Hong Kong Government
Civil Engineering Department
香港政府土木工程署

Reclamation Works for District Open Space and GIC Facilities in North Tsing Yi
青衣北部填海工程環境影響評估

Executive Summary
行政摘要

Mouchel Asia Ltd
sub-consultants
HWR • Enpac • WSA
萬碩亞洲顧問工程公司
水力水研(亞洲)有限公司
怡栢環境工程有限公司
施偉拔公司

August 1995
一九九五年八月

Document No. 90451/SVJ				
	Name	Position	Signature	Date
Prepared by	C. H. Wan	Associate		12/2/96
Checked by	D. Johnson	Project Manager		12/2/96
Approved by	S. V. Jones	Project Director		13/2/96
Revision No.	09/02/96			
Copy No.	92 of 160			
♻ This report is printed on recycled paper				

Mouchel Asia Ltd

INTRODUCTION

In July 1994 the Civil Engineering Department (CED) appointed Mouchel Asia to carry out an Environmental Impact Assessment (EIA) of the formation of a reclamation at a site on North Tsing Yi presently occupied by shipyards. The reclamation is to be formed using construction waste as the fill material.

The EIA addresses:

- traffic,
- noise;
- air quality;
- marine water quality; and
- land contamination.

The EIA Final Report provides an assessment of existing environmental conditions, the impacts during the execution of the Project and measures required to mitigate environmental impacts. A monitoring and audit programme has been prepared to monitor the effectiveness of the measures.

THE PROPOSED DEVELOPMENT

PROJECT DESCRIPTION

The Project comprises the reclamation of 7.62 hectares of seabed and foreshore located in the northern most portion of Tsing Yi Island adjacent to Tam Kon Shan Road. The location of the Project is shown on Figure S1 and the Project site is shown on Figure S2.

Twenty-one shipyards presently occupy the Project site, fifteen of which are on Government land and six on private lots.

The Project is proposed to commence in mid 1996 and will be completed within 21 to 30 months depending upon the rate of receipt of the fill.

The Project comprises three main stages:

- site clearance;
- construction of a seawall; and
- reclamation construction by operating as a public dump receiving construction waste.

The after use of the Project site is planned for "O", Open Space, with a small portion of the site designed as "GIC", Government Institution and Community Facilities. The future land use of the reclamation is not addressed in this EIA.

SITE CLEARANCE

Buildings and piers remaining after relocation of the shipyards will require demolition, removal and disposal. There may also be residual waste on site such as scrap materials and containers. The type and quantity of material that will require removal and disposal have been estimated from field surveys. Site clearance will commence at the start of the Project and will last for about three months.

SEAWALL CONSTRUCTION

The Project requires the construction of a 530m long seawall approximately 155m offshore. It has been assumed that dredging for the seawall foundations will be from east to west and that the seawall will then be constructed from both ends inwards with a gap being left in the middle until completion of the reclamation. This will allow ingress and egress of water and will minimise ponding. About 380m of the seawall will be sloping rubble mound and 150m will be a vertical seawall with landing steps to provide marine access to and from the site.

The soft marine sediments directly below the seawall will require removal to prepare the foundation for the seawall. Approximately 105,000m^3 of sediment will require removal and disposal as follows:

- the dredging will be conducted by one grab dredger using a 3m^3 grab;
- the working hours of the dredger will be 12 hours a day (0700 - 1900); and
- the dredging rate will be approximately 1,020 m^3 per day.

The seawall will take about eight months to construct. A sand layer will be placed in the dredged trench and the wall will be formed with a rock fill core and armour. Precast blocks will be used to form the vertical section.

CONSTRUCTION OF THE RECLAMATION

The reclamation will take between 6 and 15 months to complete depending upon the rate of delivery of fill material. The hours of operation will be 0800 to 1800 Monday to Saturday and the facility will be closed on Sundays and Public Holidays. Fill material will be delivered to the site by truck and will normally be end tipped into the reclamation. There may also be temporary stockpiling of materials. There will be no rock crushing but there will be some light equipment used for sorting of unsuitable materials that may be delivered to the reclamation.

The total fill material required is 0.5 million m^3 to achieve the finished level of +5 mPD. The source of fill material will be construction sites within and around the Tsing Yi area.

Because of the unpredictability of the rate of delivery of fill material at public dumps, three filling scenarios were assessed as follows:

- 15 month period - approximately 1,355m^3 of material received daily;
- 12 month period - approximately 1,694m^3 of material received daily; and
- 6 month period - approximately 3,375m^3 of material received daily.

The material that will be accepted at the site will be public dumping material as defined under the Public Dumping Licence Agreement in Appendix I of the Works Branch Technical Circular No. 2/93. Acceptable material under the licence will include earth, inert building debris, broken rock and concrete. Small quantities of timber may also be included. Other types of waste such as marine mud, household refuse, plastic, metal, industrial and chemical waste, animal and vegetable matter and any other material considered unsuitable for public dumps will be rejected.

EXISTING ENVIRONMENT

TRAFFIC

There are two access routes to Tsing Yi : the northern route and the southern route. The northern route brings traffic over the Tsing Tsuen Bridge directly to the Tam Kon Shan Roundabout and into Tam Kon Shan Road. The southern route brings traffic via the Tsing Yi Bridge. Access from the southern approach is less direct and once over the bridge there are three options all of which converge at the Tam Kon Shan roundabout. The key road junction is therefore the Tam Kon Shan Roundabout.

Traffic surveys at the Tam Kon Shan Roundabout during peak morning and evening periods showed approximately 3,000 vehicles/hour negotiating the junction. An assessment of the traffic conditions revealed that the roundabout operates well during peak traffic hours with no apparent queues or delays.

