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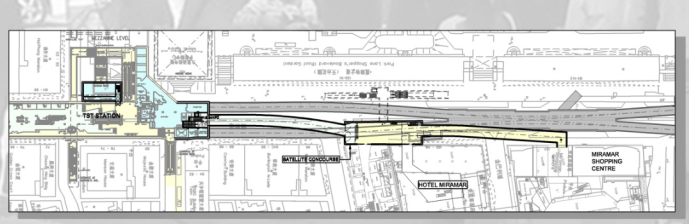

Agreement No. NEX/1034

Tsim Sha Tsui Station Northern Subway

Environmental Impact Assessment Report

Revision A
September 2008

MAUNSELL | AECOM in association with MTRC, Aedas, MVA

Maunsell Consultants Asia Ltd.
茂盛(亞洲)工程顧問有限公司

MTR Corporation Limited

Consultancy Agreement No. NEX/1034
Tsim Sha Tsui Station Northern Subway

Environmental Impact Assessment Report

Revision A

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MAUNSELL PROJECT OFFICE
8/F Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, N.T. Hong Kong
Telephone (852) 2605 6262 Fax (852) 2691 2649

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Abbreviation

AMO	Antiquities and Monuments Office
E&M	Electrical and mechanical
ETS	East Tsim Sha Tsui Station
HEER	Health Education Exhibition and Resource Centre
HM	Hotel Miramar
KSL	Kowloon Southern Link
MSC	Miramar Shopping Centre
MTRCL	Mass Transit Railway Corporation Limited
OVT	Old and Valuable Tree
Subway MSC	Subway connecting the Satellite Concourse and Miramar Shopping Centre
Subway TST	Subway connecting the Satellite Concourse and Tsim Sha Tsui Station
TNS	Tsim Sha Tsui Station Northern Subway
TST	Tsim Sha Tsui Station
TWL	Mass Transit Railway Tsuen Wan Line
TYB	Tung Ying Building

1. INTRODUCTION

1.1 Background

1.1.1 The title of this project is known as "Tsim Sha Tsui Station Northern Subway" (TNS) (hereafter known as the Project). The Project Proponent is MTR Corporation Limited (MTRCL). ENSR Asia (HK) Limited has been commissioned to carry out an Environmental Impact Assessment Study for the Project.

1.2 Project Objectives

1.2.1 The objectives of this Project are to provide passengers with a direct and accessible safe pedestrian subway in addition to the existing entrances and to relieve the existing busy northern concourse and platform areas of Tsim Sha Tsui (TST) Station by providing a new direct high-capacity corridor for effective passenger access. The location of the proposed Project is shown in **Figure 1.1**. Three cross sections of the Project are shown in **Figures 1.2** to **1.4**.

1.3 Nature of the Project

1.3.1 The Project is classified as a Designated Project under Category A.2 (A railway and its associated stations) of Part 1, Schedule 2 of the EIAO.

1.3.2 The Project involves construction and operation of (i) An underground pedestrian subway link that connects the north end of the TST Station platform with integrated entrances in the basements of the Tung Ying Building Redevelopment, Miramar Hotel and Miramar Shopping Centre; (ii) An underground satellite concourse underneath Nathan Road located adjacent to Tung Ying Building and the Miramar Hotel; and (iii) A new plant basement near existing Entrance A1 to house the station equipment relocated from the north end of TST Station for accommodating the TNS connection.

1.4 Purpose of EIA Study

1.4.1 The purpose of this EIA Study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the proposed subway works, and to contribute to decisions on the overall acceptability of the Project, after the implementation of proposed mitigation measures.

1.5 The Approach

1.5.1 The EIA study has been prepared in accordance to the EIA Study Brief (No. ESB-168/2007) and the guidelines provided in Annex 11 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) for the report contents and Annexes 12 to 19 for the impact assessments of various environmental issues. The general approaches and methodologies adopted for this EIA study are described below.

Existing Environment Condition

1.5.2 The characteristics of the existing environment were reviewed for identification and prediction of environmental impacts. The baseline conditions of the key

issues as identified in the EIA Study Brief including landscape & visual, noise, construction air and water quality and built heritage are described in the assessment.

Impacts Prediction

1.5.3 The EIA Study was undertaken in accordance with the guidelines on assessment methodologies given in Annexes 12 to 19 of the EIAO-TM.

1.5.4 Quantitative approach was adopted for assessing the construction noise impacts. The predictions were conducted based on well-proven, internationally accepted methods.

1.5.5 The applied methodologies for the Project had previously been adopted in other EIA studies. They have been generally accepted for use in predicting environmental impacts and for comparison of assessment results with the EIAO-TM requirements. Limitations are however envisaged of these methodologies. The accuracy of the prediction result will be affected by uncertainty in input data such as sound power levels of construction plants to be used on-site. The most realistic data have been used in the prediction in order to provide a result with the lowest practicable quantitative uncertainty.

