

## 11 ENVIRONMENTAL MONITORING AND AUDIT

### 11.1 Introduction

- 11.1.1 The Telegraph Bay EIA has focused on identifying providing mitigation options for the potential impacts associated with both the advance works / construction phase of the development. No adverse residual impacts have been identified during the operational phase. Therefore it is considered not necessary to carry out a long term monitoring during the operational phase except sewage outfall monitoring. The sewage outfall monitoring has been recommended to validate the dilution modelling results as well as protecting the water sensitive receivers by checking the attainability of the water quality objectives. The EM&A requirements for different construction stages and the sewage outfall monitoring will be discussed in this chapter.
- 11.1.2 The recommendations given within each section of this report are designed to identify enforceable means through which compliance with the relevant government standards, guidelines or objectives can be achieved.
- 11.1.3 The information presented within this EIA report should be fully considered and recommendations implemented during the detailed design stage, tendering and construction stage of the project. It is anticipated that this continuity will be attained through the Environmental Monitoring and Audit (EM&A) programme which is discussed in outline within this section of the report.
- 11.1.4 EM&A requirements have been identified as part of the EIA study in order to evaluate the potential impacts to air and water quality, noise, waste, ecology, landscape and visual. Detailed requirements for each area will be presented within a separate Telegraph Bay Environmental Monitoring and Audit (EM&A) Manual. The outline EM&A requirements for each topic area are described in brief below.
- 11.1.5 The EM&A Manual must be submitted to EPD for approval prior to the commencement of the project site work. The will contain the detailed EM&A programme and include baseline and impact monitoring requirements, monitoring locations, frequency of visits, monitoring parameters, action and limit levels and an event and action plan. The Manual will be submitted with the final EIA report.

### 11.2 Noise

- 11.2.1 The EIA has predicted the construction noise impacts associated with the advance works and construction works of the proposed development, as well as the construction of Route 7. It can be concluded that there are no adverse noise impacts which cannot be appropriately mitigated. Noise monitoring will have to be carried out during advance works, Telegraph Bay Development (TBD) main construction works as well as Route 7 construction to ensure that such mitigation measures have been implemented appropriately.
- 11.2.2 The construction activities will only be carried out during the daytime (between 0700 - 1900). Noise measurement should be undertaken at all monitoring station for a 30 minute period during the daytime when the noisiest activities are being carry out. Type 1 sound level meters, which comply with the International Electrochemical Commission (Publications 651:1979 and 804:1985) must be used for carrying out the noise measurement.

- 11.2.3 Ad hoc noise monitoring should also be carried out if necessary. To establish the prevailing background noise level, one  $L_{eq}$  (30minute), obtained between 0700-1900 of a normal weekdays, and three consecutive  $L_{eq}$  (5 minute) measurements, obtained from each monitoring period (between 1900-2300; and between 2300-0700), are required.
- 11.2.4 Baseline monitoring to establish the background noise environment will be required and should be carried out for at least 14 consecutive days prior to the commencement of the project. During the construction phase impact monitoring will be required in order to assess whether operations on site in compliance with construction noise criteria (Table 1B, Noise Standards for Daytime Construction Activities, Technical memorandum on Environmental Impact Assessment).
- 11.2.5 Discrete traffic noise measurements should also be carried out after the population intake of the TBD development and the opening of the roadway. The purposes are to compare the measured levels with the predicted noise levels and to check the effectiveness of the proposed noise barriers. The details of the noise measurement arrangement will be given in the separate EM&A manual.

