Ocean Park Master Redevelopment Project

Contract No. CI 05

EP-249/2006/A – Condition 2.13

Drainage Proposal (Rev. A2)

Submitted by DBJV on 5-May-07

Certified by _____ **on** 10-May-07

Terence Kong

Project Environmental Team Leader

Verified by Independent Environmental Checker **on** 10-May-07
IEC Certificate attached in the submission? Yes

Submitted to Ocean Park on 14-May-07

Ocean Park Master Redevelopment Project

Environmental Permit No. EP-249/2006/A - Condition 2.13

Drainage Proposal (Revision A2)

Submitted by Dragages-Bouygues JV on 05-05-2007

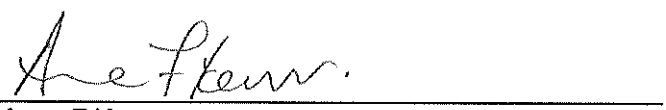
This is to verify that

Drainage Proposal (Revision A2)

Submitted by Dragages-Bouygues JV

On 05-05-2007

Has been verified by the undersigned.

Signed 

Dr Anne F Kerr
Independent Environmental Checker (IEC)
Retained by Ocean Park Corporation
pursuant to Environmental Permit No. EP-249/2006/A

Date 10 May 2007

本署檔號 OUR REF: (10) to EP2/H16/O/05/Pt.4
來函檔號 YOUR REF:
TEL. NO.: 2835 1155
FAX NO.: 2591 0558
E-MAIL:
HOMEPAGE: http://www.epd.gov.hk

Environmental Protection Department
Branch Office
28th Floor, Southorn Centre,
130 Hennessy Road,
Wan Chai, Hong Kong.

環境保護署分處
香港灣仔
軒尼詩道
一百三十號
修頓中心廿八樓

PD-DCC#: Gov/OPC-Letter-000213
cc: MK

15 March 2007

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Urgent By Post and Fax (2873 5584)
Ocean Park Hong Kong
Aberdeen, Hong Kong
(Attn. Ms. Helen Leung, Project Manager (Infrastructure)

Dear Ms. Leung,

Environmental Impact Assessment Ordinance (EIAO), Cap.499
Project Title: Repositioning and Long Term Operation Plan of Ocean Park
Environmental Permit No. : EP-249/2006/A
Permit Condition 2.13: Submission of Drainage Proposal

I refer to your letter (ref. OPC- Letter ~ 000123) dated 13 February 2007 depositing the captioned Drainage Proposal under the Condition 2.13 of Environmental Permit No. EP-249/2006/A.

While we note that your have responded to our comments raised on 7 November 2006, we have the following comments on the new information provided in the submission:

- We note that a 600mm deep surface channel will be provided to divert the surface run-off from the headland site to the wastewater treatment plants. Please ensure that, from your engineering point of view, the proposed sedimentation tanks, wastewater treatment plant and in particular the downstream 8" GI pipe could have adequate capacity to cater for the surface run-off from the headland construction site.
- In relation to the monitoring and auditing of the flocculants dosage and performance as mentioned in paras. 4.3 and 4.8 of the proposal, please provide us the information of flocculants types, dosage and adjustment recommended by the wasterwater treatment plant's manufacturer and state clearly how the flocculants dosage applied, monitored, reviewed and/or adjusted could be documented to facilitate on-site auditing, such as the keeping of site records and potential reporting in site auditing reports and/or EM&A reports etc..

The above comments are on technical details for reference/record rather than concern on the acceptability of the drainage proposal. Grateful if you could take note of the above comments

and revise the drainage proposal accordingly and deposit four hard copies and one electronic copy of the finalized version at the earliest. The finalized version of the drainage proposal will be deposited in the EIAO Register Office available for public inspection.

Furthermore, in relation to the overall construction drainage issues, your attention is also drawn to the following:

- In relation to EP condition 2.19, please ensure that no construction discharge from the construction site shall be allowed within the existing freshwater ponds at the Tai Shue Wan area and within the enhanced Pond 35 at Lowland area.
- We observe that there will be an access road and a vet pool on Nam Long Shan. Please also pay attention to control/minimize the surface run-off arising from the associated construction activities.
- Please ensure that construction discharges would comply with the requirements under Water Pollution Control Ordinance.

Should you have any query, please contact the undersigned or Ms. Mable CHAN at 2835 1837.

Yours faithfully,

(Victor WT YEUNG)
Senior Environmental Protection Officer
for Director of Environmental Protection

c.c.
AFCD (Attn. Dr. Khaki CHAN) Fax: 2377 4427

Internal
S(MA)5 S(RS)3

MAUNSELL AECOM	OCEAN PARK MASTER REDEVELOPMENT PROJECT Contract No. CS01 – Vet Hospital	SUBMISSION REVIEW RECORD

CSF Ref. No.: OPE-DBJV-PRPJ-QSE-0073 Rev. A & A1 ~ Drainage Management Plan

Title of Submission: Permit Condition 2.13: Submission of Drainage Proposal

ITEM NO.	REVIEWER	REF. SECTION	EPD'S COMMENTS	PMR'S RESPONSE		STATUS
			Description of Comment	Response	Action due date	(C-closed; blank-open) (COMPLETED BY PMR)
10	EPD	General	We observed that there will be an access road and a vet pool on Nam Long Shan. Please also pay attention to control/minimize the surface run-off arising from the associated construction activities.	Noted. Temporary Drainage system and wastewater treatment facility for the surface runoff will be installed at the access road and the vet pool on Nam Long Shan under the contractual requirements. Discharge License has been applied at vet pool area and the requirement under Water Pollution Control Ordinance will be fully followed.		
			- End -			

