)

Capital Investment & Planning Department

WATER SUPPLY AND SANITATION INFRASTRUCTURE IMPROVEMENT PROGRAM
GY -L1040 AND GY-X1003

Environmental and Social Assessment

Samuel Wright
Environmental Management Consultant 17 Mitchell Avenue,
East Brunswick, NJ, 08816
USA

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EXECUTIVE SUMMARY

This **Environmental and Social Assessment** has been prepared in compliance with the **IDB** and **GWI** policies concerning environmental protection.

An overall description of present condition of infrastructures and proposed project features is given in **Chapter 2.**

The institutional and legal framework governing the environmental sector in Guyana is thoroughly described in **Chapter 3**, while the main characteristics of study area, with particular attention to the environmental and social conditions in the four Program Areas: Georgetown, West Coast Demerara/Cornelia Ida – De Kinderen; East Bank Demerara/Diamond – Herstelling; East Berbice/Fort Ordinance, Sheet Anchor - # 19 Village, are shown in **Chapter 4**.

Chapter 5 provides a comprehensive assessment of the environmental and social impacts consequent to the implementation of the project, considering both temporary and permanent impacts. Impacts have been evaluated using the **Environmental Screening Checklist** required by GWI Environmental Guidelines.

Chapter 6 gives a comparison between the four proposed alternatives including the no-action option, in terms of technical advantages and disadvantages,

A draft structure for the future **Environmental and Social Management Plan** to be elaborated by contractors according to GWI Environmental Guidelines is given in **Chapter 7.**

Chapter 8 proposes actions to be taken for the implementation of awareness campaigns and public disclosure of the project objectives.

The report is complemented with annexes incorporating the Environmental Screening Checklists for the selected option and the record of supporting public consultations.

ENVIRONMENTAL AND SOCIAL ASSESSMENT

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LIST OF ACRONYMS

AC	Asbestos Cement
CI	Cast Iron
CRFW	Caribbean Regional Fund for Wastewater Management Project
EAB	Environmental Assessment Board
EAP	Environmental Action Plan
EAT	Environmental Appeals Tribunal
EDMI	Enumeration District Marginality Index
EDWC	East Demerara Water Conservancy
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ESA	Environmental and Social Assessment2
ESC	Environmental Screening Checklist
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GNBS	Guyana National Bureau of Standards
GoG	Government of Guyana
GPL	Guyana Power and Light
GT&T	Guyana Telephone and Telegraph Co. Ltd
GWI	Guyana Water Incorporated
GYD	Guyana Dollar
HDPE	High Density Polyethylene
IDB	Inter-American Development Bank
LBS	Land Base Sources
LWSRP	Linden Water System Rehabilitation Project
M&CC	Municipality and City Council
MDGs	Millennium Development Goals
Mld	Mega liters per day
MNRE	Ministry of Natural Resources and the Environment
MoA	Ministry of Agriculture
MoH	Ministry of Health
MoHW	Ministry of Housing and Water
MoPW	Ministry of Public Works
NA	Not Applicable
NDC	Neighborhood Democratic Council
NEAP	National Environment Action Plan
NPA	National Programme of Action
NRW	Non-Revenue Water

PAHO	Pan-American Health Organization
PRSP	Guyana Poverty Reduction Strategy Paper
PVC	Polyvinyl Chloride
RDC	Regional Democratic Council
ToR	Terms of Reference
UNEP	United Nations Environmental Programme
WHO	World Health Organization
WSSIIP	Water and Sanitation Infrastructure Improvement Program
WTP	Water Treatment Plan
WWTP	Waste Water Treatment Plant

This Environmental and Social Assessment Report has been prepared under the contract "Preparation of an Environmental and Social Assessment (ESA) and Environmental and Social Management Plan (ESMP)" signed between Inter-American Development Bank (IDB) and the Consultant Samuel Wright in the framework of "*Support the Preparation of a Water Supply and Sanitation Infrastructure Improvement Program (GY-T1090)".*

1.0 INTRODUCTION

There have been notable improvements in the delivery, availability and distribution of water and sanitation services in Guyana over the last decade, 2000–2010; ninety four (94%) percent of the population in Guyana used an improved drinking water source, as compared with 89% in 2000. Also, about 84% of the population used improved sanitation facilities.

Even with these improvements, Guyana Water Inc. (GWI), the water and sewerage services public utility, face constant operational, financial, and institutional challenges: Some of the challenges include, deteriorated distribution systems and high levels of NRW, unreliable delivery of water at low pressures and often low quality.

The proposed GY- L1040 Program was designed to address some of the critical challenges and reflects GWI Strategic Plan 2012. The general objective of the proposed Program is to improve efficiency, quality and sustainability of the potable water services and sanitation infrastructure in the program areas.

The Specific Objectives are to:

i. Improve pressure, quality and continuity of the water supply service in Georgetown, Cornelia Ida-De Kinderen; Diamond- Herstelling and Goed Bananen Land -Sheet Anchor-No.19;
ii. Reduce the level of NRW in the program areas, especially in Georgetown;
iii. Improve access to sanitation for low-income households in the program areas; and
iv. Strengthen GWI performance in its operational and management practices.

The following activities were proposed to meet the stated objectives:

- Construction of a water treatment plant (WTP) , with complementary works such as transmission mains installation, distribution mains upgrades and metering, to serve the communities from Cornelia Ida to De Kinderen, (Bridge the geographical “treatment-gap” in the West Coast of Demerara)
- Construction of a WTP (with complementary works such as transmission mains installation, distribution mains upgrades and metering) to serve the communities from Diamond to Herstelling. (Bridge the geographical “treatment-gap” in the East Bank of Demerara).
- Construction of a WTP (with complementary works such as transmission mains installation, distribution mains upgrades and metering) to serve the communities from Goed Bananen Land, Sheet Anchor to No. 19 Village (Bridge the geographical “treatment-gap” in East Berbice).
- Improve the supply and quality of water delivered in Georgetown, the Capital, with the rehabilitation of the Shelter Belt and Sophia WTPs, and expansion of the Central Ruimveldt WTP, including complementary works for the improvement of the water supply network.
- Improve the access to sanitation services of low income settlements in the program areas by converting 1,000 pit latrines into efficient septic tank units.

The design of these facilities and components will be completed under the TC GY-T 1090.

1.1 Goals of the Consultancy

The goal of the consultancy, as presented in the TOR, is to prepare an Environmental and Social Analysis (ESA) and an Environmental and Social Management Plan (ESMP) for the GY-L1040 Program. These documents will provide the basis for the environmental and social management of the Program including the obtaining of the required construction permits. The consultancy will also develop the plans for public consultation and communication.

2.0 PROJECT DESCRIPTION

This description of the Water and Sanitation Infrastructure Improvement Program, (WSSIIP) GY-L1040, includes the following:

- Summary Descriptions of the *Component Water Systems*
- The Condition Assessment Summary
- The Rehabilitation Objectives
- Description of the Proposed Interventions

2.1 Summary Descriptions of the GY- L1040 WSSIIP Component Water Systems

The WSSIIP involves the construction and rehabilitation of treatment plants, installation of transmission lines and the installation and rehabilitation of related distribution systems; additionally the conversion of pit latrines into septic tanks.

The WSSIIP comprises four distinct component water-systems. The component systems are owned and operated by GWI and located in four GWI Divisions (3 - Georgetown, 3 - Diamond, 2 - Leonora, 5 –W. Berbice). Each Division is managed by a Division Manager with support from engineers, operators, service personnel and clerical staff.

Table 2.1, Component System Locations, references the location of each component system with respect to GWI Divisional Management and Guyana Regional Administration System. The relative geographical location of the component water systems is illustrated in Figure 2.1, Locations of the WSSIIP GY-L1040 Component Systems. Summary descriptions of the component systems for the various program areas are presented subsequently.

Table 2.1: Component-System Locations

Component System	GWI Division	Guyana Administrative Region	Communities Served	Target Population (2025) (1)	Typical Demand l/cap/day (2)
Cornelia Ida – De Kinderen	**2 - Leonora**	Region 3	Cornelia Ida, Anna Catherina, Edinburg, Groenveldt, Leonora, Stewartville, Uitvlugt, Zeeburg, DeWilliem, Met-En-Meerzorg	36,812	270
Goed Bananen Land, Sheet Anchor- #19 Village	**5- E. Berbice**	Region 6	Reliance, Adelphi, Prospect, Goed Bananen, No 14 Village, No. 19 Village, Cumberland, Williamsburg	18,153	270
Diamond – Herstelling	**3- Diamond**	Region 4	Great Diamond, Little Diamond, Coven Garden, Farm Herstelling, and Arcadia Mocha.	38,740	270

Component System	GWI Division	Guyana Administrative Region	Communities Served	Target Population (2025) (1)	Typical Demand l/cap/day (2)
Georgetown: (Central Georgetown, Shelter Bank, Sophia)	**3- Georgetown**	Region 4	All of Georgetown	200,280	270

(1) Target Population : The Target Population is the project population for the areas based on the 2012 Guyana Census and further adjustments based on actual growth patterns

(2) Typical Demand: Projected water usage/person based on monitoring in Georgetown and Linden

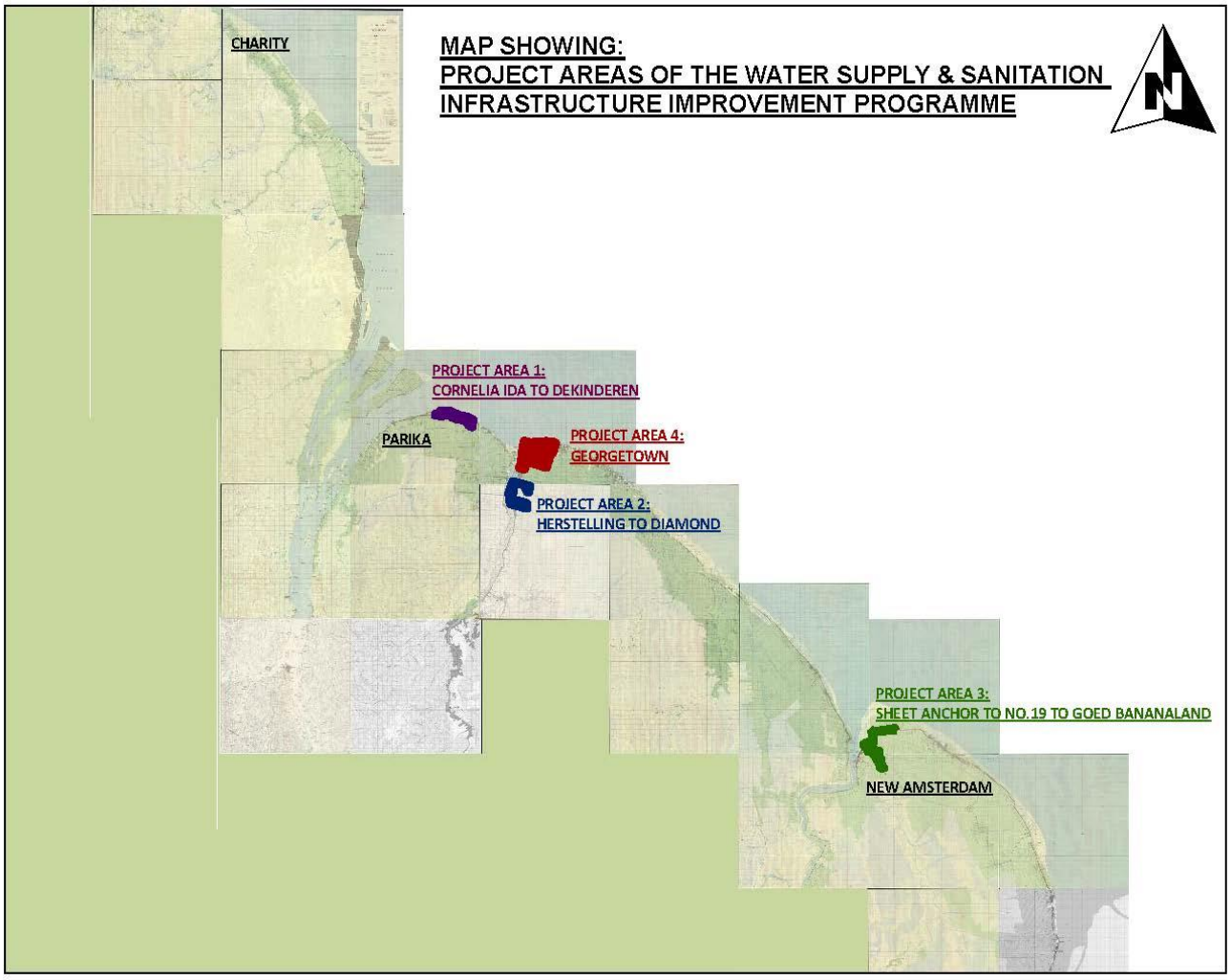


Figure 2.1: Locations of the WSSIIP GY-L1040 Component Systems

2.1.1 Cornelia Ida – De Kinderen

The Cornelia Ida – De Kinderen component-system is located in GWI Division 2 and delivers untreated water to the De Kinderen, Met en Meerzorg, Uitvlugt, Leonora, Stewartville, De

Willem, Edinburgh, Anna Catherina, Reliance, and Cornelia Ida communities. The system is connected to the Vergenoegen and Fellowship sub-systems by valves that are closed.

The system is supplied by 5 water wells (Leonora, Cornelia Ida, Anna Catherina, Zeeburg and Met-En-Meer-Zorg) with a total capacity of 14Mld. It is served by PVC transmission and distribution mains that were installed from 1999 - 2013. The breakdown of PVC mains is illustrated in Table 2.2, Distribution of PVC Mains, and Cornelia Ida - De Kinderen. The distribution network is illustrated in Figure 2.2, Cornelia Ida - De Kinderen Distribution Network.

The construction of a new water treatment plant in the area is proposed to address the referenced geographical treatment gap. This new plant will receive water from a new well, recently sunk by GWI, in the Uitvlugt area, and from the Leonora well. All other wells (Cornelia Ida, Anna Catherina, Zeeburg and Met-En-Meer-Zorg), will be decommissioned by 2020, not increasing the pressure over groundwater resources compared with the current baseline conditions (see Section 5).

Table 2.2: Distribution of PVC Mains, Cornelia Ida - De Kinderen

PVC	Length (m)
50mm	1,287
100mm	71,766
150mm	26,130
200mm	6,104
250mm	1,298

2.1.2 Diamond – Herstelling

The Diamond – Herstelling component-system is served with non-treated water from the existing well with a production output of 5ml/day. It is served by HDPE and PVC transmission and distribution mains that were installed from 1994 – 2013 (See Table 2.3, Distribution of HDPE/PVC Mains) the distribution network is illustrated in Figure 2.3, Diamond-Herstelling Distribution Network. The system is serves the communities of, Coven Garden, Farm, Little Diamond, Greater Diamond, Herstelling, and Arcadia Moca; the projected population of these communities is 38,740 by the year 2025.

Table 2.3: Distribution of HDPE/PVC Mains, Diamond-Herstelling

Pipe Diameter	Length (m)	
	PVC	HDPE
37.5mm	-	-
50mm	-	-

Pipe Diameter	Length (m)	
	PVC	HDPE
100mm	58,062	
150mm	18,307	
200mm	10,893	
450mm	-	5,370

2.1.3 Goed Bananen Land, Sheet Anchor to No 19 Village

The Goed Bananen Land, Sheet Anchor to No 19 Village component-system is located in Division 5 and delivers untreated water to the Cumberland, Sheet Anchor, Canefield, Adelphi, Reliance, and Goed Bananen Land, Prospect, No. 14 and No 19 communities. The water system is isolated from the adjoining treatment systems at New Amsterdam and Rose Hall. The projected number of residents in 2025 is 18,153.

The system is supplied by a water wells at Sheet Anchor and Cumberland with a total capacity of 5Ml/d. It is served by PVC transmission and distribution mains that were installed from 1999 – 2013. The breakdown of PVC mains is illustrated in Table 2. 4, Distribution of PVC Mains, Goed Bananen Land, Sheet Anchor– No. 19 Village.

Table 2.4: Distribution of PVC Mains, Goed Bananen Land, Sheet Anchor to No 19 Village

Pipe Diameter	PVC Length (m)
100 mm	40,411
150 mm	36,958
200 mm	11,417
350 mm	1,833

2.1.4 Georgetown

Potable water is supplied to Georgetown through two different sources, the East Demerara Water Conservancy (EDWC) and groundwater from water wells. The total amount of water supplied to the system is about 30Mld.

The EDWC was built in 1877 has a catchment-area of 520km^2 which supplies approximately 40% of the City water needs via the 14km long Lamaha Canal. The remaining 60% is pumped from 17 wells located within the urban area.

Georgetown Treatment Plants

The City is served by three treatment plants located at the Shelter Belt, Sophia, and Central Ruimveldt. The age, location and capacity of the treatment plants are summarized in Table 2.5, Summary of Georgetown Treatment Plants.

Georgetown Distribution Network

The Georgetown water distribution network extends to and covers over ninety-five percent of the City (Figure 2.5, Georgetown Distribution Network). The network is divided into three major subsections, each associated with a treatment Plant. The aggregate operational capacity of the water system is about 73Mld.

The various sub-systems of the distribution systems were constructed at different periods in the development of Georgetown, 1887 - 2013. This is reflected in the different pipe materials – such as cast iron (CI), asbestos cement (AC), polyvinyl chloride (PVC), high density polyethylene, HDPE, medium density polyethylene, MDPE. Asbestos cement pipes represent 41% (163km) of the existing system whereas 21% (84km) is represented by cast iron pipes.

The pipe network is in a very poor condition due to age, internal incrustation, breakage and corrosion. This contributed to unreliable water distribution system with respect to pressures, supply and water quality. The inflow of dirty water into the pipes through cracks and breakages further compromises the system. There has been a continuous upgrading and rehabilitation of the distribution system.