Queues occur on the approaches to the eastern end of Tsing Tsuen Bridge. The queuing lasts from a few minutes up to a maximum of 15 minutes, indicating that this junction is operating close to capacity during peak hours. Queues also occurred at the eastern approach to the Tsing Yi Bridge indicating that this road is also operating close to capacity in both peak hours.

NOISE

The existing noise levels in the vicinity of the Project site are dominated by intermittent hammering noise from the shipyards and noise from schools. Tam Kon Shan Road is not a major traffic route but the existing traffic flow is fairly heavy, particularly for the road section close to the Tam Kon Shan Roundabout. Road noise therefore contributes to the overall noise environment.

Baseline noise levels were monitored in October and November 1994. Maximum noise levels of 68 dB(A) were measured at Shing Tai House and Queen's College Old Boys' Association Secondary School. The school is already air-conditioned and is insulated against noise impact.

AIR QUALITY

The proposed reclamation is about 1.3 km from the Tsuen Wan industrial areas and 600m west of the Nga Ying Chau Oil Depot on Tsing Yi Island.

Air quality is routinely monitored by EPD at the Tsuen Wan Air Quality Monitoring Station, the closest station to North Tsing Yi. The 1993 annual average total dust and fine dust concentrations

monitored at this station were 101 $\mu g/m^3$ and 57 $\mu g/m^3$ respectively. Both of these values exceed the annual Air Quality Objective (AQO) value of 80 $\mu g/m^3$ and 55 $\mu g/m^3$ respectively.

Dust levels at four locations around the Project site were measured daily over a two week period in October and November 1994. On all occasions monitoring data was below the AQO.

MARINE WATER AND SEDIMENTS

The quality of marine water in and around the Project area is affected by:

- water from the Pearl River containing, in particular, high suspended solids;
- foul sewers and storm drains discharging into the Rambler Channel; and
- restricted flushing of the Rambler Channel due to low tidal currents.

Short term variations in water quality adjacent to the Project site are influenced by the local tidal conditions.

Long term water quality monitoring by EPD reveals that the Water Quality Objectives are breached for some parameters, in particular *E. coli*, dissolved oxygen and inorganic nitrogen.

The EPD Sediment Classification Scheme defines the sediments along the line of the seawall as Class C, seriously contaminated, with respect to their heavy metal content. High Polycyclic Aromatic Hydrocarbons (PAH) concentrations are indicative of probable pollution from petroleum hydrocarbons from the shipyards.

LAND CONTAMINATION

The Project site was originally formed in 1964 and has been used continually for shipyard activities since 1967.

The main activities carried out at the shipyards are the construction, maintenance and renovation of steel hulled ships and barges. There has been some manufacture of fibre glass boats but this has now stopped. The chemicals and materials used in the shipyards consist primarily of paint, solvents, acetylene gas and oxygen, welding tubes and zinc sacrificial anodes. Diesel oil and lubricating oil and grease are also used for the machinery, cables and rails of the slipways. These materials most likely will have caused land contamination of the site.

Spills from these materials have accumulated on the bare soil and concrete surfaces in the shipyards. The surface deposits appear to be composed of materials such as marine growth residue, stripped paint, rust, and liquid wastes.

POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MITIGATION

TRAFFIC IMPACTS

Daily vehicle trips from site clearance will be less than those generated at present by the shipyards and the seawall will be constructed using marine-based equipment. These works will thus not generate any additional road traffic.

There will, however, be additional traffic from delivery of reclamation material. Observations at similar reclamation sites indicate that the peak hours for vehicles delivering construction waste to the reclamation will differ from those for other traffic and the existing peak hour flows on the adjacent roads will not increase.

The impacts of the Project on traffic flows will be:

- a reduction of 134 vehicle trips in the morning peak hour (0730 to 0830);
- a reduction of 165 vehicle trips in the evening peak hour (1715 to 1815);
- changes in mid-morning (1000 to 1200) traffic ranging from an increase of 13 trips if the site is filled in six months to a reduction of 93 trips if the site is filled in 15 months; and
- a reductions in mid-afternoon traffic (1530 to 1800) of up to 123 trips depending on the rate of filling.

All of these changes are compared with traffic flows including those generated by the shipyards.

The impact on peak traffic flow will not be significant. However, at certain times the rate of arrival of vehicles at the site may exceed the material handling capacity resulting in the formation

of queues close to the site on Tam Kon Shan Road.

Mitigation Measures

The Project will not cause an increase in peak traffic flows and thus no mitigation measures are considered necessary.

To minimise queuing of traffic on Tam Kon Shan Road, it is recommended that the Contractor locates the site entrance in such a way as to provide queuing space within the site boundary.

NOISE IMPACTS

There will be no working after 1900 or on public holidays when noise levels are restricted under the Noise Control Ordinance (NCO). The criteria for noise levels at the sential receivers during normal working hours for noise from the construction activities are thus the EPD guideline of 75dB(A) L_{eq} (30 min) for dwellings, 70 and 65 dB(A) L_{eq} (30 min) for schools and during examinations and 70dB(A) for road traffic noise.

Mechanical equipment used during site clearance could give rise to noise levels above the EPD guidelines at locations immediately adjacent to the site unless mitigation is applied. Noise levels could exceed the NCO values when filling is being carried out in the eastern half of the reclamation site. Construction of the seawall is not expected to give rise to any significant rise in noise levels.

Mitigation Measures

The study has considered mitigation measures to reduce noise levels. The most effective mitigation measure for construction noise is control at the source. In the case of powered mechanical equipment, this involves either selecting silenced equipment, or reducing the transmission of noise using mufflers, silencers, or acoustic enclosures.

