

## 1 INTRODUCTION

### 1.1 Background Information

- 1.1.1 The Highways Department (HyD) of the Hong Kong SAR Government has commissioned Scott Wilson (Hong Kong) Limited in association with specialist sub-consultants to undertake an Environmental Impact Assessment (EIA) as part of the Preliminary Design and Ground Investigation for Widening of Yuen Long Highway (Agreement No. CE 98/98).
- 1.1.2 This Assignment has entailed carrying out an EIA for Yuen Long Highway between Lam Tei and Shap Pat Heung Interchange in accordance with the Environmental Impact Assessment Ordinance (Cap.499, S.16) (EIAO) and the associated Technical Memorandum on the Environmental Impact Assessment Process (EIA-TM).
- 1.1.3 The scope and content of this Environmental Monitoring and Audit (EM&A) Manual is based upon the findings of the Final Environmental Impact Assessment Report.

### 1.2 Sensitive Receiver

Representative sensitive receivers (SR) which are potentially liable to nuisance arising from the Works are identified in the EIA Report. These principally relate to noise and air quality.

The location of noise sensitive receivers (NSR) and air sensitive receivers (ASR) along the Yuen Long Highway are listed in Tables 1.1 and 1.2 and shown in Figure 1.1.

**Table 1.1 Representative Existing Sensitive Receivers**

NSR	Description	LandUses	Level, mPD	No. of Storeys	Top of Building, mPD
1	Parkside Villa	Residential	6	3	15
2	Village House in To Yuen Wai	Residential	5	3	14
3	Village House in To Yuen Wai	Residential	5	3	14
4	Village House near Lo Fu Hang	Residential	7.5	3	16.5
5	Botania Villa	Residential	16	3	25
6	Village House in Lo Fu Hang	Residential	6	3	15
7	Village House in Lo Fu Hang	Residential	14.7	3	23.7
8	Village House in Fuk Hang Tsuen	Residential	17	3	26
9	Village House opposite to Tsoi Yuen Tsuen	Residential	28.5	3	37.5
10	Lam Tei Gospel School	School	30.5	3	39.5
11	Village House opposite to Tsoi Yuen Tsuen	Residential	28.2	3	37.2

NSR	Description	LandUses	Level, mPD	No. of Storeys	Top of Building, mPD
12	Village House near Tin Shui Wai Interchange	Residential	13.4	3	22.4
13	Jasper Court Block 7	Residential	14.4	3	23.4
14	Village House in Tan Kwai Tsuen	Residential	24.2	3	33.2
15	Tan Kwai Tsuen School	School	22	3	31
16	Osmanthus Garden	Residential	22	6	40
17	Village House near Great Garden	Residential	33.4	3	42.4
18	Village House in Tai Tao Tsuen	Residential	17	3	26
19	Village House in Fui Sha Wai	Residential	9.8	3	18.8
20	Village House beside Tong Tai Road	Residential	14.1	3	23.1
21	Jasper Court Block 3	Residential	14.4	3	23.4
22	Village House in Sha Tseng Tsuen	Residential	7	3	16
23	Parkside Villa	Residential	6	3	15
24	Village House in Lam Hau Tsuen	Residential	6	3	15
25	Village House near Lam Hau Wai Tsuen	Residential	5	3	14
26	Village House near Kung Um Road	Residential	6.5	3	15.5
27	Lung Tin Tsuen	Residential	5	3	14
28	Village House in Sham Chung Tsuen	Residential	7	3	16
29	Village House in Tin Liu Tsuen	Residential	7.3	3	16.3
30	Chi Ching School at Fraser Village	School	7	3	16
31	Sham Chung Tsuen	Residential	8	3	17
32	Shung Ching San Tsuen	Residential	7	3	16
33	Village House beside Tai Kei Leng	Residential	6	3	15
34	Village House near Tai Shu Ha Road East	Residential	8.2	3	17.2
35	Kong Tau San Tsuen	Residential	4	3	13
36	Home of Elderly near To Yuen Wai	Home of elderly	5	2	11
37	St. Rose Church	Church	22	3	31
38	Park Yu School	School	18	2	24
39	70 To Yuen Wai	Residential	5	3	14
40	88G To Yuen Wai	Residential	5	3	14
41	130 To Yuen Wai	Residential	9.8	3	18.8
42	23 Fuk Hang Tsuen	Residential	14.4	3	23.4
43	155 Tsoi Yuen Tsuen	Residential	16.3	3	25.3
44	280 Tsoi Yuen Tsuen	Residential	18	3	27
45	301 Tsoi Yuen Tsuen	Residential	20	3	29
46	Block 33 Meadowlands	Residential	18.2	3	27.2
47	Block 3 Great Garden	Residential	21	3	30
48	Po Kuk Branch School	School	17.1	2	23.1

