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RAILWAY DEVELOPMENT STUDY

Phase II (Part 1)
Tai Wai to Ma On Shan
KCR Extension to Tsim Sha Tsui

Report MV4 / KV4

Environmental Feasibility Studies
Executive Summary

MVA ASIA
MAUNSELL CONSULTANTS ASIA

in association with

Urbis
Parsons Brinckerhoff (Asia)
Design Research Unit
ERM - Hong Kong
Brooke Hillier Parker

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Position: *Dep. Managing Director*

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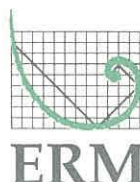
Date: *14 March 1997*

Maunsell/MVA

RDS Phase II Tai Wai - Ma On Shan:
MV4 Environmental Feasibility Study
- *Executive Summary*

14 March 1997

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14 March 1997

Reference C1435/50173

For and on behalf of ERM-Hong Kong, Ltd

Approved by: S. M. LAISTER

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Date: *13th March 1997*

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1 INTRODUCTION

1.1 Background to the Environmental Feasibility Study

The Hong Kong Government announced its Railway Development Strategy in December 1994, this set out the framework for the expansion of the Territory's railway network into the next century. The strategy classified proposed new railways in terms of priority and accorded the highest priority to three packages:

- the Western Corridor Railway;
- the Tseung Kwan O Extension of the MTR system; and
- Ma On Shan Rail Link (MOS Rail) and KCR Extension to Tsim Sha Tsui.

The Western Corridor Railway and the Tseung Kwan O Extension are being progressed by the KCRC and MTRC respectively. MOS Rail and the KCR Extension are envisaged by Government as being potentially suitable for private sector participation and as a next step the Railways Development Office of Highways Department has initiated the MOS Rail and KCR Extension Study as Phase II (Part 1) of the Railway Development Study. This new study is a comprehensive Feasibility Study to put forward the preferred railway schemes and, if appropriate, to prepare technical documentation to form part of an invitation for tenders from interested parties. On 30th October 1995 the MVA-Maunsell Joint Venture was appointed to undertake the study.

This Executive Summary covers MOS Rail, which is envisaged to be a fully segregated rail line largely following the planned rail reserve as shown on the Outline Zoning Plan between Tai Wai in Sha Tin and Ma On Shan New Town. It was expected that the alignment will be mostly at grade or elevated including 7 or 8 stops and will include a major interchange with KCR East Rail services at Tai Wai station. Two possible one-station extensions are under consideration: from Tai Wai to Hin Keng and from Ma On Shan to Lee On. These have both been included in the current Study.

The *MOS Rail Transit Systems Options Report (MO2)*, MVA/Maunsell et al, February 1996, recommended the operation of MOS Rail with short trains (up to 4-car) of relatively long and wide conventional steel-wheeled "heavy rail" cars while indicating that there were possible alternatives. In the light of the findings of the Railway Development Strategy Preliminary Review Study, these alternatives have been ruled out (*MOS Rail: Option Selection Report*, MVA/Maunsell et al, October 1996) and it is assumed that MOS Rail will be operated by trains of similar characteristics to existing MTRC trains. In the light of the Final Demand Forecasts, 4-car trains are proposed and have been assumed in this Report. In the event that longer trains are adopted, a full appraisal of environmental mitigation measures will be required.

ERM Hong Kong, as part of the Study Team, has carried out a feasibility stage environmental impact assessment (EIA), that is to say an Environmental Feasibility Study (EFS) to provide information on the type and magnitude of impacts which may be caused by the construction and operation of the railway. The findings of the EFS have contributed to the overall Feasibility Study for the railway, providing information on:

- environmental constraints that may affect railway design;
- selection of the preferred railway system;
- options for mitigation measures to control adverse impacts; and
- environmental protection requirements for inclusion the detailed design stage.

The purpose of the EFS was to investigate the suitability of the proposed project in terms of its environmental acceptability and, where necessary, provide recommendations to control any identified adverse impacts. If the project is approved, the findings of the EFS will be used to determine the scope of work required for a full EIA to be carried out through the project design stages.

1.2 Objectives of the Environmental Feasibility Study

The Feasibility Study Brief sets out the objectives of the Study to be to determine:

- the most appropriate system type(s) and configuration for the MOS Rail and an effective interchange with the KCRC line at Tai Wai; and
- how best to package and phase the line for implementation.

The Study should also ensure that the Preferred Schemes support and enhance on-going planning and development and do not have any adverse environmental or drainage impacts. Furthermore they should be properly integrated into the Territory's transport system and their implications on other plans and proposals identified.

In addition, the Study has also fulfilled the requirements of the Environmental Protection Department's (EPD's) Study Brief, which were:

- to describe the proposed railway and associated facilities including railway stations and the requirements for their development;
- to identify, predict and evaluate the environmental impacts and the cumulative effects which may be expected to arise during the construction and operational phases of MOS Rail;
- to recommend appropriate measures to mitigate these impacts to environmentally acceptable levels in accordance with Hong Kong Planning Standards and Guidelines and relevant Government Ordinances; and
- to identify the environmental monitoring and audit (EM&A) requirements for impact and compliance monitoring to ensure that the conditions referred to above are met.

1.3 Format of the Report

The MOS Rail EFS comprises two volumes:

- *Volume I*, this Executive Summary, briefly explains how the EFS was carried out and describes the findings of the Main Report, concentrating on the potential adverse impacts and proposed mitigation measures;
- *Volume II*, the Main Report provides the findings of the EFS: identifying the environmental performance criteria applicable to MOS Rail; focusing on the likely impacts of the construction and operation of MOS Rail; and developing appropriate mitigation measures to control any adverse impacts.

After this introductory section, the remainder of *Volume I*, the Executive Summary, of the EFS is arranged as follows:

- *Section 2* identifies and describes the impacts arising from the construction of MOS Rail, their magnitude and suitable mitigation measures;
- *Section 3* identifies and reviews the impacts arising from the operation of MOS RAIL and puts forward effective mitigation measures; and
- *Section 4* reviews the findings of the EFS and puts forward recommendations for environmental protection measures for MOS Rail.

2 THE ALIGNMENT

2.1 Introduction

The MOS Rail alignment runs from Tai Wai in the west, where it will interchange with the KCR East Rail Service to Ma On Shan in the east. Two additional stations are also under consideration at Hin Keng, west of Tai Wai and Lee On, east of Ma On Shan. These have both been assumed in the current report, however, it should be noted that due to the proximity of the chlorine store at Shatin Water Treatment Works the local Hin Keng area is considered to have a high societal risk and a hazard assessment must be undertaken before any further development can be considered. As a hazard assessment is outside the scope of the present Study, all references to the feasibility of Hin Keng Station must be considered provisional at this stage. *Figure 2.1a* shows the proposed alignment which is described in more detail below.

2.2 Hin Keng to Tai Wai

The section from Hin Keng Station to Tai Wai Station runs at grade, parallel to the existing KCR East Rail lines which are elevated on an embankment. As it approaches Tai Wai station the MOS Rail alignment will rise to the same height as East Rail to facilitate passenger transfer between the two services. A depot, with commercial and residential development on a podium above, is planned for the area to the immediate south of Tai Wai Station, currently occupied by the Hong Kong School of Motoring and cycling area. The site is bounded on its southern side by Che Kung Miu Road, on its eastern side by Mei Tin Road, on its northern side by the KCR alignment and on its western side by a public park that is located opposite Hin Keng Estate.