1.6 Mitigation Measures

1.6.1 Mitigation measures are proposed to alleviate the potential impacts predicted. The proposed mitigation measures have previously been adopted in other environmental assessment studies with similar construction works. An Environmental Monitoring and Audit programme is recommended to ensure that the recommended mitigation measures can effectively mitigate the impacts so as to comply with the corresponding criteria.

1.7 Reference to Relevant Study

1.7.1 The EIA Study was made reference to the approved relevant EIA Study Modifications to MTRCL Tsim Sha Tsui Station, Mass Transit Railway Corporation Limited (EIAO Register No.: AEIAR-043/2001).

1.8 Scope of Key Environmental Issues

1.8.1 The identified key environmental issues regarding the construction of the proposed Project are listed as below:

- potential construction dust impacts to nearby sensitive receivers from the Project;
- potential construction and operation noise impacts to nearby sensitive receivers from the Project;
- potential construction water quality impacts to nearby sensitive receivers, as well as waste management implications, from the Project;
- potential landscape and visual impacts to nearby sensitive receivers from the Project during its construction and operation stages;
- potential impacts to nearby identified heritage resources from the Project during its construction and operation stages; and

- potential cumulative impacts to nearby sensitive receivers for the above key issues, taking into account the existing construction works is discussed in Section 2.

1.8.2 The assessments of these key environmental issues are to be discussed in the following chapters of this Report. The study boundaries of construction air quality, noise and construction water quality impacts are shown in **Figure 1.5.**

1.8.3 The Project is within a developed urban area, there are no ecological sensitive receivers, such as Sites of Special Scientific Interest (SSSIs), Fish Culture Zones and Marine Parks and/or Reserves and other areas of ecological importance or conservation interest, within or in the immediate vicinity of the site area. Ecological impacts are, therefore, not expected during the construction and operation phases of the proposed Project. Accordingly ecological impact assessment is not required in this EIA Study.

2. DESCRIPTION OF THE PROJECT

2.1 Location and Description of the Project

2.1.1 The Project is located in Tsim Sha Tsui district which is an urban area with mixture of commercial and residential developments. The proposed works lie along Nathan Road from Cameron Road junction to Miramar Shopping Centre near Kimberley Road. The proposed new plant basement will be located under the existing Entrance A1 of the TST Station.

2.1.2 The project includes the following:

- A subway (Subway TST) from the north end of TST Station, running approximate 85m under Nathan Road to a Satellite Concourse;
- A satellite concourse (45m approx) underneath Nathan Road located adjacent to Tung Ying Building and the Miramar Hotel;
- A subway (Subway MSC) from the north end of the Satellite Concourse, running approximate 80m under Nathan Road to the Miramar Shopping Centre (MSC).

2.2 Identification of the Project Need

2.2.1 The passenger forecast study has established that the north of TST Station is under the most pressure and is now already approaching capacity. This is because the station catchment areas of the northern section are relatively more developed and will have more re-development. The northern section of the station is already and is expected to continue to be overloaded, especially at the vertical links between concourse and street at Entrances A1 (to Nathan Road and Haiphong Road), B1 and B2 (to Nathan Road and Cameron Road). Without any modification works, the north end of the station concourse will become significantly overloaded in the next few years.

2.2.2 The proposed subway will provide a direct link for passengers between the platform at the north end of the TST Station to a satellite concourse with access to street level via subway connections to the Tung Ying Building Redevelopment, Miramar Hotel, and Miramar Shopping Centre. Passengers can access the development areas north-east of TST, thus avoiding congestion and a number of signalled pedestrian crossings at street level.

2.2.3 TNS will provide an attractive route for existing and future passengers as it will enhance the walking quality, and provide a fast, safe, air-conditioned and weather proof route between the station and the catchment north of Tsim Sha Tsui avoiding Entrances A1, B1 and B2 of TST Station and traffic and pedestrian congestion at street level.

2.2.4 In the absence of the project, in the longer term the TST Station would remain busy and its congested sections would remain saturated. This strongly implies that the station is in need of a significant operational relief in its northern section, despite the launching of the Kowloon Southern Link (KSL) in year 2009, and the passenger diversion that it may cause.

2.2.5 The TNS scheme is also complementary with a number of pedestrian schemes and traffic calming measures implemented by the Government of the HKSAR in

the area west of Nathan Road to improve the whole pedestrian environment. These include Haiphong Road, Canton Road, Peking Road, Hankow Road, Lock Road and Ashley Road modification schemes. As these schemes have been well received by the public, further schemes are in progress to implement even more comprehensive measures to regulate both vehicular and pedestrian traffic to achieve a better environment in the whole Tsim Sha Tsui area.

- Those projects include:
- Greening Master Plan (GMP) for TST Area by Civil Engineering Development Department (CEDD); and
- Area Improvement Plan (AIP) for TST Area by Transport Department (TD).

