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EXECUTIVE SUMMARY

CONSULTING SERVICES BY ENVIRONMENTAL RESOURCES MANAGEMENT

Civil Engineering Department

Environmental Impact Assessment
of Backfilling Marine Borrow Areas
at East Tung Lung Chau

11 February 1998

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of Backfilling Marine Borrow
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Reference C1412

For and on behalf of ERM-Hong Kong, Ltd

Approved by: S.M. LAISTER

Signed: 

Position: Executive Director

Date: 11th February 1998

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Environmental Impact Assessment of Backfilling Marine Borrow Areas at East Tung Lung Chau

- Executive Summary -

INTRODUCTION

This Executive Summary presents the main findings and recommendations of the Environmental Impact Assessment for the proposed backfilling of Marine Borrow Areas situated at East Tung Lung Chau.

BACKGROUND

The East Tung Lung Chau Marine Borrow Areas (ETLC MBAs) cover an area of 18 km² and comprise two pits: a deep and distinct borrow pit to the west of the Ninepins Islands and a large, less well-defined area of shallow depressions, located to the southeast of Tung Lung Chau (*Figure 1*). Sand excavated from these two pits has been used primarily for the West Kowloon reclamation, with main excavation operations completed by July 1996. In accordance with the policy of the Fill Management Committee, it is proposed to backfill the MBAs both to provide disposal capacity for uncontaminated dredged materials and to reinstate the natural seabed. Mud disposal at the ETLC MBAs would replace the existing operations at the East of Ninepins site and would include implementation of a more rigorous site management and monitoring programme. Disposal at the ETLC MBAs is likely to be environmentally preferable to the East of Ninepins Disposal Site because the ETLC MBAs consist of a seafloor pit which is better able to contain disposed material than the open seafloor mound at the East of Ninepins site.

Following the results of the Initial Assessment Report (IAR), an Environmental Impact Assessment (EIA) was prepared to investigate in detail required mitigation measures for the backfilling operations. The purpose of the EIA is to provide information on the nature and extent of potential environmental impacts arising from the proposed backfilling of the MBAs. Key issues addressed include identification and evaluation of impacts on water quality, marine ecology, air quality and noise. The EIA also recommends an Operations Plan for the proposed backfilling project which will maximise use of the MBAs and minimise environmental impacts by incorporating appropriate mitigation measures.

THE PROPOSED PROJECT

The proposed backfilling would involve the use of barges and/or trailer dredgers. The key mitigation elements of the proposed backfilling Operations Plan are as follows:

- As the direction of water currents greatly influences the potential impact of disposal operations, disposal locations will be specified according to the prevailing seasonal currents;
- Daily disposal rates for both the deep and southwestern-most portion of the shallow MBAs should be restricted to a maximum of 50,000 m³day⁻¹, whereas

the northeastern portion of the shallow MBA should have a reduced maximum rate of 25,000 m³day⁻¹;

- To prevent mounding, only trailer dredged material will be disposed in the shallow MBA. The deep MBA shall be used for grab or trailer dredged materials;
- Backfilling will be prohibited during dredging, backfilling, disposal or reclamation at other locations in eastern waters;
- The maximum backfilling level will be limited to the level of the natural seabed in the north eastern (deep) pit and to -30 mPD in the southwestern (shallow) pit. These levels are inclusive of any materials used to enhance the habitat. In order to allow consolidation of recently disposed material to densities which will better resist the erosive forces of storms, a mitigation measure requiring cessation of backfilling once the Typhoon Signal No 3 is hoisted has been incorporated;
- To prevent combinations of plumes from separate disposal events resulting in unacceptable elevations of suspended sediment concentrations, a minimum interval of 3.84 hours between trailer dredger disposal events in dry and wet seasons is specified. The combined effect of trailer and barge disposals will be limited by the maximum daily disposal rate. In addition, no more than 5 barge disposals will be undertaken in the two hour period following a trailer disposal and trailer disposals may follow barge disposal events only after an interval of half an hour;
- With the exception of the extreme southwestern part of the ETLC MBAs, the proposed backfilling area is not frequented by large marine vessels, therefore it is not expected that marine traffic shall be disrupted as a result of backfilling. However, priority shall be given to fishing operations through the requirement of disposal vessels to delay disposal if a fishing vessel is present.

STUDY FINDINGS AND RECOMMENDATIONS

The EIA conducted assessments of water quality, marine ecology, air quality and noise. The findings of the assessments are summarised below.

Water Quality

Water quality impacts associated the proposed disposal of material at the ETLC MBAs were evaluated using sediment transport mathematical models. Predicted concentrations of SS and resulting depletions, elevations and deposition rates for DO, nutrients and sediment respectively, were derived. These predictions were used to assess the impact of backfilling operations on the water quality of the study area and on specific sensitive receivers. Modelling scenarios were designed to evaluate variations in disposal rate and disposal location with season in order to specify mitigation measures to minimise adverse impacts. These mitigation measures were developed as operational constraints and presented as an Operations Plan for further assessment.

