ROUTE 3 TAI LAM TUNNEL & YUEN LONG APPROACH - SOUTHERN SECTION

FINAL DETAILED ENVIRONMENTAL IMPACT ASSESSMENT

Volume 3 - Environmental Monitoring & Audit Manual

August 1995

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

ROUTE 3 CONTRACTORS CONSORTIUM

ROUTE 3 TAI LAM TUNNEL & YUEN LONG APPROACH - SOUTHERN SECTION

FINAL DETAILED ENVIRONMENTAL IMPACT ASSESSMENT

Volume 3 - Environmental Monitoring & Audit Manual

August 1995

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

Room 1201, Tai Yau Building
181 Johnston Road, Wanchai, Hong Kong
Telephone : (852) 2893 1551 Facsimile : (852) 2891 0305

QUALITY ASSURANCE POLICY STATEMENT

Consultants in Environmental Sciences (Asia) Ltd is committed to satisfying the requirements of its Clients at the highest standards of professional ethics.

It is the Company's objective to provide services which meet the required specification and are produced on time in a cost-effective manner.

In pursuit of these objectives, the Directors have implemented Quality Systems based on ISO 9001 standard. All employees of the Company have a responsibility for quality.

The quality procedures are under continual review by senior Management to ensure that the changing needs of the Company's Clients are met.

CONSULTANTS IN
ENVIRONMENTAL
SCIENCES (ASIA) LTD

CES (ASIA) LTD DOCUMENT RELEASE FORM			
TITLE	Route 3 Tai Lam Tunnel & Yuen Long Approach - Southern Section Detailed EIA (Volume 3 - EM&A)		
CLIENT	Route 3 Contractors Consortium		
REPORT NO.	650	PROJECT NO.	96530
STATUS	Final	DATE OF ISSUE	16/8/95
QUALITY CONTROL	NAME	SIGNATURE	DATE
CHECKED BY	E Chan		16.8.95
TECHNICAL REVIEWER	P Kreuser		16.8.95
APPROVED BY	T J Cramp	T.J.Cramp	16/8/95

REMARKS : The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing. Where information has been supplied by third parties, such information is reproduced here in good faith.

CES (Asia) Ltd accepts no responsibility for changes made to this report by third parties.

CONTENTS

List of Tables

List of Figures

Appendix

ACRONYMS

ACE	Advisory Council on the Environment
AIP	Approval in Principle
APCO	Air Pollution Control Ordinance
AQO	Air Quality Objective
DEIA	Detailed Environmental Impact Assessment
DEP	Director of Environmental Protection
DO	Dissolved Oxygen
EIA	Environmental Impact Assessment
EM&A	Environmental Monitoring & Audit
EPD	Environmental Protection Department
ET	Environmental Team
HKPSG	Hong Kong Planning Standard Guidelines
NCO	Noise Control Ordinance
NSR	Noise Sensitive Receiver
NTCR	New Territories Circular Road
PDS2EA	Preliminary Design Stage 2 Environmental Assessment
PME	Powered Mechanical Equipment
ppb	Parts per Billion
ppm	Parts per Million
R3CC	Route 3 Contractors Consortium
RSP	Respirable Suspended Particulates
SR	Sensitive Receiver
SS	Suspended Solids
SWL	Sound Power Level
TAT	Trigger, Action & Target
TLT & YLA(S)	Tai Lam Tunnel & Yuen Long Approach (Southern Section)
TM	Technical Memorandum
TSP	Total Suspended Particulates
WC	Works Checker
WDO	Waste Disposal Ordinance
WPCO	Water Pollution Control Ordinance
WQO	Water Quality Objective

1 INTRODUCTION

1 INTRODUCTION

1.1 Background

The new Hong Kong International airport at Chek Lap Kok on the north coast of Lantau Island is scheduled to commence operations in 1997. To serve the new airport as well as the proposed container terminals 10 and 11 (also located on Lantau Island), extensive infrastructure and transport links are required.

Route 3 Tai Lam Tunnel and Yuen Long Approach (R3 TLT & YLA) is an integral part of this supporting transport network, extending from Ting Kau to Au Tau, including the Northern Link (Au Tau Interchange to Yuen Long) and the connection to the New Territories Circular Road (NTCR).

An Environmental Assessment (EA) study for the R3 TLT & YLA (including the conveyor system under a separate cover) Preliminary Design Stage 2 (PDS2) was undertaken by Freeman Fox Maunsell for Highways Department according to a brief provided by the Environmental Protection Department (EPD). This study, hereafter referred to as the PDS2EA, was completed in March 1994, conditionally recommended for endorsement by the Advisory Council on the Environment (ACE) EIA Subcommittee on 5 July 1994 and was subsequently endorsed by the full ACE committee, subject to certain conditions.

This project is now being undertaken by a franchisee, Route 3 (CPS) Company Limited, that has delegated responsibilities for design and construction to Route 3 Contractors Consortium (R3CC). A set of Construction Requirements are given in Appendix 5 part I of the Project Agreement, including various requirements for a Detailed Environmental Impact Assessment (DEIA) for aspects which were not covered adequately by the PDS2EA or had considerable design changes.

The R3 TLT & YLA (S) DEIA fulfills the requirements of the assessment for the Southern Section of the Main Line extending from the works boundary with Ting Kau Bridge up to and including the Kam Sheung Access Road (Volume 1), and the Conveyor System (Volume 2). This Manual is designed to meet the environmental monitoring and audit (EM&A) requirements of the Construction Requirements and forms Volume 3 of the DEIA.

1.2 Purpose of Manual

This Manual outlines the environmental monitoring and audit programmes for the construction and operational phases of the southern section of the TLT & YLA and the Conveyor system in accordance with the Construction Requirements, included in clauses 10.4 to 10.10. The aims of these programmes are to verify the DEIA predictions, to confirm the effectiveness of mitigation measures, and to ensure compliance with construction licence conditions and pertinent environmental legislation. Pro-active response is emphasised in this Manual through a series of systematic monitoring and checking procedures to detect and mitigate environmental impacts at their early stages.

1.3 Project Site and Works

The project site extends northwards from the Ting Kau Interchange off the northern ramp of Ting Kau Bridge to the Kam Sheung Access Road (see Figure 1.1). The South Portal

of the Tai Lam Tunnel is located in a Water Services Department (WSD) catchment area outside of the border of the Tai Lam Country Park at 85 mPD. Excavation, cutting and filling will be undertaken to form the road bed. An area near the portal site will be excavated to store, crush and screen the excavation spoil from the Tai Lam Tunnel.

Handling of excavated and cut material will be by a conveyor system extending from the processing area near the portal site to a barge loading point off the Gemini headland by the Rambler Channel. Approximately 4.5 Mm^3 of excavated spoil material will be transported via this conveyor system over a period of some 2 years.

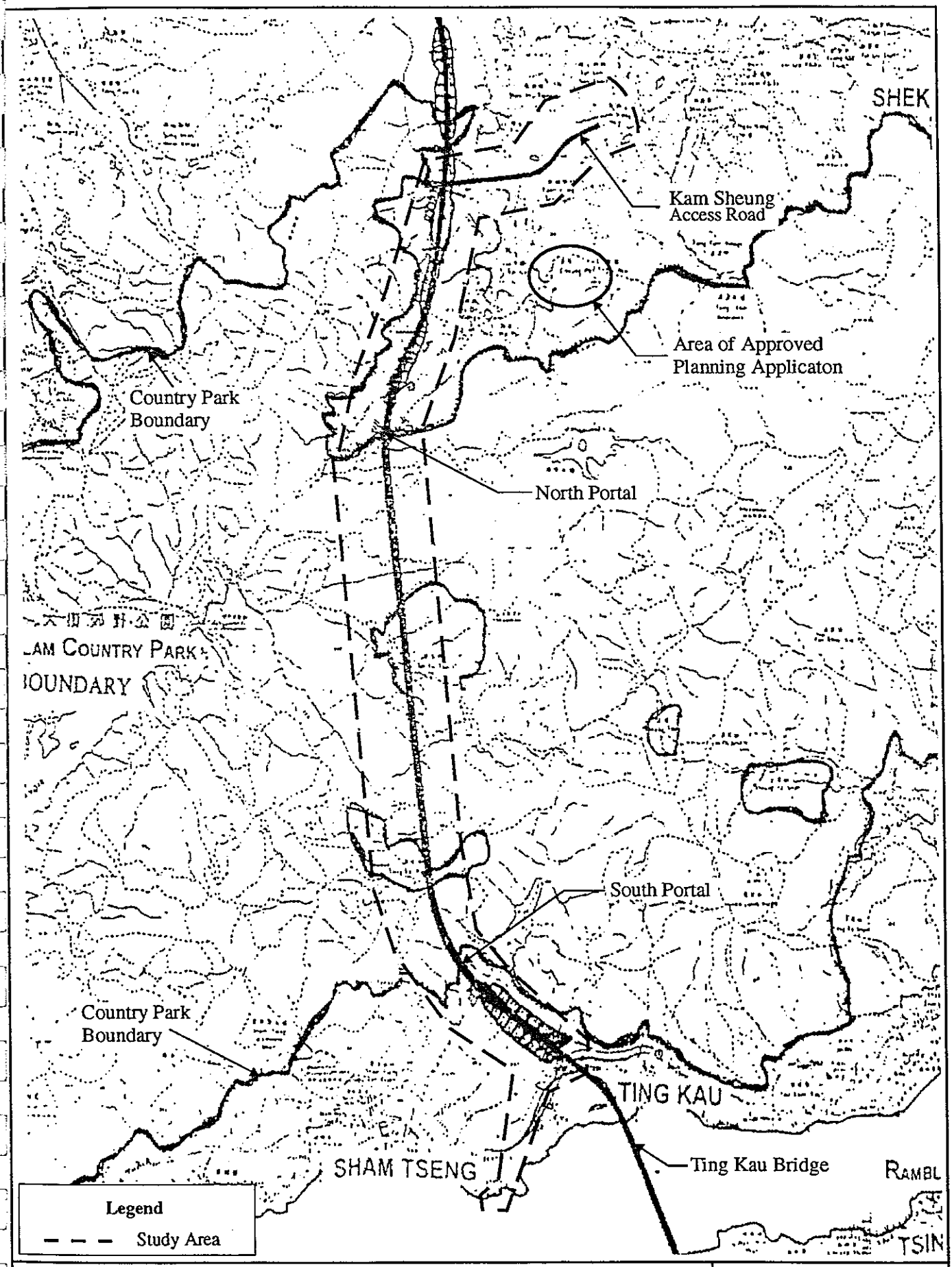


Figure 1.1 TLT & YLA (South) Study Area

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

2 ENVIRONMENTAL IMPACT ASSESSMENT STUDIES

2 ENVIRONMENTAL IMPACT ASSESSMENT STUDIES

2.1 Summary of the PDS2EA

2.1.1 Air Quality Impacts

Construction Phase

Main Line
It was predicted that the Air Quality Objectives (AQOs) for both 1-hour guideline and 24-hour statutory maximum total suspended particulates (TSP) levels (500 μgm^{-3} and 260 μgm^{-3} respectively) may be exceeded at nearby sensitive receivers (SRs) if mitigation is not effective. Cumulative effects of other large construction projects in the vicinity of the site area were not included.

Conveyor System
The 1-hr and 24-hr TSP levels at the identified SRs, namely the Pink/Gold Villas and Homi Villa were predicted to be substantially below the maximum concentration criteria. Cumulative effects of other construction projects in the vicinity were not assessed.

Operational Phase

Concentrations of carbon monoxide (CO), nitrogen dioxide ($NO_{2)}$ and respirable suspended particulates (RSP) were predicted to remain within acceptable limits, except in areas close to the Route, where some of these concentrations are expected to exceed the AQO. Cumulative levels of pollutants at 4 ground level receivers along the route (Cassam Beach, Ho Pui Village, Ma On Kong Village and Tai Kek Village) were also predicted to be within the AQO maxima.

2.1.2 Noise Impacts

The locations of identified noise sensitive receivers (NSRs) coincide with the air quality sensitive receivers.

Construction Phase

Main Line
The worst case mitigated construction noise at NSRs was expected to exceed 75 dB(A) $L_{Aeq\ (30\ min)}$, a daytime noise limit commonly accepted in government projects, at thirteen properties.

Conveyor System
The noise levels at the NSRs arising from both mechanical operations and impact of materials were predicted to be below the 75 dB(A)$L_{Aeq\ (30\ min)}$ criterion.

Operational Phase

Cumulative noise impact assessment indicated that the 70 dB(A) noise criterion would be exceeded at one NSR.

2.1.3 Water Quality Impacts

Sensitive receivers identified included fresh and marine water bodies, as follows:

- A stream in the deep V-shaped valley that runs north-east towards the San Miguel brewery in Sham Tseng;
- Catchwater draining the eastern area of the Tai Lam Country Park towards the Tai Lam Chung Reservoir (via a series of water tunnels and open culverts);
- Water tunnel adjacent to the South Portal connecting Tai Lam Chung Reservoir to Tsuen Wan and linking the catchwater to the Tai Lam Chung reservoir via the Sham Tseng Settlement Basin reservoir;
- Catchment of a stream underneath the alignment immediately above the Ting Kau Interchange which drains to Lido Beach;
- Gemini Beaches and inland coastal waters.

Construction Phase

Main Line
Fresh and marine water quality impact could arise from (i) surface run-off from cuttings and works areas containing high levels of suspended solids (SS); (ii) liquors with significant quantities of cement derived materials with localised effects of increased pH and turbidity in receiving water bodies; and (iii) spillage, leakage and/or indiscriminate disposal of petroleum products from construction sites. This will be minimised through observance of the "best engineering practice" defined in the Practice Note for Professional Persons PN 1/94 issued by EPD, as far as possible.

Conveyor System
It was predicted that surface run-off of the cutting areas may result in increases in turbidity and suspended solids levels and impact fresh and marine water receiving bodies. Stockpiling of excavated material in the barge loading area could similarly impact on the marine water quality. This will be minimised through observance of the "best engineering practice" defined in the Practice Note for Professional Persons PN 1/94 issued by EPD, as far as possible.

Operational Phase

While road surface run-off will contain some amount of sediments, surfactants, hydrocarbons and materials, its impact on either freshwater or marine water quality was not expected to be significant during this phase of the Project.

2.1.4 Ecological Impacts

Construction Phase

Main Line
Potential impacts included the loss and disturbance of habitats, notably the loss of mature forest as a result of landtake between Tuen Mun Road and the South Portal. Impingement on the Country Park was not considered desirable, however a detailed survey of the area potentially affected by the road indicated that the habitats to be disturbed were not of major ecological significance.

Conveyor System

The principle impact would be the loss of mature woodland habitat within a stream valley, and the associated effects on avifauna and local amphibians.

Operational Phase

Ecological impacts on the area following construction would be from increased disturbance to species, notably disturbance to ardeids (egrets and herons) in the Ho Pui area.

2.2 Summary of the R3 TLT & YLA (S) - Main Line DEIA

2.2.1 Air Quality Impacts

Construction

The findings were broadly similar to those of the PDS2EA, except that blasting was not previously addressed. With the committed mitigation measures, dust levels during construction were predicted to comply with the 1-hr TSP guideline limit and the 24-hr TSP AQO at all sensitive receivers. This will be confirmed through the EM&A programme. Additional mitigation such as further refinement of blasting procedures will be taken if needed.

Operational

NO_2 levels from traffic emissions and ventilation exhaust during operation were predicted to meet AQO requirements at the existing sensitive receivers and the fresh air supply to the tunnel will also meet the AQO for NO_2. Buffer distances of 350 m and 300 m from the ventilation shafts of the northern and southern ventilation buildings respectively would be required for future sensitive uses.

2.2.2 Noise Impacts

Construction

Construction noise was predicted to comply with the daytime noise criterion of 75 dB(A) at representative sensitive receivers with the mitigation measures listed in the DEIA. Construction during restricted hours requires a Construction Noise Permit. The contractor will adhere to statutory requirements under the CNP.

Operational Phase

Traffic noise during the operational phase was predicted to meet the HKPSG limit for the area north of the North Portal if friction course is used. Traffic noise was predicted to also meet the HKPSG limit for all representative NSRs south of the South Portal except two (R2 and R70). Noise at these 2 facades are dominated by traffic on Tuen Mun Road. Route 3 contributes 0.1 dB(A) to R2 and a maximum of 2.2 dB(A) out of an overall noise level of 80 dB(A) to R70 overlooking Ramp C. A noise barrier along Route 3 to protect R70 was found to be ineffective due to traffic noise from Tuen Mun Road. Mitigation at the receiver with acoustic insulation is more appropriate and was recommended.

2.2.3 Water Quality Impacts

Construction Phase

Potential water quality impacts during construction include site runoff, sewage and wastewater generated by workers, dewatering of ponds and pond mud leachate, and production water discharge during tunnelling. Mitigation measures include suspended solids removal using stilling ponds, oil and grease removal using oil interceptors and grease traps, use of septic tanks and chemical toilets for sewage, and recycling of production water where possible.

Operational Phase

Residual impacts have been addressed, and are considered to be similar to those identified during PDS2EA, ie. due to the surface and tunnel runoff from the highway. The runoff is not expected to differ from that found in any urban runoff derived from large scale vehicular transport infrastructure. The impact will be reduced through installation of silt traps and oil interceptors at strategic locations and effective management in case of spillage or traffic accidents.

Sewage generated by the work force in the Administration Building required attention due to lack of sewerage system in the area. A septic tank will be installed and will not discharge to a water course.

2.2.4 Landscape and Visual Impacts

The road will potentially give rise to significant landscape impacts, particularly in the vicinity of the South Portal and its approach, where there is to be deep cutting. A revision in the design, reducing the depth of the road cutting has reduced the severity of the impacts as predicted in PDS2EA.

2.2.5 Ecological Impacts

In terms of ecological impacts, no major unexpected finding has emerged from the further surveys and assessments conducted to date. However, two new egret and heron nesting sites have been identified close to Ho Pui Egretry. These are located outside the project works boundary. Therefore the findings remain broadly similar to those of the PDS2EA.

Individuals of a protected plant species, *Enkianthus quinqueflorus*, within the works areas may be subject to disturbance and removal due to construction. It was also predicted that ardeid use sites near the works boundary near Ho Pui could be disturbed. The overlapping of the construction works period with the ardeid breeding season (March to September) may have a negative impact on Ho Pui and Ma On Kong egretries.

2.3 Summary of the R3 TLT & YLA (S) - Conveyor System DEIA

2.3.1 Air Quality Impacts

Dust sources include:

- end-tipping of fill material from the trucks
- bulldozing fill material
- trucks travelling on the unpaved site and the access road
- wind erosion of open site during construction
- loading of material to main conveyor then onto stockpile during operation
- loading of material from underground conveyors onto barges during operation

Dust levels at representative sensitive receivers during the construction and operation of the conveyor system were predicted to comply with guideline and AQO limits with the implementation of mitigation measures.

2.3.2 Noise

Construction of the conveyor system has the potential to cause a significant noise nuisance to nearby Noise Sensitive Receivers (NSRs) at Pink Villa and the isolated residence near Sham Tseng Tsuen. Nuisance may arise from a concentration of Powered Mechanical Equipment (PME) along the linear conveyor alignment or at the barging point. Near Pink Villa, most construction activities are amenable to mitigation to bring their noise levels within daytime and evening noise limits. Near the isolated NSR, daytime limits will probably be attainable, but evening works will have to be closely monitored to ensure compliance with Noise Control Ordinance (NCO) limits.

During operation of the conveyor, assuming a contribution of 64 dB(A) at Pink Villa from the barging point during the restricted evening hours, the contribution at Pink Villa from the conveyor is restricted to a maximum of 57 dB(A). This is achievable with a source Sound Power Level (SWL) of 82 dB(A) or less. This same source SWL will permit the Acceptable Noise Level at the isolated NSR to be achieved.

2.3.3 Water Quality

Marine water quality impacts may arise during the construction of the seawall and embankment slopes over a 6 week period. Site formation will take place behind the seawall with approximately 50,000 m^3 of fill over a 2 month period. Impacts on the fresh water quality would be mainly at the stream catchment areas where cutting takes place. As this work is of short duration and small scale, water quality impact will be temporary and should be minor compared to much larger scale reclamations presently carried out in Hong Kong.

Impacts during the operation of the conveyor system include drainage from the stockpile area and the effect of the jetty area (a reclaimed headland into the sea) on the flushing capacity of the Gemini Beaches to the east. A drainage scheme was devised to contain all surface runoff at the stockpile area. In view of the fact that *E. coli* at the Gemini Beaches is already high and there are other cofactors affecting the bacteria concentration, the temporary erection of the jetty is considered not likely to cause considerable deterioration of water quality at the remaining Gemini Beaches.

2.3.4 Landscaping and Visual Issues

The conveyor system will cause a number of impacts at local level. This effect can be reduced by implementing the recommended mitigation measures. In general, the summary of potential landscape and visual impacts outlined by the PDS2EA remains valid for this study (Table 2.1).

Table 2.1 Summary of Potential Landscape and Visual Impacts

Element	Construction	Operational	Residual
Landform	Low (locally moderate)	Low (locally moderate)	Low
Landscape character	Moderate	Moderate	Positive
Visual receivers	Low (locally severe)	Low (locally severe)	-

2.3.5 Ecological Impacts

The estimated habitat loss includes 1.5 ha of woodland mainly in a ravine, and 8.4 ha of shrubland. A protected species, *Rhododendron simsii,* which is located in the ravine may be disturbed and cleared. Loss of ravine habitats may have adverse effects on avifauna as well as on local populations of amphibians. Mammals, especially burrowing mammals, may suffer habitat loss during the construction phase.

2.4 Suggested Mitigation Measures

Mitigation measures for air quality, noise, water quality and ecological impacts as suggested in the PDS2EA, the TLT & YLA (S) DEIA and the Conveyor System DEIA report are summarised as follows:

2.4.1 Air Quality Impacts

Main Line

- frequent wetting or covering of exposed site surface; possible use of chemical wetting agents;
- use of chemical stabilizers on completed cuts and fills;
- cover and dampen truck loads;
- gravelling or sealing of unpaved site roads;
- regulate traffic speed on unpaved roads to a reasonably low speed;
- provide wheel washing facilities at all vehicle exit points;
- adopt filtration at concrete batching plants and crushing plants;
- adopt automatic water spraying system for the stone crushing and associated processes; and
- apply water and possibly chemical wetting agent to better wet the stockpiles.

Conveyor System

In addition to the measures described above, specific dust mitigation measures pertinent to the conveyor system are:

- enclose the conveyor with a steel roof on the top, dust curtains on the two sides and wind boards on the bottom;
- use water sprays to suppress dust at point of discharge in the barge loading area;
- remove dust deposition on conveyor belt surface with scrapers;
- minimise dropping height of the discharge point;
- minimise stockpiling at barge loading jetty; and
- wetting of all stockpiles with water spraying.

2.4.2 Noise Impacts

Main Line

- employ silenced plant;
- enclose or acoustically screen carpentry operations and locate these operations at least 100 metres from the nearest residential building; and
- placement of permanent 0.8 m noise barriers along bridges and use of friction course (operational phase).

Conveyor System

In addition to the above mentioned measures, specific noise mitigation measures pertinent to the conveyor system are:

- enclose the drive house and site it far away from the NSRs;
- regular maintenance and inspection of conveyor system and enclosure; and
- avoid parallel noisy operations.