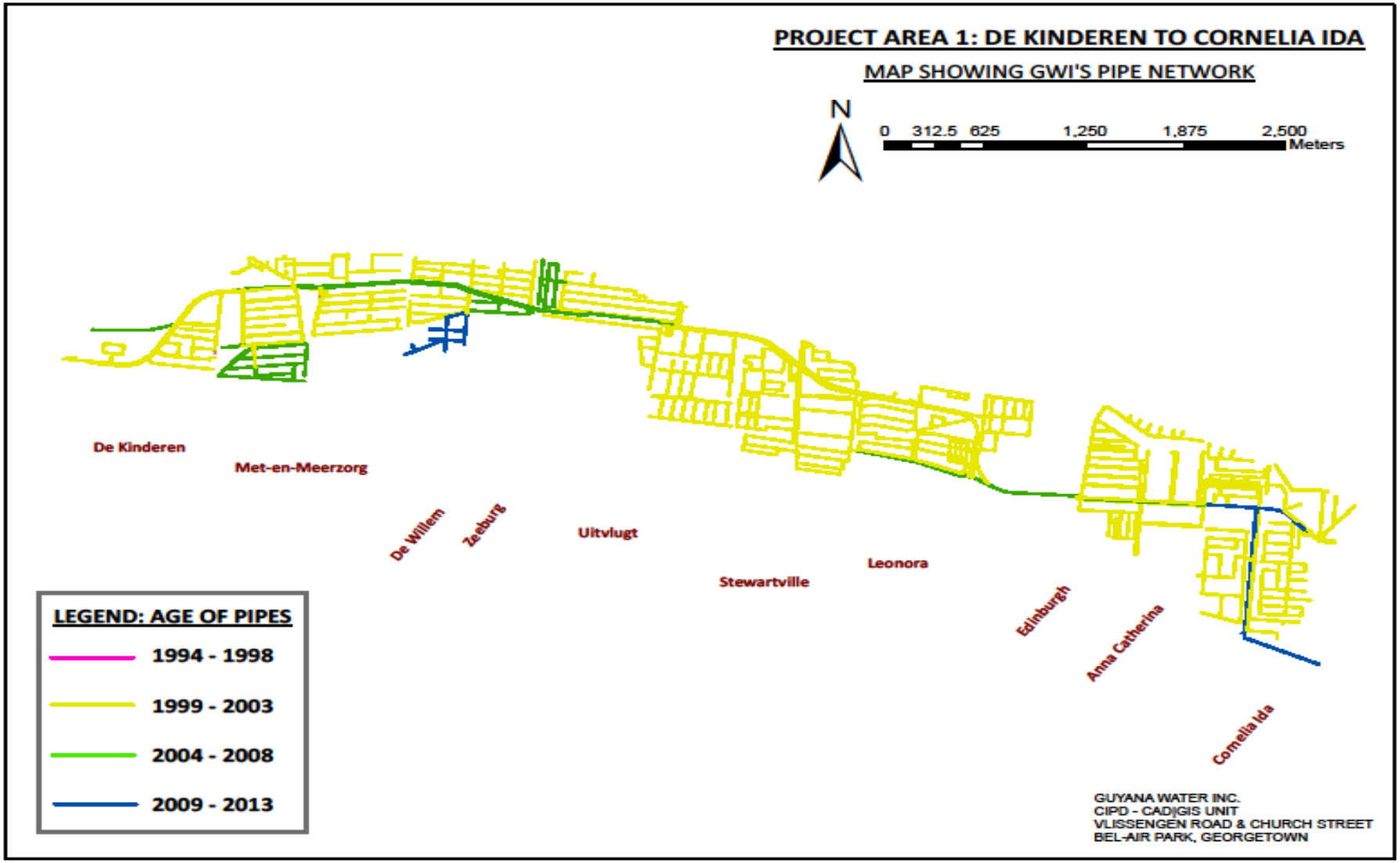


Figure 2.2: Cornelia Ida - De Kinderen Distribution Network

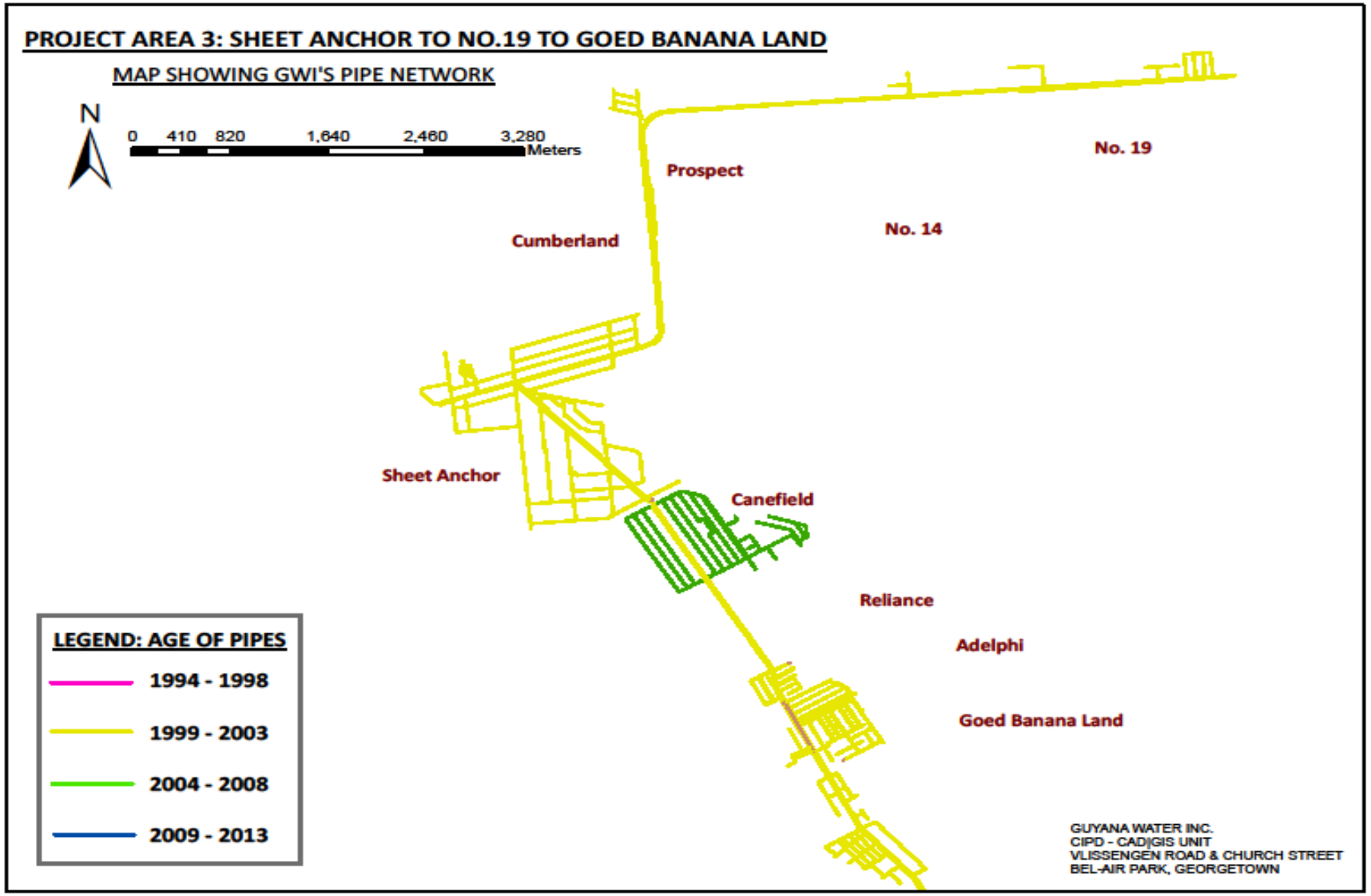


Figure 2.3: Goed Bananen Land, Sheet Anchor – No 19 Village Distribution Network

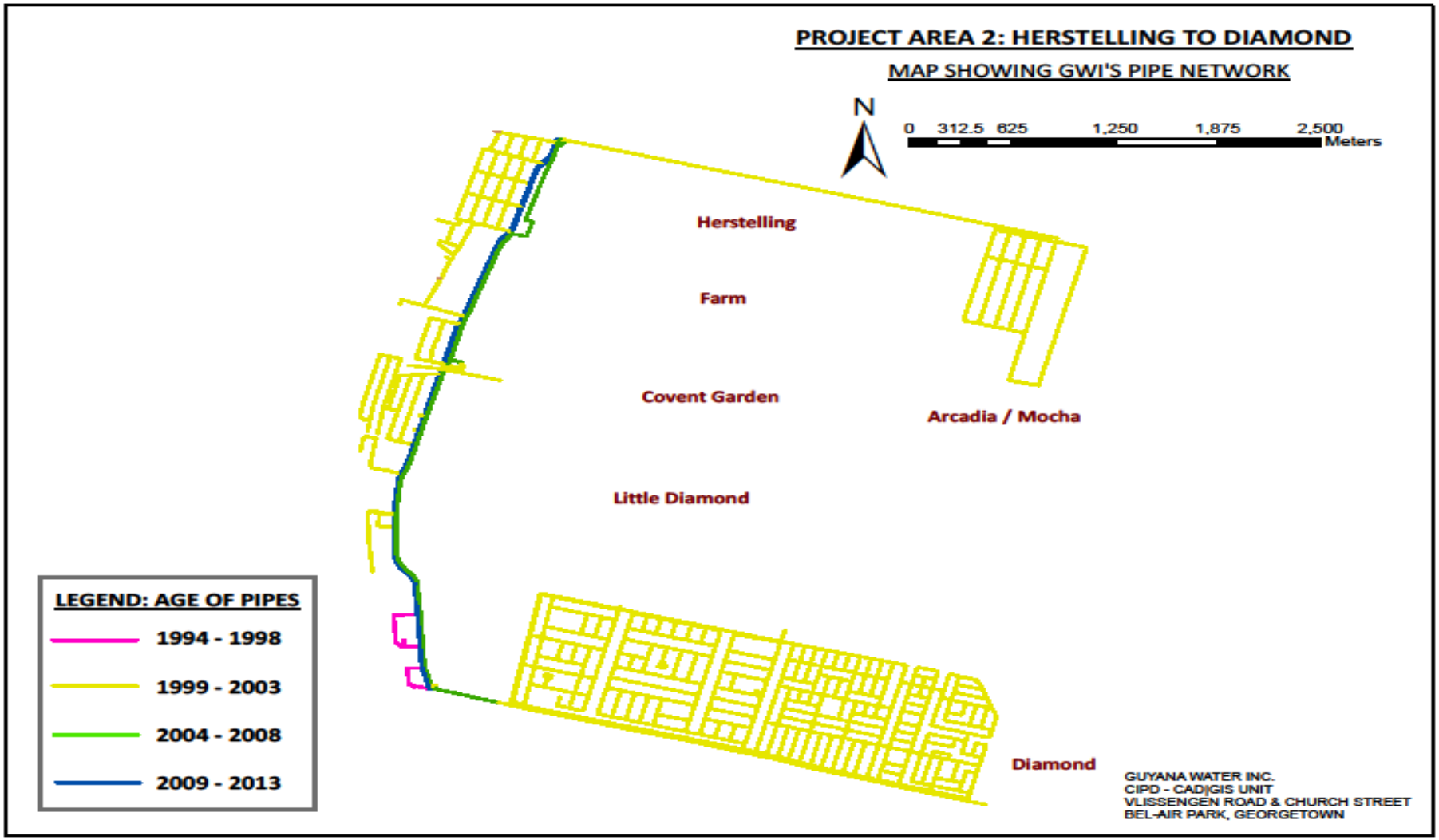


Figure 2.4: Diamond – Herstelling Component - System Distribution Network

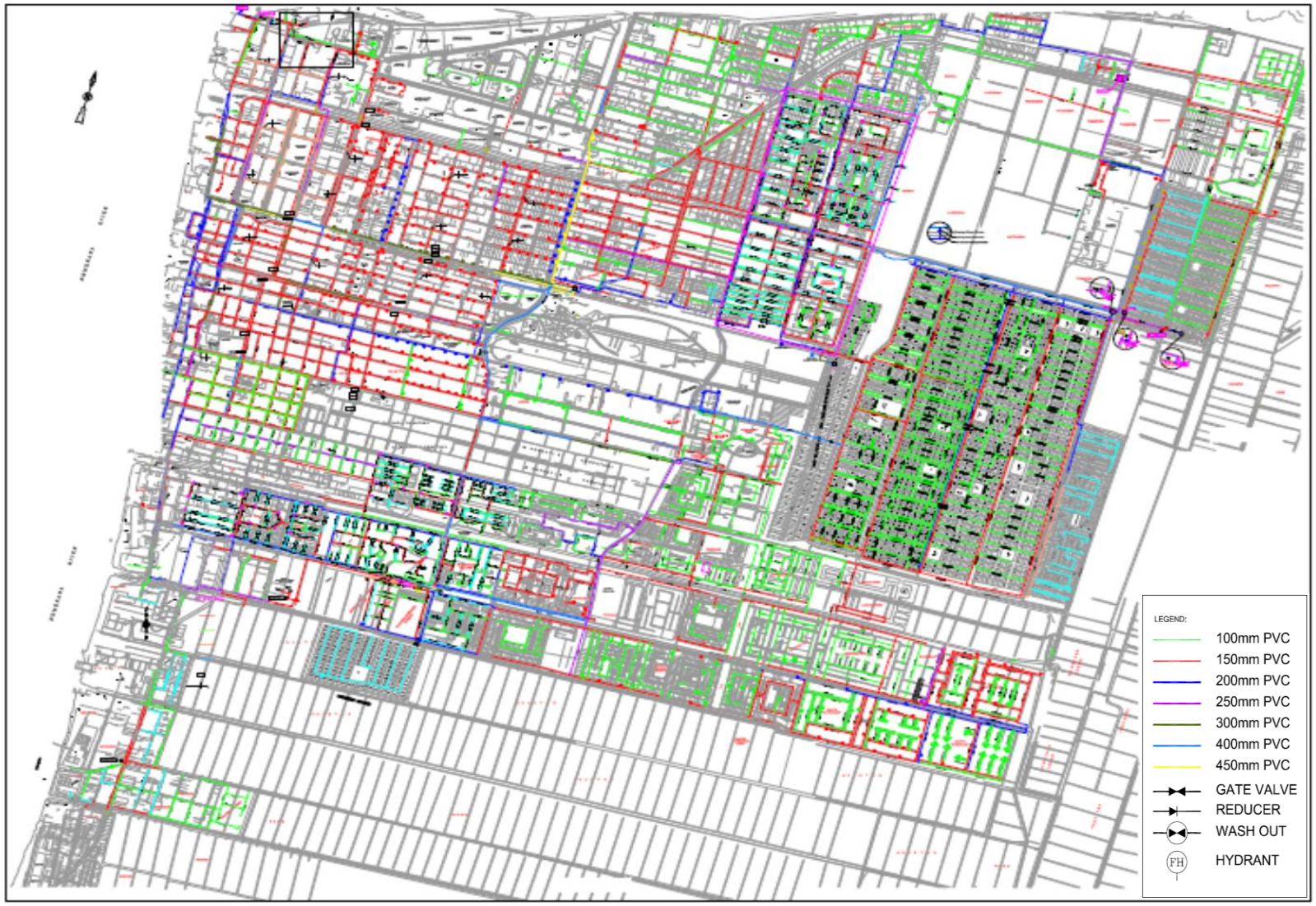


Figure 2.5: Georgetown Component - System Distribution Network

Table 2.5: Georgetown Water Supply System Summary

Treatment Plant	Year Commissioned	Treatment Capacity		Components	Hours of Operation	Service Areas
		Design m^3	Operation m^3			
Shelter Belt	1887	3,636	3,456	Coagulation, flocculation, sedimentation , filtration chlorination	24 hours	North Georgetown
Central Ruimveldt	1997	5,000	3,960	Aeration, filtration, chlorination	5:00 am – 10:30 pm	Southern
Sophia	1998	5,000	3,960 m	Aeration, filtration, chlorination	5:00 am – 10:30 pm	Eastern

2.2 Condition Assessment - Summary

The state of the delivery of potable water service to program areas reflects the challenges faced by GWI in managing and operating the facilities.

GWI is the public utility owned by the Government of Guyana (GOG) in charge of providing water and sewerage services in the country. Established in 2002, GWI operates in accordance with the regulations outlined in the Water & Sewerage Act 2002, under a license issued by the Ministry of Housing and Water.

GWI water supply systems operate under constant challenges, the main problems including aging pipes and equipment, poor asset management, lack of adequate maintenance, illegal connections, high energy costs, uncertainty in aquifer yields, and inadequate financial performance. The proposed WSSIIP exemplifies GWI's strategy and commitment to satisfy its mandate to supply water and sewage services.

GWI executes its mandates through its seven management Divisions; each Division is managed by a Divisional Manager who is supported by engineers, operators, service persons and clerical staff. The WSSIIP covers 4 GWI Divisions, including Division 3-Georgetown, Division 3-Diamond-Herstelling, Division 2-Cornelia Ida-De Kinderen and Division-5 Goed Bananen Land Sheet Anchor – No 19 Village and Goed Bananen.

A condition assessment provides the framework for assessing the efficacy of the proposed interventions and the related environmental and social impacts. The proposed rehabilitation options, associated with the proposed interventions, are based on current conditions in the program area.

This condition assessment was based on site visits, and evaluations and assessments conducted by GWI, and supporting reviews by IDB Water and Sanitation Consultants **(GWI, 2014).** The assessed conditions of the four component systems are summarized subsequently.

2.2.1 Cornelia Ida – De Kinderen, Diamond – Herstelling, Goed Bananen Land, Sheet Anchor – No. 19 Village

The state of delivery of water service in the named program areas is summarized below:

- Untreated borehole water supplied to customers; *chemical and physical characteristics that are below drinkable water standards as defined the adopted WHO standards*.
- Intermittent water supply; maximum duration of water supply - 16 hours
- Supply water-pressure less than $3m^2$
- NRW rates of 60 percent

2.2.2 Georgetown (WTPs; Shelter Belt, Central Georgetown, Sophia)

The state of delivery of water service in the Georgetown program area is summarized below:

- 70 percent treated water coverage
- Intermittent water supply; maximum duration of water supply - 16 hours
- Supply water pressure less than $3m^2$
- NRW rates of 70+ percent
- Poor quality of water supplied to customers; chemical and physical characteristics that are below drinkable water standards as defined the adopted WHO standards.
- Shelter Belt Plant is state of disrepair with Health and Safety concerns.
- Shelter Belt Plant receives ground water without the attendant systems to treat

2.2.3 Sanitation

The Central Georgetown sewage system, was originally constructed between 1924 and 1929, and serves only 48,000 citizens **(1,160 acres).** A satellite sewer network located in Tucville serves approximately 3,000 residents. The two systems are connected via a trunk main which originates at the Tucville sewage receiving facility and terminates within the central sewer system. **Greater Georgetown and the Program Areas outside of Georgetown (**Cornelia Ida-De Kinderen ; Diamond- Herstelling and Goed Bananen Land -Sheet Anchor-No.19**)**, use pit latrines and septic tanks.

The use of flush toilets located in houses is the preferred solution, and is on the increase. This was confirmed by a survey carried out in the program areas during the preparation of the proposed operation, as well as by the University of Guyana, through a 2012 survey study to assess the results of the World Bank financed Water Sector Consolidation Project.

While onsite facilities can be an appropriate means of sanitation in less densely populated areas, previous studies suggest that traditional pit latrines, largely used in low-income areas, are in poor conditions (below WHO standards) and septic tanks are not properly maintained (Pan American Health Organization (PAHO), 2009).

Based on the survey conducted in the WSIIR program areas, approximately ninety nine percent have access to "improved sanitation", more than eighty (80) percent use septic tanks and fourteen (14) percent use improved (VIP) pit latrines (Sanitation Survey, IDB 2014). The sanitation intervention of the program aims at transforming 1,000 pit latrines to efficient septic tanks focusing mainly in the low-income households of the program areas.

2.3 Rehabilitation Objectives

The GY-L1040 WSSIIP involves the construction and rehabilitation of treatment plants, installation and rehabilitation of related distribution systems, the installation of meters, and the conversion of pit latrines into septic tanks. The general objective of the proposed program is to improve efficiency, quality and sustainability of the potable water services and sanitation infrastructure in the program areas.

The specific goals include:

- Improve pressure, quality and continuity of the water supply service in Georgetown, Cornelia Ida-De Kinderen ; Diamond- Herstelling and Goed Bananen Land -Sheet Anchor-No.19; approximately 53,300 households will benefit from upgraded access to drinking water;
- Reduce the level of NRW in the program areas, especially in Georgetown;
- Improve access to sanitation for low-income households in the program areas; and
- Strengthen GWI performance in its operational and management practices;
- Improve access to sanitation for 1000 low-income households by converting 1000 pit latrines to septic tanks;

In order to meet the goal/objective of delivering water at WHO Standards in the program areas, additional production and treatment capacity is to be provided; the currently untreated wells will become raw water sources for the treatment facilities, or be de-commissioned.

A comprehensive NRW reduction programme will be developed and implemented to support the achievement of the stated goals/objectives at lower cost and shorter schedule. The NRW reduction programme will include reduction in leakage by rehabilitation of sections of the distribution systems, and in domestic per capita demand by the adoption of universal metering.

2.4 Proposed Interventions

Four different schemes, denoting four options for achieving the WSSIIP objectives have been identified in the feasibility study for this project. The options, listed one through four, are characterized by increasing coverage or supply of treated water to the component-systems. There is a related increase of effectiveness/impact on the above-mentioned problems and correspondingly, an increasing cost of implementation.

It should be noted that the differences between the various options reflect differences in the sequencing of activities and not the application of different technologies or treatment methods/options: the existing treatment technologies are deemed appropriate to treat the source waters at the various treatment plants/systems.

*From the technical point of view, the proposed works are based on the installation of new treatment systems, increasing the effectiveness and efficiency of existing systems, or the replacement of old materials with new and more reliable materials, as well as , the installation of new storage systems***.** The related works support a good quality water supply to the Program Area residents both in terms of continuity of service and in terms of water quality.

There are no related works or interventions associated with Option #1, the No-Action Option. The four options are detailed subsequently.

For Options #2 through #4 and related works, a budget is allocated for works supervision. Supervision is to be initiated a few weeks before the commencement of the works and continue throughout the construction period.

Further interventions shall comprise the replacement of other parts of the distribution network and the installation of more water meters.

2.4.1 Non-Technical Interventions

To achieve optimum service and reliability of the water supply system, the technical interventions or construction works have to be combined with correct management and adequate maintenance of treatment plants and distribution systems, and mitigation of identified hazards and related risks to systems. In support of these goals a series of non-technical interventions or initiatives are proposed at the project-specific and programmatic levels. They include public awareness and information campaigns, capacity building and institution support to GWI. These initiatives shall be performed through separate consultancy contracts by specialized consultants as detailed subsequently in Tables 2.6: Institutional Support and Works Supervision Activities and Table 7.1: Environmental and Social Impacts and Mitigation Measures. An estimative budget has been included in the total project cost estimate

Table 2.6: Works Supervision Activities and Institutional Support

Interventions	Descriptions/Goals	Project/Programmatic	Target Audience	Responsible Party	Schedule	Funding Sources
Works Supervision	Work supervision; - Follow up of the contractual requirements in terms of quality of work, budget and planning; Verification of the application of the ESMP and risk management plan; Specific conditions of the environmental permit - Liaising with the Contractor, GWI and public institutions	Project level	NA	GWI/ Supervision Consultant Firm	Works Construction phase During the whole construction period till works commissioning	IDB through works supervision contract (maybe part of the Conceptual design contract) Estimated Budget is included in the project cost estimate
Public Awareness and Information Campaigns	Effective management and operation of Septic Tanks; - Introduction to Component Water Supply system, operation, challenges; - Public Consultation on the scope of works; - Community stewardship of Water system; - Need for cost recovery and justification of water rates - Provide information on project impacts;	Programmatic -Level	Program Area residents and stakeholders	GWI, Specialized Communications Consultant, Contractor	Preconstruction & Construction Phase Intermittent activities starting 2 months prior to project initiation and through end of the construction works – for a total of 6 months	IDB through a specific institutional support contract. G$5,000,000

Interventions	Descriptions/Goals	Project/Programmatic	Target Audience	Responsible Party	Schedule	Funding Sources
	- Provide for resolution of complaints during construction works;					
Capacity Building	Optimize treatment processes through plant operator training programs Develop operator training programme and manuals Develop specific Standard Operating Procedures Establish GWI procedure and schedule for review of water quality monitoring records Develop verification and performance ,audit procedure and schedule Auditor and supervisor training	Programmatic - Level	GWI Operators GWI Management	GWI, Capacity Building Consultant GWI, Capacity Building Consultant	6 months before project completion and commissioning of rehabilitated system	IDB through a specific institutional support contract. Estimated Budget is included in the Project cost estimate G$15,000,000
Institutional Support	Protect Lamaha Canal/EDWC Source) (Conduct Study and coordinate with GWI and Lands & Survey) Groundwater Management Plan	Programmatic - Level Programmatic - Level	NA NA	GWI, Consultant GWI, Consultant	Within 1st. year of operation	Special Funding to be arranged G$5,000,000 G$3,000,000

2.4.2 Option # 1 - No-Action

In this Option there are no specific interventions. The focus would be on maintenance of the current system and capital investments in response to observed problems in meeting GWI's mandate.

2.4.3 Option #2:

Option 2 reflects the strategy of rehabilitating the Georgetown system to GWI objectives, and focusing on the reduction of NRW and the related decommissioning of untreated wells in the Georgetown other component systems.

The proposed actions under this intervention produce the following results:

- Current untreated production from wells is progressively decommissioned, as NRW is decreased to 45% by 2020, and to 25% by 2025.
- Coverage held at current levels (2013) until NRW is decreased below the level required to decommission untreated wells, allowing coverage to increase in areas with existing treatment systems.

The interventions proposed for the various component-systems are presented in Table 2.7, Option #2: Proposed Interventions.

Table 2.7: Option # 2 - Proposed Interventions

Component System	Option 2
Option Description	❖ Wells not associated with WTP, untreated water, are progressively decommissioned: ❖ *WHO quality standards met by 2020, at the latest., at existing or newly installed systems* ❖ NRW decreased to 45% by 2020, and to 25% by 2025. ❖ Coverage held at current levels (at the various component systems) until NRW is decreased below the level required to decommission untreated wells, allowing coverage (delivery of water) to increase.
Georgetown	❖ Install transmission lines to facilitate the transfer of Sanata well production water(7Ml/d) to Central Ruimveldt WTP, ❖ Install new well at Sophia (3Mld), including installation of requisite transmission lines ❖ Retrofit/rehabilitate the Central Riumveldt Sophia treatment works to12Mld design capacity ❖ Rehabilitate the Shelter Belt WTP to full capacity (33Ml/d) , and adapted WHO standards (including increasing storage capacity and the addition of an aeration component) ❖ Rehabilitate 9km of distribution lines ❖ Rehabilitate 8 km of transmission lines ❖ Install 4000 meters ❖ Decommission wells (Agricola, Tucville Terrace, Industry, Turkeyen, Cummings Lodge, Kingston and Festival City = 16 Ml/d) **Results/goal:** - *All untreated sources decommissioned, except the N Ruimveldt well, , by 2020* - ***100% coverage by 2025***.

Component System	Option 2
Cornelia Ida	❖ No change in system; No new WTP - Untreated water continues into supply after 2023, **NRW Programme** ❖ Rehabilitate 4 km of transmission lines ❖ Rehabilitate 10 km of distribution lines **Results/goal:** - Untreated water continues into supply after 2025, and - Coverage remains at the current levels of 75% until at least 2025 ***GWI policy objective of meeting WHO quality standards by 2020 not met in this option.***
Diamond	Not applicable as there are no untreated wells to be taken out of service
Sheet Anchor	❖ Install 5Mld WTP - Some untreated water continues into supply after 2023, **NRW Programme** ❖ Rehabilitate 7km of distribution lines ❖ Rehabilitate 8 km of transmission lines ❖ Install 8000 meters ❖ Decommission wells (Adelphi, Canefield) **Results/goal:** - Coverage increases from 90% in 2012 to 95% by 2025 **GWI policy objective of meeting WHO quality standards by 2020 not met in this option.**

The estimated duration for completion of works relevant to **Option 2** is 24 months. The duration may be extended or shortened based on construction sequence and planning.

2.4.4 Option *# 3*

This Option is the same as Option 2, with the difference as indicated below

- ❖ Increased water well production and treatment capacity to enable all untreated wells to be decommissioned by 2020.
- ❖ Decommission all untreated wells by 2020
- ❖ Coverage held at current levels until NRW is decreased below the level required to decommission untreated wells, thereafter allowing coverage to increase.

The interventions proposed for the various component-systems are presented in Table 2.8, Option #3: Proposed Interventions.

The estimated duration for completion of **Option 3** is 24 months.

Table 2.8: Option # 3 - Proposed Interventions

Component System	Option 3
Option Description	***Option 2, plus:*** ❖ *Additional production and treatment capacity - all untreated wells to be taken out of service by 2020.* ❖ *Coverage held at current levels until NRW is decreased below the level required to decommission untreated wells:* NRW reduction to 25% by 2025, coverage increases to 100% by 2025
Georgetown	❖ Same as Option 2.
Cornelia Ida	❖ Install new well at Uitvlugt (6Mld) ❖ Construct 11Mld WTP at Uitvlugt ❖ Transfer production of 5Mld Leonora well (to support treatment capacity of 11Mld at Uitvlugt; **NRW Programme** ❖ Rehabilitate 4km of distribution lines ❖ Rehabilitate 10km of transmission lines ❖ Install meters ❖ Decommission wells (Cornelia Ida, Anna Catherina, Zeeburg and Met-En-Meer-Zorg) **Results/Goals** With increased NRW reduction to 25% by 2025, coverage increases to 100% by 2025
Diamond	❖ Construct WTP with 10 Mld capacity **NRW Programme** ❖ Rehabilitate 6km of distribution lines ❖ Rehabilitate 11km of transmission lines ❖ Install 8000 meters **Results** ❖ Coverage increases to 50% by 2020 and 85% by 2025
Cumberland	❖ Construct 7Mld WTP (Additional production and treatment capacity of 2Mld above Option 2 is required) ❖ Rehabilitate 4 km of transmission lines ❖ Rehabilitate 10 km of distribution lines ❖ Install meters **Results** ❖ Coverage increases to 90% in 2020, and 100% by 2025.

2.4.5 Option # 4

This primary strategy for this Option is increased production and treatment capacity to enable all untreated wells to be taken out of service immediately upon commissioning of the additional capacity in 2017.

The interventions proposed for the various component-systems are presented in Table 2.9, Option #4: Proposed Interventions

The following major activities define Option 4

Table 2.9: Option # 4 - Proposed Interventions

Component System	Option 4.
Option Description	❖ ***P****roduction and treatment capacity provided to enable all untreated wells to be taken out of service immediately (2017) upon commissioning of the additional capacity* ❖ *Coverage held at current levels until NRW is decreased below the level required to decommission untreated wells, allowing coverage to increase.*
Georgetown	Same as Options 2 & 3
Cornelia	❖ Install new well at Uitvlugt (7Mld) ❖ Construct 12Mld WTP at Uitvlugt ❖ Transfer production of 5Mld Leonora well (to achieve treatment capacity of 1Mld at Uitvlugt; ❖ Rehabilitate 6km of distribution lines ❖ Rehabilitate 11km of transmission lines ❖ Install meters ❖ With increased NRW reduction to 25% by 2025, coverage increases to 100% by 2025. ❖ Decommission untreated wells (Cornelia Ida, Anna Catherina, Zeeburg and Met-En-Meer-Zorg) in 2017.
Diamond	❖ Same as Option #3
Cumberland/Sheet Anchor	❖ Construct WTP with 8Mld (2Mld above Option 2) ❖ Transfer production from Sheet Anchor and Cumberland. ❖ The additional capacity would become redundant as the NRW programme became increasingly effective, for which reason the option is not considered further ❖ Decommission untreated wells (Adelphi, Canefield) in 2017 ❖ Coverage increases to 100% by 2025.

The estimated time for completion of works relevant to Option 4 is 24 months.

Discussions between the GWI, the IDB and other stakeholders led to the selection of Option 3

2.5 Projected Activities under Options 2 – 4

The execution of the above-mentioned interventions will require the following types of construction activities:

2.5.1 Treatment Plants

- Site preparation and earth work (grading, excavation and backfill)
- Concrete delivery, forming, placement and rebar placement

- Roof installation
- Steel work (assembly welding)
- Masonry construction
- Installation of mechanical equipment and piping
- Electrical instrumentation work
- Installation of pumps and power supply equipment
- System testing and start up
- Site restoration

2.5.2 Storage Reservoirs

- Site preparation
- Foundation excavation and preparation
- Concrete delivery, forming, placement and rebar placement
- Steel work (assembly welding)
- Electrical instrumentation work
- Masonry construction
- Installation of mechanical equipment and piping
- Installation of pumps and power supply equipment
- System testing and start up
- Site restoration

2.5.3 Distribution and Transmission Lines

- Utility clearance
- Relocation of existing utilities (pipes, cables, etc.) as it might be required in some sections
- Trench excavation about 0.80 m wide and about 1.0 m deep, with adequate shoring and de-watering. The trench works shall be carried out in consecutive sections about 30 m long
- Trench bottom preparation and laying of a sand bed
- Pipe supply, installation and welding. The distribution lines shall be 75 mm to 160 mm HDPE pipes. The trenches works shall be carried out in consecutive sections about 30 m long
- Supply and installation of pipe fittings, including gate valves, Tee's, air vent valves, washouts, couplings and dismantling joints
- Site restoration

3.0 INSTITUTIONAL AND LEGAL FRAMEWORK

The legislative and Regulatory framework for the project is a combination of National, International and Regional Policies, Regulations, Legislations and Guidelines to which Guyana is a Signatory. The Environmental and Social Assessment Process for development and operation of the project will be undertaken in accordance with the legislative and regulatory framework detailed below.

