

2.1

PROJECT DESCRIPTION

The Sha Tin Sewage Treatment Works (STW) Stage III Extension (the Project) is designed to increase the treatment capacity of the existing Sha Tin Sewage Treatment Works to cater for increasing wastewater flows and loads as a result of residential developments in the Sha Tin catchment area. The Project is also required to comply with the new effluent discharge standard set by the Environmental Protection Department (EPD).

At present, the treated effluents from both the Sha Tin STW and the Tai Po STW are conveyed, via pumps and a sewer tunnel to the Kai Tak Nullah for disposal into the Victoria Harbour. This scheme is known as the Tolo Harbour Effluent Export Scheme (THEES). This disposal arrangement will remain in place upon completion of the Project and its performance is subject to an independent monitoring and verification programme being managed by EPD under Agreement No. CE 1/98.

The Project comprises the development of the following process elements:

- primary sedimentation tanks;
- activated sludge aeration tanks;
- final sedimentation tanks;
- sludge thickening facilities;
- sludge dewatering facilities;
- anaerobic sludge digestion tanks;
- flow control facilities;
- measurement channels; and
- ultra-violet disinfection facilities.

The works also involve the installation of electrical and mechanical (E&M) equipment for these new facilities and the replacement of some E&M equipment in the existing Stage I/II facilities.

The Project site area and boundary is shown in *Figure 2.1a*.

2.2

CONSTRUCTION PROGRAMME

The construction works for the Stage III Extension are scheduled to commence in September 2000 and to be completed in December 2003. A detailed construction programme is not available at this stage. While the actual sequence of work and construction programme is to be given by the Contractor, the major work items likely to be undertaken for this Project are presented below:

- site preparation;
- piling;
- excavation and backfilling;
- reinforced concrete construction;
- pipe laying;
- E&M equipment installation; and
- testing and commissioning.

The ET Leader of this Project shall make reference to the actual works progress and programme during the construction stage to schedule the EM&A works, and the Contractor shall provide the respective information to the ET Leader for formulating the EM&A schedule.