2.4.3 Water Quality Impacts

Main Line

- install drainage channels and settlement lagoons in site compounds to control contaminated surface water;
- provide settling and pH adjustment facilities for concrete batching plant discharges;
- provide appropriate effluent treatment facilities at site works areas;
- install oil interceptors in site compounds and empty contents regularly. Provision of a by-pass to prevent flushing during rain storm events;
- bund oil, fuel and chemical bunkers (to hold 110% of maximum storage volume) and line the bunkers with an impervious material to prevent seepage;
- connect all sewage discharges to either a treatment facility, or alternatively provide chemical toilet facilities on work sites; and
- construct a trench to divert run-off from the stream to avoid contamination

Conveyor System

Further water quality mitigation measures pertinent to the conveyor system are:

- restrict the conveyor system access road to service traffic only;

- partially seal the service road to enable dust retention and reduce run off contamination; and
- construct jetty by prior establishment of sea wall.

2.4.4 Landscape and Visual Impacts

Main Line

- restrict volume of construction traffic on local road network;
- restrict the construction working areas to a minimum;
- enclose the working areas with hoardings, where possible;
- restrict heights of storage materials, stock piles and spoil heaps to low levels as far as possible;
- minimise night-time working and lighting; and
- advanced planting in designated landscape areas.

2.4.5 Ecological Impacts

Main Line

- compensatory planting in a ratio of 3:1 (replacement area to lost area of woodland) using native species as suggested;
- establishment of conservation management regimes in 2 fish ponds which will be partially lost through construction, to increase carrying capacity for water birds;
- transplanting individuals of *Enkianthus quinqueflorus* to nearby suitable sites;
- avoidance of sedimentation of Sham Tseng Stream and other unnecessary habitat destruction.

Conveyor System

- compensatory planting in a ratio of 3:1 (replacement area to lost area of woodland) using native species as proposed in the DEIA;
- transplanting individuals of *Enkianthus quinqueflorus* and *Rhododendron simsii* to nearby suitable sites;
- hand excavation of mammal burrows and capture and release of mammals into secure areas such as Tai Lam Country Park;
- avoidance of night operations to minimise disturbance to nocturnal mammals;
- avoidance of sedimentation of Sham Tseng Stream by erosion control, earthen berms, hydroseeding and revegetation of exposed slopes.

2.4.6 General Nuisance Control Measures

In addition to the environmental impact mitigation measures outlined above, general nuisance control measures shall be implemented by the Contractor, including:

- compliance with Public Cleansing and Prevention of Nuisances By-Law 1972;
- maintenance of site in clean and tidy condition, orderly storage of materials for temporary works;
- rubbish and debris shall be removed from site frequently;
- wastes and other materials shall not be burned on site;
- wastes from grease traps shall be collected and disposed of by a licensed contractor;
- earth, rock or debris shall not be deposited on public or private rights of way;

- existing stream courses and drains within and adjacent to the Site shall be kept safe and free from any debris and any excavated material arising from the Works;
- adequate precautions shall be provided to ensure that spoil or debris is not allowed to be pushed, washed down, fall or be deposited on adjacent land or on the seabed adjacent to the site.

3 PROJECT ORGANISATION

3 PROJECT ORGANISATION

3.1 Environmental Responsibilities of the Franchisee

Under the contract, the Franchisee is required to impose specific conditions on the contractor regarding:

- Cleanliness of works site;
- Abide with the pertinent environmental legislation - the Water Pollution Control Ordinance (WPCO), the Noise Control Ordinance (NCO), the Air Pollution Control Ordinance (APCO), and the Waste Disposal Ordinance (WDO);
- Compliance with established noise criteria/guidelines;
- Maintenance of all roads, footways, access roads, streams, drains etc.;
- Discharge or disposal of all water and waste products;
- Construction, maintenance, removal and reinstatement of temporary drain;
- Dust suppression measures;
- Operation of cutting and excavation equipment and procedures for the avoidance of pollution during cutting/excavation, conveyance and removal of spoil material;
- Operation of concrete batching plant and rock crushing plant;
- Protection of bathing water quality;
- Protection of water quality at water intakes;
- Construction and working methods to ensure compliance with relevant standards and the conditions of land within the site;

The above responsibilities will be discharged by setting up an Environmental Team (ET) for the task. The ET will be responsible for carrying out environmental monitoring and audits to the standard required by the Environmental Protection Department (EPD) as described in the Construction Requirements, Appendix 5 Part I of the Project Agreement. For design and construction works, these responsibilities have been delegated to the Route 3 Contractors Consortium (R3CC) by the franchisee.

3.2 Project Organisation

3.2.1 Internal Organisation of the Project Team

Figure 3.1 outlines the structure of the project management team.

3.2.2 Internal Organisation of the Environmental Team

The Environmental Manager (Gael Ogilvie, of R3CC) is experienced in monitoring and audit of construction work. She will be supported by specialists in each environmental area of environmental impact concern as well as a field monitoring team. The Environmental Manager will report to R3CC on all the environmental issues.

3.3 Project Programme

The project programme has been laid out in detail in the proposal agreed by Government with the franchisee. This calls for construction of the whole project to be completed within 38 months from the date of execution of the project agreement. The Northern Section works will commence after control of the land is given to the contractor by the Government. The conveyor system will operate for about 2 years.

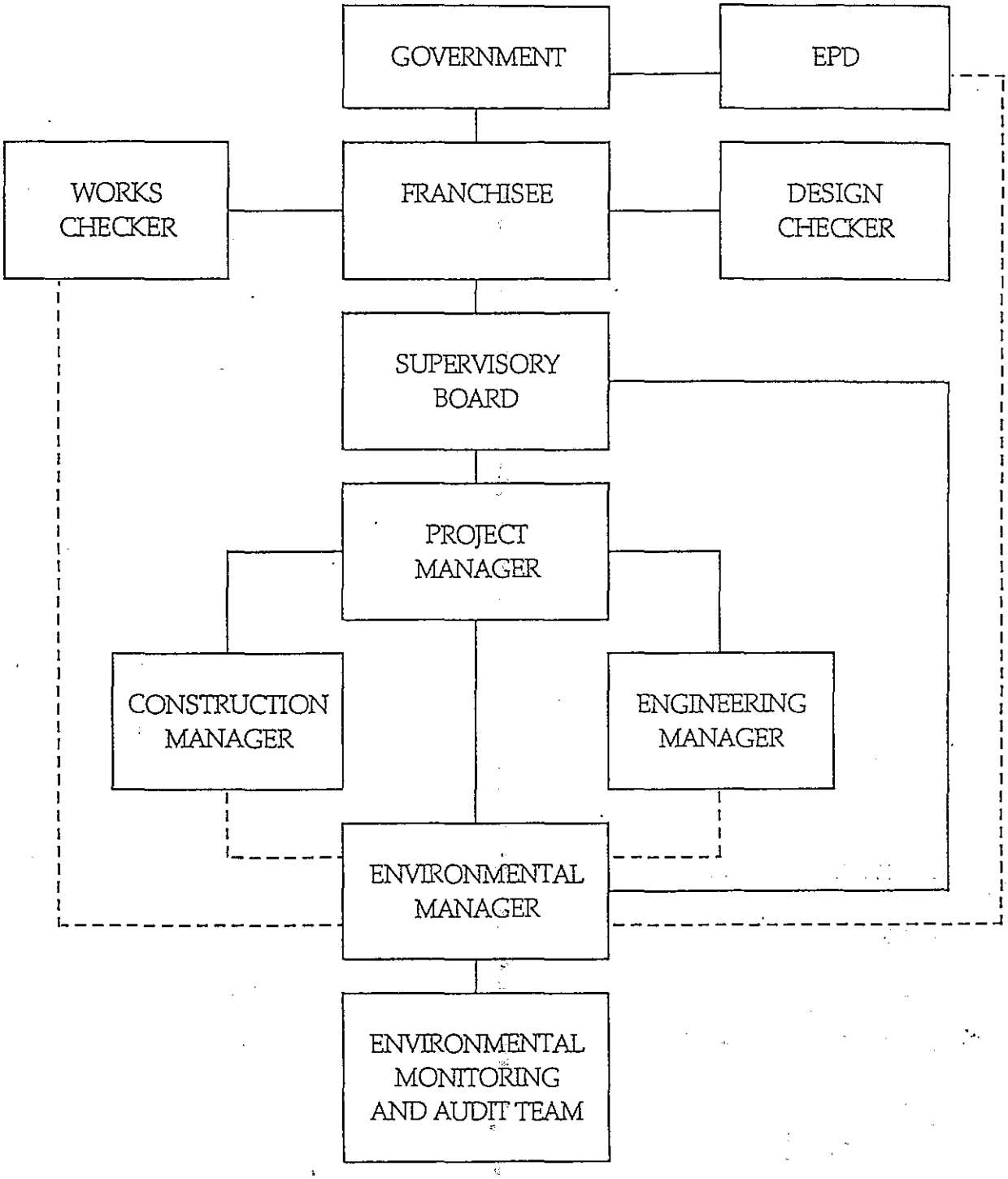
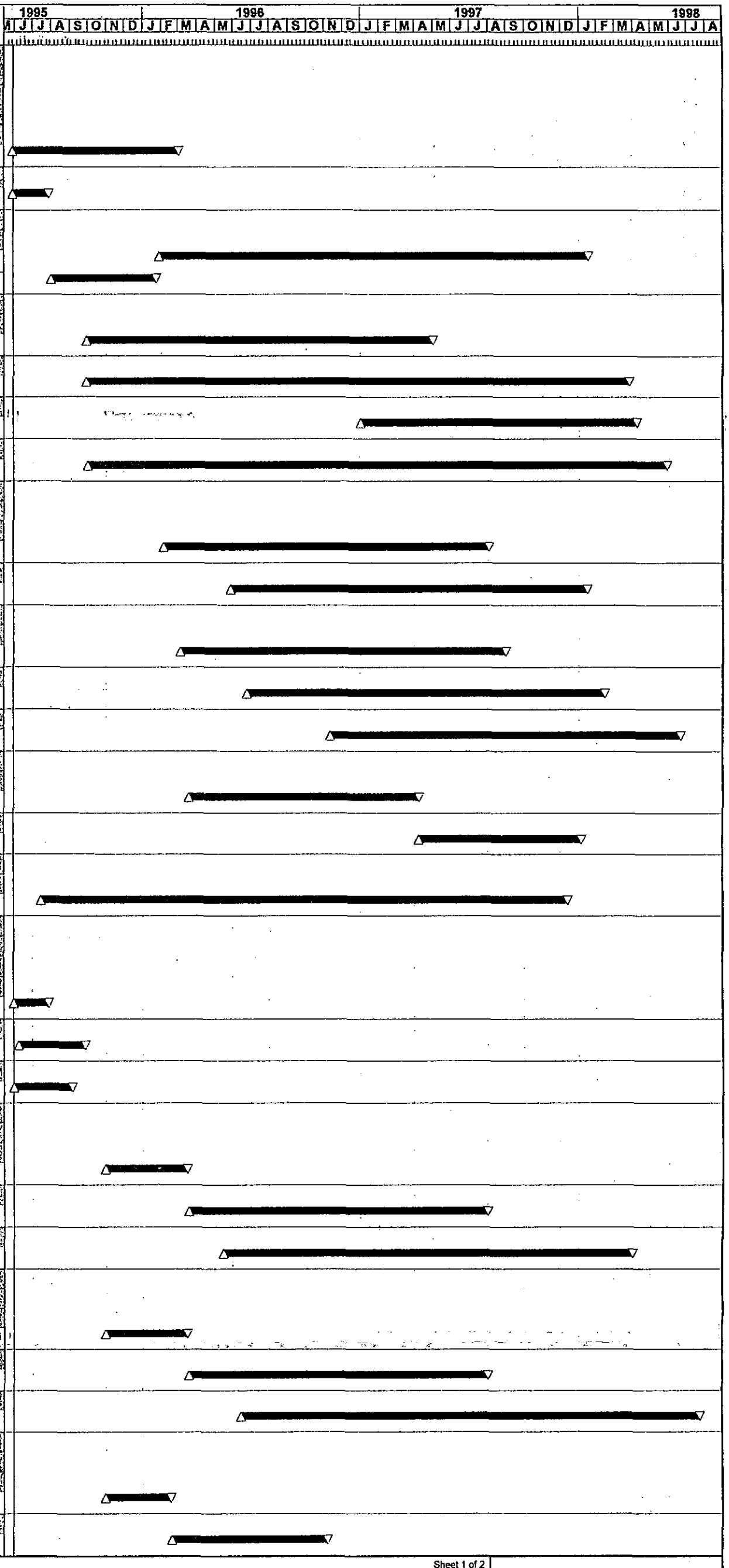


Figure 3.1 Project Team Organisation

Activity Description	Early Start	Early Finish
CIVIL CONSTRUCTION		
TIN KAU APPROACH		
Preliminaries & Temporary Works		
+ Conveyor System Construction		
	29MAY95	02MAR96
Construct Platforms for Site Installations		
Site Levelling and Preparation (incl drainage)	29MAY95	28JUL95
Earthworks		
Earthworks Near South Portal		
Main Cut Excavation incl Slope Protection	29JAN96	17JAN98
Thalweg Fill and Box Culvert	02AUG95	23JAN96
Structures		
+ Bridge D1		
	30SEP95	30APR97
+ Bridge D2		
	30SEP95	26MAR98
+ Bridge D3		
	31DEC96	06APR98
+ Bridge C		
	02OCT95	27MAY98
TAI LAM TUNNEL - SOUTH		
TLT South - Northbound		
+ TLT South - Northbound Excavation		
	05FEB96	02AUG97
+ TLT South - Northbound Lining & OHVD		
	27MAY96	15JAN98
TLT South - Southbound		
+ TLT South - Southbound Excavation		
	04MAR96	30AUG97
+ TLT South - Southbound Lining & OHVD		
	24JUN96	12FEB98
+ TLT South - Other Tunnel Works		
	11NOV96	20JUN98
TLT South - Ventillation Adit		
+ Ventilation Adit Excavation		
	18MAR96	07APR97
+ Ventilation Adit Lining & Other Works		
	08APR97	05JAN98
TLT South - Portal & Buildings		
+ TLT South - Portal Initial Formation		
	15JUL95	13DEC97
TAI LAM TUNNEL - NORTH		
Preliminaries & Temporary Works		
Construct Common Temporary Facilities		
Access Roads		
Form Access to North Portal	31MAY95	28JUL95
+ Buildings		
	07JUN95	26SEP95
+ Construct Temporary Site Formation		
	31MAY95	05SEP95
TLT North - Northbound		
TLT North - Northbound Excavation		
+ Soft Drive		
	30OCT95	15MAR96
+ Rock Drive		
Excavation - N/B Tunnel	18MAR96	01AUG97
+ TLT North - Northbound Lining & Other Works		
	15MAY96	01APR98
TLT North - Southbound		
TLT North - Southbound Excavation		
+ Soft Drive		
	30OCT95	15MAR96
Rock Drive		
Excavation - S/B Tunnel	18MAR96	01AUG97
+ TLT North - Southbound Lining & Other Works		
	14JUN96	24JUL98
TLT North - Ventillation Adit		
Ventilation Adit Excavation		
+ Soft Drive		
	30OCT95	16FEB96
+ Rock Drive		
	19FEB96	06NOV96



Project Start 31MAY95
Project Finish 15MAY99
Data Date 31MAY95
Plot Date 06JUL95

Early Bar
Progress Bar

WORK

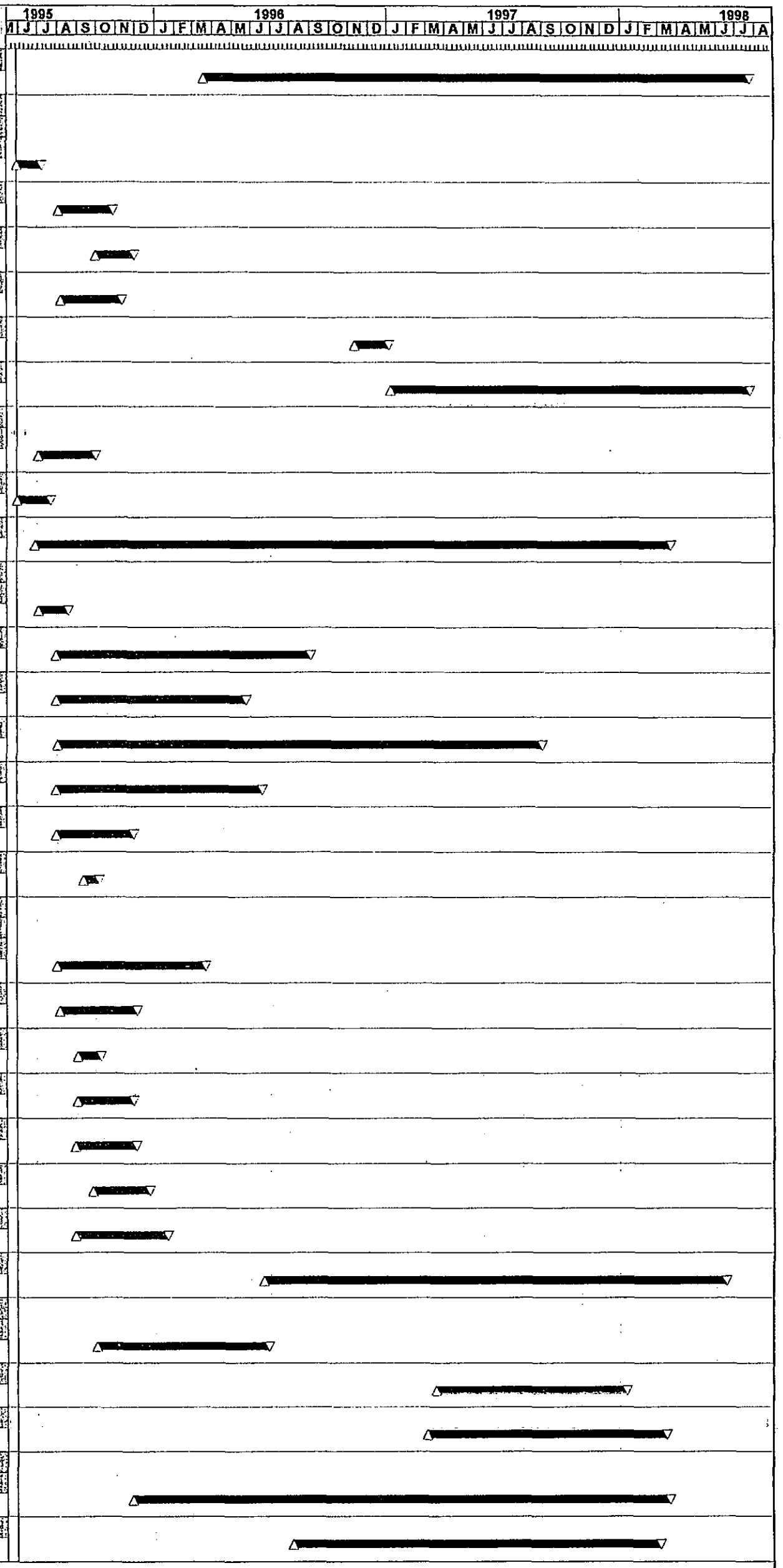
Sheet 1 of 2

(c) Primavera Systems, Inc.

Route 3 Contractors Consortium

Figure 3.2 Draft Works Programme

Activity Description	Early Start	Early Finish
+ Ventilation Adit Lining & Other Works		
	18MAR96	24JUL98
TLT North - Portal & Buildings		
TLT North - Site Formation		
Clearing & Grubbing		
Clearing/Grubbing	31MAY95	07JUL95
+ Cutting Slope		
	04AUG95	27OCT95
+ Soil Nailing		
	02OCT95	30NOV95
+ Drainage		
	07AUG95	10NOV95
TLT North - Portal Structure		
Substructure	11NOV96*	03JAN97
+ TLT North - Portal Vent Building		
	06JAN97	24JUL98
YUEN LONG APPROACH - NP to TP		
Preliminaries & Temporary Works		
Mobilization & Site Clearance	03JUL95*	30SEP95
+ Access Roads		
	31MAY95	22JUL95
+ Buildings & Facilities		
	28JUN95	21MAR98
Earthworks		
+ Earthworks - Excavation Ch 6700 - 7300		
	03JUL95	19AUG95
+ Earthworks - Excavation Ch 6700 - 6100		
	31JUL95	02SEP96
+ Earthworks - Embkt Fill Link Rd M		
	31JUL95	23MAY96
+ Earthworks - Embkt Fill Ch 7300 - 6100 Ph 1		
	01AUG95	30AUG97
+ Earthworks - Embkt Fill Ch 7300 - 6100 Ph 2		
	31JUL95	17JUN96
+ Earthworks - Embkt Fill Ch 6100 - 5600 T/Plaza		
	31JUL95	28NOV95
Tunnel Spoil Removal		
Commence Tunnel Spoil Removal	11SEP95	07OCT95
Drainage		
Culverts		
+ Construct Culvert No. 1		
Box Culvert C1 at Ch 7200	01AUG95	20MAR96
+ Construct Culvert No. 5		
	05AUG95	04DEC95
+ Construct Culvert No. 6A		
	01SEP95	09OCT95
+ Construct Culvert No. 2		
	01SEP95	29NOV95
+ Construct Culvert No. 3		
	28AUG95	02DEC95
Construct Culvert No. 4		
Culvert C4 Ch 6000	25SEP95	23DEC95
Construct Culvert No. 7		
Culvert C7 Ch 5700	28AUG95	20JAN96
Landscaping		
Landscape Area	19JUN96*	16JUN98
Structures		
+ Bridge 7		
	02OCT95	27JUN96
+ Bridge 5		
	17MAR97	10JAN98
+ Bridge 8		
	03MAR97	14MAR98
Buildings		
+ Administration Building		
	27NOV95	21MAR98
+ Toll Booth Building		
	05AUG96	04MAR98



Project Start	31MAY95	Early Bar	WORK
Project Finish	15MAY99	Progress Bar	Sheet 2 of 2
Data Date	31MAY95		Route 3 Contractors Consortium
Plot Date	06JUL95		Extract from Draft Works Programme

4 ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

4 ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

4.1 Introduction

EM&A requirements set out in this section were designed to comply with those given in the Construction Requirements and the PDS2EA.

4.2 Levels of Monitoring

4.2.1 Baseline Monitoring

Baseline monitoring of noise, air and water quality before the project starts will be carried out to ascertain the site area's existing conditions for setting the trigger, action and target (TAT) levels. Baseline checking will also be undertaken during construction when no construction activity is taking place.

4.2.2 Compliance Monitoring

Compliance monitoring of noise, ecology, air and water quality during both construction and operation phases will be undertaken to verify impact assessment predictions and the effectiveness of mitigation measures, and to facilitate immediate action when problems arise.

4.3 Trigger, Action, and Target Levels

The basic method of recording any change in the environmental conditions is through monitoring of noise, air and water quality. It is an accepted practice to apply a preset range of Trigger, Action and Target (TAT) levels as a framework for interpreting monitoring results. These levels are defined as follows:

Trigger - trigger levels provide an indication of deteriorating ambient environmental quality

Action - action levels indicate the necessity to adopt appropriate remedial actions to prevent the environmental quality from going beyond the target limits.

Target - target levels are stipulated in relevant pollution control ordinances, Hong Kong Planning Standards and Guidelines. These are the maximum levels at which the works will proceed. If levels go above target, appropriate remedial action, including critical review of plant and work methods would be required.

For the R3 TLT & YLA project, it is proposed to set the background level for each pertinent parameter at the 90 percentile of the respective values. For example, the daytime background noise level will be the 90 percentile of $L_{eq\ (30min)}$ values recorded in the daytime during the baseline monitoring period. The same criterion would also apply to other air and water quality parameters.

Upon completion of baseline monitoring, the TAT levels for this project may be established in accordance with the criteria given in Table 4.1, subject to the existing baseline conditions and confirmation with EPD.

