

## 9 SUMMARY

### 9.1 Introduction

This EIA represents the third phase of environmental assessment for Container Terminals to be sited adjacent to Pennys Bay on Lantau Island. Earlier reports have investigated construction and operation of the terminals, refining the assessment as more detailed information on construction and operation becomes available. This EIA document follows on from the earlier reports, focusing on construction phase impacts and in particular comparing a reclamation technique which will involve dredging marine sediments prior to reclamation. Earlier studies assumed that sediments would be left in-situ.

### 9.2 Water Quality

Worst case scenarios have been given priority and it has been concluded that for both the fully dredged and the drained options, suspended solids at Ma Wan could exceed the Water Quality Objective (WQO) of 30% increase over background if the annual average of EPD 1992 data was used. The fully dredged option produced a greater exceedance of this environmental objective (60%) than the drained option, the latter exceedance being marginal (34%). This same Objective was exceeded at Peng Chau for the fully dredged option but not for the drained option. Exceedances were limited to a few hours per day. However, if seasonal values for background are used, based on recent monitoring data for the Ma Wan Mariculture area, then the WQO will be met at all times. Suspended solids at Discovery Bay were low for all scenarios. As this assessment has been conducted on worst case assumptions it is concluded that real effects will probably be less than predicted and that increases in suspended solids at sensitive receivers will not exceed water quality objectives. Calculations have indicated that in the near field area continually affected by dredging, the 30% over background increase should be met within a distance of approximately 650 m.

The statement regarding overestimation also applies to nutrient assessments. In this respect, it is considered that the scenario involving a nutrient concentration proportional to the mass of sediment in suspension represents the most realistic, yet still conservative, approach. On this basis, it is concluded that there should not be any measurable impact resulting from nutrients desorbed from sediments during dredging. Nonetheless, any potential for increase in nutrients correctly attracts the precautionary principle and in terms of the Lantau Port reclamation, it must be recommended that dredging proceeds in such a way as to minimise sediment losses to the water column at all times.

It is recommended that the position of the proposed stormwater outfalls to the west of the Terminals be reviewed. If they are relocated positions to either the east or seaward edge of CT10 are preferred to avoid potential eutrophication problems in the Sz Pak embayment and outer Discovery Bay.

In terms of *water quality* and marine resource utilisation, it is apparent that the drained option would be preferable in all respects except for the duration and method of fill placement. The drained option has only approximately one fifth of the dredging and disposal of mud required by the fully-dredged option, and approximately 70% of the fill requirement. The volumes of contaminated mud

are virtually the same. Given that dredging will probably generate more suspended solids in the water column than filling, the drained option offers a reduction of 66% on the duration of this activity for the fully-dredged scheme. The duration of filling is similar at just over two years, but the drained option necessitates the use of rainbowing.

In view of the fact that dredging will be required for 18 months longer for the fully-dredged option, and that rainbowing will not be used to place all the fill for the drained option, it is concluded that in overall terms the drained option offers the least impact to the marine environment.

### 9.3 Noise

The assessment indicates that night-time (23.00 hrs to 07.00 hrs) dredging work can be conducted and remain within the 45 dB(A) criteria. The daytime and evening assessment carried out for the drained option differs from the LPD Stage I Preliminary Design assessment in that surcharge height is increased to 12 metres, earlier studies assumed 9 metres. This increases the level of construction activity and associated noise impact. For the fully dredged option only 4 metres of surcharge are needed. Unmitigated peak construction noise impact of 61.3 dB(A) and 64.6 dB(A) for the dredged and drained options respectively are predicted. The duration of the exceedence is about six months for the dredged option and about twenty one months for the drained option. The assessment has identified mitigation that is capable of reducing the construction noise impact to below the 60 dB(A) daytime and evening criteria. It is believed that with sympathetic programming the impacts could be reduced to within the assessment criteria for the dredged option, for the drained option the number of operating dumptrucks would have to be halved which would disrupt the construction programme. In view of the fact that unmitigated construction activity for the drained option will exceed the assessment criteria for fifteen months longer than for the fully-dredged option, and is less readily mitigatable it is concluded that in overall terms the dredged option offers the least impact to the environment.

