ELECTRICAL AND MECHANICAL PROJECTS DIVISION

PROJECT PROFILE

WATER RECLAMATION FACILITY IN TAI PO SEWAGE TREATMENT WORKS

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1 PROJECT INFORMATION

1.1 Project Title

Water Reclamation Facility in Tai Po Sewage Treatment Works.

1.2 Purpose and Nature of Project

The Project will involve the installation of water reclamation facility (hereinafter called " Facility") in Tai Po Sewage Treatment Works (TPSTW). The water reclamation facility includes a membrane filtration plant (hereinafter called "MF Plant") and a reverse osmosis plant (hereinafter called "RO Plant"). The MF Plant will be able to advance treat the secondary effluent after secondary treatment at sewage treatment works for the production of reclaimed water for ground and facility washing and toilet flushing. Part of the effluent from the MF Plant will be further polished in the downstream RO Plant so that reclaimed water will be produced for polymer preparation and landscape irrigation. All the reclaimed water produced will be used within the plant boundary of Drainage Services Department (DSD). Potable water consumption of the sewage treatment works can then be reduced with the operation of the water reclamation facility and contributes to a green and sustainable environment.

The maximum design flow of the water reclamation facilities for ground and facility washing, toilet flushing, polymer preparation and landscape irrigation are summarized as follows :

No.	Plant Location	Ground and Facility Washing and Toilet Flushing (m^3/day)	Polymer Preparation (m^3/day)	Landscape Irrigation (m^3/day)	No. of Water Reclamation Facility
1	Tai Po STW	300	300	50	1

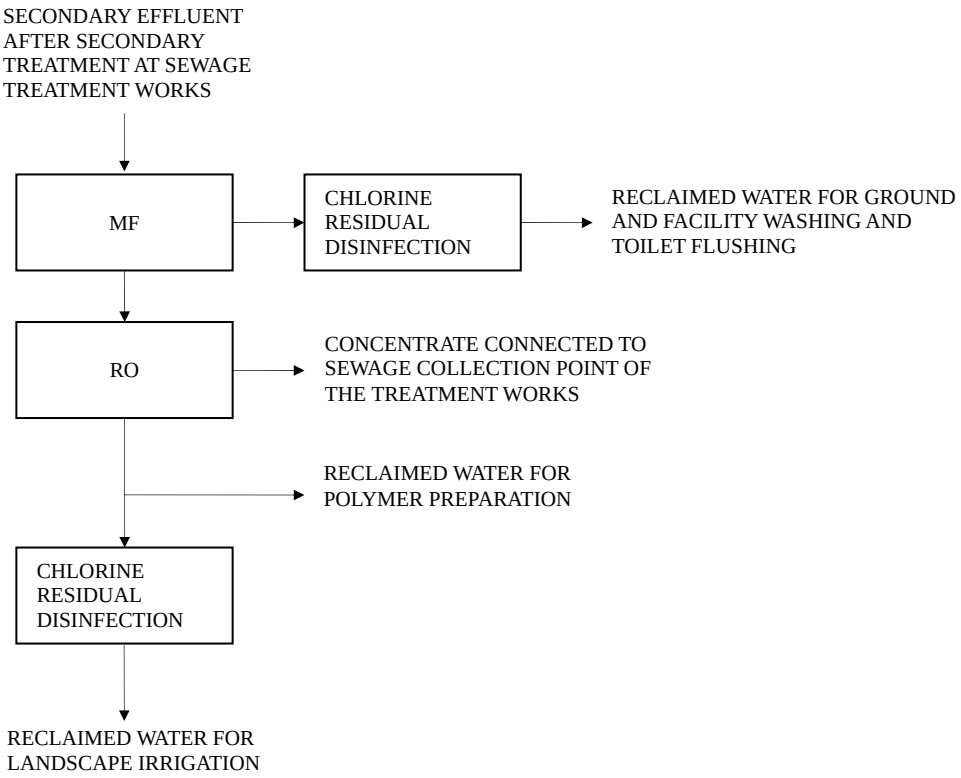
1.3 Name of Project Proponent

Drainage Services Department (DSD).