NSR	Description	LandUses	Level, mPD	No. of Storeys	Top of Building, mPD
49	Ho Dao College	School	11.8	6	29.8
50	173 Fui Sha Wai	Residential	8.7	3	17.7
51	139 Fui Sha Wai	Residential	6.2	3	15.2
52	202 Fui Sha Wai	Residential	8.4	3	17.4
53	48 Tong Yan Shan Tsuen Road	Residential	13.8	3	22.8
54	Tong Yan Building	Residential	21.2	3	30.2
55	Building 5 Curlo Court	Residential	21.7	4	33.7
56	Tower1 Evergreen Place	Residential	18.7	4	30.7
57	Village House in Tai Tao Village	Residential	26.6	3	35.6
58	6 Lam Hau Wai Tsuen	Residential	5.6	3	14.6
59	329 Luen Tin Tsuen	Residential	5.5	3	14.5
60	Chi Ching School	School	6.3	2	12.3
61	67 Ma Tin Pok	Residential	6.7	3	15.7
62	111 Ma Tin Pok	Residential	6.3	3	15.3
63	129 Ma Tin Pok	Residential	6.8	3	15.8
64	15 Fraser Village	Residential	7.1	3	16.1
65	32 Shung Ching San Tsuen	Residential	8.3	3	17.3
66	Ling Man School	School	6.3	2	12.3
67	448 Shung Ching San Tsuen	Residential	8.4	3	17.4
68	306 Sheung Yau Tin Tsuen	Residential	5.7	3	14.7
69	72 Sheung Yau Tin Tsuen	Residential	5.2	3	14.2
70	61 Kong Tau San Tsuen	Residential	7.2	3	16.2
71	Hing Sam School	School	6.6	2	12.6
72	Wa Fung School	School	14.2	2	20.2
73	Block 8 The Eldorado Garden	Residential	15.1	4	27.1
74	School	School	19.7	2	25.7
75	10 Tong Tai Road	Residential	16.2	3	25.2
76	Village House in Lo Fu Hang	Residential	22	3	31
77	Village house in Tan Kwai Tsuen	Residential	16	3	25
78	73 Shung Ching San Tsuen	Residential	7.8	3	16.8
79	Village House beside Kung Um Road	Residential	5.9	3	14.9
80	Village House in Tai Kei Leng	Residential	7.3	3	16.3
81	Village House in Tan Kwan Tsuen	Residential	17.4	3	26.4
82	Village House in Tan Kwan Tsuen	Residential	19	3	28
83*	Village House in Fuk Hang Tsuen	Residential	21.8	3	30.8
84	Village House in To Yuen Wai	Residential	5	3	14
85	Village House in To Yuen Wai	Residential	17	3	26
86	Village House in Lo Fu Hang Tsuen	Residential	9.2	3	18.2
87	Village House in Lam Hau Tsuen	Residential	10	3	19

NSR	Description	LandUses	Level, mPD	No. of Storeys	Top of Building, mPD
88	Village House in Lam Hau Tsuen	Residential	10	3	19
89	Village House in Lam Hau Tsuen	Residential	7.8	3	16.8
90	Village House in Fu Sha Wai	Residential	13.7	3	22.7
91	Village House in Tai Tao Tsuen	Residential	33.2	3	42.2
92	Village House opposite to Tsoi Yuen Tsuen	Residential	23.8	3	32.8
93	Village House in Tan Kwai Tsuen	Residential	34	3	43
94	Village House in Tan Kwai Tsuen	Residential	30.6	3	39.6
95	Existing village in HSK Area 3C	Residential	20.4	3	29.4
96	Village house at Tan Kwai Village in HSK Area 3B	Residential	14.8	3	23.8
97	Existing village beside Fui Sha Wai Lane South	Residential	8.5	3	17.5

