

1. Basic Information

1.1 Project Title

De-stratification of Plover Cove Reservoir by Aeration.

1.2 Purpose and Nature of Project

1.2.1 Apart from the surface run-off collected in its direct and indirect gathering grounds, the majority of the storage in the Plover Cove (PC) Reservoir comes from Dongjiang, the water quality of which has been deteriorating since early 1990s. The high concentration of nutrients in the form of nitrate and phosphate stimulates algae growth in the impounded water, particularly in favorable conditions of hot, calm, clear weather in summer months.

1.2.2 The excessive algal growth results in high pH values, odour and taste problems that adversely affect the operation of water treatment works receiving raw water from the reservoir. For example, the pH values in the PC water had risen up to 10 and above in June 2003. This had to a great extent upset the clarification process in the following water treatment works (WTW) for which PC water is the main source of supply:-

- Ma On Shan WTW
- Pak Kong WTW

Other than this, algae blooms have also resulted in odour and unsightliness in the reservoir water.

1.2.3 The results of regular monitoring reveal that thermal stratification often occurs in Plover Cove Reservoir and divides the reservoir water into three layers, namely upper warm layer, thermocline intermediate layer and cool bottom layer. The intermediate layer serves as a barrier in between the upper and bottom layers and isolates the bottom layer from the air at the surface. As a result, the degradation of organic matter in the bottom layer depletes

the oxygen in the water, produces anaerobic conditions, which leads to the re-solution of iron and manganese in the bottom sediments.

- 1.2.4 Both phenomena, apart from causing water quality problem, also affect the eco-system in the reservoir. For example, algal blooming killed hundreds of fish in June 2001. Subsequently, dead fishes had to be removed from the water body to prevent deterioration of water quality in the impounding reservoir water. The events attracted enquiries from the public and the press. A smaller scale fish kill event had also occurred in 2003 summer due to algal proliferation and low dissolved oxygen levels.
- 1.2.5 A radical solution to eutrophication of an enclosed water body is removal of the nutrients. Although nutrient level of the imported Dongjiang water is declining since the commissioning of the closed aqueduct, the physical removal of soluble nutrients and deposits in the previous years poses insurmountable technical and financial difficulties.
- 1.2.6 A well-proven and well-established practice of handling stratified reservoirs is to draw-off from the best level available. However, this is not always feasible owing to storage levels and water quality situation.
- 1.2.7 Fish stocking is an effective means to control algal growth in impounding reservoirs. Annual stocking exercises have been carried out in Plover Cove for many years already. However, this cannot achieve the objective of mixing the thermally and/or chemically stratified layers. Besides, fish only temporarily locks up part of nutrients for algal proliferation. The nutrient will eventually return to the ecosystem when the fish die.
- 1.2.8 A positive control and an acceptable means of tackling stratification is by installing de-stratification equipment in the reservoirs. By the experience gained in Tai Lam Chung Reservoir, an aeration system is a feasible and effective means to combat the stratification problem in a local reservoir. It will provide effective mixing of the top and bottom layers of the water column and introduce a higher dissolved oxygen content thereby preventing anaerobic conditions and maintaining healthy eco-system in the reservoir.
-

1.2.9 In order to achieve the desirable mixing effect, increase in DO levels and improve quality of the reservoir water which is an essential source of raw water for potable water supply after treatment, a fine-bubble system similar to the aeration system at Tai Lam Chung Reservoir is recommended.

1.3 Name of the Project Proponent

Water Supplies Department is both the works and client department.

1.4 Location and Scale of Project and History of Site

1.4.1 Sketches showing the location of the Project and the general layout of the proposed aeration system are attached in Appendix A. The aeration system comprises the following three major components:

- (i) A 500m long sparge ring pipe surrounding Plover Cove Shaft Tower from which reservoir water is drawn off and delivered via tunnel and submarine pipeline to Pak Kong WTW and Ma On Shan WTW. The sparge pipe is submerged in water and supported by stainless steel chains of which the bottom end is to be secured at pre-cast concrete blocks and the other end is to be tied to hollow balls or floating cork. No dredging works will be involved in the installation of the sparge pipe and its supports.
- (ii) A one-storey high air compressor house that provides accommodation to two air compressors, air receivers, control panel and CLP transformers. The height of the building is 5.5m. The compressor house will be located within an existing pipe storage compound for which the land had been formed for a long time.
- (iii) A 300m long on-ground DN150 air dosing pipes from the compressor house to the reservoir waterfront and a 150m long underwater DN100 air dosing pipe connecting to the sparge ring pipe.

1.4.2 The project site is within the Permanent Government Land Allocation to WSD for the Harbour Island Pumping Station project and is accessible through a vehicular waterworks maintenance access.

1.5 Number and types of Designated Project

The project site is within the boundary of Plover Cove Country Park. The proposed aeration system therefore constitutes a Designated Project under type Q1 in Part I, Schedule 2 of the Environmental Impact Assessment Ordinance.

1.6 Name and Telephone Number of Contact Person

Ir. S K SO

Senior Engineer, NT East Region, Water Supplies Department

Telephone No. 2152-5508

Fax No. 2354-5737

2.0 Outline of Planning and Implementation Programme

2.1 The purpose of the proposed fine-bubble aeration system is to combat the water quality problem in Plover Cove Reservoir and the treatment problem at waterworks installations in summer months. WSD targets to commission the aeration system in March 2006. The detailed design of the aeration system has substantially been completed. Purchasing orders for air compressors, air receivers, control panels and water quality monitoring equipment/instruments have been placed. Agreement has also been reached with CLPP and PCCW regarding the provision of electricity supply and telephone services to the compressor house.

2.2 There is no other project in the vicinity of the project site with overlapping implementation programme that will have significant environmental impacts due to cumulative effects.