2.2.6 Since the opening of East Tsim Sha Tsui (ETS) Station and the new pedestrian connections to TST Station, it has provided rail and non rail users a direct and convenient interchange to/from MTR stations, relieving congestion at the busy street level and enhancing the walking environment in Tsim Sha Tsui. In the next few years, this subway network is to be expanded to include the Middle Road Subway Extension to Peking Road extending the railway catchment to the south west of Tsim Sha Tsui. With both the ETS related pedestrian links in TST south and the TNS scheme in TST north completed, the TST District can be comprehensively served with good pedestrian connectivity and accessibility along both sides of Nathan Road.

2.2.7 To conclude, this station improvement scheme would provide much-needed relief to the currently congested Entrances A1 (to Haiphong Road) and B1 & B2 (to Cameron Road). Without such relief, these two northern entrances would continue to suffer from heavy operational pressure, especially with the continuous TST catchment growth following the airport relocation and the subsequent relaxation of building height/massing constraints in south Kowloon.

2.3 Considerations for Design Options

2.3.1 In 2006, MTRCL commenced the planning of a new capacity enhancement scheme to relieve the northern section of the TST Station. This is known as the Tsim Sha Tsui Station Northern Subway (TNS) and is the subject of this submission. This scheme consists of an underground pedestrian subway link (TNS) that connects the northern end of the TST Station platform, via the modified concourse plant room area, with integrated entrances in the basements of Tung Ying Building Redevelopment, Miramar Hotel and the Miramar Shopping Centre together with an underground satellite concourse (the Satellite Concourse) in the middle of the subway.

Considerations for TNS Subway Alignment

2.3.2 The two prime objectives to be achieved in the planning of the TNS subway include:

- to provide a direct pedestrian subway link between the TST Station and the Tung Ying Building Redevelopment, Hotel Miramar and Miramar Shopping Centre;
- to accommodate the existing plant rooms displaced from the TST Station by the TNS subway link.

2.3.3 The key objective is to minimise the walking distance as far as practicable. Obviously, if the alignment of the pedestrian subway is not attractive to the passengers, the purpose of building it will be defeated. In planning the subway alignment, there are several key considerations for its layout and the form that it might take. The major constraints on the design and construction of the proposed subway identified are as follows:

- Clearance requirements to the Tsuen Wan Line (TWL) Tunnels and structures;
- Minimum disturbances to the existing water mains, utilities and drainage systems;
- Interface with the redevelopment works of Tung Ying Building (TYB);
- Interfaces with Hotel Miramar (HM) and Miramar Shopping Centre (MSC), both in use during construction;
- Interface with MTR TST Station and the need to minimise any impacts on the functionality of key public and plant room areas;
- Limited works area and construction access;
- Land availability and projections from buildings;
- Vehicular and Pedestrian Traffic Management during construction;
- Landscape and visual impacts for any above ground structures;
- Minimal disturbance to Old and Valuable Trees (OVTs) and trees of landscape value; and
- Minimum noise and dust nuisance to the public and residents during construction.

TNS Subway Alignment

2.3.4 In identifying the above constraints, the preferred alignment of the subway has been developed to provide:

- a shallow and broad subway;
- a vertical alignment that is as flat as possible, the ideal conditions for pedestrians comfort and convenience;
- Travelators to further enhance passenger convenience.

2.3.5 As the vertical alignment of the subway is controlled by the need to connect into the TST Station and the basement of Tung Ying Building Redevelopment, Miramar Hotel and Miramar Shopping Centre, there is limited flexibility in adjusting the vertical alignment.

2.3.6 The subway connects into the section north end wall at approximately 1m above existing concourse level to provide sufficient cover to the existing MTR running tunnels underneath. To overcome any artificial obstructions, in the form of left-in-place temporary piles and grout injection tubes, a Connection Chamber is located here to be built by cut-and-cover method. The Connection Chamber is a buried underground structure with no permanent impacts at ground or above-ground level.

2.3.7 The north end of the existing TST Station is to be modified to accommodate the passageway to Subway TST (the southern section of the subway between the Satellite Concourse and TST Station).

New Plant Basement Options

2.3.8 The connection between the Subway MSC (the northern section of the subway between Satellite Concourse and the Miramar Shopping Centre) and TST Station requires that the existing station E&M equipment from north-end plant rooms be re-located to provide a clear passageway to the platform. There is no space in the existing station for the relocated E&M equipment. By inspection of the surrounding area, the only vacant space near the station in which to construct a new Plant Basement to contain the displaced equipment from TST Station is in the vicinity of Entrance A1.

2.3.9 In physical terms, the new plant basement is contained within a zone around Entrance A1 with the following structures and features surrounding it:

- Heritage building, known as the Health Education Exhibition and Resource Centre (HEER) located north;
- the old retaining wall at Haiphong Road;
- existing TST Station Entrance A1 Adit and Ventilation Shaft Z located east;
- the western wall of the TST Station and Nathan Road to the west; and
- existing Entrance A2 Adit and Haiphong Road to the south.

