APPENDIX C

INVENTORY SURVEY

THE PREPARATORY SURVEY FOR KINGSTON SEWERAGE DEVELOPMENT PROJECT

FINAL REPORT APPENDIX C INVENTORY SURVEYS

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Summary

1. Introduction

The major focus of this investigation was to visit and analyze the operation condition and logistics of the sewage system as follows

1) Portmore area

2) Kingston and St. Andrew area (KSA)

The sewage systems includes treatment plants and pump stations shown as Table 1 as below. Some residences and facilities were visited to survey septic tank, and Commercial / Industrial / Institutional sewerage flows. Target areas can be shown as Figure 1 – 3

Table 1 List of Investigated Sewerage Systems

Contents	Quantity
1. Portmore area	
1) Sewage treatment plants	4
2) Pumping station	18
2. Kingston and St. Andrew area (KSA)	
1) Sewage treatment plants	6
2) Pumping station	6
3. Septic Tank	22
4. Commercial / Industrial / Institutional sewerage flows	195

Source) JICA Survey Team

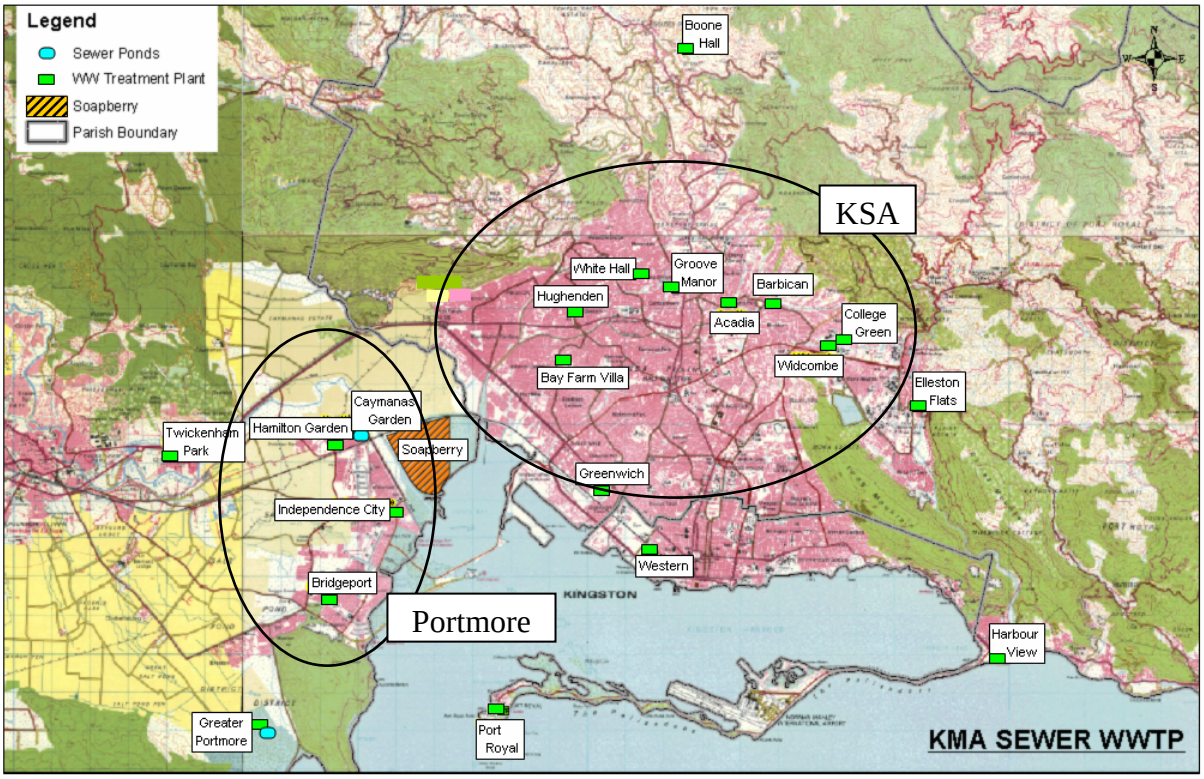


Figure 1 Investigated sewerage treatment plant in Portmore & KSA (1)