2.3 Tai Wai to Sha Tin Tau

To the east of Tai Wai Station, the alignment will emerge on a viaduct structure, passing over the area currently occupied by the Happy Dragon Recreation Park. It will continue along the south side of the Shing Mun River Channel to an elevated station on the site of the Temporary Housing Area at Sha Tin Tau. A number of residential developments have clear views of the site and adjacent section of alignment including Tim Sam Village and Carado Gardens, Sun Choi Estate, Lung Hang Estate and Hin Keng Estate (all located to the south) as well as Holford Gardens and Grandview Gardens (both located to the north).

2.4 Sha Tin Tau to Sha Kok Street

The alignment between Sha Tin Tau station and Sha Kok Street Station runs on viaduct eastwards, over Che Kung Miu Road and Lion Rock Tunnel Road, passing over a wooded mound, probably of fung shui significance, located at the junction of the two roads. The alignment then passes over the Tsang Tai Uk Recreation Ground before running parallel to, and immediately to the south of, Sha Kok Street on its way to Sha Kok Street Station. Residents of the historic Shan Ha Wai (Tsang Tai Uk) Village as well as users of the Tsang Tai Uk Recreation Ground and the adjacent footpath and cycle track will have clear views of this section of alignment. Several large housing estates are

located on either side of Sha Kok Street and these include the Jat Min Chuen residential area, the Pok Hong Estate and the Sha Kok Estate.

2.5 Sha Kok Street to City One Shatin

From Sha Kok Street, the alignment passes over Shui Chuen Au Street towards Sha Tin Road. The alignment heads north-east over a vegetated mound containing six graves, rising further as it passes Wong UK Village, to clear the China Light and Power Substation before crossing Shatin Road to the north and west of the Prince of Wales Hospital. Thereafter, the alignment passes over a bus terminus and a small open space located between the bus-terminus and Ngan Shing Street. City One Station is located on an embankment at the junction of Ngan Shing Street and Chap Wai Kong Street. The site is located in a long linear reserve set aside for the MOS Rail development immediately to the west and parallel to Chap Wai Kong Street. It is bounded to the north and west by schools and residential developments (Yue Tin Court and City One Plaza) and to the south and east by industrial buildings (mostly godowns).

2.6 City One Shatin to Shek Mun

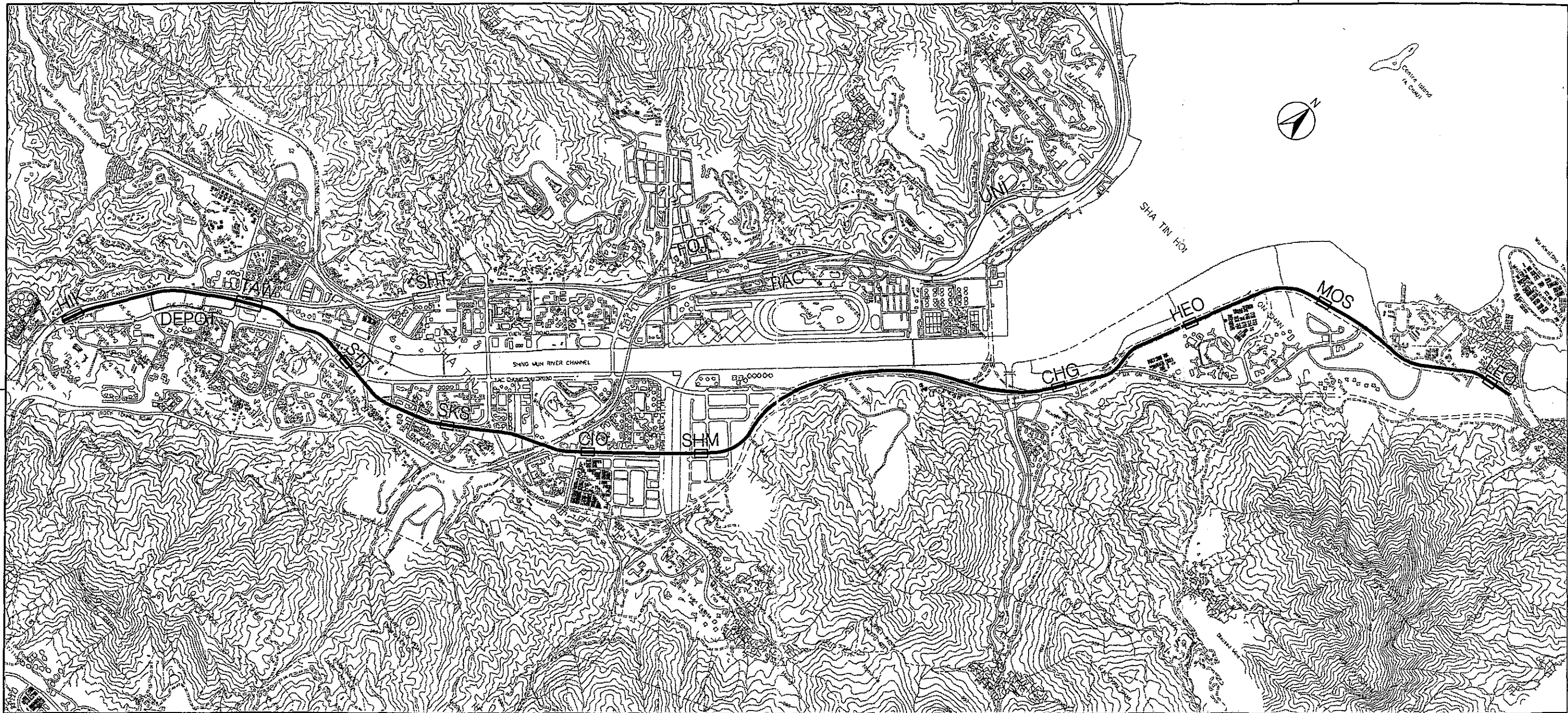
A large area of recreational open space, undeveloped land and a nullah are located between City One Station and the Shek Mun Station site. The alignment passes across this open space and over the nullah before entering an industrial area that is set in a triangle of land located between the nullah, Tate's Cairn Highway and Tai Chung Kiu Road. The alignment then passes parallel to, and immediately to the north-west of, On Ming Street before reaching the site of Shek Mun Station which is located at the junction of On Ming Street and On Lai Street.


2.7 Shek Mun to Chevalier Garden

The alignment then swings north over the eastbound lane of the Tate's Cairn Highway, descending to grade in the reserve, approximately 12 m wide, set aside for MOS Rail along the centre of the highway from this point until the track alignment reaches Chevalier Garden Station, also within the central reserve. This section is less heavily developed than those to the west of City One Station but contained residential areas including Pictorial Gardens and Sha Tin Fishermen's New Village as well as Shatin Hospital. Near Chevalier Garden Station, residential developments (Tai Shui Hang Village and Chevalier Gardens) are located within side-valleys set amongst vegetated hill slopes.