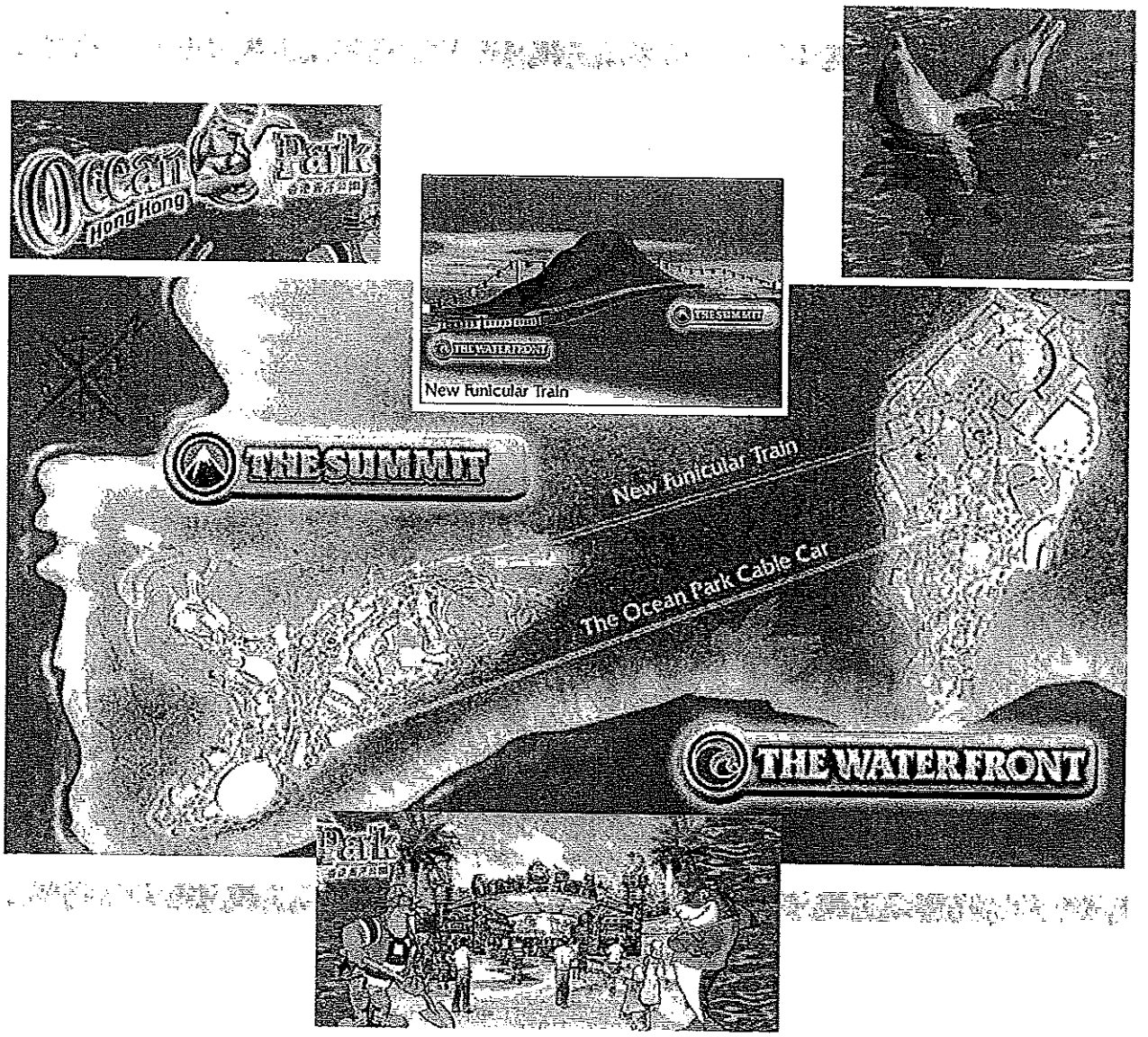
Dragages-Bouygues JV 宮路–布依格聯營	Ocean Park Master Redevelopment Project Contract No. CI05 – Site Formation, Funicular Tunnel and Miscellaneous Works	Submission Review Record

Contractor's Submission Reference No. OPE-DBJV-PRPJ-QSE-0073 Rev. A & A1 ~ Drainage Management Plan						For MCAL Use		
Item No	Review By	Document / Drawing Reference	Reply Code	PMR's Comments	DBJV's Response	Action	Action Date	Closed Date
6	EPD	General		We note that a 600mm deep surface channel will be provided to divert the surface run-off from the headland site to the wastewater treatment plants. Please ensure that, from your engineering point of view, the proposed sedimentation tanks, wastewater treatment plant and in particular the downstream 8" GI pipe could have adequate capacity to cater for the surface run-off from the headland construction site.	Noted. From our engineering point of view, the proposed capacity of the drainage system for the surface runoff from Headland construction site is adequate. Besides, site inspections will be carried out regularly to ensure that the drainage system is properly function.			
7	EPD	General		In relation to the monitoring and auditing of the flocculants dosage and performance as mentioned in paras. 4.3 and 4.8 of the proposal, please provide us the information of flocculants types, dosage and adjustment recommended by the wastewater treatment plant's manufacturer and state clearly how the flocculants dosage applied, monitored, reviewed and/or adjusted could be documented to facilitate on-site auditing, such as the keeping of site records and potential reporting in site auditing reports and/or EM&A reports etc.	The dosage of flocculants will be used according to the Chemical Data Sheet of Flocculent Agent #26 and the concentration of the solution are as follows: 1. Stock solution: 0.25 – 0.5% max; 2. Feed solution: 0.025 – 0.05% max. Routine monitoring will include in the weekly inspections and by collecting water samples in accordance with the requirement under the Effluent Discharge Licenses. Records would be kept on site and sent to EPD as necessary.			
8	EPD	General		In relation to EP condition 2.19, please ensure that no construction discharge from the construction site shall be allowed within the existing freshwater ponds at the Tai Shue Wan area and within the enhanced Pond 35 at Lowland area.	Noted. The EP condition 2.19 will fully follow on site.			
9	EPD	General		Please ensure that construction discharges would comply with the requirements under Water Pollution Control Ordinance.	Noted. Discharge License will apply and the requirement as stated in the License will fully follow.			

Reply Code: A- Comment must be incorporated into a resubmission. B - Comment to be noted and implemented but does not require resubmission. C – PMR preferred solution, to be incorporated if possible. D - For information only. E - New requirement to be incorporated - variation may be required.

Dragages-Bouygues JV 寶嘉–布依格聯營

Ocean Park Master Redevelopment Project
Contract No. CI05



PROJECT DRAINAGE MANAGEMENT PLAN

A2	09 May 07	STa	JRi/YTS/DNg/PIp	DAL	
A1	31 Jan 07	AVC/STa	INg/JRi/YTS/DNg/PIp	DAL	
A	15 Jan 07	AVC/STa	ING/JRi/YTS/DNg/PIp	DAL	
Rev.	**Date**	**Prepared**	**Reviewed**	**Approved**	**Comments**

	To be checked by the ICE	~~YES~~ / NO	OPE/DBJV/PROJ/QSE/0073 Rev A2
			Doc. number

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Revision History

Revision	Revisions
A2	Third Issue (incorporated comments from EPD)
A1	Second Issue
A	First Issue

TABLE OF CONTENTS

LIST OF APPENDICES

1. INTRODUCTION

This Project Drainage Management Plan is concerned about how to manage the temporary drainage to be installed for the works related to the Construction Works at Waterfront and Summit.

The major element of works and their potential impact on the drainage system within the Summit area are summarized in the following table:

Summit:

Site Formation to Summit	Cutting of permanent slope at Summit. Temporary drainage gullies along the bottom of the slope will be provided. Water thus collected will be discharged through sedimentation tanks into the drainage system.	The size of the catchment is unaltered and no additional surface runoff water is expected to flow into the existing drainage system. Overall, no significant increase in adverse impact is expected on the drainage system.
Access Road from Nam Long Shan Road to Summit	Construction of vehicle access roads and pedestrian access road to Summit.	The size of the catchment is unaltered and no additional surface runoff water is expected to flow into the existing drainage system. Overall, no significant increase in adverse impact is expected on the drainage system.
Drainage Works	Construction of a new drainage system at Summit.	The size of the catchment is unaltered and no additional surface runoff water is expected to flow into the existing drainage system. Overall, no significant increase in adverse impact is expected on the drainage system.
Funicular Tunnel and Adit Tunnel	Construction of Funicular Tunnel using drill and blast method.	The construction of tunnel structures is not expected to generate a large amount of water. Overall, no significant increase in adverse impact is expected on the drainage system.
Funicular Terminus	Construction of RC structures at the ends of the tunnel.	The construction of terminus structures is not expected to generate a large amount of water. Overall, no significant increase in adverse impact is expected on the drainage system.
Service Reservoir at Summit & Associated Pipework	Construction of Service Reservoir and associated pipeworks.	The construction of service reservoir at Summit and associated pipeworks is not expected to generate a large amount of water. Overall, no significant increase in adverse impact is expected on the drainage system.

