New Territories West Development Office

Reclamation and Servicing of Tuen Mun Area 38 for Special Industries – Environmental Impact Assessment Study: *Executive Summary*

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The Reclamation and Servicing of Tuen Mun Area 38 for Special Industries - EIA Study

- Executive Summary -

INTRODUCTION

This Executive Summary presents the main findings and recommendations of the Environmental Impact Assessment (EIA) study for the proposed Reclamation and Servicing of Tuen Mun Area 38 for Special Industry.

BACKGROUND

The engineering feasibility and the general environmental, safety and marine impacts of the reclamation of about 125 ha of land from the seabed in Area 38 between the proposed Shiu Wing Steel Works in the west and the Pillar Point Sewage Treatment Works in the east was assessed and confirmed in the original Expanded Development Study for Tuen Mun Area 38 conducted in 1990. The Area 38 Development comprises the Special Industrial Area (SIA) and the River Trade Terminal (RTT).

This EIA Study is an implementation EIA to supplement and to follow up the Expanded Development Study in 1990. The purpose of the present Study is to identify and evaluate the potential environmental impacts arising from the construction of one part of the Area 38 Development, namely the SIA and the associated infrastructure, which will account for about half of the 125ha of the whole Area 38 reclamation. The Study also assesses the operational impact of the Pillar Point Sewage Treatment Works outfall to be reprovisioned as a result of the Area 38 Development. The private RTT developer will conduct the implementation EIA for the RTT separately taking the current Study as a constraint.

The Proposed Project comprises three elements and is scheduled to commence in early 1995. These include:

- Reclamation and construction of the SIA at Tuen Mun Area 38;
- The reprovisioning of the submarine outfall at Pillar Point Sewage Treatment Works (PPSTW); and
- The widening and re-alignment of a section of Lung Mun Road adjacent to Tuen Mun Areas 38 and 47.

Part of the reclamation will be advanced by public dumping of about 500,000m^3 of suitable construction waste so as to divert suitable construction waste to a constructive end-use and so help to preserve landfill capacity for domestic and commercial waste. It is considered that the public dump operations will not pose any major environmental impacts to the surrounding areas. However, to further minimise any potential impacts, a

series of mitigation measures have been proposed and included in the Contract Specifications.

As many of the environmental issues associated with the project had already been covered and resolved in the original Expanded Development Study for Tuen Mun Area 38, the present EIA Study focuses on the following key issues:

- Water quality impacts from the construction activities, including the interaction between the reclamation and RTT construction and the discharge from existing or future submarine outfall and emergency bypass;

- The water quality impacts caused by the reprovisioning of the PPSTW outfall;

- Off-site environmental impacts from borrowing activities at the stockpile areas of Tuen Mun Area 16, Area 18 and Area 19; and

- Noise impacts from the construction activities and traffic noise associated with the operation of the SIA; and

THE PROPOSED PROJECT

The Proposed Project will involve the reclamation of about 60 ha of land along the seafront at Tuen Mun Area 38 together with the associated berthing facilities, roads and drainage works (*Figure 1*). Apart from the public dumping, material for the reclamation could not be finalised during the preparation of the EIA report, however it is expected that the contractor will make arrangements to import fill from the PRC and that the existing stockpiling materials available in Tuen Mun Area 16, 18 and 19 will be used.

The reclamation will be divided into two main stages. The Stage 1 reclamation is proposed to be completed by early 1998 and encompasses 10ha of advanced reclamation by public dumping along the shoreline; approximately 17ha of reclamation and associated dredging and ground improvement; approximately 400m of vertical seawall; a four cell stormwater box culvert; and temporary seawall. Marine sand would be used for filling below 2.5mPD whilst fill supplied by the contractor or public dump would be used above the water level. Apart from the dredged mud under the seawall and box culvert, the bulk volume of the marine mud should be left in-situ. No pulverised fly ash (PFA) would be used in the Stage 1 reclamation.

The Stage 2 reclamation will be similar to that for Stage 1, but complicated by some uncertainty about the proposed timing of the adjacent RTT which is expected to be privately funded. Marine sand would be used below 2.5mPD for the Stage 2 reclamation whilst leached PFA may be used above 2.5mPD. PFA will not be used under 2.5mPD. The bulk volume of marine mud will also be left in-situ.