Specific measures that are recommended to be implemented by the Contractor for compliance with the NCO and appropriate Technical Memorandum include:

- use a bulldozer and dump truck with a sound power level at or lower than 109dB(A) and 111dB(A) respectively unless the Contractor can prove that noise levels from other plant will meet the noise control criteria;
- prepare a list of equipment and provide a schedule of activities prior to site clearance or reclamation activities that demonstrate that no noise impact will occur at any NSR;
- apply other measures such as locating, selecting, operating and maintaining equipment in such a manner as to reduce noise and selecting noise barriers or earth embankments to screen NSRs as required; and
- establish community relations between the Contractor, the Engineer's Representative, surrounding residents and school administrators.

Compliance with the construction noise criteria can be achieved by employing these mitigation measures.

Residual noise impacts after implementation of mitigation measures will be within established standards and guidelines.

AIR QUALITY IMPACTS

The structures in the shipyards are steel or wooden with the exception of a few concrete structures. It is unlikely that substantial amounts of dust will be produced by site clearance.

Dredging and placing of the fill for construction of the seawalls are not dust generating activities and thus no adverse air quality impacts are expected.

Construction dust will be generated by the transport and handling of fill reclamation material.

Mitigation Measures

The following mitigation measures are recommended to suppress dust emissions:

- twice-daily watering of exposed surfaces;
- haul roads on the site to be watered four times daily;
- progressive cover of areas reaching the final level by hydroseeding;

- stockpiles restricted to an area of 500m^2 , a mean height of 3m and surrounded on three sides by windbreaks;
- a washing facility at the exit from the site to remove dust and grit from the tyres, undercarriage and body of the vehicle; and
- twice weekly cleaning of the access road by flushing or vacuuming.

These mitigation measures will result in the 1-hour and 24-hour dust standards being met even at the most exposed sensitive receivers. The annual air quality estimate is influenced by the background value, which, at Tsuen Wan, already exceeds the Air Quality Objectives under the Air Pollution Control Ordinance. The predicted increase in the annual figure from this Project is small and consequently the impact of the Project is also small.

Residual dust impacts from the Project after mitigation will be within established standards and guidelines.

MARINE WATER QUALITY IMPACTS

It is not expected that the reclamation will have any effect on the hydrodynamics of the Rambler Channel or alter flow from the storm water discharge at the eastern boundary of the site.

Marine sediments in the Project area are contaminated and special care will be required to avoid any contamination of marine waters during dredging and other marine works. Removal of existing piers, jetties and slipway rails will disturb the near shore sediments. The area of impact will, however, be limited to the immediate adjacent shoreline.

Dredging for the seawall foundations could cause impacts on water quality if not carefully controlled; however, the materials to be used for the formation of the seawall are not expected to release any significant quantities of suspended solids into the water.

Filling will be predominantly carried out by end face tipping from trucks. Water current velocities in the region of the face will be low and increased suspended solids will be confined to the area immediately adjacent to the face. Timber and other buoyant matter in the dumped material could cause to floating debris which could cause visual annoyance and damage marine craft.

Effluent from the vehicle washing facility could cause siltation in the catchpits, produce a visible sediment plume and possibly a surface oil film if allowed to run into the surface water drains. Toilet and washing facilities in the site offices could cause pollution if allowed to discharge into the marine waters. Maintenance and refuelling facilities could create a risk of oil and fuel spillage.

Mitigation Measures

The following mitigation measures are proposed to control the potential for marine water quality impacts:

- removal of marine structures, in particular slipway runners, should be carried out during low water;
- dredging should be carried out using a sealed grab within a silt curtain;
- contaminated sediments should be disposed of in the pits at East Sha Chau and contained by capping with clean sand;
- a containment curtain with a surface boom should be used for containing floating material and the area contained by the boom should be cleared at least daily by scavenging sampans;
- a vehicle washing facility should be built at the site exit. This should include a recirculation system to reduce the amount of discharge. Arrangements should be made for treatment or disposal of contaminated wash water;
- any fuel tanks on the site should be housed within bunded containment areas. Vehicle maintenance should be carried out on paved areas and waste oils disposed of off site; and
- permanent site offices and facilities should be connected to the sewer in Tam Kon Shan Road or chemical toilet facilities should be provided

and serviced daily.

Sediment lost into suspension during dredging will be mostly contained by the silt curtain and there will be no significant effects away from the dredging area.

Implementation of these mitigation measures will reduce impacts to within established standards and guidelines and there will be no adverse residual impact.

CONTAMINATED LAND IMPACTS

This study has included a preliminary survey of the potential for land contamination. A detailed survey has not been possible due to lack of access. Contractors undertaking site clearance could be exposed to hazardous materials if present in the soil and dust. There could also be effects on the contractors working during the reclamation construction. The level of impact will decrease as the works proceed and the surface deposits are covered. In addition, surface runoff and groundwater flow from the contaminated land could cause pollution of the waters of the Rambler Channel.

The impacts of the contamination on future land uses are dependent on the level of contamination. High levels of heavy metals in the soil would render the ground unsuitable for leaving uncovered; high levels of phenol would require careful choice of building materials to minimise deterioration. Where the material is covered the limitations on future use of the site will depend on the nature and level of contaminants and the depth of fill.

Mitigation Measures

Measures to minimise the exposure of sensitive receivers will depend on the nature and level of contaminants at the site which can only be effectively determined when access to the site is granted.

Where the soil is "un-polluted" or if contamination is at a low level, the best environmental option will be to leave the surface material in place.

If the contamination is too great to allow burial in the reclamation, or the contamination is classified as chemical waste, it should be removed from the site and disposed of in a suitable landfill or treated at the chemical waste facility.

If contamination is below the limit requiring removal from the site, but at a level which may cause adverse effects if left exposed, it should be buried in the reclamation at a suitable depth.