2. POTENTIAL IMPACT

It is envisaged that the followings are the potential impacts that may occur during the construction works:

- Surface run-off from high ground
- Waste water run-off during construction works;
- Groundwater discharge; and
- Concrete washing and concrete contaminated run-off

3. PROGRAMME

Summit:

Summit has been divided into 5 areas, the construction sequence of the works are 5C, 3A, 3B, 4 & 4A to minimize the influence to the environment. Please refer to the figure in Appendix 1 for details.

4. MITIGATION MEASURES

4.1 Licence Requirements

The Contractor must comply with the requirements of the Buildings Ordinance, the Water Pollution Control Ordinance, and the Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters issued by EPD. Licences will be required for all off-site discharges with the exception of domestic sewage to foul sewer. Licences will be specifically required with respect to off-site surface water discharge, and off-site discharge of groundwater generated through tunnelling activities.

4.2 Interface with EMIS

As noted, the Production Manager will be responsible for the preparation of an EMIS for each discrete works area, which will identify the specific mitigation measures to be implemented and the method of delivery.

4.3 Against Surface run-off from high ground

Surface run-off from construction sites will be collected with temporary U channels at top and bottom. The run-off collected from these U-channels will be pumped to a sump pit and directed to an adequately designed sand/silt removal facilities including Sedimentation Tank and Water Treatment Plant (AquaSed or WetSep) before discharged to the public drainage system. (Drainage Layout Schematic Plan in Appendix 1 refers.) Site inspection will be carried regularly to ensure the adequate capacity of the drainage system.

Wastewater Treatment Plant (AquaSed or WetSep Model) with 40m^3/hour treatment capability will be used for desilting and pH adjustment. The flocculent used will be

Flocculent Agent #26. The dosage of flocculent will be used according to the manufacturer's Chemical Data Sheet and the concentration of the solution is as follows:

1. Stock solution: 0.25 – 0.5% max.
2. Feed solution: 0.025 – 0.05% max

The concentration of the flocculent will be adjusted according to the runoff from the construction site. Details of the Flocculent Agent #26 are presented in Appendix 5. As the maximum daily rainfall during the wet season (i.e. June to August) of the past two years (i.e. 2005 and 2006) is 303.3 mm with reference to the Hong Kong Observatory's record, the drainage system set-up could adequately cope with the discharged volume for surface run-off. The details of AquaSed & WetSep are contained in Appendix 2.

Silt removal facilities, channels and manholes would be maintained and the deposited silt and grit would be removed regularly, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.

4.4 Against Waste Water During Construction Works

Cement sand would be used to seal the hoarding skirt around the area of construction works to prevent wastewater flowing offsite. Details can be referred to a sketch (Section A-A) attached in the Appendix 1.

4.5 Against Groundwater Discharge

Groundwater pumped out from cofferdams will be discharged into storm drains after the removal of silt in silt removal facilities as mentioned in section 4.3.

4.6 Against Concrete washing and concrete contaminated run-off

The process of concrete washing will be performed in the site area, in this regards, generation of concrete contaminated run-off was avoided.

Site run-off containing concrete washing would be settled either in a skip or a spoil pit for dewatering. Settled wastewater would be delivered to water treatment plant for de-silting and pH adjustment prior to discharge.

4.7 Maintenance

Regular maintenance of all drainage systems (such as channels, sedimentation tanks and waste treatment plant) would be carried out.

4.8 Monitoring and audit

Routine audit of the implementation status of specified mitigation measures during the construction phase would also be undertaken.

Periodic self-monitoring of the discharge by collecting sample from sampling point would be performed in accordance with the requirement of effluent discharge licence issued under WPCO. The dosage of flocculants used will be adjusted according to the results found.

Results of self-monitoring would be summarized in a report for reference.

4.9 Event Contingency Plan

The drainage layout and management plan will be monitored as part of the ongoing environmental monitoring and audit programme. In the event that the auditing criteria are exceeded, Event Contingency Plans must be followed as set out in Appendix 3 and the related details of the contact persons are summarized in Appendix 4.

4.10 Drainage Layout Plan

The drainage layout plan showing the schematic routing of the drainage to be installed is attached in the Appendix 1 of this document.

5. PRECAUTIONS / ACTIONS TO RAINSTORMS

5.1 Precautions to be taken at any-time of year when rainstorms are likely

- Site removal facilities, channels and manholes would be maintained and the deposited site and grit would be removed regularly.
- Temporarily exposed slope surfaces would be covered, e.g. by tarpaulin, cement paste or hydroseed where possible.
- Temporarily access roads would be protected by hardcore.

5.2 Actions to be taken when a rainstorm is imminent or forecast

- Silt removal facilities, channels and manholes would be checked to ensure that they could function properly.
- Open stockpiles of construction materials (e.g. aggregates, sand and fill materials) on site would be covered with tarpaulin or similar fabric.
- All temporary covers to slopes and stockpiles would be secured.