2.8 Chevalier Garden to Heng On

After Chevalier Garden, the alignment continues north on viaduct, rising to cross out of the highway reserve and into the central reservation of Sai Sha Road from where it continues on viaduct, north east to Heng On Station, again within the central reserve of Sai Sha Road. Heng On Estate is located immediately to the east of the station site and the high-rise buildings within this estate overlook the site. A school and associated playground is located between the high-rise buildings and Sai Sha Road. Areas to the west of the Sai Sha Road are set aside for residential and Government / Institution /




 Highways Department
 Railway Division
 RAILWAY DEVELOPMENT STUDY
 PHASE 2 (PART 1)

FEASIBILITY STUDY FOR THE TAI WAI TO MA ON SHAN RAIL LINK AND THE KCR EXTENSION TO TSIM SHA TSUI

TAI WAI TO MA ON SHAN RAIL LINK
 MASTER PLAN

© COPYRIGHT RESERVED 版權所有	MVA ASIA MAUNSELL CONSULTANTS ASIA and associated consultants CAD REF : \\PROJECTS\94595\SKETCH\MOS\GTD.DWG
DATE: DEC 96	FIGURE No. 2.1a
SCALE: NTS	

Community development. Foundation construction works are in progress in many of these areas.

2.9 Heng On to Ma On Shan

The alignment continues on viaduct, turning east as it approaches the Ma On Shan Town Centre and Ma On Shan Station. The site for Ma On Shan Station is located within a central reserve, varying between 15 m and 25 m wide, that was set aside for the MOS Rail project within the Sai Sha Road corridor. The Sunshine City development (residential towers on podium deck with a bus station and commercial properties below) is located immediately to the south of Sai Sha Road at this point and the Ma On Shan Centre (residential towers on podium deck with commercial properties below) is located immediately to the north of the road. Thereafter, the track alignment continues along the MOS Rail reserve in an easterly direction towards Lee On Station.

2.10 Ma On Shan to Lee On

Heading east after crossing over On Chiu Street, the alignment falls to grade along the central reserve of Sai Sha Road, through an area of residential properties (Villa Athena to the north and Saddle Ridge Gardens together with the Ma On Shan Health Centre to the south). The track alignment then descends in a cutting under the junction with Kam Ying Road and rising back to grade along the central reserve as it passes to the north of Lee On Estate and south of Wu Kwai Sha New Village. The alignment rises over the Lee On Estate access road, dropping back to grade at Lee On Station. Lee On Station site lies approximately 100 m to the east of the access road and is located within a former borrow area comprising a series of flat platforms separated by rock outcrops.

3 IMPACTS DURING CONSTRUCTION

3.1 Introduction

Much of the alignment is through developed or developing residential areas and the numbers of sensitive receivers that may be affected by the construction of MOS Rail is high.

This EFS has assumed that the currently proposed developments will be occupied by the time of the construction of MOS Rail, but no cumulative impacts from other construction work have been included in the assessment. Once the timetabling of the construction of other developments is available, at the detailed design stage, it will be possible to refine the EFS predictions in the EIA.

Table 3.1a, at the end of this *Section*, shows the recommended mitigation measures and their implementation programme for the construction phase.

3.2 Air Quality

3.2.1 Predicted Unmitigated Impacts

Unmitigated cumulative dust levels from the construction of the stations, alignment and depot are predicted to exceed the recommended hourly limit for Total Suspended Particulates (the dust particles which tend to be dispersed furthest from the construction sites) at a number of receivers.

For the Hin Keng to Tai Wai section, the only receiver close enough to the construction sites to be adversely affected is the Hin Keng Commercial Complex, whilst levels at Hing Yau House, 29 Keng Hau Road and Hin Tin Swimming Pool are predicted to be close to the limit level.

Between Sha Kok Street and City One Shatin, an exceedance of the hourly limit is predicted at Sha Tin Wai playground, TSP levels at Pok Tai House and Sha Kok Estate Office were close to the limit level.

For the section from City One Shatin to Shek Mun, exceedances were predicted at Yuen Chau Kok Temporary Housing Area, Pamela Youde Child Assessment Centre and School Dental Clinic, Yue Sui House and Yow Kam Yuen Prevocational School. High levels, within the hourly limit were also predicted at Yue Kwan House.

The Chinese YMCA College is predicted to be exposed to a major dust exceedance from station construction on the Chevalier Garden to Heng On section, whilst levels at Po On House at Heng On Estate are likely to be close to the hourly limit.

Between Heng On and Ma On Shan, exceedances of the hourly limit level have been predicted at Sun Shine City Blocks E and M, Bayshore Towers Block 2 and Ma On Shan Centre Block 1. Cumulative impacts at Bayshore Towers Block 5, Ma On Shan Centre Block 2 and Fu Fai Garden Block 1 will also be close to the hourly limit.

Predicted unmitigated levels from works in other sections of the alignment are well below the limit level.

3.2.2 Mitigation Measures

A series of measures have been identified which will control dust levels from general construction activities to within the recommended hourly limits during the construction of MOS RAIL. These include:

- on site vehicle speed restrictions and vehicle washing before leaving the site;
- careful handling and the containment or damping of dusty materials; and
- covering or damping exposed areas of ground and prompt site restoration.

These measures should be used as general good practice on all MOS Rail construction sites to ensure that potential dust emissions are controlled and impacts upon sensitive receivers minimised.

3.3 Noise

3.3.1 Introduction

Other than percussive piling, noise from daytime construction works is not controlled by law, however, the MOS Rail construction will be required to meet the EPD's recommended voluntary daytime noise limits. Any percussive piling, evening, night-time or holiday working will only be allowed if the contractor can demonstrate to the EPD that noise levels will meet their criteria for the issue of a Construction Noise Permit under the Noise Control Ordinance.

3.3.2 Predicted Unmitigated Impacts

Unmitigated construction noise impacts from all sections of the alignment are predicted to exceed the recommended voluntary daytime noise limits at many of the sensitive receivers. A package of mitigation measures has, therefore, been designed to control construction noise and these are described below.

3.3.3 Mitigation Measures

Whilst not sufficient to fully resolve the predicted noise impacts, general good site practices will help to control noise impacts. These include

- care in the location and operation of plant and equipment;
- correct fitting and use of silencers, mufflers and acoustic shields; and
- regular maintenance of plant and equipment.

A series of further mitigation measures have been identified which will provide increasing levels of noise reduction which would normally be sufficient to control daytime noise impacts to within the recommended limit. These are

- Mitigation Stage 1 - the use of items of quieter construction equipment than those listed by the EPD as standard;
- Mitigation Stage 2 - in addition to the use of quiet plant, movable noise barriers are located in close proximity to operational plant within the construction site; and

- Mitigation Stage 3 - as well as a combination quiet plant and moveable barriers, the number of items of equipment operating at the same time is limited.

The recommended voluntary daytime limit for schools and other educational establishments is lower than that for the other sensitive receivers considered in the EFS. Additional mitigation is, therefore, required for the schools between Sha Tin Tau and Sha Kok Street, City One Shatin to Shek Mun and Chevalier Garden to Heng On. It is recommended that site hoardings and cantilever barriers be provided to further reduce noise levels and that secondary glazing and air conditioning be installed at those schools where the MOS Rail construction noise levels would otherwise exceed the recommended daytime limit.

A number of minor exceedances still remain, even with the use of the mitigation measures described above, these can be controlled by restricting the operational periods for noisy plant, preventing simultaneous noisy activities on adjacent MOS Rail work sites and, if necessary, further restricting the numbers of operational plant. These modifications to the construction methodology can only be programmed once the detailed design stage has been completed.

3.4 Water Quality

3.4.1 Predicted Unmitigated Impacts

Unmitigated construction site runoff is a potential problem, however, under the Water Pollution Control Ordinance all sites will be required to obtain a discharge licence. In meeting the discharge requirements, the contractor will prevent adverse impacts upon receiving water bodies.

Sewage effluent arising from the construction workforce has the potential to cause adverse impacts if dealt with in an inappropriate manner.