BENEFICIAL IMPACTS

The primary beneficial impact is the diversion of inert construction waste from landfill sites and reusing waste materials. This will extend the life of these landfills and the need for new or expanded landfills will be deferred.

Secondary benefits include:

- the removal of a land use incompatible with the residential and educational uses of northeast Tsing Yi and the creation of land for much-needed GIC facilities and district open space;
- reduction in marine contamination by materials washed from the intertidal zone within the shipyards;
- a smoother coastline profile which will improve marine flushing of the area;
- a rocky sea wall which will result in a greater degree of biological diversity and hence productivity in the subtidal, intertidal and splash zones.

ENVIRONMENTAL MONITORING AND AUDIT (EM&A)

The EIA has identified and quantified the potential environmental effects of the Project and proposed mitigation measures. To ensure the effective implementation of the measures and monitor un-anticipated effects, an EM&A programme is required which will undertake the following specific activities:

- monitoring of the environmental performance of the Project and the effectiveness of mitigation

measures;

- verifying the environmental impacts predicted in the EIA;
- determining compliance with regulatory requirements and government policies; and
- initiating remedial action if un-anticipated impacts arise.

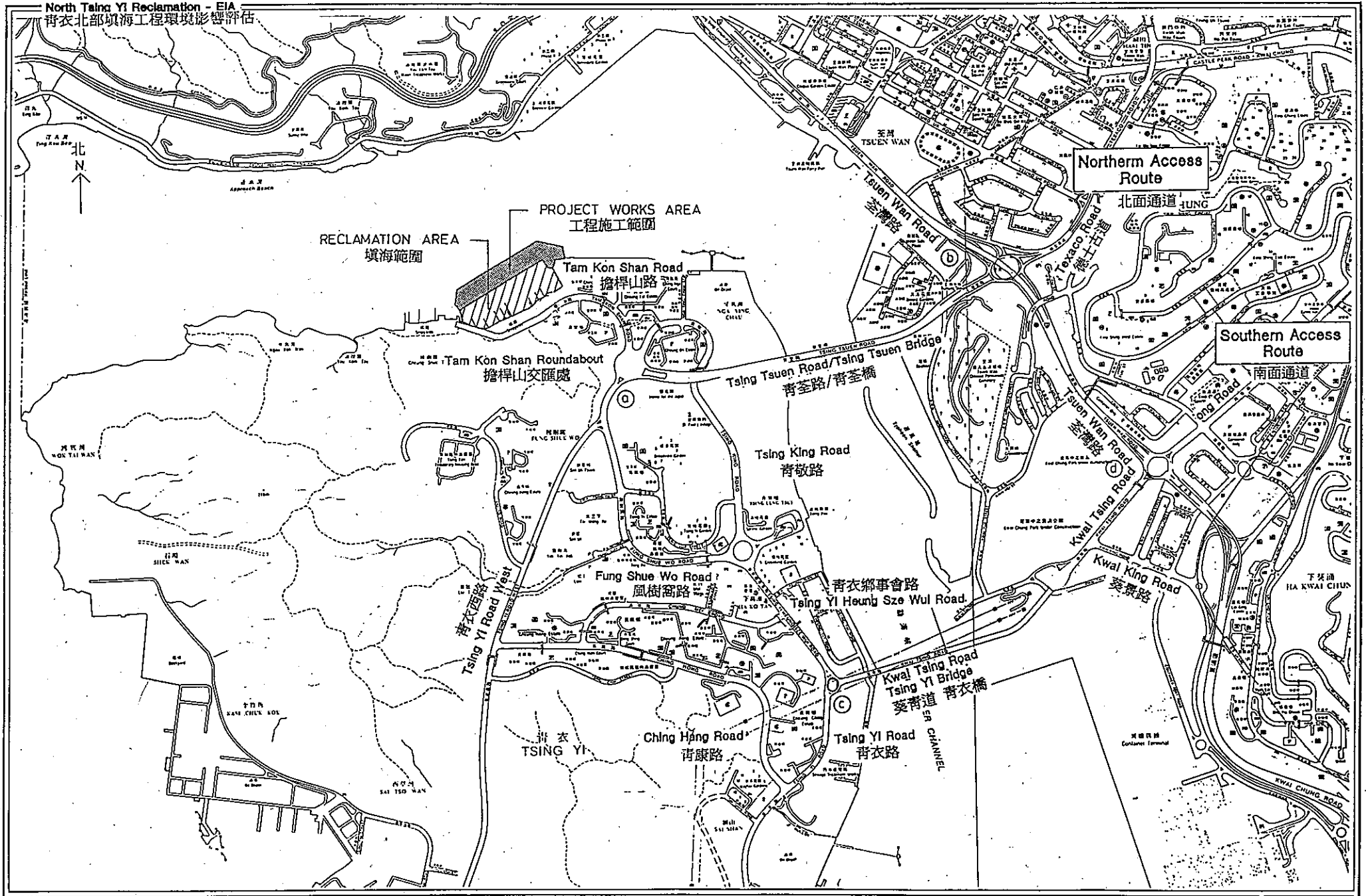
Monitoring should be undertaken before, during and after the Project and should consist of:

- baseline monitoring of noise, air and marine water quality, to determine the conditions immediately prior to the commencement of the Project;
- impact and compliance monitoring to determine the effect of the activities and the effectiveness of the mitigation measures and compliance with regulatory requirements and standards.

The results of environmental monitoring programme should be subject to independent audit and reported to EPD.