3.0 Possible Impacts on the Environment

During Construction

- 3.1 The whole of the proposed aeration system is located on the southeast of Plover Cove Reservoir. The potential environmental impacts of the proposed Project are reviewed in this section.
- 3.2 Dust – The nearest air sensitive receiver (ASR) is Harbour Island Pumping Station that is approximately 400m to the southeast of the proposed compressor house. Potential construction phase air quality impacts pertinent to the Project would include dust nuisance and gaseous emission from the construction plant and vehicles. The proposed compressor house is located in an existing pipe storage compound, the boundary of which is surrounded with trees and bushes. No site formation works is required for the construction of the building structures. The DN150 air-dosing pipe in between the compressor house and the reservoir waterfront will mainly be laid on-ground. Given that the number of plant to be used on site would be limited and the works scale would be small, no adverse dust impacts during construction are expected with the incorporation of mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation.
- 3.3 Water Quality – The laying of the underwater air dosing pipe and the sparge ring pipe may slightly disturb the bottom silt in a small part of the reservoir, which would eventually re-settle. It is anticipated that the impact will be minimal, with no adverse impact on water quality as the pipeline will be installed section by section. Water pollution control measures will be taken to minimize adverse impacts on the water quality during execution of the works and shall follow the mitigation measures as specified in the Practice Note 1/94 “Construction Site Drainage” issued by EPD.
- 3.4 Noise – The nearest Noise Sensitive Receiver (NSR) would be Plover Cove Government Quarters which is located about 2 km away from the works site. There was no NSR identified within the assessment area (i.e. 300m from the boundary of the proposed works area) apart from the Plover Cove Country Park. Visitors to the County Park would potentially be impacted by the

proposed construction works. However, the EIAO-TM does not specify a construction noise level limit for Country Park. Taking into account the transient nature of visitors to the Country Park, insurmountable construction noise impact on the NSR would not be expected.

- 3.5 Waste Management – Measures will be taken to minimize the generation of waste from the work. The contractor shall undertake measures to comply with the Waste Disposal Ordinance and its subsidiary regulation for waste management and disposal.
- 3.6 Ecology – The area along the proposed 300m long on-ground DN150 air dosing pipes from the proposed compressor house to the reservoir waterfront was surveyed in July 2005. A large portion of the proposed pipe alignment would run approximately along an unpaved path surrounded by a tall shrubland habitat. A total of 89 plant species (Appendix B.1) were recorded during the survey with dominant tree species including *Aporosa dioca*, *Cratoxylum lligustrinum*, *Schefflera heptaphylla* and *Syzygium hancei* with average height about 7-8m. Understorey was mainly *Blechnum orientale*, *Breynia fruticosa*, *Pteris semipinnata* and *Sarcandra glabra*. Common climber species of the study area included *Canavalia maritime*, *Dalbergia benthami*, *Smilax china*, *Pueraria lobata* var. *Montana* and *Tetracera asiatica*. Common disturbed grassland/shrubland mosaic species such as *Dicranopteris pedata*, *Embelia laeta* and *Paederia scandens* were recorded near the proposed location of compressor house and transformer house. A total of 5 bird species, 12 butterfly species and 1 dragonfly species were recorded during the survey (Appendix B.2). Most of the species recorded are common and widespread in Hong Kong. A large number (about 20) of ardeids of conservation interest (Little Egret, *Egretta garzetta*) was recorded perching in nearby shrubland at the waterfront during the surveys. The large, secure population of this species in Hong Kong is considered important in a regional context by Fellowes *et al.* (2002)¹. Photographic records of representative habitats are presented in Appendix B.3.

¹ Fellowes, J.R., Lau, M.W.N., Dudgeon, D., Reels, G.T., Ades, G.W.J., Carey, G.J., Chan, B.P.L., Kendrick, R.C., Lee, K.S., Leven, M.R., Wilson, K.D.P. & Yu, Y.T. (2002) Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong. *Memoirs of the Hong Kong Natural History Society* **25**: 123-159

-
- 3.7 The proposed compressor house would be located inside an existing pipe storage compound, which is concrete paved. It is unlikely that the building works will have any ecological impact. Regarding the DN150 air-dosing pipe from the proposed compressor house to the reservoir waterfront, no plant species of conservation importance were found along the proposed pipeline alignment. No adverse impact on ecology either on land or in the reservoir is expected during the minor pipe laying works. To minimize potential noise disturbance on any ardeid species at the reservoir waterfront, the noise mitigation measures and good site practices recommended in Section 5 should be implemented during the pipe laying works.
- 3.8 Tree felling – In the formation of the 1m wide earth track for the laying of the DN150 air dosing pipe, it is technically feasible to adjust the alignment of the path to avoid felling trees and bushes with girth greater than 100mm.
- 3.9 Cultural Heritage – No impact on historical monuments or buildings is expected during the construction stage.

During Operation

- 3.10 It is expected that the proposed aeration system will not have any dust and traffic impact during the operation stage.
- 3.11 Noise – The proposed compressor house adopts a closed design and would be located in an existing pipe storage compound with small hills on the north and south sides. With those two layers of man-made and natural noise barriers, it is unlikely that the proposed aeration system will cause any adverse effect to the remote NSRs.
- 3.12 Landscape and Visual Impact – The proposed compressor house is located inside an existing storage compound, the boundaries of which are surrounded with trees and bushes (see Appendix A). The building structures would not be seen with exception at the entrance of the storage compound. In addition, the compressor house and all on-ground air dosing pipes will be painted with subdued colour to be agreed with AFCD to match the
-

environment. It is expected that the proposed aeration system will not have any visual impact to the public. Notwithstanding to this, WSD is prepared to plant more trees and bushes along the access road on the south of the storage compound.

3.13 Water Quality – It is anticipated that, after the commissioning of the proposed aeration system, the quality of the reservoir water as well as the quality of raw water abstracted at the draw-off tower for treatment at water treatment works for drinking water supply will be significantly improved.