Table 4.1 Air, Noise and Water TAT Levels

Parameter		Trigger Level	Action Level	Target Level
Air Quality	TSP (1hr) TSP (24 hr)	TSP (1hr): to be established on review of baseline data. TSP (24hr): to be established on review of baseline data.	Average of Trigger and Target Levels	500 μgm^{-3} (1 hr average) or 260 μgm^{-3} (24 hr average)
Noise*	$L_{Aeq\ (30\ min)}$	1 complaint	2 complaints	75 dB(A)
Fresh Water Quality	DO SS/ turbidity pH	N/A	N/A	TM Standards for Group D Inland Waters: DO: no TM standard SS: 30 mg l^{-1} Turbidity: no TM standard pH: 6-10
Marine Water Quality	DO (depth averaged)	10 %-ile of baseline or 90 % of control station (whichever is lower)	Average of Target and Trigger Level	1%-ile of baseline (4 mg l^{-1} depth average) or 70% of control station (whichever is lower)
	SS	90 %-ile of baseline or 110% of control station (whichever is greater)		99%-ile of baseline (33 mg l^{-1}) or 130% of control station (whichever is greater)
	turbidity	90 %-ile of baseline or 110% of control station (whichever is greater)		99%-ile of baseline (10 NTU) or 130% of control station (whichever is greater)

Note* Applies during non-restricted hours (0700-1900 hrs weekdays, except for public holidays). During restricted hours a Construction Noise Permit would be required, and the conditions stipulated in the CNP should be followed.

In the event that the measured readings exceed the non statutory day time limit of 75 dB(A), the net contribution to the noise level from construction works will be calculated. In these instances a sound pressure level equal to th 95%-ile of the baseline data is subtracted from the recorded value. If the remaining sound pressure level still exceeds 75 dB(A), then the target level will have been exceeded.

4.4 TAT Action Plans

The action plan as determined by the frequency of complaints and/or exceedance of the compliance monitoring levels is given in Table 4.2.

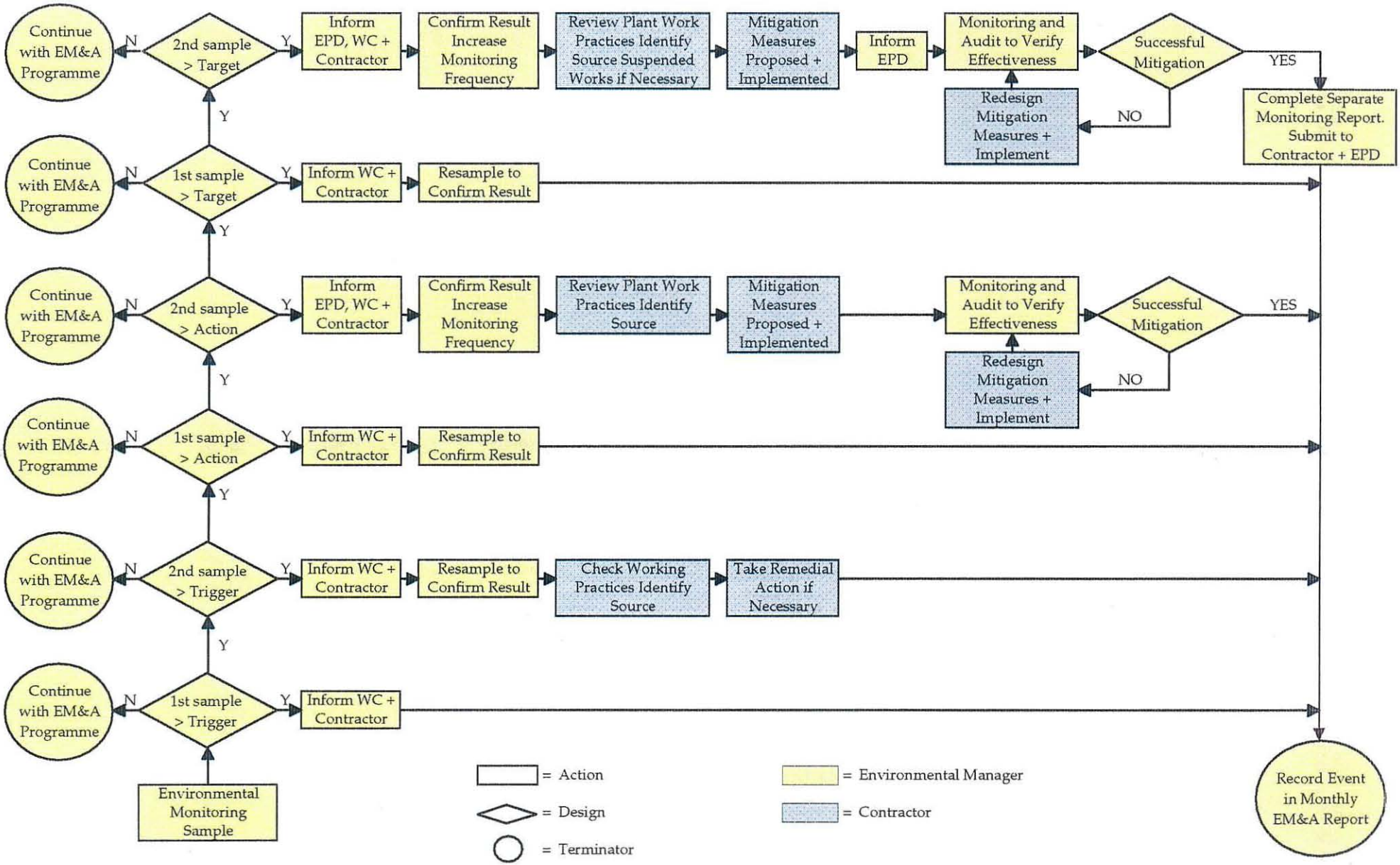


Figure 4.1 Outline of Action Plan Events

Table 4.2 Action Plan For Exceedance of TAT Levels

Event	Occurrence of Exceedance	Action		
		Environmental Team	WC/Site Manager	Contractor
Breach of Trigger Value	One sample	• Inform contractor & WC		
	Two consecutive samples	• Inform contractor and WC; re-sample to confirm result	• Check working methods/practices to identify any immediate causes; take appropriate remedial action if necessary	
Breach of Action Level	One sample	• Inform contractor and WC; re-sample to confirm result		
	Two consecutive samples	• Inform EPD, contractor and WC; re-sample to confirm result • Increase frequency of monitoring as necessary • Propose remedial action • Continue monitoring after completion of remedial action to confirm action is effective • Record event in monitoring report for submission to contractor and EPD	• Check working methods/practices to identify any immediate causes; take appropriate remedial action if necessary • Ensure effectiveness of corrective action • Amend method statement, if appropriate	• Review plant, equipment and working procedures • Ensure implementation of remedial action • Inform EPD of remedial action and result
Breach of Target Level	One sample	• Inform contractor and WC; re-sample to confirm result		
	Two consecutive samples	• Inform EPD, contractor and WC • Confirm result & increase monitoring frequency as necessary • Review effectiveness of remedial action and if necessary propose additional remedial action • Undertake monitoring at nearest quality SR • Continue monitoring after completion of remedial action to confirm action is effective • Complete a separate monitoring report and submit to contractor and EPD	• Undertake immediate check of activities and employ any appropriate mitigation. • Amend method statement, if appropriate • Suspend relevant portion of works as necessary • Carry out appropriate remedial action as recommended by environmental monitoring team • Ensure effectiveness of corrective action	• Review plant, equipment and working procedures • Ensure immediate implementation of remedial action • Inform EPD of remedial action

Note: 1 In the case of noise monitoring, the frequency of sample exceedance corresponds to the number of complaints received. Any follow-up monitoring will be undertaken at the affected NSRs. In the event of creeping ambient noise levels, trigger level = 1 complaint, action level = 2 complaints

4.5 Monitoring Schedule

The ET will be responsible for undertaking both baseline and compliance monitoring and audits. Specifics in terms of methodology, monitoring location and equipment required are presented in the following sections.

A monitoring programme will also be undertaken to detect changes in levels of *Escherichia coli* bacteria at the remaining Gemini beach and identify whether these are attributable to inflows from the stream, higher main channel *E. coli* levels or the physical existence of the jetty associated with the Conveyor System. The monitoring programme includes 2 control stations in the Ma Wan main channel (Station MW1 and MW4), a compliance station at the beach (MW3) and in the stream flowing into the remaining Gemini Beach (FW 1). As agreed with the Environmental Protection Department, R3CC will offset any potential impacts on *E. coli* levels at the Gemini Beaches by diverting the existing water surface inflow away from the beach. As a result the proposed conveyor system and jetty platform is not expected to cause a net increase in *E. coli* levels (c.f. Volume 2, section 4). The monitoring programme has therefore been designed to supplement existing EPD monitoring, and no further mitigative actions will be assigned to R3CC.

4.5.1 Baseline Monitoring

Air Quality

Baseline monitoring of 1-hr and 24-hr TSP at Sensitive Receivers (SRs) will be carried out for two consecutive weeks prior to the commencement of construction. Continuous 24-hour TSP and 1-hour TSP sampling three times per day will be conducted when the highest dust levels are expected, as determined by the Environmental Manager(EM). 24-hr TSP monitoring locations may be constrained by access and availability of power.

Noise

Continuous baseline noise monitoring of $L_{Aeq\ (30\ min)}$ at NSRs will be carried out for two consecutive weeks prior to the commencement of construction. Baseline levels will be checked for one 24 hour period every three months, or as near as possible, for a typical 24 hour period when construction activities are not taking place.

Marine Water Quality

Baseline monitoring of dissolved oxygen (DO, in both mg l^{-1} and % saturation), suspended solids (SS) and turbidity will be carried out at Stations MW1, MW2 and MW3 in the barge loading area prior to jetty construction. Samples will be taken at both mid-flood and mid-ebb tides, 6 times per week for 2 weeks, respectively at 1 m below water surface, mid depth, and 1 m above sea bed.

Checking of baseline levels of the above parameters will be carried out at all stations every 3 months, when construction activities are not taking place.

E. coli Monitoring

Baseline monitoring will be carried out four times per week for three weeks at Stations MW1 (one composite sample during mid-ebb), MW3 (one composite sample at mid-flood), MW4 (one composite sample at both mid-ebb and mid-flood) and FW1 (one grab sample).

4.5.2 Construction Phase Compliance Monitoring

Air Quality

Continuous 24-hour TSP monitoring will be carried out once every six days and hourly TSP sampling three times every six days at selected SRs. Wind speed and directions will be recorded continuously at one monitoring station.

Noise

During day time non-restricted hours (0700-1900 on normal weekdays), $L_{Aeq\ (30\ min)}$ will be recorded at the closest affected SRs three times per week. During restricted hours (evening and/or night time), three consecutive $L_{Aeq\ (5\ min)}$ measurements will be recorded three times per week (if work occurs during both evening and night time hours, at least one set of measurements will be taken for each period). Spot check of $L_{Aeq\ (30\ min)}$ at each SR will be carried out during restricted hours once per week when construction activities are taking place.

Freshwater Quality

Measurement of DO, SS and turbidity will be carried out twice per week at major discharge points into streams. In addition to DO, SS and turbidity, discharges from each concrete batching plant will also be checked for pH to confirm compliance with the *Technical Memorandum: Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* (TM) at each discharge point.

Marine Water Quality

Monitoring of DO, SS and turbidity will be carried out at 3 monitoring stations (MW1, MW2 and MW3), during operation of barge loading facilities. Samples will be taken at mid-flood and mid-ebb tides, 3 times per week at 1 m below water surface, mid-depth, and 1 m above sea bed, respectively.

While MW1 and MW2 are located at the proximity of the gazetted works boundary, the water quality measured will be to a large extent influenced by impacts arising from other major construction works in the area such as the CRA1, Lantau Fixed Crossing and Tuen Mun Road Widening. Therefore, while exceedance of TAT levels for these stations will warrant appropriate attention, any exceedance of TAT levels recorded at the down-tide station will be referenced to the up-tide station, which will act as a control station, to confirm the R3 TLT & TLA works impact.

E. coli Monitoring

Monitoring of *E. coli* will also be conducted during the construction phase of the Conveyor. The frequency of monitoring shall be once per fortnight at Stations MW1 (one composite sample during mid-ebb), MW3 (one composite sample at mid-flood), MW4 (one composite sample at both mid-ebb and mid-flood) and FW1 (one grab sample).

A summary of the monitoring schedule is given in Table 4.3.

4.5.3 Operational Phase Compliance Monitoring

Introduction

Operational monitoring for air and noise will be carried out every six months. Operational monitoring reports will be furnished every six months within 1 month of the completion of the monitoring. A summary of the monitoring schedule is given in Table 4.3. The monitoring methodology, including parameters, frequency, locations and reporting requirements will be reviewed after 2 years of monitoring.

Air Quality

Operational air quality monitoring will be undertaken for vehicle emissions once every six months, with initial monitoring for Respirable Suspended Particulates (RSP) (μgm^{-3} 24-hr), CO (ppm) and NO_2 (ppb) to confirm their compliance with Air Quality Objectives. Baseline data will be gathered just prior to the commissioning of the road.

To adequately account for the effect of meteorological conditions on the air quality, the results for the parameters given above will be logged at least every half hour for one week continuously. Suggested locations for monitoring stations are at R2013 (near North Portal, Sensitive Receiver Survey Map 23), R1875 (near Toll Plaza, Sensitive Receiver Survey Map 22) and R70 (near Ramp C, Sensitive Receiver Survey Map S2). Maps showing their locations are provided in Appendix 1.

In addition, continuous operational air quality monitoring will be carried out within the Tai Lam Tunnel, to demonstrate compliance with EPD tunnel air quality guidelines. Guidelines are given for the following parameters (average of 5 minute period of continuous monitoring):

CO	100 ppm
NO_2	1 ppm
SO_2	0.4 ppm
Haze	0.009 m^{-1} stationary traffic
	0.007 m^{-1} average traffic speed of 20 $kmhr^{-1}$
	0.005 m^{-1} average traffic speed of 60 $kmhr^{-1}$ and over

Monitoring will be undertaken for CO, NO and visibility. Compliance with the requirement for SO_2 will be deemed to be achieved if the requirement for NO_2 is met. The ventilation system will be controlled by a multi-tier computer processor system as part of the Central Monitoring and Control System. Under automatic operation, data from the tunnel environmental sensors will be sent to the duty programmable controller at regular scanning intervals and will be compared with predefined limits. When the

limit of an operation range is exceeded, the number of fans required to be put in service will be determined by a software programme. A manual fallback console will also be provided.

Noise

Operational noise monitoring is not required.

Marine Water Quality

Daily monitoring of DO, SS and turbidity at the three monitoring stations given in Section 4.5.4 will be carried out for 4 weeks after completion of decommissioning of barge loading facilities. Samples taken at both mid-flood and mid-ebb tides respectively at 1 m below water surface, mid-level, and 1 m above sea bed will be compared against the WQO.

E. coli Monitoring

Monitoring of *E. coli* will also be conducted during the operational phase of the Conveyor. The frequency of monitoring shall be once per fortnight at Stations MW1 (one composite sample during mid-ebb), MW3 (one composite sample at mid-flood), MW4 (one composite sample at both mid-ebb and mid-flood) and FW1 (one grab sample).

4.5.4 Decommissioning of Conveyor System

Air Quality

Continuous 24-hour TSP once every six days and hourly TSP sampling three times every six days will be sampled at the closest affected SRs. Wind speed and direction will be recorded continuously at one monitoring station.

Noise

Measurement of $L_{Aeq\ (30\ min)}$ during day time (0700-1900) will be taken on normal weekdays at the closest affected SRs three times per week. Three consecutive measurements of $L_{Aeq\ (5\ min)}$ will be taken three times per week during evening and/or night time work. Spot check using measurement of $L_{Aeq\ (30\ min)}$ at each SR will be carried out during restricted hours once per week when construction activities are taking place.

Freshwater Quality

Measurement of DO, SS and turbidity will be carried out twice per week at major discharge points into streams.

Marine Water Quality

Monitoring of DO, SS and turbidity will be carried out at 3 monitoring stations (MW1, MW2 and MW3) during decommissioning of barge loading facilities. Samples will be taken at mid-flood and mid-ebb tides, 3 times per week at 1 m below water surface, mid depth, and 1 m above sea bed, respectively.

While MW1 and MW2 are located at the proximity of the gazetted works boundary, the water quality measured will be to a large extent influenced by impacts arising from other major construction works in the area such as the CRA1, Lantau Fixed Crossing and Tuen Mun Road Widening. Therefore, while exceedance of TAT levels for these stations will warrant appropriate attention, any exceedance of TAT levels recorded at the down-tide station will be referenced to the up-tide station, which will act as a control station, to confirm the R3 TLT & YLA works impact.

E. coli Monitoring

Monitoring of *E. coli* will be conducted during the decommissioning of the Conveyor. The frequency of monitoring shall be once per fortnight at Stations MW1 (one composite sample during mid-ebb), MW3 (one composite sample at mid-flood), MW4 (one composite sample at both mid-ebb and mid-flood) and FW1 (one grab sample).

4.6 Monitoring Locations

4.6.1 Review of Sensitive Receivers

Monitoring at various locations will be applied as a means of quantifying and controlling the environmental impacts of this project. To determine the precise monitoring locations a comprehensive Sensitive Receiver (SR) survey was conducted in Spring 1995. All potential SRs within 300 m either side of the alignment and the conveyor system were identified from 1 : 1000 scale maps. The actual existence of the SRs was confirmed by a field survey. For each SR the status and condition was assessed as follows:

1 Abandoned or derelict
2 Poor construction (wood / sheet / no glazing)
3 Solid construction (concrete / brick / glazing)
4 Modern (eg. village house)

The findings of this survey are given in Appendix A.

4.6.2 Air and Noise

Suggested locations of air and noise monitoring stations are the Gold/Pink Villas (R23a-f, SR Survey Map S6), the receiver closest to conveyor alignment (R40, SR Survey Map S4), a receiver close to the North Portal (R2013, SR Survey Map 23), and a receiver close to the Toll Plaza (R1875, SR Survey Map 22). These stations were visited by CES staff in March 1995, were inhabited, and have been chosen to represent worst case receivers. Provided results at these receivers prove acceptable, results at other receivers along the route should also be acceptable.

In addition, receiver R70 (SR Survey Map S2), on a hill above Ramp C, close to the Ting Kau Interchange has been predicted to experience cumulative impact due to Tuen Mun Road widening, Ting Kau Bridge and this project. This receiver will be added to the Route 3 EM&A programme during periods of intense work on Ramp C and will also be monitored during the operational phase.

4.6.3 Freshwater Quality

The freshwater quality monitoring locations will be at the points of discharge of potentially contaminated water from the site. These will be mainly from sedimentation basins provided for settling of site runoff and discharges from batching plant(s). Locations of freshwater quality monitoring stations will be determined on the works site in consultation with EPD and the Environmental Manager of R3CC, since these locations will change over time.

4.6.4 Marine Water Quality

Locations of the 4 marine water quality monitoring stations are respectively labelled MW1 (114°03'52"E, 022°21'55"N), MW2 (114°04'02"E, 022°21'55"N), MW3 (114°04'01"E, 022°21'59"N) and MW4 (114°04'07"E, 022°21' 55"N) as shown in Figure 4.2.

Table 4.3 Summary of Baseline and Compliance Monitoring Programme

Subject	Period	Parameters	Location	Frequency	Duration	Additional Requirements
Air Quality	Baseline	TSP (24-hour)	Selected SRs[1]	Continuously	Two consecutive weeks prior to construction	
		TSP (1-hour)		3 times daily		
	Baseline Check			4 times a year , interval over one month	During construction phase as allowed by activities on site	During periods of no construction
	Construction	TSP (24-hour)	Three monitoring stations at Site Boundary in line with nearest SRs, locations to be reviewed monthly to take account of dust generating activities.	Once every 6 days	--	More frequent monitoring for TAT exceedance according to action plan
		TSP (1- hour)		3 times every 6 days	--	
		Wind speed, direction	Monitoring station	Continuously	--	
	Operational	CO RSP NO_2	SRs[1]	Two times per year	--	Once the project has been in operation for three months
Noise	Baseline	L_{10}, L_{90}, $L_{Aeq\ (30\ min)}$	SRs[1]	Continuously	Two weeks prior to construction	
	Baseline Check			Every 3 months	One 24 hour period, during construction phase	During periods of no construction
	Construction	$L_{Aeq\ (30min)}$ (0700-1900)	SRs[1]	3 times per week	During construction phase	More monitoring when appropriate in response to complaints.
		$L_{Aeq\ (5\ min)}$ (1900-0700)		3 consecutive measurements 3 times per week (if CNPs are issued)		
	Spot Check (0700-1900)	$L_{Aeq(30\ min)}$		At least once per week during construction activities		

Table 4.3 Summary of Baseline and Compliance Monitoring Programme (cont'd)

Subject	Period	Parameters	Location	Frequency	Duration	Additional Requirements
Freshwater Quality	Construction	DO, SS/turbidity	Major discharge points into stream	Twice per week		
		pH	Discharge points of concrete batching plant	Twice per week	During operation of concrete batching operation	
Marine Water Quality	Baseline	DO, SS/turbidity	3 monitoring stations around the barge loading area (MW1, MW2 & MW3) - 1 m below surface - mid-depth - 1 m above sea bed	2 samples[2] 6 times per week for 2 weeks	Prior to commencement of jetty construction	2 consecutive in-situ readings to agree within 25% , else retake readings
		E. coli	MW1, MW3, MW4 & FW1	4 per week for 3 weeks	Prior to commencement of jetty construction	
	Construction	DO, SS/turbidity	MW1, MW2 & MW3 - 1 m below surface - mid-depth - 1 m above sea bed	2 samples[2] 3 times per week	During operation of barge loading facility	2 consecutive in-situ readings to agree within 25% , else retake readings
		E. coli	MW1, MW3, MW4 & FW1	1 per fortnight		Composite sample
	Decommissio -ning	DO, SS/turbidity	MW1, MW2 & MW3 - 1 m below surface - mid-depth - 1 m above sea bed	2 samples[2] daily for 4 weeks after decommissioning is complete	After completion of barge loading activity and during decommissioning	2 consecutive in-situ readings to agree within 25% , else retake readings
		E. coli	MW1, MW3, MW4 & FW1	1 per fortnight		Composite sample

Note: 1 The precise SR locations cannot be identified until after site inspection and agreement with owners is reached.
2 One at each of mid-flood and mid-ebb tides

4.7 Monitoring Methodology

4.7.1 Air Quality Monitoring

24-hr TSP will be sampled by drawing air through a pre-conditioned, pre-weighed filter paper inside the high volume sampler at a controlled flow rate. After 24 hours (± 1 hr) of sampling the filter paper with retained particulates will be collected and returned to the laboratory for drying in a desiccator, followed by accurate weighing. TSP levels are calculated from the ratio of mass of particulates retained on the filter paper to the total volume of air sampled. The analysis process normally takes approximately two days. All equipment and procedures will follow USEPA Standard Method desribed in 40 CFR, Part 58, Appendix B. Sample collection filters will comprise of glass fibre, quartz fibre or teflon fibres in order to minimise sample degradation.

For 1-hr TSP, a portable dust meter will be used. TSP measurement is based on the principle of light scattering. The meter shall be factory calibrated against known opacity and will be calibrated in the field each time prior to deployment against known standards provided by the manufacturer. The purpose of 1-hr TSP monitoring is to enable fast response action to dust problems. The use of the portable meter is preferred because it enables the ET to obtain instantaneous readouts and if necessary to assist in source identification. Whereas the high volume sampler requires 24-48 hr for filter paper processing and is therefore less suitable for fast response action plans.