5.3 Actions to be taken during or after rainstorms

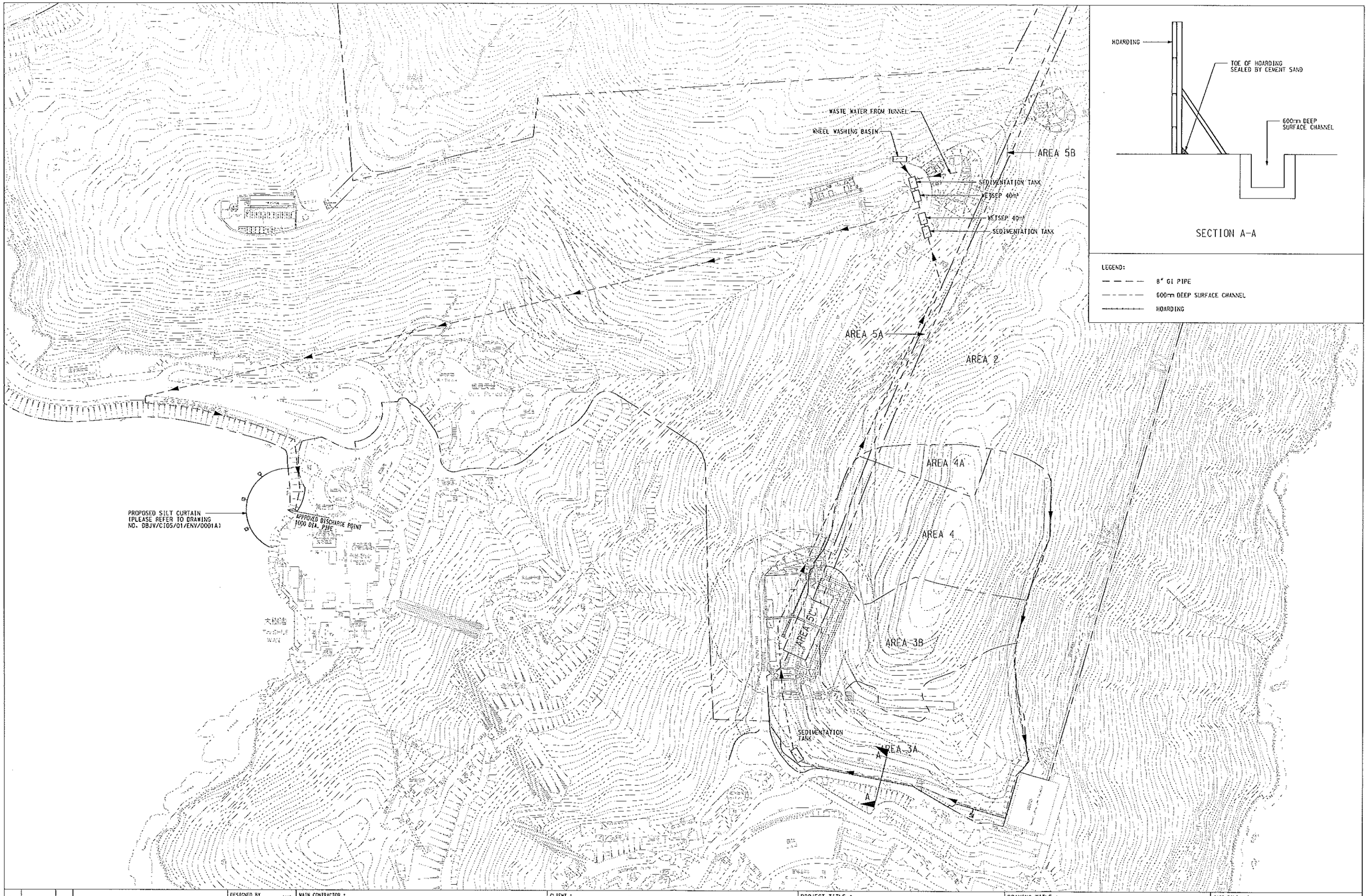
- Silt removal facilities, channels and manholes would be checked and maintained to ensure satisfactory working conditions. Attention would be given to safety when carrying out this work.

6. AUDITING AND REPORTING

The Environmental Team will inspect the implementation of drainage-related mitigation measures during the routine site inspections and the IEC during formal site audits. Any identified nonconformance will be reported.

Appendix 1

Drainage Layout Schematic Plan



REV.	DATE	BY	DESCRIPTION
B	05FEB2007	AVC	AREA OF THE SITE ADDED
A	06JAN2007	AVC	FIRST ISSUE

DESIGNED BY AVC
DRAWN BY BLo
CHECKED BY AVC
IN CHARGE JR1
DATE 06JAN2007

MAIN CONTRACTOR :
Dragages-Bouygues JV 寶嘉-布依格聯營

CLIENT :
香港海洋公園
OCEAN PARK HONG KONG

PROJECT TITLE :
OCEAN PARK REDEVELOPMENT
Contract No. CI05
Site Formation, Funicular Tunnel and Miscellaneous Works

DRAWING TITLE :
DRAINAGE LAYOUT SCHEMATIC PLAN FOR SUMMIT

CADD FILENAME : 04ENV0002B.DGN
DATE : 05FEB2007
SCALE : N.T.S.
DRAWING NUMBER : DBJV/CI05/04/ENV/0002
REV. B

Appendix 2

Details of Water Treatment Plant (AquaSed & WetSep Model)

HKPC

Hong Kong Productivity Council

AquaSed

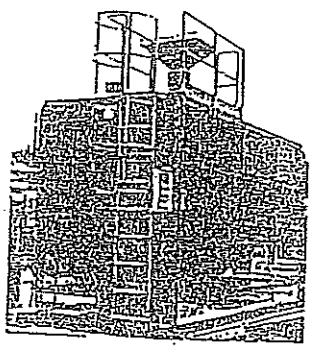
HKPC - AquaSed :

A Simple and Effective Wastewater Treatment System fc Construction Site

HKPC - AquaSed :

一個簡單而有效的

清理建築地盤污水之處理系統



Minimal space

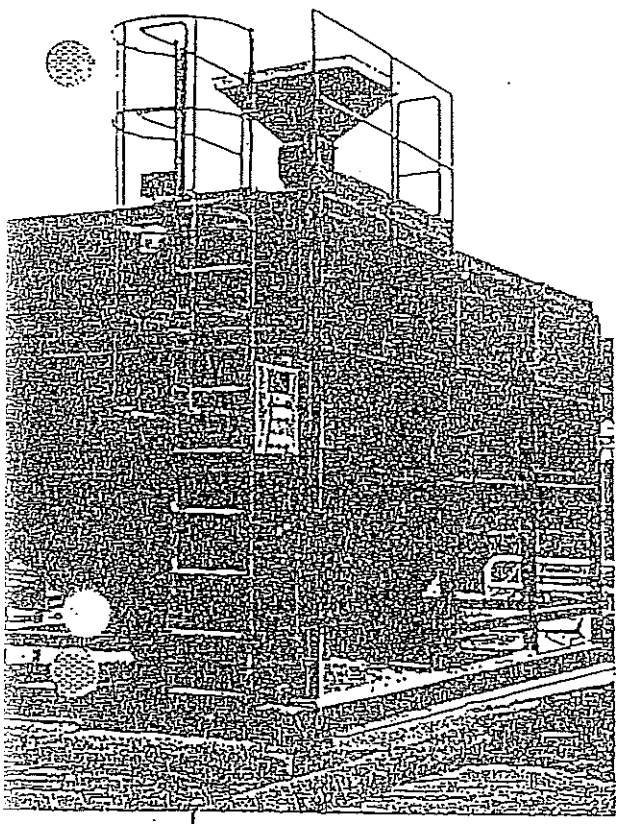
High efficiency

佔地小

效率高

HKPC-AquaSed is a system specially designed by the Hong Kong Productivity Council (HKPC) is capable of the treating large volume of highly turbid wastewater discharged from construction sites. This system can treat the wastewater to comply with the discharge standards and ensure the construction work uninterrupted.

HKPC-AquaSed污水處理系統乃香港生產力促進局專門為建築工地設計的污染控制設備，可以處理大流量高混濁度的工地廢水，使到出水合符香港政府的排放標準，以保證施工過程不受影響或延誤。



HKPC-AquaSed

At present, many construction sites are using sedimentation tanks to reduce the discharge of suspended solids in their effluent. However, this method is generally not satisfactory and inadequate, because:

1. It is not feasible to set up effective sedimentation tanks due to limited space available;
2. The effluent of construction works is always silt-clay laden and cannot be separated effectively by sedimentation.

HKPC is fully aware of the constraints and has developed a real solution, HKPC-AquaSed, to tackle the wastewater problems arising in construction sites of various sizes. HKPC-AquaSed uses a low cost chemical agent to enhance sedimentation. Based on the principle of chemical coagulation, the removal efficiency for suspended solids can be higher than 90%. Moreover, the system incorporates tilt plate device to facilitate solids sedimentation, thereby minimizing the size of the system. It can be readily accommodated in construction sites of various sizes.