3.14 Ecology – After the commissioning of the aeration system, it will improve the circulation within the reservoir and eliminate the recurrence of algal blooming in the summer months each year. This will definitely help to maintain the balance of the eco-system in the impounding reservoir and hence enhance the environment of the Plover Cove Reservoir.

4.0 Major Elements of the Surrounding Environment

This section outlines the existing and planned sensitive receivers that might be affected by the Project. In addition, it also outlines the major elements of the surrounding environment that may affect the Project.

4.1 Existing Sensitive Receivers and Sensitive Parts of Natural Environment

As aforementioned, the project site is located on the southeast of Plover Cove Reservoir. The nearest air sensitive receiver (ASR) is Harbour Island Pumping Station that is approximately 400m to the southeast of the proposed compressor house. The nearest NSR is the Plover Cove Government Quarters on the opposite side of the reservoir and is about 2 km away from the proposed compressor house.

4.2 Planned Sensitive Receivers and Sensitive Parts of Natural Environment

There are no re-zoning proposal and/or Section 16 planning application under the Town Planning Ordinance in the vicinity of the project site that will

become planned sensitive receivers of the project site.

4.3 Major Elements of the Surrounding Environment Affecting the Project

The project site is within the Plover Cove Reservoir and the permanent government land allocation to WSD. There are no major elements of the surrounding environment affecting the location of the Project.

The Project Area in Pak Sha Tau falls within the boundary of Plover Cove Country Park, which supports a variety of habitat types, with upland areas dominated by grassland and low shrub. Lowland areas and stream valleys within the Country Parks support more mature vegetation including plantation and secondary/*fung shui* woodland.

5.0 Environmental Protection Measures to be Incorporated in the Design and Further Environmental Implications

5.1 The following environmental protection measures have been/shall be incorporated in the design to alleviate the potential impacts of the proposed aeration system:

- (a) The proposed compressor house will be equipped with acoustic louvers to eliminate the noise emission from the building.
- (b) The proposed compressor house together with the on-ground air dosing pipes will be painted with subdued colour to be agreed with AFCD. More trees and bushes will be planted along the access road to the south of the storage compound.

5.2 The following environmental protection measures shall be implemented to minimize the short-term construction impacts of the Project:

- (a) No works shall be carried out on Sundays and holidays. No works shall be carried out at night.

-
- (b) The aeration system is located within the catchment of Plover Cove Reservoir. Contractors shall be required to strictly observe the “Conditions of Working within Gathering Grounds” in Appendix C and “Construction Site Drainage” Professional Persons Practice Note PN 1/94.
- (c) Contractors shall observe and comply with the “Waste Disposal Ordinance” and its subsidiary regulations.
- (d) Dust mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation shall be implemented to minimize fugitive dust emissions from the works area during the construction phase. Relevant control measures are listed below:
- Use of regular watering to reduce dust emissions from exposed site surface and unpaved road, with complete coverage, particularly during dry weather.
 - Use of frequent watering for particularly dusty static construction areas.
 - Tarpaulin covering of all dusty vehicle loads transported to and from the site.
 - Where feasible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASR.
- (e) No adverse noise impact at the NSR would be expected during the construction phase, however, good site practices and noise management would considerably reduce the impact of construction activities on nearby areas:
- Noisy powered mechanical equipment (PMEs) should be avoided to operate concurrently.
 - Only well-maintained PMEs should be operated on-site and PMEs should be serviced regularly during the construction program.
 - Silencers or mufflers on the construction equipment should be utilized and should be properly maintained during the construction program.
-

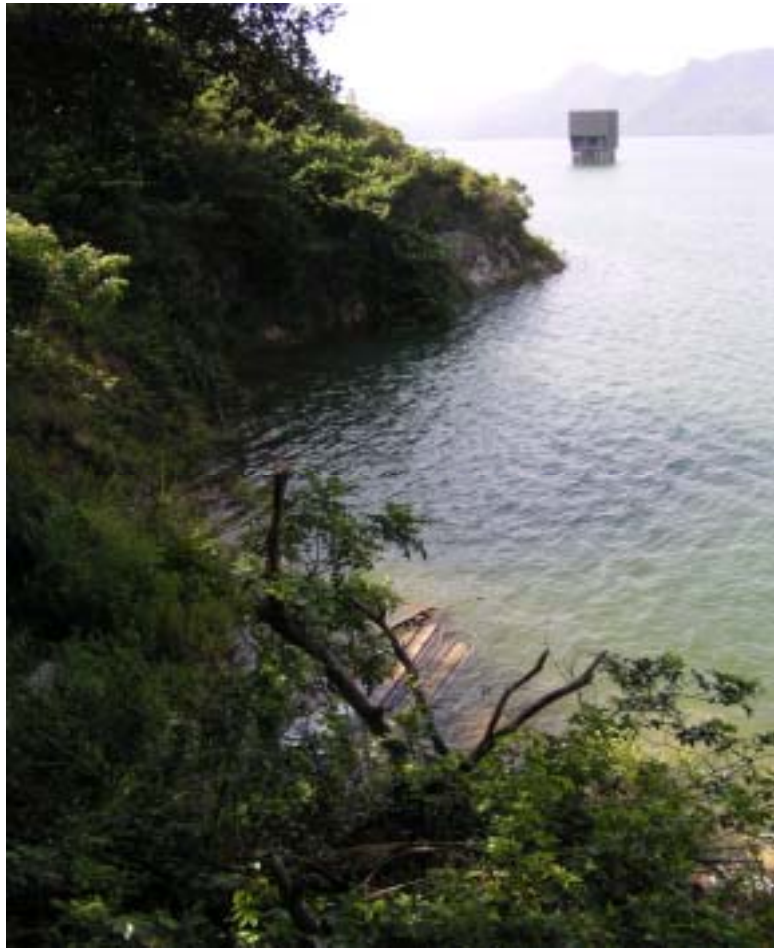
-
- Mobile plant, if any, should be sited as far from NSRs as possible.
 - Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.
- (f) Standard good site practice shall be implemented to ensure construction phase disturbance to the features and surrounding habitats of the Plover Cove Country Park is avoided and minimized. Such measures would include:
- Placement of equipment or stockpile in the work areas and access routes would be selected on existing disturbed land where possible to minimise disturbance to vegetation.
 - Construction activities would be restricted to work areas that should be clearly demarcated.
 - Construction works, including pipe laying works, should avoid damage to the branches and root systems of the existing plants and trees.
 - Temporary work areas would be reinstated immediately after completion of the construction work.
 - Open fires would be strictly prohibited on the works site.
 - Waste generated from the site would be disposed of in a timely and proper manner.
 - The Site Engineer would audit the proper implementation of the above mitigation measures.
- 5.3 It is anticipated that the construction impacts of the aeration system would be short-term and minimal. They will have no further implications to the environment. As regards the aeration system, our experience obtained from the operation of the aeration system installed in the Tai Lam Chung Reservoir reveals that it will significantly improve the quality of water and the eco-system in the reservoir, as well as the quality of raw water abstracted for treatment at water treatment works for potable water supply.
- 5.4 Notwithstanding the above, the performance of the aeration system shall be closely monitored. Sampling and testing on the quality of aerated reservoir
-