1.4 Location and Scale of Project

The Facilities (the MF Plant and the RO Plant) will be installed within the plant boundaries of TPSTW as shown in **Figures 1 & 2**. The Facility will occupy a footprint of about 300m^2. The height of the Facility will be about 5 m and all associated tanks in the Facility will be covered for safety purpose and to minimize odour emission, if any. The water distribution pipeline in each site will be less than 100mm in diameter in size of about 500m long.

The following shows the process train of the advanced treatment :



PROCESS TRAIN OF ADVANCED TREATMENT

The Facility is scheduled to operate in January 2013. The Facility (the MF Plant and the RO Plant) will operate automatically on a 24 hours per day.

1.5 Number and Types of Designated Project to be Covered by this Project Profile

The use of reclaimed water from the MF Plant and RO Plant within the existing DSD plant boundary for ground and facility washing, toilet flushing, polymer preparation and landscape irrigation is identified as a Designated Project in accordance with F.4 (An activity for the reuse of treated sewage effluent from a treatment plant) of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO).

1.6 Name and Telephone Number of Contact Person

Mr. LIU Hon-wa, Senior Engineer/Electrical and Mechanical Projects Division, Drainage Services Department (Tel. 2594 7303)

2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

DSD will carry out the design of the proposed reclaimed water facility. DSD will also supervise the construction and operation of the whole scheme.

It is anticipated that the tender and construction of the works will commence in September 2011 and January 2012 respectively for completion of the construction works by January 2013. Operation of the scheme will take place after the installation of the reclaimed water facility in January 2013.

3 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1 Major Elements of Surrounding Environment

The water reclamation facility and distribution system will be located within the boundary of TPSTW (**Figure 2**). There are some industrial buildings in the south, west and north side. The east side is Tai Po Shuen Wan Temporary Golf Driving Range.

3.2 Existing and Planned Sensitive Receivers

3.2.1 Air Quality and Noise

As shown in **Figure 2**, Tai Po Shuen Wan Temporary Golf Driving Range in the east side, Taclon Industries Ltd. and Hung Hing Offset Printing Centre in the south side, Cabot Plastics and a planned commercial building in the west side and Watson's Water Centre and HK Yakult Co. Ltd. and Rainbow Latex Ltd. in the north side are identified as the sensitive receivers during the construction and operation stages.

3.2.2 Water Quality

Tolo Harbour at the southeast side is identified as the sensitive receiver during the construction and the operation stages.

3.2.3 Health and Hygiene

The occupants of the sewage treatment works including plant staff and visitors are identified as the sensitive receivers during the operation phase.

4 POSSIBLE IMPACTS ON THE ENVIRONMENT

4.1 Possible Environmental Impacts during Construction Stage

4.1.1 Air Quality

The major potential air quality impact during construction of this Project is dust arising from general construction activities.

4.1.2 Noise

The construction activities involved in this Project will include very minor scale excavation and general E&M installation works. Sources of noise during the construction stage would be associated with the use of conventional construction plants and equipment.

4.1.3 Water Quality

Water quality impacts of the Project would be associated with the site runoff and wastewater generated from construction activities. In view of the small scale of the Project, adverse water quality impact during the construction stage is not anticipated.

4.1.4 Waste

Excavation of very minor scale will be required for the construction pipework distribution system. The volume of excavated material generated during construction for

each reclamation facility would be about 10 m^3. Other C&D waste from the formwork and temporary works, and minor chemical waste and general refuse, will also be generated.

4.1.5 Ecology

The MF Plant, the RO Plant and the associated distribution pipework system would be located within DSD plant boundary. No adverse ecological impact is anticipated during the construction stage.

4.1.6 Landscape and Visual

The MF Plant, the RO Plant and pipework distribution system would be located within DSD plant boundary. No tree felling is expected for this Project. The landscape and visual impact arising from the Project is negligible due to the small scale of the project.

4.1.7 Health and Hygiene

Adverse impacts on health and hygiene are not anticipated during the construction stage.