### 9.4 Air Quality

The results of the modelling study carried out for this assessment indicate that exceedences of the 1-hour guideline level and 24-hour and annual average Air Quality Objectives (AQO) for Total Suspended Particulates (TSP), dust, may occur during construction of the drained option. To reduce this impact to within the AQO, higher levels of mitigation will be required which may impact on the programme by decreasing intensity of activity, alternatively a positive approach, such as defining haul routes and keeping them permanently wetted, may be considered. No exceedences of the AQO are predicted for the fully dredged option. The dust generating activities are identical for the two methods of construction and the difference in their air quality impacts arises mainly from the duration and intensity of these activities for the respective options. In view of the fact that construction activity for the drained option will exceed the assessment criteria which is not the case for the fully-dredged option, it is concluded that the dredged option offers the least impact to the environment.

## 9.5 Marine Ecology

No additional marine ecological studies have been carried out as part of this study. The benthic resource will be permanently lost by reclamation though the previous studies (LAPH) have identified that the whole of the area to the east of Lantau between the proposed Port and Cheung Chau to be of low benthic diversity. A survey of the activities of the Chinese White Dolphin was undertaken as part of the Ancillary Works studies but the one month study could only achieve a cursory investigation to document the presence of the dolphins in the study area. AFD / CED are currently in the process of appointing Consultants to undertake longer term studies. The Ancillary Works studies concluded that the number of dolphins sighted in the area was small and the area appeared to be less utilised by the dolphins than the waters to the north of Lantau Island. Sighting records of the World Wide Fund for Nature/Hong Kong (up to December 1993) and data collected during the Swire Institute of Marine Science Study also suggested that the area does not appear to be of major significance to the dolphins and it was concluded that the Lantau Port Development is likely to have minimal impact on the dolphins. Monitoring of the dolphins during construction has been recommended and has been incorporated into the EM&A Manual produced as part of this study.

## 9.6 Waste Management

Wastes generated by CT construction works are likely to include: general site wastes such as residues, packaging and containers; workforce wastes from site offices, works canteen and approximately 2000 staff; arisings from vehicles, plant equipment servicing and repair facility including wastes classified as Chemical Waste; and arisings from accidental spillage. Formalised site collection, storage and transport to approved disposal facilities will be required. Effluent discharges will need to be licensed, it is anticipated that a treatment system including screens, primary sedimentation, Rotating Biological Contractor (RBC) plant and final sedimentation would be the most appropriate. Effluent should be discharge outside embayments and areas of low water movement. A discharge to the east into the deeper faster flowing waters is the preferred option.

## 9.7 Conclusion

This EIA has only investigated the environmental impacts on the sensitive uses adjacent to the proposed Terminal site. It has not carried out assessment of the far field issues of fill material source and marine mud disposal. Conclusions may be altered when these issues are taken into account. Water quality impacts from dredging and filling for the drained option occur over a shorter period and are less intense than the fully dredged option, though it is predicted that for worst case scenarios, comparisons based on recent seasonal data for suspended solids at Ma Wan, both the fully dredged and drained options can be carried out within the identified criteria. EPD take a different view in that they consider that the drained option is always preferable to the fully dredged option, and that for the purpose of determining WQO compliance, the 1992 data should be used as the basis for comparisons of increases in suspended sediments, in which case, exceedance of the 30% criterion would occur at Ma Wan and Peng Chau under the fully dredged option. Notwithstanding this, EPD, however agree that the suspended solids rise at Ma Wan and Peng Chau are small in absolute terms and any impacts that may arise from such exceedances would tend to be transient.

However, the drained option is the preferred construction technique for minimising water quality impact. The noise and air quality impacts associated with reclamation are principally attributable to the movement of surcharge material by the large fleet of haul vehicles. The larger amounts of surcharge which have to be moved for the drained option create higher levels of air quality and noise impact. It is predicted that night time (23.00 hrs to 07.00 hrs) dredging and filling activity can be carried out within the 45 dB(A) criterion. From air and noise quality aspects therefore, the dredged solution would be preferred.