Operational monitoring of RSP sampler will carried out in a similar way to TSP, with the difference being that the high volume sampler will be equipped with an additional PM_{10} assembly which screens off all the particulates of size 10 μm and above. The gain in weight of the filter is then used to calculate the RSP level.

Monitoring for NO_2 and CO may be readily undertaken with commercially available equipment.

Wind velocity will be monitored hourly in conjunction with a data logger, which will be downloaded once a week.

4.7.2 Noise Monitoring

Noise levels will be determined by carrying out measurements at the monitoring locations. Where a measurement is to be carried outside of a building, the assessment point would normally be positioned at 1 m from the sensitive facade, but may be re-positioned at any other point considered appropriate by EPD. Where a measurement is to be made of noise being received at a place other than a building, the assessment point would be at a position 1.2 m above the ground in the free-field.

Noise measurements will be made in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}) measured with an integrating sound level meter. Such measurements will be made over a 30 minute period to give 6 consecutive L_{eq}(5 min) readings. The L_{eq}(30 minute) reading will be calculated from the L_{eq}(5 minute) readings within the noise meter.

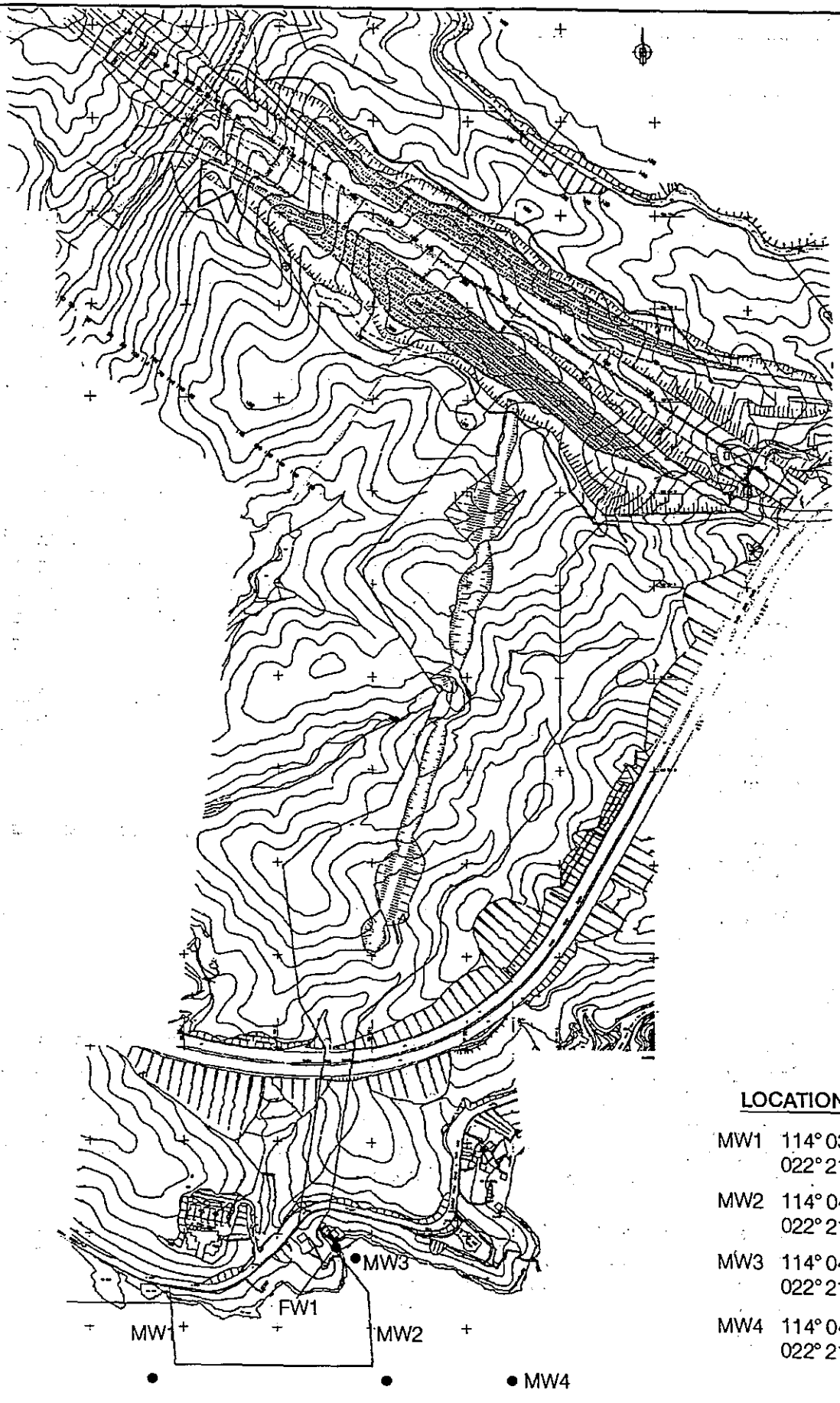


Figure 4.2 Locations of Marine Water Quality Monitoring Stations

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

4.7.3 Freshwater Monitoring

Samples will be taken twice per week from each main discharge point. Two consecutive readings of DO concentration, and turbidity will be taken at each location. For concrete batching plant discharges, pH readings will also to taken to confirm alkalinity. If they do not agree to within 25%, the readings will be discarded and repeated.

Two water samples will be collected, stored at 4 °C in a cold box and returned to the laboratory for SS analysis within 24 hours. SS determinations will be carried out according to APHA Standard Methods for the Examination of Water and Wastewater, 17 Edition, 1989 analysis no. 2540D.

In the field each water sample taken for subsequent laboratory analysis will be given a unique sampling number, which will be recorded on the sample label and the data form.

4.7.4 Marine Water Monitoring

Two consecutive readings of DO concentration, DO % saturation, temperature and turbidity will be taken in situ at each location at 1 m below surface, mid-depth and 1 m above bottom. If the two consecutive readings do not agree to within 25%, the readings will be discarded and repeated.

Two water samples will be collected at each location at each of the 3 depths, stored at 4 °C in a cold box and returned to the laboratory for SS analysis within 24 hours. SS determinations will be carried out according to APHA Standard Methods for the Examination of Water and Wastewater, 17 Edition, 1989 analysis no. 2540D.

Samples for *E.coli* will be taken at a depth of one metre and should be kept at 4 °C and sent for analysis within 6 hours. The sampling bottles used for *E. coli* must be sterilised by methods such as autoclaving. All samples will be collected in duplicates for analysis. *E. coli* determination will be carried out according to DOE (1983): The Bacteriological Examination of Drinking Water Supplies 1982, Section 7.8 and 7.9.

4.8 Monitoring Equipment

4.8.1 Air Quality

For air quality monitoring, the following or similar equipment will be used:

Construction

- GMWL-2000 High Volume Air Sampling System
- WD401 Wind Speed and Direction Sensor connected to a MET EL8 Data Logger will be used to collect meteorological data in accordance with the monitoring programme
- HAZ-dust HD-1000 portable dust meter

Operation

- GMWL-2000 High Volume Air Sampling System fitted with Model 1200 HVPM 10 size selective inlets (For RSP < 10μm)

- WD401 Wind Speed and Direction Sensor connected to a MET EL8 Data Logger will be used to collect meteorological data in accordance with the monitoring programme
- Thermo Environmental Instrument Inc. Model 42 Chemiluminescence NO-NO_2-NO_x analyser
- Interscan Model 1148 carbon monoxide analyser equipped with a CO electrochemical cell

The TSP and RSP monitor will be a high volume sampler as referenced in the USEPA Standard Method described in 40 CFR Part 50, Appendix B.

4.8.2 Noise

The sound level meter used will comply with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). Any other noise measuring and analysis instrumentation used will be of a comparable professional quality. Standard acoustical principles and practices will be followed in the measurement and analysis of the noise under investigation.

Noise will be monitored using Bruel and Kjaer modular precision sound level meter type 2231, with statistical analysis module BE 7101 or other suitable instruments which comply with the IECP Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications.

4.8.3 Freshwater Quality

For freshwater quality monitoring, the equipment suggested in Table 4.4 or those with similar specifications are to be used.

4.8.4 Marine Water Quality

For marine water quality monitoring, the equipment in Table 4.5 or those with similar specifications will be used.

Table 4.4 Freshwater Quality Monitoring Equipment

Equipment Function	Manufacturer	Model Name/Number
Turbidity Measurement	Hach	2100P
Dissolved Oxygen and Temperature Measurement	YSI	Model 59 DO meter with 10m cable and YSI 5739 probe with YSI 5795A submersible stirrer for *in situ* DO measurements; YSI Model 33 conductivity meter for salinity for calibrating DO meter; YSI temperature sensor for temperature measurement.
Sampling SS Determinations	--	Appropriate plastics container

Table 4.5 Water Quality Monitoring Equipment

Equipment Function	Manufacturer	Model Name/Number
Turbidity Measurement	Hach	2100P
Dissolved Oxygen and Temperature Measurement	YSI	Model 58 DO meter with 30m cable and YSI 5739 probe with YSI 5795A submersible stirrer for *in situ* DO measurements; YSI Model 33 conductivity meter for salinity for calibrating DO meter; YSI temperature sensor for temperature measurement.
Navigation and Positioning	Magellen	NAV 5000D or compass, where satellites are unavailable
Sampling at Depth for SS Determinations	Kahlsico	Kahlsico Water Sampler with vented drain and messenger
Depth Finding	Seafarer	Model 701 Echo Sounder

4.9 Equipment Calibration

All monitoring equipment will be maintained in calibration at all times. Re-calibration will be carried out in accordance with requirements stated in this Manual or that recommended by the manufacturers, whichever is more stringent. Calibrations should be carried out by a laboratory that is HOKLAS accredited for those parameters under consideration.

4.9.1 Air Quality Monitoring

The flow rate of each high volume sampler with mass flow controller will be calibrated using an orifice calibrator. Initial five point calibration will be conducted upon installation and prior to commissioning. One point flow rate calibration will be carried out every two months. Five point calibration will be carried out initially and every six months thereafter.

The nitrogen oxides analyser will be calibrated by an Ecotech dynamic calibrator Model 8300HS equipped with a MonitorLab nitrogen dioxide permeation tube. Zero and span checks will be carried out at each time of use.

The Interscan Model 1148 carbon monoxide analyser will be zero and span checked at each time of use. Calibration will be against a known standard as recommended by the manufacturer.

The portable dust meters will be calibrated against a known standard on each occasion the meter is used.

4.9.2 Noise Monitoring

The sound level meters will be calibrated using a Bruel and Kjaer Sound Level Calibrator Type 4230, or other similar equipment, prior to and after each set of measurements. The results of the calibration will be recorded on the field data form. The measurement is discarded if the calibrations before and after do not agree to within 1 dB(A), then repeated until the calibrations before and after agree to within 1 dB(A). An annual calibration check will be carried out by the manufacturer.

4.9.3 Fresh/Marine Water Monitoring

DO Meter The DO meter will be calibrated against the results of standard Winkler titration every 2 months. The temperature sensor will be calibrated using a standard certified reference thermometer with an accuracy of 0.5 °C.

Turbidimeter The Turbidimeter will be calibrated every two months using standard formazin solutions. It will be standardised with reference formazin gel solutions every time before use.

Balance The balance will be calibrated against an internationally traceable standard at intervals recommended by the manufacturer.

4.10 Ecological Monitoring and Audit

4.10.1 Baseline Monitoring

Baseline study of flora and fauna was completed in the course of the 12 month study for the Supplementary EIA.

4.10.2 Construction Phase Compliance Monitoring

Monitoring will cover transplantation of protected species, marking of special areas and areas of vegetation to be avoided by personnel and equipment, ardeid use at Ho Pui and Ma On Kong egretries during and after construction, and design and conservation management plan of fish ponds.

4.10.3 Operational Phase Compliance Monitoring

Monitoring will be performed to assess the success of revegetation measures, restoration of wildlife in revegetated areas, ardeid use of the egretries at Ho Pui and Ma On Kong, and ardeid use of fish ponds managed for conservation.

4.10.4 Monitoring Locations

Monitoring locations for ardeid use will be concentrated in the Ho Pui area. Sites identified in the DEIA as sites of frequent usage for ardeids will be monitored.

Mammal burrows were located between the conveyor alignment and Tuen Mun Road. Searches will be conducted for burrows in this and other areas of similar habitat along the conveyor alignment.

Site selection for revegetation monitoring will depend on details of planting plans and specifications upon the approval in principle (AIP). At this stage only draft AIPs for TLT & YLA (S), i.e. from the Toll Plaza to the North Portal (Design Element 192 dated May 10, 1995) and from the South Portal to Ting Kau Interchange (Design Element 390 dated May 17, 1995) are complete. The AIP for the Conveyor System has not yet been obtained. Major revegetation monitoring locations based on the draft AIP are soft slopes, soil nailed slopes, berms, median, toll plaza and sites for transplantation of protected species and for compensatory planting.

4.10.5 Monitoring Methodology

Revegetation

Monitoring methods for revegetated areas will be based on the landscaping treatments described in the drafts.

Soft slope planting

Soft slopes are slopes formed with soft materials suitable for planting. These slopes include:

- all fill slopes from the Toll Plaza to the North Portal
- cut slopes with slope 1:1.5 from the Toll Plaza to the North Portal
- upper levels of cut and fill slopes from Ting Kau Interchange to the South Portal

According to the AIPs all soft slopes will be hydroseeded with grass and tree seeds and planted with whips/seedlings of mainly native tree and shrub species at 1.5 m staggered spacing. Survival and growth of each planting species in this site will be monitored. Twenty individuals with three duplicates of each species on soft slopes will be number-

tagged. The basal diameter and main stem height of each number-tagged individual will be measured at six-month intervals. Evaluation will also be based on photos taken at six month intervals from selected permanent photo points.

Nailed slope planting

Nailed slopes (cut slopes formed at 1:1 from the Toll Plaza to the North Portal) will be hydroseeded with grass and tree species due to poor soil conditions and site inaccessibility. Survival and growth of vegetation will be monitored through assessment of photographs taken at selected photo points at six month intervals.

Berm planting

Flat berms will be constructed along cut slopes from Ting Kau Interchange to the South Portal. Planters will be constructed and pit planted with trees, shrubs and trailing plants. Survival and growth of vegetation will be monitored based on photographs taken at selected photo points at six month intervals.

Median planting

The median along the centre of the road from the Toll Plaza to the North Portal will be planted with native tree and shrub species. These plants will be subjected to traffic exhaust and hence their survival will be closely monitored. Due to the inaccessibility of the site, the site will be monitored by photographs taken at selected photo points at six month intervals.

Toll Plaza Area and Administration Building

Embankments around the toll plaza area will be hydroseeded and planted with native trees and shrubs. Roadside and key accessible locations will be planted with ornamental species. Since this area will also be subject to serious air pollution from vehicle exhaust, the growth of these plants will be closely monitored. Photographs will be taken at six month intervals from selected permanent photo points for evaluation of the success of revegetation efforts.

Compensatory Planting

Two areas off-site will be used for compensatory planting. Monitoring of revegetation in these areas will be based on the final decisions regarding the size of the planting areas and specifications for revegetation.

4.10.6 Transplanted Protected Species

Two protected species, *Enkianthus quinqueflorus* and *Rhododendron simsii*, will be transplanted from affected areas (assumed to be areas within the construction works boundary) prior to construction by the landscaping contractor. Each individual within the affected area will be marked with red flags. Seedlings of individual plants will be transplanted to adjacent shrubland outside the construction boundary. Another protected species, *Arundina chinensis*, was located near but outside the construction boundary. Transplantation may not be necessary, but the plants should be marked with red flags to warn construction teams of their presence and avoid disturbance. Mature individuals

which cannot be moved due to technical problems (e.g. risk of severe damage to the root systems upon transplantation) should be marked with red flags to advise the construction team of their location, and unnecessary disturbance should be avoided. A permit from the Director of Agriculture and Fisheries is required if individuals are to be transplanted within the country park boundary, or if removal of individual protected plants is unavoidable. Survival and growth (basal diameter and stem height) of each transplanted individual will be recorded at six month intervals.

4.10.7 Monitoring of Avifauna in the Revegetated Areas

Avifauna use of revegetated areas will be monitored during spring, autumn, and winter seasons to assess recolonisation and seasonal use patterns. Spring and autumn monitoring will be scheduled to coincide with migration periods. Winter monitoring will be scheduled to evaluate use by winter residents. Fixed-point or belt transects will be monitored, depending on the extent of available revegetated habitat. Transects will be monitored on three days during each sample period.

4.10.8 Ardeid Use of Ho Pui and Ma On Kong Egretries

Seasonal spatial distribution and habitat use will be monitored quarterly from fixed observation points surrounding both egretries. Numbers of birds seen will be recorded at 15 minute intervals, and their locations will be plotted on 1:5000 or 1:1000 scale topographic maps. Habitat use will be recorded for all birds seen. Highway construction activity will be simultaneously recorded to develop quantitative relationships between it and bird activities and spatial distribution.

Nesting will be monitored at the egretries between April and May annually to determine the nesting species, number of nests, and nesting substrate.

4.10.9 Fish Pond Enhancement

If necessary, fish pond enhancement design will be monitored through cooperation with the design engineer. Input will be provided on pond configuration, bank slope, water control structures, revegetation, and relationship with surrounding surface drainage.

4.10.10 Excavation of Mammal Burrows

Excavation of mammal burrows will be supervised and monitored only in cases where active burrow systems are discovered. Arrangements will be made for attendance by an Agriculture and Fisheries Department veterinarian to supervise animal handling and sedation if required. Release of animals in surrounding undisturbed habitats will be supervised and monitored as needed.

4.11 Data Recording

Standard pro-formas will be used for recording field data. The data will then be input into a computerised database. These will serve as a systematic method of recording and storing data. In the event of complaints or evidence of unacceptable environmental impacts being obtained from the monitoring results, these data will be easy to reference.

Monitoring staff will record observations and events on the data forms to allow later interpretation of the results obtained.

4.12 Pollution Control Requirements

4.12.1 Environmental Inspection and Control Procedures

During on-site environmental monitoring, the ET will also observe and record the effectiveness of mitigation measures, working practices, as well as site and equipment maintenance conditions. Site inspection checklists for air quality, noise, water and waste management will be produced to the satisfaction of EPD to facilitate the observation of:

Air Quality

- Weather condition
- Maintenance and/or use of:
  - wheel washing troughs
  - water spray on construction sites, access roads and stockpiles
  - dust covers on stockpiles and trucks
  - site cleanliness
  - plant with filtration equipment
- Vehicle speed on site unpaved roads

Noise

- Weather condition
- Use and maintenance of construction plant
- Use, maintenance and effectiveness of noise enclosures and barriers
- Hours of operation
- Location of noise emitting plant on site and distance from SRs
- Presence of any significant noise source beyond the site boundary
- Number of powered plant used on site
- Compliance with permit conditions in the event of evening and night time work

Water Quality and Waste Management

- Weather
- Operation of sedimentation, pH adjustment and sewage treatment facilities
- Volume of sediments/oil in the basins and drains
- Direct discharge of sediment loaded washwater/run-off, if any
- Discolouration of water
- Storage and maintenance of fuel and chemicals
- Spillage/leakage of oil, fuel, or paint within site
- Appropriate disposal of waste oils
- Cooling water used for air conditioning
- Appropriate disposal of vegetation waste

4.12.2 Remedial Action

In the event of any non-compliance, the ET will notify the Contractor/WC and remedial actions will be taken where appropriate. Non-compliance of pollution control procedures, remedial action, effectiveness of the action, and possible recommendations will be addressed in the Monthly Monitoring and Audit Reports.

4.12.3 Solid Liquid and Chemical Waste Control Procedures

The requirements are summarised as follows:

- The different categories of wastes will be segregated, stored, transported and disposed of separately in accordance with EPD's required procedures. For instance, chemical and maintenance wastes will be collected by authorised collectors and sludge by hygiene services companies.

- As only a small amount of sludge will be produced on sites requiring periodic disposal, temporary on-site storage facilities may be required. Sludge/waste will be stored in enclosed containers to prevent odour emission.

- If transportation of hazardous materials is necessary, the contractor will ensure that hazardous materials, chemical wastes and fuel are packed or stored in containers or vessels of suitable design and construction to prevent leakage, spillage or escape.

- The contractor and operator will prevent the uncontrolled disposal of hazardous materials and chemical waste to the air, soil, surface waters, groundwaters and coastal waters.

- Dangerous materials including fuel, oil and lubricants as defined under the DGO will be stored in specially designed areas and be properly labelled on site. If leak, spill or discharge occurs, it can be contained more effectively in these specially prepared areas.

4.13 Construction Phase Audit

Construction phase audit will be carried out in conjunction with the construction compliance monitoring programme. The audit will be conducted every month by the Environmental Manager as part of the preparation for the monthly report. The audit will check:

- Records of monitoring procedures
- Records of monitoring results
- Records of exceedance of any regulatory requirements/target levels
- Control and mitigation taken in response to unacceptable environmental impacts
- Records of any complaints from SRs and actions taken
- Inspection of waste handling
- Contractor malpractice
- Activities against contract requirements

Audit findings by the Environmental Manager will be presented in the Monthly Monitoring and Audit Report. The report will identify any unanticipated impacts and improvement requirements required for future monitoring programme.

All correspondence between the WC or the ET and DEP will be copied to the Director's Representative.

4.14 Operational Phase Audit

A post-project audit will be carried out when the road becomes operational (e.g 3 months after completion of construction). The audit will:

- Review environmental management practises in terms of achieving environmental performance requirements
- Review the effectiveness of mitigation measures
- Review the effectiveness of, and requirements for, on-going monitoring programme
- Recommend improvements in environmental control in the event of non-compliance.

A post-audit report will be submitted to EPD within 10 days after completion of the audit. All correspondence between the WC or the ET and DEP will be copied to the Director's Representative.

4.15 Impact Prediction Review

A review will be undertaken on a monthly basis by the Environmental Manager, of where and when environmental impacts are likely to occur during the following month. This will be based on work schedule information, to be updated and supplied monthly by the contractor, giving locations and dates relative to described activities. The impact prediction review shall be included in the Monthly EM&A Report.

4.16 Reporting

A monthly Monitoring and Audit Report will be prepared within 10 days of the end of each month with the first report due in the month after construction commences. Reports will be submitted to the Works Checker and EPD. The report should include:

Executive Summary - A brief summary of the main points of the report.

Project Data - A synopsis of the project organisation, project programme, management liaison structure.

Monitoring & Audit Requirement - Summary of monitoring parameters, TAT levels, action plans, environmental protection requirements in contract documents, land lease and engineering conditions. In addition, an implementation status report should be provided indicating the level of implementation of those requirements.

Monitoring Methodology - Monitoring equipment used, calibration schedule, locations, duration and frequency.

Monitoring Results - Parameter, date, time, environmental conditions and locations. Results should be presented as full page graphs of each parameter over the previous 4

months at all the stations with TAT levels clearly shown on the graph. Graphs should be annotated with the major activities carried out on site during the period, weather conditions and any other factors that may affect the monitoring results.

Audit Result - Review of pollution sources and working procedures in the event of non-compliance with environmental monitoring levels; action taken in the event of non-compliance; and follow up procedures related to earlier non-compliance actions. Summary of the number of TAT level exceedances in the month. List of active construction noise permits.

Site Inspection Report - Findings of site investigations, identification of deficiencies and action taken. Advice on solid and liquid waste management status.

Complaints Received - Liaison and consultation undertaken, subsequent action, database of complaints received, location of complaints, action plan, and follow-up procedures.

Schedule - Programme of site activities and a monitoring schedule for the next reporting period.