4.2 Possible Environmental Impacts during Operation Stage

4.2.1 Natural Resources

Currently, DSD sewage treatment works utilize potable water for ground and facility washing,, polymer preparation and landscape irrigation. The use of reclaimed water under the Project will reduce the potable water demand of DSD sewage treatment works. It is anticipated that approximately 650 m^3 of potable water will be saved per day due to the proposed Project.

4.2.2 Air Quality

Chlorination tank will be enclosed to contain any potential odour emission. Adverse odour impact on the air sensitive receivers during the operation stage of the Project is not expected.

4.2.3 Noise

The pumps of the Facility will be the main potential noise sources during the operation stage of the Project. The noise will arise from the pumps, which are located about 100m from the building of Taclon Industries. In view of the small scale of the works, adverse noise impact is minimal during the operation stage of the Project.

4.2.4 Water Quality

During the operation stage, the reclaimed water from the MF Plant and the RO Plant will undergo chlorination process by dosing of sodium hypochlorite to maintain a specific residual chlorine level of the reclaimed water for ground and facility washing, toilet flushing and landscape irrigation. The quality of the reclaimed water is summarized in **Table 1**.

Table 1 –Reclaimed Water Quality

Water Quality Parameter	Unit	USEPA Criteria*				Reclaimed Water Quality of this Project				
		Washing	Toilet Flushing	Irrigation	Chemical	Make-up Water	Ground and Facility Washing	Toilet Flushing	Polymer Preparation	Landscape Irrigation
pH	-	N.S.	6-9	6-9	6.2-8.3	6-9	6-9	6-9	6.2-8.3	6-9
Colour	HU	N.S.	N.S.	N.S.	20	N.S.	N.S.	< 20	< 20	N.S.
Turbidity	NTU	N.S.	≦ 2	≦ 2	N.S.	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Total Suspended Solids (TSS)	mg/L	≦ 30	N.S.	N.S.	5	≦ 10	≦ 10	≦ 10	≦ 5	≦ 10
Biochemical Oxygen Demand (BOD_5)	mg/L	≦30	≦ 10	≦ 10	N.S.	≦ 20	≦ 20	≦ 10	≦ 10	≦ 10
E.Coli	No./100 mL	≦ 200 fecal coli	Not Detectable	Not Detectable	N.S.	Not Detectable	Not Detectable	Not Detectable	Not Detectable	Not Detectable
Total Residual Chlorine (TRC)	mg/L	≧ 1	≧ 1	≦ 1	N.S.	≧ 1	≧ 1	≧ 1	N.S.	≦ 1
Total Dissolved Solids (TDS)	mg/L	N.S.	N.S.	N.S.	1,000	N.S.	N.S.	N.S.	< 500	<500

Remarks:
N. S. – Not Specified
* From USEPA (2004) Guidelines for Water Reuse

The reclaimed water of this Project will have an overall better water quality than the USEPA criteria currently in use for landscape irrigation and non-potable usages. No water quality impacts are predicted during normal operation of the Facility.

4.2.5 Waste

The concentrate from the MF Plant and the RO Plant will be collected and diverted to the sewage collection point of the sewage treatment works. Waste impact is not anticipated during the operation stage.

4.2.6 Ecology

No ecological impact is expected during the operation of the Facility.

4.2.7 Health and Hygiene

Ground and facility washing, toilet flushing, polymer preparation and landscape irrigation are non-potable uses. The reclaimed water from the RO Plant will be directly fed into the polymer preparation tank. Direct contact by human being is not expected. All other reclaimed water from the MF Plant and the RO Plant will be treated with chlorination prior to use or for storage. Its impact on human health and hygiene is therefore minimal. In addition, for ground and facility washing and landscape irrigation applications, operators will be required to wear personal protective gears to minimize contact with the reclaimed water whilst carrying out the washing/irrigation work. However, potential health and hygiene concerns may still exist if there is incorrect connection of the potable and reclaimed water pipes.