3.4.2 Mitigation Measures

To meet the discharge requirements, mitigation measures should include:

- appropriate drainage facilities to control site runoff;
- proper site management to prevent debris and harmful materials from reaching drainage facilities of water bodies; and
- the provision of adequate toilet facilities and proper disposal of sewage by a recognised waste disposal company.

3.5 Waste

3.5.1 Predicted Unmitigated Impacts

The potential for the uncontrolled disposal of wastes arising from the MOS Rail construction works to generate adverse impacts has been identified in the EFS, however, observance of the relevant legislation will prevent such effects.

Waste materials will be removed from the sites by lorry and impacts will be limited to the effects associated with increases in vehicle movements which have been considered in the assessment of air quality and noise impacts.

3.5.2 Mitigation Measures

Inert excavated material and construction waste will either be reused on site, taken to other reclamation or construction projects, or sent to a public dump. Materials containing more than 20% by weight of organics must be sent for disposal at a landfill. Other waste, including general refuse, will also be disposed of in a responsible manner and will not give rise to significant impacts.

Mitigation measures will include:

- general good housekeeping practices;
- sorting and segregation of wastes for reuse and disposal;
- observing the requirements of the disposal permits; and
- meeting the requirements of the Waste Disposal Ordinance.

3.6 Ecology

3.6.1 Predicted Unmitigated Impacts

Most of the MOS Rail alignment is within existing urban developments and the remaining sections are either planned for new developments or part of the highway infrastructure. This land is of little or no ecological value and adverse unmitigated construction impacts are extremely unlikely. Although none of the sites are of particular value or contain rare or endangered species, in keeping with general conservation policy in the Territory, they should be protected from unnecessary disturbance and appropriate mitigation measures are identified below.

3.6.2 Mitigation Measures

Mitigation measures to minimise impacts on ecological resources should include the following:

- restrict construction works to within the identified site boundaries and check regularly that no damage is being caused to the surrounding areas;
- maintain high standards of housekeeping and dust control to protect habitats adjacent to work sites; and
- where areas remain the responsibility of the Proponent, maintenance of planted areas for at least the first two years after the completion of the works.

3.7 Landuse and Visual Impacts

3.7.1 Predicted Unmitigated Impacts

Unmitigated adverse landuse and visual impacts are predicted from the construction of MOS Rail and whilst landuse impacts can be largely overcome by careful planning, some residual visual impacts from construction works will remain even after mitigation. However, these impacts should be considered in the context of the local environment near the alignment which is one of ongoing urban renewal and new urban development.

3.7.2 Mitigation Measures

Implementation of the mitigation measures described above will help greatly to reduce the level and quantity of these impacts. In addition, boundary fences should be erected around construction sites before the commencement of works to reduce the potential visual impacts of the proposed works and to prevent tipping, vehicle movements and encroachment of personnel off site and all work sites, particularly the areas of disturbed vegetation, should be reinstated to standards as good as, or better than the original at the earliest opportunity.

3.8 Environmental Monitoring and Audit

The EFS has identified that EM&A will only be necessary for air quality and noise impacts during the construction of MOS Rail. No water sensitive receivers will be affected and any potential impacts on the local drainage system will be controlled by the requirements of the wastewater discharge licence.

The Contractor will be responsible for commissioning a qualified team to undertake the EM&A work required during the construction of MOS Rail. The Proponent's and the Contractor's responsibilities will be related through the application of Event Contingency Plans to deal with any exceedance of the established criteria, either in the course of normal construction working or through unforeseen circumstances.

Table 3.1a Implementation of Mitigation Measures

Mitigation Measure	Site Preparation	Railway Alignment	Stations	Developments	Commissioning
<i>Air Quality</i>					
Good Site Practice	All sites	All sites	All site	All sites	
Site Watering & Compaction	All sites	All sites	All sites	All sites	-
Vehicle Speed Control	All sites	All sites	All sites	All sites	-
Vent Orientation	-	-	-		Stations, developments and depot
<i>Noise</i>					
Good Site Practice	All sites	All sites	All sites	All sites	
Use of Quiet Plant	SKS	TAW-STT	HIK & CHG	-	-
Quiet Plant and Moveable Barriers	CIO & MOS, CHG-HEO, HEO-MOS & MOS-LEO	-	SKS	TAW & STT	-
Quiet Plant, Moveable Barriers and Limited Numbers of Plant	HEO, STT-SKS, SKS-CIO, CIO-SHM	All sites from STT east.	CIO, HEO & MOS	-	-
Site Hoardings	-	STT-SKS, SKS-CIO, SHM-CHG, CHG-HEO, HEO-MOS	STT & HEO	-	
Glazing for Schools	TAW	STT-SKS & CHG-HEO	HEO	-	-
Acoustic Control of Vents	-	-	-		Stations, developments and depot
<i>Water Quality</i>					
Site Boundary Drainage	All sites	All sites	All sites	All sites	-
Site Runoff Control and Drainage	All sites	All sites	All sites	All sites	-
Operational Drainage	-	-	-		Stations developments and depot
<i>Landuse and Visual</i>					
Site Boundary Fencing	All sites	All sites	All sites	All sites	-
Vehicle Movement Controls	All sites	All sites	All sites	All sites	-

4 IMPACTS DURING OPERATION

4.1 Introduction

The entire MOS Rail alignment is above ground, either at grade or on elevated structure. Potential operational impacts will arise primarily from the appearance of the railway structures and train movements causing noise. The train units will be electrically powered so no adverse air quality impacts are expected.

4.2 Air Quality

The only potential impacts will arise from the station and depot ventilation systems and as these are primarily used for the circulation of fresh air no adverse impacts are expected during normal operations. The ventilation system is also designed to extract smoke in the event of a fire and the vent locations and orientations should be selected to avoid facing onto sensitive receivers.

4.3 Noise and Vibration

4.3.1 Unmitigated Impacts

Noise impacts from the operational railway are a major concern, particularly after 23.00 and before 07.00 where the statutory and recommended noise limits are strictest. Exceedances of the night-time criteria have been identified on all sections of the alignment from Tai Wai to Lee On and the use of track side noise barriers will be necessary to reduce noise levels from the railway to below the established criteria.

The residential blocks of station related developments at Tai Wai, Sha Tin Tau and Lee On may be affected by road traffic noise and at Tai Wai, train noise from the KCR and MOS Rail may also adversely affect the development.

Ground-borne noise and vibration are not expected to cause adverse noise impacts as all sections are above ground. At this stage of the project, the track mounting system and supporting structures are not defined and, therefore, ground vibration has been excluded from this study, and will be addressed during the detailed design stage.

4.3.2 Mitigation Measures

The following forms of mitigation have been considered to control the predicted exceedances:

- standard reflective track side barriers 1.5 m high similar to the 1 m standard viaduct parapet design;
- track side barriers 2.5-3.5 m high, with acoustic absorptive lining on the inner face of the lower portion, which is similar to the standard track side barriers of 1.5 m high, the upper section is transparent;

- centerline barriers of 1 m high, both sides lined with absorptive material, in combination with track side barriers of 1.5 m, 2.5 m or 3.5 m high as described above; and
- either partial (ie. absorptive cantilever barriers with one side open) or total enclosure.

Table 4.3a shows the types and locations of the proposed barriers.