2.3.10 The dimensions of the Plant Basement are constrained by the site environs (see above). Options have been considered for both single-level and two-level basements. The single level basement extended beyond the footpath of Haiphong Road was rejected based on unacceptable impacts to the existing structures nearby and the traffic on Haiphong Road. A two-level basement was preferred as the layout was more compact and minimised impacts to the surrounding vehicular traffic and the existing structures including the heritage building nearby.

2.3.11 The plant basement will be ventilated through to the existing exhaust stack in Vent Shaft 'Z', in preference to constructing new ventilation shafts which would cause operational noise, visual and landscape impacts.

Entrance Options

General

2.3.12 In general, the above-ground entrances have the most potential impacts on noise, dust, visual and landscape to the public. The entrance options discussed in the following section have different impacts on the immediate surrounding areas as follows:

Entrances Q1, Q2 and Q3

2.3.13 The three integrated entrances to the east of the satellite concourse (namely, Entrances Q1, Q2 and Q3) will have no permanent environmental impacts at ground and above-ground levels, with the only impacts being the underground connections to the basement levels of the adjoining buildings, namely, Tung Ying

Building Redevelopment and the two existing Miramar Developments, Miramar Hotel and Miramar Shopping Centre.

2.3.14 As far as these buildings and their integrated MTR entrances are concerned, appropriate interior layout will be arranged such that any pedestrians can be fed to/from the respective buildings, and any by-passing passengers can walk effectively through these buildings for:

- comfort of weather proof environment; and
- convenient and direct access to the station's platform avoiding the congested northern section at the station's concourse level.

Entrances Q4 and Q5 on Park Lane Shopper's Boulevard

2.3.15 To comply with statutory requirements for the emergency escape requirements from the subway. It has been established that one emergency exit is required at the Satellite Concourse, the mid-point between the two subways. A second emergency exit is required at the end of Subway MSC. As emergency escapes routes can be upgraded to form entrances, a review of entrance options was undertaken on the western footpath of Nathan Road. These entrances are all located in order to:

- facilitate public accessibility to the station, the Kowloon Park or as a means of crossing Nathan Road; and
- assist in evacuation from the underground subway.

2.3.16 The environmental considerations include the need to:

- minimise noise and dust impacts during construction;
- minimise the visual and landscape impacts during construction and operation;
- minimise the nuisance to pedestrians during construction; and
- avoid the large OVTs, and the assumed extent of their tree roots and tree canopies.

2.3.17 The entrance locations identified on the western footpath of Nathan Road include:

a) An entrance located at the Kowloon Park entrance between the north and south blocks of Park Lane Shopper's Boulevard;

b) An entrance opposite the Miramar Shopping Centre; and

c) An entrance opposite the proposed Satellite Concourse.

No further entrance options were identified, given the constraints found on the footpaths of Nathan Road.

2.3.18 The entrance scheme at Kowloon Park was not considered further due to construction impacts on the existing Kowloon Park stair structure where the electric equipment supporting the Park Lane Boulevard shops could not be temporarily re-provided during construction.

2.3.19 Substantial discussions had been held with Leisure and Cultural Services Department (LCSD) regarding the entrance options proposed on the footpath of Park Lane Boulevard opposite the Miramar Shopping Centre and the proposed Satellite Concourse. Though due considerations have been given in the design

and construction methodology of the entrances, it is concluded that the two entrance options on the footpath of Park Lane Boulevard were inappropriate in view of the potential impacts to the OVTs on the west side of Nathan Road and were not further pursued.

2.3.20 The ventilation shaft originally proposed to be integrated with one of the entrance on the footpath of Park Lane Boulevard will be incorporated with the Tung Ying Redevelopment and Hotel Miramar.

Emergency Exits

2.3.21 As mentioned earlier, two emergency exit points are required for the scheme, and as no entrances would be provided to street, the proposed emergency exits are dedicated escape routes only and not for public access. Two locations identified are at the satellite concourse and at the end of the Subway MSC.

Emergency Exit at the Satellite Concourse

2.3.22 The emergency exit at the Satellite Concourse exits via the Tung Ying Building Redevelopment in a dedicated emergency corridor to street level. The exit location to street is under study by the Tung Ying Building developer.

Emergency Exit at Subway MSC

2.3.23 The emergency exit is situated in the east footpath and planter of Nathan Road. It was placed well away from the OVT in the roadside planter in front of the Miramar Shopping Centre. The footprint of the emergency exit was minimized to fit into the space at present occupied by young *Ficus microcarpa* (non-OVTs). No other feasible locations have been identified due to the sever constraints found in the area. To minimise any sight line problems and visual impacts, the above-ground structure is level with the existing planter and finished with materials to the adjacent planter to provide total integration.

Entrance A1 Upgrade

2.3.24 The existing canopy structure for Entrance A1 is approximately twenty-six years old.

2.3.25 The existing Entrance A1 canopy will be demolished during construction of the Plant Basement. It will be replaced with an iconic transparent glass box, a distinctive station entrance that reinforces the Corporate image in Tsim Sha Tsui District. The new Entrance A1 will improve access to the station with a disabled lift serving the Kowloon Park entrance, street level and the TST concourse level, a staircase and escalators from street level to the existing Entrance A1/A2 adit.