\* NSR is to be resumed under the Deep Bay Link Project

**Table 1.2 Representative Planned Sensitive Receivers**

NSR	Description	LandUses	Level, mPD	No. of Storeys	Top of Building, mPD
(A)	Proposed Residential Area at To Yuen Wai	Residential	5	3	14
(B)	Proposed Residential Area at Fuk Hang Tsuen	Residential	14.6	7	35
(C)	Village zone at Tan Kwai Tsuen along Shun Tat Street in HSK Area 3B	Residential	16.4	3	25.4
(D)	Hung Shui Kiu SGA at Site 3D (R3)	Residential	12.5	15-19	55.5
(E)	CDA zone near Tan Kwai Tsuen in HSK Area 3B	Residential	15.3	12	51.3
(F)	Proposed Residential Area at east of Long Tin Road (R(B))	Residential	10	12	46
(G)	Proposed Residential Area at Yuen Long Area 13 (R(A))	Residential	6	12	42
(H)	Proposed Residential Area at Yuen Long Area 14 (R(B))	Residential	8	12	44
(I)	Proposed Residential Area (R4)	Residential	5	6	23
(J)	Proposed Residential Area (R4) (TMTL 430)	Residential	5	6	23
(K)	Proposed Residential Area (RS) (HOS) (TMTL 418)	Residential	5	40	125

NSR	Description	LandUses	Level, mPD	No. of Storeys	Top of Building, mPD
(L)	Proposed Residential Area at Tuen Mun San Tsuen	Residential	5	12	41
(M)	Proposed Residential Area near Fuk Hang Tsuen Road (CDA)	Residential	4	12	40
(N)	Proposed Residential Area at Tsoi Yuen Tsuen (R(D))	Residential	13	3	22
(O)	Hung Shui Kiu SGA at Site 3C (RR2)	Residential	25.6	12	61.6
(P)	Hung Shui Kiu SGA at Site 3D (RP2)	Residential	22.2	12	58.2
(Q)	Proposed Residential Area at Tong Yan San Tsuen (R(B)1)	Residential	7	6	25
(R)	Proposed Residential Area between Sha Tseng and San Ha Road (R(D))	Residential	7	2	13
(S)	Proposed Residential Area at Tai Kei Leng (R(D))	Residential	11	3	20

### 1.3 Purpose of the Manual

- 1.3.1 The purpose of this EM&A Manual is to guide the setup of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action.
- 1.3.2 This Manual outlines the monitoring and audit programme to be undertaken for the widening of Yuen Long Highway between Lam Tei and Shap Pat Heung Interchange. It aims to provide systematic procedures for monitoring, auditing and minimising of the environmental impacts associated with the construction works.
- 1.3.3 Hong Kong environmental regulations for air quality, noise and waste, the Hong Kong Planning Standards and Guidelines, and recommendations in the EIA study final report on Widening of Yuen Long Highway between Lam Tei and Shap Pat Heung Interchange have served as environmental standards and guidelines in the preparation of this Manual.
- 1.3.4 This Manual contains the following :
- (a) duties of the Contractor, the Engineer's Representative (ER), the Independent Environmental Checker (IEC) and the Environmental Team (ET) with respect to the environmental monitoring and audit requirements during construction;
  - (b) information on project organisation and programming of construction activities for the project;

- (c) requirements with respect to the construction schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
- (d) definition of Action and Limit levels;
- (e) establishment of event and action plans;
- (f) requirements of reviewing pollution sources and working procedures required in the event of non-compliance of the environmental criteria;
- (g) requirements of presentation of environmental monitoring and audit data and appropriate reporting procedures.

1.3.5 For the purpose of this manual, the "Engineer" shall refer to the Engineer as defined in the Contract and the Engineer's Representative (ER), in cases where the Engineer's powers have been delegated to the ER, in accordance with the Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the environmental monitoring requirements. The IEC shall undertake the auditing role.

## 1.4 Background

1.4.1 The existing Yuen Long Highway is a dual-2 lane highway completed in 1993/94. The Highway provides a trunk route between Tuen Mun and Yuen Long, traversing terrain that encompasses some cuttings to the south in the Tuen Mun area, whilst the northern section towards Yuen Long is constructed largely on embankment over alluvial flood plain. Major interchanges are sited at Tong Yan San Tsuen connecting Long Tin Road (the eastern distributor form Tin Shui Wai New Town) and at Tin Shui Wai West interchange connecting Hung Tin Road (the western distributor for the above estate).