3.1 National Policies

The importance of the environmental and the social issues in Guyana policies is well expressed and highlighted in the following major documents:

3.1.1 Constitution of Guyana

From the Guyana Act N°2 of 1980 and its consecutive amendments (2003):

- Article 25*: "Every citizen has a duty to participate in activities to improve the environment and protect the health of the nation."*
- Article 36: *"The wellbeing for the nation depends upon preserving clean air, fertile soils, pure water and the rich diversity of plants, animals*
- Article 149J "The environment":
  1 Everyone has the right to an environment that is not harmful to his or her health or wellbeing.
  2 The State shall protect the environment, for the benefit of present and future generations, through reasonable legislative and other measures designed to:

    (a) Prevent pollution and ecological degradation;
    (b) Promote conservation; And
    (c) Secure sustainable development and use of natural resources while promoting justifiable economic and social development
  3 It shall not be an infringement of a person's rights under paragraph (1) if, by reason only of an allergic condition or other peculiarity the environment is harmful to that person's health or wellbeing

3.1.2 Millennium Development Goals, 2000

In 2000, at the United Nations Millennium Summit, 189 world leaders adopted the Millennium Declaration and agreed to collective commitments to overcome poverty through a set of eight mutually reinforcing interrelated time-bound goals (MDGs) with related targets. Guyana was part of the Nations adopting the MDGs.

The MDGs synthesize the goals of 1990s global UN conferences and provide an accountability framework and global partnership for progressively eradicating poverty in all its dimensions. The MDGs are at the forefront of the global development agenda and represent the international community's commitment to eradicate poverty by 2015 where ensuring environmental sustainability is one of the main goals.

Goal 7: *Ensure environmental sustainability*:

1. Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources;
2. By 2015, reduce by half the proportion of people without access to safe water;
3. By 2020 achieve significant improvements in the lives of at least 100 million slum dwellers

3.1.3 National Development Strategy 2001-2010

The NDS 2001-2010 enunciates the "environmental philosophies" on which Guyana's social and economic development will be based underlying the importance of the respect of the environment and its sustainability in all forms of physical and social development and defines Guyana's principal environmental policy objectives as follows:

- to enhance the quality of life of the country's inhabitants by utilizing its natural resources while neither degrading nor contaminating them;
- to ensure that the natural resource base for economic growth continues to be available in the future; and
- To intensify and widen the dimensions of our living standards through the conservation of unique habitats, natural treasures, biodiversity and our cultural heritage.

3.1.4 Guyana Poverty Reduction Strategy Paper (PRSP), 2001

The Guyana PRSP of 2001 in line with the Millennium Development Goals defined its policy objectives for minimizing the impact of environmental degradation and the strategy for their achievement by enforcing the provisions of the Environmental Protection Act, promoting public awareness and involving local communities in vulnerable ecosystems management and conservation of the resources of protected areas.
In addition, the PRSP included the reinforcement of the EPA capacities and the enhancement of its role of audit, monitoring and ensuring the compliance to environmental standards and the application of the environmental management plans.

"The Government's goal in the sanitation sector is to improve the sanitary conditions of the population of Georgetown and to reduce the current levels of environmental degradation through improvement in the quality and availability of the water supply and sewerage services".

3.1.5 UNEP Cartagena Policy

Guyana's Cabinet has approved the accession to Cartagena Convention and its three Protocols on June 17th, 2010. The accession becomes official when the Government submits its instruments of accession for official recording by the Depository for the Convention located in Cartagena, Columbia.

The Cartagena convention is a convention for the protection and Development of the Marine Environment in the Wider Caribbean Region that was adopted in Cartagena, Colombia on 24

March 1983 and entered into force on 11 October 1986, for the legal implementation of the Action Plan for the Caribbean Environment Programme.

The Convention is supplemented by three protocols:

Cartagena Convention Article 7: POLLUTION FROM LAND-BASED SOURCES

The Contracting Parties shall take all appropriate measures to prevent, reduce and control pollution of the Convention area caused by coastal disposal or by discharges emanating from rivers, estuaries, coastal establishments, outfall structures, or any other sources on their territories.

Cartagena Convention Article 12: ENVIRONMENTAL IMPACT ASSESSMENT

As part of their environmental management policies the Contracting Parties undertake to develop technical and other guidelines to assist the planning of their major development projects in such a way as to prevent or minimize harmful impacts on the Convention area.

Each Contracting Party shall assess within its capabilities, or ensure the assessment of, the potential effects of such projects on the marine environment, particularly in coastal areas, so that appropriate measures may be taken to prevent any substantial pollution of, or significant and harmful changes to, the Convention area.

With respect to the assessments referred to in paragraph 2, each Contracting Party shall, with the assistance of the Organization when requested, develop procedures for the dissemination of information and may, where appropriate, invite other Contracting Parties which may be affected to consult with it and to submit comments.

The Cartagena convention has not yet entered into effect for Guyana, however the GoG's goal is to get aligned with the different protocols. The present project is concerned mainly with the LBS protocol with respect to the discharge of effluents into the Convention protection area and the definition of the effluent limitations and the effective date of obligation for achieving these limitations.

Effluent limitations are defined as a function of the classification of the receiving water body, divided into Class I Waters and Class II Waters as follows:

Class I Waters are *waters in the Convention area that, due to inherent or unique environmental characteristics or fragile biological or ecological characteristics or human use, are particularly sensitive to the impacts of domestic wastewater.*

Class II Waters are waters in the Convention area, other than Class I waters, that due to oceanographic, hydrologic, climatic or other factors are less sensitive to the impacts of domestic wastewater and where humans or living resources that are likely to be adversely affected by the discharges are not exposed to such discharges.

Discharges into Class I Waters

Each Contracting Party shall ensure that domestic wastewater that discharges into, or adversely affects, Class I waters is treated by a new or existing domestic wastewater system whose effluent achieves the following effluent limitations based on a monthly average:

Parameter	Effluent Limit
Total suspended solids	30mg/L*
Biochemical oxygen demand (bod_5)	30mg/L
Ph	5-10 Ph Units
Fecal coli form(parties may meet effluent limitations either for fecal coli form of for e. Coli (freshwater) and enterococci (saline water)	- Fecal Coli Form: 200 Mpn/100 Ml; Or - E. Coli: 126 Organisms/100ml; - Enterococci: 35 Organisms/100 Ml
Floatables	*Not visible*
** Does not include algae from treatment ponds*	

Discharges into Class II Waters

Each Contracting Party shall ensure that domestic wastewater that discharges into, or adversely affects, Class II waters is treated by a new or existing domestic wastewater system whose effluent achieves the following effluent limitations based on a monthly average:

Table 3.1: LBS Protocol effluent limits for discharges into Class II Waters

Parameter	Effluent Limit
Total Suspended Solids	150mg/l*
Biochemical Oxygen Demand (BOD_5)	150mg/l
pH	5-10 pH Units
Fats, oil, and Grease	50mg/l
Floatables	Not visible
* Does not include algae from treatment ponds	

Currently a small portion of the sludge generated by the Shelter Belt Plant is discharged into nearby drains the lead to the Demerara River: A mitigation program under the WSSIIP is planned to characterize the sludge and develop a plan for the control and appropriate disposal. (Please see Section 5.3, Potential Impacts during Operations Sage)

With regards domestic wastewater, the provision of treated water is not projected to increase effluent discharges from homes. Although the program will finance significant interventions to improve the water supply service in the program areas, it is projected that the volume of water supplied to the program areas will not increase significantly in the future, on the contrary, reductions are expected. This is due to the fact that the WSIIR Program will also comprise an extensive Non-Revenue Water (NRW) program which will aim at reducing NRW levels to 45%. (See details in Section 5).

3.2 National Environmental Action Plan, 1994

The National Environment Action Plan (NEAP) developed in 1994 outlined the Government of Guyana's main environmental policy objectives for sound management of the environment and natural resources. Twelve policy objectives were outlined. One of the policy objectives calls the GoG to request the carrying out of environmental assessments for proposed development activities that may significantly affect the environment. In keeping with this environmental policy objective, the **Environmental Protection Act** was made law in June 1996 and the legal framework for undertaking an environmental impact assessment was outlined.

The **Environmental Protection Agency** was established under the Environmental protection Act that outlines the legal process for undertaking sustainable and effective management of the environment and its natural resources. The national plan was updated in 2000 setting out the environmental development strategy for Guyana for the next five years. It states Guyana's Policy position as 'sustainable development that integrates economic, environmental and social values during planning, and recognizes the need to distribute benefits equitably across socio-economic strata and gender upon implementation.' The main goals of protecting the environment as defined in the plan are:

(i) The prevention or control of pollution in order to maintain the integrity of the land and the natural purity of the air and water resources;

(ii) The general preservation and conservation of ecological integrity and the protection of natural habitats and fragile ecosystems in particular;

(iii) Ensuring sustainability through best practice of the management and use of natural resources for economic development.

3.3 Environmental Protection Act and Agency, 1996

The **Environmental Protection Agency** was established through the Environmental Protection Act (1996); its identified functions consist in providing for the management, conservation, protection and improvement of the environment, the prevention or control of pollution, the assessment of the impact of economic development on the environment and the sustainable use of natural resources.

Therefore the Environmental Protection Agency is the agency under which GWI's environmental activities are regulated.

The Environmental Protection Act mandated four functions for the EPA which relate to environmental assessment and are applicable to this project as follows:

1 To take such steps as are necessary for the effective management of the natural environment so as to ensure conservation, protection and sustainable use of natural resources;

2 To promote the participation of members of the public in the process of integrating environmental concerns in planning for development on a sustainable basis;

3 To ensure that any development activity which may cause an adverse effect on the natural environment be assessed before such activity is commenced and that such adverse effect is taken into account in deciding whether or not such activity should be authorized.

4 To give development consent this entitles the developer to proceed with the project.

The Environmental Protection Act has led to the preparation of the Environmental Protection Regulations enacted in 2000. These are:

- The Environmental Protection Air Quality Regulations
- The Environmental Protection Water Quality Regulations
- The Environmental Protection Noise Management Regulations
- *The Environmental Protection Hazardous Wastes Management Regulations*
- The Environmental Protection Authorizations Regulations

This Act is applicable to the project due to its potential to impact the environment.

3.4 Environmental Protection (Authorizations) Regulations 2000

Regulations on Hazardous Waste Management, Water Quality, Air Quality and Noise Management were established, in 2000, under the Environmental Protection Act. These pollution management regulations, which would be applicable to this project, were developed to regulate and control the activities of development projects during construction and operation. The EPA has the responsibility to ensure the compliance of all new activities to these regulations by issuing the required authorizations and monitoring their application.
The Environmental protection regulations are described here after.

3.4.1 Environmental Protection Air Quality Regulations 2000

Environmental Protection (Air Quality) Regulations were developed in 2000 under the Environmental Protection Act 1996. In accordance with these regulations anyone who emits any air contaminant in the construction, installation, operation, modification or extension of any facility related to industry, commerce, agriculture or any institution shall apply to the EPA for an environmental authorization and shall submit an application to the EPA at least ninety days before the date on which the emission is to commence.

During the construction phase, this project is expected to produce dust from excavation activities and air emissions from the construction equipment and trucks. These emissions have **a short-time reversible impact** limited to the construction phase, where the contractor will be required to apply mitigation measures for reducing their impact such as using dust suppression techniques by applying water to minimize dust from vehicle movements, increasing moisture content of fill material and using covers for onsite stocked material and excavated earth as described in **Chapter 6**.

In accordance with the Regulations the EPA shall establish the desirable air pollution limits and may use measuring instruments for the purpose of assessing the air quality. EPA may also

prepare Air Pollution Monitoring Index for the project area, defining an Air Advisory Level and First Air Pollution Alert for monitoring the air quality and, when needed, the EPA and the Ministry of health may order the curtailment of air pollution sources' activities.

Currently, no National Air Quality Standards exist, however the WHO Ambient Air Quality guidelines (2007) presented in**Error! Reference source not found.** Table 3.3, WHO Air Quality Standards, can be adopted as a reference.

Table 3.3: WHO Air Quality Guidelines

POLLUTANT	AVERAGING PERIODS	GUIDELINE VALUE (µg/m^3)
Nitrogen Dioxide (NO_2)	1-hour average	200µg/m^3
Particulate Matter (PM_{10})	24-hour average	50µg/m^3
Sulphur Dioxide (SO_2)	24-hour average	125µg/m^3

3.4.2 Hazardous Waste Management Regulations 2000

These regulations outline the rules and procedures for transport, storage, treatment and disposal of hazardous wastes. There are no regulations for the management of hazardous substances. These regulations are intended to ensure, through the environmental authorization process, that all operations that generate, transport, treat, store and dispose of hazardous wastes are managed in a manner that protects human health and the environment. The regulations allow for the provision of information on the types of facilities and quantity of hazardous waste generated, treatment standards and efforts to reduce the waste generated. An emergency preparedness plan is required for anyone who operates a hazardous waste facility.

The project construction is not expected to produce any toxic or hazardous material waste. The use of fuel for the equipment and some lubricants at the construction site is not subject to authorization, however the contractor will be required to apply safety procedures and to use secondary containment in case of fuel or oil storage on site to avoid spill accidents.

3.4.3 Environmental Protection Water Quality Regulations 2000:

These regulations require registration and environmental authorization by any person whose construction, installation, operation, modification or extension of any facility relating to industry, commerce, agriculture, institution or sewage cause the discharge of effluents. These regulations cover parameter limits of effluent discharges, new sources of effluent discharges, fees for registration and environmental authorization, sampling points, records and reports and general provisions for the registration of water effluent, biological integrity, spills or accidental discharges and standard methods of analysis. Guidelines on the discharge of effluents and disposal of sludge are detailed in these regulations.

In accordance with the Environmental Protection Water Quality Regulations (2000), the EPA was mandated to establish parameter limits for concentration of constituent of effluent which can be discharged into any inland or coastal waters or lands of Guyana. No standards are available today, and no monitoring arrangements for water effluent are presently in place.

In recognition of this situation, together with a number of countries from the wider Caribbean, Guyana ratified the Convention for the Protection and Development of the Marine Environment in the WCR, also known as the Cartagena Convention (adopted in Cartagena, Colombia on March 24, 1983), and signed the Protocol on Land Based Sources (LBS) of Marine Pollution, which was adopted on October 6, 1999. The LBS sets several goals to govern domestic sewage discharges into the waters of the Wider Caribbean.

Within this framework, the "Caribbean Regional Fund for Wastewater Management Project" (GRT/FM-12725-RG) was approved in 2011 to provide the mechanism to initiate a long-term frame work for addressing wastewater issues in Guyana. The "CRFW "program aims to mobilize investments in wastewater management operations, looking at treatment opportunities.

In particular, under the CRFW, financed by the Global Environment Facility (GEF), the Bank is partnering with the United Nations Environment Programme to implement pilots in different countries, with the goal of mobilizing investments in wastewater management in the wider Caribbean region. Guyana has been selected as one of the pilots, whereby $3 million is allocated to finance wastewater projects based on financially sustainable principles and with engagement from both the public and private sector entities.

Currently, a number of projects are being apprised within the CREW framework, including projects to deal with sludge disposal and treatment, wastewater treatment, treatment of leachate. Also, within the ATN/OC-14086-GY (Support for the Preparation of a Water Supply and Sanitation Infrastructure Improvement Program), a study is being prepared to assess the possibility to convert the Tucville sewer receiving facility into a wastewater treatment facility. Finally, it is worth mentioning that GWI has also presented to the attention of the authorities a proposal for the construction of a wastewater treatment plan for the Georgetown sewer system.

As a reference for effluent limits, Table 3.4: Effluent Limits of WBS and LBS Protocols presents a comparison of the WB and LBS protocol limits of the main parameters for sewer effluents discharged in water bodies.

Table 3.4: Effluent Limits of WB and LBS Protocols

Parameter	Unit	WB	LBS Class I Waters	LBS Class II Waters
TSS	mg/l	50	30	150
BOD_5	mg/l	50	30	150
PH	units	6-9	5-10	5-10

Fats, Oil and Grease	mg/l	10	15	50
Fecal Coliforms	mpn/100ml	<400	200	-

The effluents and sludge generated by the treatment plants need to be characterized to establish protocol for management and disposal. Based on that analysis it could be determined which would be most applicable regulation. The proposed treatment processes and identified water sources (Coastal Aquifer and EDWC) are projected to have effluents within the established discharge limits, a monitoring program should be put in place.

3.4.4 Water (Potable) Quality Standards

WHO standards for potable water have been adopted since no national standards exist and also because. Guyana's laws or regulations do not address technical standards for potable water quality: the national water quality regulations do not address potable water quality. The WHO Guidelines for Drinking-Water Quality 3rd Edition have been used as a guide by GWI for their treatment plants, with a relaxed standard for iron (see **Table 3.5**). These standards have also been adopted by the Ministry of Health (MoH) for its monitoring and surveillance programs.

The relaxed standard for iron was in response to the naturally occurring high levels of iron in most sources of waters in Guyana; the reduction of these levels requires expensive treatment. This and the fact that iron is not detrimental to health, justified the relaxed standard for iron. High levels of iron can cause bad tasting drinking water and stain laundry. This in turn can give rise to poor public perceptions about the quality of water received.

Table 3.5: Current Reference Water Quality Standards

Parameters	GWI Standards	Notes
PH	6.5 – 8.5	No WHO health-based guideline value
Turbidity	<5 NTU	Above 5, the water appearance is not appealing to consumers. *1 NTU is the desirable value that should be achieved
Aluminum	0.2 mg/l	There is currently no health-based guideline value for Aluminum due to limitations of available health data.
Iron	0.5 mg/l	No WHO health-based guideline value; GWI uses a relaxed value 0.5 mg/l
Chlorine	0.2 mg/l	Disinfectant of distribution system
Fecal Coliform/E Coli	0	
Total Coliform	0	WHO recommends 0 Coliforms as an indicator of adequate disinfection

The treatment processes established for the existing treatment plants and proposed for the new plants have been demonstrated to meet the proposed water quality standard, WHO with relaxed iron, as presented in Table 3.5: Current Reference Water Quality Standards. (See Section 4.8, Water Quality Baseline).

3.4.5 Environmental Protection Noise Management Regulations 2000

Under these regulations operations that emit noise in the execution of various activities such as construction, transport, industry, commerce and any institution are required to apply to the Agency for an environmental authorization. The EPA is responsible for the establishment of standards for permissible noise levels in industry, construction and other areas. The EPA may grant authorization for noise emission unconditionally or subject to conditions and may require environmental audit procedures. The Guyana National Bureau of Standards (GNBS) and the EPA together with other relevant agencies developed Guidelines for Noise Emission into the Environment as presented in the following table.

Table 3.6: Guyana Standard Guidelines for Noise Emissions into the Environment

Categories	Daytime Limits in dB (A)	Night-time Limits in dB(A)	
Residential	75	60	
Institutional	75	60	
Educational	75	60	
Industrial	100	80	
Commercial	80	65	
Construction	90	75	
Transportation	100	80	
Recreational	100	18:00 - 01:00 h	100
		01:00 – 08:00 h	70

The equipment and work engines are expected to emit noise during working hours. Application to the EPA for Environmental permit will cover noise management during construction and operation phases.

Daytime: 06:00h – 18:00h; Night-time 18:00h – 06:00h.

3.5 GWI and Water and Sewerage Act, 2002

The Water and Sewerage Act of 2002 is an Act providing for the ownership, management, control, protection and conservation of water resources, the provision of safe water, sewerage

services and advisory services, the regulation thereof and for matters incidental thereto or connected therewith.

Under the Water and Sewerage Act 2002, **Guyana Water Incorporated (GWI)** was established on May 30, 2002, resulting from the merger of the Guyana Sewerage and Water Commission (GS&WC) and the Guyana Water Authority (GUYWA).

The current project is committed by GWI and has to conform to its regulations. For what environment and social issues are concerned, the project shall follow the following GWI Guidelines:

- GWI Corporate Environmental Guidelines January 2005
- Environmental Guidelines for Construction Projects and Environmental Assessment, Written in Conjunction with the World Bank, February 2005.

The mission of GWI is:

"*To deliver safe, adequate and affordable water and to ensure safe sewerage systems for improved public health and sustainable economic development****".***

3.5.1 GWI Corporate Environmental Guidelines - January 2005

The GWI Corporate Environmental Guidelines are meant to improve the GWI's social and environmental performance. The guidelines are split into three sections:

- GWI's mandate and environmental and social responsibilities
- GWI's environmental and social guiding principles
- GWI employees' roles and responsibilities

The major guiding principles ruling this project are the following:

GWI will conduct its business in keeping with the Environmental Protection Act and regulations therein;

GWI will apply to the requisite National Authority for an environmental permit for all projects in excess of G$ 5M. If deemed necessary, Environmental Impact Assessments (EIAs) will be carried out (new EIAs may not be required if a similar project already has an EIA). Notwithstanding, environmental screening will be carried out for all activities. Projects in excess of G$ 5m will be guided by environmental management plans (EMPs), describing in detail the steps and actions required to comply with the EPA and regulations therein;

GWI will implement and maintain a compliance strategy based on environmental audits to verify compliance with GWI environmental policies and specific EMP;

GWI will implement and maintain an environmental monitoring program to assess the impact of its interventions and continued operation on the environment, and the impact the environment is causing in its works.

- GWI interventions would be designed to: (I) avoid whenever possible or minimize its impact on biodiversity and natural habitats; (ii) reduce potential negative public health risks; (iii) minimize the need for involuntary resettlement; (iv) provide safeguards for

physical cultural property; and, (v) reduce the emission of greenhouse gases and implement climate change mitigation measures.

- GWI welcomes community participation and dialogue at all levels. At project level during planning and before implementation GWI will introduce the project, its components, contractor(s), and GWI's contact personnel to the community, and community concerns will be incorporated as appropriate.
- GWI will approach the community utilizing appropriate communication channels and through cultural sensitive expressions.

3.5.2 GWI Environmental Guidelines for Construction Projects and Environmental Assessment, February 2005

This document was written in 2005 in conjunction with the World Bank in response to a request by the World Bank to ensure mechanisms were be in place that would take environmental issues into account should the bank decide to fund future capital investment within GWI. The guidelines are now a mandatory component of any project over GYD 5M carried out either by GWI, or by subcontractors on its behalf. **The application of GWI guidelines is consequently mandatory to the current project.**

The GWI environmental guidelines outline the general environmental and social principles guiding GWI to serve as a basis for design and construction of civil works (pipelines, pump stations, etc.), requiring to avoid or minimize the generation of negative social and environmental impacts and public nuisances on population, residents and businesses. When negative impacts cannot be avoided the implementation of mitigation measures and when possible the identification of alternative solutions will be required with emphasis on the importance for public and community consultations and community participation.

For all projects (or sub-projects) greater than GYD 5M in contract value, a project specific EIA screen shall be performed according to a checklist template included in the Guidelines for the first assessment of possible negative social and environmental impacts of the project. For screening purposes, impacts are only assessed as positive versus negative and major versus minor. Negative impacts are characterized as either "minor" or "major". In general, minor impacts are temporarily visible or otherwise notable changes while major impacts generally are permanent and require significant mitigation such as resettlement. The EPA will be consulted to identify best practices for all major issues identified through the screening process. Typically, any potential major impacts will require further studies to assess the sensitivity of the issue, extent of impact and best practice for mitigation and a project specific ESMP shall be developed in accordance with guidelines from the EPA.

In addition, the *GWI Environmental Guidelines* define the basic environmental and social considerations to be addressed during the project planning and design phases as well as during construction activities and for environmental and social supervision during construction. It also defines the procedures for public participation, consultation and information activities to be implemented in coordination between the Contractor and the GWI.

The Design Consultant shall consider these guidelines to the extent practical during project planning and design and while drafting the bidding documents for construction works.

It is deemed that GWI Guidelines for construction projects and environmental assessment elaborated in 2005 represent an exhaustive document well adapted to the type of construction projects usually implemented by GWI. Since the Guidelines' publication, project screening procedures have been successfully applied on the Linden Water System Rehabilitation Project.

GWI will ensure the continued implementation of the construction guidelines for all the projects.

In conformity with the GWI guidelines, a preliminary screening checklist identifying the significant potential impacts of the WSSIIP has been prepared and is presented in Annex 1. This checklist is the basis for the complementary document, the WSSIPP Environmental and Social Management Plan (ESMP). The WSSIIP ESMP has been prepared and is being finalized.

3.6 Environmental Impact Assessment Guidelines

The Environmental Impact Assessment Guidelines are outlined by the Guyana EPA in the following documents:

- Environmental Impact Assessment Guidelines Volume 1, Rules and Procedures for Conducting and Reviewing EIAs, version 4, dated November 2000
- Environmental Impact Assessment Guidelines Volume 2, Generic, version 4, dated November 2000

As mentioned in the above paragraphs, for water and wastewater projects, EIAs are only required in the case of major impacts identified in the preliminary environmental impact screening checklist.

A summary of that EIA process established by the EPA is detailed below:

Commencement of the environmental impact assessment process is preceded by an application for an environmental authorization and a summary of the project including information on the site, design and size of the project, possible effects on the environment and a non-technical explanation of the project. The Environmental Protection Agency would then indicate whether an environmental and social impact assessment is a mandatory requirement for the issuance of an environmental authorization for the operation.