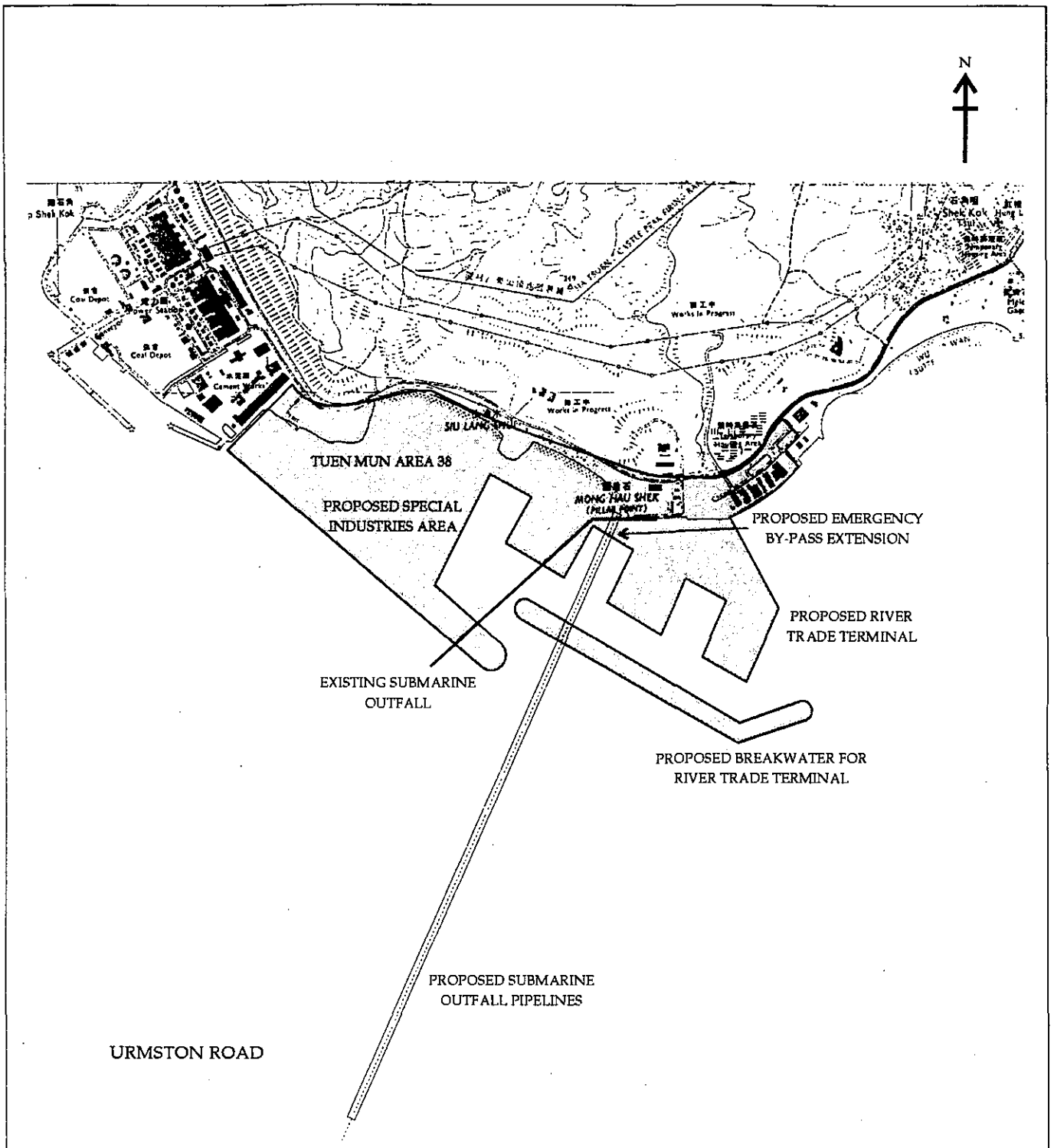

FIGURE 1 - THE STUDY AREA

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The EIA Study also addressed issues related to the reprovisioning of the submarine outfall at the Pillar Point Sewage Treatment Works (PPSTW) scheduled to commence in late 1995 for completion at early 1998. Works associated with the reprovisioning of the outfall will comprise the extension of the existing emergency bypass pipe and the provision of a sewage pumping station, salt water intake for the PPSTW and other associated facilities. The construction of the SIA, the submarine outfall and the RTT will be interfacing with each other which have been considered in the Study.