1.4.2 The general study area and the proposed road alignment are identified in Figure 1.2.

## 1.5 Environmental Monitoring and Audit Requirements

1.5.1 The EIA Report identified the likely environmental impacts during construction and operational phases, including noise and air quality. It has been identified that these impacts can be minimised to acceptable levels with the implementation of environmental mitigation measures. In order to ensure compliance with relevant environmental standards, baseline and compliance monitoring for noise and air quality during construction is recommended, as well as operational monitoring of traffic noise to confirm the effectiveness of noise mitigation measures. These requirements are specified in the subsequent sections and summarized in the Appendix A. The works will also result in the generation of materials that will require management, entire as wastes for disposal offsite or for reuse within the project. These materials will require management and the procedures should be monitored on-site.

1.5.2 The works will require the removal and subsequent re-planting of a number of trees along the alignment. Measures for the supervision and audit of these works by a qualified Landscape Architect should be included in the contract documents.

## **1.6 Project Organization**

1.6.1 The project organisation and lines of communication with respect to environmental protection works is shown in Figure 1.3.

1.6.2 There shall be two elements to the environmental monitoring and audit team, the Environmental Team (ET) and the Independent Environmental Checker (IEC). The ET shall be employed by the contractor and will undertake the monitoring. The IEC shall be engaged by the ER and audit the work of the ET. The IEC shall not be in any way an associated body of the Contractor. The ET and the IEC Team Leaders shall have relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the Environmental Protection Department (EPD).

1.6.3 Appropriate staff shall be included in the ET and IEC under the supervision of the ER/IEC Team Leader, to fulfil the EM&A duties specified in this manual.

1.6.4 The general duties/responsibilities of various parties comprise the following:

### The Contractor

- Employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audits;
- Provide assistance to the ET in carrying out monitoring;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit Levels in accordance with the Event and Action Plans;
- Implement measures to reduce impacts where Action and Limit Levels are exceeded; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 4.3 of this Manual.

### Engineer or Engineer's Representative (ER)

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Employ an Independent Environmental Checker (IEC) to audit the results of the EM&A works carried out by the ET; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 4.3 of this Manual.

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## Environmental Team (ET)

### *Environmental Team Leader*

- Overall supervision and administration of the ET's daily operation;
- Managing the various specialist and professionals who are designated as members of the ET;
- Liaison with other government departments or external parties regarding any environmental issues arising from the project; and
- Ensure the outputs of the Team meet the objectives and requirements set out in this manual.

### *Environmental Engineer / Scientist*

- Schedule the environmental monitoring activities;
- Check the validity of data upon receipt of field measurement and laboratory results;
- Prepare reports, which are specified in the EM&A Manual, in timely manner and ensure the quality of the outputs;
- Liaise with the ER and Contractor upon receipt of complaints and/or breaching of statutory limits;
- Ensure the Event/Action Plan is implemented;
- Investigate the causes of complaints and/or limit exceedances;
- Advise on required mitigation measures;
- Ensure the proposed mitigation measures are implemented;
- Perform regular audits of the environmental monitoring data;
- Provide advice on any pollution control measures, if necessary, after a site inspection; and
- Provide, calibrate and maintain monitoring equipment.

### *Environmental Technician*

- Perform monitoring activities for the environmental parameters as required by the EM&A Manual;
- Be proficient in the monitoring methodologies and QA/QC procedures set out in this EM&A Manual;
- Ensure the quality of the monitoring data;
- Know the specified Action and Limit Levels in the EM&A Manual;
- Alert the ET Leader of any observed exceedances of the Action/Limit Levels;
- Calibrate and maintain the monitoring equipment; and
- Assist the Environmental Engineer / Scientist in performing regular site inspections as required.



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*Independent Environmental Checker (IEC)*

- Review the EM&A works performed by the ET;
- Audit the monitoring activities and results;
- Report the audit results to the ER and EPD in parallel;
- Review the EM&A reports submitted by the ET;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 4.3 of this Manual.

1.6.5 Appropriate resources shall be allocated by the Contractor and the ER to fulfil their duties specified in this manual.

## **1.7 Construction Programme**

1.7.1 The construction period will be about three years and is tentatively programmed to commence in August 2003. A project programme is shown in Figure 1.4.

1.7.2 This programme is for the information of the ET and IEC Team Leader to gain an initial understanding of the projection of the works. The ET and IEC Team Leader shall make reference to the actual works progress and programme during the construction stage to schedule the EM&A works, and the Contractor shall provide the respective information to the ET Leader for formulating the EM&A schedule.