2.3 SENSITIVE RECEIVERS

2.3.1 Sensitive Receivers

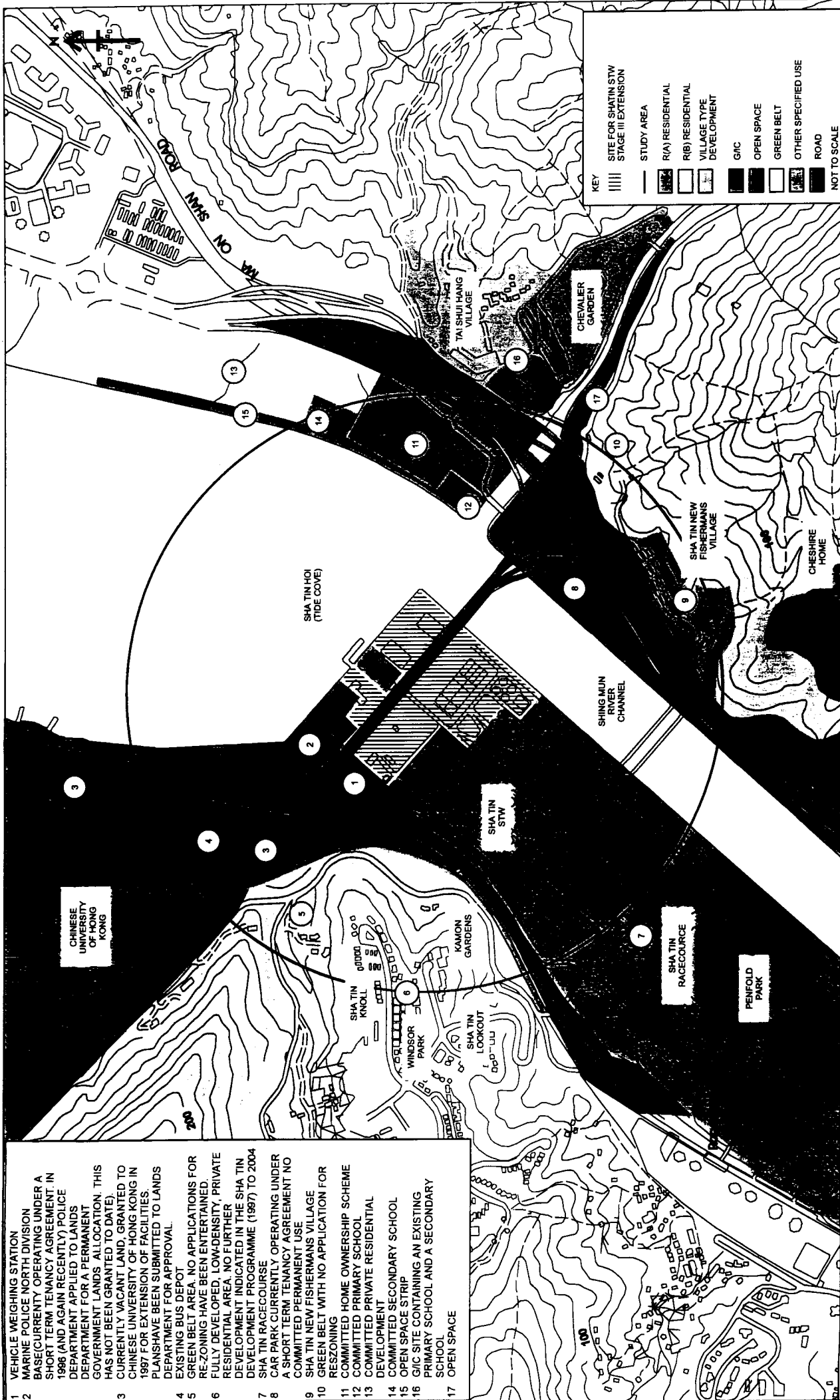
Potential sensitive receivers have been identified in accordance with the criteria set out in the EIAO TM. These sensitive receivers (SR) and their horizontal distances from the boundary of the Project area are listed in *Table 2.3a*. Locations of the SRs are shown in *Figure 2.3a*.

Table 2.3a *Location of Representative Existing and Planned Sensitive Receivers in and Near the Project Area*

SR	Location	Sensitive Use	Distance from Sha Tin STW Stage III Site Boundary (m)	Direction to Sha Tin STW	Height (mPD) (m)
S1	Windsor Park	Domestic Premises	500	West	90
S2	Existing primary and secondary schools	Educational Institution	550	North-east	10
S3	Committed Home Ownership Scheme	Domestic Premises	400	North-east	7
S4	Committed Primary School	Educational Institution	250	North-east	7
S5	Committed Secondary School	Educational Institution	475	North-east	7
S6	Committed Residential Development	Domestic Premises	750	North-east	7
S7	Chinese University of Hong Kong	Educational Institution	650	North-west	5.2
S8	Sha Tin Knoll	Domestic Premises	350	West	85
S9	Kamon Gardens	Domestic Premises	150	West	75
S10	Sha Tin Racecourse	Sports Stadium	600	South-west	5
S11	Sha Tin New Fishermen Village	Domestic Premises	400	South-east	10
S12	Cheshire Home (for the elderly)	Hostel	600	South	100
S13	Chevrier Garden	Domestic Premises	750	North-east	10
S14	Sha Tin Hospital	Hospital	550	South	10
S15	Marine Police North Division Base	Office	80	North-west	5
S16	Vacant Land Granted to CUHK	Educational Institute	400	North-west	10

2.4 SUMMARY OF THE EIA STUDY

The EIA Study of the Project has assessed the potential environmental impacts that are likely to be generated during the construction and operation of the Sha