Impact Prediction Review - Revision of the predicted impacts related to an updated work schedule for the following reporting period.

Appendices - Appropriate drawings/tables of monitoring locations, sensitive receiver locations, calibrated certificates from a HOKLAS accredited laboratory, environmental monitoring results (tabulated), audit check sheets and an implementation status report.

A disk containing all the measured data should be submitted with the monthly report. The format of the data should be agreed with EPD prior to the first report.

It should be noted that under normal circumstances, non-compliance and remedial action will be addressed in the Monthly Environmental Monitoring and Audit reports, but would also need to be dealt with on a day to day basis through the issue of action plans, detailing deviations from the specification and requesting the contractor to correct the deviations.

All correspondence between the Works Checker or the Environmental Team and the DEP will be copied to the Directors Representative.

5 ENVIRONMENTAL COMPLAINTS RESPONSE PROCEDURES

5 ENVIRONMENTAL COMPLAINTS RESPONSE PROCEDURES

5.1 Complaint Response Procedures

Complaints regarding environmental quality arising from the project area will be received from the EPD Hotline and direct enquiries to Government, the franchisee or the contractors. The following steps will be taken upon receipt of complaints:

- Log complaint and date of receipt onto the complaint database;
- Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to recurring works activities;
- If complaint is valid and due to works, identify mitigation measures;
- Undertake additional monitoring and audit to verify the situation as necessary, and address the issue in the Monthly Monitoring and Audit report; and
- Log the monitoring data and results of the investigation onto the database.

The complaint response procedure is shown in diagrammatic form in Figure 5.1

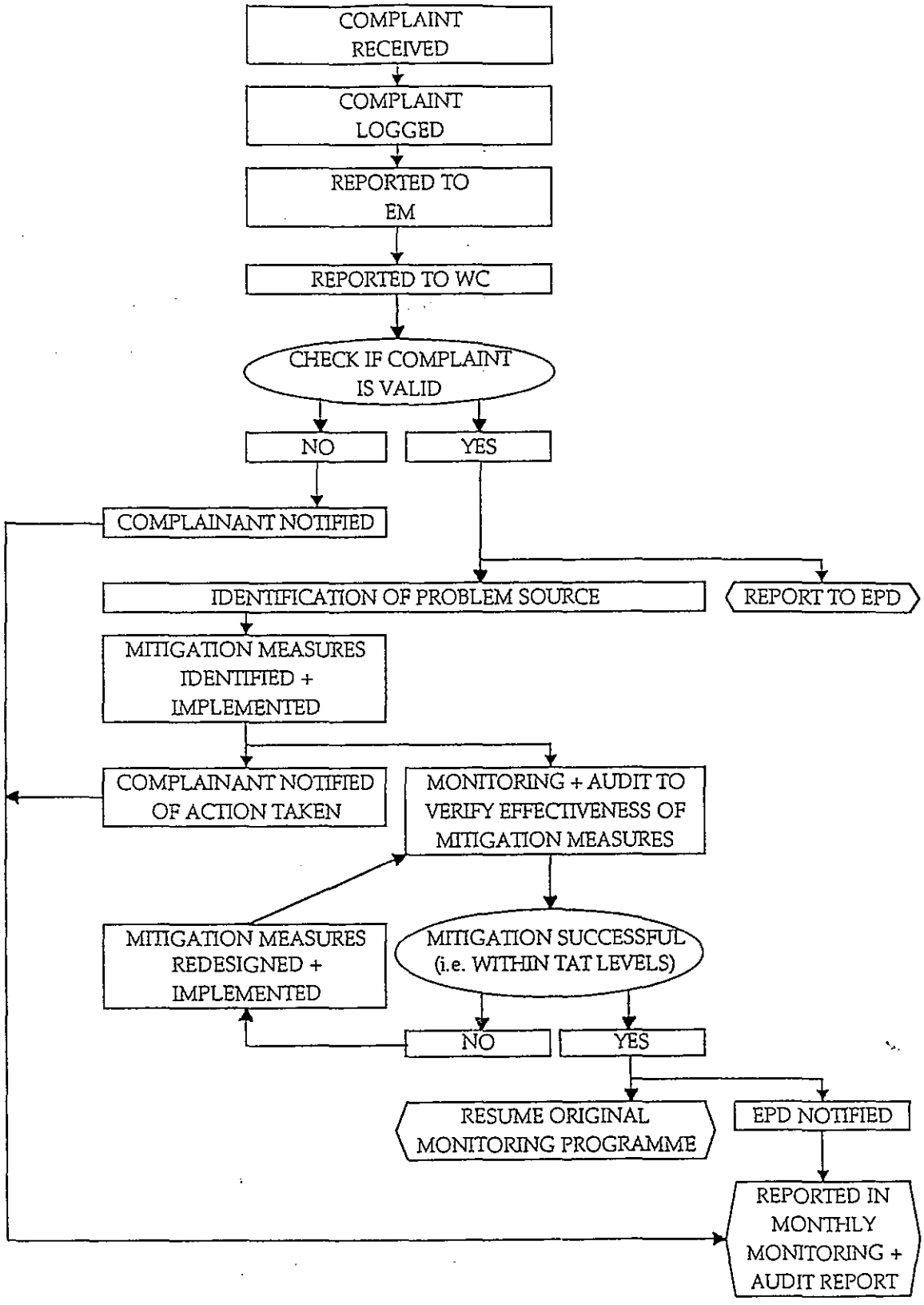
5.2 Complaint Response Action Plan

Experience has shown that complaints received are generally based on the complainants perception of the environmental situation. Verification of complaints following the above outlined procedures is therefore advisable prior to undertaking any remedial action.

Depending on the severity of the complaint, individual complaint cases may be referred to the Deputy Project Manager and the Construction Manager. The Deputy Project Manager with the Environmental Manager will be responsible for determining the appropriate mitigation measures required. Both the project and the environmental teams will follow up on the implementation of mitigation measures.

5.3 Complaint Response Audit Follow-up Procedures

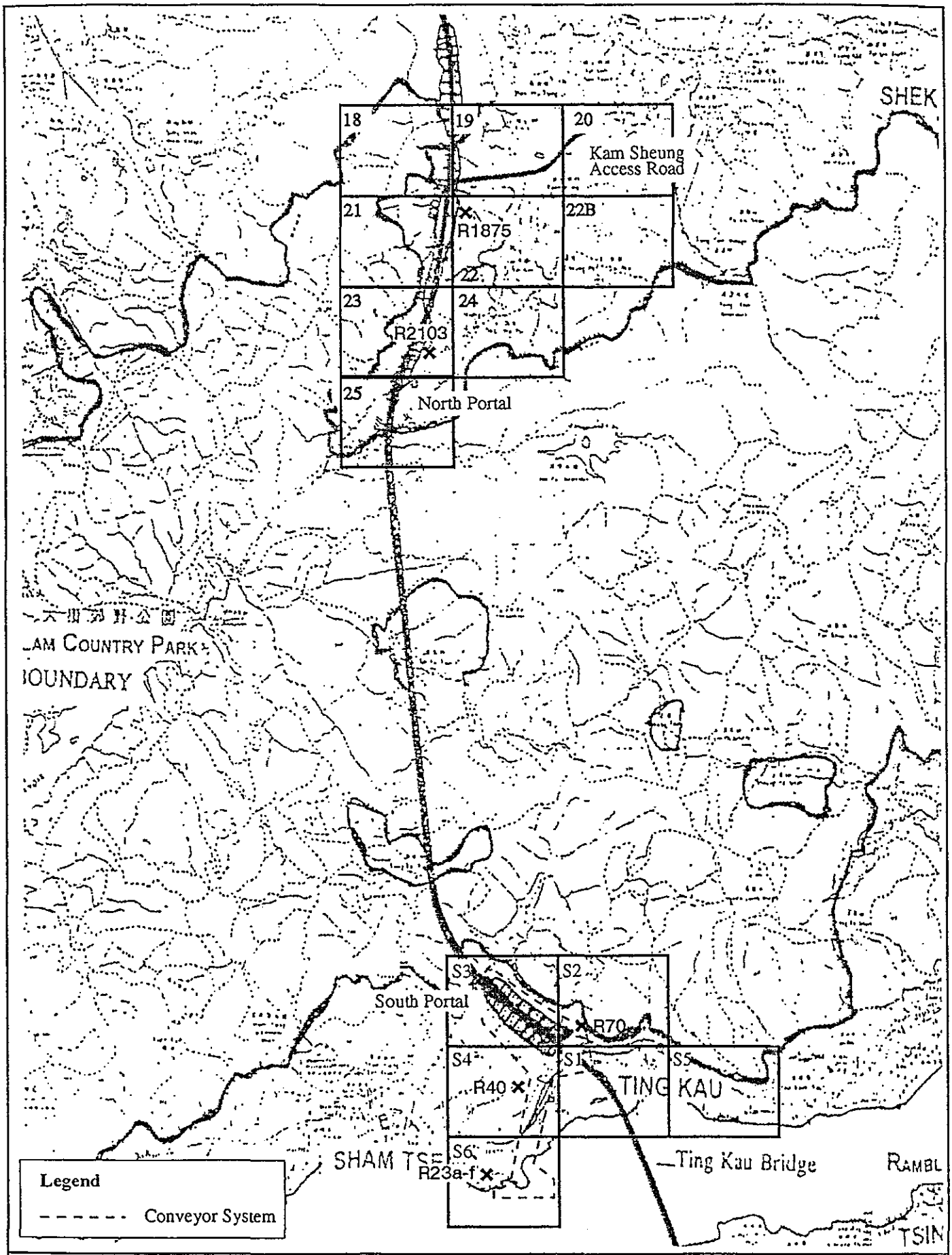
Notify complainants of results of complaint investigation. Audit response procedures to ensure that any valid reason for complaint does not recur.



Ref: decision EM = Environmental Manager
terminator WC = Works Checker
flow direction

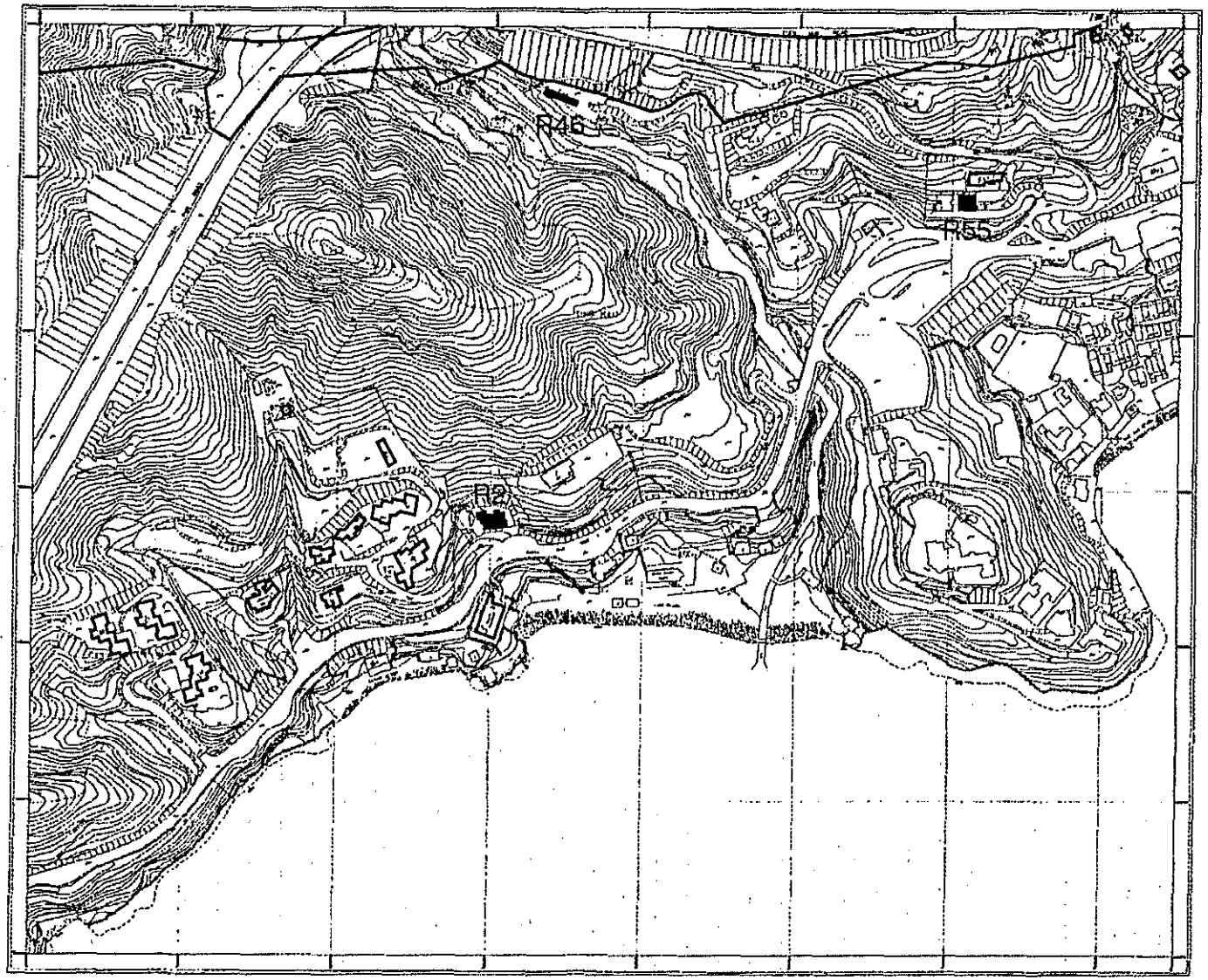
Figure 5.1 Complaints Response Procedure 96530\xl\fig5_1n.xls

APPENDIX A
SENSITIVE RECEIVER SURVEY



Appendix 1 Location of Survey Maps and Monitoring Stations for Air & Noise

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD



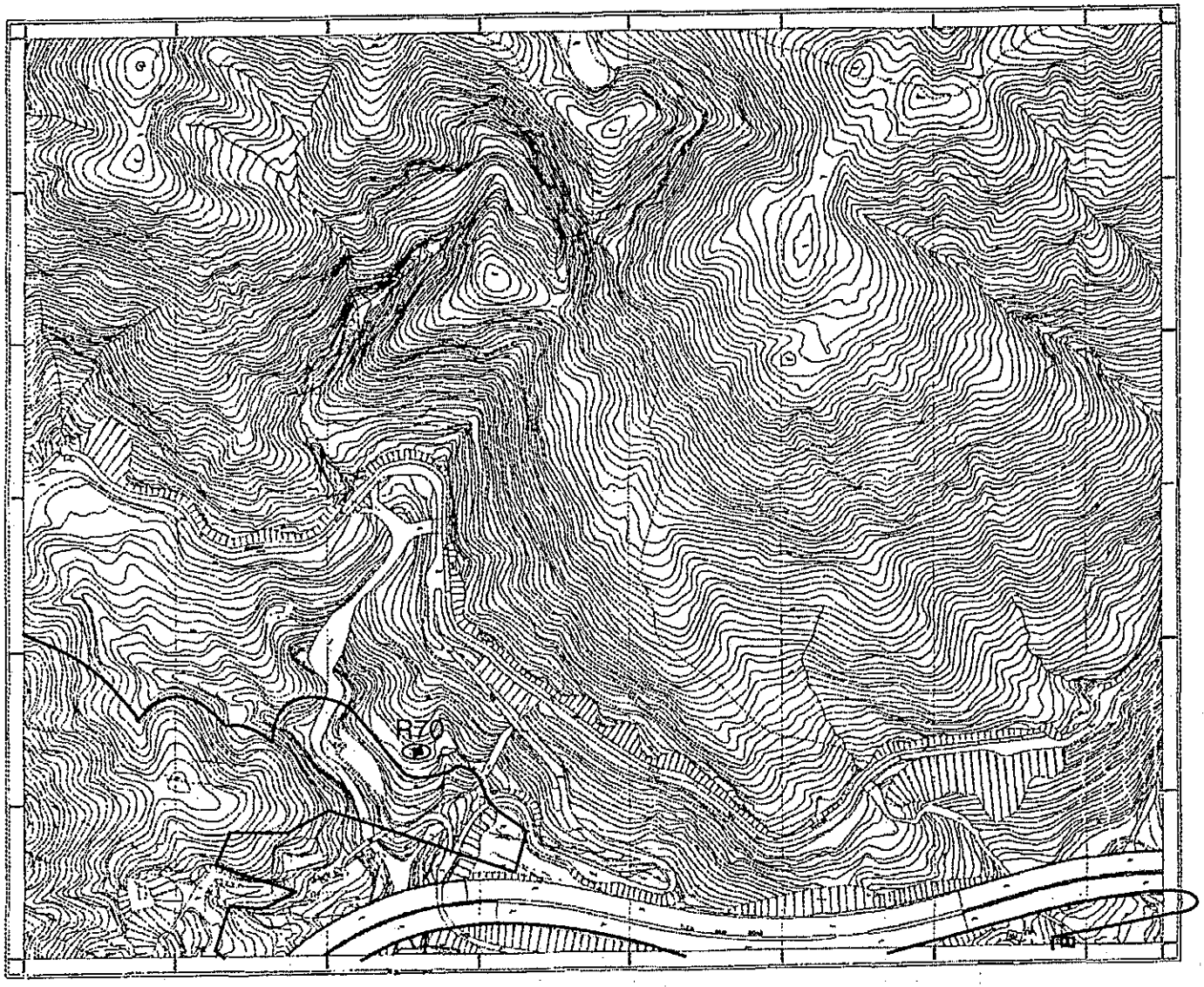
LEGEND

- Potential Sensitive Receiver
- Included in Noise/Air Modelling
- Project Site Boundary

Survey Map S1

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

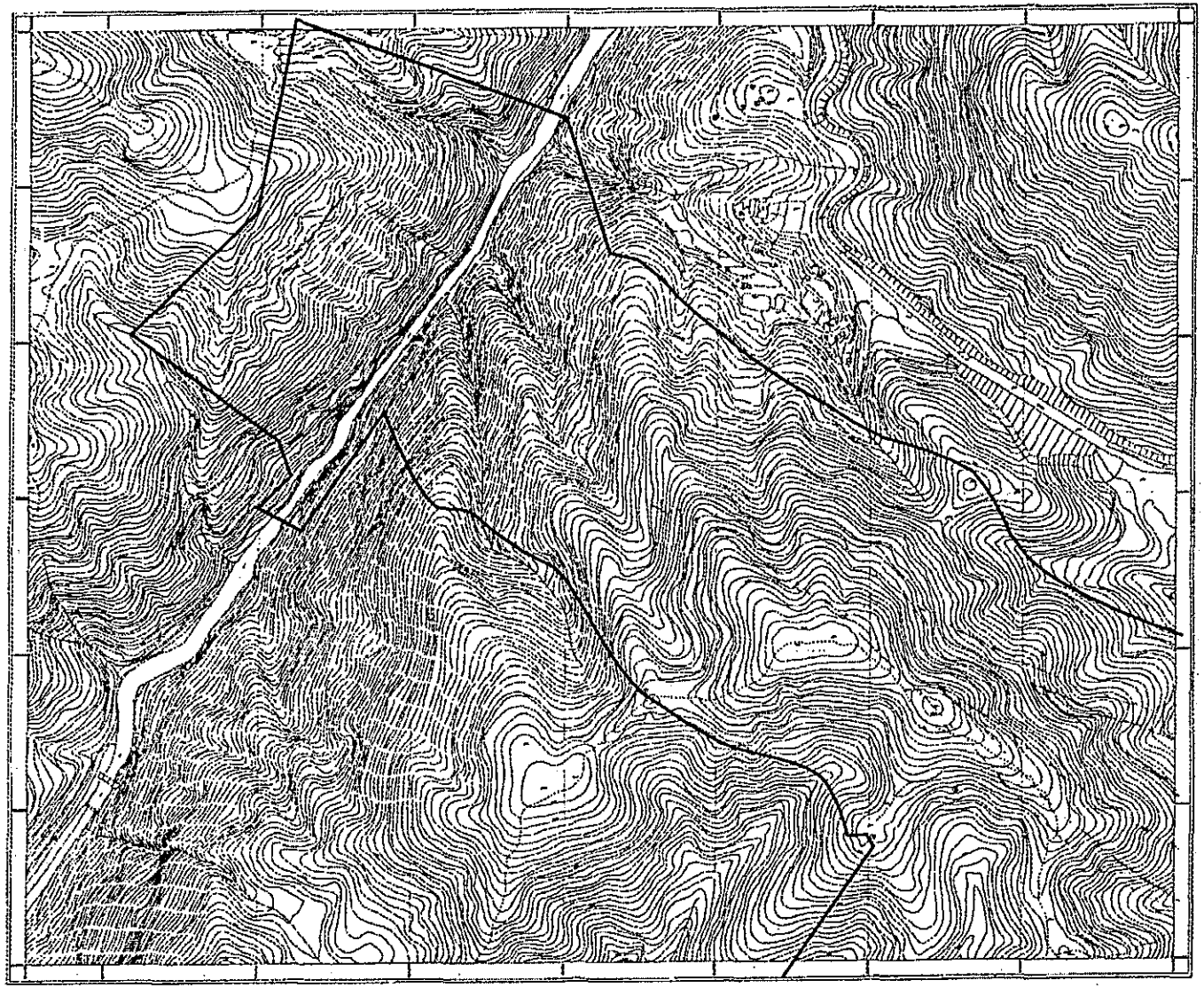
SURVEY SHEET - EXISTING NSR'S SHEET S1					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R1	N				
R2	Y	Y	2	4	
R3	Y	Y	6	4	
R4	Y	Y	1	3	
R5	Y	Y	1	1	
R6	N				
R7	N				
R8	Y	Y	2	1	
R8A	Y	Y	1	1	
R9	Y	Y	2	1	
R10	Y	Y	3	1	
R11	Y	Y	1	1	
R12	Y	N	1	3	
R13	Y	Y	2	4	
R14	Y	Y	3	4	
R15	Y	Y	2	4	
R16	Y	Y	3	4	
R41	N				
R42	N				
R43	N				
R44	N				
R45	N				
R46	Y	Y	2	3	X2
R47	Y	N	1	2	N
R48	Y	N	1	2	N
R49	Y	N	1	2	N
R50	Y	N	1	2	N
R51	Y	N	2	1	N
R52	Y	N	2	1	N
R53	Y	N	1	1	N
R54	Y	N	1	3	N
R55	Y	Y	2	4	X1
R56	Y	Y	2	4	X1
R57	Y	N	1	1	N
R58	Y	N	1	1	N
R59	N				
R60	N				
R61	Y	N	1	1	N
R62	Y	N	1	1	N
R88A	Y	Y	1	2	X8
R89	Y	Y	1	2	X10
R90	Y	N	1	2	N
R91	Y	Y	3	4	X4
R92	Y	N	1	1	N
R93	Y	N	1	1	N



Survey Map S2

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET S2					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R63	Y	N	1	1	N
R64	Y	N	1	1	N
R65	N				
R66	N				
R67	N				
R68	N				
R69	N				
R70	Y	Y	2	4	X3
R71	Y	N	1	1	N
R88B	Y	Y	1	2	X9
R88C	Y	Y	1	2	X9