Source) NWC

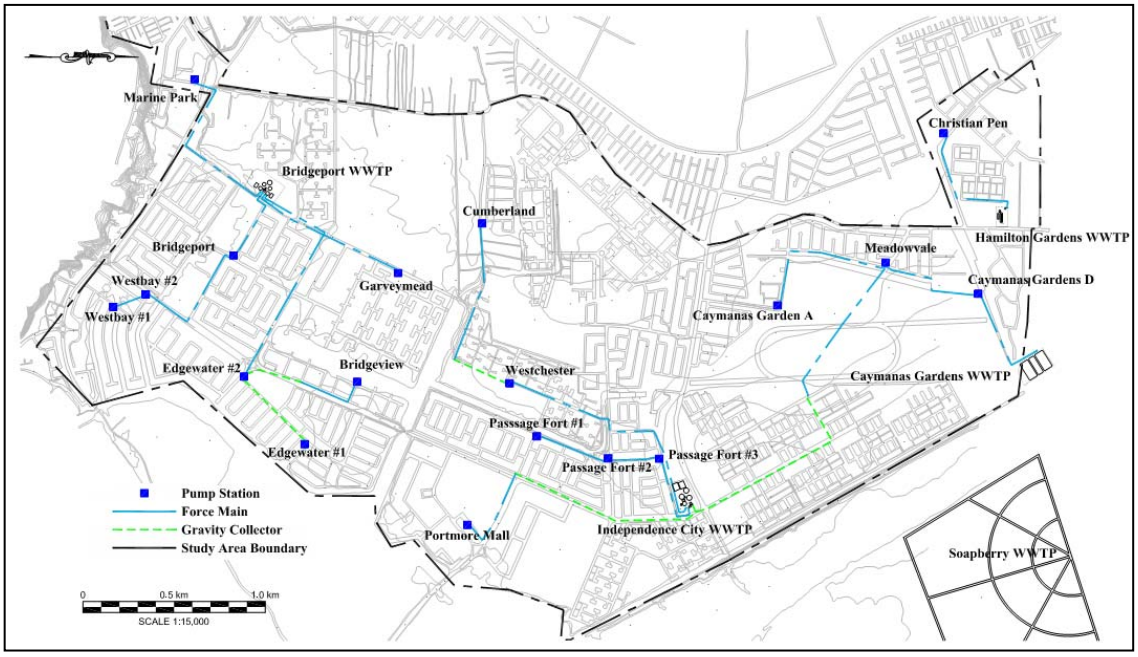


Figure 2 Investigated Pump Station in Portmore

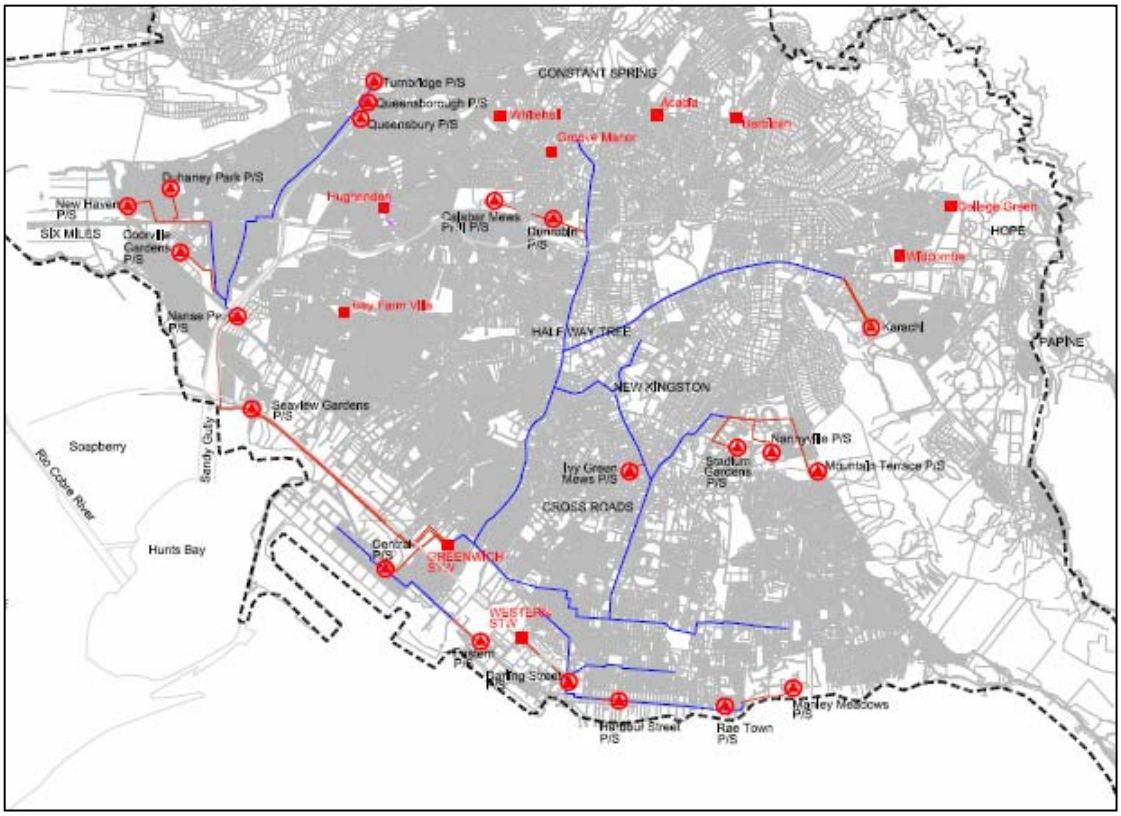


Figure 3 Investigated Pumping Station in KSA

In conjunction with the NWC, the survey team visited each location with the intent of garnering specific information that will help in the overall task of improving the sewage conditions of each area.

2. Portmore area

(1) Sewerage Treatment Plants

There were four treatment plants in the Portmore area that were visited by the survey team, they were shown as Table 2 & 3. Survey sheet can be shown as Appendix C-1

These treatment plants are strategically placed to serve areas that are in the general locale of the treatment plant.

Table 2 Summary of Investigated Sewerage Treatment Plants (Portmore)

	Capacity (m^3/day)	Treatment Method	Construction Year
(i) Independence City	11,300	Standard activated sludge	1969
(ii)Bridgeport / Capacity	7,600	Standard activated sludge + Stabilization pond	N/A
(iii) Hamilton Gardens	760	Oxidation ditch	N/A
(iv) Caymanas Gardens	100	Stabilization pond	N/A

Source) JICA Survey Team

Table 3 Characteristic of Investigated Sewerage Treatment Plants (Portmore)

(i) Independence City
The Independence City plant is the largest treatment plant in Portmore, and it is also the major office location for the wastewater operations in Portmore; it has been in operation since 1969. The plant at Independence City serves the Independence City, Waterford, Passagefort, Portsmouth, Meadowvale and Westchester housing schemes among others; it is therefore obvious that this plant is the recipient of a large amount of sewage on a daily basis. However at the present moment the plant is not operating at an optimal level, with only two of the four contact stabilization tanks placed on-site being in full operation and also the return sludge pumps are out of service. The influent is being discharged without receiving the required amount of treatment due to poor operation standards.
(ii) Bridgeport
The Bridgeport treatment plant is the largest plant in terms of land space, as there is a vast amount of unused land that is present on the site. There are also four contact stabilization tanks as with the Independence City plant; at the present moment there is construction underway for a fifth contact stabilization tank. The Bridgeport plant services the Marine Park, Bridgeport, Bridgeview, Edgewater and Garveymeade communities. The plant receives the sewage from the lift stations through four (4) inlet pipes and transfers them to the stabilization tanks for treatment, the chlorination is done by way of a chlorination chamber that emits chlorine in a gaseous form. The effluent that is the result of the treatment process is estimated to have a B.O.D of 55%; this could be as a result of many imperative fixtures such as the skimmers and scrapers being absent from the setup of the stabilization tanks. This effluent is also pumped to a nearby channel which eventually leads to the ocean body.
(iii) Hamilton Gardens
The most effective treatment plant in the Portmore area was the Hamilton Gardens plant, the very setup of the plant was a much more simplified operation that that of the previously visited plants. The plant made use of an oxidization ditch that receives the sewage from the lift pumps that are fitted to the ditch. The plant serves the Gregory Park area which consists of Hamilton gardens and Christian Pen. The plant produces an effluent quality of approximately 70% B.O.D removal, and this is far more acceptable than the level at which the previously visited plants produce. The only issue that this plant undergoes is the lack of maintenance personnel that are on-site; as there is only one recognizable operator at this site. This also causes the maintenance of the plant environment to be shortchanged.
(iv) Caymanas Gardens
The final plant that was inspected was the Caymanas Gardens Lagoons that serve the Caymanas Gardens community. It has not been in operation for over two years because the influent pipe was

damaged and is currently discharging the influent directly into an adjacent creek. The pond had entirely dried up leaving only layers of softened dirt and areas of high vegetation. There is no acceptable entrance or exit though which personnel can easily access the plant, and therefore the frequency of checks done at the site were few. The treatment plant infrastructure such as the inlet pipes and chlorination chambers were all in a state of terrible disrepair.

Source) JICA Survey Team

(2) Pumping Station

As previously stated, there were a total of twenty three (23) pump stations in the Portmore area, however the NWC only requires that eighteen (18) of these being placed in the study area. In general the function of these pump stations is to transmit the sewage that is collected from the housing schemes that they serve to the treatment plant that is in its general area. It was noticed that many of these pump stations were in close proximity to each other, so as to keep the flow of the sewage at a constant pace. These treatment plants were of a standard size, with only a few exceptions either greater or lesser. The biggest pump station was noted to be the Marine Park facility which has a large operating space with an average size generator house, whilst the smallest and most cramped for space was the Caymanas Gardens Site D, which was basically located in the backyard of a resident.

There was a consistent trend that was noticed with the pump stations, there were two pump units present but in most occasions only one was functional. The issues that these pumps were facing varied from broken motors to missing belts. The only site that had two functional pump units was the Garveymeade Pump Station, whilst the Westchester had three (3) units in total, however only one was in service. Another consistent trend that was noticed was the fact that the stand-by generators which are a fixture of most of the pump stations were not in service. Many of the generators were very old, whilst a select few seemed to be fairly new; however the trend still remained that they were out of service.

Another major issue that was found at quite a few of the sites were that the security facilities such as perimeter fences, gate locks and the steel doors on the pump house were in good condition; with only a few major exceptions such as the Caymanas Site D and West Bay B facilities were in disrepair. Also the site conditions were generally good, this may be because of the frequent visits that are made by the N.W.C mobile teams.

Table 4 Summary of Investigated Pumping Station (Portmore)

Name	Capacity	Diameter	Pump No	Construction Year
Edgewater 1	N/A	100mm	2	N/A
Bridge View	N/A	100mm	2 (1unit out of service)	N/A
Christian Pen	N/A	75mm	2 (1unit out of service)	N/A
Garvey Mead	N/A	150mm	2	N/A
Meadowvale	N/A	100mm	2 (1unit out of service)	N/A
Marine Park	N/A	150mm	2 (1unit out of service)	N/A
Caymanas Garden D	N/A	100mm	2 (1unit out of service)	N/A
West Bay A	N/A	100mm	2 (1unit out of service)	N/A
Edgewater 2	N/A	150mm	2	N/A
Caymanas Park	N/A	100mm	2 (1unit out of service)	N/A
Bridgeport	N/A	150mm	2 (1unit out of service)	N/A
Portmore Mall	N/A	150mm	2 (1unit out of service)	N/A

Cumberland	N/A	75mm	2 (1unit out of service)	N/A
Passagefort #3	N/A	150mm	2 (1unit out of service)	N/A
Passagefort #2	N/A	75mm	2 (1unit out of service)	N/A
Passagefort #1	N/A	100mm	2 (1unit out of service)	N/A
Westchester	N/A	200mm	3 (2unit out of service)	N/A

Source) JICA Survey Team

3. Kingston and St. Andrew area (KSA)

(1) Sewerage Treatment Plants

There were six treatment plants in the KSA area that were visited by the survey team, they were shown as Table 5 & 6. Survey sheet can be shown as Appendix C-3

These treatment plants were strategically placed to serve areas that are in the general locale of the treatment plant. In general, the treatment facilities in the K.S.A area are operating at an acceptable level and in order to make the operations more effective the implementation of new infrastructure and the maintenance of existing equipment should be forefront in the mind of the stakeholders.