When an EIA is required, a draft Terms of Reference is prepared and submitted to the EPA. After that submission, the EPA publishes a notice of the project in at least one daily newspaper. A summary of the project is made available to members of the public for a period of 28 days. Within this period the EPA accepts written submissions to the Agency related to the project. These submissions detail questions and matters which members of the public consider relevant

to the deliberations of the EIA. A public consultation meeting is held after this 28 day period. Additional concerns of the public are noted at this forum and the EPA provides comments to the ESIA Consultants for finalization of the Terms of Reference (TOR) of the EIA. This meeting is chaired by the Environmental Protection Agency and a member of the Environmental Assessment Board (EAB) is present at that meeting. The Environmental Assessment Board is a body which provides an independent contribution to the development and finalization of the EIA and makes recommendations which uphold the principles of the EP Act in the context of the interests of the developer, the public and the regulatory agencies. In order to carry out its functions, the EAB is involved in the development of the ESIA from the point of ESIA scoping to establishing conditions for the issuance of an Environmental Permit.

During the environmental impact process the Developers and Consultants are required to consult members of the public, interested bodies and organizations and also provide to members of the public on request, and at no more than reasonable cost, copies of information obtained for the purpose of the EIA. The Developer and Consultant must submit to the EPA, the ESIA report along with an Environmental Impact Statement (EIS) for evaluation and recommendations.

Every environmental impact assessment is required to contain a description of the project, an outline of the main alternatives studied and reasons for choices, a description of significant effects of the development on the environment, an indication of any difficulties encountered by the developer in compiling information for the ESIA, a description of the best available technology, a description of any hazards or dangers which may arise and a risk assessment of same, a description of mitigation measures for any adverse effects, a monitoring plan and an emergency response/contingency plan and a program for rehabilitation and restoration.

The decision by the Agency to grant an environmental authorization for a project shall be subject to conditions, which are reasonably necessary to protect human health and the environment. The ESIA must be completed to conform to the TOR and copies submitted to the EPA for review and public comment. The EPA subsequently publishes a notice in at least one daily newspaper notifying the public of the submission of the ESIA. The public has 60 days from the publication date of the notice to make submissions to the EPA and/or the EAB related to the EIA. The EPA, along with relevant sector agencies review the EIA during this sixty days period to ensure that the EIA is in line with any plans, guidelines, regulations or codes of practice developed by the EPA and sector agencies. Copies of the EIA and the findings of the review by EPA and sector agencies are passed to the EAB for review and recommendation. A public meeting, chaired by the EPA may be held, if considered necessary, at the end of the 60 days period. Additional comments are provided by members of the public at this meeting.

A final EIA is then prepared to address the comments of the EPA, the sector agencies, the public and the EAB to address issues in the TOR initially agreed to but excluded from the EIA. The EAB will then recommend to the EPA whether the EIA is acceptable and the conditions to be attached to the Environmental Permit, should it be granted. The EPA takes into account the recommendations of the EAB and sectorial agencies, comments of the public and its own review, and decides whether or not the project should be approved.

For approved projects, the EPA issues an Environmental Permit with the terms and conditions necessary to effectively manage the environment. If an Environmental Permit is not granted, the developer can file an appeal within 28 days with the Environmental Appeals Tribunal (EAT). The EAT is a superior court of record and has in addition to the jurisdiction and powers conferred by the EP Act, all the powers inherent in such a court. The Tribunal has the power to enforce its own orders and judgments and the same power to punish contempt as the High Court of Justice. The EAT has the jurisdiction to hear and determine appeals against:

1 The refusal of an Environmental Permit;
2 The requirement of an Environmental Permit;
3 Cancellation or suspension of an Environmental Permit.

For the specific case of the WSSIIP this ESA has been prepared to respond to the IDB requirements for the project approval and funding. The process for development and review of the project ESA is illustrated in Figure 3.1, EPA/IDB Environmental Impact Assessment Process

In this preliminary phase of the project design, this document will be submitted to the EPA for their review and will be discussed during the planned public consultation meeting. The Consultant shall integrate the comments of the EPA and other stakeholders in the final version of this document.

Following the completion of the Draft ESA, the draft environmental permit application was submitted by GWI to the EPA for review. The EPA has determined that in order to process the Environmental Permit Application, a separate environmental permit will be required for each of the program areas. The permit applications have been revised and will be submitted to by April 15, 2015.

The granting of the environmental permits is a necessary precondition before the bidding process for the works under the WSSIIP Program.

3.7 IDB Policies and Regulations

Collectively three specific IDB policies provide guidance for the planning and execution of environmental assessments for the WSSIIP. These are Environment and Safeguards Compliance Policy (OP 703), Disclosure of Information Policy (OP-102), Disaster Risk Management (OP 704), and Basic Environmental Sanitation Policy (OP 745)

As part of the IDB Environmental and Safeguards Compliance Policy, B.3 for Screening and Classification requires that all bank financed operations shall be screened and classified according to their potential environmental impacts. Operations are classified according to the following categories:

Category A: "Any operation that is likely to cause significant negative environmental and associated social impacts, or have profound implications affecting natural resources"

Category B: "Operations that are likely to cause mostly local and short-term negative environmental and associated social impacts and for which effective mitigation measures are readily available"

Category C: "Operations that are likely to cause minimal or no negative environmental and associated social impacts"

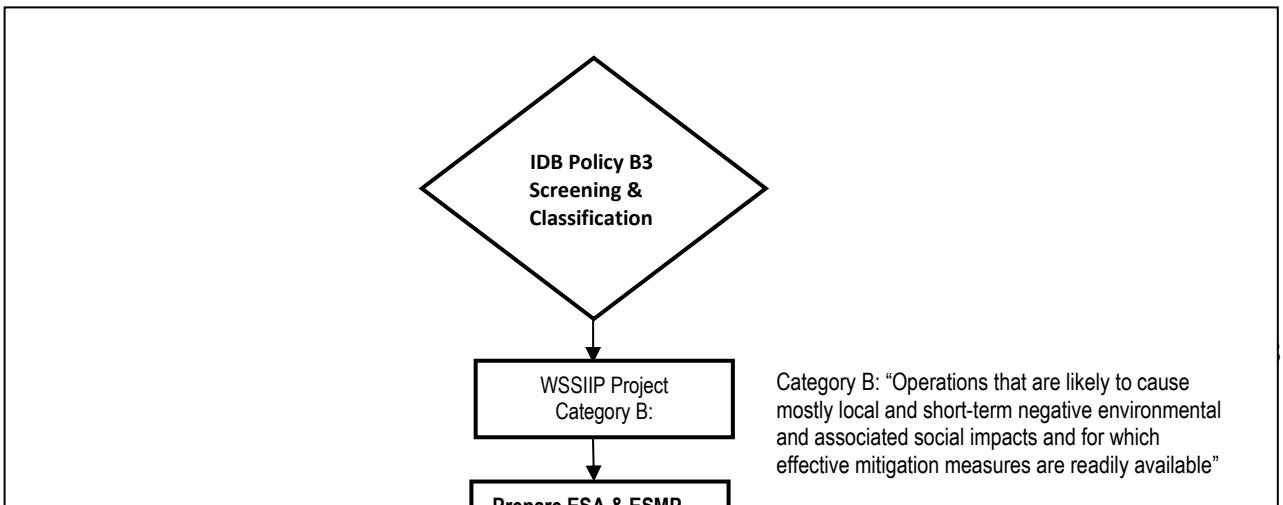
The present proposed interventions for this project are classified as Category B requiring an environmental and social analysis and an environmental and social management plan (ESMP). The environmental and social impacts associated with the WSSIIP projected to the minor, short term and temporary as is demonstrated in Section 5.0, Environmental and Social Impacts, of this ESA.

The IDB policy (B.5) further requires that the borrower prepare adequate EA and documentation including a minimum screening and scoping for impacts, analysis of compliance to local and regional legislations, and timely and adequate consultation and information dissemination process. The ESA shall also be supported by economic cost-benefit assessment of the project's environmental impacts and/or the associated protection measures.

The policy also allows for the EA to be completed without undergoing the EIA process. This ESA satisfies the policy requirement.

Section B.6, Consultation, requires that consultations be conducted with affected parties and stakeholders and that their views are taken into consideration. This policy complements the Disclosure of Information Policy (OP-102) which requires that the ESA report be prepared with its ESMP and disclosed to the public prior to the analysis mission.

In conformity with the IDB policy this ESA with its associated ESMP has been prepared. Public consultations have been held with affected parties and other stakeholders in February and March 2014. The report of the public consultations, including the main concerns, is presented in Annex II, Public Consultations. The final version of the ESA will enclose the comments and discussions from public consultations.



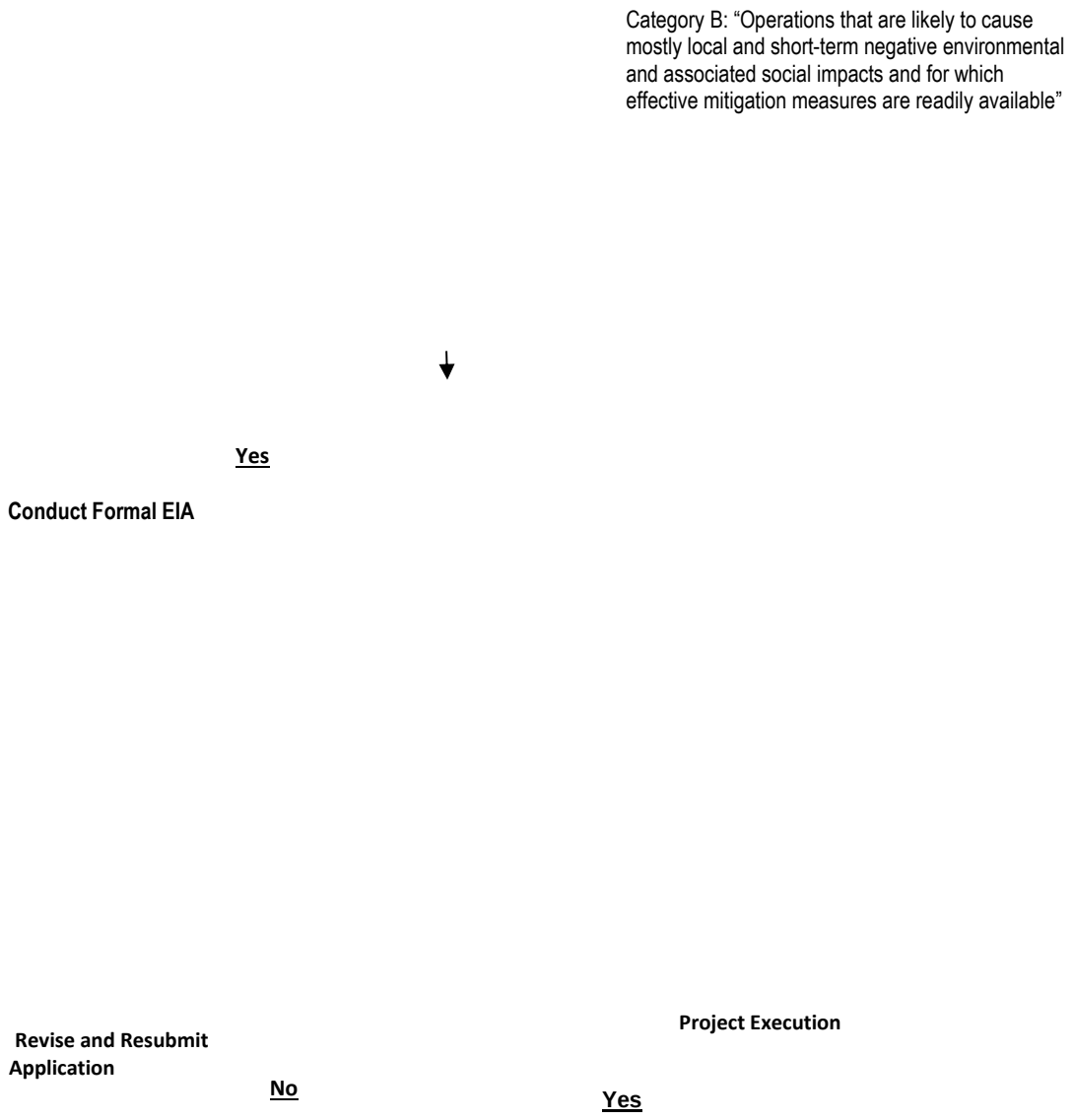


Figure 3.1: EPA/IDB Environmental Impact Assessment Process

The ESA has been disclosed **on the GWI and IDB websites** prior to the submission of the project to the IDB board for the loan agreement early April 2014.

The project ESA also satisfies Section B.11, Pollution Prevention and Abatement, of the Environment and Safeguards Compliance Policy (OP 703). The policy requires that operations and projects *"include as appropriate, measures to prevent, reduce or eliminate pollution emanating from their activities*" and that they "*follow source-specific emission and discharge standards recognized by multilateral development banks*". The WSIIP GY- L1040 project follows

the discharge standards established by the UNEP Cartagena Convention and the Environmental Protection Water Quality Regulations 2000.

IDB Disaster Risk Management Policy (OP 704) aims to prevent or reduce risk exposure due to natural hazards. The environmental and social assessment (screening and classification) process has assessed the exposure to natural hazard to identify mitigation measures accordingly, (see Section bellow)

The ESA recommendations and the ESMP shall be incorporated in the detailed design and tender documents, where a budget shall be allocated for the implementation and the monitoring of application of the ESMP and the safeguard measures during the project execution.

The WSIIP ESA and ESMP reflect the goals of the Basic Environmental Sanitation Policy (OP745). The Policy supports the following:

- Rational use of natural resources through conservation and protection sources
- Extension of essential sanitation to low-income groups
- Promotes the parallel solution of the disposal of human wastes and waste water with the supply of potable water, and
- Participation of Beneficiaries in the planning, design and administration of projects.

Table 3.7: Governing and Applicable IDB Policies

IDB Policy	Ref.	ESA/ESMP Correlation
Disclosure of Information Policy	(OP-102)	• ESA report prepared along with ESMP, and • Disclosed to the public and located on IDB Web Site • Public Consultations held: ESA Section 7.0 and Annex II
Disaster Risk Management Policy	OP 704 (B11)	• ESA/ESMP identified and proposed mitigation measures for flooding (Natural Disaster)
Basic Environmental Sanitation Policy	OP 745	• The NRW program includes universal metering within the program areas outside Georgetown. In Georgetown, GWI is currently implementing a metering program covering this area of intervention. Public awareness campaigns to inform the introduction of water meters will also focus on water use and conservation. It has been observed that informed metered costumers change their water usage patterns in a more conservative way.

		• Rehabilitation of Distribution Networks • During the design stage of the project, public Consultations were Held in each of the program areas(see details in Section 8.0) • The issues related to poorly maintained pit-latrines will be addressed through a sanitation component targeting low-income households in selected targeted areas. The activities will follow the same implementation scheme of the successful IDB-financed Low Income Settlement Programs (2102/BL-GY). The provision of treated water is not projected to increase effluent discharges from homes. Although the program will finance significant interventions to improve the water supply service in the program areas, the volume of water supplied to the program areas will not increase significantly in the future, on the contrary, reductions are expected as a result of the NRW program and metering activities. This has been confirmed by the Feasibility Study (IDB 2014) commissioned by the IDB to support the preparation of this project, where the projected gross daily water use at the completion of the WSSIIP is 87Ml/ down from the current 105Ml/d.
Pollution and Prevention Control	B.11	• Main risks will be associated to construction works. The ESMP includes specific measures to address them, and the Contractor will be responsible for their implementation.

4.0 ENVIRONMENTAL AND SOCIAL CONDITIONS

This chapter provides a description of the existing environmental and social conditions within and adjacent to the program areas.

4.1 Project location

The component-systems of the WSSIIP are located in four distinct geographical areas or alignments; these are Georgetown, West Demerara (Cornelia Ida – De Kinderen), East Bank Demerara (Diamond- Herstelling) and East Berbice (Goed Bananen Land, Sheet Anchor – No 19 Village). The component systems are all located within the Coastal Plain of Guyana and experience the same climatic conditions. They also tap the same aquifer water for the source supply.

The location of the four component systems is illustrated in Figure 4.1, Map of Guyana, and Figure 2.1, Location of WSSIIP Component Water systems.

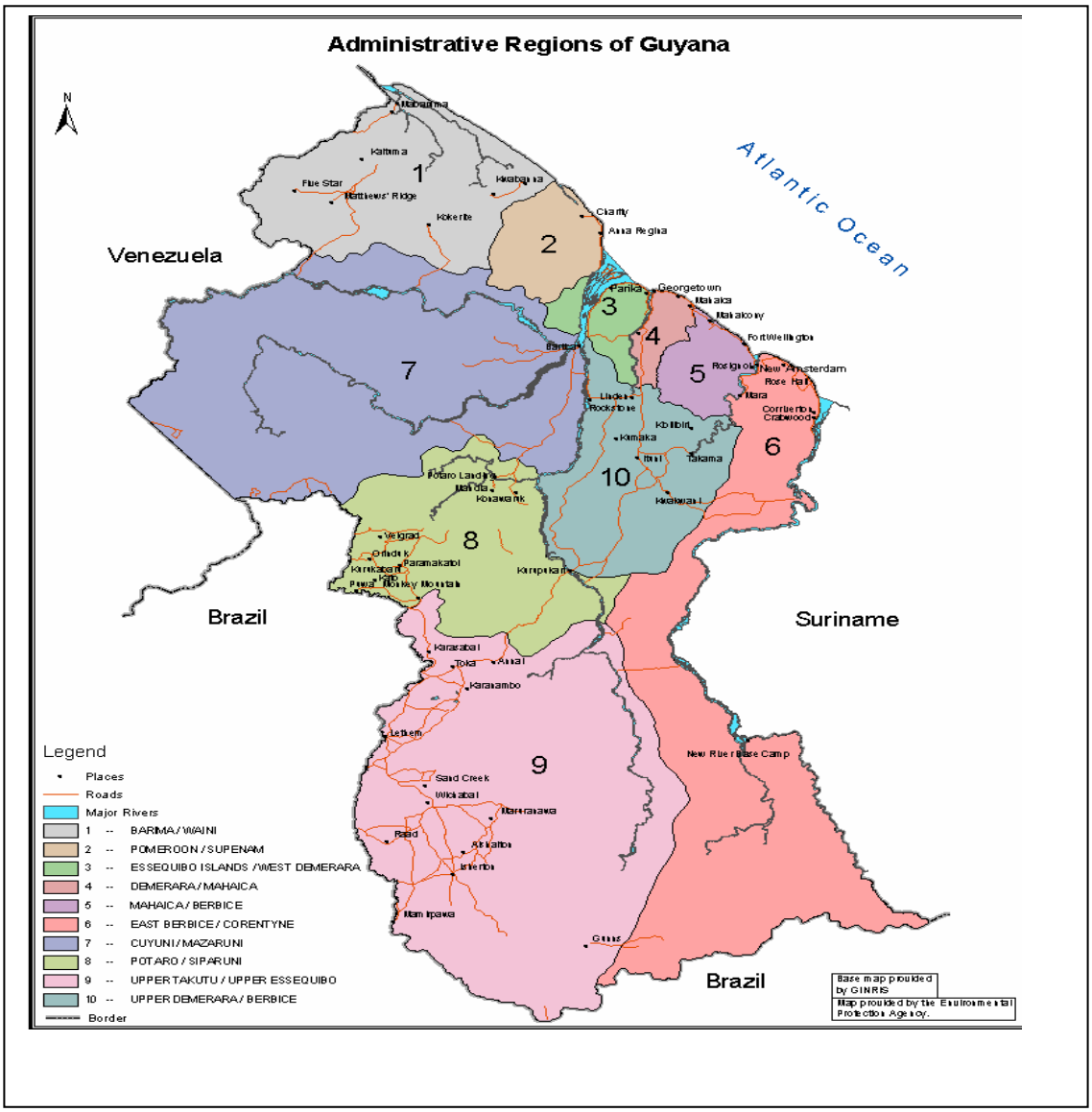


Figure 4.1: Map of Guyana (Source: State of the Environment Report for the Demerara

4.2 Morphology

The morphology of the locations of the four component water systems (located within the Coastal Plain) is similar with some site-specific variations. The Coastal Plain varies in width from about 10 miles in the West, to about 40 miles in the East. The coastal environmental reflects the influence of the Atlantic Ocean and drained naturally by a network of rivers and creeks. The region is generally below sea level; some sections being as much as 6 feet below the high tide mark. This low elevation makes drainage problematic and is supported by network of canals, dykes and controlled by pumps and sluices.

4.3 Soils

The fertile coastal- soils are acidic, greyish blue clays composed of alluvium from the Amazon River carried by ocean currents and deposited on the Guyana shores. The clays/mud overlies white sands and clays formed from the erosion of the interior bedrock and carried seaward by the rivers of Guyana. *Pegasse* soil, a type of tropical peat, occurs behind the coastal clays and along the river estuaries.

Extensive areas of swamps/wetlands occur within and long the Coastal Plan, formed when water flow from the interior is impeded.

4.4 Climatic Conditions

The climate across the Coastal Plain and the component water systems is tropical with two wet and two dry seasons occurring from mid-April to mid-August and in December and January. Annual rainfall is about 2300 mm, and most rainfall occurs from April to May.

The temperatures on the Coastal Plain are fairly constant, ranging from 16 to 39 degrees Celsius. July is the hottest month (average highs - 29 to 33 °C) while the February is the coolest month (average lows - 29 to 23 °C). Humidity averages around 70 percent.

Heavy precipitation results in ponding/pooling and large amounts of surface runoff.

4.5 Natural Disaster Risks

Guyana is not susceptible to many of the natural disasters such as volcanoes, hurricanes, tornadoes or earthquakes; they are extremely rare according to the UNDP risk index. Furthermore, although the rains are sometimes delayed, prolonged or severe, droughts are rare. Flooding is a major risk along the Coastal Plain, there has been three major floods over the last decade:

The 2005/2006 Flood had the following specific impact of the water system: "Wells are elevated 1 m above the ground therefore flood water did not affect the operation of these wells. However, the booster pumps and control building were affected after flood water raised and covered the pumps and some of the electrical. The plants had to be taken out of operation for a short period until the water receded and were expeditiously put back in operation about 6 days". (Ramchand Jailal, Director CIPD, Personal Communication, March, 7, 2014)

This susceptibility to flooding should be reflected in the design and construction schedules of the treatment systems. Sensitive electro-mechanical should be flood-proofed and placed on

elevated platforms as much as possible. Storage facilities for treatment chemicals should also reflect the propensity for flooding on the Coastal Plain.

Flooding is the most significant natural threat. The systems and settlements within the Coastal Plain depend on effective management of the movement of water south from the interior to the Coast. Flooding generally occurs with the confluence of high precipitation and high tides when the flow and discharge is impeded by high tides and impaired transmission and drainage systems.

Inundation due to flooding could possibly contaminate the water system where there are breaks in the pipeline and at defective valves and connections. Increased turbidity generally accompanies flooding. Waste stockpiles are susceptible to landslides during heavy rainfall and minor earth tremors from earthquake events centered in the Caribbean and neighboring regions.

Flooding could potentially aggravate the sanitation conditions fostered by the high incidents of pit latrines and a compromised water treatment and delivery system. Proposed mitigation is detailed in the WSSIIP ESMP and includes:

- Design of Treatment plants and facilities reflect Program Area's propensity to flooding
- Design and install valves, connections and fittings on transmission and distribution network to reflect Program Area propensity to flood.

4.6 Climate Change and Vulnerability Assessment

The climate change main impact is the increase of the frequency of the extreme weather conditions and the rise of sea level, the combined effect of both phenomena results in the increase of flooding risks due to heavy rains as well as the rise of the high water tide levels.

The design and location of the treatment plants and pumping stations should be informed by, and mitigated to address, the risks associated with climate change. Sections of the distribution network will be susceptible to flooding. Response to and recovery from flooding will be addressed in the proposed O&M Manuals for the new and rehabilitated treatment systems.

4.7 Hydrogeology of the WSSIIP Area

With the exception of the treatment system at the Shelter Belt, in Georgetown, which sources the East Demerara Conservancy Canal, all of the treatment plants within the WSSIIP Program Areas tap (water wells and boreholes) the Coastal Aquifer (see Figure 4.2: Geologic Cross-Section, Georgetown-Linden).

The coastal aquifer system is composed of a series of three separate, but hydro-geologically connected, aquifers. This aquifer has been providing water to the coastal inhabitants for the last century.

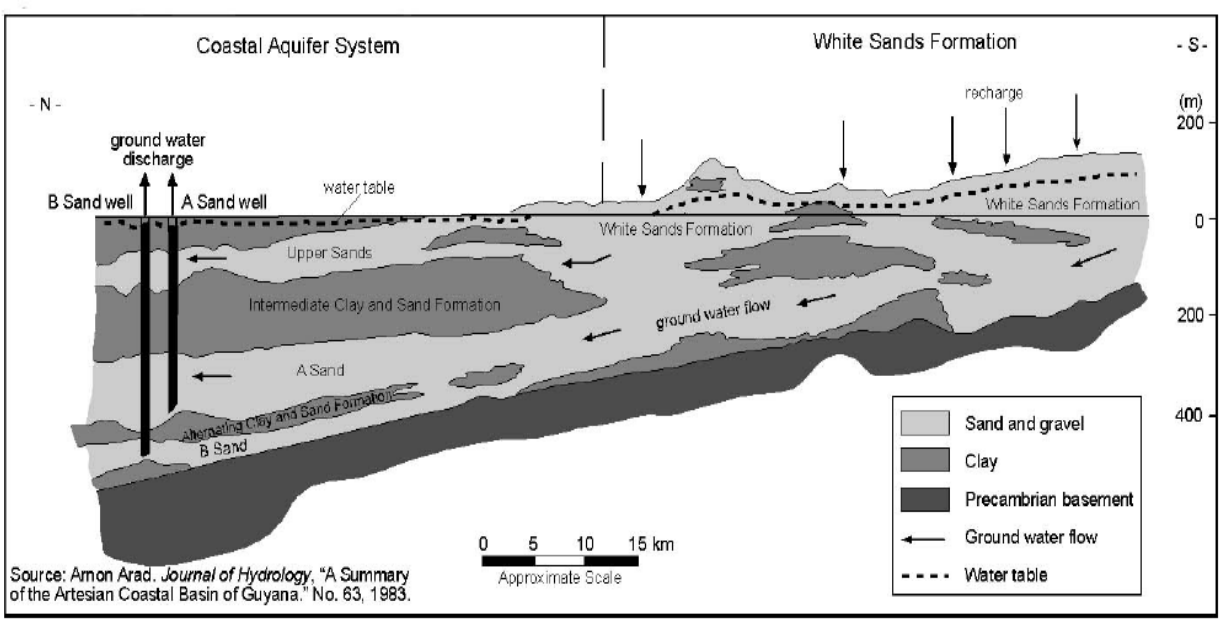


Figure 4.3: Geologic Cross-Section, Georgetown-Linden

The coastal aquifer system occupies a subsurface area of about 20,000 square kilometers, extending about 250 kilometers along the Atlantic coast and 40 to 150 kilometers inland. Sediments reach a thickness of 1,800 meters onshore and become progressively thicker offshore and towards the East.