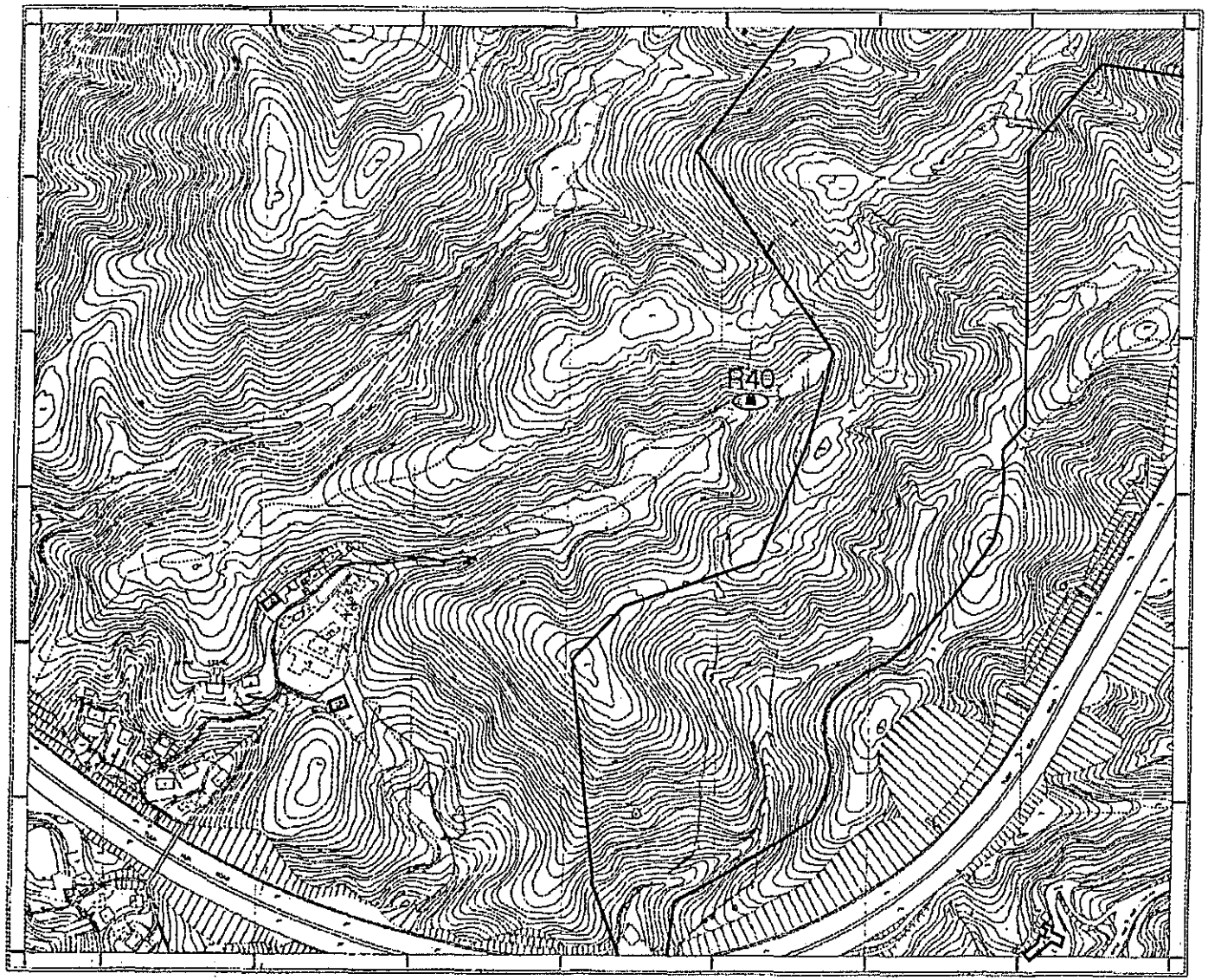
LEGEND

— Project Site Boundary

Survey Map S3

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET S3					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R72	Y	N	1	1	N
R73	Y	N	1	1	N
R74	N				
R75	Y	N	1	1	N
R76	N				
R77	N				
R78	N				
R79	Y	N	1	1	N
R80	Y	N	1	1	N
R81	Y	N	1	1	N
R82	Y	N	1	1	N
R83	Y	N	1	1	N
R84	Y	N	1	1	N
R85	Y	N	1	1	N
R86	Y	N	1	1	N
R87	Y	N	1	1	N



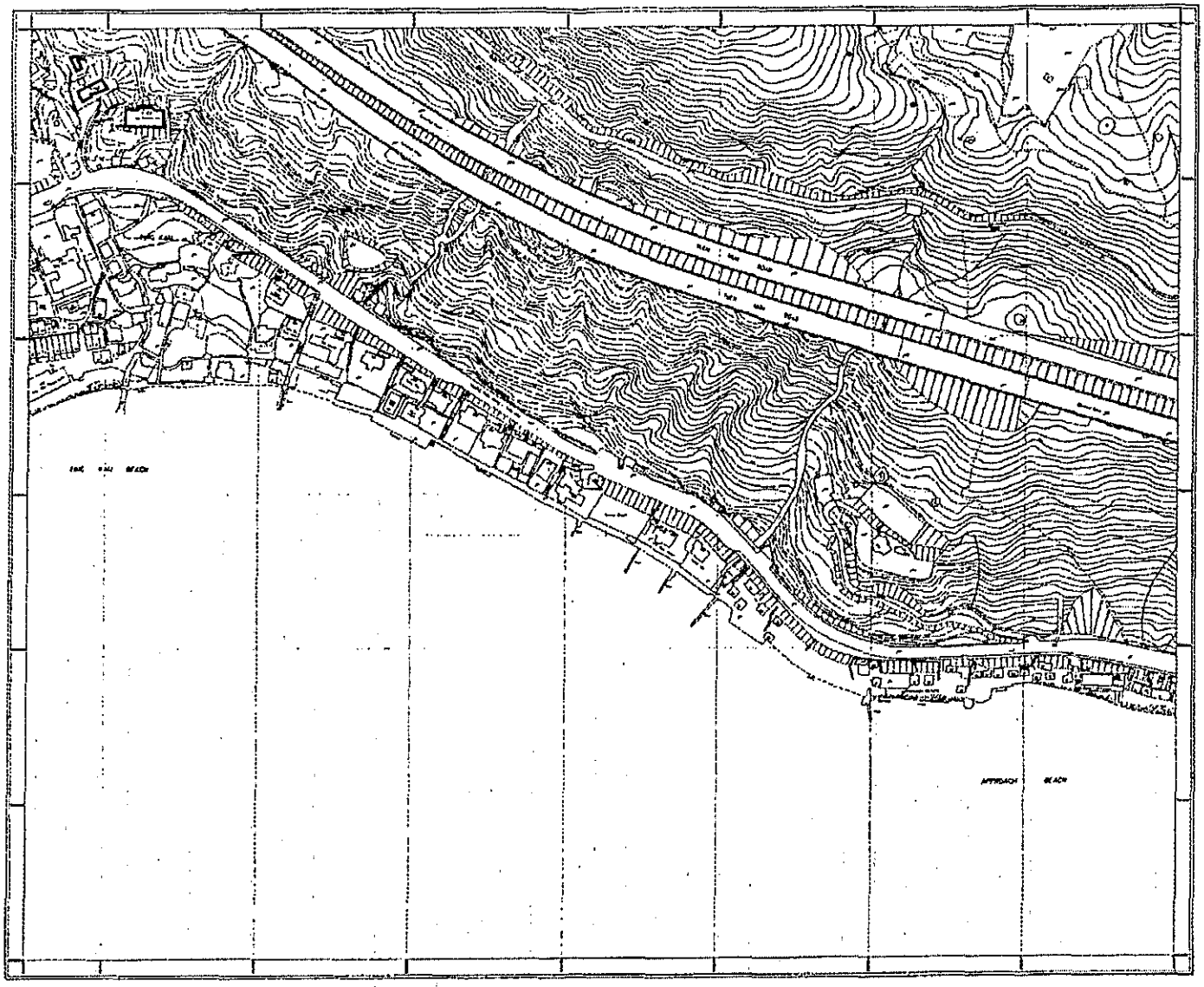
LEGEND

- Potential Sensitive Receiver
- Included in Noise/Air Modelling
- Project Site Boundary
- Monitoring Station

Survey Map S4

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET S4					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R17	Y	Y	1	4	
R29	Y	Y	3	4	
R30	Y	N	1	1	
R31	Y	N	1	1	
R32	Y	N	1	1	
R33	Y	N	1	1	
R34	Y	N	1	1	
R35	Y	N	1	1	
R36	Y	N	1	1	
R37	Y	N	1	1	
R38	Y	N	0	N/A	
R39	Y	Y	1	3	
R40	Y	Y	1	2	X11



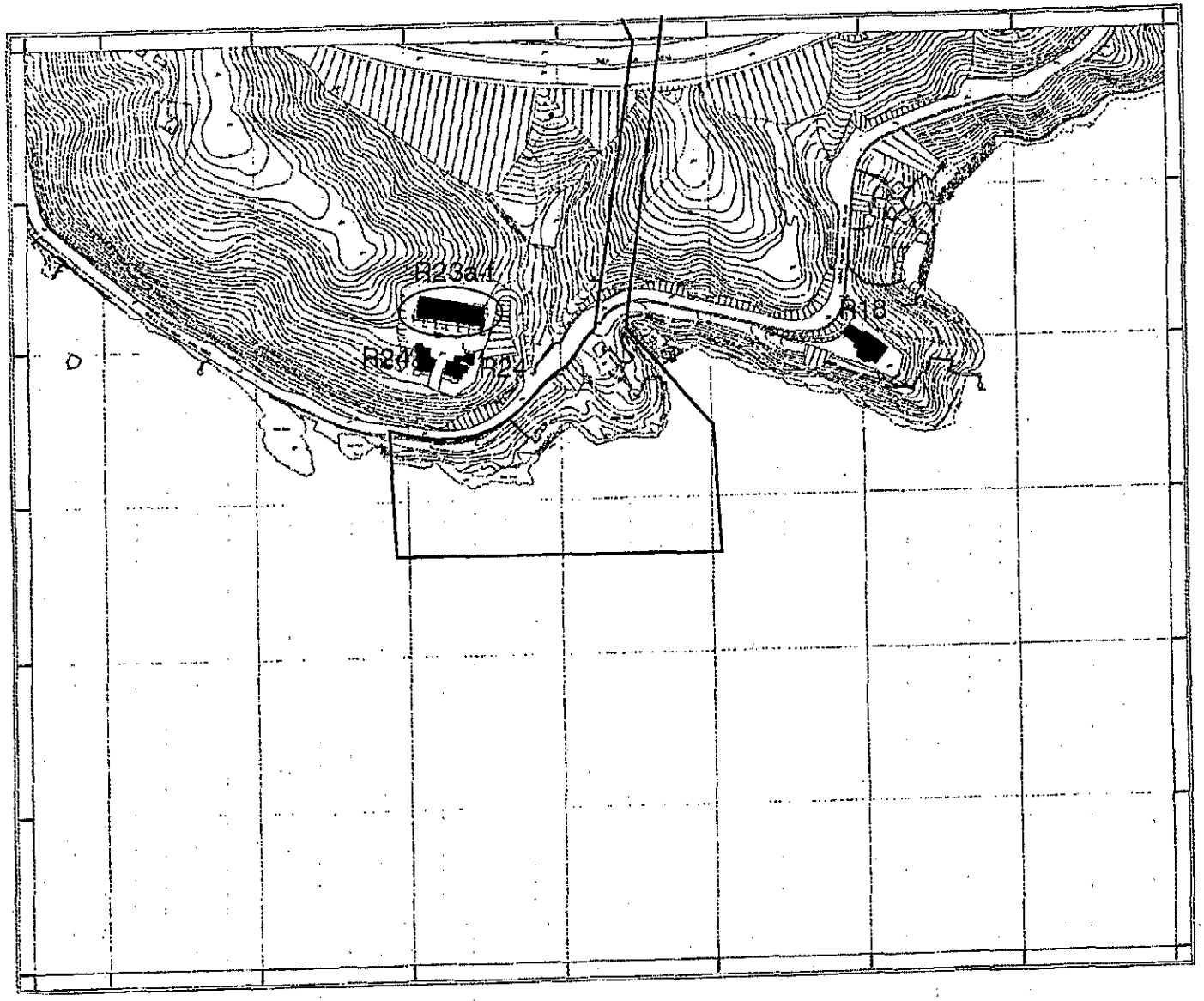
LEGEND

Potential Sensitive Receiver

Survey Map S5

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

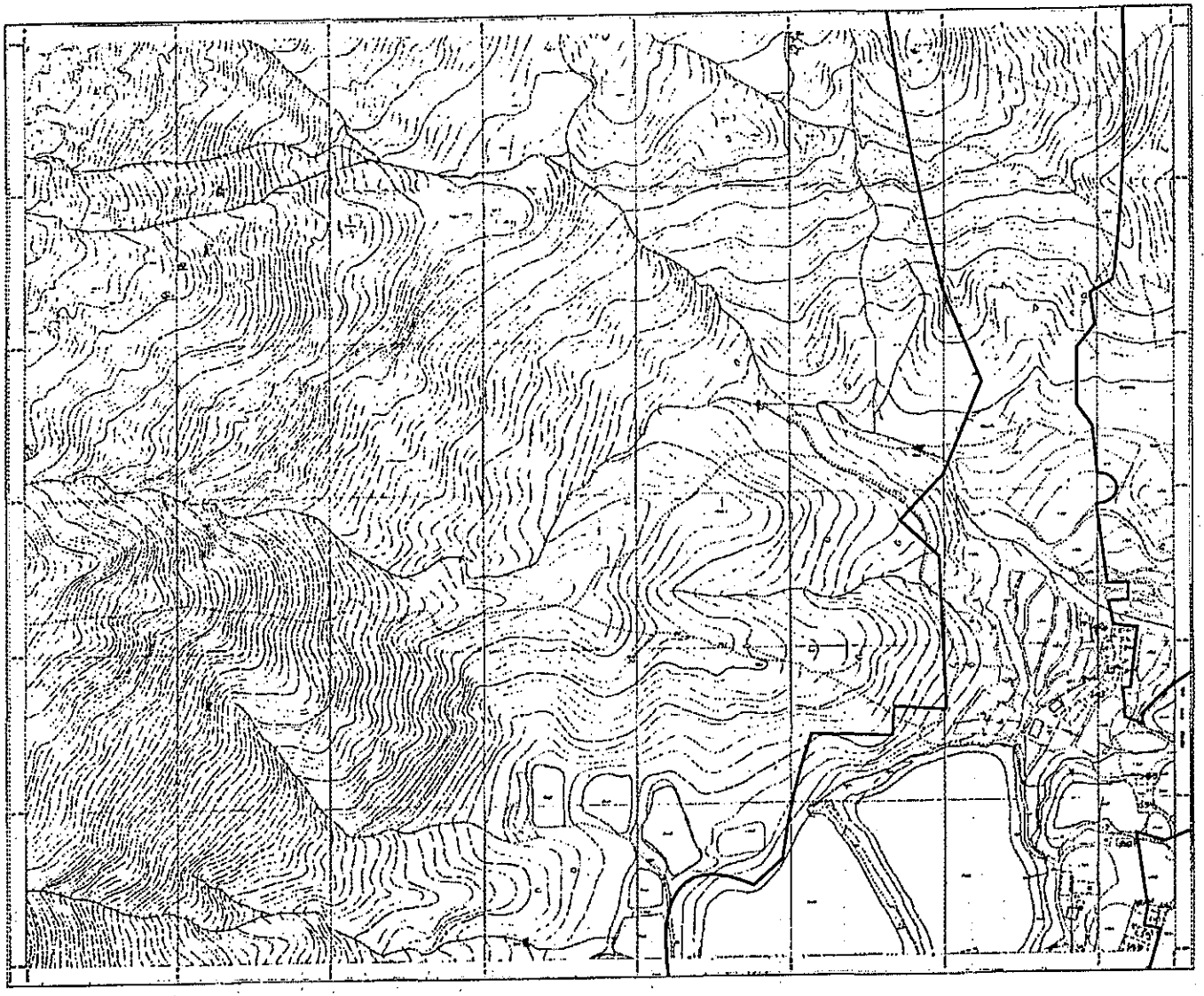
SURVEY SHEET - EXISTING NSR'S SHEET S5					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R94	Y	Y	1	3	X5
R95	Y	N	1	3	N
R96	Y	Y	2	4	X6
R97	Y	Y	3	4	X7
R98	Y	N	1	3	N
R99	Y	N	1	3	N



Survey Map S6

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET S6					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R18	Y	Y - GOV OFFICES	2	3	R8, R9
R19	Y	N	1	3	
R20	N				
R21	Y	N - LIFE GUARD HUT	1	3	
R22	Y	N	1	2	
R23a	Y	Y	3	4	
R23b	Y	Y	3	4	
R23c	Y	Y	3	4	
R23d	Y	Y	3	4	
R23e	Y	Y	3	4	
R23f	Y	Y	3	4	
R24	Y	Y	2	4	
R25	Y	Y	2	4	



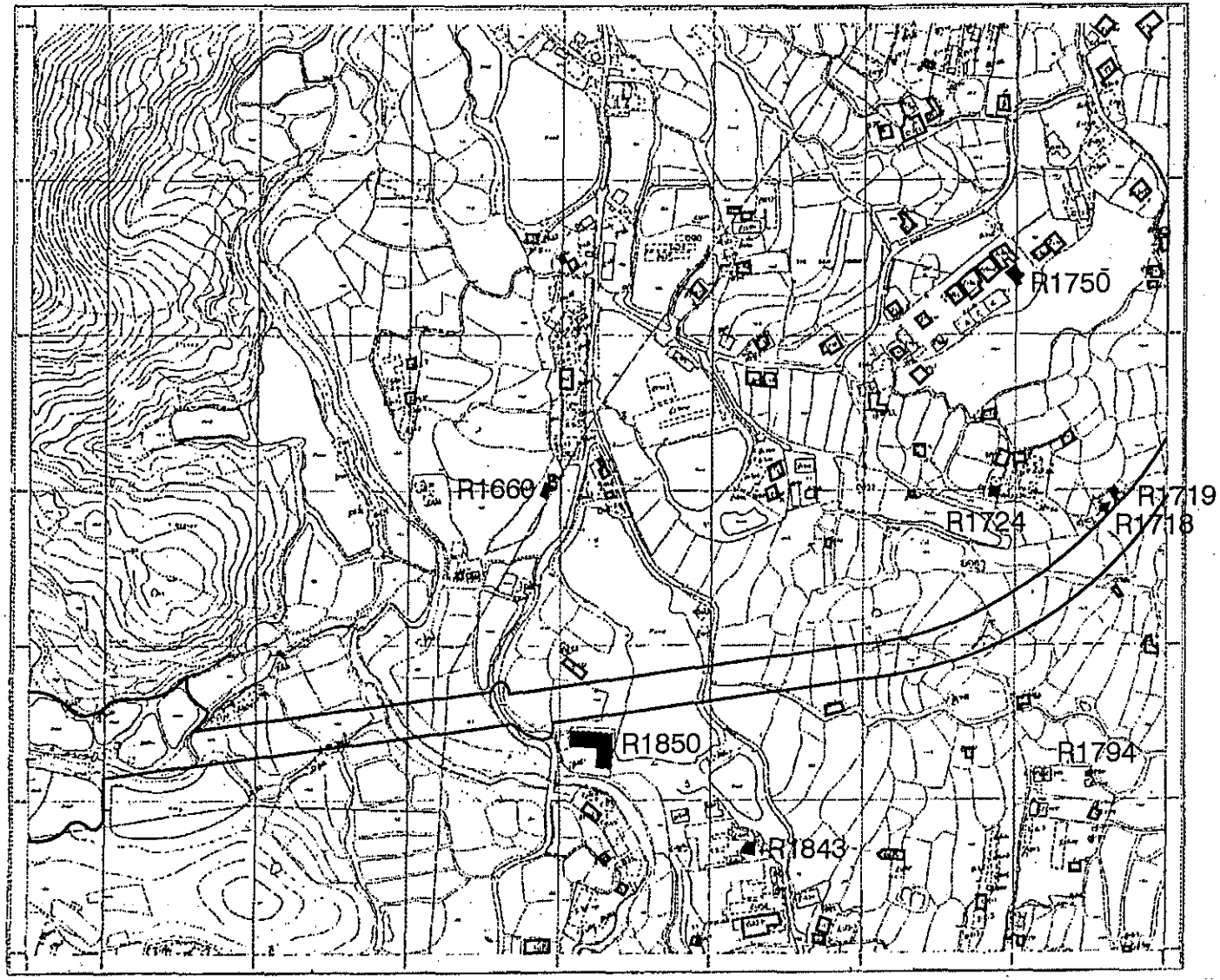
LEGEND

— Project Site Boundary

Survey Map 18

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET 18					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R1610	Y	N	1	2	N
R1611	Y	N	1	2	N
R1612	Y	N	1	2	N
R1613	Y	N	1	2	N
R1614	Y	N	1	2	N
R1615	Y	N	1	2	N
R1616	Y	N	1	2	N
R1617	Y	N	1	2	N
R1618	Y	N	1	2	N
R1619	Y	N	1	2	N
R1620	Y	N	2	2	N
R1621	Y	N	2	2	N
R1622	Y	N	2	2	N
R1623	Y	N	2	2	N
R1624	Y	N	2	2	N



LEGEND

- Potential Sensitive Receiver
- Included in Noise/Air Modelling
- Project Site Boundary

