ELECTRICAL AND MECHANICAL PROJECTS DIVISION

PWP No. 4276DS
Shatin Sewage Treatment Works Stage 3 Extension

PROJECT PROFILE

WATER RECLAMATION FACILITIES IN SHATIN SEWAGE TREATMENT WORKS

Table of Content

1 PROJECT INFORMATION

1.1 Project Title

Water Reclamation Facilities in Shatin Sewage Treatment Works (hereinafter called "STSTW").

1.2 Purpose and Nature of Project

The Project will involve the installation of a membrane filtration plant (hereinafter called "MF plant") at STSTW. The MF plant will consist of Disc Filter for pretreatment, ultrafiltration (UF) system and reverse osmosis (RO) system treatment units. The MF plant will be able to further polish 1,000 m^3/day of UV disinfected secondary treated effluent to provide reclaimed water for polymer preparation required for sludge dewatering and irrigation of vegetation in STSTW. Potable water consumption in STSTW can then be greatly reduced with the water reclamation facilities and contributes to the green environment.

1.3 Name of Project Proponent

Drainage Services Department (DSD).

1.4 Location and Scale of Project

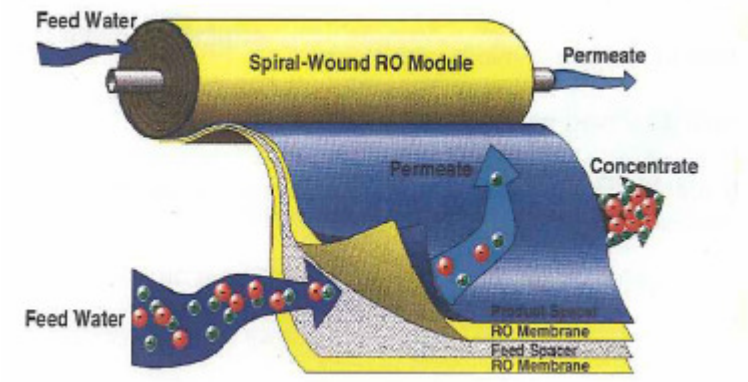
The MF plant will be installed inside the existing Dewatering House (DWH) No. 1 of STSTW as shown in Drawing No. DEM-1399/SKE01. The plant will occupy a footprint of about 300m^2. The height of the construction area will be about 5 m. Drawing No. DEM-1399/SKE02 shows the MF plant layout and Drawing No. DEM-1399/SKE03 shows the flow diagram of the MF plant.

Drawing No. DEM-1399/SKE01 shows the pipework distribution system including the connection between the effluent reuse facilities to the Dewatering House No. 2 for polymer preparation and the two Irrigation Pump Houses for irrigation. The size of the distribution pipeline will range from 50mm to 100mm. The total length of the pipeline will be about 400m.

1.5 System Description and Performance

Source water, UV disinfected secondary treated effluent, is designed to be collected at the existing wash water point near the DWH No. 1, pumping through 100-150 micron Disc Filter for pretreatment to remove any particulate that could cause damage to the UF and RO membrane. The filtrate is then flowed through the UF System, where suspended particles and large colloids are rejected while dissolved solids pass through the UF membrane. The UF permeate is finally pumped to the RO System to achieve the RO permeate quality as stated in Section 3.2.4.

The working principle of UF and RO are similar. The following figure shows the details on how the pressurized feed water (UF permeate) goes through the feed spacer of a RO Module. Feed water passing through the RO membrane would become RO permeate, otherwise the rejected concentrate.



All plant operations are automatically controlled via a Programmable Logic Controller (PLC) with the intention of reducing the possibility of operator's error and to provide reliable operation of the equipment.

The whole system recovery would be around 60% and the performance for each system in the MF plant is shown as followings.

System	Qty	Micro Rating	Type of Membrane	Salt Rejection	Recovery
Disc Filter	2	~100-150	Polypropylene (PP)	N/A	>90%
UF	2	< 0.05	Polyvinylidene Fluoride (PVDF)/ (Hollow Fiber Membranes)	N/A	>90%
RO	2	<1 nm	Polyamide	~95%	~60%

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

The reuse of treated effluent in STSTW for polymer preparation and irrigation is identified as a Designated Project in accordance with Schedule 2 Part F.4 – Sewage Collection, Treatment, Disposal and Reuse of the Environmental Impact Assessment Ordinance (EIAO).

1.7 Name and Telephone Number of Contact Person

Mr. WONG Wai-chung, Senior Engineer/Electrical and Mechanical Project Division, Drainage Services Department (Tel. 2594 7302)

2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

The Project will be implemented in accordance with the following tentative programme:

Date	Activity
May 2009	Finalization of Design
June 2009	Tender Invitation
August 2009	Commencement of Works
August 2010	Completion of Works & Commissioning

3 POSSIBLE IMPACTS ON THE ENVIRONMENT

3.1 Possible Environmental Impacts during Construction Phase

3.1.1 Air Quality

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

3.1.2 Noise

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

3.1.3 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 phase is not anticipated.