2.3.26 The transparent structure is intended to allow the new structure to blend in with the surrounding environment and minimise any landscape and visual impacts.

2.4 Alternative Options for Entrance and Subway Alignment

2.4.1 Alternative entrance locations and subway alignment are studied under the following constraints placed on this Project:

a) Location of large OVTs and their assumed extend of root system near the project boundary;

b) Requirement of an emergency escape/exit at the subway northern end;

c) Requirement of an emergency escape/exit located at the mid-point between the existing TST station box and the northern end of the subway extension; and

d) With the objective to minimise the walking distance as much as practicable; hence the shortest construction duration and the minimal environmental impacts.

2.4.2 Alternative location for Entrance Q3 (proposed at the footpath of Park Lane Boulevard) has been reviewed. Nevertheless, in view of the potential impacts to the OVTs on the west side of Nathan Road, it is concluded that lesser degree of environmental impact cannot be provided from any alternative due to the location constraint and thus not pursued further.

2.4.3 For the subway alignment, the current alignment provides the shortest and the most direct connection between the existing TST Station & Satellite Concourse and between Satellite Concourse and the Miramar Shopping Centre, such that the environmental impact will be minimised. Other alignment alternatives have been considered but all present additional environmental burdens from noise and dust due to longer or deeper subway alignment hence were not further pursued.

2.5 Considerations of Alternative Construction Methods

2.5.1 The construction of the TNS subway and associated structures is expected to be difficult, given the obvious need to minimise any environmental disturbance and impacts on the OVTs, traffic and pedestrian, residents, existing MTRCL Tsuen Wan Line (TWL) tunnels, TST Station and the nearby building structures. Tunneling by mining method and cut-and-cover method are the available techniques to select from. Based on the study, large proportion of the works under this project are to be constructed using tunneling by mining method, in which environmental impact will be minimised, only small proportion of works, where above ground construction works are inevitable are to be constructed by cut-and-cover method.

2.5.2 In order to minimise the environmental impacts and disturbance to the existing utilities and traffic along Nathan Road, the subway tunnels, which comprise a large proportion of the project, are to be constructed by using tunneling by mining method. The alignment of the tunnels and ground conditions found in the project area are considered suitable for using tunneling by mining method based on the geological information provided by the geotechnical investigation carried out for this Project.

2.5.3 For the small remaining proportion of works of this project, where above ground construction works are inevitable (such as area with limited soil cover and the need for access point for the works), the cut-and-cover method are to be adopted. Nevertheless, cut-and-cover elements of the work have been limited as far as practicable to the Satellite Concourse, Connection Chamber, Plant Basement and the Emergency Exit stair.

2.5.4 Whenever cut-and-cover method is adopted, majority of construction works will be decked to reduce airborne noise, dust, visual and minimise traffic impacts which allow traffic to be diverted back over the excavation on Nathan Road.

2.5.5 Other alternative construction method including open-cut excavation method has been reviewed. Nevertheless, in view of large environmental impact will be created as compare with tunneling by mining method and cut-and-cover method, it is not recommended and thus not further pursued.

2.6 The Preferred Scheme

2.6.1 The site constraints, environmental factors and options available for the selection of the preferred scheme have been discussed in the above sections and are summarised below in **Table 2.1**:

Table 2.1 Summary of the Preferred Scheme

TNS Component	Scheme and Environmental Factors Considered
Subway Tunnels - Subway TST - Subway MSC	• The TNS subway is the most direct and shortest link to the proposed entrances, i.e. minimise the extent of the construction works area and limit the works area to the section of Nathan Road that are mostly surrounded by hotels and commercial buildings provided with central air conditioning systems and do not rely upon openable windows for ventilation. • The subway tunnels which form of a large proportion of the project are to be constructed using tunneling by mining method. The environmental benefits include: - minimal airborne noise and dust impacts on nearby sensitive receivers; - minimal impact on the traffic and pedestrians at street level during construction to reduce the chance noise generated from possible traffic back up. • The subway alignment shifts towards the east side of Nathan Road away from the row of OVTs on west footpath of Nathan Road.
Cut-and-Cover Components – Satellite Concourse, Connection Chamber, Plant Basement and Emergency Exit	• Above ground construction work are inevitable. Nevertheless, they are limited as far as practicable to: - Satellite Concourse; - Plant Basement; - Connection Chamber; and - Emergency Exit Stair. Moreover, cut and cover method is adopted, i.e. majority of construction works would be carried out under road deck. Dust and airborne noise emission during construction, would be screened off by the road deck from the nearby receivers.
Plant Basement and Entrance A1 Upgrade	• The two-level plant basement located near Entrance A1 is compact to minimise environmental impacts during the construction phase. Comparing to the single-level scheme, the works area would be largely reduced, the associated impacts, particularly construction noise and fugitive dust impacts are substantially reduced. • Relocation of the plant basement near Entrance A1 provides an opportunity to upgrade the entrance. The