現時很多建築工地往往使用沉澱池來處理廢水以減少懸浮物的排放，但是效果一般都是不足夠，原因是：

(一) 安裝一個有效的沉澱池，需佔用最大工地面積，並非實際可行的方法；

(二) 建築工地廢水往往夾雜大量具有黏土性的懸浮物，不能簡單地沉降出來。

針對以上的情況，生產力促進局研制了一系列的HKPC-AquaSed污水處理系統以配合各大小建築工地解決污水問題。HKPC-AquaSed系統應用了一種廉宜的化學沉澱劑，以化學混凝的原理，可清除90%以上的懸浮物；此外，亦採用了斜板沉澱的方法，大大加強沉澱效果，從而減少安裝面積，適合各大小建築工地之應用。

HKPC-AquaSed is indeed the best choice for construction contractors to meet the environmental standards, maintain good working record, and keep the competitive edge in the industry. To suit the requirements of different clients, HKPC-AquaSed offers a series of standard models (as listed below) as well as tailored designs.

HKPC-AquaSed實在乃承建商符合環保要求，保持良好施工聲譽，與及維持在業內競爭力之最佳選擇。HKPC-AquaSed具有下列標準型號， 另外亦可根據現場不同情況，作出特別的設計，以配合不同客戶的需要。

HKPC-AquaSed (Series II)
HKPC-AquaSed系統(系列二)

Model 型號	Treatment capability (m^3/hr) 處理能力(立方米/小時)	Size of system (m) 設備尺寸(米) (L長 x W闊 x H高)	Suspended solids in effluent (mg/L) 出水懸浮固體含量(毫克/升)
ASII-20	20	3.5 x 2.2 x 3.9	< 30
ASII-40	40	5.3 x 2.2 x 3.9	< 30
ASII-80	80	7.5 x 2.4 x 5.0	< 30

HKPC-AquaSed (series II) has even better performance than the first series as a result of continuous improvement.

經持續之改良，HKPC-AquaSed(系列二)之處理效能已大大超越此系統之第一系列。

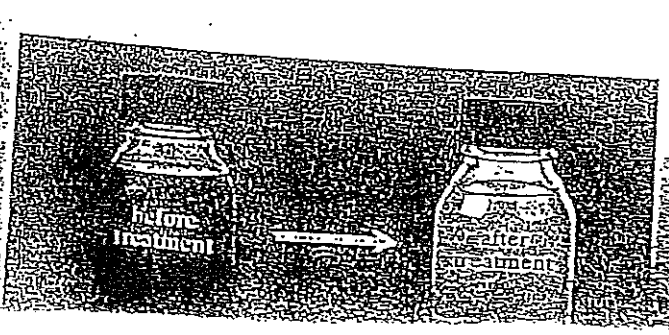
Advantages of HKPC-AquaSed

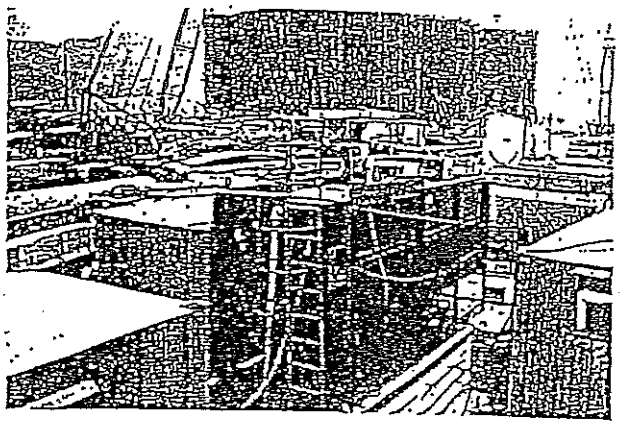
- Minimal space required for installation (80% less area than the sedimentation system);
- High solids removal (can reduce suspended solids in effluent to less than 30 mg/L);
- Chemical used for sedimentation is low cost and does not not affect pH values of effluent;
- Settled sludge can be discharged automatically to ensure treatment performance
- Simple, continuous and automated operation;
- Highly mobile. Can be put on a truck to become a movable treatment station and transported easily to different locations;

Low operating costs.

HKPC-AquaSed之特點

- 佔地小(所需要的面積對比沉澱池最多可減少80%)
- 沉降效率高(污水所含之懸浮物可降至30毫克/升)
- 所用之化學沉澱劑價錢便宜及不影響酸鹼值(pH)
- 沉降出來的污泥可自動排放以確保處理效果
- 操作容易，可連續自動操作
- 機動性強，可放於運載車輛作流動處理站及隨意移動來回工地使用
- 操作費用低





COMPREHENSIVE SERVICE AND SUPPORT

HKPC engineers will provide turnkey services in design, installation, start-up and training in the operation and maintenance of the system.

提供全面服務及支援

香港生產力促進局的工程師將提供整套系統之承包服務，包括設計、安裝、設備啟動和提供系統的操作及維修的培訓。

QUALITY ASSURANCE

The design and installation team of HKPC-AquaSed implements and maintains a quality assurance system in accordance with the ISO 9001 standard.

保證品質

負責AquaSed系列的設計及安裝的小組已實施一套品質保証系統以符合ISO9001的國際標準。

ISO 9001 : 1994
Certificate No. CC 865

ISO 9001 : 1994
Certificate No. CC 865

Hong Kong
Productivity Council
香港生產力促進局

Environmental Management Division
Hong Kong Productivity Council
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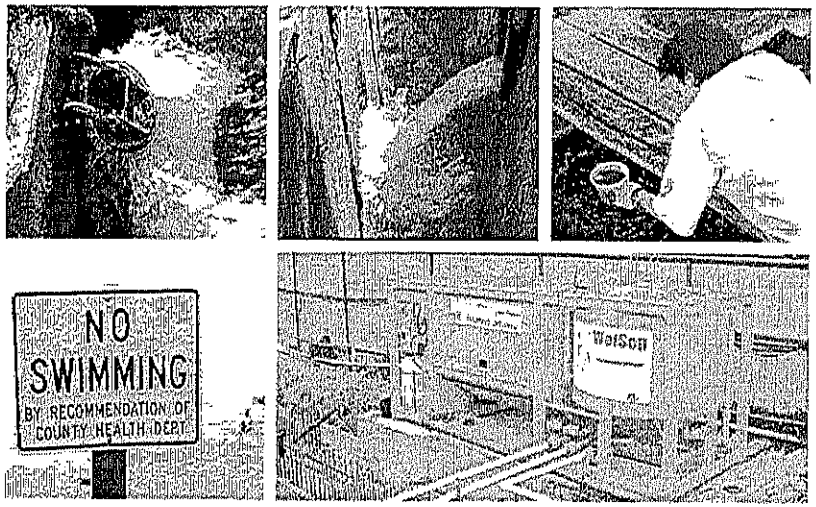
WetSep



Water & Wastewater Filtration System

Waste & Environmental Technologies Ltd.

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E-mail: mail@wastech.com.hk

www.wastech.com.hk

Application Highlights

[Left] Project

[Left] WetSep is used for tunnelling project in France.

[Right] 120 cMM/hr of waste water being treated by WetSep 250m underground in Taiwan.