Results of all modelled scenarios predicted a maximum elevation of suspended sediment at sensitive receivers of 7 mg l⁻¹ at Sung Kong South. Where elevations

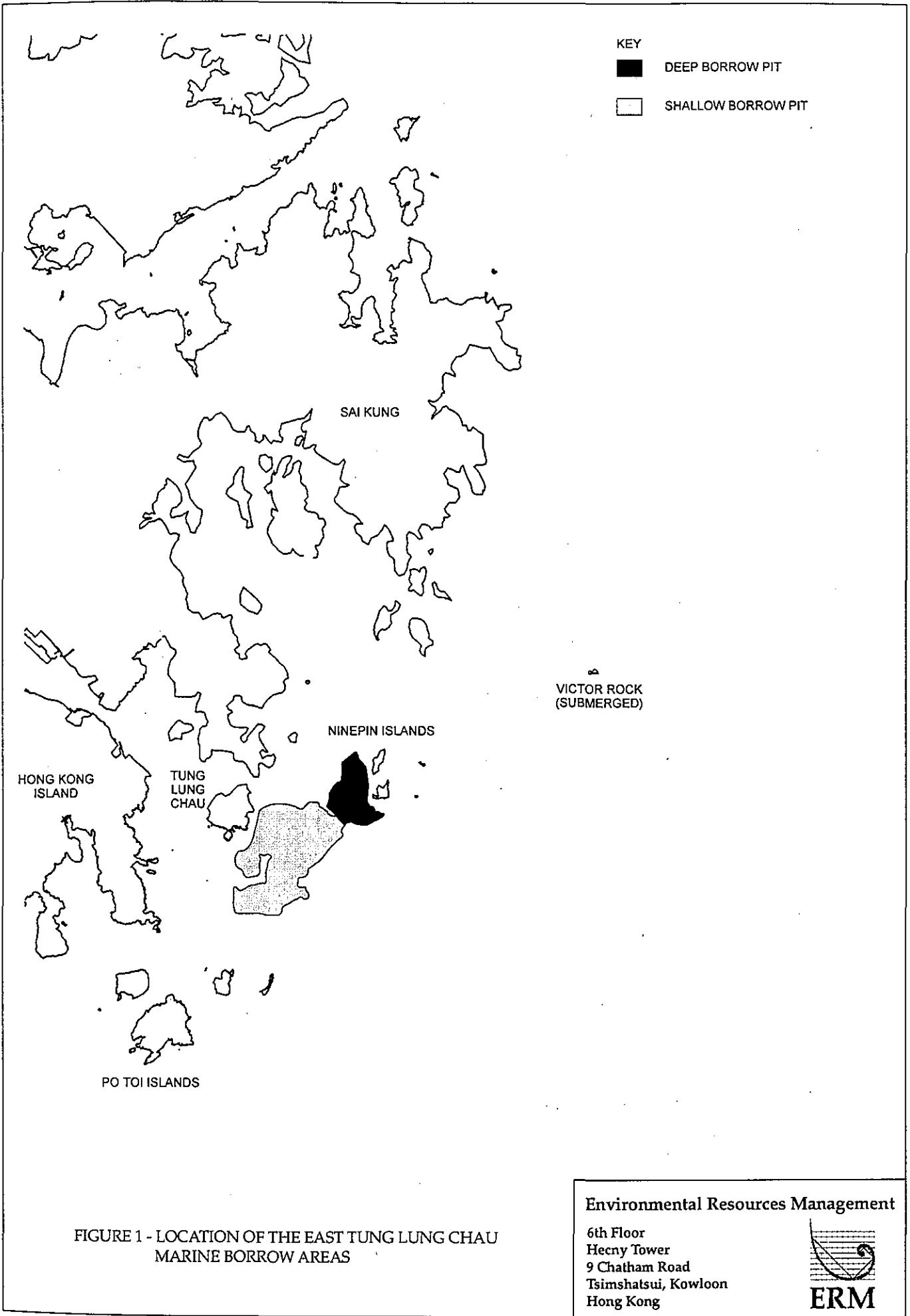


FIGURE 1 - LOCATION OF THE EAST TUNG LUNG CHAU MARINE BORROW AREAS

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are predicted at other sensitive receivers, lower elevations of 1 -2 mg l⁻¹ are typical. Predicted suspended sediment concentrations above an agreed assessment criterion of 10 mg l⁻¹ are largely restricted to within the gazetted boundaries of the MBAs. Dissolved oxygen depletions and nutrient elevations in all cases are predicted to be low with respect to background levels and Water Quality Objectives. Therefore backfilling in accordance with the Operations Plan is not predicted to result in unacceptable impacts to water quality.

The stability of recently deposited material in the MBAs was assessed at various backfill levels. The deep MBA is fairly sheltered and analyses predict that the pit can be filled to the level of the surrounding seabed (approximately -30 mPD) without causing unacceptable erosion. The northern part of the shallow MBA is less exposed than the southern part. Analyses predict that the northern part can be filled to seabed level without causing unacceptable erosion. In the southern part of the shallow MBA there may be erosion of some recently deposited backfill material under a storm with a return period of 1 year. However, this erosion is deemed acceptable in the context of natural erosion of the natural seabed. Due to slightly greater exposure to storm-induced erosion of disposed materials in the shallow pit, backfilling above -30 mPD is not recommended in this part of the MBA. These levels are inclusive of any materials used to enhance the habitat.