### 11.3 Air Quality

- 11.3.1 Dust is expected to be the major air pollutant during the advance and construction works. The main potential dust generating sources associated with the construction are as follows:
- Unloading and handling of sand fill for surcharging operations;
  - removal of vegetation and topsoil;
  - site excavation, levelling, filling, terracing and slope works;
  - handling and stockpiling of excavated material;
  - haulage of excavated top soil, vegetation and bed rock;
  - wind blown dust from dry exposed site areas;
  - deposition of dust from haulage trucks onto local roads; and
  - truck movements over the unpaved haul roads.
- 11.3.2 It will be necessary to monitor the Total Suspended Particulates (TSP) levels throughout the project (including the advance works, TBD and Route 7 construction) to ensure any deterioration in air quality can be detected readily and appropriate measures undertaken to restore the situation.
- 11.3.3 Measurement of 1-hour and 24-hour TSP levels should follow the standard high volume sampling method set out in Title 40 of the Code of Federal Regulations, Chapter 1 (part 50), Appendix B. The samples should be sent to HOKLAS accredited laboratory for analysis as far as practicable. Approval from the Engineer Representative will have to be sought if a non-HOKLAS laboratory is utilised.
- 11.3.4 Monitoring results should be assessed against the relevant Air Quality Objectives (AQOs) which are detailed within the Air Pollution control Ordinance (APCO).
- 11.3.5 *Baseline Monitoring* : 1-hour and 24-hour TSP samples should be obtained for at least 14 consecutive days at all monitoring stations prior to the commission of construction works. Three 1-hour samples should be done each day at the time when the highest dust impact is expected. The results obtained will then be used for deriving the air quality criteria (namely Action and Limit levels) for impact monitoring.

- 11.3.6 *Impact* monitoring : One 24-hour and three 1-hour TSP samples should be obtained from all stations once every six days, with 1-hour samples being collected when the worst dust impact occurs. The impact monitoring data will then be compared with the air quality criteria and the action as set out in the Event/Action Plan. Any appropriate mitigation measures should then be implemented if exceedance of the air quality criteria is recorded.

## 11.4 Sewage

- 11.4.1 Although the sewage plume model results indicate that the mixing zone is likely to be small, sewage outfall monitoring has been recommended in order to monitor the impacts of discharge on the marine environment and to validate the dilution modelling results.
- 11.4.2 Six monitoring locations have been identified, which include two control stations (one upstream and one downstream) and four impact sampling stations which are chosen at the representative water sensitive receivers nearby. The monitoring stations are shown in Figure 11.1 and include :

| <u>Station No.</u> | <u>Description</u>         |
|--------------------|----------------------------|
| M1                 | Mixing zone boundary       |
| M2                 | WSD seawater intake at TBD |
| M3                 | Coral community at Pak Kok |
| M4                 | Secondary contact subzone  |
| M5                 | Upstream control station   |
| M6                 | Downstream control station |

- 11.4.3 Baseline monitoring shall be conducted prior to commencement to sewage treatment work to provide data on water quality within the study area and the identified sensitive receivers. The baseline data will then be used to monitor any short or long term deterioration in water quality due to the development project. Samples shall be collected at all designated monitoring locations 3 days per week, for a period of four weeks before making the discharge.
- 11.4.3 Operational outfall monitoring shall be carried out once per 2 weeks for the first three months of sewage treatment work operation. The interval for the subsequent monitoring shall be agreed with EPD.
- 11.4.4 Both baseline and outfall monitoring shall be carried out at the designated locations three times per week, at slag tides and at three depth locations.
- 11.4.5 The outfall monitoring should be monitored for the following parameters:
- suspended solid (SS);
  - dissolved oxygen (DO);
  - temperature;
  - Salinity;
  - turbidity;
  - pH;
  - BOD;

- E-Coli;
- Chlorophyll-a;
- Ammonical Nitrogen;
- Total Oxidised Nitrogen;
- Kjeldahl Nitrogen;
- Total Inorganic Nitrogen;
- Total Phosphorus;
- Heavy Metal (dissolved and total Cu, Cr, Cd, Pb, Ni, Zn, Hg, As); and
- Silicate.

11.4.6 The impact monitoring result will then be compared with the Action and Limit Levels. The proposed Action Levels (for all parameters) are the 95% ile of the baseline data while the proposed Limit Levels be the WQOs for that water control zone and sensitive use or 99% ile of the baseline data. These levels however are to be confirmed with EPD after the completion of the baseline monitoring.

## 11.5 Water

11.5.1 During the construction phase, if uncontrolled, contaminated surface runoff from the construction site could enter East Lamma Channel.

11.5.2 The dredging of marine muds and construction of the quay deck as well as the site runoff generated during the construction may create impacts on the marine water quality which requires regular monitoring. Stream re-alignment and construction of the southern access road may also impact on the water quality within the Southern Stream.

11.5.3 Baseline monitoring will be initially required in order to provide data on water quality within the study area and the identified sensitive receivers. The baseline data will then be used to monitor any short or long term deterioration in water quality due to the development project. Samples shall be collected at all designated monitoring locations 3 days per week for a period of four weeks before the commencement of work.