TNS Component	Scheme and Environmental Factors Considered
	old entrance is over 26 years old. The new entrance with use of transparent glass would reduce bulk effect and be in compatible with the adjacent urban setting. The new facilities for the entrance include a disabled lift serving the station, street level and Kowloon Park. The accessibility/connectivity of Kowloon Park, a recreational/ leisure resource in urban Hong Kong, is effectively enhanced with the Entrance A1 upgrade in place as it significantly improves the pedestrian and disabled access to the park from the station with insubstantial level of visual impact. • Ventilation at the plant basement utilises the existing exhaust shaft that could avoid environmental impacts arising from construction of a new vent shaft.
Emergency Exit	• The emergency exits are a statutory requirement for the TNS scheme. The emergency exits are located at the Satellite Concourse and at the end of Subway MSC. • The emergency exit at the Satellite Concourse is routed via the Tung Ying Building Redevelopment in a dedicated route to street level. • The emergency exit at Subway MSC is situated in the planter along the east footpath at Nathan Road. The above ground structure is level with the existing planter and finished with materials similar to the adjacent planter to provide total integration. Moreover it is well away from the OVT. As such visual and landscape impacts are minimised.

2.6.2 Following review of the scheme options, construction methods and environmental factors, the preferred scheme for the Tsim Sha Tsui Station Northern Subway consist of :

a) A subway (Subway TST) from the north end of TST Station, running approximate 85m under Nathan Road to a Satellite Concourse;

b) A satellite concourse (the Satellite Concourse) approximate 45m underneath Nathan Road, containing ticket gates (reversible type), ticket issuing machines (TIMs), self service points, help-lines, etc. It has direct underground connections to the basements of the Miramar Hotel and of the development on the site of the former Tung Ying Building - these integrated entrances are designated Q2 and Q1 respectively. A mezzanine level in the Satellite Concourse contains electrical and ventilation plantrooms for the subway;

c) A subway (Subway MSC) from the north end of the Satellite Concourse, running approximate 80m under Nathan Road to the Miramar Shopping Centre (MSC), where an underground link connects to its basement. This integrated entrance is designated Q3;

d) An Emergency Exit situated in the east footpath and planter of Nathan Road, outside the Miramar Shopping Centre;

e) The fresh, ventilation and smoke exhaust ducts for TNS are integrated with the Tung Ying Redevelopment and Hotel Miramar;

f) A two-level plant basement (Plant Basement) located below and in front of Entrance A1 to house the displaced E&M equipment from the north end of TST Station; and

g) Entrance A1 upgrade to replace the existing concrete structure with a new transparent box reconstructed on the same site with a improved access to the station with new disabled lift serving TST concourse level, street and Kowloon Park; and escalators serving street and the existing Entrance A1 Adit.

2.7 Implementation and Planning of the Proposed Project

2.7.1 The proposed works are scheduled to commence in June 2009 with duration of approximately 35 months. The entire project is scheduled to be completed in May 2012. The preliminary construction programme for the Project is shown in **Table 2.2**.

Table 2.2 Preliminary Construction Programme

Activity	Time period
Site clearance and set up	Jun 2009 to Jul 2009
Tree Protection	Jun 2009 to Jan 2012
Plant Basement and Entrance A1 construction	Jul 2009 to Dec 2010 and Nov 2010 to Nov 2011
Satellite Concourse and Entrances Q1 and Q2 construction	Nov 2009 to Jan 2012
Subway to TST Station	Mar 2011 to Dec 2011
Subway to Miramar Shopping Centre and Entrance Q3 construction	Feb 2011 to Dec 2011
Emergency Exit at Miramar Shopping Centre	Jul 2009 to Aug 2009, Nov 2011 to Feb 2012
TST Connection Chamber	Jul 2009 to Mar 2010
TST North End modification	Jun 2011 to Mar 2012
Landscaping works	Oct 2011 to Jan 2012
Site reinstatement works	Jan 2012 to May 2012

2.7.2 The construction of the proposed Plant Basement and Satellite Concourse are divided into six stages to adopt temporary pedestrian flow and traffic diversion. The construction sequence of the Plant Basement and Satellite Concourse are shown in **Figures 2.1** and **2.2** respectively.

2.7.3 Based on the tentative construction programme, the Project will be carried out concurrently with the adjacent Tung Ying Building Redevelopment, which is under construction. It is expected that the foundation and infrastructure works of the Tung Ying Building Redevelopment will be completed at the time of the commencement of this Project. Consequently, cumulative environmental impacts from the Tung Ying Building Redevelopment are envisaged to be insignificant.

3. CONSTRUCTION AIR QUALITY IMPACT

3.1 Introduction

3.1.1 This section presents air quality impact assessment during construction phases of the Tsim Sha Tsui Station Northern Subway (TNS) Project. Representative Air Sensitive Receivers (ASRs) and the potential air quality impact on these receivers associated with the Project has been identified and assessed. Appropriate mitigation measures would be proposed if necessary.