The existing Lung Mun Road adjacent to Area 38 and Area 47 will be widened to a dual-2 lane carriageway in order to cater for the Tuen Mun Area 38 development. The new road will be constructed principally on new reclamation.

THE STUDY AREA

The Study Area is located at Tuen Mun Area 38 approximately 3 km to the west of Tuen Mun new town. The proposed reclamation will lie in a predominately industrial environment between the proposed Shiu Wing Steel Mill to the west and the Pillar Point Sewage Treatment Works to the east (*See Figure 1*). It is understood that development of both the Shiu Wing Steel Mill and the RTT are likely to be carried out by private developer and the construction work may proceed in parallel with the SIA reclamation and the reprovisioning of the submarine outfall.

Other adjacent landuses in the area include: the Castle Peak Power Station (CPPS) and the China Cement Works to the west; a block making factory under short term tenancy and the container storage area in the immediate vicinity of Area 38; the disused Siu Lang Shui Landfill and the Pillar Point Valley Landfill to the north; and the PPSTW in Area 47 adjacent to the future RTT. In addition, fresh and salt water service reservoirs, a government depot, the WAHMO Physical Model Laboratory and a series of fishermen's graves are also located in the vicinity of the Proposed Development.

Residential uses are very limited in the Study Area, the nearest residential areas being the Pillar Point Vietnamese Refugee Camp to the east of the site, and which is scheduled to be vacated before main construction works commences. Other sensitive receivers, such as Butterfly Estate and Melody Garden in Area 28, are some 2 km to the east. Although residential development was planned in Area 45C as part of a Private Sector Participation Scheme (PSPS) during the original Expanded Development Study, this area is now occupied by a Jockey Club Horse Riding Training Centre and a public golf course is currently under construction.

The result of a sediment quality sampling programme conducted by the Civil Engineering Department in 1993 indicated that approximately 100,000m^3 of contaminated marine sediment and approximately 276,800m^3 of moderately contaminated or uncontaminated mud in the reclamation area will be dredged for the construction of the seawall and the box culvert.

THE EIA STUDY AND RECOMMENDATIONS

The present EIA Study commenced in 20 January, 1994 and was completed in January 1995. During this period, relevant previous studies in the area were reviewed and additional baseline environmental data were collected. Detailed water quality, noise and air quality modelling were then conducted for the construction and operation period. The findings and recommendation of the assessment are summarised below.

A. CONSTRUCTION PHASE

The construction phase assessment focused on the water quality impacts from the dredging and reclamation activities; potential construction traffic noise problems; and off-site noise and air quality impacts due to the borrowing activities at the stockpile areas of Tuen Mun 16, 18 and 19.

Water Quality Impacts

The construction water quality impact assessment assessed and quantified the worst-case impact that could occur during the various construction stages. The assessment included water and sediment quality issues.

For the assessment of water quality impacts, bacterial plume and sediment plume modelling were conducted for ten different scenarios, in order that the most appropriate reclamation strategy and reclamation sequence with the least environmental impact be recommended.

The results of the construction phase water quality assessment generally indicated that a sediment plume covering a large area would be formed due to the SIA reclamation works, but that this plume would have low suspended solids concentrations (in the range 0-5 ppm) as compared with the natural background levels which range from 1.5 to 51.5 ppm in nearby waters (measured by EPD in 1992).

However, the worst-case unmitigated scenario of the Stage 1 reclamation indicated that high concentrations of suspended solids might be found in North Western waters. Therefore, it was recommended to advance the construction of the SIA Stage 1 and part of the Stage 2 seawall prior to the Stage 1 filling. This resulted in a reduction in impacts and full compliance with the Water Quality Objectives (WQOs).

Apart from this worst-case scenario, the impact from all other construction stages would be minimal with excess suspended solids concentrations not higher than 20 ppm at about 100m away from the construction works. However, these impacts are reduced to levels compliant with the WQOs at all sensitive receivers, including the gazetted bathing beaches from Butterfly to Cafeteria Beaches.

Bacterial plume modelling has also been carried out to assess and simulate the existing Pillar Point outfall, and the longer, reprovisioned outfall during the various construction stages. For the bacterial plume modelling the

results indicated that in general, from comparison with the baseline condition, the Area 38 works have little effect on the sensitive receivers distant from the discharge point. Although a temporary local embayment in the area of the works resulted during the worst-case scenario with the existing outfall, this had no impact on the nearby gazetted beaches.