11.5.4 Impact and compliance monitoring (on marine water) will be required upon commencement of the project site works (including the TBD and Route 7 construction) and should be carried out at the designated locations three times per week, at mid-ebb and mid-flood tides and at three depth locations. Three locations have been selected as the marine monitoring stations (M7 to M9) and they are shown in Figure 11.2.

| <u>Station No.</u> | <u>Description</u>         |
|--------------------|----------------------------|
| M7                 | Upstream control station   |
| M8                 | Downstream control station |
| M9                 | WSD seawater intake at TBD |

11.5.5 While constructing the southern access road and training of the Southern Stream, additional monitoring on freshwater quality (at stations F1 and F3) will be required to ensure the stream is not impacted by the works. The proposed freshwater monitoring stations are marked in Figure 11.2. Samples shall be taken from the mid depth of the stream three times per week throughout the southern access road construction and stream training works.

- 11.5.6 An Event/Action plan should be prepared to summarise the appropriate actions required if the monitoring data at any designated locations shows an exceedance to the relevant criteria. The Action and Limit Levels will be assigned as per EPD requirements.
- 11.5.7 Parameters to be monitored should include the following:
- Marine water monitoring - suspended solid (SS), dissolved oxygen (DO), turbidity, pH, salinity; and
  - Freshwater monitoring - suspended solid (SS).
- 11.5.8 In addition to monitoring, regular site inspections should be carried out in order to ensure that the mitigation measures are implemented and are working effectively. This includes:
- checking all the sediment/silt traps and oil interceptors;
  - review of working methods; and
  - checking the operation of the on-site wastewater treatment system
- 11.5.9 Ad hoc inspections should also be conducted if significant deterioration in water quality is recorded or complaints are received.

## **11.6 Waste**

- 11.6.1 The contractor will be responsible for waste control within the site as well as minimising the volume of waste generated. The contractor should comply with all the mitigation measures as suggested in the EIA. Regular inspections carried out by the environmental team (ET) will be required in order to check the contractor's compliance with the relevant specifications.

## **11.7 Ecology**

- 11.7.1 The contractors' works area should be clearly defined on Site. The contract documents should require the contractor to erect a sturdy hoarding around the Site and maintain it during the course of the construction. No vegetation or soil beyond the sturdy hoarding should be disturbed as a result of the construction activities. The conformance should be checked and recorded by photographs during the regular site audit.
- 11.7.2 To avoid undesirable impact on small mammals within neighbouring woodland areas no keeping of dogs should be allowed within the construction site. The conformance should be checked during the regular site audit.
- 11.7.3 No specific ecological monitoring requirement is proposed at this stage although surface water monitoring data from the Southern stream should be reviewed in order to assess any potential impacts from the stream realignment works.

## **11.8 Landscape and Visual**

### Landscape

- 11.8.1 A full tree survey shall be undertaken, with recommendations for retention, transplanting or felling of all trees affected. This shall be carried out in accordance with the Works Branch Technical Circular 24/94: Tree Preservation. All trees unaffected by the works shall be adequately protected from the works. This shall be monitored by the Resident Engineer or agent.