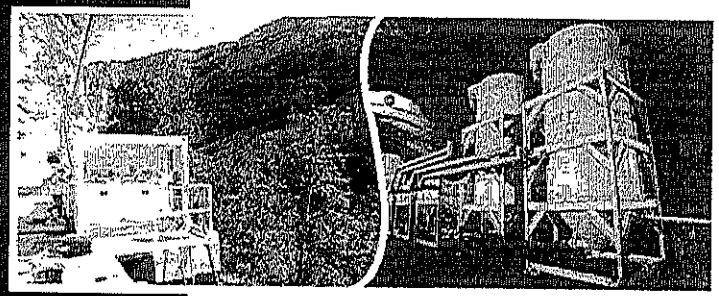
[Left] Total Integrate Sewage Treatment in TM's, Hong Kong.

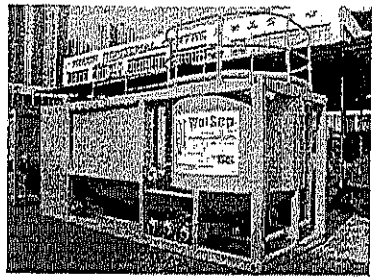
[Right] Stainless Steel WetSep for laundry waste water in Lilac Centre of the locations of Correctional Service Department, Hong Kong.

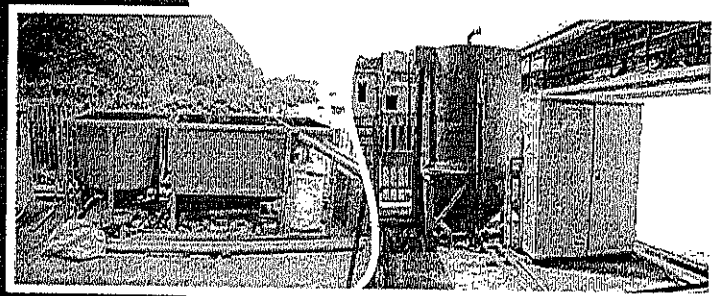
[Left] Construction Operations: WetSep has been applied in different part of the world including Australia, Canada, France, Japan, Macau, Singapore, Taiwan, Thailand and USA.

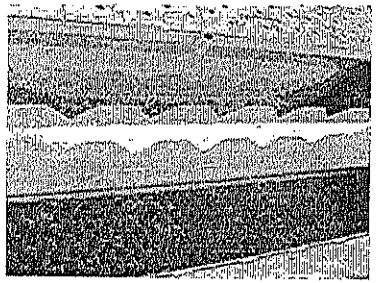
[Left] In Canada, WetSep is used for construction runoff treatment.

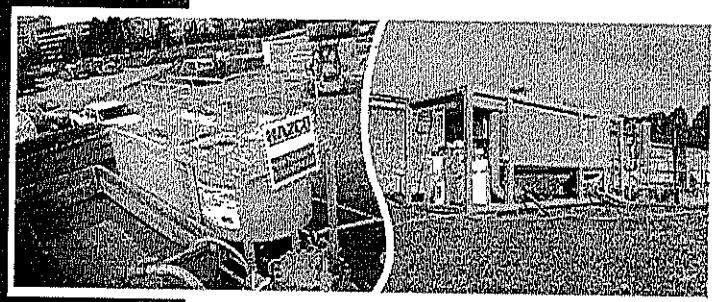
[Right] Apartment construction wastewater, one of the applications of WetSep is Sewage reuse. (Australia)

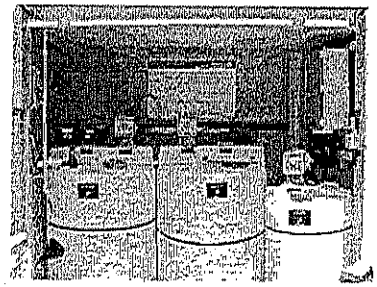


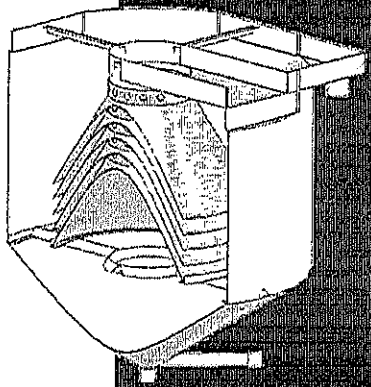






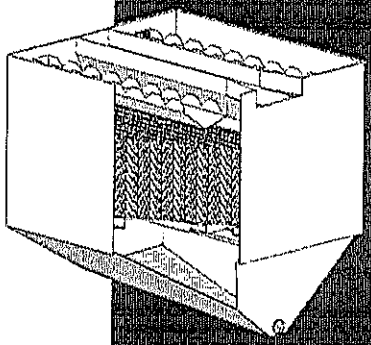






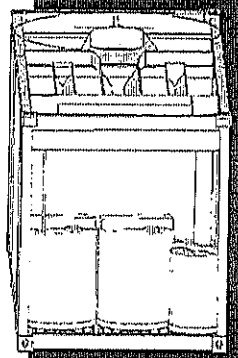
Impinging Stream Reactor (ISR)

The Impinging Stream Reactor (ISR) offers a critical path for mixing and separation of the suspended solids. It also allows the removal of BOD & COD by coagulation and flocculation. The hydraulic differential and conical separation enhance the performance without the electrical motors found in most other systems.



Universal Processing Chamber (UPC)

It has been designed to accommodate various means of filter media and absorbents such as lamella blocks, zeolite, silica sand and activated carbon. The dosing of Hydrogen Peroxide at the inter-connection also extends the application of the WetSep to Advanced Oxidation Process and achieves the Tertiary Treatment which results in ppb level.



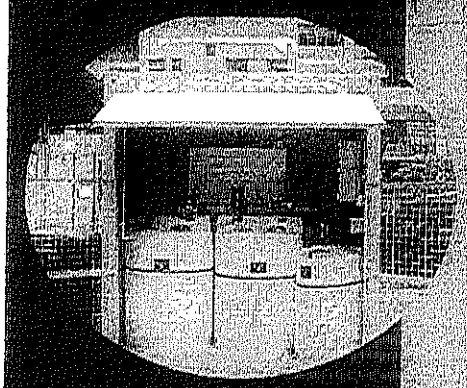
Chemical Preparation Unit

A complete package for chemical preparation for coagulant, flocculant, acid or other reagents. Chemicals such as liquid form of chlorine compound and oxidant can also be prepared. Controls are present to maintain the pH and chlorine levels.