The longer reprovisioned PPSTW outfall discharges into the deep (>10m) Urmston Road waters, and so that the discharge plume is no longer confined by the Area 38 works, and generally travelled further than the existing outfall and resulted in lower bacterial concentrations at the plume extremities and hence slight improvement on water quality over baseline conditions. The bacterial plume does not impact on any of the gazetted beaches between Cafeteria Beach and Butterfly Beach for any of the construction scenarios.

The majority of marine mud under the main reclamations will be left in place and over two-thirds of this material to be dredged will not be contaminated. All uncontaminated mud will be disposed of at East Ninepins Spoil Disposal Area or in a disused marine borrow area, subject to the issue of the dumping licence by DEP and all contaminated mud will be disposed of to the Contaminated Mud Disposal Pit at East Sha Chau, subject to the FMC's allocation.

The assessment of dissolved oxygen (DO) indicated that even with the worst-case results with sediment plume of 20 ppm, the DO concentration would only drop by a marginal 0.154 mg/l (as compared to a background DO level of 4.8 to 7.7 mg/l) as a result of the dredging. In view of the relatively low dredging mud volume and the use of low impact dredging method, construction impacts due to released of pollutants from the dredging of sediments and from pore water into the water column will be insignificant. It is therefore concluded that the dredging and reclamation will not lead to water quality impacts that exceed the established standards/guidelines.

Ecological Impact

The original Expanded Development Study for Tuen Mun Area 38 has not identified the ecological impacts as an issue to be followed in the present implementation EIA. A preliminary ecological review of the present study has indicated that the Area 38 SIA reclamation project would result in the permanent loss of a length of approximately 550m of mixed rocky coastline and shallow shelving sandy non-bathing "beach" and sub-littoral areas through the proposed reclamations. The relative quality of these non-pristine areas is considered low due to degradation as a result of the adjacent industrial land uses. In view of this low relative quality it is considered these areas have already suffered damage to their ecological potential for nursery and spawning of marine biota. Therefore, the ecological impact in the area due to the SIA construction is considered as not significant.

In addition, according to the dolphin sighting record of the Agriculture and Fisheries Department's (AFD) Dolphin Research Team, there have been no sightings of the Chinese White Dolphin in the Tuen Mun Area 38 area. However, considered that there have been a number of sightings in the adjacent Urmston Road area, it will be necessary to contain construction within the project site boundary to prevent the impact to this species of animal.

Air Quality Impacts

The construction of the reclamation and the associated facilities will inevitably lead to dust emissions. The potential dust impacts were assessed with particular emphasis on impacts from the excavation works of the existing stockpiles in Tuen Mun Area 16, 18 and 19.

The assessment results indicated that the reclamation works in Tuen Mun Area 38 site will not pose dust impacts on all the identified air sensitive receivers exceeding the health-based Hong Kong Air Quality Objectives (HKAQOs), as the receivers are far away from the reclamation site. Nevertheless, as a part of good on-site management, dust suppression measures are recommended to be adopted on the reclamation site.

However, the predictions of the assessment also showed that the excavation activities within stockpile areas at Tuen Mun Area 16, 18 and 19 could give high dust levels exceeding the HKAQOs at the identified air sensitive receivers. Mitigation measures are therefore necessary to control dust emissions from the activities at the stockpile areas. Upon implementation of the mitigation measures recommended in the EIA, predicted impacts on all the identified air sensitive receivers due to the excavation activities within the stockpile areas at Tuen Mun Area 16, 18 and 19 will be controlled to within the HKAQOs.

It is also recommended that baseline dust monitoring and dust impacts monitoring should be carried out prior to and during the construction of the SIA, so that corrective action could be implemented if high dust levels are detected.

Noise Impacts

The construction work on site will not cause adverse noise impact that exceed the established standards/guidelines due to the considerable distance from noise sensitive receivers, however, the construction traffic to and from Lung Mun Road and Nim Wan Road may be a concern. As such, detailed modelling on the potential noise impact arise from construction traffic was carried out. In addition, noise generated from the excavation of off-site stockpile materials in Tuen Mun Area 16, 18 and 19 were assessed.

The modelling results indicated that construction noise would not exceed the day-time construction noise criteria of 75 dB(A), either at nearby Noise Sensitive Receivers along the access route, or for the stockpile and reclamation areas. However, should operations be extended into the

restricted hours (1900–0700, Monday through Saturday and all day Sunday), construction noise permits should be obtained and mitigation measures are recommended to ensure that Noise Control Ordinance criteria are met and so protect nearby NSRs from the noise of the scheduled activities. In addition, no night time operations are recommended.