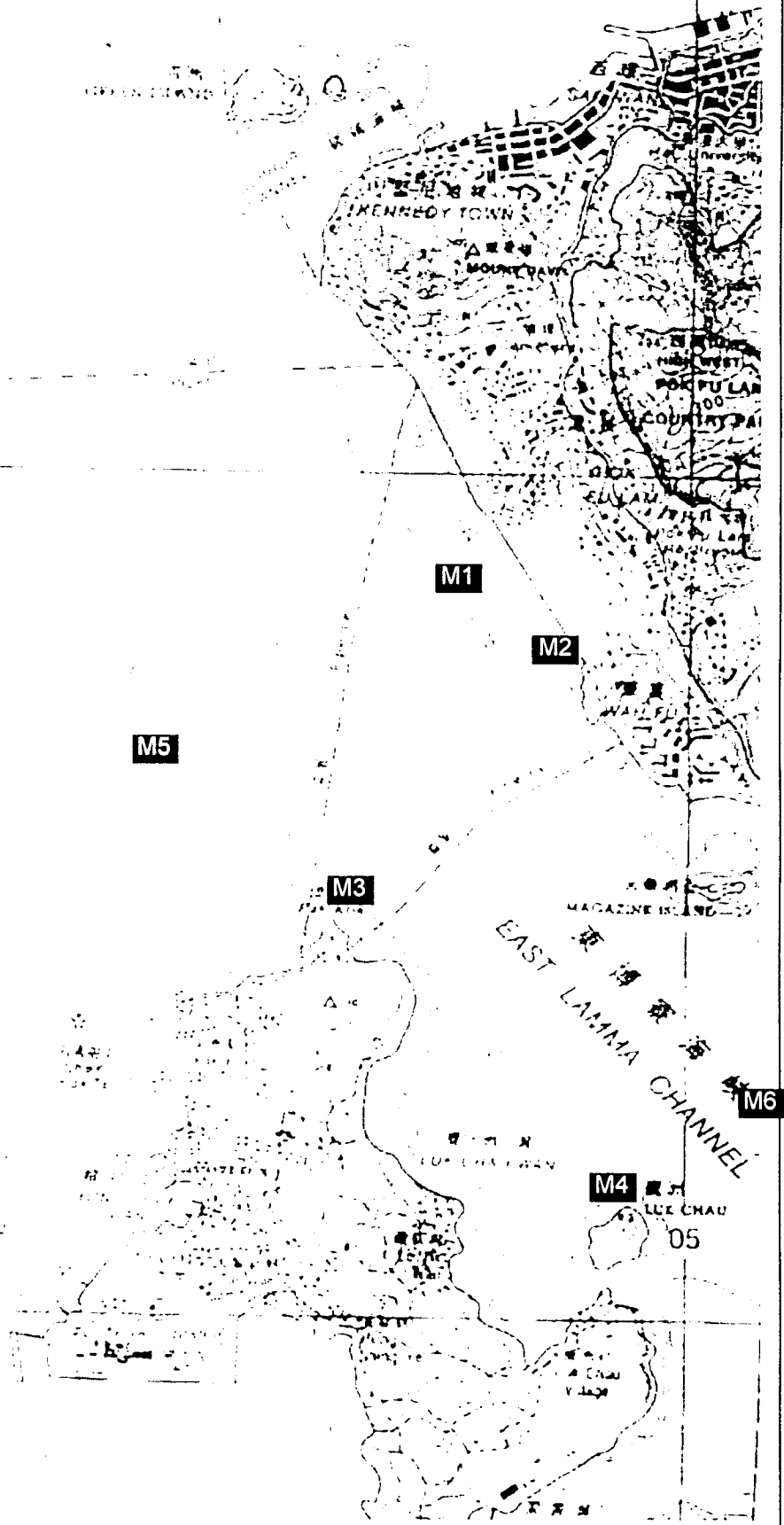
Visual

- 11.8.2 The elevated location of the visually sensitive receivers precludes visual mitigation during construction.

**11.9 Reporting**

- 11.9.1 All information obtained from monitoring and site inspections should be reviewed and presented within a monthly environmental and audit report. The major objective of the environmental and audit report will be to identify any non-compliance with the contractual and legislative requirements on water quality and recommend the subsequent corrective actions.

# Figures



65

Legend

- M1** Mixing zone boundary
- M2** WSD Pumping Station  
Seawater Intake
- M3** Coral Community
- M4** Secondary contact subzone
- M5** **M6** Control Stations

AGREEMENT NO. CE 92/97 INFRASTRUCTURAL WORKS FOR HOUSING DEVELOPMENT AT TELEGRAPH BAY  
- ENGINEERING FEASIBILITY STUDY

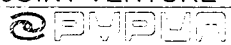
Proposed Sewage Outfall Monitoring Locations