water shall be undertaken on weekly basis. The performance of the aeration system will be reviewed on a half-yearly basis in the first year of operation, and on regular basis in subsequent years.

- END -



MAUNSELL AECOM Maunsell Environmental Management Consultants Ltd.	PWP NEW ITEM - DESTRATIFICATION OF PLOVER COVE RESERVOIR BY AERATION Proposed location of compressor house inside existing storage compound	SCALE	N.T.S.	DATE	Aug-05	
		CHECK	JEC	DRAWN	JNSC	
		JOB NO.	A06505	DRAWING No.	Appendix A	Rev
						-



View from reservoir waterfront to intake tower



View of proposed location of compressor house and transformer house

MAUNSELL AECOM Maunsell Environmental Management Consultants Ltd.	PWP NEW ITEM - DESTRATIFICATION OF PLOVER COVE RESERVOIR BY AERATION Photographic records of representative habitats	SCALE	N.T.S.	DATE	Jul-05
		CHECK		DRAWN	GCCL
		JOB NO.	A06505	DRAWING No.	Appendix B.3
				Rev	-

Appendix B.1 Plant Species Recorded within Study Area

(Code for Abundance: xxxx=abundant; xxx=frequent; xx=ocassional; x=scarce)

附件 B.1 在研究範圍內記錄得之植物

(豐富度註釋: xxxx=很常見; xxx=常見; xx=偶見; x=少見)

中文名	習性	香港境內現況	Family(科名)	Plant Species	Growth Form	Status in Hong Kong	
扇葉鐵線蕨	草本植物	常見		<i>Adiantum flabellulatum</i>	herb	common	xx
黃瑞木	灌木	常見	THEACEAE (山茶科)	<i>Adinandra millettii</i>	shrub or small tree	common	xx
勝紅薊	草本植物	外來植物, 常見		<i>Ageratum conyzoides</i>	herb	exotic, common	xxx
紅背山麻桿	灌木	常見	EUPHORBIACEAE (大戟科)	<i>Alchornea trewioides</i>	shrub	common	xx
大沙葉, 銀柴	喬木	常見		<i>Aporusa dioca</i>	tree	common	xxxx
猴耳環	喬木	常見	MIMOSACEAE (含羞草科)	<i>Archidendron clypearia</i>	tree	common	xx
竹	竹	常見	GRAMINEAE (禾本科)	<i>Bambusa</i> sp.	bamboo	common	xxx
勾兒茶	攀援灌木	常見		<i>Berchemia racemosa (Berchemia floribunda)</i>	climbing shrub	common	xx
白花鬼針草				<i>Bidens alba</i>	herb		xxx
烏毛蕨	草本植物	很 常見		<i>Blechnum orientale</i>	herb	very common	xxx
豐花草屬	草本植物		RUBIACEAE (茜草科)	<i>Borreria</i> spp.	herb	common	xx
黑面神, 鬼畫符	灌木	很 常見		<i>Breynia fruticosa</i>	shrub	very common	xxx
土蜜樹, 迫逼仔	喬木	常見		<i>Bridelia tomentosa</i>	tree	common	xx
鴉膽子, 苦參子	灌木	常見		<i>Bucea javanica</i>	shrub	common	xx
蔓草蟲豆	攀援植物	常見		<i>Cajanus scarabaeoides</i>	climber	common	x
海刀豆	攀援植物	常見		<i>Canavalia maritima</i>	climber	common	xxx
竹節樹	喬木	常見		<i>Carallia brachiata</i>	tree	common	xxx
無根藤	攀援植物	很 常見		<i>Cassytha filiformis</i>	climber	very common	xx
假淡竹葉	多年生草本植物	常見	GRAMINEAE (禾本科)	<i>Centotheca lappacea</i>	perennial herb	common	xxx
毛柱鐵線蓮, 甘草藤			RANUNCULACEAE (毛茛科)	<i>Clematis meyeniana</i>	Woody Vine	common	x
香絲草	草本植物	常見	ASTERACEAE (菊科)	<i>Coryza bonariensis</i>	herb	common	x
黃牛木	灌木	很 常見		<i>Cratoxylum lligustrinum</i>	shrub	very common	xxxx
兩廣黃檀, 兩粵黃檀	攀援植物: 藤本植物	常見	FABACEAE (蝶形花科)	<i>Dalbergia benthami</i>	climber: vine	common	xxx
牛耳楓	灌木	常見	DAPHNIPHYLLACEAE (交讓木科)	<i>Daphniphyllum calycinum</i>	shrub	common	xxx
寄生藤	木質藤本植物		SANTALACEAE (檀香科)	<i>Dendrotrophe frutescens</i>	Woody Vine	common	xx
假地豆	草本植物	很 常見	FABACEAE (蝶形花科)	<i>Desmodium heterocarpon</i>	herb	very common	xx
假鷹爪, 酒餅葉	攀援植物	常見		<i>Desmos chinensis</i>	woody climber	common	xx
芒萁	草本植物	很 常見	GLEICHENIACEAE (裏白科)	<i>Dicranopteris pedata (Dicranopteris dictotoma; Dicranopteris linearis)</i>	herb	very common	xxx
黃獨	攀援植物	常見	DIOSCOREACEAE (薯蕷科)	<i>Dioscorea bulbifera</i>	climber	common	xx
酸藤果	攀援植物	很 常見		<i>Embelia laeta</i>	climber	very common	xx
白花酸藤果	攀援植物	常見	MYRSINACEAE (紫金牛科)	<i>Embelia ribes</i>	climber	common	xx
一點紅, 雞腳草	草本植物	外來植物, 常見		<i>Emilia sonchifolia</i>	herb	exotic, common	xx
細齒葉柃	灌木	常見	THEACEAE (山茶科)	<i>Eurya nitida</i>	shrub	common	xx
粗葉榕, 牛奶仔	灌木	常見	MORACEAE (桑科)	<i>Ficus hirta</i>	shrub	common	xx
白蟬 / 水橫枝	灌木	常見		<i>Gardenia jasminoides</i>	shrub	common	xx
毛果算盤子	灌木	常見	EUPHORBIACEAE (大戟科)	<i>Glochidion eriocarpum</i>	shrub	common	xx
算盤子屬	灌木		EUPHORBIACEAE (大戟科)	<i>Glochidion</i> spp.	shrub		xx
風鳳菜, 紅鳳菜、兩色三七草	多年生草本植物	常見	ASTERACEAE (菊科)	<i>Gynura bicolour</i>	perennial herb	common	xx