CONCLUSIONS

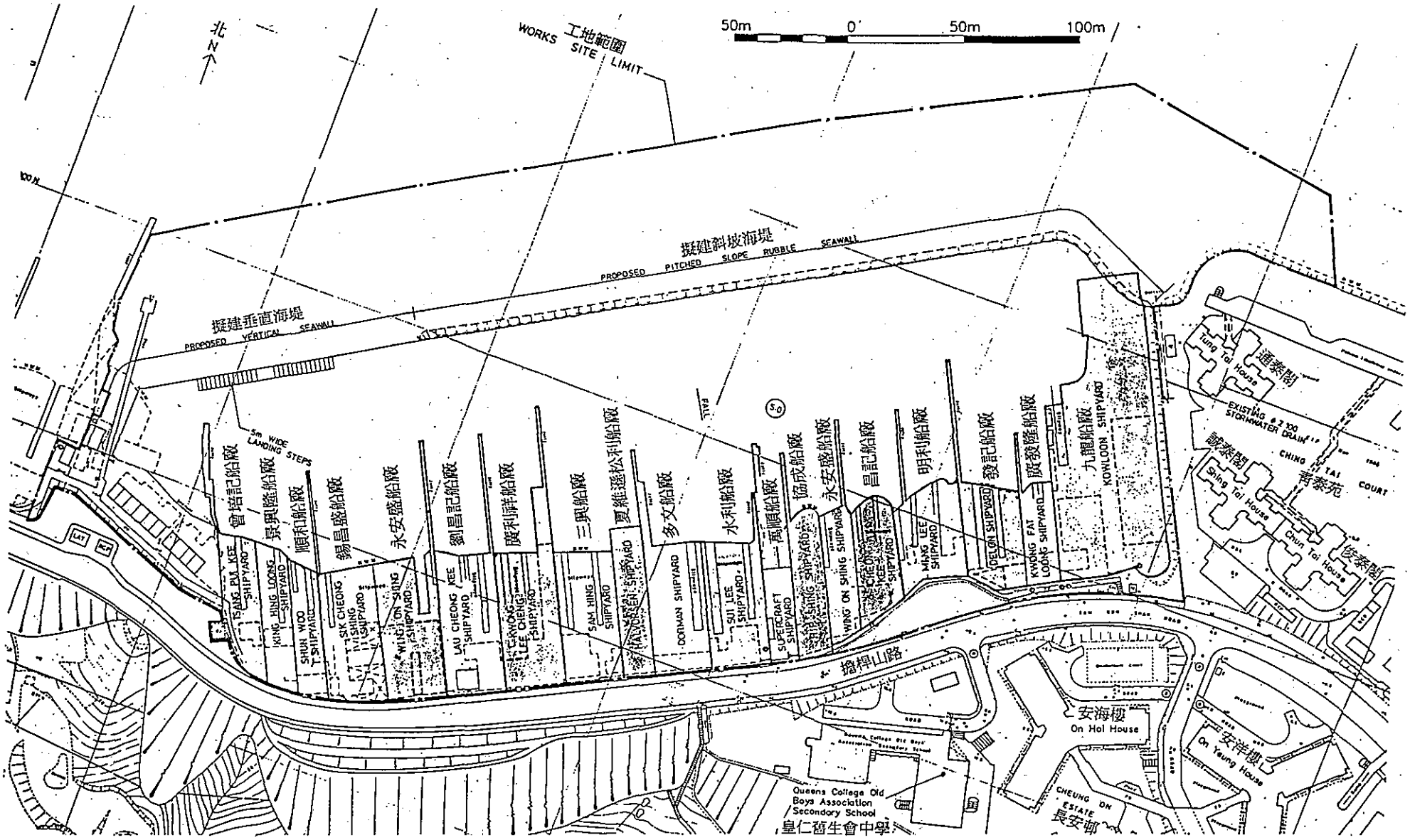
The implementation of the mitigation measures recommended in the EIA Report supported by the EM&A programme will ensure that the Project is carried out in such a way that the potential environmental impacts are controlled to within the environmental guidelines and standards.



The Study Area 研究範圍

Mouchel 茂頓

Figure No 圖 S1



The Project Site 場址

Mouchel 茂碩

Figure No 圖 S2

導言

一九九四年七月，土木工程署委託萬碩組合顧問工程師爲青衣北部一個擬進行填海工程的場址進行環境影響評估。該場址目前建有船廠。填海工程將採用建築廢物作爲填料。

該環境影響評估包括以下事項：

- 交通；
- 噪音；
- 空氣質素；
- 海洋水質；以及
- 土地污染。

環境影響評估最終報告評述青衣北部目前的環境情況、填海工程進行期間對環境可能造成的影響，以及必須實施的環境影響緩解措施。該報告亦制訂了監察及評審計劃，用於監察緩解措施的成效。

建議的發展

工程說明

這項填海工程涉及填築7.62公頃的海床及前灘，施工地點是青衣島北端靠近担捍山路的海岸。工程位置見圖S1，工程場址見圖S2。

工程場址目前建有21間船廠，其中15間建於官地上，6間位於私家地段。

填海工程擬於一九九六年中展開，預計可於二十一至三十個月內完竣，實際所需時間視接收填料的速度而定。

工程主要分以下三個階段進行：

- 清理場址；
- 建造海堤；以及
- 填築土地，方法是將場址闢作公眾卸泥區，接收建築廢物。

填築所得土地計劃用作休憩用地，並撥出小部分土地興建政府、團體或社區設施。填海區日後的土地用途不在本報告討論範圍內。

清理場址

船廠搬遷後留下的建築物及碼頭將需要拆卸、清理及棄置。場址上亦可能有殘餘廢物，例如廢料、容器等。顧問公司進行實地調查，評估了需要清理及棄置的物料類型及數量。場址清理工作將於工程開始時展開，預計需時約三個月。