3.2 Environmental Legislation, Standards and Guidelines

3.2.1 The criteria for evaluating air quality impacts and the guidelines for air quality assessment are set out in Annex 4 and Annex 12 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

Air Quality Objective & EIAO-TM

3.2.2 The Air Pollution Control Ordinance (APCO) provides the statutory authority for controlling air pollutants from a variety of sources. The Hong Kong Air Quality Objectives (AQOs), which must be satisfied, stipulate the maximum allowable concentrations of certain pollutants over specific periods. The relevant AQOs are listed in **Table 3.1**.

Table 3.1 Hong Kong Air Quality Objectives

Pollutant	Maximum Concentration (µg m^{-3}) (1)			
	Averaging Time			
	1 hour (2)	8 hour (3)	24 hour (3)	Annual (4)
Total Suspended Particulates (TSP)	-	-	260	80
Respirable Suspended Particulates (RSP) (5)	-	-	180	55
Sulphur Dioxide (SO_2)	800	-	350	80
Nitrogen Dioxide (NO_2)	300	-	150	80
Carbon Monoxide (CO)	30,000	10,000	-	-
Photochemical Oxidants (as Ozone, O_3) (6)	240	-	-	-

Notes:
(1) Measured at 298 K and 101.325 kPa.
(2) Not to be exceeded more than three times per year.
(3) Not to be exceeded more than once per year.
(4) Arithmetic mean.
(5) Suspended particulates in air with a nominal aerodynamic diameter of 10 µm or smaller.
(6) Photochemical oxidants are determined by measurement of ozone only.

3.2.3 The EIAO-TM stipulates that the hourly TSP level should not exceed 500 μgm^{-3} (measured at 25℃ and one atmosphere) for construction dust impact assessment. Standard mitigation measures for construction sites are specified in the Air Pollution Control (Construction Dust) Regulations.

Air Pollution Control (Construction Dust) Regulation

3.2.4 Notifiable and regulatory works are under the control of the Air Pollution Control (Construction Dust) Regulation. Notifiable works are site formation, reclamation, demolition, foundation and superstructure construction for buildings and road construction. Regulatory works are building renovation, road opening and resurfacing slope stabilisation, and other activities including stockpiling, dusty material handling, excavation, concrete production etc. This Project is expected to include both notifiable and regulatory works. Contractors and site agents are required to inform the Environmental Protection Department (EPD) on carrying out construction works and to adopt dust reduction measures to reduce dust emission to the acceptable level.

3.3 Description of the Environment

3.3.1 The Project is located in Tsim Sha Tsui district which is an urban area with mixture of commercial and residential developments. The proposed works lie along Nathan Road from Cameron Road junction to Miramar Shopping Centre near Kimberley Road. The proposed new plant basement is located under the existing Entrance A1 of the TST Station.

3.3.2 There is no EPD air quality monitoring station at Tsim Sha Tsui. The background pollutant values adopted for assessment are based on the EPD "Guideline on Assessing the 'TOTAL' Air Quality Impacts". In the categorisation of monitoring air quality data, Tsim Sha Tsui is categorised as urban development. The latest five years (2002-2006) average monitoring data for urban development would be adopted as the background concentrations. These urban monitoring stations considered in this assessment include: Central/Western, Kwun Tong and Sham Shui Po. **Table 3.2** summarizes the annual average TSP concentrations adopted as background concentrations for this air impact assessment.

Table 3.2 Annual Average TSP Concentration in the Latest Five Years (Year 2002 - 2006) for Urban Development

Pollutant	Annual Average Concentration in the Latest Five Years ($\mu g\ m^{-3}$)
TSP	78

3.4 Air Sensitive Receivers

3.4.1 In accordance with the Annex 12 of the EIAO-TM, any domestic premises, hotel, hostel, hospital, clinic, nursery, school, educational institution, office, factory, shop, shopping centre, place of public worship, library, court of law, sports stadium or performing arts centre are considered to be an ASR. Any other place with which, in terms of duration or number of people affected, has a similar sensitivity to the air pollutants as the aforelisted places are also be considered to be a sensitive receiver, for example, playground, sitting area of parks/promenade.

3.4.2 No planned ASRs are located in vicinity of the Project. The identified representative ASRs are listed in **Table 3.3** and the corresponding locations are shown in **Figure 3.1**.