TERRITORY  
DEVELOPMENT  
DEPARTMENT,  
HONG KONG

HONG KONG ISLAND  
AND ISLANDS  
DEVELOPMENT OFFICE

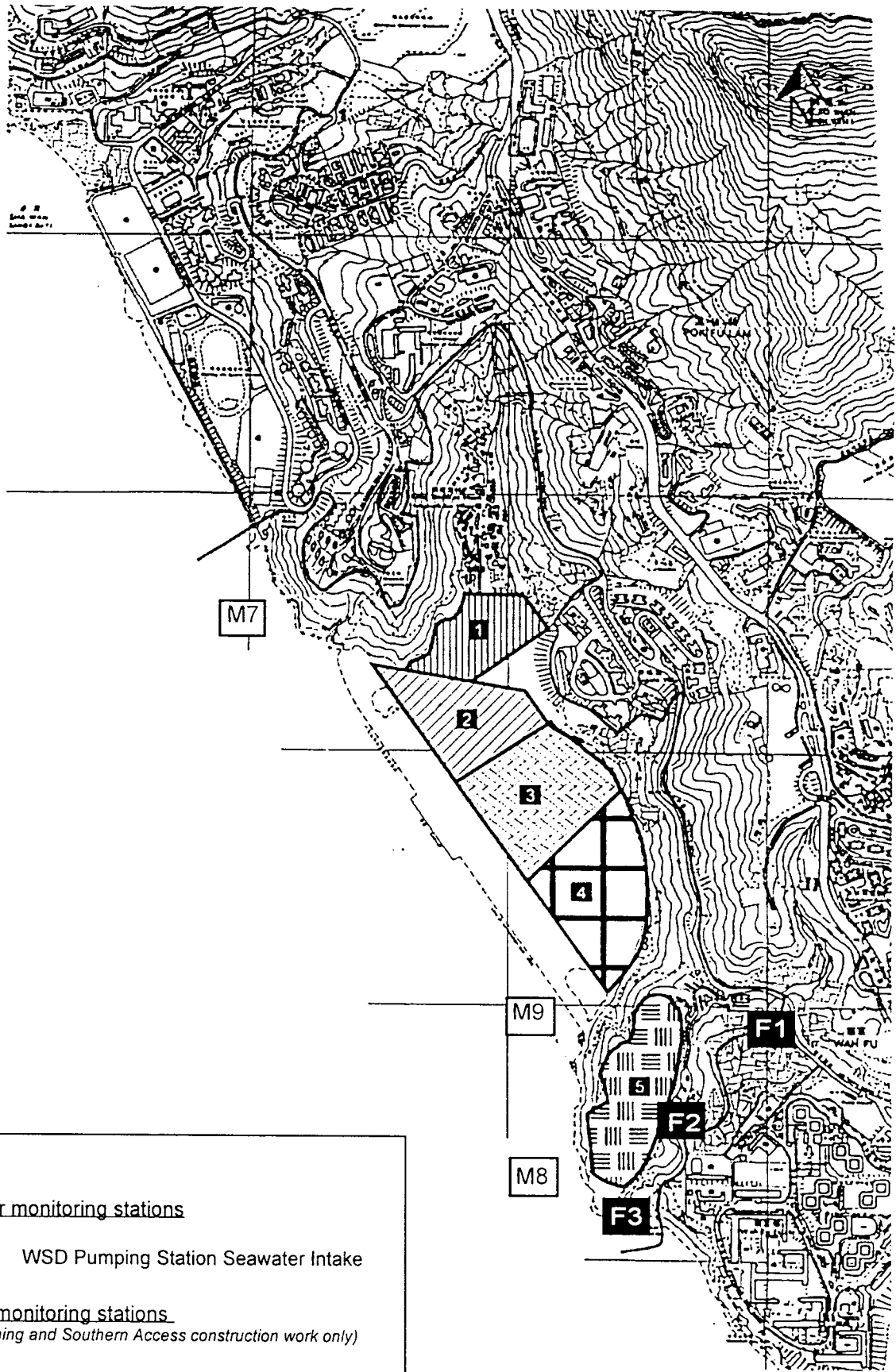
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| Legend  |   |
|---|---|
| <u>Marine water monitoring stations</u>   |   |
| <b>M9</b>   | WSD Pumping Station Seawater Intake       |
| <u>Freshwater monitoring stations</u><br>(for stream training and Southern Access construction work only) |   |
| <b>F2</b>   | Immediate downstream of training location |
| <b>F3</b>   | Downstream Location                       |
| <b>M7</b> <b>M8</b> <b>F1</b>   | Control Stations                          |

AGREEMENT NO. CE 92/97 INFRASTRUCTURAL WORKS FOR HOUSING DEVELOPMENT AT TELEGRAPH BAY  
- ENGINEERING FEASIBILITY STUDY

Proposed Water Monitoring Locations  
for Construction Phase

 TERRITORY  
DEVELOPMENT  
DEPARTMENT,  
HONG KONG  
HONG KONG ISLAND  
AND ISLANDS  
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