建造海堤

這項工程需要在離岸約155米處建造一條長530米的海堤。顧問公司假設海堤地基的挖泥工程會由東面延展至西面，而海堤會由東西兩端向中央建造，中間留有空隙，直至填海工程完竣。此舉將使海水可以流進流出，減少截流的情況。海堤其中大約380米會築成碎石斜坡，另150米則是直牆式海堤連梯級，以便水路往返場址。

在海堤之下鬆軟的海洋沉澱物將需要挖走，以備建造海堤地基。估計約有105,000立方米的沉澱物需要用下述方法清理和棄置：

- 用一部抓斗式挖泥機進行挖泥工程，抓斗的容量爲3立方米；
- 挖泥機每日施工十二小時，由上午七時至下午七時；以及
- 挖泥速度每天約1,020立方米。

建造海堤需時約八個月。挖出的海溝將鋪上一層泥砂，海堤的堤心和面層均用石塊築成，直牆部分則用預製石塊築成。

填築土地

填海工程需時六至十五個月，實際所需時間視填料運送速度而定。施工時間由星期一至星期六，上午八時至下午六時，星期日及公眾假期則停工。填料會由貨車運送至工地，一般是在車尾直接將填料傾卸於填海區。有些填料亦會暫時堆放一旁。工程毋須進行碎石，但可能需要利用一些輕型設備，把不適合用來填海的材料篩掉。

填海工程總共需要500,000立方米的填料，方能達到海拔5.5米的竣工水平。填料主要來自青衣島上及附近一帶的建築工地。

由於難以預計填料運往公眾卸泥區的速度，研究是根據以下三個填海速度的情況作出評估：

- 爲期十五個月，每日約接收1,355立方米填料；
- 爲期十二個月，每日約接收1,694立方米填料；以及
- 爲期六個月，每日約接收3,375立方米填料。

場址可接受的填料，是工務科技術通告第2/93號附件1公眾傾卸廢物發牌協議所界定的物料。根據該發牌協議，可接受物料包括泥土、建築瓦礫、碎石、三合土等。極少量的木材是可以接受。至於海泥、住宅垃圾、塑料、金屬、工業及化學廢物、動植物廢物及視爲不適合棄置於公眾卸泥區的物料，該場址均會拒絕接收。

目前環境情況

交通

通往青衣島有南北兩條通路。由北面通路進入的車輛，通過青荃橋後可直達担桿山迴旋處，進入担桿山路；南面通路則經青衣橋。南面通路沒有這麼直接，出青衣橋後可由三條路線匯流至担桿山迴旋處，因此主要道路交匯處是担桿山迴旋處。

根據於早晚繁忙時間內在担桿山迴旋處進行的交通調查，每小時約有3,000輛汽車通過交匯處。交通情況評估顯示，在交通最繁忙的時間，迴旋處車輛流動依然暢順，沒有明顯車龍或擠塞的情況出現。

當車輛駛至青荃橋的東端則出現車龍，車輛需要等數分鐘至最多十五分鐘時間輪候通過交匯處，顯示該交匯處在繁忙時間的交通流量已接近飽和。此外，在早晚繁忙時間，青衣橋東面入口亦出現車龍，顯示該道路的交通流量亦接近飽和。

噪音

目前，工程現場附近一帶的噪音主要由船廠發出的間歇性錘擊聲及來自學校的嘈雜聲音造成。担桿山路並非交通要道，但目前的交通流量已相當繁密，尤其是近担桿山迴旋處一段路面，因此交通噪音也是構成整體環境噪音的主要來源。

顧問公司於一九九四年十月及十一月期間監測基線噪音水平。在誠泰閣與皇仁舊生會中學測得的最高噪音水平爲68分貝（A）。皇仁舊生會中學已安裝空調系統及隔音設備，以減低受噪音的滋擾。

空氣質素

擬議的填海場址距離荃灣工廠區約1.3公里，位於青衣島牙鷹洲油庫以西600米。

環境保護署在荃灣的空氣質素監測站定期監測空氣質素。該監測站距離青衣北部最近。一九九三年，該監測站錄得的全年平均總塵埃濃度是101微克／立方米，微塵濃度是57微克／立方米。這兩項數值分別地超過全年空氣質素指標所訂的80微克／立方米及55微克／立方米標準。

一九九四年十月及十一月期間，顧問公司在填海工程場址附近四個地點測量每日的塵埃水平，爲期兩週，結果在所有情況下錄得的數據均低於空氣質素指標所訂的數值。

海水及沉澱物

填海區附近一帶的海水質素主要受以下方面影響：

- 含有極高懸浮固體的珠江河水；
- 由污水渠及雨水渠排出藍巴勒海峽的污水；以及
- 藍巴勒海峽緩慢的潮水未能提供足夠的沖洗能力。

填海工程場址附近的水質短期變化，主要受該區潮汐情況的影響。

環境保護署在填海區附近長期監測水質的結果顯示，部分參數超出水質指標，特別是大腸桿菌、溶解氧及無機氮。

根據環境保護署的沉澱物分類計劃，海堤沿線的沉澱物金屬含量偏高，因此列爲C級，亦即受到嚴重污染。沉澱物的多環芳香烴（PAH）含量亦相當高，很可能是受到鄰近船廠排放的石油烴污染。

土地污染

工程場址於一九六四年闢拓而成，自一九六七年以來一直作船廠用途。

船廠主要經營鋼體船及駁船的建造、維修、翻新等業務。以前，船廠亦有製造玻璃纖維船，但現在已停止生產。船廠所用的化學品及物料主要是油漆、溶劑、乙炔氣體、氧氣、焊管、鋅犧牲陽極等。船台上的機械裝置、電纜及路軌亦有使用柴油、潤滑油及油脂。這些物料最有可能導致場址土地受到污染。