The three aquifers are named, from upper to lower, the "Upper Sands", the "A Sand" and the "B Sand". Overlying layers of clays confine the lower two aquifers, protecting them from contamination from external sources.

The "Upper Sands " aquifer is 30 to 60 meters deep and ranges in thickness from 15 to 120 meters, being 15 meters the thickness under the capital town. It is the shallowest of the three aquifers of the coastal system. The "A Sand" aquifer is 150 to 220 meters deep and 12 to 27 meters thick.

The "B Sand" aquifer lies below the two above mentioned aquifers at depths of 350 to 800 meters.

The pumping levels have dropped noticeably over the last thirty years. And there has been an observed decline in both the static and dynamic water levels in the Coastal aquifer over the last 30 years (JICA 2010). The observed decline in static and dynamic levels, the reported increase in flow rates - in Divisions 1 and 2 could, possibly, be attributed to over pumping. This is an additional cause for concern because the sustainable yield and other critical hydrological characteristics of the tapped aquifer have not been adequately determined. The behavior or response of an aquifer is not necessarily linear; it is therefore important that the aquifer be characterized fully through monitoring, analysis and simulation (see Section 5.3: Potential Impacts during the Operations Phase).

Table 4.1 Observed Annual Decline in Static Water

Division	Number of location	Maximum (m)	Minmum (m)	Average (m)
1	8	1.12	0.16	0.59
2	17	1.73	0.24	0.79
3EBD	4	1.02	0.19	0.48
3ECD	13	0.62	0.16	0.32
3GT	1	-0.18	-0.18	-0.18
4	12	0.65	0.06	0.32
5	19	0.60	0.13	0.34

Source: JICA 2010

However, given the proposed project design, the installation of the WSSIIP system (IDB 2014) will actually see a net reduction in the extraction rates within the Program Areas, improving the current water extraction efficiency conditions and thus having a positive impact over the groundwater resources of the project area (see details in Sections 4.8.1 and 5.3.1)

4.8 Water Quality Baseline

A primary goal of the WSSIIP is to provide the Program Areas with potable water that meets or exceeds the standard set by the Government of Guyana. The standard is described as WHO (with relaxed iron). The relaxed iron provision is based the natural occurrence of elevated iron in most source waters in Guyana. The reduction of these levels requires expensive treatment. That, along with the determination that iron is not detrimental to health, justified the relaxed standard for iron.

The water quality baseline of untreated water sources (wells and treatment plant raw water) within the Program Areas is summarized in Tables 4.2, Water Quality (Averaged) 2011 – 2013 and Table 4.3. Water Quality (Raw Water Averaged 2013). The average pH values range from 5.5 to 6.21 which are below the range WHO values. Iron concentrations range from 0.99 to 4.30 mg/L which are all above the standard value for iron (0.5mg/l). The highest value is reported at Sheet Anchor which reflects the known high concentrations of iron in the Program Area.

Average Turbidity values range from 1.4 to 30.30 NTU; most of the values exceed the standard value of 5.0NTU. Total and Fecal Coliforms (treatment plants raw water) exceed the standard value of 0.0 CFU.

The baseline concentrations for the indicator parameters confirm the need for treatment.

Table 4.2: Water Quality (Averaged) 2011 - 2013

Well Station	pH	Iron (mg/L Fe)	Turbidity (NTU)
Cornelia Ida P/S	*5.96*	*1.59*	4.21
Diamond P/S	*5.66*	*2.08*	3.98
Sheet Anchor P/S	*5.50*	*4.30*	*30.30*
WHO (relaxed Iron)	**6.5-8.5**	**.5**	**<5.0**

Source: Feasibility Study for GY-L1040

Table 4. 3: Average Water Quality (Raw Water)

Treatment Plant	pH	Iron (mg/L)	Turbidity (NTU)	Total Coliform (CFU)	Fecal Coliform (CFU)
Shelter Belt	*5.32*	*1.88*	*9.49*	*60.00*	*34.45*
Sophia	*6.21*	*1.37*	3.20	*6.07*	*0.00*
Pouderoyen	*5.99*	*0.99*	1.40	*18.33*	*1.87*
WHO (relaxed Iron)	**6.5-8.5**	**.5**	**<5.0**	**0**	**0**

Source: Water Quality Data Provided by GWI; **(*) Denotes values outside the Range for WHO Standard.**

4.8.1 Treatment Process

The treatment process proposed for the new treatment plants at Sheet Anchor, Uitvlugt and Diamond has been used successfully at GWI plants that extract source water from the Coastal Aquifer. The Feasibility Study conducted in support of the WSSIIP (GY-L1040) confirms the continued application the treatment process.

A comparison of raw and final water from three plants (Shelter Belt, Sophia and Pouderoyen) indicates that the process is effective in treating source water from the Coastal Aquifer. However, as indicated in Table 4.4, Average Water Quality (Raw/ Final Water), and the final water after treatment do not completely satisfy the WHO Standard: Pouderoyen meets the Standards with the exception of Coliform bacteria which have not been removed as required. There is reduction in concentration of iron, the pH is increased, and turbidity is reduced.

The incomplete treatment reflects the current state of disrepair of the plants; both the shelter Belt and Sophia plants are to be rehabilitated as part of Component 1 of the WSSIIP.

Table 4.4: Average Water Quality (Raw/ Final Water)

Treatment Plant		pH	Iron (mg/L)	Turbidity (NTU)	Total Coliform (CFU)	Fecal Coliform (CFU)
Shelter Belt	Raw Water	*5.32**	1.88	*9.49*	*60.00*	*34.45*
	Final Water	6.61	1.77	*6.25*	*53.96*	*1.67*
Sophia	Raw Water	*6.21*	1.37	3.20	*6.07*	0.00
	Final Water	7.19	0.69	2.11	*5.59*	0.00
Pouderoyen	Raw Water	*5.99*	*0.99*	1.40	*18.33*	*1.87*
	Final Water	6.54	0.30	1.35	*5.00*	*0.29*
WHO (relaxed Iron)		**6.5-8.5**	**.5**	**<5.0**	**0**	**0**

Source: Water Quality Data Provided by GWI; (*) Denotes values outside the Range for WHO Standard.

4.9 Demography

The four communities in which the four component systems of the WSSIIP are being installed can fit into two classifications, urban and rural. The rural classification matches De Kinderen – Cornelia Ida and Goed Bananen Land, Sheet Anchor – No. 19 Village, while Georgetown and Diamond – Herstelling can be classified as urban.

Table 4.1: Population of Program Areas, details the population of the program areas, correlated the GWI Division, the Administrative Regions and the Communities Served by the Treatment and Component Systems.

Generally, in all Administrative Regions, there are slightly higher proportions of males than females. The exception is Region 4 where there are a slightly higher percentage of females. More than 50 percent of the population is below 30 years. However the percentage of older persons is increasing faster than other groups.

4.10 Social Conditions

This section provides summary descriptions of the Social Conditions within the Program Areas

4.10.1 De Kinderen – Cornelia Ida

The served-communities are part of Region 3 which is classified as an upper middle or less poor group (0.303) according to the Enumeration District Marginality Index (EDMI (Guyana Census 2002)). The primary employment sectors/industries are agriculture (rice, vegetables, coconuts and artisanal fishing, beef and dairy farming), service industries and construction, and National and local Government Agencies. Sugar cane and coconuts are cultivated on a smaller scale and there is also beef and dairy farming.

Table 4:5 Population and Program Areas

Component-System	GWI Division	Guyana Administrative		Communities Served
		Region	Population	
Cornelia Ida – De Kinderen	**2 – West Coast, Demerara**	Region 3	27,615	Met- en - Meerzorg, Uitvlugt Leonora, Stewartville D e Williem, Zeeburg , Edinburgh Anna Catherina , Cornelia Ida
Diamond – Herstelling	**3- East Bank, Demerara**	Region 4	27,000	Diamond, Little Diamond, Farm, Arcadia/Mocha, Coven Garden and Herstelling
Goed Bananen Land – Sheet Anchor – No.19	**5 - East. Berbice**	Region 6,	13,707	Reliance, Adelphi, Prospect, Goed Bananen, Sheet Anchor, No 14 Village, No. 19 Village
Georgetown: Central Georgetown, Shelter Bank, Sophia	**3 - Georgetown**	Region 4,	163,300 56,095	All of Georgetown

4.11 Social Conditions

This section provides summary descriptions of the Social Conditions within the Program Areas

4.11.1 De Kinderen – Cornelia Ida

The served-communities are part of Region 3 which is classified as an upper middle or less poor group (0.303) according to the Enumeration District Marginality Index (EDMI (Guyana Census 2002)). The primary employment sectors/industries are agriculture (rice, vegetables, coconuts and artisanal fishing, beef and dairy farming), service industries and construction, and National and local Government Agencies. Sugar cane and coconuts are cultivated on a smaller scale and there is also beef and dairy farming.

There is a fairly high level of unemployment.

The program area is ethnically and religiously heterogeneous with specific communities having ethnic predominance. Hindus have the highest representation followed by Christians and Muslims.

Most households are headed by males but most women work out of the home. While most professional jobs are held by males there are proportionally a higher percentage of female professionals. There are increasing instances of violence against women in the Region 3.

There is good access to education up to the secondary level with continued development of education infrastructure.

There is an increasing homeownership supported by government promoted housing schemes and infrastructure.

4.11.2 Goed Bananen Land, Sheet Anchor – No. 19 Village

The served-communities are part of Region 6 which is classified as an upper or wealthy group (0.188) according to the Enumeration District Marginality Index (EDMI). The primary employment sectors/industries are agriculture (rice, sugar, vegetables, artisanal fishing), service industries and construction, and National and local Government Agencies and mining. There is a fairly high level of unemployment.

The program area is ethnically and religiously heterogeneous with specific communities having ethnic predominance. Hindus have the highest representation followed by Christians and Muslims.

Most households are headed by males but most women work out of the home. While most professional jobs are held by males there are proportionally a higher percentage of female professionals.

There is good access to education up to the secondary level with continued development of education infrastructure. Tertiary education is accessible within the Region. There is good access to the media including radio stations and local TV stations.

There is an increasing homeownership supported by government promoted housing schemes and infrastructure.

4.11.3 Diamond – Herstelling

This Program Area is part of Region 4 and is one of the fastest growing communities in Guyana due mainly to the development of planned housing schemes in the Greater Diamond Area. The Diamond – Herstelling area had an EDMI index of -0.299, matches that of Georgetown, reflecting the lowest poverty rating in Guyana. The area is growing exponentially fuelled by housing and related infrastructure development.

The area is bounded by the Demerara River to the West and housing developments and sugar cane fields to the East. The East Bank Public Road, the primary North/South transportation corridor connecting Georgetown and the interior, separates most of the Western section of the communities from the housing developments and cane fields in the East. The exception is Greater Diamond and Moca Arcadia; the location of the Diamond-Herstelling Program Area affords excellent access to other parts of Guyana via the East Bank Public Road, the Linden-Soesdyke Highway and the Demerara Harbour Bridge.

While the Greater Diamond Area is mainly a suburban housing scheme, the other communities (Little Diamond, Farm, Arcadia/Mocha, Coven Garden and Herstelling) within the Program Area are mostly rural. Their primary employment sectors/industries are agriculture (sugar, vegetables, artisanal fishing), service industries, manufacturing, construction, and National and local Government Agencies. A large portion of the non-agriculture workers work in Georgetown and other parts of Region 4.

The program area is ethnically and religiously heterogeneous. Christians have the highest representation followed by Hindus and Muslims.

Most households are headed by males but most women work out of the home. While most professional jobs are held by males there are proportionally a higher percentage of female professionals. There has been a net inflow of females into Region 4.

There is good access to education up to the secondary level with continued development of education infrastructure. Tertiary education is accessible within the Region. There is very good access to the media including the internet, newspapers, radio stations and TV stations.

The banking section is well represented; there is a high and increasing homeownership supported by government promoted housing schemes and infrastructure.

4.11.4 Georgetown

Georgetown, the Capital City of Guyana reflects all the vibrancy and challenges in Guyana. What was once the known as the "Garden City" is plagued with overcrowding in certain areas, a population of 134,497 were registered on the 2002 National Census, poor planning, impacted traffic and lack of resources to supply basic services.

The area is bounded by the West Demerara River, to the North by The Atlantic Ocean, to the East by the East Coast Demerara community and Public Road and South by cane fields. This Program Area affords excellent access to other parts of Guyana via the East Bank Public Road, the Linden-Soesdyke Highway, the Demerara Harbour Bridge and the East Coast Public Road. The two international Airports are located within 40 km of the City.

Being the seat of the National and Municipal Governments, is more a source of political tension rather than an opportunity for facilitation and resolution. Some of the social challenges experienced in Georgetown stems from consistently high economic activity and growth over the last decade. It has an EDMI index of - 0.299 which is classified as lowest poverty rating in Guyana. There is a significant growth in Tourism, Infrastructure improvement and housing sector...

There is a good access to education infrastructure. Public schools are notable complemented by private schools. Tertiary education is accessible within the Region.

Georgetown remains the cultural and sports and entertainment center of Guyana; there is access to media, newspapers, radio and local TV stations. The program area is ethnically and religiously heterogeneous. Christians have the highest representation followed by Hindus and Muslims.

Their primary employment sectors, include service industries, manufacturing, construction, and National and local Government Agencies, entertainment, and limited agriculture. There is a fairly high level of unemployment even as there is a reported shortage of skilled and professional workers.

Most households are headed by males but most women work out of the home. While most professional jobs are held by males there are proportionally a higher percentage of female professionals. There has been a net inflow of females into Region 4.

The banking section is well represented by all major banking institutions.

Georgetown is the only population center with a sewage system; the system is now being rehabilitated. There is still a high incidence of septic tank and pit latrine use. The compromised drainage system, the lack of City service and poor hygienic and waste management practices has contributed to the perceived low sanitation standards within the Georgetown Program Area.

5.0 ENVIRONMENTAL AND SOCIAL IMPACTS

A preliminary screening of the potential environmental and social impact of the proposed works has been carried out using the preliminary environmental screening checklist template proposed by the GWI Environmental Guidelines for Construction Projects and Environmental Assessment. The screening checklist is presented in **Annex 1**.

As previously mentioned the proposed project is classified according to the IDB classification as **Category B,** as it is "likely to cause mostly local and short-term negative environmental and associated social impacts and for which effective mitigation measures are readily available".

This classification is confirmed by the preliminary screening checklist assessment, where all the potential negative environmental and social impacts identified are related to the construction and operation phases, are localized and of temporary impact with possibility of mitigation actions. The project components consist of the construction of treatment plants at new locations, rehabilitation and upgrade of existing treatment plants, construction of storage reservoirs at existing and new locations, construction of transmission lines to new treatment plants, rehabilitation of distribution lines and conversion of pits latrines to septic tanks. Small deviations can be integrated into the detailed design or the execution design after specific consultations to minimize the construction works impact on existing buildings, operations and utilities.

The works will concern or are projected to be in locations that require minor or no disturbance of natural habitats or protected species (animals, birds, or plants) either because they (the locations) are small or are isolated, or because they were previously disturbed or currently utilized. None of the species on the Protected Species list are known to reside, or are located within the respective Program Areas. The exception is mangrove trees which have designated protective zones Along the Atlantic Coast in Regions 3 and 6. However none of the proposed or related WSSIIP activities will impact the Mangrove trees or their habitat See Figures 5.1, and 5.2).

With the exception of transmission lines to the new plants all works involving pipelines will be in existing alignments. Transmission lines are installed on road shoulders. Therefore there will

be limited removal of existing trees and no expected negative influence on the local fauna and flora. The project is not expected to disturb any cultural or archaeological sites.

The proposed works are located on existing distribution alignments or on lands owned by GWI, on municipal or public lands; resettlement or expropriation will therefore not be required. Temporary storage and staging areas for materials and equipment will be required in the project area and shall be agreed upon between the Contractor, GWI, Municipality, and the NDCs and Regional Administrations.

Figure 5.1: Location of Mangrove Protective Zones - Region 3

Figure 5.2: Location of Mangrove Protective Zones - Region 6

5.1 Potential Impacts during the Preconstruction Phase

No negative impacts are expected during the preconstruction phase. Preconstruction activities include the definition of alignments, and layout construction limits, location and establishment of equipment storage of staging areas and communication with stakeholders and the general public.

The Contractor may need a space for material and equipment storage during the construction period. The construction work and activities will be centered in a variety of settings including, rural, urbanized, undisturbed and previously disturbed, and congested areas. The existence large open spaces and the existence of State and Municipal Right-of-Ways readily allow the location and placement of staging areas.

The allocation of these spaces shall be coordinated between the Construction Contractor, GWI and the various Municipalities, NDCs and Regional Administrations. De-bushing which will be part of the site preparation will be needed at some locations, and will be part of construction phase.

After contract signature and before starting construction works, the Contractor shall produce detailed execution plans and drawings utilizing the baseline maps with exact utilities locations (GT&T cables, GPL poles and wires, and GWI pipes). The execution drawings shall be presented to GWI and all interested utilities companies for comments and approvals. When relocation of utilities is needed, the relocation project shall be coordinated with the concerned institution before the beginning of the works.

In addition, before the beginning of construction works, the Contractor shall develop the project phasing programme and drawings, the site management plan, the construction environmental and social management, community relations plan, and the hazard management plan for consultation with the different interested stakeholders and the approval of GWI.

Finally, an information and communication campaign for the mitigation of construction works impacts shall start prior to works' commencement date and continue all through the project period.

Table 5.1: List of Plans to Be Prepared

Plan Description	Responsible	Schedule
Construction Environmental and Social Management Plan	Construction Contractor	Prior to Mobilization
Community Relation Plan	ESA/ESMP Consultant	Along with WSSIIP ESA/ESMP
Hazard Management Plan	Construction Contractor	Construction Contractor
Emergency Response Plan	Construction Contractor	Construction Contractor
Health and Safety Plan	Construction Contractor	Construction Contractor

Plan Description	Responsible	Schedule
Waste and Hazardous Materials Management Plan	Construction Contractor	Construction Contractor
Monitoring and Reporting Plan	ESA/ESMP Consultant	Along with WSSIIP ESA/ESMP
Inspection and Corrective Measure Plan	Construction Contractor	Along with WSSIIP ESA/ESMP

5.2 Potential Impacts during the Construction

The expected negative environmental impacts and risks are generally the same risks encountered in the execution construction projects involving multiple sites, linear alignments, and extended durations (24 months) in urbanized and rural settings. The environmental impacts and risks are also compounded by those (risks) associated with the heavy construction, as in treatment plants.

There are some project and site-specific environmental challenges associated with the construction in the Coastal Plain, location in flood plains and the parallel execution of current infrastructural development projects. The nature of the impacts and risks are expected to be: *safety of pedestrians and workers, access difficulties, disturbance of traffic and public utilities, air quality and noise problems, environmental risks due to water pumping and discharge, and management of materials and construction wastes, and storage chemicals.*

The identified negative impacts and risks during the construction and operation phases are detailed hereafter while the proposed mitigation measures for every potential impact or risk are detailed in **Section 7.0 Environmental and Social Management Plan**

- Disruption and damage to public service: the proposed interventions will necessitate road cuttings, excavations and re-excavations of trenches for the placement/replacement of transmission and distribution lines , and in some cases the relocation of existing public utilities like water lines and electrical and telephone cables resulting in the interruption of the services for a period of time. Also detailed planning and coordination will be conducted to minimize the potential for accidental damages to existing services occur during excavation;
- Traffic congestion and temporary road closures: the construction activities will necessitate partial or total traffic interruption, and temporary road cuts and vehicle and pedestrian traffic deviations resulting in traffic congestion and risk of accidents. Also the materials supply and disposal will generate circulation of camions increasing the traffic load on the various highways, city streets, and East Bank, East Coast, West Demerara and East Canje Public Roads.
- Difficulties of access to houses, businesses and schools: excavations to unearth and replace defective pipelines and to place new pipes and transmission lines will create

temporary difficulties of access to the adjacent buildings and some disturbance of the neighboring residents and users;

- Air quality problems due to smoke emissions from the use of machines and dust production while excavating, resulting in annoyance to the site workers, nearby residents and activities and the pedestrians;
- Noise generation from the use of excavation machines and construction equipment with its impact on workers and neighborhood;
- Construction materials and waste management: the construction activities will necessitate temporary on-site storage of construction materials and excavated materials; poor management of the stored materials and wastes can result in dispersion of materials in the nearby drainage systems and creeks, streets and adjacent properties;
- Storing of lubricants on site: the Contractor will need to store some oils and lubricants on site for the machines and pipe laying activities, this can create a risk of water and soil contamination in case of spill;
- Safety risks due to excavations and other construction site activities such as the use of cranes and elevated working environments;
- The excavation of 1.0 m-deep trenches for placement of pipelines and excavation for emplacement of foundations are potential risks: the vehicles and machines operations on site and long pipe alignments can create health and safety risks for both workers and pedestrians. Adequate shoring, fencing and signage will be important;
- Pumping and discharging of storm water and ground water off-site during trenching and excavation of foundations: for the excavation and construction works, the Contractor may need to extract ground and storm waters from the trenches to insure working conditions, the pumped water will be discharged into the nearby drainage systems and creeks;
- Risk of flooding: The lower elevations and canals, drains and banks of the adjacent rivers are subject to flooding in case of heavy rains in concomitance with high water tide impeding the discharge to outfalls at the rivers and Atlantic Ocean: the Contractor shall present, before the beginning of the construction works, an Emergency Plan for the event, including alerts mechanisms, action protocols, evacuation plans, etc.,

The impacts can be mitigated and the risks can be avoided by careful planning and a correct implementation of the ESMP. The ESMP shall be closely monitored by the Construction Supervision Contractor team through well-defined monitoring and reporting procedures.

Special attention shall be paid for the planning and notification of the works phases in order to reduce the traffic disruption and road closures for residents and businesses, and in particular works along the East Bank and other Public Roads.

Crucial strategies to be implemented to manage the negative impacts include the following:

- Identify a community relations coordinator in every Program Area; the Coordinator will be the focal point and primary conduit for all communications with the Community and Stakeholders:
- Setting up of complaints mechanism and appropriate response for conflict resolution;
- Continuous consultation and coordination with interested stakeholders;
- Adequate phasing of the works and strict respect of the project plan;
- Timely and adequate information dissemination all through the project execution period;
- preparation and implementation of a Health and Safety and Emergency Response Plan

Finally, the project cost estimate includes a budget for the reinstatement of public utilities and roads; the poor reinstallation or non- or delayed installation of roads and utilities has been a constant complain expressed by communities. it would be very important at an early stage of project planning to consult with the Municipalities, the Ministry of Public Works, Utility Companies, the respective NDCs and Regional Administrations, and other institutions to coordinate any possible planned infrastructure works; this would prevent overlapping of works or conflicts of activities on the project sites and also to optimize resources and reduce disruption time. These issues or mitigation measures are addressed in the ESMP.

5.3 Potential Impacts during the Operation Phase

The potential impacts during the Operations Phase are related the following:

- Impacts on water resources quality
- Impacts on groundwater availability: Unsustainable Pumping of Coastal Aquifer

5.3.1 Impacts on water quality

The Feasibility Study (IDB 2014), commissioned by the IDB to support the preparation of this WSSIIP, projects that the gross daily water use at the completion of the WSSIIP will be 87Ml/day, down from the current 105Ml/d. The projected reduction is based in part on the proposed Non-Revenue Water (NRW) program aimed at reducing NRW levels to 45%.

The NRW program also includes an extensive metering program which will improve cost recovery for the water service. It is projected, based on GWI's experience with other communities, that there will be a reduction of the water consumption per capita. It is also projected that with the successful implementation of the NRW Program any potential increases in water demand will be covered by the volume of water "recovered" through the NRW Program activities.

The reduction in the volume of water extracted from the Coastal Aquifer improves its long-term sustainability.

Effluents from septic tanks are channeled into community drains and ultimately into nearby canals and drains. Currently there is no National Regulation or guidance in the discharge of effluents from domestic systems. Poorly maintained septic tanks could result in increased concentrations of nitrates and phosphates and pathogens in surface water. Poor drainage

could also produce stagnant water and the associated increase in mosquitoes and transmittal of diseases.

Pit latrines have similar composition and potential health and environmental impacts as septic tanks. They are more likely to impact surface than ground water. The proximity to surface water sources and their concentrations (locations) is a critical factor in assessing the potential impacts. The area of influence of pit latrines range from 10m to 30m (EHP 2014) depending on the porosity or transmissivity of the subsurface soils/materials. The soil column serves as a potential barrier to the vertical migration of contaminants to ground water sources.