Appendix B.1 Plant Species Recorded within Study Area

(Code for Abundance: xxxx=abundant; xxx=frequent; xx=occasional; x=scarce)

附件 B.1 在研究範圍內記錄得之植物

(豐富度註釋: XXXX=很常見; XXX=常見; XX=偶見; X=少見)

中文名	習性	香港境內現況	Family(科名)	Plant Species	Growth Form	Status in Hong Kong	
白子菜, 雞菜	多年生草本植物	常見	ASTERACEAE (菊科)	<i>Gynura divaricata</i>	perennial herb	common	xx
	草本植物	常見		<i>Hedyotis consanguinea</i>	herb	common	x
山芝麻	草本植物	很 常見		<i>Helicteres angustifolia</i>	herb	very common	xx
梅葉冬青, 崗梅	灌木	很 常見	AQUIFOLIACEAE (冬青科)	<i>Ilex asprella</i>	shrub	very common	xxx
毛冬青, 茶葉冬青	灌木	很 常見	AQUIFOLIACEAE (冬青科)	<i>Ilex pubescens</i>	shrub	very common	xx
白牛膽 / 山白芷	草本植物	常見		<i>Inula cappa</i>	herb	common	xx
五爪金龍	攀援植物	外來植物, 常見	CONVOLVULACEAE (旋花科)	<i>Ipomoea cairica</i>	climber	exotic, common	xx
七爪龍	草本植物	外來植物, 常見	CONVOLVULACEAE (旋花科)	<i>Ipomoea digitata</i>	climber: twining herb	exotic, common	x
麥冬, 蒲草	草本植物	很 常見		<i>Liriope spicata</i>	herb	very common	xx
潺槁樹	灌木	很 常見	LAURACEAE (樟科)	<i>Litsea glutinosa</i>	shrub	very common	xxx
豺皮樟	灌木	很 常見	LAURACEAE (樟科)	<i>Litsea rotundifolia</i>	shrub	very common	xxx
淡竹葉	草本植物	常見		<i>Lophatherum gracile</i>	herb	common	xx
海金沙, 羅網藤	攀援植物	很 常見	LYGODIACEAE (海金沙科)	<i>Lygodium japonicum</i>	climber	very common	xx
血桐	喬木	很 常見		<i>Macaranga tanarius</i>	tree	very common	xxx
白楸	喬木	很 常見	EUPHORBIACEAE (大戟科)	<i>Mallotus paniculatus</i>	tree	very common	xx
通泉草	草本植物	常見	SCROPHULARIACEAE (玄參科)	<i>Mazus pumilus</i>	herb	common	x
毛梔	灌木	常見		<i>Melastoma sanguineum</i>	shrub	common	xxx
薇甘菊	攀援植物	外來植物, 常見		<i>Mikania micrantha</i>	climber	exotic, common	xx
含羞草	草本植物	外來植物, 常見		<i>Mimosa pudica</i>	herb	exotic, common	xx
五節芒	多年生草本植物	常見	GRAMINEAE (禾本科)	<i>Miscanthus floridulus</i>	perennial herb	common	xx
雞眼藤	攀援灌木	常見		<i>Morinda parvifolia</i>	climbing shrub	common	xx
玉葉金花	攀援植物	很 常見		<i>Mussaenda pubescens</i>	climber	very common	xx
腎蕨	草本植物	很 常見	NEPHROLEPIDACEAE (腎蕨科)	<i>Nephrolepis auriculata</i>	herb	very common	xx
雞矢藤	攀援植物		RUBIACEAE (茜草科)	<i>Paederia scandens</i>	climber: vine	common	xx
馬甲子, 狗骨筋	灌木	常見	RHAMNACEAE (鼠李科)	<i>Paliurus ramosissimus</i>	shrub	common	x
				<i>Photinia raupingensis</i>	tree	common	x
油甘子	灌木	很 常見		<i>Phyllanthus emblica</i>	shrub	very common	xx
葉下珠, 珍珠草	草本植物	常見		<i>Phyllanthus urinaria</i>	herb	common	xx
排錢草	灌木	常見		<i>Phyllodium pulchellum</i>	shrub	common	x
九節, 山大刀	灌木	常見		<i>Psychotria rubra</i>	shrub	common	xxx
蔓九節, 穿根藤	攀援植物	很 常見		<i>Psychotria serpens</i>	semi-woody climber	very common	xx
半邊旗	草本植物	很 常見	PTERIDACEAE (鳳尾蕨科)	<i>Pteris semipinnata</i>	herb	very common	xx
葛麻姆	攀援植物	常見	FABACEAE (蝶形花科)	<i>Pueraria lobata var. montana</i>	climber	common	xxx
石斑木, 車輪梅、春花	灌木	常見		<i>Rhaphiolepis indica</i>	shrub	common	xxx
崗桉	灌木	很 常見		<i>Rhodomyrtus tomentosa</i>	shrub	very common	xxx
鹽膚木	灌木	很 常見		<i>Rhus chinensis</i>	shrub	very common	xxx
野漆	喬木	很 常見		<i>Rhus succedanea</i>	tree	very common	xx
山烏柏	喬木	很 常見	EUPHORBIACEAE (大戟科)	<i>Sapium discolor</i>	tree	very common	x
烏柏	喬木	常見	EUPHORBIACEAE (大戟科)	<i>Sapium sebiferum</i>	tree	common	xx
草珊瑚, 雞爪蘭	灌木	很 常見		<i>Sarcandra glabra</i>	shrub	very common	xx
草海桐	草本植物	很 常見		<i>Scaevola sericea</i>	herb	very common	xx
鵝掌柴, 鴨腳木	喬木	很 常見	ARALIACEAE (五加科)	<i>Schefflera heptaphylla (Schefflera octophylla)</i>	tree	very common	xxxx