4.2.8 Hazard to Life

Small amounts of chemicals will be used for the Facility : 10% solution of sodium hypochlorite for chlorination process (250L) and a 10% solution of sodium bisulphite (250L) required for dechlorination process. The amount of chemicals required is far less than that planned to be stored in the future Stonecutters Island Sewage Treatment

Works for the operation of the disinfection facilities in the Harbour Area Treatment Scheme (HATS), storage of which has been concluded to present an "acceptable" risk in the quantitative risk assessment of the approved EIA report (AEIAR – 121/2008). Sodium hypochlorite is classified as a Category 4 poisonous substance and sodium bisulphite is classified as a Category 3 corrosive substance under the Dangerous Goods Ordinance (Cap 295). They are not acutely toxic, flammable, or explosive substances, but hazardous gas would be generated if they were accidentally mixed with incompatible chemicals. In fact, if sodium hypochlorite mixes with sodium bisulphite, only heat, but not toxic gas, would be evolved. Also, the use of these chemicals in the Facility would not constitute a potentially hazardous installation in accordance with EPD's ProPECC PN 2/94 Potentially Hazardous Installation. As such, no hazard impact is anticipated from the Facility.

4.2.9 Landscape and Visual

The Facility and the pipework distribution system will be located within DSD plant boundary. In view of the small scale of the works, the impact arising from the Project is negligible.

5 ENVIRONMENTAL PROTECTION MEAUSRES TO BE INCORPORATED

5.1 Environmental Protection Measures during Construction Stage

5.1.1 Air Quality

In view of the small scale of the Facility, the effect of dust generation from the construction works is expected to be insignificant with the implementation of mitigation measures. The impact will be minimized by the adoption of proper working methods, e.g. regular water spraying.

5.1.2 Noise

The construction activities of the Project will include very minor site excavation and general E&M installation works. Only minor noise impacts will be anticipated. Implementation of good site practices e.g. regular maintenance of powered mechanical equipment and use of silent equipment as the proper noise control measures during the construction stage are recommended to minimize the potential noise impacts.

5.1.3 Water Quality

Adoption of the practices as outline in ProPECC PN 1/94 Construction Site Drainage to minimize site runoff and potential water pollution is recommended, e.g. silt removal facility at nearby stormwater drains on-site before commencement of the excavation. Implementation of good site arrangement and management practice is required. In view of the small scale of the Project, adverse water quality impact during construction stage will not be anticipated.

5.1.4 Waste

The volume of excavated materials generated from the construction of each water reclamation facility would be about 200m^3 and most of it could be reused on-site. Other construction and demolition waste, and minor quantity of chemical waste and general refuse generated will be properly disposed. With proper mitigation measures in place, there will be no adverse waste impact anticipated.

5.2 Environmental Protection Measures during Operation Stage

5.2.1 Noise

The pumps of the Facility will be enclosed to contain the noise emissions. Silenced ventilation system incorporating silencers at the air intakes and discharge openings of the Facility will also be employed to further reduce the noise impact. With these mitigation measures in place, adverse noise impact is not anticipated during the operation stage of the Project.

5.2.2 Water Quality

The pipework arrangement of the Facility is so designed and made that in case complete failure of the Facility, seawater for toilet flushing and potable water for polymer preparation and landscape irrigation will be resumed by simply opening and closing of corresponding isolation valves. With these measures incorporated into the design of the Facility, adverse water quality impact is not anticipated during the operation stage of the Project.

5.2.3 Health and Hygiene

The reclaimed water pipeline will be a separate system and will not be connected with the potable water pipeline system. To avoid cross-connection of the reclaimed water supply to the potable water supply, the pipes for the reclaimed water will be specially arranged to differentiate them from that of the potable water pipes, e.g. clearly labeled with warning signs and notices, colour-coded, and/or using different pipe size, so that physical connection of the reclaimed water pipes with the potable water fittings would not be possible.

5.3 Comments on Environmental Effects

The reclaimed water for ground and facility washing, polymer preparation and landscape irrigation will reduce the quantity of potable water consumed in the existing DSD sewage treatment works. This is considered to be the benefits or positive impacts of the Project. The promotion of the use of reclaimed water in appropriate circumstances to enable conservation of potable water will contribute to a green and sustainable environment in Hong Kong.