Table 5 Summary of Investigated Pumping Station (Portmore)

	Capacity (m^3/day)	Treatment Method	Construction Year
(i) Hughenden	1,300	Stabilization pond	N/A
(ii) Whitehall	350	Stabilization pond	N/A
(iii) Grove Manor	260	Extended Aeration	N/A
(iv) Barbican	260	Extended Aeration	N/A
(v) Widcombe	440	Stabilization pond	N/A
(vi) College Green.	260	Oxidation ditch	N/A

Source) JICA Survey Team

Table 6 Characteristic of Investigated Sewerage Treatment Plants (KSA)

(i) Hughenden
The Hughenden plant is located on Relay Road, and at first glance it is a huge site with a lot of unused land space. The plant at Hughenden serves the Glendale area, which is located just off Molynes road; it is therefore obvious that this plant is the recipient of a large amount of sewage on a daily basis as this community is a rather large one. The designed capacity of this plant is approximately 300,000 litres per day. At the present moment the plant is operating at an optimal level, with both contact stabilization tanks being in full operation and were treating the influent at very high level as all the available screens were in operation. This treatment plant was one of the few plants that contain a splitting box that separated the two (2) inlet pipes from both contact stabilization tanks. There was a slight hindrance in the overall operational capabilities of the plant as the lift pumps were experiencing mechanical and electrical problems. This problem did not prevent the quality of the effluent from being produce at a high level; the effluent quality was estimated to be approximately 70%. The effluent is finally discharged into a nearby gully by way of a gravity main. The major issue that this treatment plant is currently experiencing is the lack of a back-up generator which could prove to be detrimental whenever there are power cuts, which tend to happen often. Also, the infrastructure of the stabilization tank needs improvement. Also the sludge conveyance system needs to be improved for the proper transmission of sludge to the open drains.
(ii) Whitehall
The Whitehall treatment plant was the next plant that was inspected by the survey team; this was an extremely small site and could be confused with the site of a pump station. However there is one large square-shaped aerated sludge digester that is currently handling the treatment operations in the

Whitehall and Victoria Court vicinity. The plant receives the sewage from the lift stations through one (1) inlet pipe and transfers them to the digester for treatment; approximately 352,000 litres per day is received by the treatment plant. After treatment the effluent is discharged through a 6 " pipe that leads directly to a nearby gully; and eventually ends up in the sea. The treatment method that is employed is described as extended aeration, and this method seems to be a very effective method as the effluent B.O.D can be estimated to be approximately 80%. This effluent is also pumped to a nearby channel which eventually leads to the ocean body. There is a major problem that this facility currently faces; the site had been invaded by squatters and there seems to be one squatter in particular who seems to have made the treatment plant and its facilities his living quarters. This is a definite problem, and this can cause equipment damage in the future, and even worse circumstances if the situation is prolonged. Also the chlorinator, and overflow low-head dam is in need of replacement.

(iii) Grove Manor

The Grove Manor treatment plant was not easily recognizable as it was located in the midst of a townhouse complex; namely Grove Manor Court which it provides services to. The plant made use of one extended aeration sludge digestion bed, however at the time of inspection the plant was experiencing various difficulties that caused the level of treatment to be very poor. The sewage capacity that this plant was designed to maintain is 264, 000 litres each day. The skimmers were out of service, which caused the chlorination tank to have a build-up of algae; also there is a blockage in the pipe that causes the sludge to overflow from the reactor tank. The effluent is eventually discharged into a channel that is found to the rear of the facility. These issues in turn leads to the estimation of the B.O.D to be in the 30th percentile. The primary issues that this plant undergoes are the blockage of the main pipe, and also there is a high level of shrubbery in the area that overhangs into the stabilization pond. Also there is a defect with the overflow weir at the current moment.

(iv) Barbican

The Barbican sewage treatment plant is a very small facility; it is located off Barbican Road. This facility is slated to be decommissioned in a matter of months, at the current time the plant serves Barbican Mews and the Dillsbury Mews communities, the approximate capacity is 264, 000 litres per day. The type of treatment that is employed at the plant is Extended Aeration; and this takes place in an extended aeration tank that is approximately 15m in length. Although this extremely small site is responsible for a comparably large service area, the influent is brought to the treatment plant by one (1) inlet channel. The effluent quality is estimated in the 60th percentile, the effluent is discharged into a nearby channel for further transmission into the sea. The issues that this facility currently face is the absence of a generator, which is rather important as the tank operations can be severely impaired during power surges and also requires a reserve blower.

(v) Widcombe

The next treatment plant that was explored was the Widcombe treatment plant, which was located in the Barbican Terrace community; however this site is another that will be decommissioned in a matter of months. In its current state, the treatment plant is only operating at half of its capability, it is officially designed to treat over 440, 000 litres of wastewater per day. There is only one contact stabilization tank that is present on the site, and it is currently inactive. This therefore means that the waste from the Ravinia Mews and Barbican terrace communities is being sent directly to the channel untreated. One of the bright spots of this treatment facility is that it is a very well secure treatment plant, as there is a newly installed perimeter gate and perimeter fences. The major issue at this site is its current inability to perform treatment duties when the only reactor tank is impaired.

(vi) College Green.

The final treatment plant that was visited was the College Green facility, which was also located inside of a gated community known as College Green. The treatment plant made use of an oxidization ditch system that was very effective in the treatment of waste. It is clear that the over 264, 000 litres per day that is being treated by this plant is done so in an efficient manner. The ditch contained one lift pump that sent the discharge from the ditch to the chlorination chamber. The B.O.D of this effluent was estimated at the 70th percentile, which further reinforces the effectiveness of using the oxidization ditch and aerator setup when treating sewage. However, this site will also be decommissioned in four months, and the site will be redesigned. The major issue at this treatment plant is that one of the two sludge return pumps is currently out of service, and also the stand-by generator seems to have been out of service for years.

Source) JICA Survey Team

(2) Pumping Station

As previously stated, there were a total of twenty three (23) pump stations in the K.S.A area, however only six (6) of these pump stations were investigated. The pumps stations that were visited were shown as Table 7 & 8. Survey sheet can be shown as Appendix C-4

In general the function of these pump stations is to transmit the sewage that is collected from the areas that they serve to the treatment plant that is in its general area. It was noticed that many of these pump stations were in close proximity to each other, so as to keep the flow of the sewage at a constant pace; most of the sewage is transmitted along various routes to meet at the Nanse Pen station before finally being transmitted by pumps to the Soapberry Treatment Facility. These treatment plants were of a standard size, with only a few exceptions either greater or lesser.

Generally the condition of the pump stations of the pump stations in the K.S.A region were in a much better condition than in the Portmore area, this is so because of the vast amount of areas that each pump station serves and also the amount of sewage that they receive is a far greater amount than the pump stations in Portmore; thus they have to be kept in a much better condition. The maintenance effort is spearheaded by the N.W.C mobile teams and various on-site personnel.

Table 7 Summary of Investigated Pumping Station (Portmore)

Name	Capacity (L/s)	Diameter	Pump No	Construction Year
(i) Greenwich	N/A	N/A	N/A	N/A
(ii) Nanse pen	720	750mm	3	N/A
(iii) Darling Street	168	250mm	2	N/A
(iv) Red Hills Road	N/A	250mm	2 (1unit out of service)	N/A
(v) Glendale	N/A	100mm	2	N/A
(vi) Seaview Gardens	58	250mm	3 (1unit out of service)	N/A

Source) JICA Survey Team

Table 8 Characteristic of Investigated Pumping Station (KSA)

(i) Greenwich
The biggest pump station was noted to be the Greenwich facility which has a large operating space this is so because its previous function was as a treatment plant however its capabilities have been downsized.
(ii) Nanse pen (iii) Darling Street (v) Glendale (vi) Seaview Gardens
There was a variance in the equipment that was at the pump stations, most times there were two pump units present and unlike Portmore both pumps were functional. Also much larger size pumps were found in pump stations such as Darling Street, Nanse Pen and Seaview Gardens where the pumps had 14 " and 10 " inlet pipes respectively. This is so because of the increased sewage load that these pump stations receive. The issues that these pumps were facing varied from broken motors to missing belts. Another consistent trend that was noticed was the fact that the stand-by generators which are a fixture of most of the pump stations were not in service. Only the Nanse Pen pump station contained a functional generator, this is so because most of the equipment that was

found in this pump station was only eighteen (18) months old.
(iv) Red Hills Road
The smallest and also most poorly kept pump station was the Red Hills Road facility, there was a very foul odor that emanated from this site upon entering and all the necessary equipment was in disrepair. The security implementations at most of these sites were in good condition, as stated before only the Red Hills Road Pump Station had most of its security facilities in total disrepair and many persons who were not officials of the N.W.C were seen walking in and out of the facility.