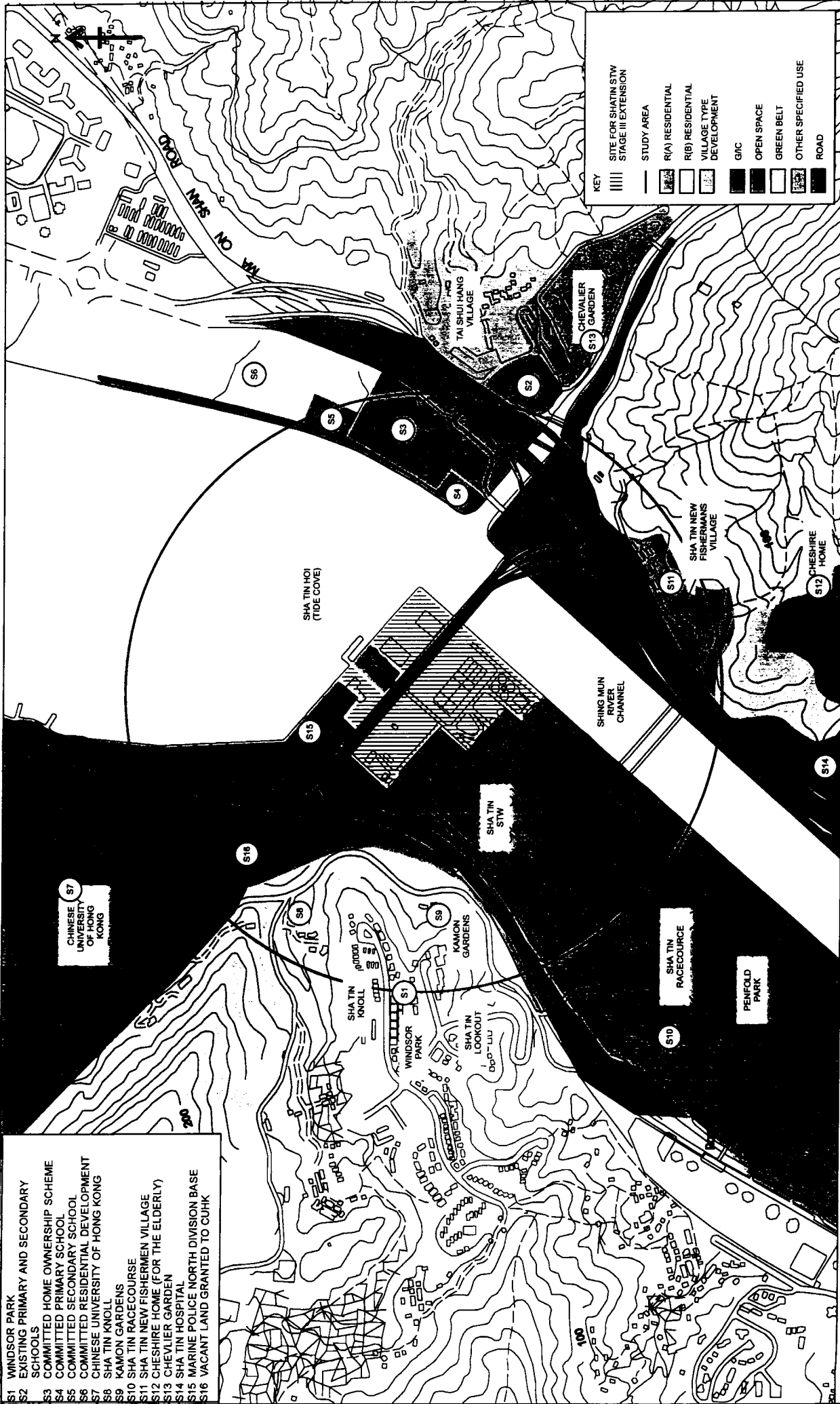
- 1 VEHICLE WEIGHING STATION
- 2 MARINE POLICE NORTH DIVISION BASE CURRENTLY OPERATING UNDER A SHORT TERM TENANCY AGREEMENT. IN 1986 (AND AGAIN RECENTLY) POLICE DEPARTMENT APPLIED TO LANDS DEPARTMENT FOR A PERMANENT GOVERNMENT LANDS ALLOCATION. THIS HAS NOT BEEN GRANTED TO DATE).
- 3 CURRENTLY VACANT LAND, GRANTED TO CHINESE UNIVERSITY OF HONG KONG IN 1997 FOR EXTENSION OF FACILITIES. PLANS HAVE BEEN SUBMITTED TO LANDS DEPARTMENT FOR APPROVAL.
- 4 EXISTING BUS DEPOT
- 5 GREEN BELT AREA. NO APPLICATIONS FOR RE-ZONING HAVE BEEN ENTERTAINED.
- 6 FULLY DEVELOPED, LOW-DENSITY, PRIVATE RESIDENTIAL AREA. NO FURTHER DEVELOPMENT INDICATED IN THE SHA TIN DEVELOPMENT PROGRAMME (1987) TO 2004
- 7 SHA TIN RACECOURSE
- 8 CAR PARK CURRENTLY OPERATING UNDER A SHORT TERM TENANCY AGREEMENT NO COMMITTED PERMANENT USE
- 9 SHA TIN NEW FISHERMANS VILLAGE
- 10 GREEN BELT WITH NO APPLICATION FOR RE-ZONING
- 11 COMMITTED HOME OWNERSHIP SCHEME
- 12 COMMITTED PRIMARY SCHOOL
- 13 COMMITTED PRIVATE RESIDENTIAL DEVELOPMENT
- 14 COMMITTED SECONDARY SCHOOL
- 15 OPEN SPACE STRIP
- 16 G/C SITE CONTAINING AN EXISTING PRIMARY SCHOOL AND A SECONDARY SCHOOL
- 17 OPEN SPACE