The coastal aquifer is occurs below a 300m column of dense clays and sands. Under such conditions the potential of vertical contamination migration to the aquifer is minimal.

The WSSIIP sanitation component will reduce the net impact by the conversion of 1000 pit latrines to septic tanks according to the national standards that take into account these security distances. The design Consultant will review and recommend any additional design aspects in order to ensure the discharges will not be a source of pollution to surface water

The water quality in the Coastal Aquifer is potentially threatened by contamination within the recharge zone and from activities adjacent to wellheads of production wells. Spills or seepage of hazardous wastes and other pollutants in the recharge zone can enter and contaminate the aquifer. For example currently there is waste-oil pool in Linden where residents have been dumping waste oil for the last decade. Since most the aquifer daylights within the recharge zone it is quite likely that the waste oil will eventually migrate to the water table. It is then important that a strategy be developed to prevent and address similar occurrences with the recharge zone. The ESMP proposes that the potential be mitigated by addressing the risk in the proposed Ground Water Study.

Migration of contamination into the aquifer via the annulus is also a potential mechanism for contamination of the Coastal Aquifer. Development of a well head protection strategy under the proposed Ground water study is identified as a mitigation measure in the ESMP.

Wastewater Generation

The WSSIIP is not expected to increase the amount of domestic sewage sludge generated.

Other than Central Georgetown, all other communities within the Program Areas rely on septic tanks and pit latrines. More that seventy percent of those residents use septic tanks. Based on a survey conducted in the WSIIR program areas, approximately ninety nine percent have access to “improved sanitation”, more than eighty (80) percent use septic tanks and fourteen (14) percent use improved (VIP) pit latrines (Sanitation Survey, IDB 2014).

The existing sewer system in Georgetown serves only 48,000 citizens. It is currently being rehabilitated through the IDB-financed LO-2428/BL-GY. Wastewater from this system is discharged non-treated through an outfall at the mouth of the Demerara River. While preliminary analyses indicate that the impact is partially mitigated by the natural environment due to the high dilution factor provided by river flows and ocean currents, this effect is being further investigated and solutions proposed under parallel operations.

Effluents from septic tanks are channeled into community drains and ultimately into nearby canals and drains. Currently there is no National Regulation or guidance in the discharge of effluents from domestic systems. The WSSIIP sanitation component will reduce the net impact by the conversion of 1000 pit latrines to septic tanks, improving the sanitation baseline conditions.

In addition to the benefits of the conversion of 1000 pit latrines to septic tanks, the potential impacts will be mitigated by training and public education on the construction and maintenance of septic tanks and the potential health impacts, which are covered specifically under the project's Component 4

The Sanitary Component of the WSSIIP Program is a short-term and urgent intervention to improve the current situation of the poorest/most vulnerable families in the project area (prioritized) and in the context/under this other long-term planning, improving the current sanitation baseline condition

Generation of Treatment Plant Sludge

The WSSIIP would also not increase the amount of sludge generated from the treatment plants. However, the current practice of indirect disposal into the Demerara River via canals, ditches and other water ways does not reflect best management practices. It should be noted that less than 20 percent of the sludge produced at the Shelter Belt treatment plant is discharged to adjacent drains and canals; Most of the sludge is retained in sludge ponds on site. The issues are mainly long term storage capacity and final disposal. The treatment plant sludge requires lengthy drying times, and is very difficult to handle and transport.

One possible solution is to determine alternative uses for the sludge in Guyana.

Currently the Ministry of Agriculture is conducting some nutrient tests to determine the suitability of Shelter Belt sludge as a cropland additive. A positive suitability determination would reduce the amount of sludge designated for landfills or other disposal methods

The treatment plant sludge will be characterized and quantified in the first stage of a long term management and disposal strategy. This will be followed by bench-scale tests to determine the most appropriate stabilization, handling and disposal methods. The ESMP has identified resources to support this initiative. The proposed Study is outlined below. It is proposed that Study be conducted at the Shelter Belt Plant Location using a consultant with processing and materials handling expertise with support from the Operations Management. These efforts will be coordinated with the EPA and the Bureau of Standards.

Proposed Sludge Management Study

- Review of Best Practices for the Management of Treatment Plant Sludges
    - Storage
    - Handling
    - Drying
    - Disposal
    - Regulatory Controls
    - Uses of sludge
- Quantification of Sludges (volume of sludge per unit volume of production)
- Physical and chemical characterization of Shelter Belt Sludges

- Bench Scale Tests
  - Drying , Shrinkage
  - Stabilization
  - Handling
- Regulatory Consultation
- Recommendations

5.3.2 Impacts on Groundwater Resources Availability

The WSSIIP Feasibility Study projects that there will be a net reduction of (27MI/day) water extracted from the Coastal Aquifer, even though there will be a marked increase in the amount of residents receiving treated water (49,000), and in the volume of treated water produced (18MI/d).

The project reduction is supported by decommissioning of wells, the (improvement) reduction in the rates of non-revenue water, the universal use of meters, and the rehabilitation of the distribution network. Table 5.2: Net Changes in Extraction and Treated Water Production Rates, is a comparison between the current extraction scenario and the projected scenario at implementation of the WSSIIP Program.

Table 5.2: Net Changes in Extraction and Treated Water Production Rates

Schedule	Surface Water (EDWC)	Extraction Rate Ml/d (Wells)	Volume of Un-treated Water Ml/d	Volume of Treated Water Ml/d	NRW Rate
Current	23	82	47	58	67%
WSSIIP	23	55	2	76	45%
Net Reduction	0	27	45	(18)	22%

While the WSSIIP Program will see a net reduction in the extraction rates from the Coastal Aquifer, there is the need for a comprehensive study to establish the sustainable yield of the Coastal Aquifer. It is also deemed prudent to conduct pump test at the proposed new treatment plant locations. GWI, in consultation with the Ministry of Agriculture Hydrometereological Department and the IDB, should commission a study to establish the sustainable yield.

The study should address:

- Aquifer Flow Rate and patterns including climate change and variability impacts
- Aquifer Limits and boundaries
- Re-charge Rate and dynamics Aquifer yield and Specific Capacity
- Develop the basis for a sustainable groundwater Management Plan

This study will be the technical basis for a specific activity included in the Program for the development of a Groundwater Action Plan which will support future GWI's water supply planning and infrastructure design, and thus will increase the GWI's adaptive capacity to predict

climate change impacts on water resources by including climate change scenarios into the proposed modelling.

5.4 Key Positive Impacts

The key **positive** environmental and social impacts expected from this project are:

- Improved continuity and reliability of potable water distribution
- Delivery of water meeting required potable water quality standards
- Consequent reduction of risks to public health in the Programs Areas associated with delivery of sub-standard water quality
- Reduction in system losses and associated reduction in total treatment and distribution costs
- Reduced environmental impact from the discontinuation of discharge of concentrated sludge from the shelter Belt treatment plant into the waterways leading into Demerara River
- Less dependence on household storage and reduced associated health risks
- Reduction in the contamination of water systems and water borne .diseases due to the construction and operation of the 1000 septic tanks
- Increased (Temporary) job opportunities during construction period
- Opportunity for training and skills transfer
- Opportunity for capacity building and empowerment for community organizations and Civil Society to represent community interests.

6.0 ANALYSIS OF ALTERNATIVES

A detailed condition assessment was conducted to support the design to achieve the WSIIP objectives. The condition assessment was part of the technical study whose main objective was to develop the technical and financial basis for the GWI efforts to improve water production facilities and reduce NRW levels.

The **Technical Feasibility Report** for WSSIIP GY- L1040 details the condition assessment of the existing water production and distribution systems, the analysis of the current problems and proposes the main interventions for the improvement of the Component Systems.

This section of the Environmental and Social Assessment Report (ESAR) presents an analysis and comparison of the proposed interventions/options for rehabilitation of the WSSIIP Component Systems.

6.1 Condition Assessment

The condition assessment of the WSSIIP Component Systems was conducted by GWI in preparation for the loan application, and by the Water Supply and Sanitation, and Environmental Management Consultants. The assessments included:

- Site visits to all treatment plants:
- Assessment of infrastructure and physical condition of plants and network
- Consultations with GWI managers , engineers, and technicians
- Assessment of treatment processes

The assessments identified the following main problems and concerns with the WSSIIP Component Systems:

- Discontinuity in water supply to some customers;
- Poor quality of water supplied to customers with chemical and physical characteristic below drinkable water standards and below $5m^2$;
- Unacceptable levels of NRW (> 70%); Generalized losses in the network with consequential waste of drinkable water and energy and possibility of contamination of the water resource;
- Improper disposal of the sludge discharge and of backwash water from treatment plants
- Health and safety risks associated with the physical state of the Shelter Belt Plant and the storage practices for chemicals

6.2 Rehabilitation Objectives and Options

The rehabilitation and operation objectives for the WSSIIP reflect GWI's proposed Operations standards and Policy. The objectives were:

- Ensure continuity and reliability of supply to residents (24 hour supply at $5m^2$)
- Provide 90% treated water coverage

- Ensure the delivery of water of correct quality, at or above WHO standards by 2020
- Reduce NRW levels below (≥50%)

Four associated options/alternatives were developed to meet those objectives.

The following tables summarize the analysis and comparisons of the four proposed interventions or improvement options:

Table 6.1: Options for the Implementation of the WSSIIP Program, Proposed Activities summarizes the activities proposed under the various options to meet the stated objectives and details the projected level of achievement of the various objectives.

Table 6.2: Technical Evaluation of the Options to Implementation of the WSSIIP Program provides summary evaluations and comparisons of the proposed options.

Table 6.3: Comparative Environmental and Social Impacts, presents a relative comparison of the impacts of the various options at the three phases of each of the Component Systems

Option # 1, No-Action, was also considered**,** it does not meet any of the stated objectives, and carries the financial, social and environmental costs associated with:

- ❖ High levels of NRW (.70%) and related energy wastage
- ❖ Delivery of poor quality water with chemical and physical characteristic below drinkable water standards and below $5m^2$
- ❖ Gaps in the coverage and delivery of treated water to component systems with the program

This option would have minimal construction costs, would satisfy none of the objectives and would continue the discontinuity of supply and delivery of water of substandard quality. The distribution system would not be optimized and there would be continued high NRW levels and its associated high energy costs, and the high O&M cost.

Option #1 is the worst option from a technical perspective in that it globally does not satisfy the stated objectives.

Option # 2 only partially satisfies all the objectives for level of coverage and meeting the WHO Standards.

Option # 3 satisfies all of the objectives in all of the program areas with the exception of Diamond where the "the objective of 90% coverage" is not met.

Option # 4 satisfies all of the objectives in all of the Program Areas. However it has the highest implementation costs.

6.3 Analysis of Alternatives/Options – Social and Environmental Impacts

Table 6.3: Comparative Environmental and Social Impacts, illustrates the comparative impacts of the various options at the three phases of the project. During the preconstruction phase, all of the active options have the same level of impacts; the activities involve mainly planning, setup and public communication.

In the construction phase the impacts are similar but with shorter duration and increasing from Option #2 through Options #4. This represents less disruption and less activity.

In the operation phase the No-Action Option is projected to have the highest environmental and social impacts because of the current poor state of the treatment plants, the high NRW rates, consumer dissatisfaction, and the risks to public health.

Option #3 *is the overall best option, and the one recommended by the Consultant and accepted by GWI and the IDB.*

Table 6.1: Options for Achieving the WSSIIP Program Objectives - Proposed Activities

OBJECTIVES	Component Systems	SUMMARY ACTIVITES PROPOSED UNDER THE VARIOUS OPTIONS			
		Option #1 No Action	Option #2	Option # 3	Option # 4
.	Georgetown	No Activities	- Rehabilitate Shelter Belt and upgrade select sections of distribution System - Upgrade West Riumveldt and Sophia WTP to 12Mld - Transfer 7Mld from Sanata well to Central Riumveldt	- Same as Option #2	- Same as Option #2
	Cornelia Ida		**NRW Programme** - Rehabilitate 4 km of transmission lines and 10 km of distribution lines - Install meters	- Install well at Uitvlugt (6Mld) and, - Construct 11Mld WTP - Transfer production of 5 Mld Leonora well **NRW Programme** - Same as Option #2 - Decommission wells **Results** NRW reduction to 25% by 2025, coverage increases to 100% by 2025	
	Diamond		No activity	- Construct WTP with 4Mld capacity **NRW Programme** - Rehabilitate distribution and transmission lines - Install meters **Results** Coverage increases to 36% by 2025	

OBJECTIVES	Component Systems	SUMMARY ACTIVITES PROPOSED UNDER THE VARIOUS OPTIONS			
		Option #1 No Action	**Option #2**	**Option # 3**	**Option # 4**
	Cumberland		- Install 5 Mld WTP - **NRW** - Rehabilitate transmission lines - Rehabilitate of distribution lines - Install meters Some untreated water continues into supply after 2023,	Install 7 Mld WTP **NRW** same as Option#2 Coverage increases to 100% by 2025.	- Install 8Mld WTP - Transfer production from Sheet Anchor and Cumberland. - Decommission untreated wells (Adelphi, Canefield) in 2017 **NRW** same as Option #2 Coverage increases to 100% by 2025.
Global Objectives Met?		**No Objectives not met**	**NO Objectives only partially**	**NO Objectives only partially met**	**Yes Objectives met.**
#1: Ensure the continuity of water supply to the customers	Georgetown	**No, Objectives not met**	**Yes, Objectives met**	**Yes, Objectives met**	**Yes, Objectives met**
	Cornelia Ida	**No Objectives not met**	**No Objectives not met**	**Yes, Objectives met**	**Yes, Objectives met**
	Diamond	**No Objectives not met**	**No Objectives not met**	**No Objectives not met**	**Yes, Objectives met**
	Cumberland	**No Objectives not met**	**No Objectives not met**	**Yes, Objectives met**	**Yes, Objectives met**
Global Objectives Met?		**No, Objectives not met**	**Objectives only partially**	**Objectives only partially met**	**Yes Objectives met.**
# 2 - Ensure the delivery of water of correct quality, at or above WHO standards by 2020	Georgetown	**No Objectives not met**	**Yes , Objectives met**	**Yes, Objectives met**	**Yes, Objectives met**
	Cornelia Ida	**No Objectives not met**	**No Objectives not met**	**Yes, Objectives met**	**Yes, Objectives met**
	Diamond	**No Objectives not met**	**No Objectives not met**	**No Objectives not met**	**Yes, Objectives met**

OBJECTIVES	Component Systems	SUMMARY ACTIVITES PROPOSED UNDER THE VARIOUS OPTIONS			
		Option #1 No Action	Option #2	Option # 3	Option # 4
	Cumberland	No Objectives not met	No Objectives not met	Yes, Objectives met	Yes, Objectives met
Global Objectives Met?		Objectives not met	Objectives partially met	Objectives only partially met	Yes – Objectives met.
Provide 90% treated water coverage	Georgetown	Objectives Not met	Objectives met	Objectives met	Yes – Objectives met
	Cornelia Ida	Objectives Not met	Objectives Not met	Objectives met	Yes – Objectives met
	Diamond	Objectives Not met	Objectives Not met	Objectives Not met	Yes – Objectives met
	Sheet Anchor	Objectives Not met	Objectives Not met	Objectives met	Yes – Objectives met
Global Objectives met?		Objectives Not met	Objectives Partially met	Objectives Partially met.	Objectives met
Reduce NRW levels below (≥50%)	Georgetown	Objectives Not met	Objectives Partially met	Objectives Partially met.	Yes – Objectives met
	Cornelia Ida	Objectives Not met	Objectives Partially met	Objectives Partially met.	Yes – Objectives met
	Diamond	Objectives Not met	Objectives Partially met	Objectives Partially met.	Yes – Objectives met
	Sheet Anchor	Objectives Not met	Yes – Objectives met	Yes – Objectives met	Yes – Objectives met
Global Objectives met?		Objectives Not met	Yes – Objectives met	Yes – Objectives met	Yes – Objectives met

Table 6.2: Summary Technical Evaluation of Options WSSIIP

	Options			
	Option #1, No- Action	**Option #2**	**Option # 3**	**Option#4**
Advantages		- Least investment option. - Partial meeting of WHO water quality standards. - Continues to use the well assets of the GWI. - Progressive reduction in NRW achieved. - Choice available to the GWI between taking wells out of supply and providing additional coverage.	- Enables the de-commissioning of untreated wells by 2020 - . *WHO quality standards met by 2020, at the latest*. - Increased coverage related to increased NRW reduction, - The NRW reduction programme can be fully or partly self-financed.	- Enables the immediate de-commissioning of untreated wells and overage starts to Increase after 2017. - Taking the untreated wells out of service is independent of the NRW reduction programme.
Disadvantages.	- Continued Dissatisfaction by residents - Continued poor service that will continue to decrease with increased population. - Continued "water into supply" that does not meet required water quality standards.	- Some unsatisfactory water is continued to be put into supply until NRW reaches a level such that all untreated wells are taken out of service. - No additional coverage achieved until NRW falls to below level to enable untreated wells to be taken out of service.	- Untreated wells remain in service until 2020, at the latest.	- Some of the additional capacity provided in WSSIIP becomes progressively redundant as NRW is reduced
Evaluation	**Objective Not Met**	*Global objectives are not met in with this Option.* - *Untreated water may continue into supply beyond the GWI policy objective date of 2020*	- *Meets GWI policy objective to supply water meeting WHO quality standards by 2020.*	- *Meets GWI policy objective to supply water meeting WHO quality standards by 2020.* - *Some capacity procured under WSIRP becomes redundant.*

Table 6.3: Comparative Environmental and Social Impacts

Project phase	Impact of Options			
	Option #1 – No Action	**Option #2**	**Option #3**	**Option # 4**
Preconstruction		← **Similar Impacts** → **(Planning, Layout, Setup, Public Communication)**		
Construction	No Impacts	Site Clearance, Traffic Concerns, Dust, Noise, Waste Management, Fuel Storage, Health & Safety Concerns, access to property, labor concerns, local commerce, infrastructure development	Similar Activities/Impacts (but to as greater degree and duration than Option # 2)	Similar Activities/Impacts (but greater degree and duration than # 2 and 3)
Operations	Waste Management, Fuel Storage, Occupation Health & Safety, Drainage, Waste of water and energy	Waste Management, Fuel Storage, Occupation Health & Safety	Similar Activates/Impacts (but to a greater degree than Option # 2)	Similar Activities/Impacts (but to a greater degree than # 2and 3)

7.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The development and implementation of a WSSIIP Environmental and Social Management Plan (ESMP) is critical to the achievement of the overall goals of the project. There are two tiers of activities and responsibilities, programmatic and project specific. The programmatic level of activities will be the responsibility of GWI, while the project level activities will be the responsibility of the selected contractor.

The programmatic level activities for the WSIIP GY- L1040 will focus mainly on Public Awareness and Information Campaigns but also on some environmental management mitigation and planning. The primary goal of the Public Awareness and Information Campaigns is to enhance residents' and stakeholders' understanding of the project and their responsibilities in assuring its success; and, also, encouraging community ownership and stewardship of the various component-systems of the WSIIP GY-L1040.

The programmatic level activities will include:

- Public Consultation on the scope of works;
- WSSIIP Environmental and Social Impacts
- Awareness campaigns on hygiene issues and water related diseases;
- Latrines/Sanitation operation and maintenance of latrines
- Effective management of in-house storage and handling of water;
- Introduction to Water Supply systems, operation , challenges;
- Community stewardship of Water system;
- Need for cost recovery and justification of water rates
- Provide for Complaints Resolution during construction works;

The WSSIIP ESMP will address the potential environmental and social impacts of the proposed works identified through the preliminary screening process proposed by the GWI Environmental Guidelines for Construction Projects and Environmental Assessment. The project ESMP shall deal with the potential impacts and risks as identified in **Section 5.0** and all additional impacts notified during public consultation or identified by the Contractor in relation to its construction methods.

The GWI Environmental Guidelines for Construction Projects and Environmental Assessment defines the responsibility of the contractor. It is proposed that the selected Construction prepare a Construction ESMP which will reflect the environmental procedures, objectives, and goals established in the WSSIIP ESMP.

The ESMP shall incorporate the GWI environmental and Social Guidelines for Construction Planning and execution dealing with:

- Occupational Health and Safety
- Excavations
- Traffic Management
- Social Impact Management

- Construction Materials and Waste Management
- Emergencies/Accidents
- Involuntary Resettlement
- Community coordination and Complaints

For this ESA, a preliminary draft ESMP has been elaborated by the Consultant in a matrix format (Table 7.1, Environmental and Social Impacts and Mitigation Measures) including mitigation measures, institutional responsibilities, monitoring and reporting requirements to all potential impacts previously identified. Proposed mitigation measures are in compliance with the GWI social and environmental guidelines.

The draft ESMP has been developed as a complementary but separate document.

As anticipated the implementation of the mitigation measures are supported by **accompanying measures** included in the budget of the project consisting of public awareness and education campaigns.

Table 7.1: Environmental and Social Impacts and Mitigation Measures

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
Preconstruction/Programmatic Phase				
Public Awareness and Community Perception Issues	• Previous surveys and experience on the LWSRP indicated that household handling and storage of water may contribute the consumption of poor quality water with the associated exposure to water-related diseases • The residents/community does not fully understand the scope and goals of the project • General lack of stewardship results in wastage, non-reporting of leaks and lowered expectations in service delivery • There is a general resistance to the payment of water rates; Maintenance of facilities and sustained services require increased revenue collection • Construction could potentially result in various community disruptions (traffic, electricity, access to buildings)	• Awareness campaigns on hygiene issues and water related diseases; • Awareness campaigns on effective management of in-house storage and handling of water; • Information campaign to introduce the component water system, operation , challenges; • Public Consultation on the scope of works; • Awareness campaigns on community “ownership” and stewardship of water system; • Information campaign and consultation on the need for cost recovery and justification of water rates • Overview of NRW • Provide for resolution of complaints during construction works;	GWI, Specialized Communications Consultant, Contractor	IDB through a specific institutional support contract. (G5.0M) Contractor costs included in the Project cost estimate
Construction Phase				

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
Construction Phases : Excavations/road cuts	**Disruption and damage to public service**: The proposed interventions will necessitate some road cuts, excavation of trenches, and in some cases the relocation of existing public utilities (water lines and electrical and telephone cables) resulting in the interruption of the services for a period of time. Also some accidental damages to existing services might occur during excavation;	• The Supervision Consultant shall appoint a Community Relations Coordinator (CRC) who will be the conduit for all project related correspondence and communication with the Public and who will be responsible for coordination with Public Administrators, Utility Company, Community Groups, Public Safety Officials and residents; The CRC will also coordinate and participate in Stakeholder Meetings. • The Contractor shall restore the project environment to the state to which it was or better, prior to construction. In the case of road cuttings, the contractor shall restore all roadways to their original state prior to project implementation • The Contractor shall prepare a detailed works' planning and construction phasing schedule, and shall coordinate service interruption with public utilities and public administrations (Public Consultation Plan) • The Contractor shall advise citizens in advance concerning programmed interruptions in water, and other services (Public Consultation Plan) • The Contractor should notify citizens and collect their concerns to minimize negative reactions according to public notification procedures • Works phasing shall be established in a way to reduce the disruption time.	Main responsibility: Contractor Supervision: GWI and external supervision team (A supervision firm will be contracted to support GWI in the supervision of civil works and training). Coordination: public utilities, Information and consultation: citizens, hospitals, schools, GPF, institutions and local authorities, traffic police, GPL	The CRC costs will be G$3.0M over the period of construction. Relocation of existing utilities and road reinstatement are included in the project design, planning and budget. In the **preliminary cost estimate** the cost for road reinstatement is included in pipe laying unit rate (per meter) The cost for relocation of underground services is given as a lump sum depending on the location of works

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
Construction phases : General	**Traffic congestion and temporary road closures:** *The construction activities will necessitate partial or total traffic interruption and vehicle and pedestrian traffic deviations resulting in traffic congestion and risk of accidents. Traffic flow may also be impacted by temporary road cuts.* *Also the materials supply and disposal will generate circulation of trucks on West Coast Demerara, East Berbice, and East Bank Demerara pubic roads/highways, Vlissengen Road, and along secondary roads in Uitvlugt, Sheet Anchor, and Diamond.*	• All traffic management will be coordinated with Traffic Police and Municipality, NDC, Regional Administration and other authorities • Delivery and discharge trucks might be assigned restricted circulation hours *(delivery hours must be set a part of planning)* • The Contractor shall advise citizens in advance concerning road closures and rerouting of vehicle and pedestrian traffic (*Public Communication Plan*) • Works will be carried out on lots of limited length, in a way to minimize closure of main streets stretches; the Contractor will present the schedule and plan for the Supervisory team's approval (*Project Planning & Scheduling*) • Flagmen shall be used to warn and direct vehicle traffic around construction sites and hazards during working hours *(Health and safety Plan*) • Outside of working hours, especially at night, all barriers and signs will remain at sites, with lighting and / or lighted signs placed as required to warn both vehicular and pedestrian traffic (Health & Safety Plan)	Main responsibility: Contractor Supervision: GWI and external supervision team Coordination: local authorities, GPF (Traffic) Information and consultation: citizens, hospitals, schools, institutions and local authorities	Included in Contractor's costs as above
Construction phases	**Difficulties of access to houses, businesses and schools:** *The trench excavations will create temporary difficulties of access to the adjacent buildings also on account of the traffic deviation and road cuts leading to some disturbance of the neighboring*	• Works will be effectuated on lots of limited length, in a way to minimize disturbance(Project planning); • Excavated areas and trench crossings shall be clearly marked and temporary fencing, bridges, access routes, signage, etc. shall be constructed to facilitate access and avoid accidental falls into these areas • Prior consultation and notification to the stakeholder,	Main responsibility: Contractor Supervision: GWI and external supervision team Information and consultation: citizens, hospitals, schools, GPF, institutions and	Included in Contractor's costs as above