Source) JICA Survey Team

4. Septic Tank

The Survey and Engineering team also undertook the task of getting an idea of the amount of residences in the KSA area that utilized septic tanks; and finding out their willingness to join the sewage connection drive that should be underway in a couple of years. This information would be gathered by making contact with random residents of selected communities in the selected areas. There were four (4) main study areas that investigations took place: shown as Table 6. Survey sheet can be shown as Appendix C-5

Table 6 Summary of Investigated Septic Tank

(i)	Pembroke Hall	4 samples
(ii)	Havendale	7 samples
(iii)	Birdsucker:	3 samples
(iv)	Hope Pastures	7 samples

The general response upon being summoned by the survey team was mostly pleasant, as the level of reception to our questions was very good; there were only a few residents who refused to speak with the survey team. Of the twenty one (21) surveys that were taken, eleven (11) of the residents surveyed brought about positive responses whilst the remaining ten (10) gave an answer of no.

When asked about the reasoning behind their being interested in the sewage connection drive the most popular response that was derived was the convenience and savings that would be gained from allowing their sewage to be transmitted directly from their house into the main sewage lines as opposed to ordering trucks to remove the sludge over a period of time. The time that it takes for a soak-away pit to reach its capacity depends on the amount of users in a house and the amount of sewage that is generated; therefore the periods of time between sludge removal differs according to the household. Cases that were encountered displayed residents who have not removed the sludge in over 25 years whilst inversely there are residents who have to remove the sludge every year. The average cost that it takes to remove the sludge by way of trucks is $6,000 JMD for each load; therefore connecting to the sewage line should prove to be a saving for those who remove the sludge more frequently. Another popular reason for connecting the sewage line is the immeasurable benefits that doing this provides for the environment. It is a known fact that the soak-away pits contribute greatly to the contamination of the water is found below the earth; in times of drought these

underground water sources could prove to be a great help. Therefore eradicating the soak-away pits would remove a lot of the pollutants.

It is clear that the people of Kingston are willing to connect to the main sewerage lines after weighing the factors such as cost and environmental ramifications; therefore the concept is not lost upon the conscious citizens of Kingston.

5. Commercial / Industrial / Institutional Survey

The Survey and Engineering team also undertook the task of getting a sewerage flows in the Portmore & KSA area; and finding out the flows such as Commercial, Industrial and Institutional. This information would be gathered by the buildings more than some scale in the selected areas. There were two main study areas that investigations took place: Survey sheet can be shown as Appendix C-6

Appendix C-1: Survey Sheet of Sewerage Treatment Plant (Portmore)

(i) Independence City

(ii) Bridgeport

(iii) Hamilton Gardens

(iv) Caymanas Gardens

Survey Sheet of Sewage Treatment Plant

Survey Da 24/08/09 **Surveyor:**

・General information of STP

Items			Specification	
Name of Plant			**Independence City Treatment Plant**	
Construction Year / Month			year : month :	
Location (name of street / avenue)			**One London Road**	
Planned sewered population			inhabitants	
Design treatment capacity			m3/day	
Present sewered population			inhabitants	
Present inflow rate			m3/day	
Amount of electricity consumption			kWh/day	
Sewage Collection	Mode of collection system		Separate ☐ Combined ☑	
	No. of inlet sewer pipelines at STP		**Three (3)** lines (by **gravity** by pressure)	
	No. of lift P/S at STP (if more than 2, please use other sheet)	No.	No. 1	No. 2
		Number of pump	unit	unit
		Each capacity	m3/min/unit	m3/min/unit
		Design head	m	m
		Pump type	Self Priming Cen. Pump	
		Pump Manufacturer	Gorman Rupp	
		Pump bore diameter	mm	mm
		Duty (in original)	unit	unit
		Standby (in original)	unit	unit
		Out-of-service	unit	unit
Water Quality	Parameter		Influent	Effluent
	BOD	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	SS	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-N	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-P	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	Fecal Coliform	Design	qty/ml	qty/ml
		Actual	qty/ml	qty/ml
Effluent Discharge		Outlet Point	Harbor ☐ River ☐ Gully ☑ Other ☐ Specify if other (**Sea**)	
		Discharge Type	Gravity ☑ Pump ☐	

・Composition of the facility

Check to select the method of treatment.

Treatment methods	Check
Standard Activated Sludge	☑
Oxidation Ditch	☐
Trickling Filter	☐
Contact stabilization pond	☐
Lagoon (with / without aeration)	☐
the others	☐

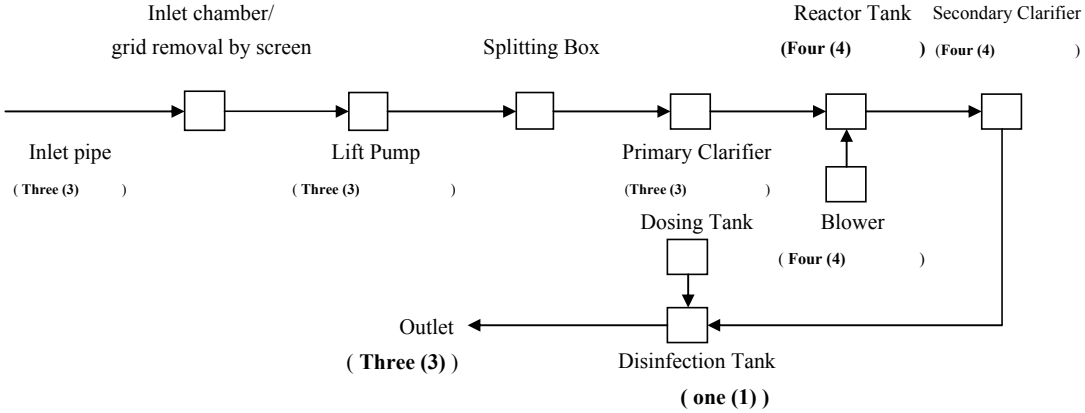
Service condition of Treatment Units

Treatment Process Line	Check
No. of treatment units	**Three (3)**
No. of treatment units in service	**Two (2)**
No. of treatment units out of servic	**Two (2)**

Service condition of Blowers

Treatment Process Line	Check
No. of blowers in service	**Two (2)**
No. of blowers out of service	**Two (2)**

Flow Diagram (check ✓ to the existing facility)



Check to select the method of sludge treatment.

Treatment methods	Check
Thickening	☐
Digesting	☑
Dewatering	☐
Drying	☑
the others	☐

・The organization of STP

Position	Number of persons	
Site Manager	**Two (2)**	persons
Operator	**Three (3)**	persons
Service / Maintenance	**Nine (9)**	persons
Water quality test expert	**Three (3)**	persons
Office worker	**One (1)**	persons
others (security, landscaper)	**One (1)**	persons

・Operator Organization

Items	Contents	
Working hours (plant operation	**24**	hrs (from **7** to **3**) **3 - 11**
Work shift formation	2	shift with **Two** groups (**Three** person per group)

	☐	☐

Any chemical for wastewater treatment?	Yes	No
	☑	☐

If yes, how much and what kind ?

The kind of chemicals	Amount of use
Chlorine (Typ **Gas**	3.2 L/day
Flocculants	L/day
the others（ ）	L/day

Procurement of chemicals (Duration of delivery days / weeks / months)	Domestic ☐	Import ☑

Frequency of power failure	No	rarely	sometime	often
	☐	☐	☐	☑

Backup generator for emergency use	Yes	No
	☐	☑

Final disposal of sludge	Landfill	Reuse	the others
	☐	☐	☑

Reuse of sludge if done currently	Composting	Materials	the others
	☐	☐	☑

・Analysis of water quality

Frequency of water quality analysis for effluent	Onse per day / week / month

Procedure of water quality analysis	NWC Laboratory	Outsource to local firm	the others
	☑	☑	☐

・Maintenance

Frequency of check / maintenance activity (How long interval, if regular basis Once per days / weeks / months)	Regular basis ☐	Irregular basis ☑

Replacement of consumble parts (sealing parts for pump……) (Frequency of replacen	Yes ☑	No ☐

Procurement of spre parts (Duration of delivery days / weeks / months)	Domestic ☐	Import ☑