Appendix B.1 Plant Species Recorded within Study Area

(Code for Abundance: xxxx=abundant; xxx=frequent; xx=ocassional; x=scarce)

附件 B.1 在研究範圍內記錄得之植物

(豐富度註釋: xxxx=很常見; xxx=常見; xx=偶見; x=少見)

中文名	習性	香港境內現況	Family(科名)	Plant Species	Growth Form	Status in Hong Kong	
綿棗兒, 天蒜	多年生草本植物	常見	LILIACEAE (百合科)	<i>Scilla scilloides</i>	perennial herb	common	x
金剛藤	攀援灌木	很 常見	SMILACACEAE (菝葜科)	<i>Smilax china</i>	climbing shrub	very common	xx
韓氏蒲桃, 紅鱗蒲桃	喬木	常見	MYRTACEAE (桃金娘科)	<i>Syzygium hancei</i>	tree	common	xxxx
葫蘆茶	草本植物	很 常見	FABACEAE (PAPILIONACEAE) (蝶形花科)	<i>Tadehagi triquetrum (Pteroloma triquetrum)</i>	herb	very common	xx
錫葉藤, 雪藤	攀援植物	很 常見		<i>Tetracera asiatica</i>	climber	very common	xx
山黃麻	灌木	常見	ULMACEAE (榆科)	<i>Trema tomentosa</i>	shrub	common	xx
肖梵天花, 痴頭婆	灌木	外來植物, 常見		<i>Urena lobata</i>	shrub	exotic, common	xx
蟛蜞菊	草本植物	引進栽培, 常見		<i>Wedelia trilobata</i>	herb	introduced, common	xx
兩面針, 入地金牛	灌木	很 常見	RUTACEAE (芸香科)	<i>Zanthoxylum nitidum</i>	shrub	very common	xx

Appendix B.2 - Fauna Recorded within Study Area

(Code for Abundance: xxxx=abundant; xxx=frequent; xx=ocassional; x=scarce)

附件 B.2 - 在研究範圍內記錄得之動物

(豐富度註釋: xxxx=很常見; xxx=常見; xx=偶見; x=少見)

Scientific name (學名)	Common Name	Status in Hong Kong	中文名	香港境內狀況	豐富度Local Abundance
Avifauna			鳥類		
<i>Egretta garzetta</i>	Little Egret	Common and widespread	小白鷺	常見及廣泛分佈	xxxx
<i>Garrulax perspicillatus</i>	Masked Laughingthrush	Common and widespread	黑臉噪[眉鳥]	常見及廣泛分佈	xx
<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	Common and widespread	紅耳鶇	常見及廣泛分佈	x
<i>Pycnonotus sinensis</i>	Chinese Bulbul	Common and widespread	白頭鶇	常見及廣泛分佈	x
<i>Sturnus nigricollis</i>	Black-collared Starling	Common and widespread	黑領棕鳥	常見及廣泛分佈	xx

Refer to Fellowes et al. (2002) for further explanation of status.

有關境內狀況的詳細資料,可參閱Fellow et al. (2002)