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
	residents and users;	impacted parties, administrative Agencies and interested entities • Supervisory team will provide inspection, oversight and audits.	local authorities	
Excavation and construction phases: Excavation	**Air quality problems *due to smoke emissions from the use of machines and dust production*** *while excavating, resulting in annoyance to the site workers, nearby residents and activities and the pedestrians.*	• Dust masks and eye protection against dust, splinters, debris etc. (*H&S Plan)* • Dust suppression methods such as wetting materials or slowing work should be employed as needed to avoid visible dust • Gas masks / respirators when working in closed areas such as access manholes, etc. (*H&S Plan)* • Document requirements and standards in the Contractors Health and Safety Plan	Main responsibility: Contractor Supervision: GWI and external supervision team	Included in Contractor's costs as above
Excavation and construction phases : Excavation	**Noise generation *from the use of excavation machines and construction equipment*** *with its impact on workers and neighborhood*	• Hearing protection for working around machinery where the noise exceeds 60 dB *(H&S programme*) • Machinery and equipment selection criteria will include noise suppression rating • Machinery will maintained according to set maintenance schedule to maintain efficiency (Equipment Management Plan) • Limiting working hours according to the EPA requirements	Main responsibility: Contractor Supervision/Monitoring: GWI and external supervision team / EPA	Included in Contractor's costs
• **Excavation and construction phases** : Construction generated	• **Construction material and waste management** :*the construction activities will necessitate temporary on site storage of construction materials and excavated materials Poor management of the stored*	• The contractor shall handle construction materials and waste in accordance with procedure in the approved EMP. • Sites for temporary piles should be agreed with GWI and local authorities	• Main responsibility: Contractor • Supervision: GWI and external supervision team • Information and consultation: EPA	• In the **preliminary cost estimate** the cost for disposal of excavation material is included in pipe laying unit rate (per meter) or excavation costs (per

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
materials and waste	*materials and wastes can result in dispersion of materials in the nearby canals, streets and adjacent properties;*	• The community should be aware of constraints imposed on the contractor for waste collection, storage and disposal (*Public Communication Plan)* • Where possible the contract should coordinate with the Municipality, NDC and Regional Administration, to deposit construction waste in areas that are to be filled or reclaimed (*Waste Management plan)* • The contractor shall contain excavated materials in the vicinity of the worksite within berms to prevent dispersion and sedimentation of drains, creeks, streets and adjacent properties(Run-off and Drainage control) (*Emergency and contingency plan*) • In case of accidental waste dispersion, EPA shall be informed and restoration measures shall be applied		cubic meter)
Excavation and construction phases : General	**Storing of lubricants on site:** *the Contractor will need to store some oils and lubricants on site for the machines and pipe laying activities, this can create a risk of water and soil contamination in case of spill*	• The Contractor shall include storage of chemicals in its H&S Plan • Secondary containment for fuels to avoid spill contamination and inspection during operation • Some training in fuel and waste handling should be part of the orientation for workers (Hazardous Materials Handling) • Supervision Team H&S Officer will provide inspection and audits of H$S practices during construction	Main responsibility: Contractor Supervision: GWI and external supervision team	Included in Contractor's mobilization cost
construction phases: Excavation	**Safety risks due to excavations and construction site** : *The excavation of 2.1 to 3.0 m deep trenches, the open trenches and manholes and the vehicles and machines operations on site can create health and safety risks*	• Safety conditions in the trenches during construction phase shall be ensured through the use of appropriate shoring systems and dewatering • Workers should not enter a trench more than waist deep without appropriate safety precautions such as shoring	Main responsibility: Contractor Supervision: GWI and external supervision team Coordination and consultation: Health and	Shoring and dewatering costs are included in the unit price for the trench excavation / pipe laying

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
	for both workers and pedestrians in case of instable excavation sections, inadequate shoring, fencing and signage	• Safe access and thoroughfare must be provided on site at all times. Dangerous areas shall be clearly identified with appropriate signs (*H&S Plan, Public Communication)* • Excavated areas and trench crossings shall be clearly marked and temporary fencing, bridges, access routes, signage, etc. shall be constructed to facilitate access and avoid accidental falls into these areas • Legible warning signs, barriers and signals shall be placed at strategic locations in sufficient number and spacing for all prominent access ways to the sites. Warning signs and other protective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles etc.(*H&S Plan, Public Communication Plan*)	safety officer of GWI	
construction phases: Installation of Mains	Pumping and discharging of storm water and off-site:	• Storm water will be pumped from pipe trenches and foundations to the ditches, waterways and creeks existing beside the roads. These are the natural recipients currently used for storm/rainwater drainage (Drainage Control Plan)	Main responsibility: Contractor Supervision: GWI and external supervision team	Included in Contractor's dewatering costs as above
	Risk of flooding	• The Contractor shall temporary stop dewatering and discharging water into the drainage canals/creeks during storms and periods of heavy rainfall; • The Contractor shall temporary stop all construction activities (*Health &Safety and Site Management*) • The Contractor shall ensure that the workers, the excavations and all on site materials are well protected	Main responsibility: Contractor Supervision: GWI and external supervision team Consultation: EPA	Included in Contractor's dewatering costs as above
Construction	Health and Safety Risks	• Ensure that proper safety gear, harnesses, etc., are	Main responsibility: Contactor	Included in Contractors construction

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
of Treatment Plants and Storage Tanks		utilized • Conduct proper worker health and safety training and orientation prior to initiation of tasks (H&S Plan) • Include in contractors health and safety plan (*Use certified welders)*	Supervision: GWI and external supervision team Consultation: Ministry of Labour	costs
Operation Phase				
	Risk of contamination water supply due to the lines crossing creeks and waterways.	Projected transmission lines may include over crossing some creeks and minor waterways. The new crossing pipes will be constructed in a way to avoid leakage or infiltration. Leakage detection and repairs will be part of ordinary GWI maintenance procedures (*Audit, Monitoring Plans)*	Main responsibility: GWI	Costs for leakage detection and repairs will be part of ordinary GWI maintenance procedures
	Visual impact	There will be changes in the shy-line due to the construction of new treatment plants, storage reservoirs and storage tanks and trench crossing pipes which will be apparent: these might be painted in blue or some other color to ameliorate the visual impact. Earth berms constructed from excavated material may also be used to screen the treatment plants and ground storage reservoirs. (*Operations Manual*) Selected trees may also be planted to screen the treatment plants and the storage reservoirs	Main responsibility: GWI	Cost included in trench crossing and the treatment plants and storage reservoir construction prices
Generation and disposal of TP sludge/wastes	Contamination of waterways and lower surface water quality	Develop a management strategy, including protocols for handling and disposal: Conduct Literature search of best practices to support Bench –scale test to Develop disposal sites; Include sludge handling in the operator training.	Main responsibility: GWI	Cost for transportation of sludge are addressed in the O&M estimates: Cost for Bench –scale test = G$ 1.2M
Noise Generation	Noise and vibration generation (pumping stations)	No significant noise can be perceived from pumping at treatment plants, storage reservoirs or intake stations. Scheduled maintenance of pumps would prevent any	Main responsibility: GWI	Cost will be part of GWI routine maintenance procedures

Project Activity	Potential Environmental/Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities to Implement Mitigation Measures	Cost Estimates
		significant noise. (H&S Plan, Operations Manual)		
Storage of Chemicals	Exposure of workers and adjacent community	Treatment chemicals (chlorine, alum, etc.) must be contained in appropriate containers workers provides adequate training in hazardous waste and chemical handling(H&S Plan, Emergency response Plan, Operations Manual)	Main responsibility: GWI	Costs are addressed in the O&M estimates

7.1 Capacity of GWI to Implement Mitigation Measures

The Linden Water System Rehabilitation Project (LWSRP) has afforded GWI important experience in the application of the GWI Environmental Guidelines for Construction Projects and Environmental Assessment (2005). The LWSRP was supervised by an independent consultant firm that reported to GWI through the Team Leader.

A certified environmental and social officer will be designated within GWI to provide environmental support and oversight to the various projects and programs (oversight sludge investigations and pilot tests, monitoring of implementation of mitigation measures, H&S audits, etc.) . The importance of this project to GWI 's strategy, its cross-Divisional scope and distribution of sites, and the potential negative impacts during the construction phase, makes it crucial that the WSSIIP program be effectively supervised, and that the lessons learned on the LWSRP guide the supervision.

While the GWI Program Manager has ultimate responsibility for the successful execution of the scope of the WSSIIPP Program and the ESMP the supervision of the construction phase should be provided by an independent Supervision Contactor reporting to the GWI Program Manager: the contractor will have the requisite experience and qualifications to effectively monitor the implementation of the mitigation measures defined in the ESMP. The supervision consultant will liaise with the Contractor and GWI continuously and effectively.

During the Operation Phase the respective Divisional Manager will have the responsibility for the implementing the ESMP with support from the GWI Operations Manager and the Environmental and H&S Specialist.

7.2 Monitoring and Reporting

During construction phase, the Supervision Team Leader shall issue monthly progress reports on the advancement of works incorporating a chapter on environmental impacts and health and safety issues and on the application of the EMSP for the reporting period. The reporting requirements, documentation and oversights will reflect the Environmental Management Procedure in Section 4.0 of the WSSIIP ESMP.

The Contractor shall keep daily site logbooks reporting the salient information concerning staff, equipment, materials delivery, climatic conditions and accidents that occurred during working hours.

During the operation phase GWI will implement a monitoring programme assure the production and delivery of water at the designated quality and satisfaction of the project objectives. A monitoring and inspection programme should be instituted to focus on:

- Operation of the individual component water system, and
- Performance of the individual component water system.

Furthermore, to reach the objective of 100% reliable service, the construction works have to be combined with correct management of treatment plants and their adequate maintenance. The goals of the monitoring and inspection programme would support the above assertion.

8.0 PUBLIC PARTICIPATION

In accordance with the IDB requirements and the GWI guidelines the population and stakeholders in the program area must be informed about the project, in order to obtain the required level of participation, ownership and support. The concerned population may knowledge informed about the necessity of the investment, as well as its expected environmental, economic and social impacts in various forums, and through the media.

A number of consultation and public information campaigns have been scheduled to increase the residents' awareness and knowledge of the project. These include, programmatic public awareness and information programmes (Section 7.0), Public Consultation on the scope and impacts of the project, and project information programs which will be conducted by the by the selected contractor.

An independent Consultant conducted a socio-economic survey (IDB 2014) aimed at the informing the residents about the advantages to the rehabilitation of the component systems and assessing their willingness to pay for improved service. The survey has been carried out over more than 500 households within the WSSIIP Program Area. The majority of the respondents lamented the poor quality and unreliable supply of water. However the Survey suggested that the additional funds expended to purchase bottled water implied the capacity to pay for high quality water from the existing system,

8.1 Disclosure of Information

The ESA report was disclosed by GWI in accordance with IDB regulations. This document prepared by the Consultant, was reviewed and commented on by the IDB and the GWI. A draft version was published on IDB and GWI websites in February 2014. Public disclosure/consultation meetings were held in the various communities impacted by the WSSIIP in January through March2014, following the identification of viable options for the installations and rehabilitation of treatment works in the program areas.

The purpose of these meetings were to inform the stakeholders and residents on the nature goals and scope of the project, the improvements expected as a consequence of the WSSIIP, and the potential positive and negative impacts related to the works.

Copies of the Draft ESA/ESMP report were sent before the meetings in Georgetown and Diamond to the representatives of stakeholder or residents, in order to enhance the knowledge about the project characteristics and facilitate informed discussion on the different aspects.

The selected priority works consist simply in the construction of new treatment systems, rehabilitation of the existing treatment systems, construction of storage tanks, rehabilitation of some defective distribution lines and installation transmission lines form the new treatment plants/systems. The negative impacts experienced by the local population will be primarily in the construction phase; these impacts are projected to be temporary.

The final version of the ESA/ESMP incorporates the comments received during the public consultation process to be published on the IDB and GWI websites by April 2014. The record of the consultations is documented in Annex II.

In case an Environmental Impact Assessment should be required by EPA, the consultation process shall be conducted as described in **Section 2**.

8.2 Consultation Process

S**takeholders' consultation** meetings were held as indicated in Table 8.1 Stakeholders' Consultation Schedules for the presentation and discussion of the Environmental and Social Impact and Risks associated with the WSSIIP prior to the completion of the Draft ESA/ESMP.

Invitation letters were sent to the local government organs including the NDCs and the RDCs in the various Program Areas. Personal invitations were given the local government officials, the local Chambers of Commerce. Informational fliers were distributed and posted on community notice boards. Public Service Announcements were also done in the communities with local media outlets (radio and television).

"Town Criers" and mobile public address systems were also utilized in the various communities.

Draft copies of this ESA/ESMP were sent to the Ministry of Housing & Water, Ministry of Public Works, NDCs, the Municipality, University of Guyana, EPA, GT&T, GPL, and civil society representatives in anticipation of the Public Consultation Meetings scheduled for the first 2 weeks in March 2014, as indicated in Table 8.1: Stakeholders' Consultation Schedule. The proposed stakeholder's consultation meetings were held as scheduled in the presence of representatives of GWI, IDB and the Consultant, where main project components, project risks and the expected environmental impacts were presented. This was followed by discussion session. A record of the Consultation meetings is annexed to this final ESA. Major comments and inputs provided by the public during these consultation workshops has been considered into this ESM, the drafting of the ESMP and will be taking into account during the technical design of the Program, as well as along the execution and operation phases (see comments in Annex II).

Table 8.1 Stakeholders Consultation Schedules

Meeting Date	Stakeholders	Meeting Location	Facilitators
January 29, 2014	General public, RDC/NDC officials,	Fort Ordinance Primary School, Fort Ordinance, Region 6	Ramchand Jailal - GWI Arshad Yacob - GWI Marle Reyes - IDB Samuel Wright - IDB
February 5, 2014	General public, RDC/NDC officials,	Uitvlugt Secondary School, Uitvlugt, Region 3	Arshad Yacob - GWI Marle Reyes – IDB Samuel Wright - IDB
March 1, 2014	General public, RDC/NDC officials, Civil Society	Diamond Secondary School, Diamond, Region 4	Arshad Yacob - GWI Marle Reyes – IDB Samuel Wright - IDB
March 15, 2014	General public, RDC/NDC officials, Civil Society, EPA, MoHW, MNRE.	F.E. Pollard Primary School, Georgetown	Arshad Yacob - GWI Marle Reyes – IDB Samuel Wright - IDB

8.3 Contractor Directed Programmes and Responsibilities

Further consultation meetings shall be organized before the commencement of works for coordination of activities between the Contractor and the different public utilities operators and involved stakeholders, in addition information and education campaign will accompany all the construction phases.

The ESMP addresses consultations and related resources during the operations phase of the WSSIIP. These consultations will be the responsibility of the Operations Management, the Divisional Manager and the GWI PR Department.

The selected Construction Contractor shall nominate a person from his staff who will liaise with the representatives of GWI, Work Supervision, NDCs, RDCs, the Municipality, residents and public authorities.

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ANNEXES

ANNEX 1**:** ENVIRONMENTAL SCREENING CHECKLISTS
ANNEX II: RECORD OF PUBLIC CONSULTATIONS

ANNEX I: ENVIRONMENTAL SCREENING CHECKLISTS

Environmental Screening Checklist

1. Summary of Project:

Water Supply and Sanitation Infrastructure Improvement Project (WSSIIP):

The proposed GY- L1040 Program was designed to address some of the various challenges faced by the Guyana Water Inc. (GWI) in meeting its mandate to provide safe and reliable potable water. The general objective of the proposed Program is to improve efficiency, quality and sustainability of the potable water services and sanitation infrastructure in the named program areas.

The objective of WSSIIP is to enable the GWI to:

- Provide water that meets WHO potable water quality standards, as soon as possible and by 2020, within the project area;
- Lay the foundations for an NRW reduction programme to reduce NRW to an "acceptable" level in order to enable untreated sources to be decommissioned, to increase coverage and to minimize the impact of losses on service charges, and
- Convert latrines into efficient septic tanks for improved waste disposal in poorer areas.

The WSSIIP Program Area comprises Georgetown, and areas where there are "treatment gaps", where water is delivered to communities is untreated and does not fully meet WHO quality standards. These areas are, Cornelia Ida, Diamond and Cumberland.

The program will include the construction of treatment plants, installation of water wells, transmission and distribution lines and septic tanks.

2. Project Environmental Summary :

The main potential negative impacts of the project require careful management and focus, principally the construction phases and can be summarized as follows:

- Traffic congestion and temporary road closings,
- Air quality problems and noise pollution during construction
- Construction material storage and transportation;
- Temporary disruption of water delivery during connections and testing of new systems

The key positive environmental impacts are:

- Improved continuity and reliability of potable water distribution
- Delivery of water meeting required potable water quality standards
- Consequent reduction of risks to the public health in the program areas associated with delivery of sub-standard water quality
- Reduction in system losses and associated reduction in total treatment and distribution costs
- Reduction of contamination of the surface water systems by the cessation of discharges of sludge and backwash water from the treatment plants.

3. Description of Site and Checklist

There are four program areas each with associated treatment plants and distribution networks.

Address:

(1) East Berbice*: Sheet Anchor*; Fort Ordinance, Goed Bananen Landing to no. 19 Village

(2) Georgetown*; Shelter Belt, Sophia, West Riumveldt*; select areas

(3) West Demerara: Uitvlugt; Cornelia Ida to De Kinderen

(4) East Bank Demerara: Diamond: Diamond to Herstelling

Site Configuration:

(1) The Site is the Program Area which includes the TP site at Sheet Anchor and extends across the distribution network from **Goed Bananen land, Fort Ordinance to No. 19 Village**...

(2) The Site Includes the TP locations at Shelter Belt, Sophia, and West Riumveldt and extends through the entire distribution network in **Georgetown**.

(3) The Site is the Program Area which includes the treatment plant site near the Uitvlugt Housing Scheme and extends across the distribution network fro**m Cornelia Ida to De Kinderen**.

(4) The Site is the Program Area which includes the treatment plant location in **Greater Diamond**, and extends throughout the distribution network from Diamond to Herstelling.

Improvement: N/A

Current Use: **Serves the** resident populations in the defined program areas.

Adjoining properties:

(1) Sections of Region 6, East Berbice, outside of the distribution network: Atlantic Ocean,

(2) Sections of Region 4 outside Georgetown City limits: Demerara River, Atlantic Ocean, East Coast Demerara Communities.

(3) Sections of Region 3, West Demerara outside the distribution network: Hague, Atlantic Ocean, Uitvlugt Sugar Estate, Zealot,

(4) Sections of Region 4 outside the distribution area: Demerara River, Providence, Grove, Sugar Fields

Area Description (s):

Summary descriptions of the four Program Areas are presented subsequently:

(1) East Berbice*: Sheet Anchor*; Fort Ordinance, Goed Bananen Landing to no. 19 Village

The East Berbice Program Area includes Sheet Anchor, the proposed location of the treatment plant and Fort Ordinance and the adjoining communities from Goed Bananen Land to No. 19 Village. The Program Area corresponds to the distribution network.

The East Berbice Program Area is along the East Canje Road, beginning approximately 5 kilometers East of New Amsterdam and has an aggregate population of 18,153. The area is part of the Coastal Plain. The Berbice and Canje Rivers, along with extensive network of drainage and irrigation canals are major hydrologic features.

The drainage patterns and infrastructure development reflect the rice and sugar industries which have had major economic and cultural influences in the area.

(2) Georgetown*; Shelter Belt, Sophia, West Riumveldt*; All of Georgetown

The Georgetown Program Area encompasses the entire geographical area of the City; this includes the *Shelter Belt, Sophia, West Riumveldt treatment plants and the associated distribution network. Georgetown* is bounded by the Atlantic Ocean to the North, to the East by the Demerara River and to the East and South, by the East Coast Demerara and the East Bank Demerara communities, respectively. This urban area is highly developed with a number of independent commercial areas with supporting transportation and other infrastructure.

The City experiences floods regularly and drainage is a major problem. The flooding and drainage is a function Georgetown's elevation (- 1m to 2m) and the Coastal drainage regime.

(3) West Demerara: Uitvlugt; Cornelia Ida to De Kinderen

The West Demerara Program Area includes Uitvlugt, the proposed location of the treatment plant and communities from Cornelia Ida to De Kinderen. The Program Area corresponds to the distribution network serving these communities.

The West Demerara Program Area is located along the West Coast Public Road, beginning approximately 24 km West of Vreed-en-Hoop on the Demerara River. The Program Area has an aggregate population of population of 36,812. The area is part of the Coastal Plain; this is reflected in the drainage patterns. The extensive networks of drainage and irrigation canals are major hydrologic features.

The drainage patterns and infrastructure development reflect the rice and sugar industries which have had major economic and cultural influences in the area.

The rice and sugar industries have been the major economic and cultural and influences and have impacted the drainage and infrastructure development in the Program Area.

(4) East Bank Demerara: Diamond; Diamond to Herstelling

The Diamond/Herstelling Program Area is located about 10 km from Georgetown, below Providence, along the Demerara River which, along with the drainage canals, is the major hydrologic influence in the area. It is part of the Coastal Plain (average elevation of 0 – 1m) and is prone to flooding during high tides and periods of high rainfall.

The Program Area has an aggregate population of 38,740. The historical land-use of sugar plantations, manufacturing, farming and housing development has denuded the area of native vegetation except along the bank of the Demerara River.

Greater Diamond is the fastest growing community in Guyana fuelled by planned housing development and the supporting commercial and infrastructure development; some of the infrastructure development includes expansion of the East Bank Public Road.

Property History:

Property owned by Government of Guyana

Proposed Project Description:

The project components consist of the construction of treatment plants at new locations, rehabilitation and upgrade of existing treatment plants, construction of storage reservoirs at existing and new locations, construction of transmission lines to new treatment plants, and rehabilitation of distribution lines

- Construction of a WTP (with complementary works such as transmission mains installation, distribution upgrades and metering) to serve the communities from Cornelia Ida to De Kinderen
- Construction of a WTP (with complementary works such as transmission mains installation, distribution upgrades and metering) to serve the communities from Diamond to Herstelling.
- Construction of a WTP (with complementary works such as transmission mains installation, distribution upgrades and metering) to serve the communities from Goed Bananen Land, Sheet Anchor to No. 19 Village
- Improve the supply and quality of Water delivered in Georgetown, the Capital, with the rehabilitation of the Shelter Belt WTP, and expansion of the Sophia and Central Ruimveldt WTPs, including complementary works for the improvement of the water supply network.
- Improve the access to sanitation services of low income settlements in the program areas by converting 1,000 pit latrines into efficient septic tank units.