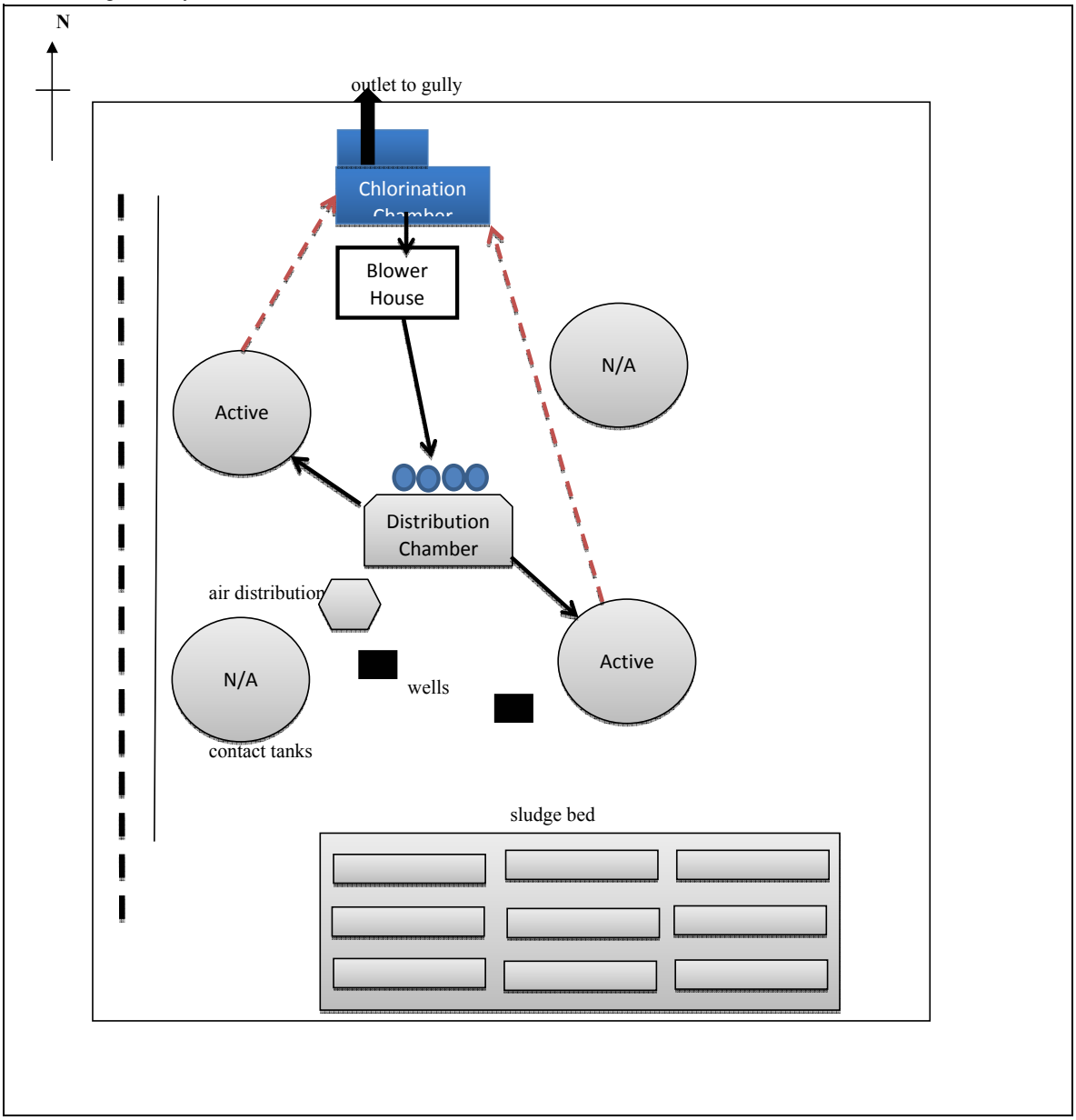
Procedure of repair	NWC ☑	Outsource ☐

・Current Issues

If any issues for improvements of the assets and O&M of facility.

The safety facilities such as handrails and proper footpaths can be improved.

・Scketch of general layout



・Photographs and comments of the site condition

Overall view of the site layout (2-3photos)

Lift pump facilities (general, pump unit, control panel, sump)

Blower house (general, blower unit)

Tanks (outside, inside)

Clarifier (outside, inside)

Disinfection tank, dosing tank (general for each facility)

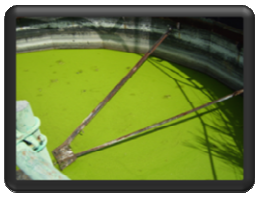
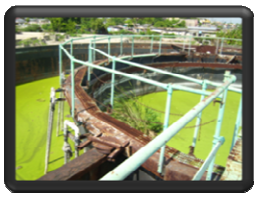
General over view




The above pictures display the inside of the blower house and is equipments

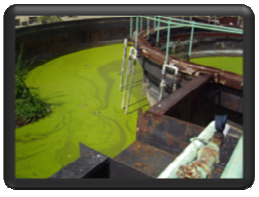



The above pictures displayes the active contact tanks at the facility and the grid chamber

Pictures above displays the contact tank at the facility's northern end that is out of service at the Indipendence city plant



Pictures above displays the contact tank that is out of service at the Indipendence city plant

Survey Sheet of Sewage Treatment Plant

Survey Da 24/08/09 **Surveyor:**

・General information of STP

Items			Specification	
Name of Plant			**Bridgeport Treatment Plant**	
Construction Year / Month			year :	month :
Location (name of street / avenue)			**Germaine Road**	
Planned sewered population			inhabitants	
Design treatment capacity			m3/day	
Present sewered population			inhabitants	
Present inflow rate			m3/day	
Amount of electricity consumption			kWh/day	
Sewage Collection	Mode of collection system		Separate ☐ Combined ☑	
	No. of inlet sewer pipelines at STP		4 lines (by **gravity** by pressure)	
	No. of lift P/S at STP (if more than 2, please use other sheet)	No.	No. 1	No. 2
		Number of pump	unit	unit
		Each capacity	m3/min/unit	m3/min/unit
		Design head	m	m
		Pump type		
		Pump Manufacturer		
		Pump bore diameter	mm	mm
		Duty (in original)	unit	unit
		Standby (in original)	unit	unit
		Out-of-service	unit	unit
Water Quality	Parameter		Influent	Effluent
	BOD	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	SS	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-N	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-P	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	Fecal Coliform	Design	qty/ml	qty/ml
		Actual	qty/ml	qty/ml
Effluent Discharge		Outlet Point	Harbor ☐ River ☐ Gully ☑ Other ☐ Specify if other ( )	
		Discharge Type	Gravity ☑ Pump ☐	

・Composition of the facility

Check to select the method of treatment.

Treatment methods	Check
Standard Activated Sludge	☑
Oxidation Ditch	☐
Trickling Filter	☑
Contact stabilization pond	☑
Lagoon (with / without aeration)	☐
the others	☐

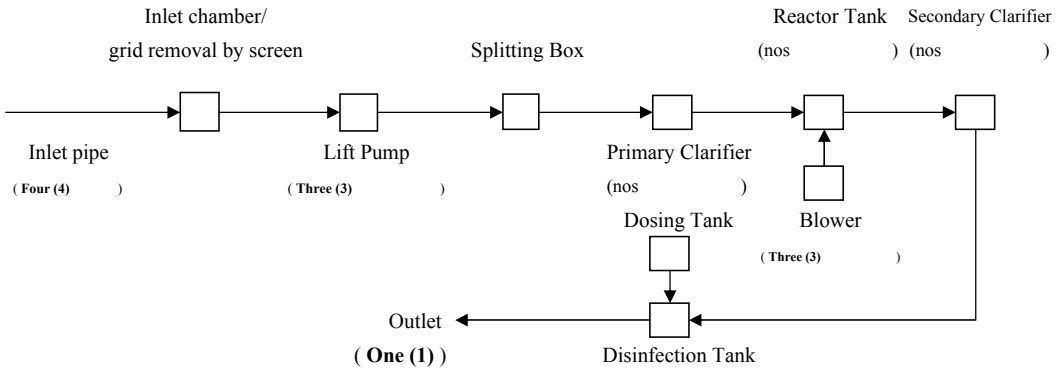
Service condition of Treatment Units

Treatment Process Line	Check
No. of treatment units	**Four (4)**
No. of treatment units in service	**Three (3)**
No. of treatment units out of servic	**One (1)**

Service condition of Blowers

Treatment Process Line	Check
No. of blowers in service	**Three (3)**
No. of blowers out of service	**One (1)**

Flow Diagram (check ✓ to the existing facility)



Check to select the method of sludge treatment.