KEY

- SITE FOR SHATIN STW STAGE III EXTENSION
- STUDY AREA
- R(A) RESIDENTIAL
- R(B) RESIDENTIAL VILLAGE TYPE DEVELOPMENT
- G/C
- OPEN SPACE
- GREEN BELT
- OTHER SPECIFIED USE
- ROAD
- NOT TO SCALE

LOCATION OF THE PROJECT AREA

FIGURE 2.1a



LOCATION OF AIR AND NOISE SENSITIVE RECEIVERS

- S1 WINDSOR PARK
- S2 EXISTING PRIMARY AND SECONDARY SCHOOLS
- S3 COMMITTED HOME OWNERSHIP SCHEME
- S4 COMMITTED PRIMARY SCHOOL
- S5 COMMITTED SECONDARY SCHOOL
- S6 COMMITTED RESIDENTIAL DEVELOPMENT
- S7 CHINESE UNIVERSITY OF HONG KONG
- S8 SHA TIN KNOLL
- S9 KAMON GARDENS
- S10 SHA TIN RACECOURSE
- S11 SHA TIN NEW FISHERMANS VILLAGE
- S12 CHESHIRE HOME (FOR THE ELDERLY)
- S13 CHEVALIER GARDEN
- S14 SHA TIN HOSPITAL
- S15 MARINE POLICE NORTH DIVISION BASE
- S16 VACANT LAND GRANTED TO CUHK

FIGURE 2.3a

Tin STW Stage III Extension. Key issues including water quality, odour, solid wastes, visual and landuse impacts have been addressed. The key findings are summarised in this section.

2.4.1 *Water Quality*

Construction Phase

The assessment indicates that the Project will not cause major water quality impacts during the construction phase, provided that good site construction practices are used. It is recommended that a comprehensive environmental audit programme should be carried out during the construction of the Project to ensure that the proposed good site construction practices are enforced and to avoid pollution during construction.

Operation Phase

The treated effluent from the Sha Tin and Tai Po STWs is currently collected by the THEES and discharged into the Kai Tak Nullah which drains into the Kwun Tong Typhoon Shelter. The treated effluent from the Sha Tin Stage III Extension will also be collected by the THEES. Following the completion of the Sha Tin STW Stage III Extension, the Kai Tak Nullah will be diverted as part of the South East Kowloon Reclamation project. This will result in the Nullah discharging directly into the Victoria Harbour, to the west of the Kai Tak runway.

Computer modelling of water quality was carried out to simulate various background conditions in the Victoria Harbour and alternative flows and loads from the Project. The results from the test of existing conditions showed that water quality within the Kwun Tong Typhoon Shelter was extremely poor; however, once the water exited the typhoon shelter there was good mixing and dilution with the waters in the Victoria Harbour and water quality improved.