3.1.4 Waste

Excavation will be required for the construction pipework distribution system. The volume of excavated material generated during construction would be about 400 m^3. Other C&D waste from the formwork and temporary works, and minor chemical waste and general refuse, will also be generated.

3.1.5 Ecology

The MF plant and pipework distribution system would be located within the boundary of the STSTW. No adverse ecological impact is therefore anticipated during the construction phase.

3.1.6 Landscape and Visual

The MF plant will be located inside an existing Dewatering House No. 1 of STSTW. The pipework distribution system will be located within the boundary of the STSTW and buried in ground. In view of the small scale of the works, these impacts will be localized and short-term. No tree felling is expected for this Project.

3.1.7 Health and Hygiene

Impacts on health and hygiene are not anticipated during the construction phase.

3.2 Possible Environmental Impacts during Operation Phase

3.2.1 Natural Resources

Currently, STSTW utilizes potable water for preparation of polymer required for the sludge dewatering process and irrigation of vegetation. The use of reclaimed water under the Project will reduce the fresh water demand of STSTW. It is anticipated that approximately 700 to 1,000 m^3 of potable water will be saved per day due to the proposed Project.

3.2.2 Air Quality

No aerial emission from the MF plant during the operational phase of the Project is anticipated.

3.2.3 Noise

The pumps of the MF plant would be the main potential noise sources during the operational phase of the Project. The noise arising from the pumps, which is located within the building, is anticipated to be well controlled, hence insignificant.

3.2.4 Water Quality

During the operation phase, the UV disinfected secondary treated effluent will undergo further treatment via the MF plant. The quality of the reclaimed water is summarized in Table 3.1. The USEPA criteria and the UV disinfected secondary treated effluent at STSTW which is considered the most comparable with this Project are also shown for comparison.

Table 3.1 –Reclaimed Water Quality

Water Quality Parameter	Unit	USEPA Criteria		STSTW Effluent Quality***	Reclaimed Water Quality in this Project
		Industrial Process (Chemical)*	Irrigation**		
pH	-	6.2-.8.3	6-9	6.2-8.0	6.2-8.0
TSS	mg/L	5	N.S.	6	<2
TDS	mg/L	1,000	500-2,000	9,200	<200
E. Coli	No/100mL	N.S.	Not Detectable	1,000	Not Detectable
Turbidity	NTU	N.S.	<=2	N.S.	<=2

Remarks:
N. S. – Not Specified
* From Table 2-4 of USEPA (2004) Guidelines for Water Reuse
** From Table 2-7 & 4-13 of USEPA (2004) Guidelines for Water Reuse
*** Average Quality of UV Disinfected Secondary Treated Effluent in STSTW in 2007

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

3.2.5 Waste

The rejected concentrate from the MF plant will be collected and diverted to the drain sump in Sludge Transfer Pumping Station. According to the supplier, the deteriorated Disc Filter would be replaced for every 10 years while the deteriorated membrane in UF and RO System would be replaced for every 3-5 years, depending on different operating situations. No other waste from the MF plant during the operational phase of the effluent reuse system is anticipated.

3.2.6 Ecology

No ecological impact is expected during the operation of the effluent reuse system.

3.2.7 Health and Hygiene

Polymer preparation will not involve direct human contact. The impact on human health and hygiene is not expected during the operational phase of the effluent reuse system. For the use of reclaimed water for irrigation, there are chances of direct human contact leading to impacts on human health and hygiene.

3.2.8 Hazard

Small amounts of chemicals including sodium bisulfite (200 L) and anti-scalant (Flocon 260*) (200 L) required for backwashing and anti-scaling of the MF plant will be stored on-site. The consumption rate of the sodium bisulfite and Flocon 260* would be around 1-2ppm and 3-5ppm respectively. The use of sodium bisulfite and Flocon 260* as backwashing chemicals will not constitute a potentially hazardous installation (PHI) and no hazard impact is anticipated from the effluent reuse scheme.

* Flocon 260 is a mixture of organic acids which consists phosphonic acid derivative and polycarboxylic acid. Flocon 260 is a multifunctional antiscalant and antifoulant for reverse osmosis systems, highly effective in controlling both crystallization and particulate fouling of membrane surfaces.

3.2.9 Landscape and Visual

The MF plant will be located inside the existing Dewatering House No. 1 of STSTW. The pipework distribution system will be located within the boundary of the STSTW and buried in ground. In view of the small scale of the works, these impacts will be localized and short-term.

4 MAJOR ELEMENTS OF THE SURROUNDING ENVIRNMENT

The MF plant and pipework distribution system will be located within the boundary of STSTW site which is located at Shui Chong Street, Shatin. The air and noise sensitive receivers in the vicinity of the Project have been identified in accordance with the criteria set out in the EIAO TM. According to the STSTW, Stage III Extension Environmental Impact Assessment Study: EM&A Manual (Reference C1795), these sensitive receivers (SR) and their horizontal distance from the boundary of the Project area are listed in the following table.