Treatment methods	Check
Thickening	☐
Digesting	☑
Dewatering	☐
Drying	☑
the others	☐

・The organization of STP

Position	Number of persons
Site Manager	**Two (2)** persons
Operator	**Three (3)** persons
Service / Maintenance	**Three (3)** persons
Water quality test expert	persons
Office worker	**0** persons
others (security, landscaper)	**One (1)** persons

・Operator Organization

Items	Contents
Working hours (plant operation	**24** hrs (from to)
Work shift formation	2 shift with **Two** groups (**Three** person per group)

	☐	☐

Any chemical for wastewater treatment?	Yes	No
	☑	☐

If yes, how much and what kind ?

The kind of chemicals	Amount of use
Chlorine (Typ **Gas**	3.2 L/day
Flocculants	L/day
the others（ ）	L/day

Procurement of chemicals (Duration of delivery days / weeks / months)	Domestic ☐	Import ☑

Frequency of power failure	No	rarely	sometime	often
	☐	☐	☐	☑

Backup generator for emergency use	Yes	No
	☐	☑

Final disposal of sludge	Landfill	Reuse	the others
	☐	☐	☑

Reuse of sludge if done currently	Composting	Materials	the others
	☐	☐	☑

・Analysis of water quality

Frequency of water quality analysis for effluent	Onse per day / week / month

Procedure of water quality analysis	NWC Laboratory	Outsource to local firm	the others
	☑	☑	☐

・Maintenance

Frequency of check / maintenance activity	Regular basis	Irregular basis
(How long interval, if regular basis Once per days / weeks / months)	☐	☑

Replacement of consumble parts (sealing parts for pump……)	Yes	No
(Frequency of replacement if yes times per year in general)	☐	☐

Procurement of spre parts (Duration of delivery days / weeks / months)	Domestic ☐	Import ☑

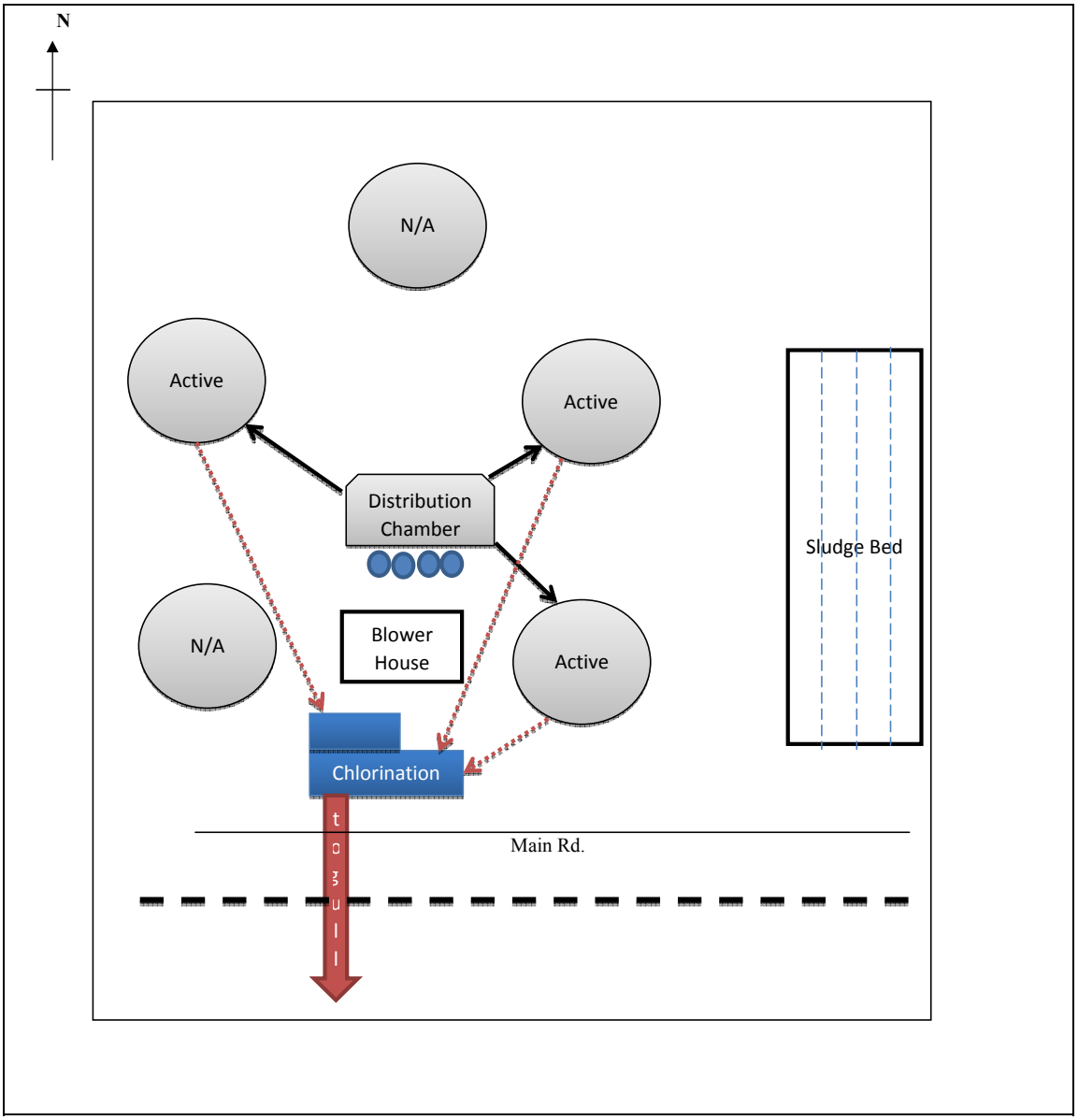
Procedure of repair	NWC	Outsource
	☑	☐

・Current Issues

If any issues for improvements of the assets and O&M of facility.

The safety facilities such as handrails and proper footpaths can be improved. Also there is currently a new tank being installed.

・Scketch of general layout



・Photographs and comments of the site condition

Overall view of the site layout (2-3photos)

Lift pump facilities (general, pump unit, control panel, sump)

Blower house (general, blower unit)

Tanks (outside, inside)

Clarifier (outside, inside)

Disinfection tank, dosing tank (general for each facility)

Comments on color, odor of sewage



The pictures above displays the general over view of the Bridgeport facility




The pictures above displays the general over view inside the Blower house




The above pictures display the initail stages of treament, the grid chamber, inlet and residual remnants




The above pictures displays the contact tank and the chlorination chamber

Survey Sheet of Sewage Treatment Plant

Survey Da 24/08/09 **Surveyor:**

・General information of STP

Items			Specification	
Name of Plant			**Hamilton Gardens Treatment Plant**	
Construction Year / Month			year : month :	
Location (name of street / avenue)			**Cottage Drive/Queens Avenue**	
Planned sewered population			inhabitants	
Design treatment capacity			m3/day	
Present sewered population			inhabitants	
Present inflow rate			m3/day	
Amount of electricity consumption			kWh/day	
Sewage Collection	Mode of collection system		Separate ☐ Combined ☑	
	No. of inlet sewer pipelines at STP		**One (1)** lines (by **gravity** by pressure)	
	No. of lift P/S at STP (if more than 2, please use other sheet)	No.	No. 1	No. 2
		Number of pump	unit	unit
		Each capacity	m3/min/unit	m3/min/unit
		Design head	m	m
		Pump type	Self Priming Cen. Pump	
		Pump Manufacturer	Gorman Rupp	
		Pump bore diameter	101.6 mm	mm
		Duty (in original)	unit	unit
		Standby (in original)	unit	unit
		Out-of-service	unit	unit
Water Quality	Parameter		Influent	Effluent
	BOD	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	SS	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-N	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-P	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	Fecal Coliform	Design	qty/ml	qty/ml
		Actual	qty/ml	qty/ml
Effluent Discharge		Outlet Point	Harbor ☐ River ☐ Gully ☑ Other ☐ Specify if other ( )	
		Discharge Type	Gravity ☑ Pump ☐	

・Composition of the facility

Check to select the method of treatment.