The conclusion from the computer modelling of the conditions following implementation of the Project demonstrated that the highest flows and loads from the Sha Tin STW Stage III Extension would not result in adverse water quality impacts in the Victoria Harbour provided that Stages I, II, III and IV of the SSDS were in place. Should the SSDS Stage I Interim Outfall still be in operation, a mixing zone for ammonia would be formed along the face of the South East Kowloon Reclamation due to the cumulative effects of SSDS and the THEES. The contribution from Sha Tin STW relative to that from SSDS was considered minimal. The highest simulated discharges and loads from the Sha Tin STW Stage III Extension are deemed to be environmentally acceptable.

Routine monitoring of the effluent quality of the Sha Tin STW is recommended to determine compliance with EPD licensing standards. Performance monitoring of the impacts of the Kai Tak Nullah discharges on water quality in the Victoria Harbour is subject to the independent monitoring and verification programme being managed by EPD under Agreement No. CE1/98.

2.4.2 *Air Quality*

Construction Phase

The construction phase assessment indicates that the Project will not cause major dust impacts, provided that good site construction practices are used. The

comprehensive environmental audit program recommended should be carried out to ensure dust nuisance does not occur during the construction phase.

Operation Phase

To control the potential for odour impacts during the operation of the Project, comprehensive mitigation measures are recommended. These mitigation measures which include oxygen/air injection or nitrate addition at the Sha Tin and Ma On Shan sewage pumping stations, will achieve a significant reduction in the predicted odour concentrations at the existing and committed future sensitive receivers in the Study Area. If the recommended mitigation measures are implemented, cumulative odour impacts are not envisaged and the odour concentrations at sensitive receivers are predicted to be in compliance with the 5 OU m⁻³ criteria as a 5 second average, as stipulated in the EIAO TM.

In order to ensure the performance of the recommended mitigation measures, an odour complaint registration system and an odour monitoring programme are recommended before and after the commissioning of the Stage III Extension.

2.4.3

Solid Waste

Construction Phase

The results of the land contamination study indicate that relatively high levels of contamination are present in a small area of the Project site. This area was formerly used for sludge disposal. As the contamination does not occur beyond a depth of 0.5m at location S4 (see *Figure B1* in *Annex B*) and 2m at location S6, it is recommended that approximately 1,400 m³ of contaminated soil will have to be excavated for off-site disposal to an approved landfill during the construction phase. Further tests to assess the leaching potential of the contaminated materials have been carried out and it was confirmed that the materials are suitable for landfill disposal without further treatment. Although a certain volume of contaminated materials would required off-site disposal, the field investigations revealed low or only moderate levels of contamination in other areas. It is proposed that these materials remain *in situ* unless excavation is required for foundation development of the new aeration and primary sedimentation tanks, in which case they would also have to be disposed of to an approved landfill.

Operation Phase

The operation of the Stage III Extension will generate increased sludge arisings when compared to the existing Stage I and II works. This will only require minimal additional vehicle movements for off-site disposal. Provided that the mitigation measures proposed for sludge management in this Study are adopted, the impacts associated with waste management during the operation phase of the Project should be minimal and will not pose a nuisance.

2.4.4

Visual, Landscape and Landuse Impacts

According to the results of the assessment, the proposed Stage III Extension is considered to cause only slightly adverse visual and landscape impacts to the sensitive receivers within the visual envelope. Nevertheless, with appropriate mitigation measures, including comprehensive tree planting at the periphery of the Stage III Extension, as well as along the waterfront of the Shing Mun River, the impact will be reduced to an acceptable level.

The landuse impacts of the STW Stage III Extension are considered to be acceptable, as the existing works have been in place for more than 17 years and the Project area was originally reserved for the expansion of the STW. The principal source of concern is related to off-site odour impacts but provided that the mitigation measures are implemented and perform in accordance with expectations, the Project should not cause any impact on future landuses in the Study Area. By providing additional treatment capacity of a higher standard, the Project may be viewed as having a positive impact on the development of the Sha Tin area.