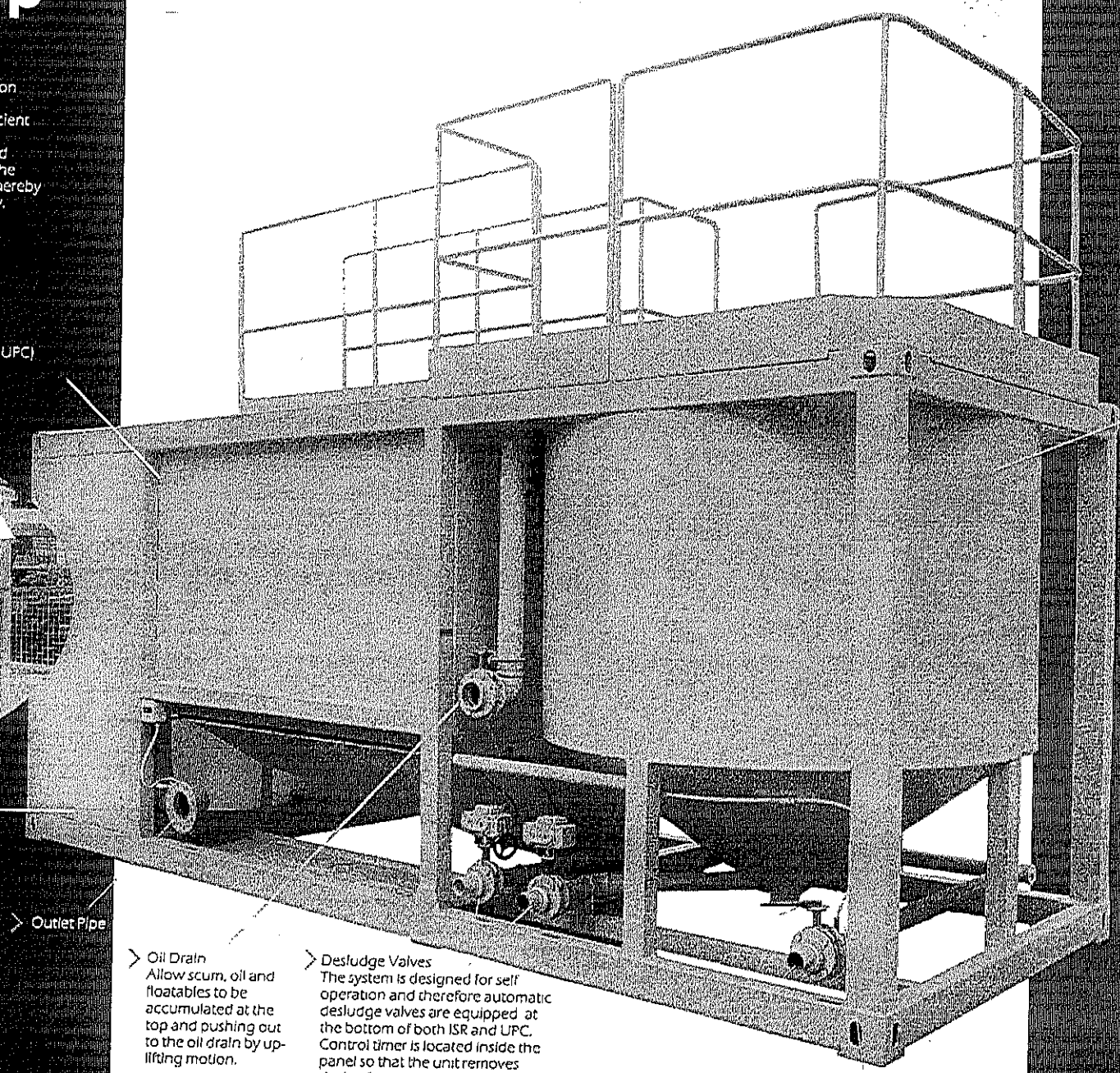
WetSep

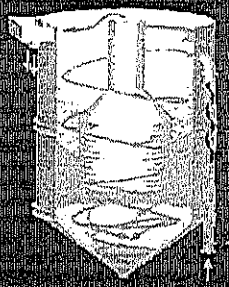
> Chemical Enhanced Precipitation Treatment (CEPT)
It is one of the most energy efficient methods for water treatment. Chemical such as flocculant and coagulant are added to allow the suspended solids settle faster thereby enhancing treatment efficiency.

> Universal Processing Chamber (UPC)



Chemical Preparation Unit
Completes with all necessary accessories for operation and safety. It consists of secondary containment, eye wash, sampling point, as well as lighting within the unit.





> Impinging Stream Reactor (ISR)

> Coagulation
Wastewater contains small particles which suspend in water forming a colloid. They carry same charges and oppose each other, this prevents the formation of larger particles. Coagulant is added to neutralize the charge in order to allow the particle easier to flocculate,which results faster sedimentation performance.

> Flocculation
Particles settle down faster if the weight is higher. By dosing the flocculant to the water, the particles form flocs that makes the particle size bigger. This leads to a faster sedimentation by gravity.

> pH Adjustment
Wastewater may be acidic and alkaline in nature. Corresponding chemical that perform neutralization with the waste water is added so that the pH range of the effluent is maintained in a acceptable range.

> Outlet Pipe

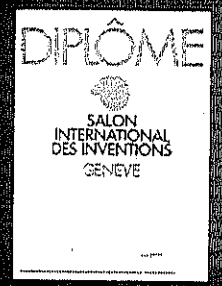
> Oil Drain
Allow scum, oil and floatables to be accumulated at the top and pushing out to the oil drain by up-lifting motion.

> Desludge Valves
The system is designed for self operation and therefore automatic desludge valves are equipped at the bottom of both ISR and UPC. Control timer is located inside the panel so that the unit removes sludge from the system in time sequence.

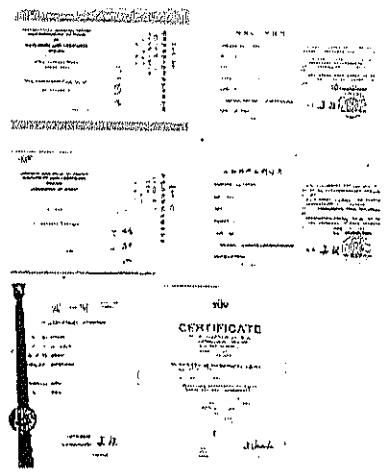
> Inlet Connection

> pH Dosing

Credibity



Asian Innovation Awards 2003



Advantage

- Treatment Package of oil filtration, suspended solid removal plus reduction in levels of BOD and COD
- No power driven mechanical parts, all done by natural gravity
- Simple operation designed for unskilled labour
- Compact and required a small footprint
- Low capital and running cost
- Low maintenance cost
- Environmental friendly
- Designed for easy transportation and installation

Performance

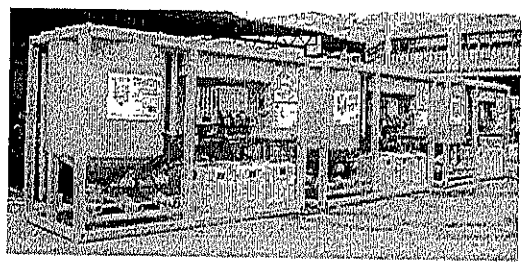
Test Data:

80-85% of suspended solids, oil and grease from the effluent are removed in the ISR.

97.5% of suspended solids are removed after the WetSep treatment with effluent SS level 50mg/l.

Worldwide Patents

WetSep system is patented over the world such as Hong Kong, Australia, Canada, China, Europe, Japan, Taiwan and USA.