6 USE OF PREVIOUSLY APPROVED EIA REPORTS

There is no previous approved report for the Project, but reference to other similar projects making direct application of an Environmental Permit is made including:

Application No.	Project Title
DIR-080/2003	Reuse of Treated Effluent from Ngong Ping Sewage Treatment plant for Toilet Flushing
DIR-125/2005	Demonstration Scheme on Reclaimed Water Uses in the North District
DIR-174/2008	Reuse of Treated Sewage Effluent from Redeveloped Lo Wu Correctional Institution
DIR-181/2009	Water Reclamation Facilities in Pumping Station and Preliminary Treatment Works of Drainage Services Department
DIR-182/2009	Water Reclamation Facilities for Yuen Long, Sai Kung and Stanley Sewage Treatment Works
DIR-183/2009	Water Reclamation Facilities for Stonecutters Island, Sham Tseng and Siu Ho Wan Sewage Treatment Works

For the projects of the reuse of treated effluent from Ngong Ping Sewage Treatment Plant for toilet flushing operated by DSD and the demonstration scheme on reclaimed water uses in the North District operated by EPD before, the performance of the facilities was satisfactory.

7 SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AND MIGITATION MEASURES

The potential environmental impacts and the proposed environmental mitigation measures to be incorporated into the design and construction contract of the proposed Facility are summarized in the following table:

Project Stage	Potential Environmental Impact	Mitigation Measures	Relevant Section in this Project Profile
Construction	Minor dust nuisance	Control by contract specifications	4.1.1 & 5.1.1
	Minor noise impact	Control by contract specifications	4.1.2 & 5.1.2
	Minor water quality impact	Control by contract specifications	4.1.3 & 5.1.3
	Minor waste impact	Control by contract specifications	4.1.4 & 5.1.4
	Ecological impact	No adverse impact is identified; no mitigation measure is required.	4.1.5
	Landscape and visual	No adverse impact is identified; no mitigation measure is required.	4.1.6
	Health and hygiene	No adverse impact is identified; no mitigation measure is required.	4.1.7
Operation	Impact on natural resources	Beneficial impact; no mitigation measure is required.	4.2.1
	Air quality	No adverse impact is identified; no mitigation measure is required.	4.2.2
	Minor noise impact	The blowers of the Facility will be enclosed to contain the noise emissions.	4.2.3 & 5.2.1
	Water quality	No adverse impact is identified. In case complete failure of the Facility, potable water will be used for make-up water, ground and facility washing, toilet flushing, polymer preparation and landscape irrigation.	4.2.4 & 5.2.2
	Minor waste impact	The concentrate from the Facility during operation will be collected and diverted to the sewage collection points of DSD sewage treatment works for treatment.	4.2.5
	Ecological impact	No adverse impact is identified; no mitigation measure is required.	4.2.6
	Impact on health and hygiene	To avoid cross-connection of the reclaimed water supply to the potable water supply, the pipes for the reclaimed water will be specially arranged to differentiate them from that of the potable	4.2.7 & 5.2.3

Project Stage	Potential Environmental Impact	Mitigation Measures	Relevant Section in this Project Profile
		water pipes.	
	Hazard impact	No adverse impact is identified; no mitigation measure is required.	4.2.8
	Landscape and visual	No adverse impact is identified; no mitigation measure is required.	4.2.9

With proper implementation of the above environmental mitigation measures that will be incorporated into the contract of the proposed water reclamation facility, insurmountable environmental impact during the construction and operation stages of the proposed Facility is not expected.

To conclude, the use of reclaimed water in the existing DSD sewage treatment works has the advantages of (i) reducing the demand on potable water, which is a scarce resource deserved for preservation to the maximum extent practicable and (ii) reducing wastewater discharges from the sewage treatment works and the pollution loading to the environment.