Butterflies			蝴蝶		
Scientific Name (學名)	Common Name	Distribution in Hong Kong	中文名	香港境內狀況	豐富度Local Abundance
Papilionidae			鳳蝶		
<i>Graphium agamemnon</i>	Tailed Jay	Common and widespread	統帥青鳳蝶	常見及廣泛分佈	xx
<i>Papilio helenus</i>	Red Helen	Common and widespread	玉斑鳳蝶	常見及廣泛分佈	x
<i>Papilio memnon</i>	Great Mormon	Common and widespread	美鳳蝶	常見及廣泛分佈	x
<i>Papilio polytes</i>	Common Mormon	Common and widespread	玉帶鳳蝶	常見及廣泛分佈	xx
<i>Chilasa clytia</i>	Common Mine	Common and widespread	斑鳳蝶	常見及廣泛分佈	x (larva)
Pieridae			粉蝶		
<i>Eurema hecabe</i>	Common Grass Yellow	Reasonably Common	寬邊黃粉蝶	頗常見	xx
Riodinidae			蛭蝶		
<i>Abisara echerius</i>	Plum Judy	Common and widespread	蛇目褐蛭蝶	常見及廣泛分佈	xx
Nymphalidae			蛺蝶		
<i>Cupha erymanthis</i>	Rustic	Common and widespread	黃襟蛺蝶	常見及廣泛分佈	xx
<i>Neptis hylas</i>	Common Sailor	Common and widespread	中環蛺蝶	常見及廣泛分佈	xx
<i>Pantoporia hordonia</i>	Common Lascar	Common and widespread	金蟠蛺蝶	常見及廣泛分佈	xx
Danaidae			斑蝶		
<i>Parantica agela</i>	Glassy Tiger	Common and widespread	絹斑蝶	常見及廣泛分佈	xx
Satyridae			眼蝶		
<i>Mycalesis mineus</i>	Dark Brand Bush Brown	Common and widespread	小眉眼蝶	常見及廣泛分佈	xx
Dragonflies			蜻蜓		
Scientific Name (學名)	Common Name	Distribution in Hong Kong	中文名	香港境內狀況	豐富度Local Abundance
<i>Tramea virginia</i>	Saddlebag Glider	Common and widespread	華斜痣蜻	常見及廣泛分佈	x

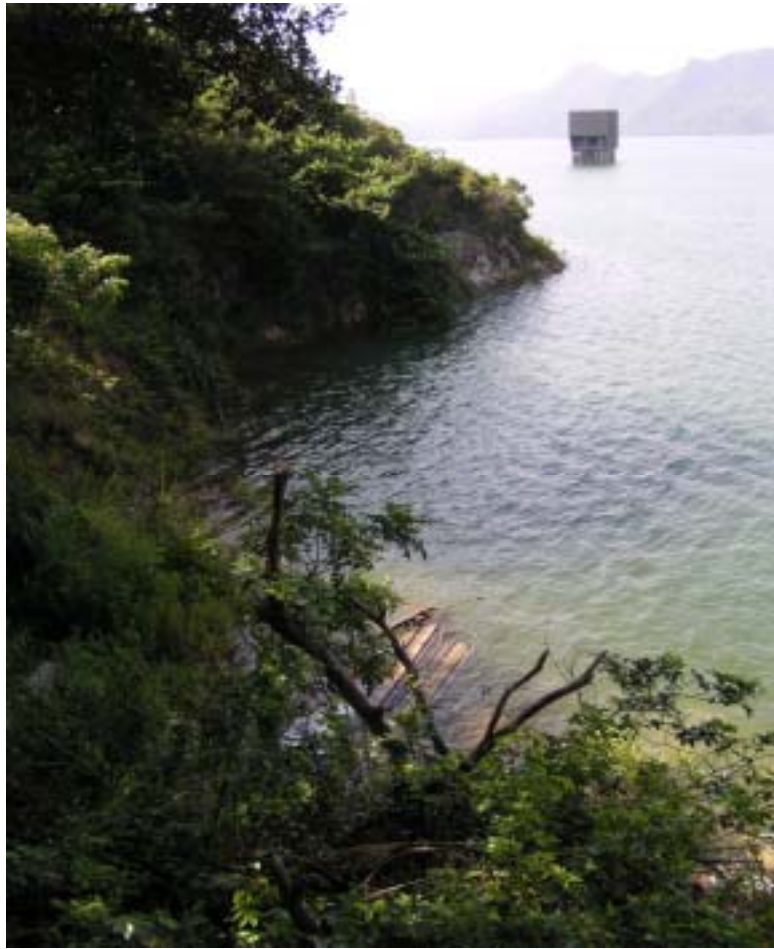


Grassland / shrubland mosaic next to proposed location of compressor house and transformer house



Proposed alignment along tall shrubland habitat

MAUNSELL AECOM Maunsell Environmental Management Consultants Ltd.	PWP NEW ITEM - DESTRATIFICATION OF PLOVER COVE RESERVOIR BY AERATION Photographic records of representative habitats	SCALE	N.T.S.	DATE	Jul-05
		CHECK		DRAWN	GCCL
		JOB NO.	A06505	DRAWING No.	Appendix B.3
				Rev	-