Treatment methods	Check
Standard Activated Sludge	☐
Oxidation Ditch	☑
Trickling Filter	☐
Contact stabilization pond	☐
Lagoon (with / without aeration)	☐
the others	☐

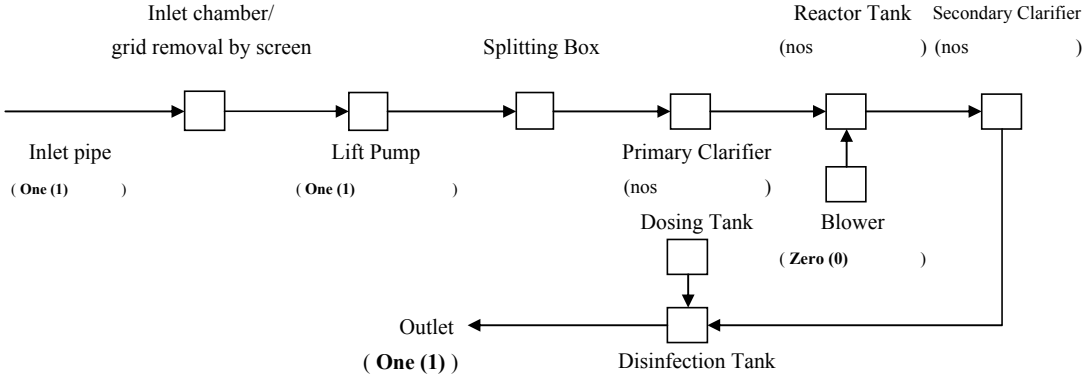
Service condition of Treatment Units

Treatment Process Line	Check
No. of treatment units	**One (1))**
No. of treatment units in service	**One(1)**
No. of treatment units out of servic	**Zero (0)**

Service condition of Blowers

Treatment Process Line	Check
No. of blowers in service	**Zero**
No. of blowers out of service	**Zero**

Flow Diagram (check ✓ to the existing facility)



Check to select the method of sludge treatment.

Treatment methods	Check
Thickening	☐
Digesting	☐
Dewatering	☐
Drying	☑
the others	☐

・The organization of STP

Position	Number of persons
Site Manager	persons
Operator	**One (1)** persons
Service / Maintenance	persons
Water quality test expert	persons
Office worker	**0** persons
others (security, landscaper)	persons

・Operator Organization

Items	Contents
Working hours (plant operation	**24** hrs (from to)
Work shift formation	2 shift with **One** group (**One** person per group)

	☐	☐

Any chemical for wastewater treatment?	Yes	No
	☑	☐

If yes, how much and what kind ?

The kind of chemicals	Amount of use
Chlorine (Typ **Gas**	3.2 L/day
Flocculants	L/day
the others（ ）	L/day

Procurement of chemicals (Duration of delivery days / weeks / months)	Domestic ☐	Import ☑

Frequency of power failure	No	rarely	sometime	often
	☐	☐	☐	☑

Backup generator for emergency use	Yes	No
	☐	☑

Final disposal of sludge	Landfill	Reuse	the others
	☐	☐	☑

Reuse of sludge if done currently	Composting	Materials	the others
	☐	☐	☑

・Analysis of water quality

Frequency of water quality analysis for effluent	Onse per day / week / month

Procedure of water quality analysis	NWC Laboratory	Outsource to local firm	the others
	☑	☑	☐

・Maintenance

Frequency of check / maintenance activity (How long interval, if regular basis Once per days / weeks / months)	Regular basis ☐	Irregular basis ☑

Replacement of consumble parts (sealing parts for pump……) (Frequency of replacement if yes times per year in general)	Yes ☑	No ☐

Procurement of spre parts (Duration of delivery days / weeks / months)	Domestic ☐	Import ☑

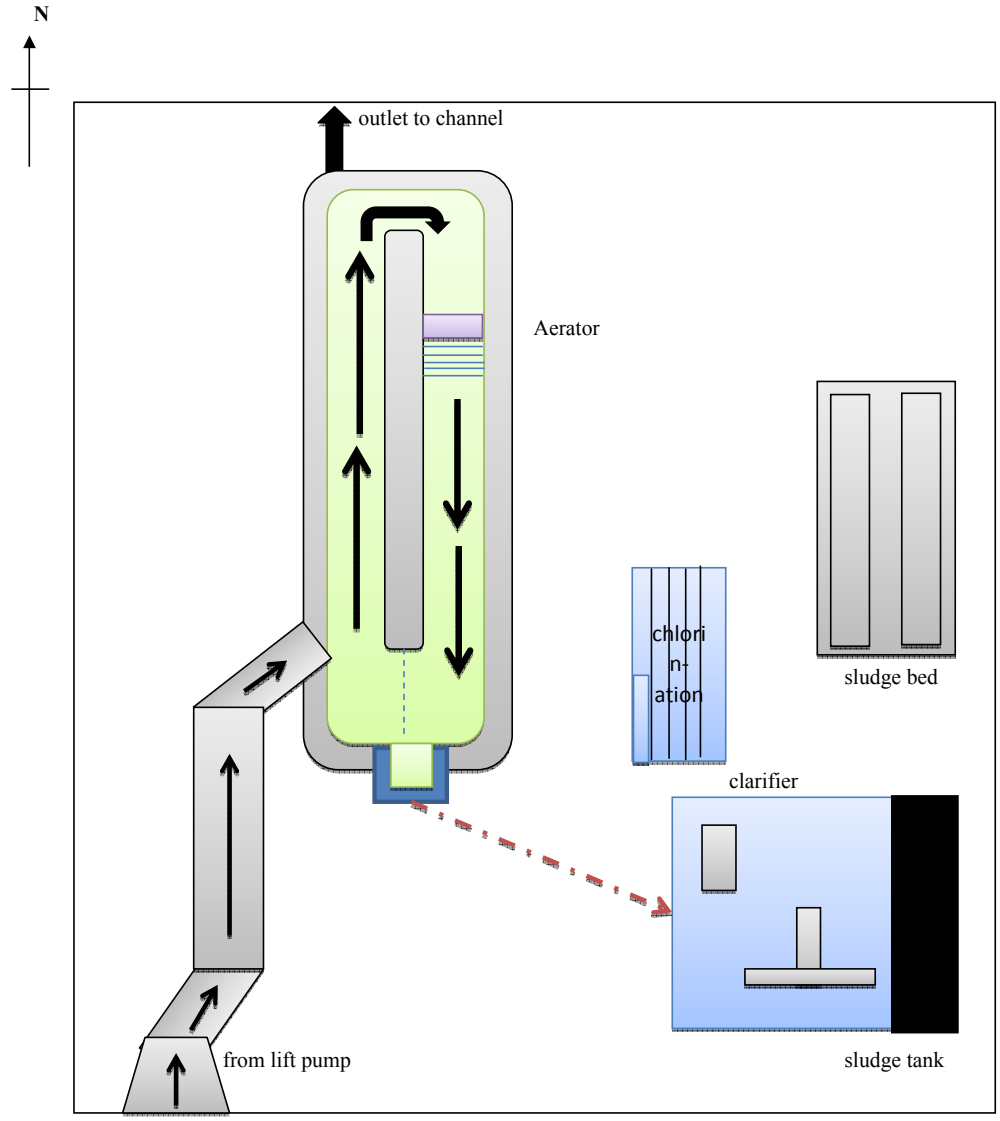
Procedure of repair	NWC	Outsource
	☑	☐

・Current Issues

If any issues for improvements of the assets and O&M of facility.

The issues that this treatment plant faces is the lack of maintenance personnnel as there is only one present at all times; it is als more equipment to be provided to complete the necessary tasks.

・Scketch of general layout



・Photographs and comments of the site condition

Overall view of the site layout (2-3photos)

Lift pump facilities (general, pump unit, control panel, sump)

Blower house (general, blower unit)

Tanks (outside, inside)

Clarifier (outside, inside)

Disinfection tank, dosing tank (general for each facility)

Comments on color, odor of sewage

The above pictures displaying the inlet well and the lift pump that replaced the axial flow pumps

The above pictures displaying the one of the two aerators that should be at the facility

The pictures above displays the screens and all other pre treament that takes place at the facility

The above pictures display chlorination chamber, clarifier and the sludge tank

Survey Sheet of Sewage Treatment Plant

Survey Date: **Surveyor:**

・General information of STP

Items			Specification	
Name of Plant			**Caymanas Dyke Ponds**	
Construction Year / Month			year : month :	
Location (name of street / avenue)			**Godley Ave.**	
Planned sewered population			inhabitants	
Design treatment capacity			m3/day	
Present sewered population			inhabitants	
Present inflow rate			m3/day	
Amount of electricity consumption			kWh/day	
Sewage Collection	Mode of collection system		Separate ☐ Combined ☐	
	No. of inlet sewer pipelines at STP		203.2mm lines (by gravity by pressure)	
	No. of lift P/S at STP (if more than 2, please use other sheet)	No.	No. 1	No. 2
		Number of pump	unit	unit
		Each capacity	m3/min/unit	m3/min/unit
		Design head	m	m
		Pump type		
		Pump Manufacturer		
		Pump bore diameter	mm	mm
		Duty (in original)	unit	unit
		Standby (in original)	unit	unit
		Out-of-service	unit	unit
Water Quality	Parameter		Influent	Effluent
	BOD	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	SS	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-N	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	T-P	Design	mg/l	mg/l
		Actual	mg/l	mg/l
	Fecal Coliform	Design	qty/ml	qty/ml
		Actual	qty/ml	qty/ml
Effluent Discharge		Outlet Point	Harbor ☑ River ☐ Gully ☐ Other ☐ Specify if other ( )	
		Discharge Type	Gravity ☑ Pump ☐	

・Composition of the facility

Check to select the method of treatment.