從這些物料流出的物質積聚於船廠的表土及三合土表面。地面的沉積物明顯含有水生殘餘物、脫落的油漆、鐵銹、液體廢物等物質。

潛在的環境影響及緩解措施

交通影響

清理場址期間，每日來往現場的車輛架次將會比現時船廠引致的車輛流量爲少，而且海堤採用海上設備建造，因此工程進行期間不會增加路面的交通流量。

不過，運送填海材料將會增加交通流量。就類似填海場址的交通流量情況，發現運送建築廢物至填海區的繁忙時段，與其他車輛使用鄰近道路的繁忙時段不同，因此運送填料的車輛不會增加鄰近道路在繁忙時間的交通流量。

填海工程對交通流量將有以下影響：

- 在早上繁忙時間（上午七時半至八時半）汽車流量會減少134架次；
- 在晚上繁忙時間（下午五時十五分至六時十五分）汽車流量次數會減少165架次；
- 如填海工程在六個月內完成，在上午十時至十二時期間交通流量會增加13架次，如在十五個月內完成，交通流量則減少93架次；以及
- 在下午三時半至六時期間，汽車流量可減少達123架次，視運送填料速度而定。

上述汽車流量的變化是與船廠引致的交通流量等數據作比較。

填海工程對繁忙時間的交通流量並不會帶來太大影響。不過，在部分時段，到達場址的車輛數量可能會超過填料的起卸量，這會引致担桿山路近工地的道路出現車龍。

緩解措施

填海工程將不會增加繁忙時間的交通流量，所以毋須實施任何緩解措施。

爲盡量減少担桿山路可能出現的車龍，建議承辦商將工地入口設置於適當的位置，使貨車可以在工地範圍內輪候傾卸填海材料。

噪音影響

噪音管制條例訂有噪音水平的管制，因此填海工程會在下午七時後或公眾假期停止施工。爲免易受噪音影響的地方受到過份滋擾，環境保護署就正常施工時間內，建築工程發出的噪音訂有噪音水平準則，規定在住宅區，以等效連續聲（Leq）作三十分鐘的量度，噪音水平不得超過75分貝（A），學校區在平日及考試期間分別地不可超過70分貝（A）及65分貝（A）。

在清理場址期間所用的機械設備可能會使工地附近一帶的噪音聲級超出環境保護署所訂的指引，因此有必要實施緩解措施。此外，在填海場址東面地區進行填土時，噪音聲級亦可能超出噪音管制條例所訂的標準。預計建築海堤將不會引致噪音聲級大幅提高。

緩解措施

本研究考慮了減低噪音水平的措施。緩解建築噪音最有效的措施，無疑是從管制噪音來源入手。在使用機動設備方面，應選用低噪音的設備，或者利用減聲器、消聲器或隔音罩減低機器發出的噪音。

爲符合噪音管制條例及有關技術備忘錄所訂的準則，顧問公司建議承辦商採取以下具體措施：

- 使用聲功率級不超過109分貝（A）的堆土機及不超過111分貝（A）的卸土車，除非承辦商能夠證明使用其他機器發出的噪音聲級符合噪音管制標準；
- 在清理場址或進行填海工程之前，必須製備所用設備的清單及施工時間表，證明對噪音敏感接收者不會造成滋擾；
- 引用其他可行措施，例如將施工設備放置在適當地點；小心挑選、操作及維修此等設備，以減低噪音，需要時可用隔聲屏障或路堤隔開噪音敏感接收者；以及
- 承辦商、工程師代表應與鄰近的居民及學校行政人員建立良好的關係。

如採用上述緩解措施，預計工程所產生的噪音將可符合建築噪音的標準。

實施緩解措施後，工程引致的剩餘噪音將不會超出既定的噪音標準及指引。

空氣質素影響

除了部分三合土搭建物外，船廠的建築物主要用鋼材或木材建造，因此進行清拆時不會產生大量塵埃。

爲建築海堤而進行的挖泥、傾卸填料等作業，亦不會產生塵埃，因此預計海堤的建造不會對空氣質素有不良影響。

不過，運送及起卸填海材料時將會產生建築塵埃。

緩解措施

建議承辦商採用以下措施，抑制塵埃散發：

- 每日在未鋪築的地面灑水兩次；
- 每日在出入工地的通路上灑水四次；
- 採用噴草方法逐步覆蓋達到竣工線的地方；
- 堆料場面積不得超過500平方米，平均高度爲3米，並用風障圍着三面；
- 工地出口處應設有沖洗設施，用於清洗輪胎的塵埃砂礫、貨車的起落架、車身等；以及
- 每星期沖洗通路或用吸塵機械清潔通路兩次。

實行這些緩解措施後，即使在最易受塵埃影響的地方，一小時及二十四小時的塵埃水平將可符合標準。全年空氣質素預計會受背景因素影響，例如荃灣區的全年塵埃濃度早已超出空氣污染管制條例所訂的空氣質素指標。預計青衣北部填海工程展開後，全年塵埃濃度的數值只會輕微上升，而這項工程最終造成的空氣污染影響相信不大。

實施緩解措施後，工程所造成的剩餘塵埃將不會超出既定的標準及指引。

海洋水質影響

預計填海工程不會對藍巴勒海峽的水力造成影響，亦不會改變在填海場址東面界線雨水渠排放的流向。

在工程範圍內的海洋沉澱物是受到污染，因此進行挖泥及其他海事工程時，必須加倍小心，以免污染海洋。清拆現有碼頭、防波堤、船台路軌等工作，亦會翻起近岸的沉澱物。不過，影響範圍只限於海岸線旁邊。