SR	Location	Sensitive Use	Distance from STSTW Stage III Site Boundary (m)	Direction to STSTW	Height (mPD)
1	Windsor Park	Domestic Premises	500	West	90
2	Existing Pri. & Sec. Schools	Educational Institution	550	North-east	10
3	Committed home Ownership Scheme	Domestic Premises	400	North-east	7
4	Committed Pri. School	Educational Institution	250	North-east	7
5	Committed Sec. School	Educational Institution	475	North-east	7
6	Committed Residential Development	Domestic Premises	750	North-east	7
7	Chinese University of Hong Kong (CUHK)	Educational Institution	650	North-west	5.2
8	Shatin Knoll	Domestic Premises	350	West	85
9	Kamon Garden	Domestic Premises	150	West	75
10	Shatin Racecourse	Sports Premises	600	South-west	5
11	Shain New Fishermen Village	Domestic Premises	400	South-east	10
12	Cheshire Home (for the elderly)	Hostel	600	South	100
13	Chevlier Garden	Domestic Premises	750	North-east	10
14	Shatin Hospital	Hospital	550	South	10
15	Marine Police North Division Base	Office	80	North-west	5
16	Vancenat Land Granted to CUHK	Educational Institution	400	North-west	10

The location of the project area in STSTW is shown in Appendix A.
(Ref. Figure 2.1a from STSTW, Stage III Extension Environmental Impact Assessment Study: EM&A Manual)

5 ENVIRONMENTAL PROTECTION MEAUSRES TO BE INCORPORATED

5.1 Environmental Protection Measures during Construction Phase

5.1.1 Air Quality

In view of the small scale of the MF plant, 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 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 MF plant, adverse water quality impact during construction phase will not be anticipated.

5.1.4 Waste

The volume of excavated materials generated from the construction of MF plant would be about 400m3 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 Phase

5.2.1 Noise

As the pumps of the MF plant will be enclosed within the building to contain the noise emissions from the MF plant, adverse noise impact is not anticipated during the operational phase of the Project.

5.2.2 Water Quality

In case complete failure of the MF plant, potable water will be used for polymer preparation and irrigation by manual opening/closing the corresponding gate valve, which is the same as the existing arrangement and no adverse effect on the discharge effluent. With all these measures incorporated into the design of the MF plant, adverse water quality impact is not anticipated during the operation phase of the Project.

5.2.3 Waste

The rejected concentrate from the MF plant during operation would be collected and discharged to the drain sump in the Sludge Transfer Pumping Station, which would be directed to the inlet works of STSTW for sewage treatment, which is only about 0.2% of

the total influent flow in STSTW (design capacity about 340,000m^3/day). The disposal of aged UF and RO membranes shall comply with the Construction Waste Disposal Charging Scheme. Therefore, waste impact is not anticipated during the operation phase of the Project.

5.2.4 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 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.

The RO permeate for irrigation will undergo chlorination process to increase the Total Residue Chlorine (TRC) level in the reclaimed water before discharging to the water tank in the Irrigation Pump House No. 1 and 2. The TRC level would be monitored continuously and controlled below 1ppm, which is the level recommended in USEPA. Sampling point at the Irrigation Pump House No. 1 and 2 would be provided to examine the TRC level if necessary.

5.3 Comments on Environmental Effects

The effluent reuse for polymer preparation and irrigation will reduce the quantity of potable water required at STSTW. This is considered to the beneficial or positive impacts of the Project. The promotion of the effluent reuse in appropriate circumstances to enable conservation of potable water will be good for the community as a whole.

6 USE OF PREVIOUSLY APPROVED EIA REPORTS

There was no previous approved report for the Project, but reference to other similar projects applying directly for an Environmental Permit is made including:

Application No.	**Project Title**
DIR-080/2003	Reuse of Treated Effluent from Ngong Ping Sewage Treatment plant for Toile Flushing
DIR-125/2005	Demonstration Scheme on Reclaimed Water Uses in the North District
DIR-137/2006	Tseung Kwan O Area 86 Property Development – Rainwater and Grey Water Recycling
DIR-174/2008	Reuse of Treated Sewage Effluent from Redeveloped Lo Wu Correctional institution

7 OVERSEAS EXPERIENCE

The technology of membrane filtration treatment is proven. At Water Factory 21, Orange County Water District, Southern California and Upper Occoquan Sewage Authority (UOSA), North Virginia, reclaimed water has been injected into ground water for more than 20 years. Similarly, the reclaimed water in Kranji Newater Reclamation Plant and Bedok Sewage Treatment Plant in Singapore is being mixed and blended with reservoir water prior to conventional water treatment to produce potable water.

In Tianjin Teda Secondary Effluent Reclamation Plant, China, the reclaimed water is used for non-potable purpose in the factories nearby, irrigation and pool water etc.