Treatment methods	Check
Standard Activated Sludge	☐
Oxidation Ditch	☐
Trickling Filter	☐
Contact stabilization pond	☐
Lagoon (with / without aeration)	☐
the others	☑

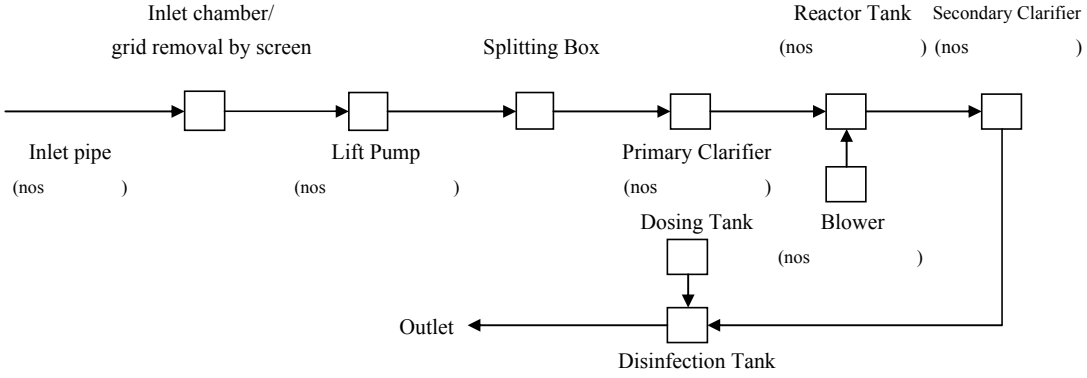
Service condition of Treatment Units

Treatment Process Line	Check
No. of treatment units	nos
No. of treatment units in service	nos
No. of treatment units out of servic	nos

Service condition of Blowers

Treatment Process Line	Check
No. of blowers in service	nos
No. of blowers out of service	nos

Flow Diagram (check ✓ to the existing facility)



Check to select the method of sludge treatment.

Treatment methods	Check
Thickening	☐
Digesting	☐
Dewatering	☐
Drying	☐
the others	☐

・The organization of STP

Position	Number of persons
Site Manager	persons
Operator	persons
Service / Maintenance	persons
Water quality test expert	persons
Office worker	persons
others (security, landscaper)	persons

・Operator Organization

Items	Contents
Working hours (plant operation	hrs (from to)
Work shift formation	shift with groups (person per group)

・Operation Condition	Yes	No
	☐	☐

Any chemical for wastewater treatment?	Yes	No
	☐	☐

If yes, how much and what kind ?

The kind of chemicals	Amount of use
Chlorine (Type)	L/day
Flocculants	L/day
the others（ ）	L/day

Procurement of chemicals (Duration of delivery days / weeks / months)	Domestic	Import
	☐	☐

Frequency of power failure	No	rarely	sometime	often
	☐	☐	☐	☐

Backup generator for emergency use	Yes	No
	☐	☑

Final disposal of sludge	Landfill	Reuse	the others
	☐	☐	☐

Reuse of sludge if done currently	Composting	Materials	the others
	☐	☐	☐

・Analysis of water quality

Frequency of water quality analysis for effluent	Onse per day / week / month (plant not in use)

Procedure of water quality analysis	NWC Laboratory	Outsource to local firm	the others
	☐	☐	☐

・Maintenance

Frequency of check / maintenance activity (How long interval, if regular basis Once per days / weeks / months)	Regular basis	Irregular basis
	☐	☐

Replacement of consumble parts (sealing parts for pump……) (Frequency of replacement if yes times per year in general)	Yes	No
	☐	☐

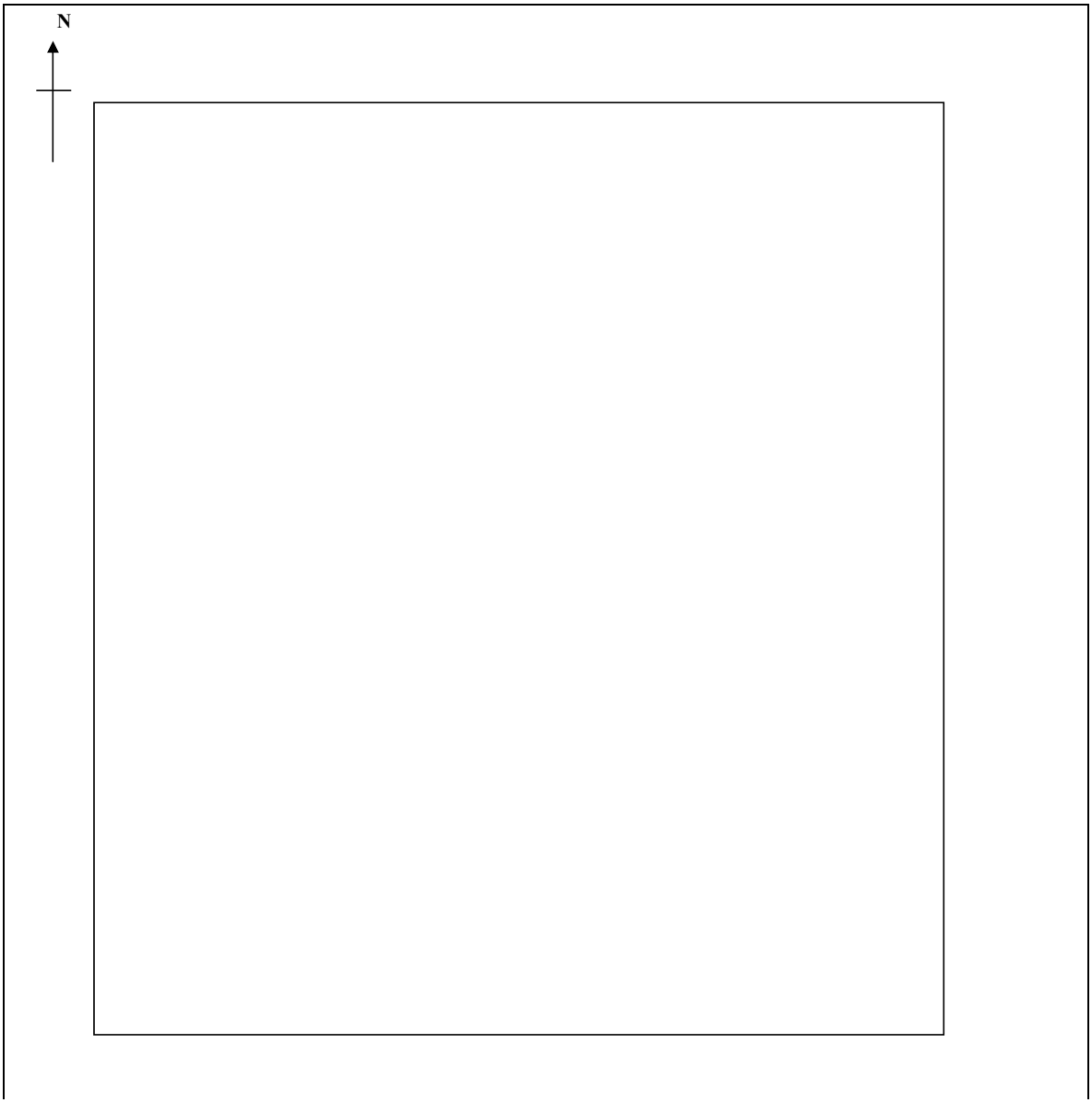
Procurement of spre parts (Duration of delivery days / weeks / months)	Domestic	Import
	☐	☐

Procedure of repair	NWC	Outsource
	☐	☐

・Current Issues

If any issues for improvements of the assets and O&M of facility.

・Scketch of general layout



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Clarifier (outside, inside)

Disinfection tank, dosing tank (general for each facility)

Comments on color, odor of sewage