Table 4.3a Summary of Required Noise Mitigation Measures

Section	Proposed Mitigation Measures	Length of Noise Barriers or Enclosure	Location
Hin Keng to Tai Wai	No mitigation required	N/A	
Tai Wai to Sha Tin Tau	2.5 m Track Side Barriers	400 m	Chainage 1700-2100
Sha Tin Tau to Sha Kok Street	1.5 m Trackside Barriers	200 m	Chainage 2250-2450
	Noise Enclosure	500 m	Chainage 2450-2950
Sha Kok Street to City One Shatin	Noise Enclosure	900 m	Chainage 3200-4100
City One Shatin to Shek Mun	3.5 m Track Side Barriers & 1 m Centerline Barriers	600 m	Chainage 4300-4900
Shek Mun to Chevalier Garden	2.5 m Track Side Barriers & 1 m Centerline Barriers	700 m	Chainage 5700-6400
	1.5 m Track Side Barriers	600 m	Chainage 6400-7000
	Cantilever Barrier	500 m	Chainage 7300-7800
Chevalier Garden to Heng On	Cantilever Barrier	900 m	Chainage 7900-8800
	2.5 m Track Side Barriers	100 m	Chainage 8800-8900
	3.5 m Track Side Barriers	400 m	Chainage 9000-9400
Heng On to Ma On Shan	Cantilever Barriers	500 m	Chainage 9400-9900
Ma On Shan to Lee On	3.5 m Track Side Barriers & 1.5 m Centerline Barriers	100 m	Chainage 10100-10200
	Noise Enclosure	1100 m	Chainage 10200-11300

Note: The lower 1.5 m of all barriers are fitted with noise absorptive lining 75 mm thick.

4.4 Water Quality

Stormwater runoff related impacts from stations and depot should be effectively controlled through the design and implementation of appropriate drainage system(s) including silt traps and oil interceptors prior to discharge to stormwater drains. Wastewater generated by the detergent wash plant in the proposed depot will be collected and transferred to a dedicated on-site treatment plant for treatment. The treated effluents from the on-site treatment plant and any other wastewater generated from the depot and stations will have to meet the criteria specified in the TM, prior to discharge to sewers. With the implementation of all the proposed mitigation measures, all future potential water quality impacts arising from the operation of the proposed rail development will be well within all the established standards and guidelines under the Water Pollution Control Ordinance.

4.5 Waste

Solid waste arisings during the operation of MOS Rail will be small. Some chemical and industrial waste will be generated from maintenance work at the depot and during

occasional station refurbishment works but the implementation of good housekeeping practices and the observation of the requirements of the Waste Disposal Ordinance will prevent adverse impacts.

4.6 Ecology

No ecological impacts are anticipated during the operation of MOS Rail.

4.7 Landuse and Visual Impacts

4.7.1 Unmitigated Impacts

The proposed above-grade stations, railway viaducts and noise control structures would generate major visual impacts on surrounding areas and their populations. Not only would these structures affect existing views, but also development of the stations and viaducts would change the landscape of many of the areas in which they are located. There would, in addition, be high visual impacts generated by the proposed residential and hotel developments associated with the depot and station developments at Tai Wai, Sha Tin Tau and Lee On.

4.7.2 Mitigation Measures

The external appearance of all above-ground structures should be carefully detailed in terms of form, colour and finishes such that they are visually integrated as much as possible into the surrounding landscape. Stations, viaducts and noise mitigation measures will be the most visually dominant elements, in particular the form and surface detailing, therefore;

- the width of viaduct sides and the supporting columns should be minimised as far as possible to provide a lightness of appearance,
- the impact of noise barriers and enclosures should be reduced through the use of clear or translucent upper sections wherever practicable, and
- the visual appearance of the railway structures should be softened through screen planting wherever possible.

Public views will be taken into account during consultation prior to the tendering process.

4.8 Environmental Monitoring and Audit

Noise monitoring will be required during the operational phase to check the efficacy of the noise barriers and to identify the need for rolling stock and rail maintenance. No other adverse impacts have been identified during the operational phase which cannot be effectively controlled through, as in the case of vent locations, specified design criteria.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

No adverse unmitigated environmental impacts, generating exceedances of the established criteria, have been predicted to arise as a result of the construction or operation of MOS Rail, which cannot be avoided or reduced to acceptable levels by the implementation of appropriate mitigation measures.

The recommended mitigation measures generally indicate the type of measures which may be employed to ensure compliance with the statutory requirements, Government guidelines and other environmental standards agreed with EPD. In addition, the EM&A programme which will be adopted during construction of MOS Rail will help ensure compliance whatever means of mitigation are used.

However, it must be noted that the EIA process, particularly at this early feasibility stage, inherently includes elements of uncertainty, such as:

- the precise final form of the proposed Project will not be known until the detailed design is completed;
- until the successful contractors have finalised their preferred methods of working, the precise construction programme, working arrangements and plant to be used on site will not be known.

5.2 Recommendations

Because of the limiting factors discussed above, a detailed EIA for MOS Rail should be undertaken to review and update the likely impacts in the light of the more comprehensive information on the construction programme and methodology which will be available at the detailed design stage.

In addition to the overall revision of the findings of the EFS, with the benefit of the more comprehensive information, the Detailed EIA should give further consideration to options for the effective control of adverse dust, noise and visual impacts through detailed mitigation measures and, if necessary, modifications to the construction methodology.

The EM&A procedure will provide a check and response mechanism to ensure that potential impacts from the effects of noise and dust emissions during the construction of MOS Rail and noise impacts during the operation of the railway are adequately controlled through the implementation of the identified mitigation measures.

Maunsell/MVA

RDS Phase II KCR Extension to
Tsim Sha Tsui: *KV4 Environmental
Feasibility Study - Executive Summary*

14 March 1997

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RDS Phase II KCR Extension to
Tsim Sha Tsui: *KV4 Environmental
Feasibility Study - Executive Summary*

14 March 1997

Reference C1435/50356

For and on behalf of ERM-Hong Kong, Ltd

Approved by: S.M. LAISTER

Signed: *S.M. Laister*

Position: *Deputy Managing Director*

Date: *13th March 1997*

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1 INTRODUCTION

1.1 Background to the Environmental Feasibility Study

The Hong Kong Government announced its Railway Development Strategy in December 1994, this set out the framework for the expansion of the Territory's railway network into the next century. The strategy classified proposed new railways in terms of priority and accorded the highest priority to three packages:

- the Western Corridor Railway;
- the Tseung Kwan O Extension of the MTR system; and
- Ma On Shan Rail Link (MOS Rail) and KCR Extension to Tsim Sha Tsui.

The Western Corridor Railway and the Tseung Kwan O Extension are being progressed by the KCRC and MTRC respectively. MOS Rail and the KCR Extension are envisaged by Government as being potentially suitable for private sector participation and as a next step the Railways Development Office of Highways Department has initiated the MOS Rail and KCR Extension Study as Phase II (Part 1) of the Railway Development Study. This new study is a comprehensive Feasibility Study to put forward the preferred railway schemes and, if appropriate, to prepare technical documentation to form part of an invitation for tenders from interested parties. On 30th October 1995 the MVA-Maunsell Joint Venture was appointed to undertake the study.

This Executive Summary covers the KCR Extension, formed by extending a pair of tracks from the existing KCRC Kowloon Station (at Hung Hom) southwards into an underground East-West alignment to a station at Tsim Sha Tsui, at the foot of Signal Hill, giving an interchange connection with the MTR Tsuen Wan Line. Overrun tunnels will continue below Middle Road as far as the Marine Police Headquarters. The proposed alignment is shown in *Figure 1.1a*.