8 FUTURE EXPANSION

The capacity of the MF Plant will be increased from 1,000 m^3/day to 1,500 m^3/day so as to meet the potential increase in usage in the future, which includes toilet flushing, wash water, top-up water for deodourisation units and cooling water in STSTW. The quality of the reclaimed water is summarized in Table 8.1. The USEPA, Water Supplies Department's (WSD) water quality objectives of sea water for flushing supply and the UV disinfected secondary treated effluent at STSTW which is considered the most comparable with this Project are also shown for comparison

Table 8.1 –Reclaimed Water Quality

Water Quality Parameter	**Unit**	**USEPA Criteria***	**WSD Criteria**	**STSTW Effluent Quality****	**Reclaimed Water Quality in this Project**
		Toilet Flushing/ wash water*	**Toilet Flushing**		
pH	-	6-9	N.S.	6.0-8.0	6.0-8.0
TSS	mg/L	N.S.	<10	6	<2
TDS	mg/L	N.S.	N.S.	9,200	<200
E. Coli	No/100mL	Not Detectable	<1,000	1,000	Not Detectable
Turbidity	NTU	<=2	<10	N.S.	<=2

Remarks:
N. S. – Not Specified
* From Table 4-13 of USEPA (2004) Guidelines for Water Reuse
** Average Quality of UV Disinfected Secondary Treated Effluent in STSTW in 2007

The reclaimed water of this Project will have a better water quality than the USEPA criteria and WSD's standard currently in use for toilet flushing and wash water. Since top-up water for deodourisation units and cooling water would have a less access or exposure to human, the quality of reclaimed water should be better than required.

9 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 effluent reuse scheme 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	3.1.1 & 5.1.1
	Minor noise impact	Control by contract specifications	3.1.2 & 5.1.2
	Minor water quality impact	Control by contract specifications	3.1.3 & 5.1.3
	Minor waste impact	Control by contract specifications	3.1.4 & 5.1.4
	Ecological impact	No adverse impact is identified; no mitigation measure is required.	3.1.5
	Landscape and visual	No adverse impact is identified; no mitigation measure is required.	3.1.6

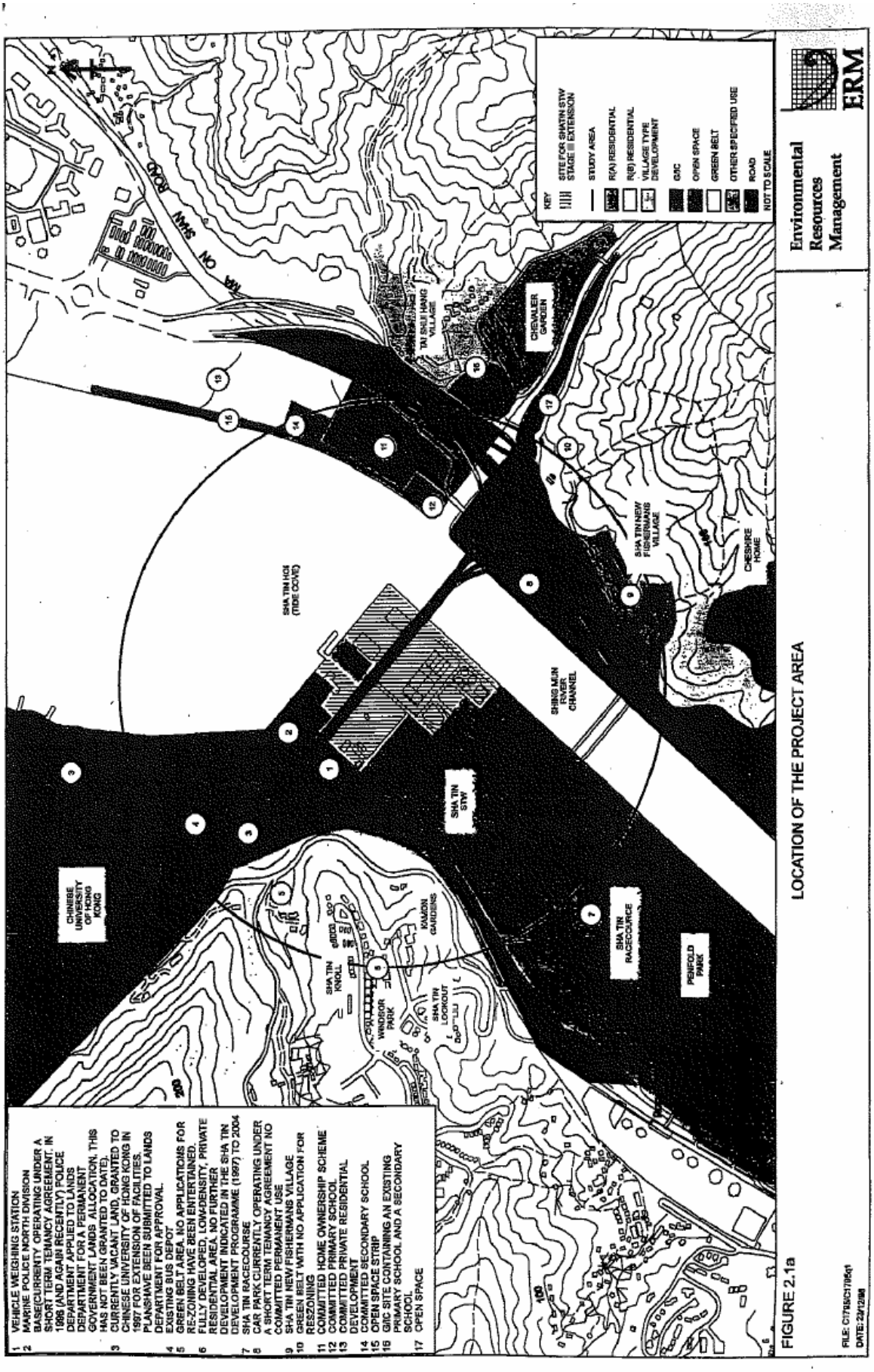
Project Stage	Potential Environmental Impact	Mitigation Measures	Relevant Section in this Project Profile
	Health and hygiene	No adverse impact is identified; no mitigation measure is required.	3.1.7
Operation	Impact on natural resources	Benefical impact; no mitigation measure is required.	3.2.1
	Air quality	No adverse impact is identified; no mitigation measure is required.	3.2.2
	Minor noise impact	The pumps of the MF plant will be enclosed within the building to contain the noise emissions from the MF plant.	3.2.3 & 5.2.1
	Water quality	No adverse impact is identified. In case complete failure of the MF plant, potable water will be Supplied for polymer preparation and irrigation.	3.2.4 & 5.2.2
	Minor waste impact	The rejected concentrate from the MF plant during operation would be collected and discharged to the drain sump in Sludge Transfer Pumping Station, which would be directed to the inlet works of STSTW for sewage treatment.	3.2.5 & 5.2.3
	Ecological impact	No adverse impact is identified; no mitigation measure is required.	3.2.6
	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 water pipes.	3.2.7 & 5.2.4
	Hazard impact	No adverse impact is identified; no mitigation measure is required.	3.2.8
	Landscape and visual	No adverse impact is identified; no mitigation measure is required.	3.2.9