With the possibility for potential impacts at nearby NSRs during the evening and to confirm day time levels remain within the established guidelines, a monitoring and audit programme has been recommended for the construction phase of the Proposed Project. Details of this have been included in the Environmental Schedule prepared as part of the present EIA Study.

Landfill Gas Migration Impacts

The Study has also considered the possibilities of landfill gas migration to the SIA from the nearby landfill site, namely the Siu Lang Shiu Landfill (SLSL) and the Pillar Point Valley Landfill (PPVL). It is considered that the SLSL is far enough from the SIA to cause any impact to the reclamation. However, as the SIA is located within the 250m Consultation Zone of the Pillar Point Landfill, appropriate mitigation measures and monitoring programme to ensure site safety have been recommended.

Environmental Monitoring and Audit

Environmental monitoring and audit programmes to cover dust, noise, and marine water quality have been incorporated in the Environmental Schedule of the present Study and will be implemented by the Government. The relevant Contract Documents will incorporate Action Plans to ensure immediate rectification of any deterioration in excess of the established standards.

B. OPERATIONAL PHASE

The operational phase issues of the Area 38 Development were addressed in the original Expanded Development Study, and thus the present EIA focused on the water quality impacts due to the reprovisioning of the Pillar Point Sewage Outfall; and the traffic noise impacts arising from the operation of the Special Industrial Area.

Water Quality Impact

Potential adverse effects on the marine environment and nearby bathing beaches as a result of the reprovisioning of the PPSTW outfall (excluding background sources), and the change of coastal configuration caused by Area 38 were modelled using the WAHMO bacterial plume model. In addition, various outfall lengths were assessed to review the relative impact of the new reprovisioned outfall position. The results indicated that the outfall design should have:–

- a minimum length (excluding diffuser) of 1.3km from the RTT boundary discharging into Urmston Road waters of about 15m depth; and

- a diffuser length of 500m;

to confine the bacterial plume to the deep waters of the Urmston Road. The results for all scenarios modelled indicated that the reprovisioned outfall dilution was sufficient to eliminate elevated *E. Coli* concentrations, along the Tuen Mun coast and particularly at the beaches, experienced with the old Pillar Point Outfall and indicated that the diffusers were appropriately located in the well mixed water zone and that 1.3km reprovisioned outfall was able to prevent any direct impact on the gazetted Butterfly and Cafeteria beaches. Overall, the simulations showed that a 1.3km reprovisioned Pillar Point outfall performed acceptably well and would lead to positive improvements in the bacterial condition of the nearby gazetted beaches in particularly of Butterfly Beach when compared with impacts arising from the old Pillar Point Outfall.

To verify the modelling results and the outfall design adequacy, the EIA Study also recommended that water quality baseline and outfall impact monitoring at the nearby beaches should be carried out to provide an indication of water quality improvements resulting from the reprovisioning.

The Northwest New Territories Landfill Restoration Studies has recommended measures to control the leachate from the SLSL and PPVL.

Traffic Noise Impact

Road traffic noise impacts associated with the operation of the reclamation were assessed with respect to three different scenarios to determine if the operation of the SIA will generate exceedances of the Hong Kong Planning Standard and Guidelines (HKPSG) at affected NSRs. The three scenarios assessed were:

- 2011 traffic levels without the SIA and without the Tuen Mun Port Development;

- 2011 traffic levels with the SIA and without the Tuen Mun Port Development; and

- 2011 traffic levels with the SIA and with the Tuen Mun Port Development.

The Study Area for the traffic noise assessment was between Tuen Mun Area 45 and Tsang Tsui PFA Lagoon. The results of the assessment indicated that vehicular traffic from the SIA operations will not cause exceedance of the HKPSG guidelines at all NSRs within the Study Area being assessed. On-site SIA activities, due to their distance from the nearest NSRs, are also not anticipated to create exceedances at the nearest NSRs.

CONCLUSIONS

The present EIA Study concluded that environmental impacts associated with the reclamation and servicing of the SIA for Area 38 can be kept within the relevant standards and guidelines through the application of appropriate design and mitigation measures. Environmental monitoring and audit programmes will be implemented by the Government. These mitigation measures, and monitoring and audit Action Plans will be included in the Contract Specifications for the individual contracts.