Marine Ecology

A review of existing information on the ecological resources located within and around the ETLC MBAs has identified that the area supports soft bottom benthic assemblages, corals, rocky intertidal species, fish and pelagic invertebrates (eg squid) many of which are commercially valuable. SSSIs occur within the study area, notably the Ninepin Islands and also the newly formed Marine Reserve at Cape d'Aguilar, the location of the Swire Institute of Marine Science.

Impacts arising from changes in water quality were assessed using the sediment transport and water quality modelling results described above. Sediment plumes are predicted to occur outside of the MBA during the dry season and during the transitional season when disposal occurs in the shallow MBA. Although predicted concentrations of SS are low, impacts to fish, particularly coral reef fish, intertidal rocky shore assemblages and corals were investigated through evaluation of tolerance thresholds. As few data are available on the tolerance thresholds of these organisms and habitats to SS concentrations, the magnitude of the impacts to these resources cannot be precisely assessed. However, using predicted sediment deposition data, and a sedimentation rate tolerance threshold for corals derived from a literature search conducted for a previous study, it was noted that no exceedances of this threshold occur. Furthermore, as elevations of SS above the assessment criterion are not predicted at any of the identified ecological sensitive receivers, impacts due to elevated SS in the water column are also not predicted to occur.

Impacts to fisheries resources and fishing activities were examined in the context of an increase in fisheries production values in recent, post-dredging years. This may reflect either an increased level of fishing effort in the area after the post-dredging years, or that the dredging of the area has not caused a long-term adverse impact to the fisheries resources. Through assessment of catch and value statistics, it was determined that the ETLC area is an important fisheries area. It is reported that the study area has a fisheries production value of \$8.7 million annually and represents 2.5% of the value of the total annual fisheries

production in Hong Kong waters. The ETLC MBA also comprises approximately 5% of a large zone of southeastern waters recommended for protection as a spawning habitat in the recent AFD Study of Fisheries Resources and Fishing Operations in Hong Kong Waters. However, since impacts to fisheries resources were predicted to be localised (affecting no more than 10% of the MBA at any one time) and temporary (occurring only during and shortly after sporadic disposal events), they are not expected to cause a long-term adverse impact to fisheries resources. Although up to approximately 650 fishing vessels from various homeports could be affected by the backfilling operations, which are expected to last for several years, disruption of fishing operations will be minimised through implementation of operational conditions. These include the requirement of disposal vessels to delay disposal when fishing operations are being undertaken within the gazetted MBAs.

Impacts to marine mammals could not be assessed as data regarding specific species, numbers and behaviour in this area is limited to stranding records. Nevertheless, as no substantial changes in vessel operations in the area are expected as a result of the proposed operations, impacts to marine mammals resulting from vessel disturbance are not predicted.

Impacts to ecological resources may be mitigated by limiting impacts to water quality. All identified impacts to ecological resources are expected to be mitigated to environmentally acceptable levels through implementation of the Operations Plan and the supplemental mitigation measures given in the Water Quality section of the EIA. Therefore, backfilling of the ETLC MBAs is not predicted to result in any unacceptable ecological impacts as the only community predicted to be adversely impacted is the infaunal community within the MBA pits.

Air Quality

No exceedances of the Air Quality Objectives have been predicted and thus no major impacts to air quality are anticipated from backfilling operations at the ETLC MBAs. Consequently, no air quality mitigation measures or air quality monitoring programmes are necessary for the backfilling operations.

Noise

The proposed disposal operations at the ETLC MBAs will not lead to exceedances of the recommended daytime limit, or the NCO evening criteria, at any nearby sensitive receivers. Also, noise modelling of the backfilling activities has shown that operations during night-time (2300-0700) will not result in exceedances of the NCO night-time criteria at the NSRs such as Tung Lung Chau, if disposal activities follow the Operations Plan. Construction noise during the sensitive hours from 1900 to 0700 and on public holidays is controlled by Construction Noise Permit under the Noise Control Ordinance. The permit issuance is on the discretion of the Noise Control Authority in accordance with the relevant Technical Memoranda. Consequently, no noise monitoring programme has been recommended for disposal operations at the ETLC MBAs.

OVERALL CONCLUSIONS

The detailed assessment of environmental impacts upon water quality, marine ecology, air quality and noise arising from the backfilling of the Marine Borrow Areas at East Tung Lung Chau indicates that there are unlikely to be any insurmountable or unacceptable residual environmental impacts associated with the proposed operations.

The Study included the development of an Operations Plan which includes appropriate mitigation measures to reduce environmental impacts to acceptable levels. Actual impacts during the backfilling operations will be monitored through an EM&A programme which is specified in an EM&A Manual released as a separate document to the EIA. The EM&A programme will provide management actions and supplemental mitigation measures to be employed should impacts arise, thereby ensuring the environmental acceptability of the project.

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