Survey Map 19

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

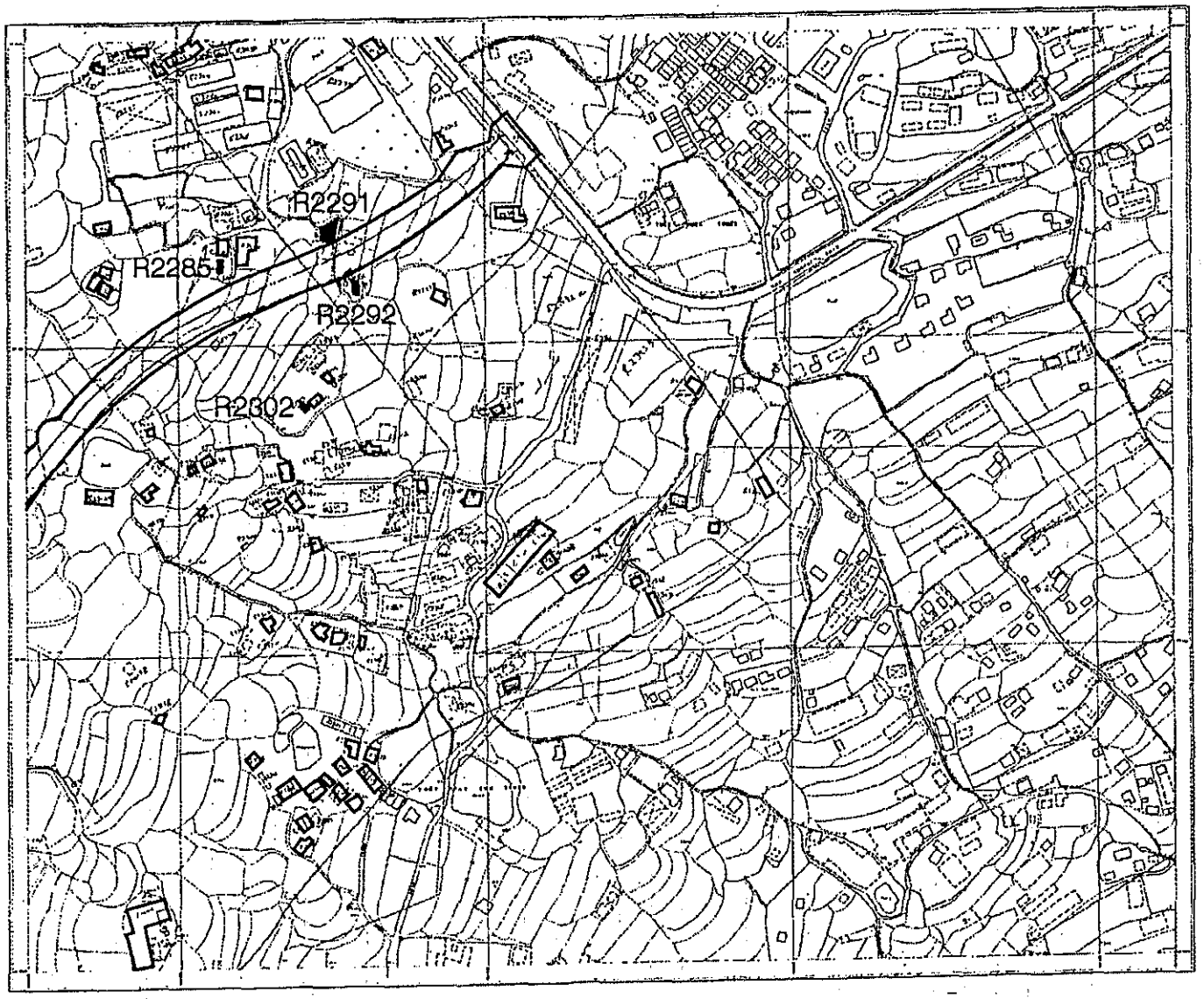
SURVEY SHEET - EXISTING NSR'S SHEET 19					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R1625	Y	N	1	2	N
R1626	N				
R1627	Y	N	1	2	N
R1628	Y	N	1	2	N
R1629	Y	N	1	2	N
R1630	Y	Y	1	2	P10
R1631	Y	N	1	2	N
R1632	Y	N	1	1	N
R1633	Y	N	2	3	P5
R1634	Y	Y	2		P6
R1635	Y	N	1	2	N
R1636	Y	N	1	2	N
R1637	Y	N	1	2	N
R1638	Y	N	1	1	N
R1639	Y	N	1	1	N
R1640	Y	N	1	1	N
R1641	Y	N	1	1	N
R1642	Y	N	1	2	N
R1643	Y	N	1	2	N
R1644	Y	Y	1	2	P4
R1645	Y	N	1	2	N
R1646	Y	N	1	2	N
R1647	Y	Y	2	3	P3
R1648	Y	N	1	1	N
R1649	Y	N	1	1	N
R1650	Y	N	2	3	N
R1651	Y	Y	2	3	P7
R1652	Y	Y	1	2	P36
R1653	Y	N	1	2	P36
R1654	Y	N	1	2	N
R1655	Y	N	1	3	N
R1656	Y	Y	1	2	O36
R1657	Y	N	1	2	N
R1658	Y	Y	2	3	O36
R1659	Y	Y	1	3	O36
R1660	Y	Y	2	4	P2
R1661	Y	Y	1	4	P2
R1662	Y	N	1	2	N
R1663	Y	N	1	2	N
R1664	Y	N - SHOP	3	2	P1
R1665	Y	N	1	2	N
R1666	Y	N	1	2	N
R1667	Y	N	1	2	N
R1668	Y	N	1	2	N
R1669	Y	N	1	2	N
R1670	Y	Y	1	3	O35
R1671	Y	N	1	2	N
R1672	Y	N	1	2	N

R1673	Y	N	1	2	N
R1674	Y	N	1	1	N
R1675	Y	N	1	2	N
R1676	Y	N	1	1	N
R1677	Y	N	1	1	N
R1678	Y	N	1	1	N
R1679	Y	Y	2	4	O33
R1680	Y	Y	2	4	O34
R1681	Y	N	1	2	N
R1682	Y	Y	2	3	O31
R1683	Y	N	1	2	N
R1684	Y	N	1	2	N
R1685	Y	N	1	3	N
R1686	Y	N	1	2	N
R1687	N				
R1688	N				
R1689	N				
R1690	N				
R1691	Y	Y	2	4	P12
R1692	Y	Y	2	4	P12
R1693	Y	N	1	2	N
R1694	Y	N	1	1	N
R1695	Y	N	1	1	N
R1696	Y	N	1	1	N
R1697	Y	N	1	1	N
R1698	Y	N	1	1	N
R1699	Y	Y	3	4	P13
R1700	Y	Y	1	3	P14
R1701	Y	N	1	3	N
R1702	Y	N - WORKSHOP	1	3	P15
R1703	Y	N	1	2	N
R1704	Y	N	1	2	N
R1705	Y	N	1	2	N
R1706	Y	N	1	2	N
R1707	Y	N	1	2	N
R1708A	Y	Y	3	4	P16
R1708B	Y	Y	2	4	P16
R1709	Y	N	1	2	N
R1710	Y	N	1	2	N
R1711	Y	N - WORKSHOP	1	3	AS P15
R1712	Y	N	1	3	AS P15
R1713	Y	N	1	3	AS P15
R1714	Y	Y	1	3	P18
R1715	Y	N	1	2	N
R1716	Y	N	1	2	N
R1717	Y	Y	1	2	AS P22
R1718	Y	Y	1	2	AS P22
R1719	Y	Y	1	2	AS P22
R1720	Y	N	1	2	AS P22
R1721	Y	N	1	2	AS P22
R1722	Y	N	1	2	AS P22

R1723	Y	N	1	2	AS P22
R1724	Y	Y	1	2	AS P22
R1725	Y	Y	1	2	AS P22
R1726	Y	Y	1	2	AS P22
R1727	Y	Y	1	2	AS P22
R1728	Y	Y	1	2	P22
R1729	Y	Y	1	2	P20
R1730	Y	Y	1	2	P21
R1731	Y	N	1	3	N
R1732	Y	Y	1	2	P19
R1733	Y	N	1	1	N
R1734	Y	Y	2	4	P17
R1735	Y	Y	2	4	P17
R1736	Y	N	1	4	N
R1737A	Y	Y	2	4	P17
R1737B	AS R1737A				
R1738	Y	Y	1	3	P24
R1739	Y	N	1	2	N
R1740A	Y	Y	2	4	AS P23
R1740B	Y	Y	2	4	P23
R1741	Y	N	1	4	N
R1742	Y	N - WORKSHOP	1	3	N
R1743	Y	N	1	1	N
R1744	Y	Y	2	4	P25
R1744A	AS 1744				
R1744B	UNDER				
R1744C	CONSTRUCTION				
R1745	Y	Y	2	4	P25
R1746	Y	Y	3	4	P25
R1747	Y	Y	2	4	P25
R1748	Y	Y	2	4	P25
R1749	Y	Y	2	4	P25
R1750	Y	Y	2	4	P25
R1751	Y	Y	2	4	P25
R1752	Y	Y	3	4	P25
R1753	Y	Y	1	3	P29
R1754	Y	Y	2	3	P29
R1755	Y	Y	2	4	P28
R1756	Y	Y	3	4	N
R1757	Y	N	1	2	N
R1758	Y	N	1	2	P26
R1759	Y	Y	2	4	N
R1760	Y	N	1	4	N
R1761	Y	N	1	2	N
R1762	Y	N	1	2	N
R1763	Y	N	1	1	N
R1764	Y	N	1	2	N
R1765	Y	N	1	2	N
R1766	Y	N	1	2	N
R1767	Y	N	1	3	N

R1768	Y	Y	1	3	P27
R1769A	Y	Y	1	3	AS P31
R1769B	Y	Y	2	4	AS P32
R1769C	Y	Y	2	4	AS P32
R1770	Y	N	1	1	N
R1771	Y	Y	1	3	P31
R1772	Y	N	1	2	N
R1773	Y	N	1	2	N
R1774	Y	N	1	2	N
R1775	Y	Y	1	2	P33
R1776	Y	N	1	2	N
R1777	Y	N	1	2	N
R1778	Y	N	1	2	N
R1779	Y	N	1	2	N
R1780	Y	N	1	2	N
R1781	Y	N	1	2	N
R1782	Y	N	1	2	N
R1783	Y	N	1	1	N
R1784	Y	Y	1	3	P30
R1785	Y	Y	1	3	AS P30
R1786	Y	Y	1	2	P37
R1787	Y	Y	1	2	P37
R1788	Y	Y	1	2	AS P37
R1789	Y	N	1	2	N
R1790	Y	Y	1	2	AS P37
R1791	Y	Y	1	2	AS P37
R1792	Y	N	1	2	N
R1793	Y	N	1	2	N
R1794	Y	Y	1	2	AS P37
R1795	Y	N	1	2	N
R1796	Y	N	1	2	N
R1797	Y	N	1	2	N
R1798	Y	N	1	2	N
R1799	Y	Y	1	3	AS Q1
R1800	Y	N	1	2	N
R1801	Y	N	1	2	N
R1802	Y	N	1	2	N
R1803	Y	N	1	2	N
R1804	Y	N	1	2	N
R1805	Y	Y	1	2	Q1
R1806	Y	N	1	2	N
R1807	Y	N	1	2	N
R1808	Y	N	1	2	N
R1809	Y	N	1	2	N
R1810	Y	N	1	3	N
R1811	Y	Y	1	3	Q2
R1812	Y	N	1	2	N
R1813	Y	N	1	2	N
R1814	Y	N	1	2	N
R1815	Y	N	1	2	N

R1816	Y	N	1	2	N
R1817	Y	Y	2	2	Q3
R1818	Y	N	1	2	N
R1819	Y	N	1	2	N
R1820	Y	Y	1	2	AS P37
R1830	Y	N	1	2	N
R1831	Y	Y	1	4	Q5
R1832	Y	Y	3	4	Q5
R1833	Y	N	1	2	N
R1834	Y	N	1	2	N
R1835	Y	Y	1	2	AS P37
R1836	Y	N	1	3	N
R1837	Y	Y	1	2	Q6
R1838	Y	N	1	1	N
R1839	Y	N	1	1	N
R1840	Y	N	1	1	N
R1841	Y	Y	1	2	AS P37
R1842	Y	N	2	3	N
R1843	Y	Y	2		AS Q5
R1844	Y	N	1	2	N
R1845	Y	N	1	3	N
R1846	Y	N	1	1	N
R1847	N				
R1848	Y	N	1	1	N
R1849	Y	N	1	1	N
R1850	Y	Y	1	2	P8
R1851	Y	N	1	2	N
R1852	Y	N	1	2	N
R1853	Y	N	1	2	N
R1854	Y	Y	1	2	P9
R1855	Y	N	1	2	N
R1856	Y	N	1	2	N
R1857	Y	Y	1	2	Q7
R1858	Y	N	1	2	N
R1859	Y	N	1	2	N
R1860	Y	N	1	2	N
R1861	Y	Y	1	2	Q8
R1862	Y	Y	1	2	P11
R1863	Y	N	1	1	N
R1864	Y	N	1	2	N
R1865	Y	N	1	2	N
R1866	Y	N	1	2	N



LEGEND

- Potential Sensitive Receiver
- Included in Noise/Air Modelling
- Project Site Boundary

Survey Map 20

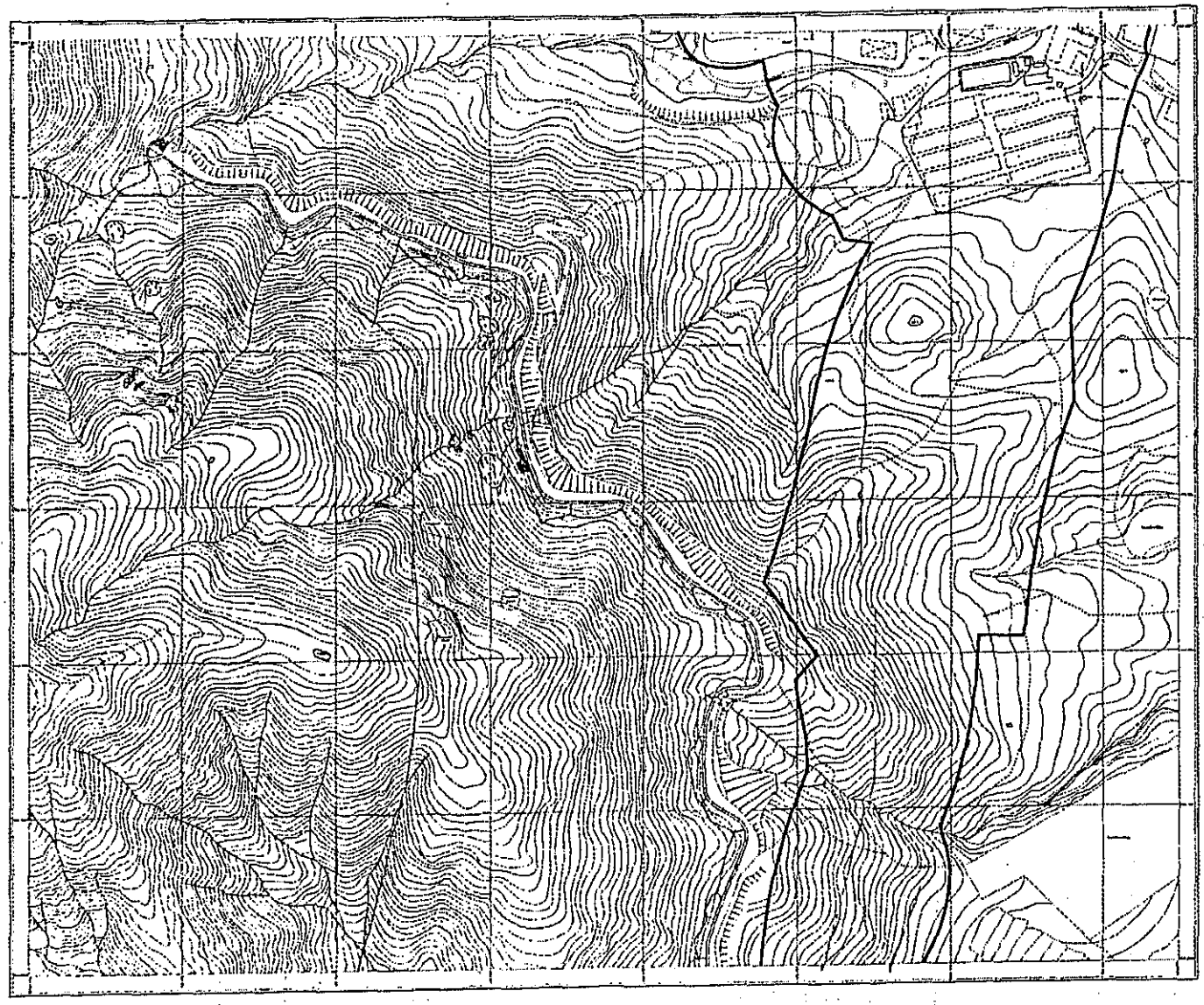
CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET 20					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R2253	Y	Y	1	3	V8
R2254	Y	N	1	3	N
R2255	Y	Y	1	3	V9
R2256	Y	N	1	2	N
R2257	Y	Y	1	3	V10
R2258	Y	N	1	3	N
R2259	Y	Y	1	3	V10
R2260	Y	N	1	2	N
R2261	Y	N	1	2	N
R2262	Y	N	1	2	N
R2263	Y	N	2	3	N
R2264	Y	N	2	3	N
R2265	Y	N	2	3	N
R2266	Y	N	2	3	N
R2267	Y	N	2	3	N
R2268	Y	N	2	3	N
R2269	Y	Y	3	4	V11
R2270	Y	N	2	3	N
R2271	Y	N	2	3	N
R2272	Y	N	2	3	N
R2273	Y	N	2	3	N
R2276	Y	Y	1	3	V20
R2277	N				
R2278	N				
R2279	N				
R2280	Y	N	2	1	N
R2281	Y	N	1	1	N
R2282	Y	N	1	1	N
R2283	Y	Y	1	3	V12
R2284	Y	Y	1	2	V13
R2285	Y	Y	2	3	V13
R2286	Y	N	1	2	N
R2287	N				
R2288	Y	Y	3	3	V14
R2289	Y	Y	1	2	V15
R2290	Y	Y	1	2	V15
R2291	Y	Y	1	2	V16
R2292	Y	Y	1	2	V17
R2293A	Y	N	1	2	N
R2293B	Y	Y	1	2	V18
R2294	Y	N	1	2	N
R2295	Y	N	1	2	N
R2296	Y	N	1	2	N
R2297	Y	N	1	2	N
R2298	Y	N	1	2	N
R2299	Y	Y	1	4	W8
R2300	Y	N	1	4	N

R2301	Y	Y	2	4	W8
R2302	Y	Y	2	4	W8
R2303	Y	N	1	2	N
R2304	Y	N	1	4	N
R2305	Y	Y	2	4	V19
R2306	Y	Y	2	4	V21
R2307	Y	N	1	3	N
R2308	Y	N	1	3	N
R2309	Y	Y	1	3	V22
R2310	Y	N	1	3	N
R2311	Y	N - FACTORY	2	2	AS V7
R2312	Y	N	1	2	N
R2313	Y	Y	1	2	W1
R2314	Y	N	1	2	N
R2315	Y	N	1	1	N
R2316	Y	N	1	1	N
R2317	Y	N	1	1	N
R2318A	Y	N	1	2	N
R2318B	Y	Y	1	2	V24
R2319	Y	Y	1	3	V25
R2320	Y	N	1	2	N
R2321	Y	N	1	2	N
R2322	Y	N	1	2	W2
R2323	Y	N	1	2	N
R2324	Y	N	1	1	N
R2325	Y	N	1	1	N
R2326	Y	N	1	1	N
R2327	Y	N	1	1	N
R2328	Y	N	1	2	N
R2329	Y	N	1	2	N
R2330	Y	N	1	2	W3
R2331	Y	Y	2	4	W4
R2332	Y	Y	2	4	W5
R2333	Y	N	1	3	N
R2334	Y	N	1	3	N
R2335	Y	Y	1	4	W6
R2336	Y	N	1	2	N
R2337 A&B	Y	Y	2	4	W7
R2338	Y	Y	1	2	AS W12
R2339	Y	N	1	2	N
R2340A	Y	Y	3	4	AS W11
R2340B	Y	Y	1	2	AS W12
R2341	Y	N	1	2	N
R2342	Y	Y	1	3	W9, W13
R2343	Y	N	1	2	N
R2344	N				
R2345	Y	Y	1	2	W12
R2346	Y	N	1	1	N
R2347	Y	Y	2	4	AS W11
R2348	Y	N	1	2	N

R2349	Y	N	1	2	N
R2350	Y	N	1	2	N
R2351	Y	Y	3	4	AS W11
R2352	Y	Y	2	4	W11
R2353	Y	N	1	2	N
R2354	Y	Y	1	3	W10
R2355	Y	N	1	2	N
R2356	N				
R2357	N				
R2358	N				
R2359	Y	N	1	2	N
R2360	Y	N	1	2	N
R2361	Y	N	1	2	N
R2362	N				
R2363	N				
R2364	N				
R2365	N				
R2366	N				
R2367	N				
R2368	N				
R2369	N				
R2370	Y	N	1	1	N
R2371	Y	N	1	2	N
R2372	Y	N	1	2	N
R2373	Y	Y	2	3	W14
R2374	N				
R2375	Y	N	1	2	N
R2376	Y	Y	2	4	AS W15
R2377	Y	Y	2	4	AS W15
R2378	Y	Y	2	4	AS W15
R2379	Y	Y	3	4	AS W15
R2380	Y	Y	3	4	W15
R2381	Y	Y	2	4	AS W15
R2382	Y	Y	3	4	AS W15
R2383	Y	Y	1	4	AS W15
R2384	Y	Y	1	3	W16
R2385	Y	N	1	1	N
R2386	Y	Y	2	4	W17
R2387	Y	Y	2	3	W17
R2388	Y	Y	2	4	AS W15
R2389	Y	N	1	3	N
R2390	N				
R2391A	Y	Y	3	4	AS W15
R2391B	Y	Y	1	2	AS W12
R2392A	Y	Y	2	4	W29
R2392B	Y	N - FACTORY	2	2	AS V7
R2392C	Y	N	2	2	AS V7
R2393	Y	Y	2	3	W27
R2394	Y	N	1	3	N
R2395	Y	Y	1	2	W28

R2396	Y	Y	1	2	W26
R2397	Y	Y	1	2	W22
R2398	Y	Y	2	4	W23
R2399	Y	Y	1	2	W24
R2400	Y	N	1	2	N
R2401	Y	Y	3	4	W25
R2402A	Y	Y	3	4	V23
R2402B	Y	Y	3	4	V24
R2402C	Y	Y	3	4	V25
R2402D	Y	Y	3	4	V26
R2402E	Y	Y	3	4	V27
R2402F	Y	Y	3	4	V28
R2402G	Y	Y	3	4	V29
R2403	Y	N	1	2	N
R2404	Y	Y	1	2	W18
R2405	Y	N	1	2	N
R2406	Y	N	1	2	N
R2407	N				



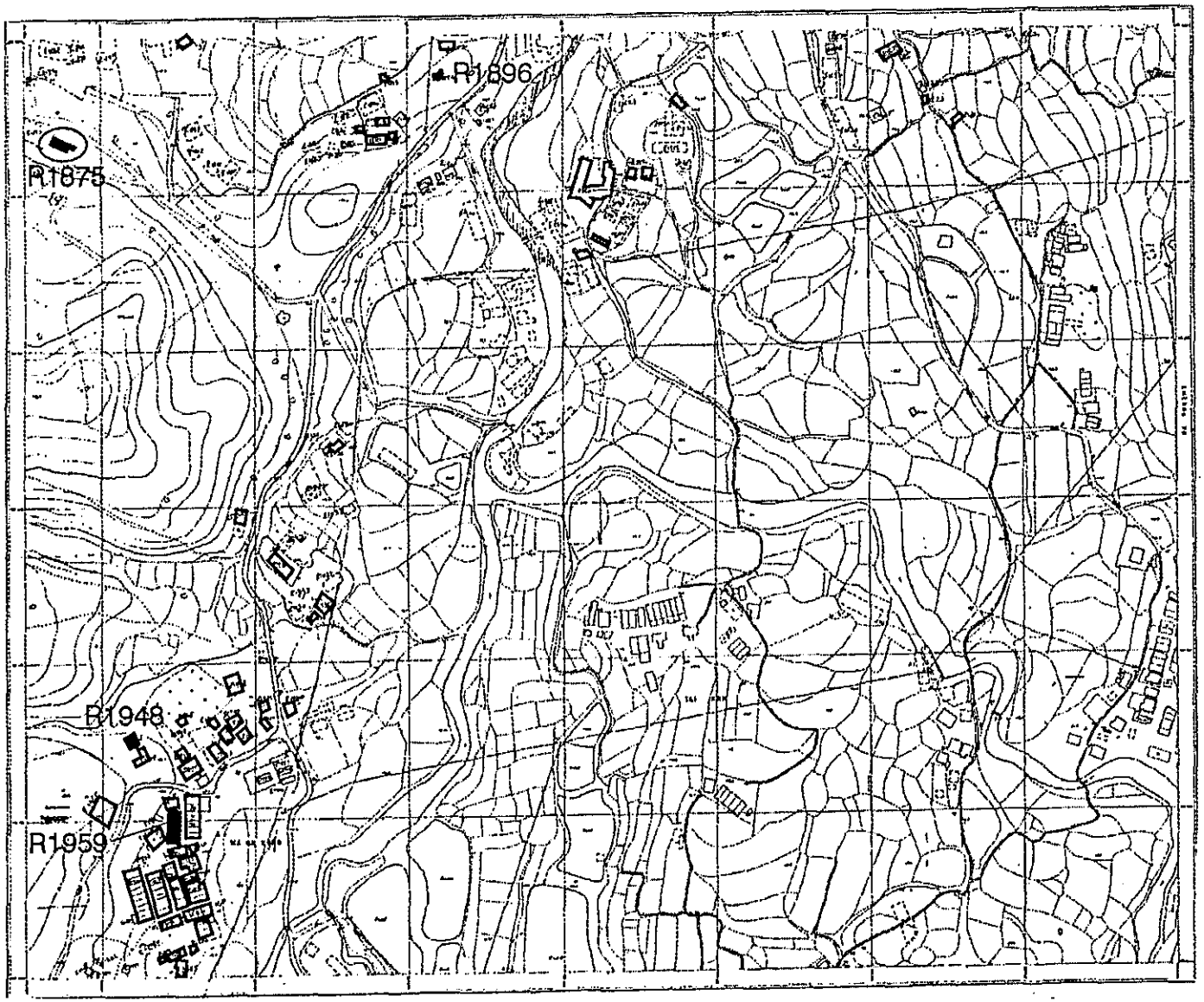
LEGEND

— Project Site Boundary

Survey Map 21

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET 21					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
No receivers					