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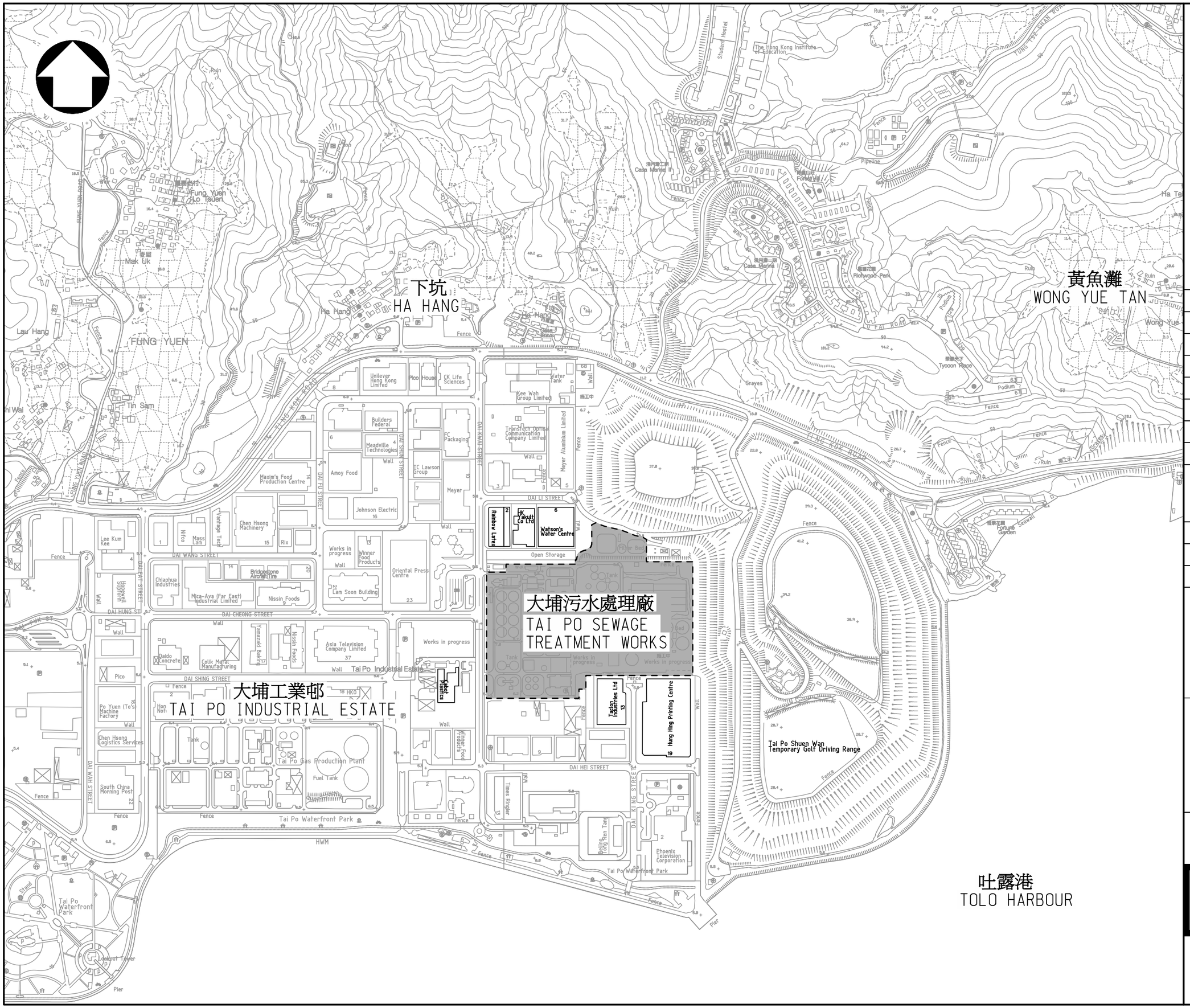

NOTES:

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REVISION		

	name	date
designed	K K CHOW	
drawn	C S CHAN	
checked	C M YIM	
counter checked	K T LEUNG	
vetted	S K TONG	

approved

Y W LAM

CE/E&MP DATE

contract no.

file no.

project no.

contract

SUPPLY AND INSTALLATION OF WATER RECLAMATION FACILITY IN TAI PO SEWAGE TREATMENT WORKS

drawing title

SITE PLAN
(FIGURE 1)

drawing no.	scale
DEM1530/SKE1	N.T.S.