With proper implementation of the above environmental mitigation measures that will be incorporated into the design and construction contracts of the proposed effluent reuse scheme, insurmountable environmental impact during the construction and operation stages of the proposed scheme is not expected.

To conclude, reclaimed water has the advantage of decreasing wastewater discharges thereby reducing pollution loading to the environmental and reducing the demand on raw water, which is a scarce natural resource deserved for preservation to the maximum extent practicable.

APPENDIX A -

LOCATION OF THE PROJECT AREA


1 VEHICLE WEIGHING STATION
2 MARINE POLICE NORTH DIVISION BASE(CURRENTLY OPERATING UNDER A SHORT TERM TENANCY AGREEMENT. IN 1996 (AND AGAIN RECENTLY) POLICE DEPARTMENT APPLIED TO LANDS DEPARTMENT FOR A PERMANENT GOVERNMENT LANDS ALLOCATION. THIS HAS NOT BEEN GRANTED TO DATE).
3 CURRENTLY VACANT LAND, GRANTED TO CHINESE UNIVERSITY OF HONG KONG IN 1997 FOR EXTENSION OF FACILITIES. PLANSHAVE BEEN SUBMITTED TO LANDS DEPARTMENT FOR APPROVAL.
4 EXISTING BUS DEPOT
5 GREEN BELT AREA. NO APPLICATIONS FOR RE-ZONING HAVE BEEN ENTERTAINED.
6 FULLY DEVELOPED, LOW-DENSITY, PRIVATE RESIDENTIAL AREA. NO FURTHER DEVELOPMENT INDICATED IN THE SHA TIN DEVELOPMENT PROGRAMME (1997) TO 2004
7 SHA TIN RACECOURSE
8 CAR PARK CURRENTLY OPERATING UNDER A SHORT TERM TENANCY AGREEMENT NO COMMITTED PERMANENT USE
9 SHA TIN NEW FISHERMANS VILLAGE
10 GREEN BELT WITH NO APPLICATION FOR RESZONING
11 COMMITTED HOME OWNERSHIP SCHEME
12 COMMITTED PRIMARY SCHOOL
13 COMMITTED PRIVATE RESIDENTIAL DEVELOPMENT
14 COMMITTED SECONDARY SCHOOL
15 OPEN SPACE STRIP
16 GMC SITE CONTAINING AN EXISTING PRIMARY SCHOOL AND A SECONDARY SCHOOL
17 OPEN SPACE
CHINESE UNIVERSITY OF HONG KONG
SHA TIN KNOLL
WINDSOR PARK
RAMON GARDENS
SHA TIN LOOKOUT
SHA TIN STW
SHA TIN RACECOURSE
PENFOLD PARK
SHA TIN HOI (TIDE COVE)
SHING MUN RIVER CHANNEL
SHA TIN NEW FISHERMANS VILLAGE
CHESHIRE HOME
TAI SHUI HANG VILLAGE
CHEVALIER GARDEN
KEY
SITE FOR SHATIN STW STAGE III EXTENSION
STUDY AREA
R(A) RESIDENTIAL
R(B) RESIDENTIAL
VILLAGE TYPE DEVELOPMENT
GMC
OPEN SPACE
GREEN BELT
OTHER SPECIFIED USE
ROAD
NOT TO SCALE
LOCATION OF THE PROJECT AREA
FIGURE 2.1a
Environmental Resources Management
ERM
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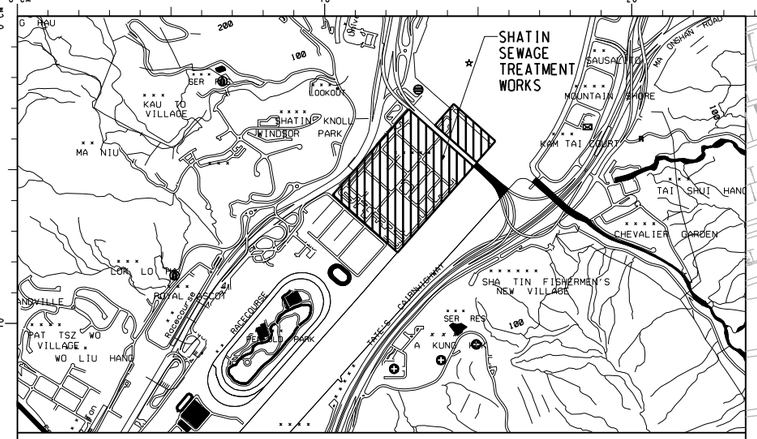
DATE: 23/12/98