The KCR Extension will provide a direct link to the employment areas of the Kowloon peninsula and, at Tsim Sha Tsui, a second interchange with the MTR, thereby relieving Kowloon Tong of cross harbour journey demands. This will improve accessibility for residents of the north-west New Territories and give the KCRC much better penetration into the area. Furthermore, the line could be extended to connect with West Rail on the West Kowloon Reclamation via the possible Kowloon Point Reclamation. This will provide a cross Kowloon link and further improve rail accessibility in Kowloon and the Territory as a whole.

ERM Hong Kong, as part of the Study Team, has carried out a feasibility stage environmental impact assessment (EIA), that is to say an Environmental Feasibility Study (EFS) to provide information on the type and magnitude of impacts which may be caused by the construction and operation of the railway extension. The findings of the EFS have contributed to the overall Feasibility Study for the railway extension, providing information on:

- environmental constraints that may affect railway design;
- options for mitigation measures to control adverse impacts; and
- environmental protection requirements for inclusion the detailed design stage.

The purpose of the EFS was to investigate the suitability of the proposed project in terms of its environmental acceptability and, where necessary, provide recommendations to control any identified adverse impacts. If the project is approved,

the findings of the EFS will be used to determine the scope of work required for a full EIA to be carried out through the project design stages.

1.2 Objectives of the Environmental Feasibility Study

The Feasibility Study Brief sets out the objectives of the Study to be to determine:

- how best to extend the KCR to Tsim Sha Tsui and potentially to West Kowloon Reclamation and provide an effective interchange with the MTR; and
- how best to package and phase the line for implementation.

The Study should also ensure that the Preferred Schemes support and enhance on-going planning and development and do not have any adverse environmental or drainage impacts. Furthermore they should be properly integrated into the Territory's transport system and their implications on other plans and proposals identified.

In addition, the Study has also fulfilled the requirements of the Environmental Protection Department's (EPD's) Study Brief, which are:

- to describe the proposed railway and associated facilities including railway stations and the requirements for their development;
- to identify, predict and evaluate the environmental impacts and the cumulative effects which may be expected to arise during the construction and operational phases of the KCR Extension;
- to recommend appropriate measures to mitigate these impacts to environmentally acceptable levels in accordance with Hong Kong Planning Standards and Guidelines and relevant Government Ordinances; and
- to identify the environmental monitoring and audit (EM&A) requirements for impact and compliance monitoring to ensure that the conditions referred to above are met.

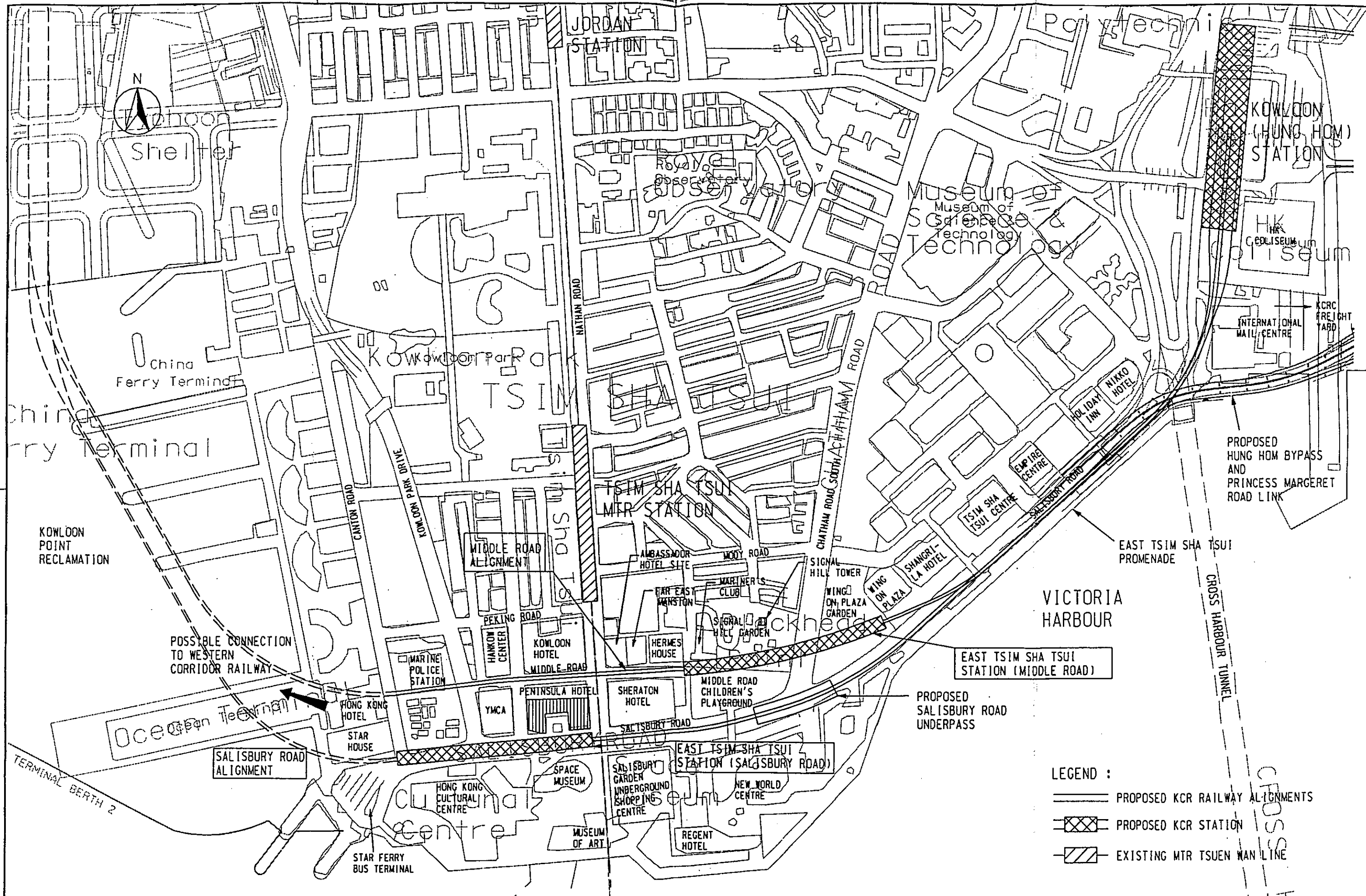
1.3 Format of the Report


The KCR Extension EFS comprises two volumes:

- *Volume I*, this Executive Summary, briefly explains how the EFS was carried out and describes the findings of the Main Report, concentrating on the potential adverse impacts and proposed mitigation measures;
- *Volume II*, the Main Report provides the findings of the EFS: identifying the environmental performance criteria applicable to the KCR Extension; focusing on the likely impacts of the construction and operation phases; and developing appropriate mitigation measures to control any adverse impacts.

After this introductory section, the remainder of *Volume I*, the Executive Summary, of the EFS is arranged as follows:

- *Section 2* identifies and describes the impacts arising from the construction of the KCR Extension, their magnitude and suitable mitigation measures;



 Highways Department
 Railway Division
 RAILWAY DEVELOPMENT STUDY
 PHASE 2 (PART 1)

FEASIBILITY STUDY FOR THE TAI WAI TO MA ON SHAN RAIL LINK AND THE KCR EXTENSION TO TSIM SHA TSUI

**KCR EXTENSION TO TSIM SHA TSUI
ALIGNMENT OPTIONS**

© COPYRIGHT RESERVED
 DATE: JAN 97
 SCALE: 1 : 5000
 MVA ASIA
 MAUNSELL CONSULTANTS ASIA
 and associated consultants
 CAD REF : M/PROJECTS/94595/MOS/MOSS117.DGN
 FIGURE No. 1.1a

- *Section 3* identifies and reviews the impacts arising from the operation of the KCR Extension and puts forward effective mitigation measures; and
- *Section 4* reviews the findings of the EFS and puts forward recommendations for environmental protection measures for the KCR Extension.