2.5

ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

The EIA Study of this Project recommended that, during the construction phase, an environmental audit programme should be carried out to address the construction dust, construction site wastewater runoff, construction waste management and construction plant noise issues. In addition, the environmental audit programme will aim to ensure the mitigation measures recommended in the EIA Report are enforced and in compliance with the relevant regulations. Considering the distance of sensitive receivers from the Project Area and the type of construction methods employed for the Project, environmental monitoring of noise and dust were not recommended in the EIA Study. Similarly, potential impacts from waste water discharges and solid waste management, with suitable mitigation measures in place, should be minimal. Therefore, environmental monitoring was not recommended. Details of the implementation schedule of the mitigation measures during the construction phase of the Project are provided in *Annex B* of this *Manual*.

For the operation phase environmental monitoring programme, the main objectives are to confirm the odour assessment findings and to ensure the satisfactory performance of the treatment works after the Stage III Extension is commissioned. The odour EM&A programme will require an odour complaint registration system to be established and odour monitoring to be carried out at the Sha Tin STW and at the nearby sensitive receivers. Environmental monitoring was not recommended for solid waste management issues or noise impacts because the potential for adverse consequences should be minimal. The on-going programme of effluent quality monitoring at the Sha Tin STW will be continued under the discharge license required by the *Water Pollution Control Ordinance (WPCO)*.

2.5.1

Project Organization

The Project organisation and lines of communication during the construction phase of the Sha Tin STW Stage III Extension with respect to environmental protection works is shown in *Figure 2.5a*.

The Environmental Team (ET) shall be employed by the Contractor appointed for this Project. The Contractor shall propose for the approval of the Engineer or the Engineer's Representative (ER) the employment of the ET leader. Control shall be exercised by the Engineer on the performance of the ET even though they are employed by the Contractor.

The personnel that should be employed to take up the responsibilities of the ET leader and IC(E) shall have relevant professional qualifications in Environmental Sciences or Environmental Engineering, and have sufficient relevant EM&A

experience. The IC (E) and ET leader should possess at least 7 years experience in EM&A and/or environmental management. An accreditation scheme is currently under development to standardise the qualifications of EM&A staff, and so accredited professional shall be employed for the roles of ET leader as far as possible.

The responsibility of respective parties are:

The Contractor

- Employ an Environmental Team (ET) to undertake environmental audit work during the construction phase of the Project.
- Provide assistance to ET in carrying out regular environmental audits and ensuring that environmental mitigation measures recommended in the EIA Study and in the Contract Specifications are enforced.
- Implement corrective actions and other measures to reduce impacts where environmental non-compliance findings are identified in the course of the regular environmental audits.
- Adhere to the procedures for carrying out complaint investigations in accordance with *Section 3.4*.

The Engineer or Engineer's Representative

- Supervise the Contractor's activities and ensure that the requirements in the *EM&A Manual* and pollution control clauses in the Contract Specification are fully complied with.
- Inform the Contractor when corrective action is required from the findings of the environmental audit.
- Employ an Independent Checker (Environment)(IC(E)) to audit the results of the EM&A works carried out by the ET.
- Adhere to the procedures for carrying out complaint investigations in accordance with *Section 3.4*.
- Report and liaise with the EPD on audit findings, corrective actions and any matters in relation to the EM&A programme of the Project.

The Environmental Team

- Carry out site inspections to investigate and audit the Contractor's site practices, equipment and work methodologies with respect to pollution control and environmental mitigation, and anticipate environmental issues for proactive action before problems arise.
- Audit and prepare audit reports on the site environmental conditions.
- Report on the environmental audit results to the Contractor, the ER, and IC(E).
- Recommend suitable mitigation measures or a corrective action plan to the