KEY PLAN

NOTES:

LEGEND :

- - - - UNDERGROUND WATER PIPE

WORKS AREA

UNDER CONSTRUCTION

no.	date	description		name	initial

REVISION

	name	date
designed	T C WONG	
drawn	S H CHAN	
checked	Y L CHAN	
counter checked	K T LEUNG	
vetted	W C WONG	

approved

Y W LAM CE/E&MP Date

contract no. DE 2009/04

file no. DSD EM/8/4276DS/WRF

project no. PWP 4276DS

contract

SUPPLY AND INSTALLATION OF WATER RECLAMATION FACILITIES IN SHATIN SEWAGE TREATMENT WORKS

drawing title

KEY PLAN, INSTALLATION LOCATION AND PIPEWORK DISTRIBUTION SYSTEM

drawing no. DEM-1399/SKE01

scale N. T. S.

office

ELECTRICAL AND MECHANICAL PROJECTS DIVISION

DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION

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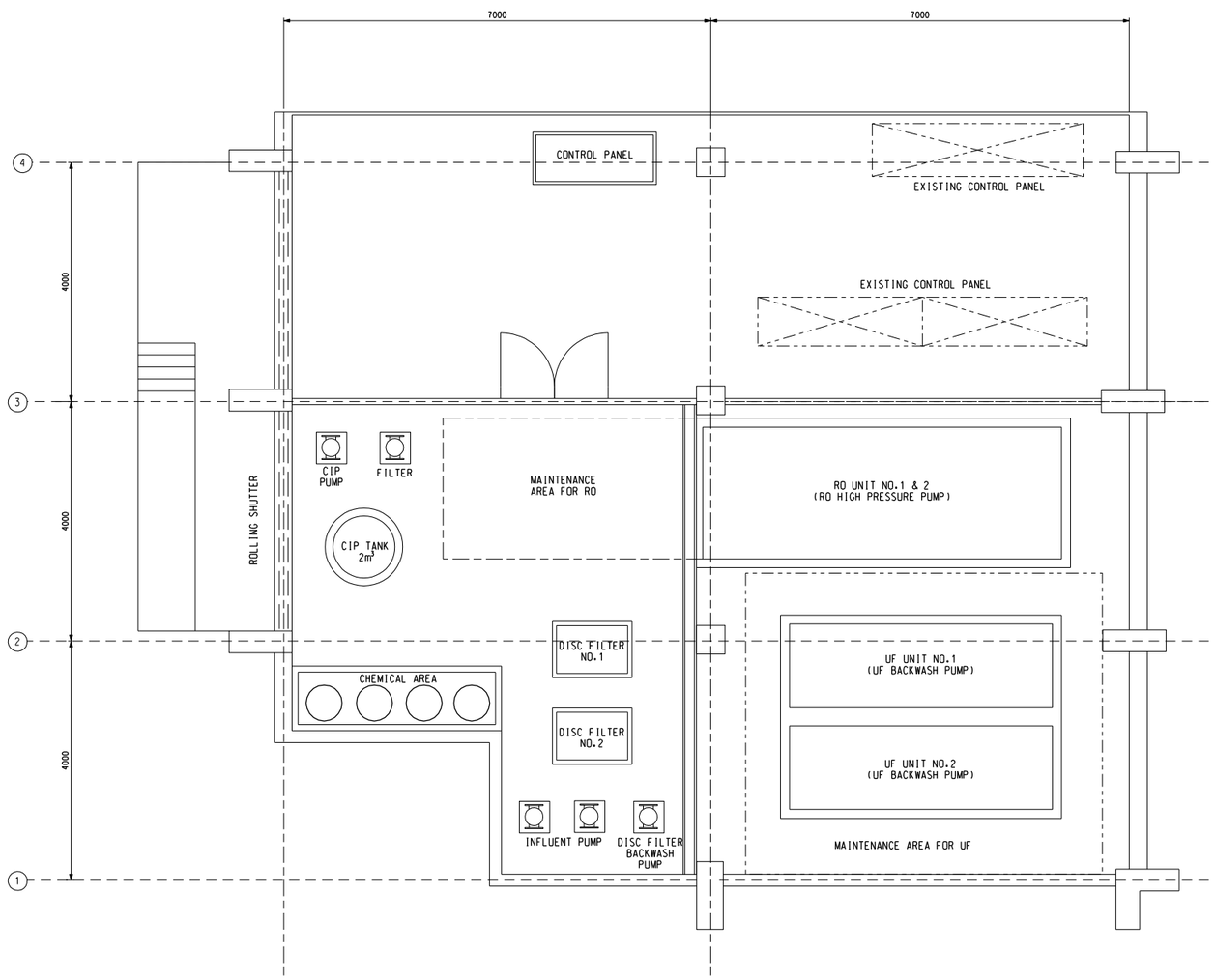