2 IMPACTS DURING CONSTRUCTION

2.1 Introduction

The KCR Extension alignment runs through the heavily developed area of east Kowloon which contains a number of major hotels as well as many offices and residential properties. The numbers of sensitive receivers that may be affected by the construction of the KCR Extension is high.

Limited information is currently available concerning other developments planned for construction at the same time as the KCR Extension and, therefore, this EFS has not considered cumulative impacts from other construction work. Once the timetabling of the construction of other developments, including the Salisbury Road Underpass, is available, at the detailed design stage, it will be possible to refine the EFS predictions in the EIA.

Table 2.1a, at the end of this *Section*, shows the recommended mitigation measures and their implementation programme for the construction phase.

2.2 Air Quality

2.2.1 Introduction

Potential adverse air quality impacts have been identified, particularly during the construction phase of the proposed railway extension, station and tunnels. During the construction phase, dust impacts are likely from site preparation activities, earthworks and excavations. It is expected that the impacts from construction plant exhaust emissions will be limited as relatively small numbers would be required.

2.2.2 Predicted Unmitigated Impacts

Unmitigated dust impacts from the alignment works are not expected to cause adverse impacts at any sensitive receivers, predicted levels are dominated by the existing background conditions.

Unmitigated dust levels from the construction of the station are predicted to exceed the recommended hourly limit for Total Suspended Particulates (the dust particles which tend to be dispersed furthest from the construction sites) at Wing On Plaza, Wing On Plaza Garden, Signal Hill Garden, Mariner's Club and Hermes House. Levels at Wang Fu Building are also expected to be close to the recommended limit.

2.2.3 Mitigation Measures

A series of measures have been identified which will control dust levels from general construction activities to within the recommended hourly limits during the construction of the KCR Extension. These include:

- on site vehicle speed restrictions and vehicle washing before leaving the site;
- careful handling and the containment or damping of dusty materials; and
- covering or damping exposed areas of ground and prompt site restoration.

These measures should be used as general good practice on all KCR Extension construction sites to ensure that potential dust emissions are controlled and impacts upon sensitive receivers minimised.

2.3 Noise

2.3.1 Introduction

The frequently noisy nature of construction works and the proximity and number of sensitive receivers in a busy urban area such as Tsim Sha Tsui means that adverse noise impacts are likely to occur. Other than percussive piling, noise from daytime construction works is not controlled by law, however, the KCR Extension construction will be required to meet the EPD's recommended voluntary daytime noise limits. Any percussive piling, evening, night-time or holiday working will only be allowed if the contractor can demonstrate to the EPD that noise levels will meet their criteria for the issue of a construction noise permit under the Noise Control Ordinance.

2.3.2 Predicted Unmitigated Impacts

Unmitigated noise impacts from the station and alignment construction are predicted to exceed the recommended voluntary daytime noise limits at all of the sensitive receivers during one or more stages of the works. Noise impacts from the construction of the overrun tunnels are predicted to be particularly severe. A package of mitigation measures has, therefore, been designed to control construction noise and these are described below.

2.3.3 Mitigation Measures

Whilst not sufficient to fully resolve the predicted noise impacts, general good site practices will help to control noise impacts. These include

- care in the location and operation of plant and equipment;
- correct fitting and use of silencers, mufflers and acoustic shields; and
- regular maintenance of plant and equipment.

A series of further mitigation measures have been identified which will provide increasing levels of noise reduction which should normally be sufficient to control daytime noise impacts to within the recommended limit. These are

- Mitigation Stage 1 - the use of items of quieter construction equipment than those listed by the EPD as standard;
- Mitigation Stage 2 - in addition to the use of quiet plant, movable noise barriers are located in close proximity to operational plant within the construction site; and
- Mitigation Stage 3 - as well as a combination quiet plant and moveable barriers, the number of items of equipment operating at the same time is limited.

These measures will effectively control most noise impacts from the construction works for the section of the alignment from Hung Hom to Signal Hill. A minor exceedance

remains at the Shangri-La Hotel but this can be easily controlled by careful planning of the construction works.

Station construction works would still generate adverse impacts at Wong Fu Building and the Mariner's Club, cantilevered site barriers are recommended to protect both receivers, with further operational restrictions on plant also required to protect the Mariner's Club.

Even with the proposed suite of mitigation measures, impacts from the construction of the overrun tunnels will still remain well above the daytime target level. As well as using cantilevered site barriers and further restricting plant activity, it is proposed that a noise enclosure be constructed around the bored tunnel portal, this will reduce noise levels to close to the target level.

Minor exceedances of the target level will still remain at Far East Mansion and the YMCA, options for further noise control measures, such as further changes to plant teams and construction methodology, should be investigated in the EIA which will be undertaken at the detailed design stage.

2.4 Water Quality

2.4.1 Predicted Unmitigated Impacts

Unmitigated construction site runoff is a potential problem, however, under the Water Pollution Control Ordinance all sites will be required to obtain a discharge licence. In meeting the discharge requirements, the contractor will prevent adverse impacts upon receiving water bodies.

Sewage effluent arising from the construction workforce has the potential to cause adverse impacts if dealt with in an inappropriate manner.

2.4.2 Mitigation Measures

To meet the discharge requirements, mitigation measures should include:

- appropriate drainage facilities to control site runoff;
- proper site management to prevent debris and harmful materials from reaching drainage facilities of water bodies; and
- the provision of adequate toilet facilities and proper disposal of sewage by a recognised waste disposal company.

2.5 Waste

2.5.1 Predicted Unmitigated Impacts

The potential for the uncontrolled disposal of wastes arising from the KCR Extension construction works to generate adverse impacts has been identified in the EFS, however, observance of the relevant legislation will prevent such effects.

Waste materials will be removed from the sites by lorry and impacts will be limited to the effects associated with increases in vehicle movements which have been considered in the assessment of air quality and noise impacts .

2.5.2 Mitigation Measures

Inert excavated material and construction waste will either be reused on site, taken to other reclamation or construction projects, or sent to a public dump. Materials containing more than 20% by weight of organics must be sent for disposal at a landfill. Other waste, including general refuse, will also be disposed of in a responsible manner and will not give rise to significant impacts.

Mitigation measures will include:

- general good housekeeping practices;
- sorting and segregation of wastes for reuse and disposal;
- observing the requirements of the disposal permits; and
- meeting the requirements of the Waste Disposal Ordinance.

2.6 Ecology

2.6.1 Predicted Unmitigated Impacts

The entire KCR Extension alignment is within the urban environment of Tsim Sha Tsui. This area is of little ecological value and adverse unmitigated construction impacts are unlikely. Although none of the sites are of particular value or contain rare or endangered species, Wing On Garden and Signal Hill Garden contain many mature trees and shrubs which have a high recreational value. In keeping with general conservation policy in the Territory, they should be protected from unnecessary disturbance and appropriate mitigation measures are identified below.

2.6.2 Mitigation Measures

Mitigation measures to minimise impacts on ecological resources should include the following:

- restrict construction works to within the identified site boundaries and check regularly that no damage is being caused to the surrounding areas;
- maintain high standards of good housekeeping and dust control to protect habitats adjacent to work sites; and
- where areas remain the responsibility of the Proponent, maintenance of planted areas for at least the first two years after the completion of the works.