Specifications

Item	WetSep20	WetSep40	WetSep80
Treatment Capacity	15-20 CUM/H	30-40 CUM/H	60-80 CUM/H
Dimension (L x W x H)	3.9m x 1.6m x 2.5m	5.4m x 2.2m x 2.5m	8.0m x 2.4m x 3.5m
Treatment Method	Chemical enhanced precipitation treatment		
	(Flocculation, Coagulation, Impinging Stream Reaction and Sedimentation)		
Material	Mild Steel With Coating		
Impinging Stream Reactor (ISR)			
Water Inlet	75mm(dia.)	75mm(dia.)	100mm(dia.)
Water Outlet	100mm(dia.)	150mm(dia.) x 2	250mm (Dia.) x1
Mixing Method	Upward flow static mixer, elbow & impinging nozzle		
Coconut Fibre Filter	4 segments	4 segments	6 segments
Universal Processing Chamber (UPC)			
Water Inlet	100mm(dia.) x 1	100mm(dia.) x 2	150mm(dia.) x 2
Water Outlet	75mm(dia.)	100mm(dia.)	200mm(dia.)
Lamella Plate	Glass fibre black with 50mm spacing and 2 mm thick ABS Plate.		
Chemical Preparation Unit			
Dosing Pump Model Type	Diaphragm Type Metering Pump		
Flocculant Agent	10 l/h (max.)	40 l/h (max.)	150 l/h (max.)
Coagulant Agent	20 l/h (max.)	80 l/h (max.)	230 l/h (max.)
Acid pump (pH control)	60 l/h (max.)	40 l/h (max.)	60 l/h (max.)
Chemical Tank Material	HDPE		
Chemical Tank Volume	200L	500L	500L
Leakage Pipe	Required		
Chemical Applied	Polymer and Poly-Aluminum Chloride (or Ferric Chloride)		
pH Adjustment System (Optional)			
Chemical Tank Material	HDPE		
Chemical Tank Volume	200L	200L	500L
Chemicals for pH Adjustment	Sulphuric acid H2SO4		
Automatic Desludge Valve (Optional)			
No. of Desludge Valve	2 nos. (6"/5)	2 nos. (6"/5)	2 nos. (6"/5)
Valves Power Supplies	Electric Activated valves, 110V/220V, Single Phase, 50Hz/60Hz		
Sludge Transfer Pump	Optional		
Control Panel			
Material	Plastic		
IP	IP65		
Power supplies	110V/220V, Single Phase, 50Hz/60Hz		

Appendix 3

Event Contingency Plan

Table A3.1 Event Contingency Plan

Step	Day	Action	CET	CM	RSS
1	1	Create a new non-compliance record in the recording system within 1 working day after making an observation during a site audit. The NNC will include the observations and the reasons for non-compliance.	♦		
2	1	Advise RSS	♦		◊
3	2	Propose corrective actions within 1 working day after the receipt of the NNC.		♦	
4	2	Review and agree with the proposed corrective actions and make additional recommendations as required.	♦		
5	2	Implement the proposed corrective actions once they have been agreed.		♦	
6	3	Audit the implementation of the corrective actions within 1 working day after the actions have been implemented.	♦		
7	-	Check the implementation of the corrective actions at the next site audit. Close the non-compliance record in the recording system if the implementation of the corrective actions is satisfactory, reported to RSS.	♦		◊
8	-	Propose preventative actions within 3 working days after the closure of the non-compliance.	◊	♦	

Notes:

CET *denotes Contractor's Environmental Team*

CM *denotes Construction Manager*

RSS *denotes Resident Site Staff*

♦ *action party*

◊ *enter comments/proposals into appropriate complaint record in recording system where applicable*

Appendix 4

Contact List of all relevant parties

List of Contact of relevant parties

Company / Department	Contact Person	Telephone No.	Facsimile No.	E-mail Address
Maunsell Consultants Asia Ltd.	Joseph GABAY (PMR)	6208 3041	2552 1256	joseph.gabay@rss-oceanpark.com
	Terence KONG (P-ETL)	9097 9549	2552 1256	terence.kong@rss-oceanpark.com
Dragages – Bouygues JV	Daniel Altier (Project Director)	9682 0692	2552 1036	daniel.altier@bouyguesasia.com
	Peter Ip (General Construction Manager)	9858 6874	2552 1036	peter.ip@bouyguesasia.com
	Y T So (QSE Manager)	9307 8728	2552 1036	yt.so@bouyguesasia.com
	Schroeder TAM (C-ETL)	9058 6501	2552 1036	schroeder.tam@bouyguesasia.com
	Ivan NG (Construction Manager – Waterfront)	9219 5282	2552 1036	ivan.ng@bouyguesasia.com
	James Rickard (Construction Manager – Tunnel and Summit)	9642 0050	2552 1036	james.rickard@bouyguesasia.com
Mac McDonald (Independent Environmental Checker)	Dr. Anne F KERR (Principal Environmental Consultant)	2828 5757	2827 1823	anne.kerr@mottconnell.com.hk

Appendix 5

Details of Flocculent Agent #26

Chemical Data Sheet

Code No. 26

Flocculent Agent #26

DESCRIPTION

Flocculent Agent #26 is a very high molecular weight anionic polyacrylamide flocculent supplied as a free flowing granular powder.

PRINCIPAL USES

Flocculent Agent #26 has found application in a wide variety of mineral processing operations including the following:

1. Base metal sulphide and oxide concentrates thickening and filtration.
2. Sedimentation of coal tailings.
3. Sedimentation of coal fines.
4. Filtration of coal fines.
5. Deep cone thickening of coal fines.
6. Sedimentation of fine sands and clays.
7. Tailings dewatering.
8. Iron ore tailings.
9. Clarification of acid leach pulp (copper).
10. Sulphur extraction.

TYPICAL PROPERTIES

Physical form	: White granular powder
Particle size	: 98% < 1,000u
Bulk density	: 0.7
pH of 1% solution at 25°C	: 7.0
Packing	: 0.5kg/bottle or 1kg/bag

APPLICATION AND STORAGE

Recommended solution concentrations:

Stock solution	: 0.25 – 0.5% max
Feed solution	: 0.025 – 0.05% max

Recommended storage periods:

Solid

Stock solution

Storage of Flocculent Agent #26 should be in cool, dry place.

Chemical Data Sheet

Code No. 26

Flocculent Agent #26

SOLUTION VISCOSLTY DATA

(Fann viscometer - 25°C – solvent – deionized water)

Flocculent Agent #26	Shear rate (sec-1)					
Concentration (%)	5.11	10.22	170	340	511	1022
	Viscosity (Cps)					
1.0	1997	1325	192	105	75	65
0.5	1248	725	102	75	67	48
0.25	606	350	48	41	37	20
0.10	300	150	27	20	17	12

SHIPPING AND HANDLING

Flocculent Agent #26 has a low order of toxicity and no special precautions are necessary in handling. Corrosivity towards most standard materials of construction is low, but aluminium and galvanized equipment should be avoided.

TECHNICAL SERVICE

Advice and assistance in the running of laboratory and plant tests to select the correct flocculent and determine the best application is given by representatives of Waste & Environmental Technologies Ltd.

HEALTH AND SAFETY

Flocculent Agent #26 exhibits a very low order oral toxicity and does not present any abnormal problems in its handling or general use.

Full details on health and safety aspects are available on request.