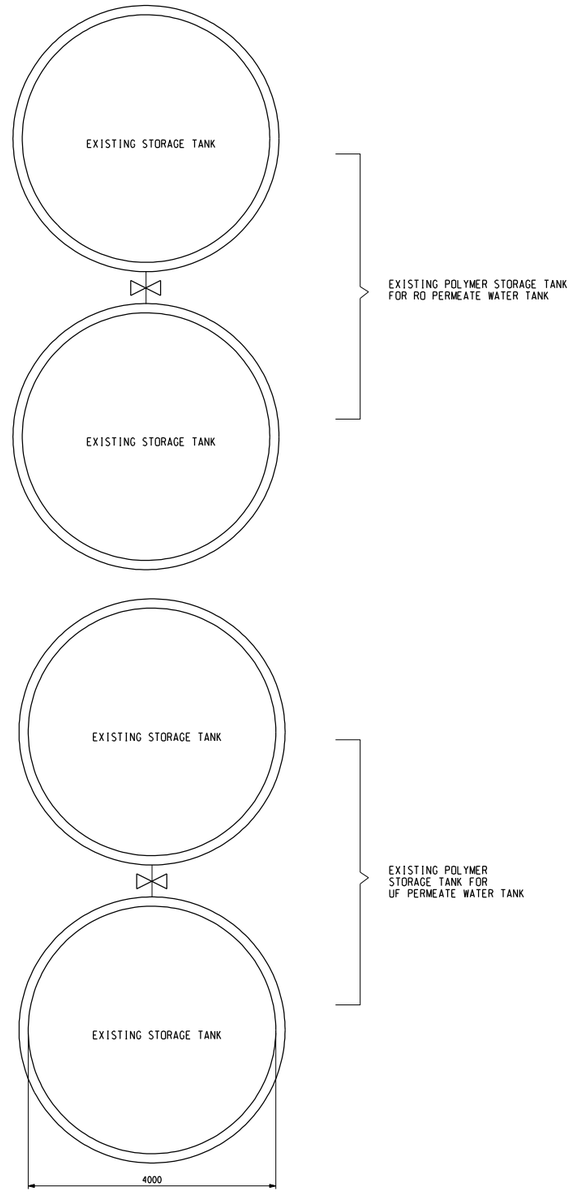

NOTES :

no.	date	description		name	initial

REVISION

	name	date
designed	T C WONG	
drawn	S H CHAN	
checked	Y L CHAN	
counter checked	K T LEUNG	
vetted	W C WONG	

approved

Y W LAM CE/E&MP Date

contract no. DE 2009/04

file no. DSD EM/8/4276DS/WRF

project no. PWP 4276DS

contract

SUPPLY AND INSTALLATION OF WATER RECLAMATION FACILITIES IN SHATIN SEWAGE TREATMENT WORKS

drawing title

GENERAL ARRANGEMENT OF MF PLANT

drawing no. DEM-1399/SKE02

scale N. T. S.

office

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DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