LEGEND

- Potential Sensitive Receiver
- Included in Noise/Air Modelling
- Monitoring Station

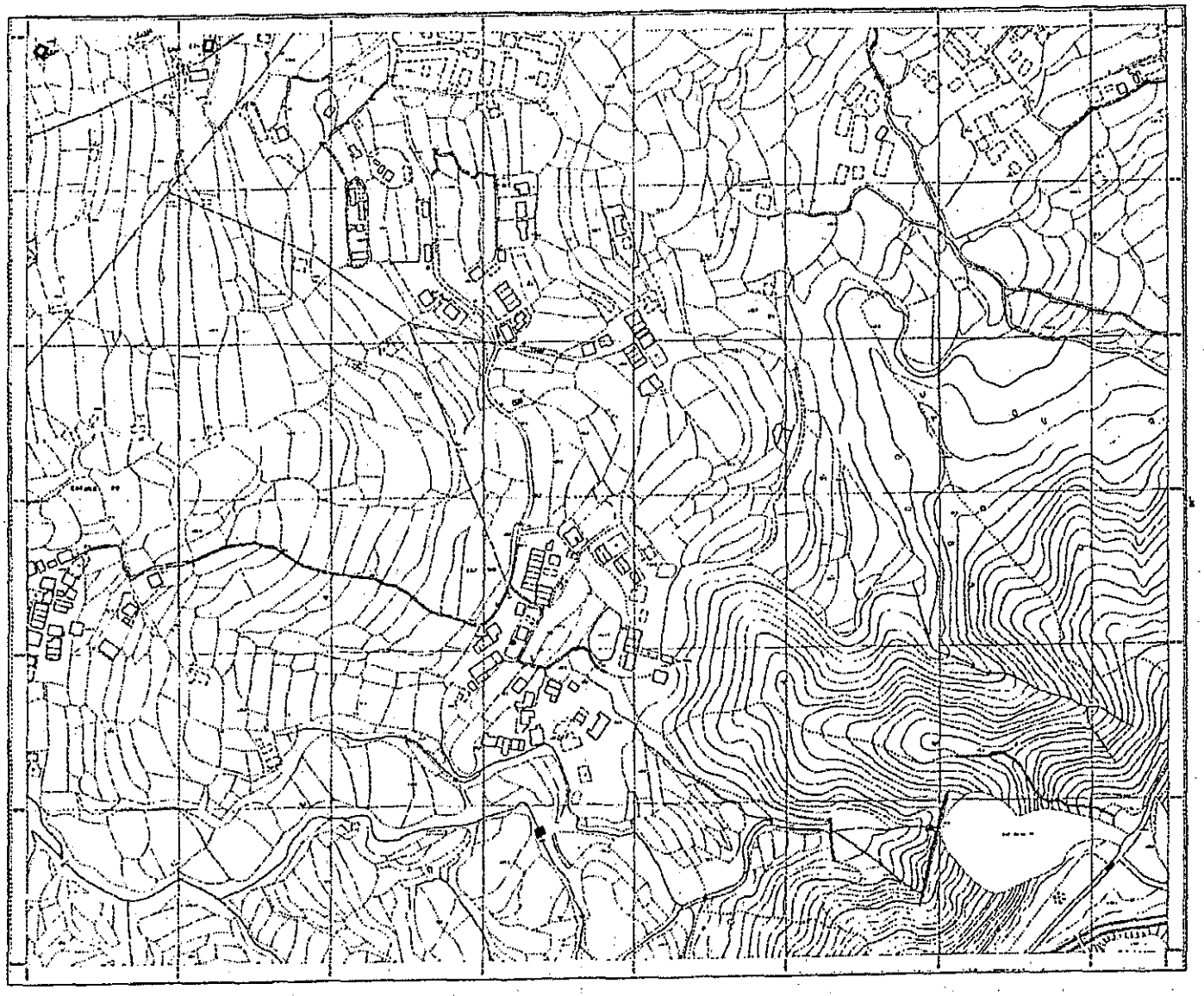
Survey Map 22

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET 22					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R1821	Y	N	1	2	N
R1822	Y	Y	1	2	AS P37
R1823	Y	Y	1	3	Q4
R1824	Y	N	1	3	N
R1825	Y	Y	2	4	Q4
R1826	Y	N	1	2	N
R1827	Y	N	1	2	N
R1828	Y	Y	1	2	AS P37
R1829	Y	N	1	1	N
R1867	Y	Y	1	2	P35
R1868	Y	N	1	2	N
R1869	Y	N	1	2	N
R1870	Y	N	1	2	N
R1871	Y	N	1	2	N
R1872	Y	N	1	2	N
R1873	Y	N	1	2	N
R1874	Y	N	1	2	N
R1875	Y	Y	2	3	P34
R1876	Y	N	1	2	N
R1877	Y	N	1	1	N
R1878	Y	N	1	1	N
R1879	Y	N	2	1	N
R1880	Y	N	1	1	N
R1881	Y	N	1	2	N
R1882	Y	N	1	2	N
R1883	Y	N	1	2	N
R1884	Y	N	1	2	Q11
R1885	Y	N	1	1	N
R1886	Y	N	1	2	N
R1887	Y	N	1	2	N
R1888	Y	Y	1	2	AS P37
R1889	Y	Y	2	3	Q12
R1890	Y	Y	1	2	Q12
R1891	Y	N	1	1	N
R1892	Y	Y	1	3	AS Q12
R1893	Y	N	1	2	N
R1894	Y	N	1	2	N
R1895	Y	Y	1	2	ASP37
R1896	Y	Y	1	3	AS Q9
R1897	Y	Y	1	3	Q9
R1898	Y	Y	2	3	Q10
R1899	Y	N	1	3	N
R1900	Y	Y	2	4	Q13
R1901	Y	N	2	3	N
R1902	Y	N	2	3	N
R1903	Y	N	1	1	N
R1904	Y	N	1	1	N

R1905	Y	N	1	2	N
R1906	Y	N	1	2	N
R1907	Y	Y	2	2	Q15
R1908	Y	Y	1	2	AS Q16
R1909	Y	Y	1	2	Q16
R1910	Y	N	1	2	N
R1911	Y	N	1	2	N
R1912	Y	N	1	2	N
R1913	Y	N	1	2	N
R1914	Y	N	1	2	N
R1915	Y	Y	1	2	Q14
R1916	Y	Y	1	2	Q14
R1917	Y	N	1	2	N
R1918	Y	N	1	2	N
R1919	Y	N	1	2	N
R1920	Y	N	1	2	N
R1921	Y	N	1	2	N
R1922	Y	Y	1	2	Q17
R1923	Y	N	1	1	N
R1924	Y	N	1	2	N
R1925	Y	N	1	2	N
R1926	Y	Y	1	2	Q19
R1927	Y	N	1	2	N
R1928	Y	N	1	2	N
R1929	Y	Y	2	4	Q20
R1930	N				
R1931	Y	Y	3	4	Q21
R1932	Y	N	1	2	N
R1933	Y	N	1	2	N
R1934	Y	N	1	2	N
R1935	Y	Y	1	2	Q22
R1936	Y	Y	1	2	Q22
R1937	N				
R1938	Y	Y	3	4	Q23
R1939	Y	Y	3	4	AS Q23
R1940	Y	Y	3	4	AS Q23
R1941	Y	Y	3	4	AS Q23
R1942	Y	Y	2	4	AS Q24
R1943	Y	Y	3	4	AS Q24
R1944	Y	N	1	4	AS Q24
R1945	Y	Y	1	4	AS Q24
R1946	Y	Y	1	2	AS Q22
R1947	Y	N	1	2	N
R1948	Y	Y	2	4	AS Q23
R1949	Y	Y	2	4	AS Q23
R1950	Y	Y	1	4	AS Q24
R1951	Y	Y	2	4	Q24
R1952	Y	Y	1	4	AS Q23
R1953	Y	Y	2	4	AS Q23
R1954	Y	Y	3	4	AS Q23

R1955	Y	N	1	3	Q26
R1956	Y	N	1	3	Q26
R1957	Y	N	1	3	Q26
R1958	Y	Y	2	4	AS Q25
R1959	Y	Y	3	4	AS Q25
R1960	Y	N	1	3	N
R1961	Y	N	1	3	N
R1962	Y	Y	3	4	AS Q25
R1963	Y	Y	3	4	AS Q25
R1964	Y	Y	2	4	AS Q25
R1965	N				
R1966	Y	Y	2	3	AS Q25
R1967	Y	Y	3	4	AS Q25
R1968	Y	Y	3	4	AS Q25
R1969	Y	Y	1	3	AS Q25
R1970	Y	Y	1	3	AS Q25
R1971	Y	Y	3	4	AS Q25
R1972	Y	Y	2	4	AS Q25
R1973	Y	N	1	3	N
R1974	Y	Y	2	4	AS Q25
R1975	Y	Y	3	4	AS Q25
R1976	Y	Y	3	4	AS Q25
R1977	Y	Y	2	3	AS Q25
R1978	Y	Y	2	3	AS Q25
R1979	Y	Y	2	3	AS Q25
R1980	Y	N	1	2	N
R1981	Y	N	1	1	N
R1982	Y	N	1	1	N
R1983	Y	N	1	1	N
R1984	Y	N	1	1	N
R1985	Y	Y	2	3	AS Q25



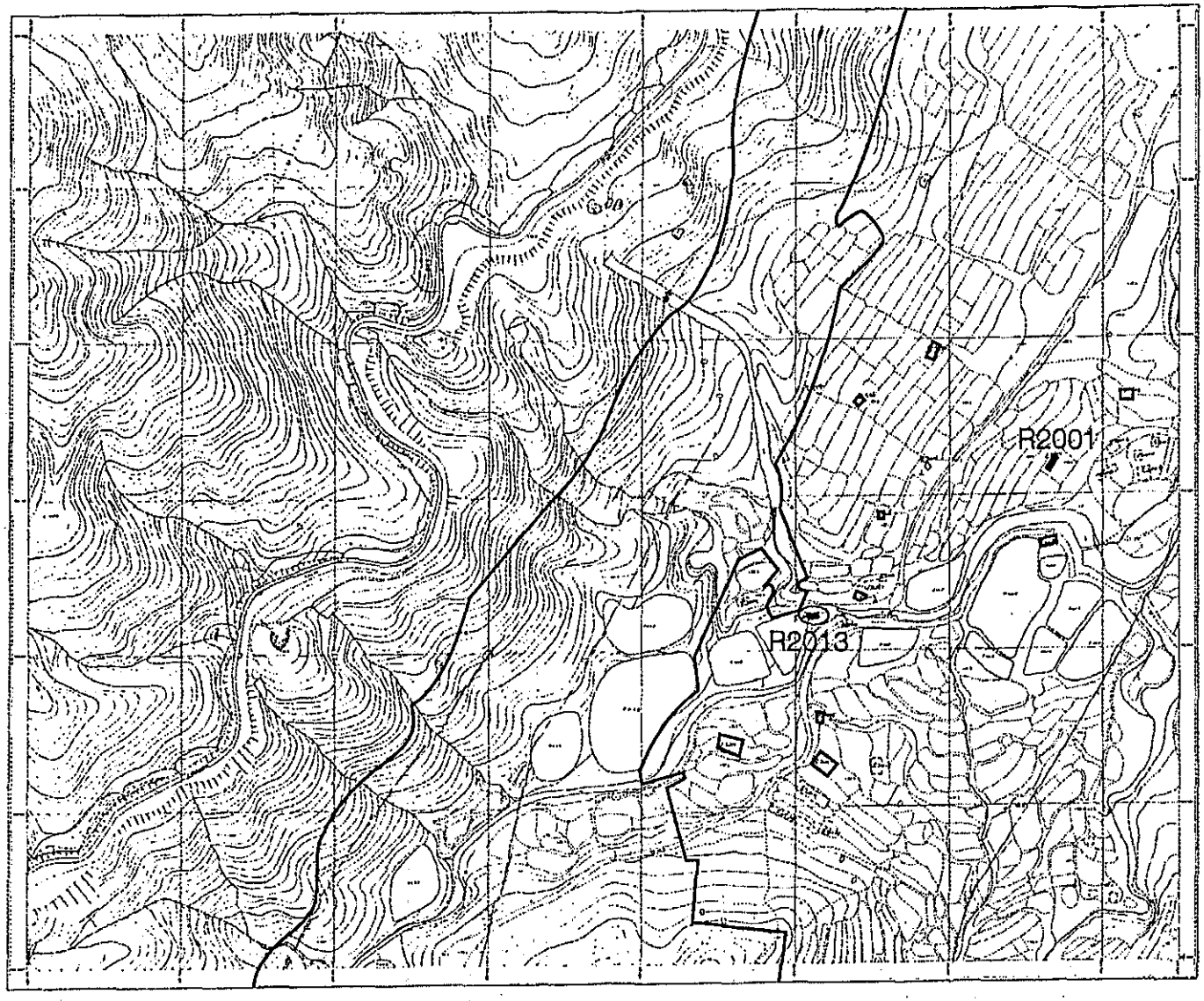
LEGEND

Potential Sensitive Receiver

Survey Map 22b

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET 22B					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R2435	Y	Y	1	2	AS W18
R2436	Y	N	1	2	N
R2437	Y	N	1	2	N
R2438	Y	N	1	2	N
R2439	Y	N	1	2	N
R2440	Y	Y	1	2	W19



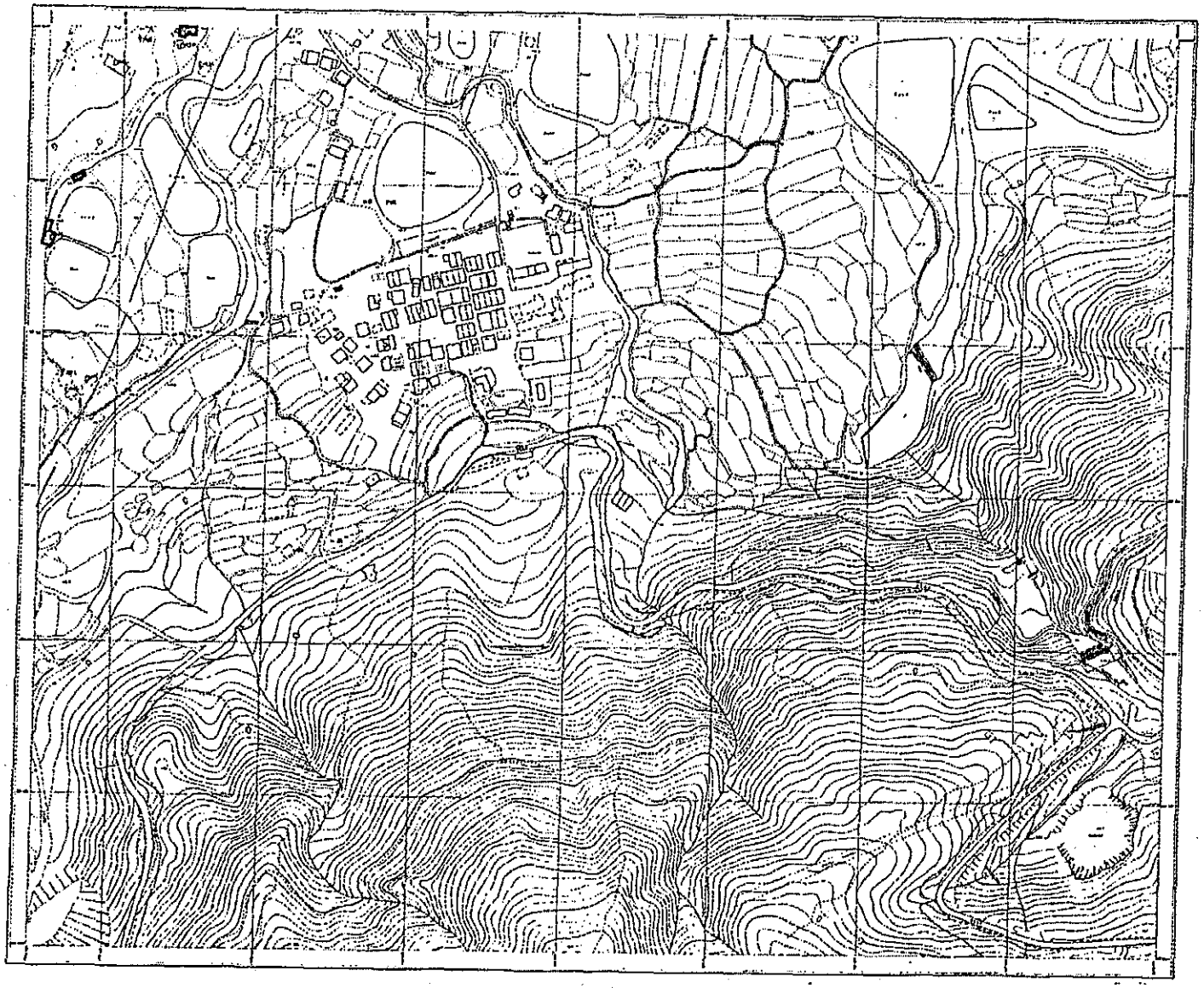
LEGEND

- Potential Sensitive Receiver
- Included in Noise/Air Modelling
- Project Site Boundary
- Monitoring Station

Survey Map 23

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET 23					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R1996	Y	Y	1	2	AS Q30
R1997	Y	N	1	2	N
R1998	Y	Y	1	2	AS Q30
R1999	Y	Y	1	2	Q27
R2000	Y	N	1	3	N
R2001	Y	Y	1	2	Q28
R2002	Y	N	1	2	N
R2003	Y	N	1	2	N
R2004	Y	N	1	2	N
R2005	Y	N	1	2	N
R2006	Y	N	1	2	N
R2007	Y	Y	1	2	Q29
R2008	Y	Y	1	3	Q30
R2009	Y	N	1	2	N
R2010	Y	N	1	2	N
R2011	Y	N	1	2	N
R2012	Y	Y	1	2	AS Q30
R2013	Y	Y	1	2	AS Q30
R2014	Y	N	1	2	N
R2015	Y	Y	1	2	Q31
R2016	Y	Y	1	2	AS Q31
R2017	Y	Y	1	2	AS Q31
R2018	Y	N	1	2	N
R2019	Y	N	1	2	N
R2020	Y	N	1	2	N
R2021	Y	N	1	2	N



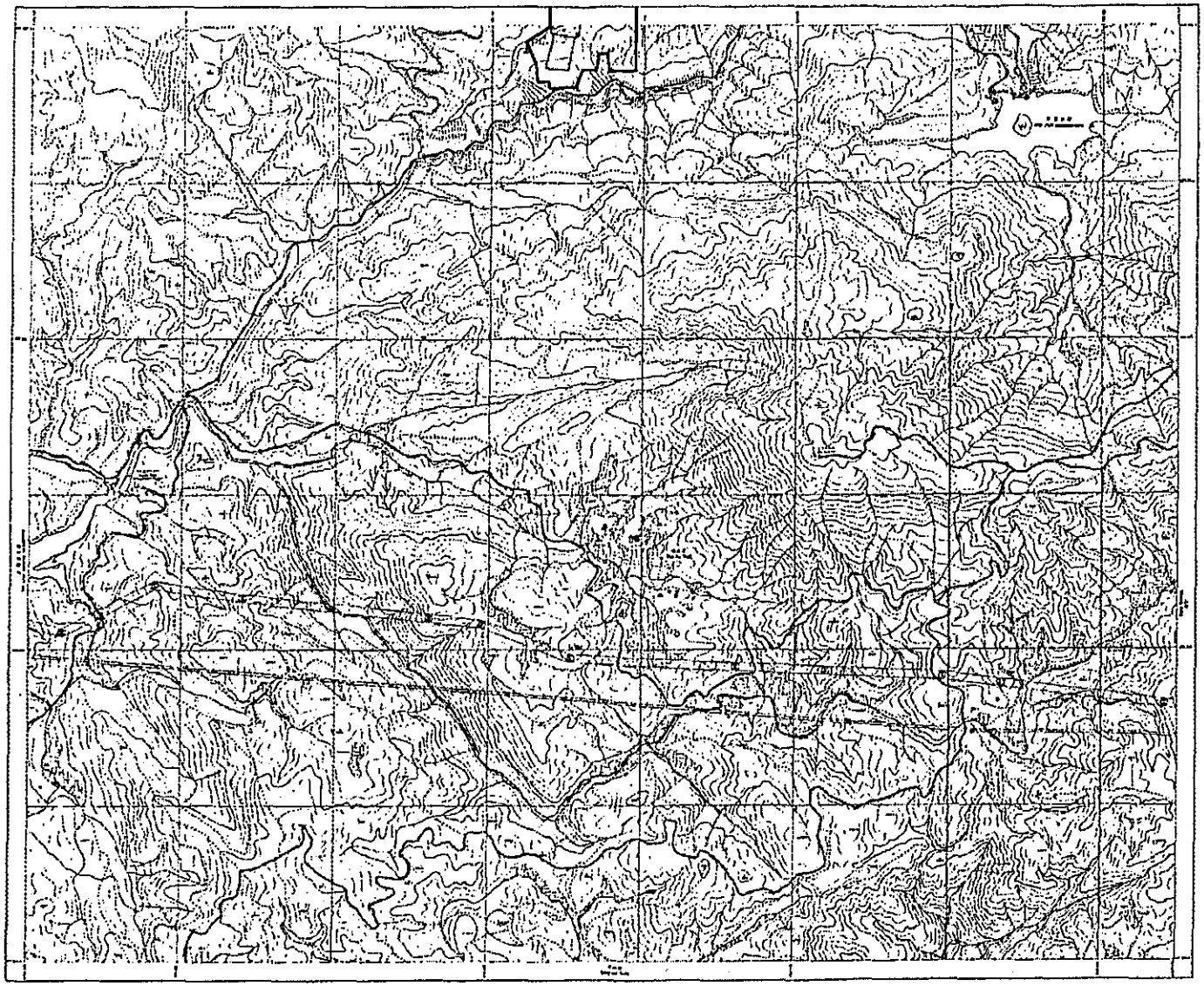
LEGEND

Potential Sensitive Receiver

Survey Map 24

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD

SURVEY SHEET - EXISTING NSR'S SHEET 24					
Reference	Exists (Y/N)	Residential (Y/N)	No. of Storeys	Condition	Photo Reference
R1986	Y	Y	1	3	AS Q25
R1987	Y	N	1	1	N
R1988	Y	N	1	1	N
R1989	Y	N	1	2	N
R1990	Y	N	1	1	N
R1991	Y	Y	1	2	AS Q22
R1992	Y	Y	1	2	AS Q22
R1993	Y	N	1	2	N
R1994	Y	N	1	2	N
R1995	Y	N	1	2	N



LEGEND

— Project Site Boundary

Survey Map 25

CONSULTANTS IN ENVIRONMENTAL SCIENCES (ASIA) LTD