View from reservoir waterfront to intake tower



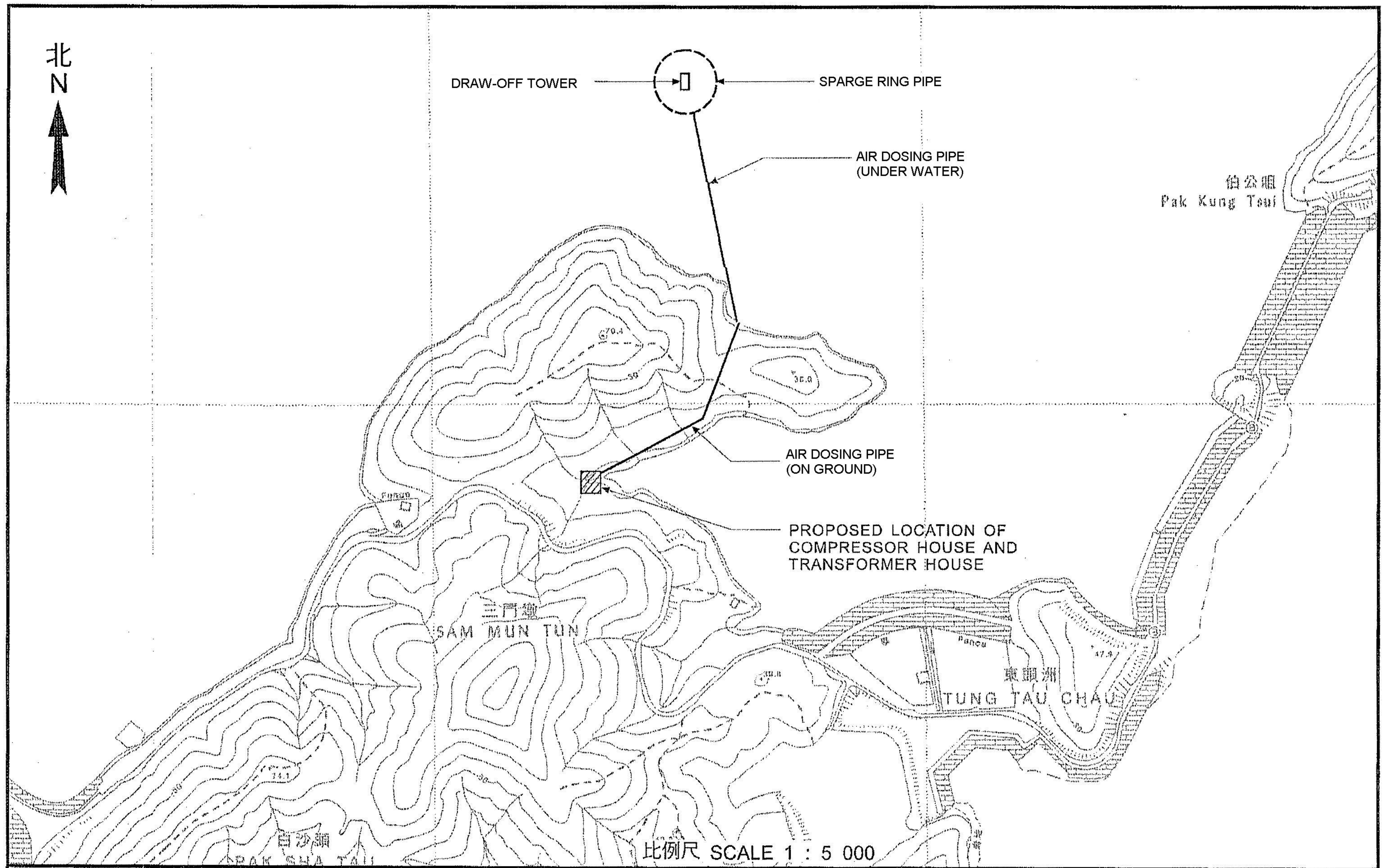
View of proposed location of compressor house and transformer house

MAUNSELL AECOM Maunsell Environmental Management Consultants Ltd.	PWP NEW ITEM - DESTRATIFICATION OF PLOVER COVE RESERVOIR BY AERATION Photographic records of representative habitats	SCALE	N.T.S.	DATE	Jul-05
		CHECK		DRAWN	GCCL
		JOB NO.	A06505	DRAWING No.	Appendix B.3
				Rev	-

Conditions for Working within Gathering Grounds

- (a) Adequate measures shall be taken to ensure that no pollution or siltation occurs to the gathering grounds.
- (b) No earth, building materials, fuel, oil or toxic materials and other materials which may cause contamination to the gathering grounds are allowed to be stockpiled or stored on site.
- (c) All surplus spoil shall be removed from gathering grounds as soon as possible.
- (d) Temporary drains with silt traps shall be constructed at the boundary of the site prior to the commencement of any earthworks.
- (e) Regular cleaning of the silt traps shall be carried out to ensure that they function properly at all time.
- (f) All excavated or filled surfaces which have the risk of erosion shall be protected from erosion at all time.
- (g) Facilities for washing the wheels of vehicles before leaving the site shall be provided.
- (h) Any construction plant which causes pollution to the gathering grounds due to leakage of oil or fuel shall be removed off site immediately.
- (i) Any soil contamination with fuel leaked from plant shall be removed off site and the voids arising from removal of contaminated soil shall be replaced by suitable material to the approval of the Director of Water Supplies.
- (j) Provision of temporary toilet facilities is to be subject to the approval of the Director of Water Supplies.
- (k) All waterworks access roads must be maintained unobstructed at all time.
- (l) Site formation plans shall be submitted to W.S.D. for approval prior to commencement of work.
- (m) No structure or temporary works shall be erected in the catchwaters without prior approval of W.S.D.
- (n) The Contractor shall be responsible for cleaning frequently any waterworks roads and associated drainage works of mud and debris.
- (o) The Contractor shall limit the gross weight of the vehicles imposed on the waterworks access to 5 tonnes and the axle load to 3 tonnes. He shall apply to W.S.D. with details of his vehicles for using the access.

- (p) The approval for using the access may be withdrawn on written notice to the Contractor by W.S.D. at their absolute discretion.
- (q) The Contractor shall recover immediately his vehicle which fell into the catchwater or stream bed or pay to Government on demand the cost of recovery that may be necessary through the occurrence of any incident caused by the Contractor.
- (r) The Contractor shall carry out repair or reinstatement works to the satisfaction of W.S.D. or pay to Government on demand the cost of repair and reinstatement to any waterworks installations that shall or may be necessary at any time as a result of damage caused by the Contractor or others under his charge.
- (s) The Contractor shall enter and remain on and use the access at his own risk and he shall indemnify the Government of Hong Kong from all claims, costs, damages and expense arising from the use of the access.
- (t) No excavation with depth more than 2m shall be permitted within 120m from the centerline of WSD water tunnels without the prior approval of WSD.



核准 APPROVED

[Signature]
總工程師/新界東 CE / NTE

17 / 8 / 2004

(丁級工程)
(CAT 'D' Submission)

新工務計劃項目 — 在船灣淡水湖充氧以消除層化作用
P.W.P. NEW ITEM — DESTRATIFICATION OF PLOVER COVE RESERVOIR BY AERATION



水務署
WATER SUPPLIES DEPT.

草圖編號
SKETCH NO. SK 62004 / 035