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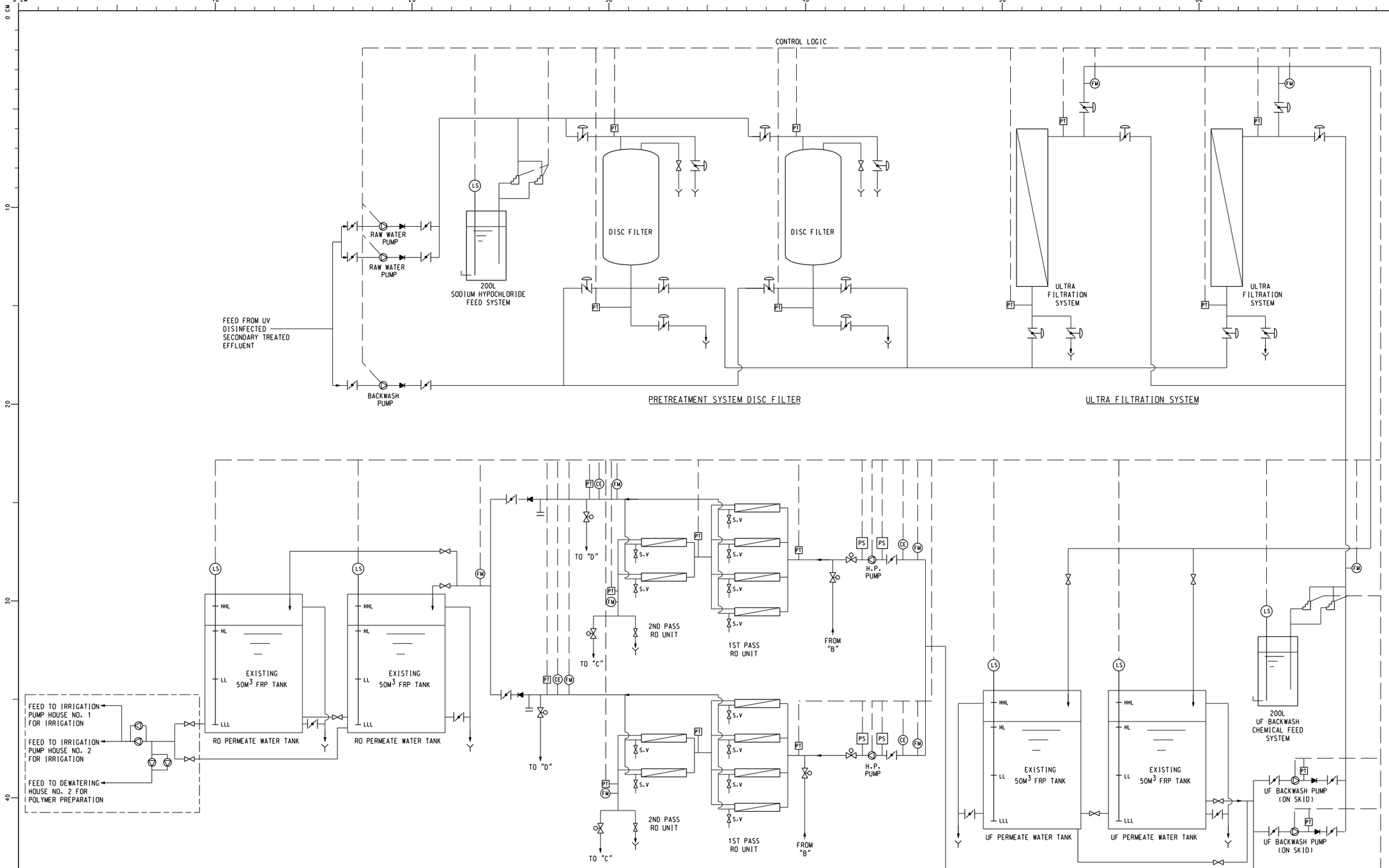

LEGEND :

CE	CONDUCTIVITY SENSOR		MANUAL BALL VALVE
FM	FLOW TRANSMITTER		CHECK VALVE
PS	PRESSURE SWITCH	S.V	SAMPLING VALVE
PT	PRESSURE TRANSMITTER		MANUAL BUTTERFLY VALVE
LS	LEVEL SWITCH		PNEUMATIC BUTTERFLY VALVE
	PNEUMATIC BALL VALVE		GATE VALVE
	DRAIN SUMP		DOSING PUMP

NOTES :

no.	date	description		name	initial

REVISION

	name	date
designed	T C WONG	
drawn	S H CHAN	
checked	Y L CHAN	
counter checked	K T LEUNG	
vetted	W C WONG	

approved

Y W LAM CE/E&MP Date

contract no. DE 2009/04

file no. DSD EM/8/4276DS/WRF

project no. PWP 4276DS

contract

SUPPLY AND INSTALLATION OF WATER RECLAMATION FACILITIES IN SHATIN SEWAGE TREATMENT WORKS

drawing title

FLOW DIAGRAM FOR MEMBRANE FILTRATION WATER TREATMENT PLANT

drawing no. DEM-1399/SKE03

scale N. T. S.

office

ELECTRICAL AND MECHANICAL PROJECTS DIVISION

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