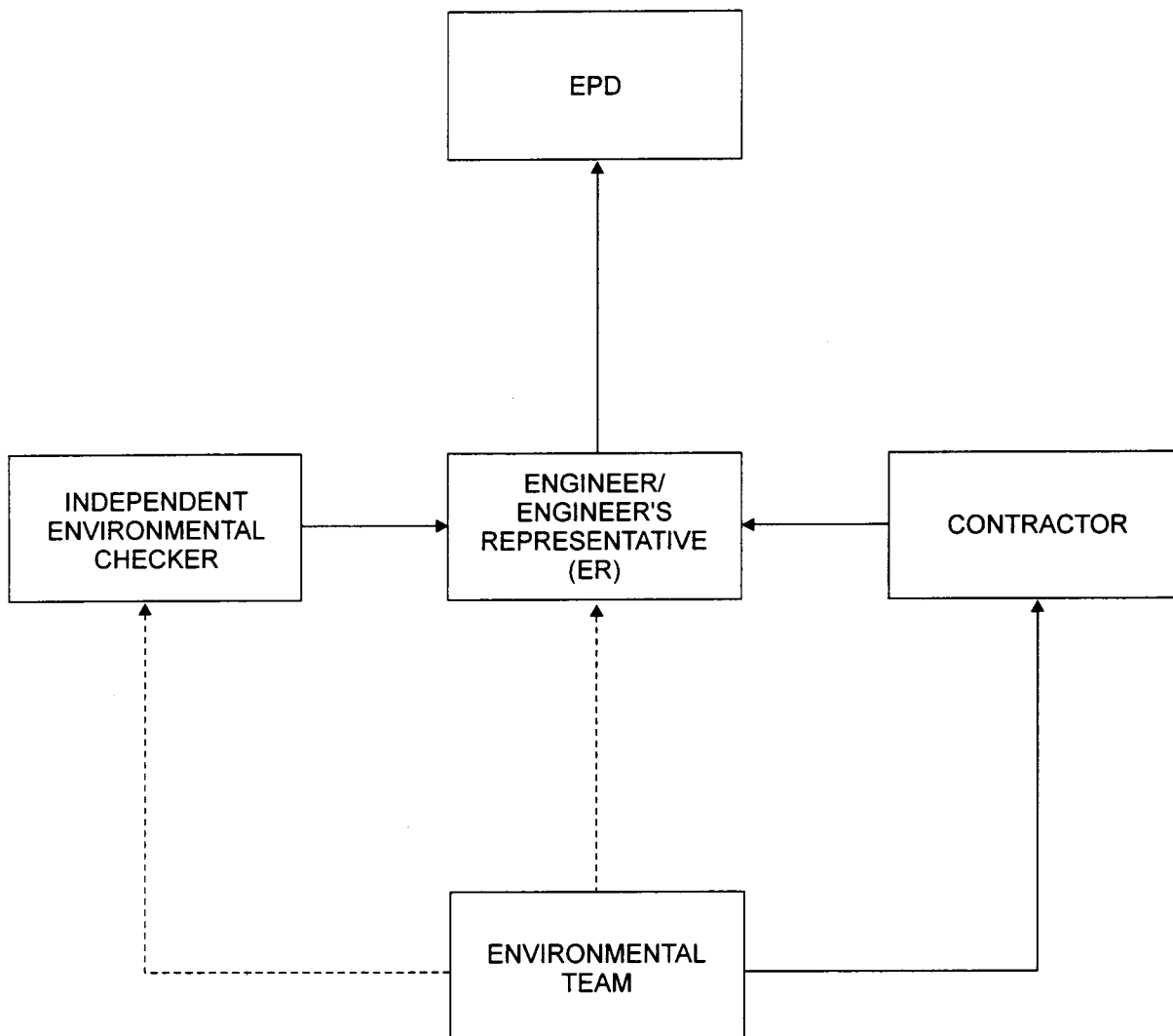


FIGURE 2.5a LINES OF REPORTING DURING THE CONSTRUCTION PHASE OF THE PROJECT

Contractor when findings in the regular environmental inspections/audits identified specific environmental issues generated from the construction work practices.

- Adhere to the procedures for carrying out complaint investigations in accordance with *Section 3.4*.

Independent Checker (Environmental)

- Review the EM&A works performed by the ET.
- Audit the construction activities, and the reports of environmental inspections conducted by the ET.
- Report the audit results to the ER.
- Review the EM&A reports submitted by the ET.
- Review the proposals on mitigation measures submitted by the Contractor in accordance with the findings of the regular environmental inspections and the corrective action plans recommended by the ET.
- Adhere to the procedures for carrying out complaint investigations in accordance with *Section 3.4*.

Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.