2.7 Landuse and Visual Impacts

2.7.1 Predicted Unmitigated Impacts

Unmitigated adverse landuse and visual impacts are predicted from the construction of the KCR Extension and whilst landuse impacts can be largely overcome by careful planning, some residual visual impacts from construction works will remain even after mitigation. However, these impacts should be considered in the context of the local urban environment near the alignment which is one of ongoing urban renewal and new development.

The construction of the KCR Extension would generate considerable impacts on the physical landscape on many of the areas in which it would be located. These impacts generally take the form of tree losses, particularly those trees that are mature specimens and provide a valuable role in the landscape amenity of the areas in which they are located. As such, it is recommended that a comprehensive tree survey should be included in the detailed design stage. The construction of the station would generate severe impacts on the landscape of Signal Hill, Wing On Plaza Garden and sections of the Tsim Sha Tsui East Promenade. These features should be reinstated and completely revegetated after completion of the construction works.

2.7.2 Mitigation Measures

Implementation of the mitigation measures described above will help greatly to reduce the level and quantity of these impacts. In addition, boundary fences should be erected around construction sites before the commencement of works to reduce the potential visual impacts of the proposed works and to prevent tipping, vehicle movements and encroachment of personnel off site and all work sites, particularly the areas of disturbed vegetation, should be reinstated to standards as good as, or better than the original at the earliest opportunity.

2.8 Environmental Monitoring and Audit

The EFS has identified that EM&A will only be necessary for air quality and noise impacts during the construction of the KCR Extension. No water sensitive receivers will be affected and any potential impacts on the local drainage system will be controlled by the requirements of the wastewater discharge licence.

The Contractor will be responsible for commissioning a qualified team to undertake the EM&A work required during the construction of the KCR Extension. The Proponent's and the Contractor's responsibilities will be related through the application of Event Contingency Plans to deal with any exceedance of the established criteria, either in the course of normal construction working or through unforeseen circumstances.

Table 2.1a Implementation of Mitigation Measures

Mitigation Measure	Site Preparation	Excavation	Structures	Reinstatement	Commissioning
<i>Air Quality</i>					
Site Watering & Compaction	All sites	All sites	All sites	All sites	-
Vehicle Speed Control	All sites	All sites	All sites	All sites	-
Vent Orientation	-	-	-	-	All sites
<i>Noise</i>					
Use of Quiet Plant	-	-	Hung Hom to Signal Hill	Hung Hom to Signal Hill	-
Quiet Plant and Moveable Barriers	-	-	-	-	-
Quiet Plant, Moveable Barriers and Limited Numbers of Plant	All sites	All Sites	Station and Overrun Tunnels	Station and Overrun Tunnels	-
Noise Enclosure	Overrun Tunnels	Overrun Tunnels	Overrun Tunnels	Overrun Tunnels	-
Further Measures Required	Station Site	Station Site	-	-	-
Additional Acoustic Control of Vents	-	-	-	-	All sites
<i>Water Quality</i>					
Site Boundary Drainage	All sites	All sites	All sites	All sites	-
Site Runoff Control and Drainage	All sites	All sites	All sites	All sites	-
Station and Tunnel Drainage	-	-	-	-	All Sites
<i>Landuse and Visual</i>					
Site Boundary Fencing	All sites	All sites	All sites	All sites	-
Vehicle Movement Controls	All sites	All sites	All sites	All sites	-
Revegetation and Reinstatement of Facilities	-	-	-	Hung Hom to Signal Hill and Station Site	-

3 IMPACTS DURING OPERATION

3.1 Introduction

The KCR Extension will be underground, the only above ground structures will be the station entrances and the upper sections of the ventilation systems. Consequently, potential operational impacts will be limited and easily mitigated.

3.2 Air Quality

The only potential impacts will arise from the station and tunnel ventilation systems and as these are primarily used for the circulation of fresh air no adverse impacts are expected during normal operations. The ventilation system is also designed to extract smoke in the event of a fire and the vent locations and orientations should be selected to avoid facing onto sensitive receivers.

Electrically powered trains will be used and there will be no adverse air quality impacts although there might be some dust generation from abrasion and gaseous and particulate emissions from maintenance operations. However, these pollutant sources are expected to have little or no impact on surrounding sensitive uses because the entire alignment is enclosed within tunnels.

3.3 Noise and Vibration

Uncontrolled night-time noise impacts from the ventilation systems could exceed the requirements of the Noise Control Ordinance. However, the current design indicate that the separation distance between the vents and the nearest sensitive receivers is sufficient to prevent adverse impacts.

It has not been possible at this stage to assess impacts caused by vibration from the operational railway due to a lack of detailed information on the locations and nature of existing foundations and other sub-surface structures along the proposed alignment. This aspect will need to be addressed at the detailed design stage, however, vibration from the operational railway can be controlled effectively by suitable trackform design.

3.4 Water Quality

Oil interceptors are recommended for the station to treat potentially contaminated runoff. As any operational discharges will be required to comply with the Water Pollution Control Ordinance, no adverse impacts are expected.

3.5 Waste

Solid waste arisings during the operation of the KCR Extension will be small. Some chemical and industrial waste will be generated from station maintenance and during occasional refurbishment works but the implementation of good housekeeping practices and the observation of the requirements of the Waste Disposal Ordinance will prevent adverse impacts.

3.6 Ecology

No ecological impacts are anticipated during the operation of the KCR Extension.

3.7 Landuse and Visual Impacts

The entire alignment will be below ground and as such, provided that the above ground structures are designed to fit in with the existing urban landscape, there will be no adverse impacts during the operational phase.

3.8 Environmental Monitoring and Audit

No adverse impacts have been identified during the operational phase which cannot be effectively controlled through, as in the case of vent locations, specified design criteria, therefore, no operational EM&A will be required.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

No adverse unmitigated environmental impacts, generating exceedances of the established criteria, have been predicted to arise as a result of the construction or operation of the KCR Extension, which cannot be avoided or reduced to acceptable levels by the implementation of appropriate mitigation measures.

The recommended mitigation measures generally indicate the type of measures which may be employed to ensure compliance with the statutory requirements, Government guidelines and other environmental standards agreed with EPD. In addition, the EM&A programme which will be adopted during construction of the KCR Extension will help ensure compliance whatever means of mitigation are used.

However, it must be noted that the EIA process, particularly at this early stage, inherently includes elements of uncertainty, such as:

- the precise final form of the proposed Project will not be known until the detailed design is completed;
- until the successful contractors have finalised their preferred methods of working, the precise construction programme, working arrangements and plant to be used on site will not be known.

4.2 Recommendations

Because of the limiting factors discussed above, a detailed EIA for the KCR Extension should be undertaken to review and update the likely impacts in the light of the more comprehensive information on the construction programme and methodology which will be available at the detailed design stage.

In addition to the overall revision of the findings of the EFS, with the benefit of the more comprehensive information, the Detailed EIA should give further consideration to options for the effective control of adverse dust, noise, vibration and visual impacts through detailed mitigation measures and, if necessary, modifications to the construction methodology.

The EM&A procedure will provide a check and response mechanism to ensure that potential impacts from the effects of noise and dust emissions during the construction of the KCR Extension are adequately controlled through the implementation of the identified mitigation measures. No adverse impacts have been identified during the operational phase which cannot be effectively controlled through, as in the case of vent locations, specified design criteria, therefore, no operational EM&A will be required.