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DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

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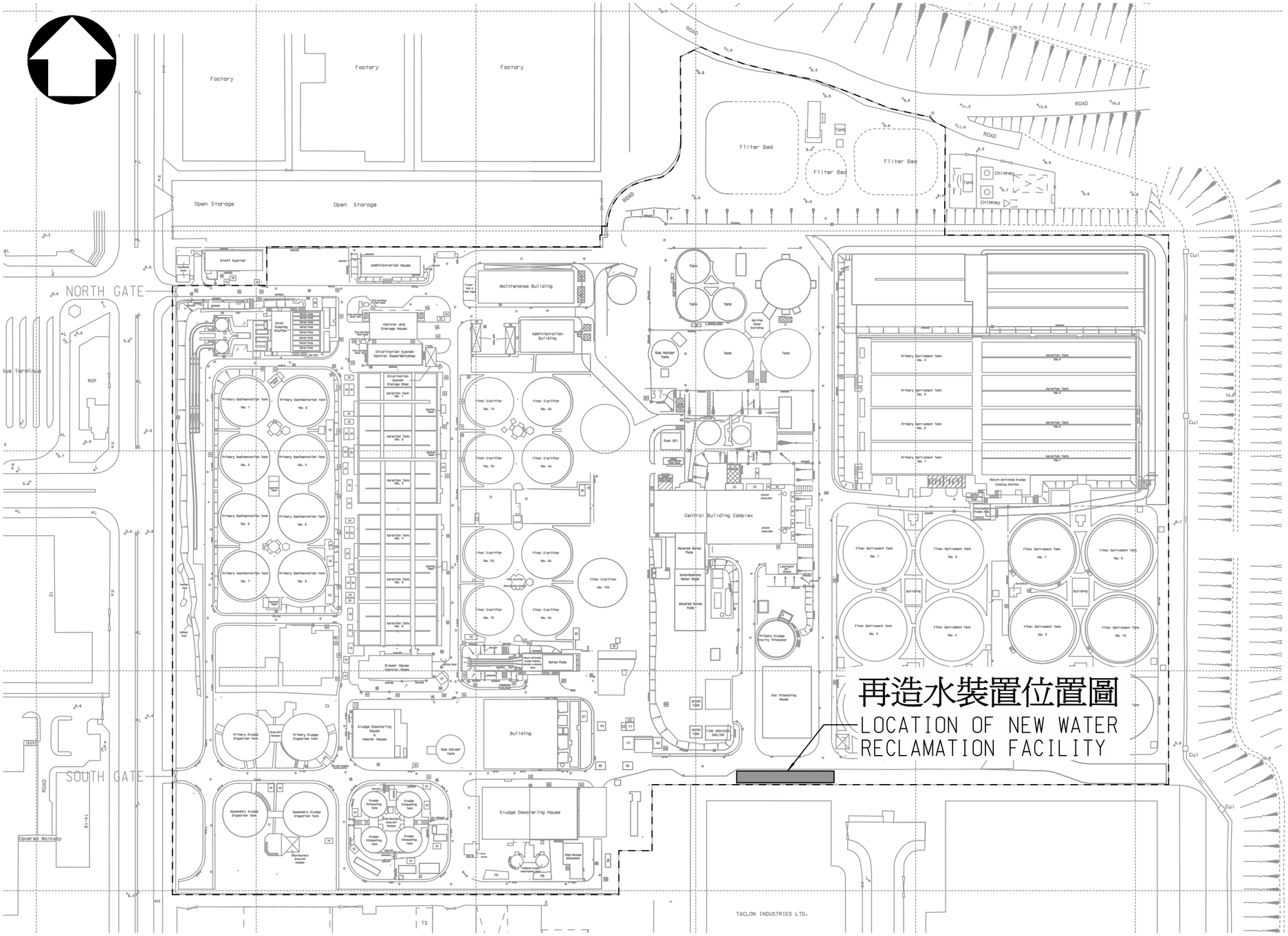

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designed	K K CHOW	
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SUPPLY AND INSTALLATION OF WATER RECLAMATION FACILITY IN TAI PO SEWAGE TREATMENT WORKS

drawing title

LOCATION PLAN OF WATER RECLAMATION FACILITY (FIGURE 2)

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