如果不妥善管制爲建造海堤地基而進行的挖泥工程，水質便可能受到污染。不過預計填築海堤所用的材料不會釋出大量懸浮固體於水中。

填海工程會利用泥頭車運送填料，泥頭車主要會由車尾卸下填料。在傾卸填料的區域，水流速度會很慢，而水中增多的懸浮固體會局限於傾卸面旁邊。傾卸填料中的少量木材及其他有浮力的物料，會引致海面有垃圾漂浮，因而破壞景觀及可能損壞在海上航行的船隻。

洗車設施流出的污水亦會使集水井淤塞，如果任由污水流進排水明渠，海水水面會出現一層油膜，並產生明顯懸浮固體的卷流。如果任由工地辦事處廁所及沖洗設施的污水排進大海，可能會引致海水污染。至於維修及加油設施，亦可能會漏出燃油及燃料。

緩解措施

顧問公司建議實施以下緩解措施，以解決填海工程對海洋水質可能造成的影響：

- 應該趁潮退時清拆水上搭建物，特別是船台路軌；
- 挖泥工程應在設有阻隔沉澱物屏幕的範圍內用密封抓斗進行；
- 受污染的沉澱物應棄置在東沙洲的坑穴，用乾淨的沙土覆蓋；
- 應該在海面設置浮泡欄柵，用以攔阻漂浮物質並每日須用舢舨清理至少一次；
- 洗車設施應設在工地出口處，設施應包括循環系統，以減少污水排放量。洗車設施的污水應作出適當的處理方可排放；
- 工地上的任何燃料缸應貯放在用圍牆圍起的地方。修理汽車應該在已鋪築地面的範圍內進行，廢油亦應在工地以外地方處理；以及
- 工地辦事處及永久設施的污水應引入担桿山路的污水渠，或應設置化學處理的廁所，而化學廁所需每日清理。

挖泥時產生的懸浮沉澱物大部分會被沉澱物屏幕阻擋，因此不會對挖泥區附近的海水造成嚴重影響。

實施這些緩解措施，可以對海洋水質的影響控制至不超出既定的標準及指引，而且不會帶來不良的影響。

受污染土地的影響

本研究亦包括有關土地可能受污染的初步調查。基於現時無法進入船廠場址，顧問公司不能就此進行詳細調查。如果場址的土壤及塵埃有危害健康的物質，負責清理場址的承辦人員可能會受到影響；此外，在填海工程進行時，亦會對施工的人員構成威脅。不過，隨着工程展開，表面的沉積物得到適當覆蓋，影響的程度將會減低。此外，受污染土地的地面徑流及地下水流，也可能對藍巴勒海峽的水域造成污染。

土地污染對場址未來的用途，將取決於土地的污染程度。如果土壤中的重金屬含量偏高，則土地必須鋪築地面，如果酚含量偏高，則必須小心選擇建築材料，以減低對建築材料的損害。如果妥善覆蓋受污染的物質，場址未來用途的限制，則視乎污染物的性質及含量與填築深度而定。

緩解措施

至於應採取甚麼措施以減低土地污染對易受影響地區構成的威脅，將取決於場址污染物的性質及含量，這方面

必須待有關當局批准進入場址後，方能確定。

在土壤沒有受污染的地方，或者污染程度相當輕微，最佳的保護環境措施就是不要移動表土。

如果污染情況太嚴重，以致不能將污染的土壤埋置在填海區內，或者如果污染物被列爲化學廢物，土壤便須移走，在適當的堆填區棄置或運往化學廢物處理設施處理。

如果污染程度不高，便毋須把土壤移走，但若任由其外露，可能會造成不良影響，這些土壤便應埋置在填海區適當的深度下。

有價值的影響

這項工程的主要效益，是可以將原本棄置於堆填區惰性建築廢物轉作適當的用途，廢物利用。此舉將使堆填區的使用期得以延長，同時可以延遲開闢新堆填區或擴大舊有的堆填區。

其他的效益包括：

- 消除青衣東北部的土地用途與鄰近住宅及學校互不配合的情況，闢拓出來的土地可用於興建需求殷切的政府、團體或社區設施及作區內休憩用地。

- 減低船廠範圍內潮漫區沖出的廢物對海洋造成污染；

- 填海之後海岸線將會更加流順，此舉可改善該區海水的流動情況；

- 由岩石築成的海堤可以使海洋生物更加多樣化，並可促進低潮帶、潮漫區、濺濕帶的生物繁殖。

環境監察及評審

環境影響評估已確定及測量青衣北部填海工程可能對環境造成的影響，並建議各項可行的緩解措施。爲確保這些措施能夠有效地實施及監察未可預見的環境影響，有必要制訂環境監察及評審計劃以便進行以下具體行動：

- 監察填海工程在保護環境方面的表現及緩解措施的成效；

- 驗證環境影響評估預測會出現的環境影響；

- 確定工程是否符合各項管制規例及政府政策；以及

- 如出現未可預見的環境影響，應採取補救行動。

在工程展開前、施工期間及工程完竣後，有必要進行以下環境監察：

- 進行噪音、空氣質素和海洋水質方面的基線監測，確定工程開展前的實際情況；

- 監測填海工程對環境造成的影響及這些影響是否符合規定，以確定工程帶來的具體後果，並監察緩解措施是否奏效，以及是否符合管制規例及標準。

環境監測計劃的結果應由獨立的機構評審，並應向環境保護署匯報。

結論

本環境影響評估報告建議實施的緩解措施，與環境監測及評審計劃互相配合，將可確保工程以符合環境保護標準的方法進行，而潛在對環境的影響將可控制至不超出既定的環境指引及標準。

Mouchel Asia Limited
24/F., Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong
Telephone: (852) 2566 7522 **Fax: (852) 2807 1577**