Potential Benefits of Project:

- Improved continuity and reliability of potable water distribution
- Delivery of water meeting required WHO potable water quality standards
- Consequent reduction of risks to public health in Program Areas associated with delivery of sub-standard water quality
- Reduction in NRW and system losses and associated reduction in total treatment and distribution costs
- Improvement in surface water quality in the vicinity if treatment plants due to the discontinuation of treatment plant discharges of sludge and untreated backwash water
- Reduced need for household storage of water and its related health hazards
- Temporary increase of jobs availability
- Technical Skills training and transfer

Checklist Assessment

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
Future Use					
Will hazardous chemicals or petroleum fuels be stored on site (i.e., for generators)? *if so, potential impact may be addressed by secondary containment and regular inspection*	Y	Minor	Minor	N	*Minor Impact* *Construction phase: Lubricants may be stored on site, secondary containment shall be used.* *Operation phase: Lubricants will be used and stored in the treatment plants during operation. Secondary containment shall be used as part of best management practices*
	.				
Geology/physical setting					
Are soils highly erodible due to steep grade or soil content (organic material, muck peat, etc.) within 1 foot (0.3m) of surface?	N	N	N	N	*No impact* *Construction Phase: Soils within the treatment plant locations and pipe alignment are clays and sand claims and are not readily susceptible to erosion during construction, trenching and emplacement of foundations for the treatment plants and storage tanks.*
Is bedrock located within 6ft. (1.8m) of the soil surface (i.e. to limit potential migration of a potential on-site spill)? Alternatively, is fractured bedrock located within 10ft. (3m) of the soil surface (i.e., that might provide a preferential conduit for a potential on-site	N	Minor	Minor	Minor	*Minor impact* *Potential for contaminant migration is minimal by virtue of limited quantity in use. Additional measures including the containment measures will be implemented* *The emergency and response plan shall address potential spills*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
spill)?					
Hydrology					
Will storm water be discharged off-site or managed via on-site infiltration? *If discharged off-site, minor impact may be addressed via on-site collection and inspection for sheen prior to discharge during both construction and operation.*	Y	Minor	Minor	Minor	*No Impact* *Construction phase: During this phase, storm water will be pumped to the ditches and creeks existing beside the roads.* *Operation phase: Storm water and runoff will be channeled into site drains which flow into creeks or the Demerara River. All discharges will be monitored.*
Does project include fill within the 100-year floodplain? If data is not available, has site flooded in memorable history?	y	Minor	Major	Minor	*No Impact* *Construction phase: Sections of the project area along the river and creek banks will be subject to flooding in case of heavy rains and high water tide.* *Site and foundation preparation for the storage tanks and treatment plants may include cut and fill. Fill material will most likely be sandy, cohesionless soils.*
Will surface topography be significantly altered?	N	N	N	N	*Minor Impact* *Construction Phase: Some fill or topographic modifications may be required due to the variations in elevations and slope of some of the locations.* *Site preparation during the construction phase may include "cut and fill" methods at the treatment plant sites.* *Asphalted roads and adjacent grounds will be*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
					reinstated with the same levels as before
Will site be more than 50% covered with impermeable surfaces or result in a significant increase in capacity requirements of a waterway or facility within 1 mile (i.e., such as associated with a grade increase)?	Y	N	Minor	N	*Minor impacts* *Most locations are within 1.0 kilometer of the River or a creek. The construction of treatment plants will increase the amount of areas covered by asphalt/concrete walkways, driveways and apron at these locations.*
Is the groundwater table located within 10 ft. (3m) of the soil surface? *If so, minor impacts during construction may be addressed by dewatering and providing secondary containment for fuels to avoid spill contamination and inspection during operation*	**Y**	**Minor**	**Minor**	**N**	*No Impact* *The works will be carried out through dewatering of the foundation excavations and trenches, as necessary.* *Management strategies including fuel handling training will be implemented. Secondary containment will be built for fuels to avoid spill contamination; this will be coupled with inspections during operation*
Are suspected wetlands, marsh or mangroves located on site?	N	N	N	N	*Minor* *The extensive coastal canal and drainage network in the program areas includes marshes and swamps. These will be considered during final design. However there are no such systems at the proposed locations for the treatment plants, reservoirs or the existing or proposed alignments for transmission or distribution*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
					mains.
Will any stream, ditch, navigable stream or dry run (storm water conveyance) be traversed or transected by the project?	Y	Minor	Minor	N	*No Impact* *Distribution systems will follow the existing layout and alignments. This includes overcrossing some creeks and minor ditches. The new and replacement pipe crossings will be designed and constructed to avoid leakage or seepage*
Will project be located with ¼ mile (0.4km) of a major water body?	Y	Minor	Minor	Minor	*Minor Impact* *Parts of the WSSIIP are within 1/4 mile of the Demerara River, Atlantic Ocean, EDWC, canals and drainage networks.* *Berms and construction barriers will be utilized to prevent surface runoff during construction. Containment of fuel storage systems and best management handling practices will be used to prevent discharges to these waters.*
Water/wastewater					
Will project require water?	Y	Minor	Minor	Minor	*Minor Impact* *Clear water will be required for washouts and construction works, such as concrete mixing and curing,*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
					pipe cleaning, etc. Potable water is available at a short distance from construction sites
If groundwater will be used, will pumping or drainage potentially lower the water table'	y	N	Minor	N	*No Impact* *The treatment systems will tap the coastal aquifer. While the net rate of extraction will be zero there is a concern that the sustainable yield of the aquifer is not known.* *GWI will investigate other sources including the EDWC.* *The No permanent effect is expected on shallow or deep aquifers*
Will project have a wastewater discharge?	Y	Minor	Minor	Nr	*No Impact* *Waste water, runoff, backwash from treatment and some cases sludge will be discharged. All discharges will be monitored.* *A program is being developed to analyze the sludge and design an acceptable disposal strategy.*
Will septic tank-soil absorption fields for on-site waste disposal be used on-site?	Y	N	Minor	N	*No impact* *Waste Water from onsite septic tanks will not impact surface water or ground water. The range of impact of effluents from septic tanks is 20 – 30 meters. The septic tanks will be maintained as part of the H&S program.*
Could any waste materials enter ground or surface waters associated with the site?	Y	Minor	Minor	Minor	*No Impact* *Waste water, runoff and backwash from treatment*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
					plants during operation will eventually be discharged to adjacent water systems. Monitoring and other measures shall be taken to minimize the negative impacts
Air					
Will project result in air emissions?	Y	Minor	Minor	N	*No Impact* *Minor emissions from the use of machines during construction phase- they will be re-distributed by coastal air*
Will project generate dust?	Y	Minor	N	Minor	*No Impact* *Small amount during construction phase- the contractor shall use mitigation measures for reducing the impact*
Solid Waste					
Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill or hazardous waste that could occur as a result of this project?	Y	N	Minor	Minor	*No impact* *Chlorine will be used as a final disinfectant in the treatment Systems; Health and Safety Procedures must be enforced to minimize the possible discharges*
Will project generate, transport or store solid or hazardous	Y	Minor	Minor	Minor	*No Impact* *Excavations will lead to storage and transport of non-*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
waste?					*reusable(onsite) excavation materials- excavation materials are not harmful* *Construction of the treatment plants will also generate construction wastes.* *Construction waste (rocks, soil) can be reused to fill and reclaim areas within the various Program Areas. This will be coordinated with the Municipality, the RDC, the NDC and other Administrative Agencies.*
Will dredging be required?	N	N	N	N	*No impact*
Does (will) this site have storage tanks, underground or above ground? If so, what will be stored in the tanks?	Y	Minor	Minor	Minor	*No impact:* The *project includes the construction of storage reservoirs, water treatment plants. These will all contain water. Some may be used to store fuels and lubricants*
Is the site located near a landfill?	N	N	N	N	*No impact*
Natural resources					
Does the site contain critical habitat for endangered, threatened or rare plants and animals? *If none listed by EPA, no impact*	N	N	N	N	*No impact*
Are endangered, threatened, unusual or rare species (animal,	N	N	N	N	*No impact*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
bird or plant) present in the area? *If none listed by EPA, no impact*					
Will project result in removal of a significant percentage of trees?	N	Minor	N	N	*No impact:* *There may be some site clearing for construction of the treatment plants, storage reservoirs and transmission lines.*
Does the project involve conversion of existing agricultural land?	N	N	N	N	*No impact*
Cultural/archeological					
Has the site been previously disturbed?	Y	N	N	N	*No impact:* *The site includes farming, industrial, residential and business areas that have all been previously disturbed. Sections of existing distribution lines will be replaced (same alignments)*
Are there any places or objects listed on, or proposed for national or local preservation registers known to be on or next to the site?	N	N	N	N	*No impact*
Disruption					
Will project disturb more than 1 acre of land*? If so, construction impact may be addressed by erosion control methods*	Y	Minor	N	Minor	*Minor Impact* *Collectively with the Program Areas more than 1 acre of land will be disturbed during the construction of treatment plants and transmission lines. There are*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
					existing erosion issues within some sections of the project area. Site restoration shall address erosion stabilization in affected areas.
Will project disrupt traffic (road closures, etc.)?	Y	Minor	N	Minor	*No Impact* *Temporary disruption of traffic during construction due to excavation across and along roads. The pipe works will be effectuated on lots of limited length, in a way to minimize closure of main streets stretches* *There will be impacts related to temporary increase in traffic flow due to transportation of materials to support construction* *Extra effort will be made to address the impacts on the traffic patterns, particularly in the Diamond/Herstelling Program Area where traffic congestion is already an issue, and along the West Demerara Public Road.*
Will project disrupt businesses?	Y	Minor	N	Minor	*No Impact* *Short term potential impact during works*
Will project require resettlement?	N	N	N	N	*No impact*
Aesthetics					
Will project emit noise?	Y	N	Minor	Minor	*Minor Impact* *Noise pollution during construction phase due to the use of excavation equipment: There will be restricted work house and the community communication program will inform residents of work schedule and likely impacts, including noise.*

Potential Impacts of Proposed Project	Y/N/NA/ Unknown[1]	Negative Impacts[2]			Positive Impacts, Comments
		Construction	Operation	Decommissioning	
Will ambient light be altered via spotlights, etc.	Y	Minor	Minor	Minor	*Minor Impact* *A temporary impact can be foreseen in the case of overnight works. Spotlights and security lights will be placed to minimize glare during operation.*
Regulatory review					
Have regulations applicable to project been identified and strategy for compliance developed? Provide detail in separate attachment	Y	N	N	N	*No impact*

Key:

[1] "Y"= yes, "N" = No, "NA"= not applicable

[2] Negative impacts are characterized either "minor" or "major". In general, minor impacts are temporary visible or otherwise notable changes while major impacts generally are permanent and require significant mitigation such as resettlement. All minor impacts may be addressed sufficiently in the contractor's EMP. All major impacts will be reviewed by EPA to determine if is a full-scale EIS is needed.

Italic = Guidance for determination of impact or impact mitigation procedure that may be included in contractor's ESMP

ANNEX II: RECORD OF PUBLIC CONSULTATIONS, JANUARY – MARCH 2014

S**takeholders' consultation** meetings were held as indicated in Table 8.1 Stakeholders' Consultation Schedules for the presentation and discussion of the Environmental and Social Impact and Risks associated with the WSSIIP prior to the completion of the Draft ESA/ESMP.

Invitation letters were sent to the local government organs including the NDCs and the RDCs in the various Program Areas. Personal invitations were given the local government officials, the local Chambers of Commerce. Informational fliers were distributed and posted on community notice boards. Public Service Announcements were also done in the communities with local media outlets (radio and television).

"Town Criers" and mobile public address systems were also utilized in the various communities.

Draft copies of this ESA/ESMP were sent to the Ministry of Housing & Water, Ministry of Public Works, NDCs, the Municipality, University of Guyana, EPA, GT&T, GPL, and civil society representatives in anticipation of the Public Consultation Meetings scheduled for the first 2 weeks in March 2014, as indicated in Table 8.1: Stakeholders' Consultation Schedule. The proposed stakeholder's consultation meetings were held as scheduled in the presence of representatives of GWI, IDB and the Consultant, where main project components, project risks and the expected environmental impacts were presented. This was followed by discussion session.

This is a record of the consultations

Table 8.1 Stakeholders Consultation Meetings

Meeting Date	Stakeholders	Meeting Location	Facilitators
January 29, 2014	General public, RDC/NDC officials,	Fort Ordinance Primary School, Fort Ordinance, Region 6	Ramchand Jailal - GWI Arshad Yacob - GWI Marle Reyes - IDB Samuel Wright - IDB
February 5, 2014	General public, RDC/NDC officials,	Uitvlugt Secondary School, Uitvlugt, Region 3	Arshad Yacob - GWI Marle Reyes – IDB Samuel Wright - IDB
March 1, 2014	General public, RDC/NDC officials, Civil Society	Diamond Secondary School, Diamond, Region 4	Arshad Yacob - GWI Marle Reyes – IDB Samuel Wright - IDB
March 15, 2014	General public, RDC/NDC officials, Civil Society, EPA,	F.E. Pollard Primary School, Georgetown	Arshad Yacob - GWI Marle Reyes – IDB Samuel Wright - IDB

GUYANA WATER INC.

Questions and Answers with GWI, IDB & Stakeholders

Employer:	Inter-Development Bank
Project:	WSSIIP GY-L1040 Water and Sanitation Infrastructure Improvement Program – Stakeholder's Consultation – Stakeholder's Consultation
Consultant:	Samuel Wright

Purpose:	To present the plans for development and construction of a water treatment plant/system for the Forth Ordinance - Goed Bananen Land, Sheet Anchor – No. 19 Village and to solicit the communities comments and concerns.
Date:	January 29, 2014
Time Start:	5:30 hrs.
Time Ended:	7:00 hrs.
Location:	Fort Ordinance Primary School, Fort Ordinance, Region 6

Participants:	
Ms. Marle Reyes – IDB	Mr. Samuel Wright – IDB Consultant
Mr. Arshad Yacob –Project Manager, GWI	Mr. Keine Read, Divisional Engineer - GWI
Mr. Thomar Dawhaj – Pensioner	Ms. M Farley – Prison Officer
Ms. June Sookram - Housewife	Mr. K. Jack – Resident, Fort Ordinance
Ms. Marla Kumar – Resident, Fort Ordinance	Ms. S.M. Razak
Ms. Lilowatie Baker	Mr. Stephen Gobin – Police Officer
Ms. Jeetnarine Ganpat – Hire Car Driver	Mr. Stanley Joshua
Mr. Laurie Williams - Pastor	Mr. Adrian Bess – Fort Ordinance Development Assos.
Mr. Sherman Ally - Weeder	Ms. Adeola Craig – Fort Ordinance Development Assoc.
Mr. Sherman Beharry - Clerk	Mr. Colin Ceasar - DAFO
Ms Somatie Saryange - DAFO	Mr. K.V Ramsander – Assistant Overseer

Ms. M. Angel - Nurse	Ms. D. Singh - Housewife
Mr. S. Simon -	
Absentees:	

Item	Matters Discussed	Actions/ Parties Responsible	Due Date
1.0	**GENERAL**		
1.1	Mr. Jailal opening the Consultation by welcoming the attendees, acknowledging the local government Officials including the Regional Chairman Goodberdan and introduced the other presenters (Samuel Wright/IDB, Arshad Yacob/GWI, Marle Reyes/IDB) He outlined the aim and schedule of the Consultation invited greater community participation. He stated that he was pleased with the turnout at the first of four planned Consultations.		
1.2	Regional Chairman Goodberdan welcomed the participants and stated how happy he was to be part of the project, and much needed and anticipated one. He invited the residents to conserve water and protect the system once it was completed.		.
2.0	Mr. Yacob presented the overview of the project detailing the current state of the water supply system and how the project, as scoped, will address the limitation in the service delivery.		
3.0	Mr. Wright introduced the concept that there are environmental and social impacts associated with any project and particularly so on large projects. Mr. Wright related that IDB and GOG regulations made provision for the information of and consultation with the impacted/host community: they must be given the opportunities to understand the nature of the project and the potential impacts. Mr. Wright made a presentation on the projected social and environmental impacts and the proposed mitigation measures. .		
4.0	Ms. Reyes made a presentation and conducted an exercise on identification and management of the risks to successfully implement the WSSIIP in the Georgetown Program Area.		

5.0	**Issues Raised by the participants:** How can we be assured that the work will be of high quality and that the roads and other areas would not be left unfinished?	• This work is being done high –level contractors who have to follow IDB guidelines. A supervisory firm will be selected to make sure it construction meets standards	
	• What is the schedule for the construction	• The schedule for construction is two years beginning 2015	
	• Will there be jobs for members of the community	• There will be a temporary increase in jobs; the NDC/RDC could consult with the Supervision Contractor and the Construction Contractor.	
	• Will there be higher cost for water? And will there be good water?	• There will be cost recovery; the water will meet the highest standards, and will be delivered 24 hours/day.	
6.0	There being no other questions/comments, Mr. Wright thanked everyone for attending and for participating in the discussion and stated that there would be a follow up Consultation on February 5, 2014. Discussion was adjourned at 7:20 hours.		

Questions and Answers with GWI, IDB & Stakeholders

Employer:	Inter-Development Bank
Project:	WSSIIP GY-L1040 Water and Sanitation Infrastructure Improvement Program – Stakeholder's Consultation – Stakeholder's Consultation
Consultant:	Samuel Wright

Purpose:	To present the plans for development and construction of a water treatment plant/system for Cornelia Ida – De Kinderen and to solicit the communities comments and concerns.
Date:	February 5, 2014
Time Start:	5:30 hrs.
Time Ended:	7:00 hrs.
Location:	Uitvlugt Secondary School, Uitvlugt, Region 3

Participants:	
Ms. Marle Reyes – IDB	Mr. Samuel Wright – IDB Consultant
Mr. Arshad Yacob –Project Manager, GWI	Mr. Eson Pearson, Divisional Manager - GWI
Ms. Bibi Neisha Deen	Mr. Samuel Aaron – Resident, Uivlugt
Ms. Shabita Kishun – Uitvlugt Women's Group	Ms. Adonna Blake – Resident, Uivlugt
Mr. Sheik Aleem	Ms. Eve Henry – Resident - Uivlugt
Ms Norma Aleem	Mr. Edul Mullin
Ms. Michelle Bob – Resident, Uitvlugt	Ms. Colleen Miller – Resident, Uitvlugt
Ms. Abideen Shaw	Ms. Tesha Naraine – Uitvlugt Secondary School
Mr. Raz Lalil – CIPD, GWI	Ms. Alllison Weller??
Ms. N. Blake - Resident, Stewartville	Ms. Subrina Sookmangal – Resident, Stewartville
Ms. Beverley Mc Donald -	G. Sunilall – Resident, Ana Caterina
Ms. Seelawatie Saucharie – Uitvlugt Women's Group	
Ms. Shabita Kishun – Uitvlugt Women's Group	Ms. Adonna Blake – Resident, Uivlugt

Absentees:			
1.0	**GENERAL**		
1.1	Mr. Wright welcomed all stakeholders to the meeting. He outlined the aim and schedule of the Consultation invited greater community participation. He stated he was pleased with the turnout in spite of how the weather was turning out. Mr Wright took the time to introduce the other presenters – Arshad Yacob/GWI, Marle Reyes/IDB		
2.0	Mr. Yacob presented the overview of the project detailing the current state of the water supply system and how the project, as scoped, will address the limitation in the service delivery. Mr. Wright introduced the concept that there are environmental and social impacts associated with any project and particularly so on large projects. Mr. Wright related that IDB and GOG regulations made provision for the information of and consultation with the the impacted/host community: they must be given the opportunities to understand the nature of the project and the potential impacts.		.
3.0	Mr. Wright made a presentation on the projected social and environmental impacts and the proposed mitigation measures. He also emphasized that the role of communities and the need for participation.		
4.0	Ms. Reyes made a presentation and conducted an exercise on identification and management of the risks to successfully implement the WSSIIP in the Georgetown Program Area.		
5.0	**Issues Raised by the participants:** • What would the water be like when this is all done; drink it? Wash in it?	The water would be high quality, you would be able to drink it and wash in it; the colouration would be gone – it was due to iron precipitation. The goal is to get water under good pressure 24 hours.	
	• Will the local agencies be consulted, play a role, too often GWI projects are incomplete or poorly	There will be consultations with the	

	done, and the NDC I left to clean up	stakeholders on a regular basis – it can be arranged to include the local agencies.	
	• It would be useful for the NDC/RDC to have some of the construction drawing to follow he work	• This work is being done high –level contractors who have to follow IDB guidelines. A supervisory firm will be selected to make sure it construction meets standards	
	• What is the schedule for the construction	• The schedule for construction is two years beginning 2015	
	• Is it possible to add fluorine to address tooth decay	• Chlorine is added as a disinfectant – Flouride will not be added.	
	• Will there be jobs for members of the community	Early discussions with the construction and supervision team can facilitate the employment of local staff personnel	
	• Will there be higher cost for water?	• The cost for water will not be more than the cost of bottled water.	

	The participants were very enthused during the consultation. expressed gratitude for the consultation; There being no other questions/comments, Mr. Wright thanked everyone for attending and for participating in the discussion and the IDB stated that there would be a consultation in this series at Diamond, DB. On March 1, 2014. Mr. Wright that the Head teacher on behalf of the IDB and GWI for her support in letting us use the school hall Discussion was adjourned at 19:00 hours.		

Questions and Answers with GWI, IDB & Stakeholders

Inter-Development Bank	
Project:	WSSIIP GY-L1040 Water and Sanitation Infrastructure Improvement Program – Stakeholder's Consultation – Stakeholder's Consultation
Consultant:	Samuel Wright

Purpose:	To present the plans for development and construction of a water treatment plant/system for the Diamond Herstelling Area, and to solicit the communities comments and concerns.
Date:	March 1, 2014
Time Start:	3:30 hrs.
Time Ended:	5:30 hrs.
Location:	Diamond Secondary School, Diamond, Region 4

Participants:	
Ms. Marle Reyes – IDB	Mr. Samuel Wright – IDB Consultant
Mr. Arshad Yacob –Project Manager, GWI	Mr. Christine Thompson, Divisional Engineer - GWI
Ms. Pabattie Sukhui	Ms. Leona Benjamin - Security
Ms. D. Debidia	Ms. D. Persaud - NDC Grove Diamond.
Mr. Shafeet Ali - GWI	Mr. Orrin Danraj
Ms. Petal Williams – Resident, Grove	Ms. Lakshimi Boroth – Herstelling NDC
Ms. Chandra Gordon	

Item	Matters Discussed	Actions/ Parties Responsible	Due Date
1.0	**GENERAL**		
1.1	Mr. Wright welcomed all stakeholders to the meeting. He outlined the aim and schedule of the Consultation invited greater community participation. He lamented the small turn out when the community has concerned about poor writer delivery.		

2.0	Mr. Yacob presented the overview of the project detailing the current state of the water supply system and how the project, as scoped, will address the limitation in the service delivery.		
3.0	Mr. Wright introduced the concept that there are environmental and social impacts associated with any project and particularly so on large projects. The example of the @expansion of the East Bank Raod and how it impacted travel and movement – the participants indicated that they were not aware of any similar consultation Mr. Wright related that IDB and GOG regulations stated that the impacted/host community must be consulted and given the opportunity to understand the nature of the project and the potential impacts. Mr. Wright made a presentation on the projected social and environmental impacts and the proposed mitigation measures. He also emphasized that the role of communities and the need for participation.		
4.0	Ms. Reyes made a presentation and conducted an exercise on identification and management of the risks to successfully implement the WSSIIP in the Georgetown Program Area.		
5.0	**Issues Raised by the participants**: • The general poor service provided by GWI • Who were the contractors and how can there be assurance that the work will be done well?	• The level service and the water quality was acknowledged • Contractors will be selected by a very transparent process: Yes local contractors can bid but it must part meet the very high standards. There will be separate arrangements for supervision of the works.	
	• Will there be consultations in other areas • Can the consultation process continue through the project • Will there be higher cost for water? • Will there be meters in every yard? • How will the recipients be selected for septic tanks	• There will be further consultations – the list of stakeholders is being prepared and the Consultation Plan will ensure the continuity. • There will be no more consultations at other locations to report on project progress and address complaints from residents.	

6.0	The participants expressed gratitude for the consultation; it was not what they expected and they found it very informative. It was stated that the poor turn-out was related to people's "hatred" of GWI. There being no other questions/comments, Mr. Wright thanked everyone for attending and for participating in the discussion and the IDB stated that there would be a consultation in this series in Georgetown on March 15, 2014. Mr. Wright that the Head teacher on behalf of the IDB and GWI for her support in letting us use the school hall Discussion was adjourned at 18:00 hours.	• There will be meters for cost recovery. However consider the cost for bottled water – it is anticipated that the monthly cost will be less than that. • The selection process is being developed.	

Employer:	Inter-Development Bank
Project:	WSSIIP GY-L1040 Water and Sanitation Infrastructure Improvement Program – Stakeholder's Consultation
Consultant:	Samuel Wright
Purpose:	To present the plans for development and construction of a water treatment plant/system for the Georgetown Area and to solicit the community's comments and concerns.
Date:	March 15, 2014
Time Start:	3:30 hrs.
Time Ended:	5:30 hrs.
Location:	F.E. Pollard Primary School, Kitty, Georgetown

Participants:	
Ms. Marle Reyes – IDB	Mr. Samuel Wright – IDB Consultant
Mr. Arshad Yacob –Project Manager, GWI	Mr. Curtis Niles, Divisional Engineer - GWI
Mr. Rudolph Haarlem-White – Kitty Resident	Ms. Jail Hicks – Environmental Science Student/UG
Ms. Petal Williams	Mr. Marcello Basani - IDB
Ms Gaeta Devi Singh - EPA	Mr. Kevin Bonnet, IDB
Ms. Esther Fraser - Turkeyen	Ms. Jean Williams - Cam
Ms. Adriana Mathews – Queenstown Resident	Mr. Andrew Gupta
Absentees:	

Item	**Matters Discussed**	**Actions/ Parties Responsible**	**Due Date**

1.0	Mr. Wright welcomed all stakeholders to the meeting. He outlined the aim and schedule of the Consultation invited greater community participation.		
2.0	Mr. Yacob presented the overview of the project detailing the current state of the water supply system and how the project, as scoped, will address the limitation in the service delivery.		
3.0	Mr. Wright introduced the concept that there are environmental and social impacts associated with any project and particularly so on large projects. Mr. Wright related that IDB and GOG regulations stated that the impacted/host community must be consulted and given the opportunity to understand the nature of the project and the potential impacts.		
4.0	Mr. Wright made a presentation on the projected social and environmental impacts and the proposed mitigation measures. He also emphasized that the role of communities and the need for participation. Ms. Reyes made a presentation and conducted an exercise on identification and management of the risks to successfully implement the WSSIIP in the Georgetown Program Area.		
5.0	Issues Raised by the participants: • The general poor service provided by GWI	• The Members of the team acknowledged the appearance of the water and the challenges faced by the community	
	• The schedule for start of the project	• The project schedule was discussed in response to the question.	
	• What is the source of the brown stuff in the water; is the water safe to drink	• The "brown stuff" was explained	
	• How can school children and young people get involved	• It was emphasized that there was public consultation component and this could include special presentation to schools and other stakeholders	

	• Is there enough water in the ground, more and more wells are being added	The question was acknowledged as n important one both for GWI and the WSSIIP Program. The WSSIIP will use less water than is currently being used in the Program Areas, collectively: Some ell will be decommissioned. Less water will be used because leaking distribution systems will be repaired and meters will be installed universally. Using less water means that GWI's electricity bill will be less and the reason for large increases in your water bill will be reduced. There is need for better understanding of the behavior of the aquifer – we know that the water levels have been dropping: we need to understand why and how much can be extracted safely.	
6.0	Mr. Singh of the EPA had two comments on the Draft ESA: (1) That while the positive impacts were detailed – there not the same emphasis or details on the negative impact (2) That it was important to submit the application for the Environmental Permit ASAP; it was important to start the process. EPA is emphasizing the issues of EIA's and that there should not be any further delay. Ms Singh emphasized regardless of GWI or IDB policy it is important to start the EIA process even if is eventually determined that it was not needed	Mr. Wright agreed to review and revise the document by March 31. 2013 Mr. Wright related that his past experience informed him that the EPA is indeed changing its approach but that the Environmental Permit application would be submitted by April 3, 2013	
	• What is the state of the aquifer – we are	• The sustainability of the aquifer is a major concern. The current program will see net reduction in the amount of water extracted. However we need more information of the properties of the aquifer including the	

	pumping more and more wells; can this be sustained? There being no other questions/comments, Mr. Wright thanked everyone for attending and for participating in the discussion and the IDB stated that there would be a follow up discussion in the second quarter of the year. Mr. also Expressed gratitude to the Head Teacher, Ms. Brown, for her kind support in making the auditorium available. Discussion was adjourned at 6:00 hours.	sustainability, boundaries, recharge etc.	