Table 3.3 Details of Representative Air Sensitive Receivers

ASR	Description	*Current Use	Distance from nearest emission sources (m)
A1	Parmanand House	Commercial	40
A2	Hai Phong Mansion	Residential and commercial	20
A3	Health Education Exhibition and Resource Centre	G/IC	35
A4	Health Education Exhibition and Resource Centre	G/IC	5
A5	Kowloon Mosque and Islamic Centre	Religionary	25
A6	Park Lane Shopper's Boulevard	Shop	20
A7	Park Lane Shopper's Boulevard	Shop	30
A8	Park Lane Shopper's Boulevard	Shop	25
A9	Park Lane Shopper's Boulevard	Shop	30
A10	Park Lane Shopper's Boulevard	Shop	55
A11	Cheong Hing Building	Residential and commercial	35
A12	Manson House	Service Apartment	25
A13	Majestic House	Residential and commercial	30
A14	Comfort Building	Residential and commercial	10
A15	Burlington Arcade	Residential and commercial	35
A16	Milton Mansion	Commercial	20
A17	Hotel Miramar	Hotel and Shop	10
A18	Miramar Shopping Centre	Commercial and Shop	5
A19	Antiquities & Monuments Office Antiquities Advisory Board Secretariat	G/IC	60

Note: (*) G/IC: Government, institution or community use. The permitted uses of the premise A16 are both residential and commercial

3.4.3 As the construction activities are to be undertaken at and below ground level, the worst dust impact on the ASRs will be at the ground floor of the ASRs. The height of 1.5m above ground, which is the breathing level of human, was adopted for the construction dust impact assessment. In addition, 5m and 10m above local ground level were also selected to show the vertical variation of the pollutant concentrations.

3.5 Identification of Pollutant Sources

3.5.1 The plant basement and modification works at the existing entrance A1, connection chamber, satellite concourse, two subways and emergency exit are to be constructed at five works areas. The construction period for the TNS Project is tentatively scheduled from June 2009 to early 2012. According to the construction programme, the major dusty construction activities at the five works areas will not be overlapped. However, the construction works at different areas are assumed to be undertaken simultaneously in the assessment as the worst case scenario.

3.5.2 Cut-and-cover method would be adopted for the construction of the plant basement, connection chamber, satellite concourse and emergency exit. Construction would be conducted initially above ground for installation of traffic deck. Once the decking is completed, majority of the construction activities would be underground below the deck. Aboveground construction works including excavation, material handling, loading and unloading of fill materials may pose potential dust impacts to ASRs in the vicinity of the site area of the proposed Project.

3.5.3 For the construction of the subways connecting the new entrances and concourses, tunneling by mining method would be considered. With the works conducted underground, no dust impact is expected.

3.5.4 Based on the tentative construction programme, the proposed Project will be carried out concurrently with the Tung Ying Building Redevelopment adjacent to TNS Project Site, which is under construction. However, it is expected that the foundation and infrastructure works of the Tung Ying Building Redevelopment will be complete at the time of the commencement of this Project i.e. June 2009 Cumulative environmental impacts from the Tung Ying Building Redevelopment are thus envisaged to be insignificant.

3.6 Assessment Methodology

3.6.1 The principal source of air pollution during the construction phase will be dust from the dusty activities as mentioned in Section 3.5.2. The impact of fugitive dust sources on air quality depends upon the quantity as well as the drift potential of the dust particles emitted into the atmosphere. Large dust particles (i.e. over 100 μm in diameter) will settle out near the source and particles that are between 30 and 100 μm in diameter are likely to undergo impeded settling. The main dust impacts are likely to arise from particles less than 30 μm in diameter, which have a greater potential to disperse over greater distances.

3.6.2 According to the USEPA AP-42, construction dust particles may be grouped into nine particle size classes. Their size ranges are 0 - 1 μm, 1 - 2 μm, 2 - 2.5 μm, 2.5 - 3 μm, 3 - 4 μm, 4 - 5 μm, 5 - 6 μm, 6 - 10 μm and 10 - 30 μm, and the percentage of particles in each class was estimated to be 4%, 7%, 4%, 3%, 7%, 5%, 4%, 17% and 49%, respectively.

3.6.3 The emission rates adopted in the TNS project assessment for different construction activities are based on the USEPA Compilation of Air Pollutant Emission Factors (AP-42), 5th edition. The four major construction sources including:

- Plant Basement;
- TST Connection Chamber;
- Satellite Concourse; and
- Emergency Stair at MSC.

3.6.4 **Table 3.4** gives the relevant clauses for emission factors used in this assessment in AP-42. Detailed calculation of emission rate is presented in **Appendix 3.1**.

Table 3.4 Emission Factors for Construction Activities

Emission Sources	Construction Activities	Emission Rate [2,3]($g/m^2/s$)	Remark [1]
Plant Basement	Heavy Construction Activities	E = 7.394E-05	- 47.5% work area - 50% reduction by water suppression (watering twice a day) - USEPA AP-42 5th ED., S.13.2.3.3
TST Connection Chamber	Heavy Construction Activities	E = 2.179E-05	- 14.0% work area - 50% reduction by water suppression (watering twice a day) - USEPA AP-42 5th ED., S.13.2.3.3
Satellite Concourse	Heavy Construction Activities	E = 4.76354E-05	- 30.6% work area - 50% reduction by water suppression (watering twice a day) - USEPA AP-42 5th ED., S.13.2.3.3
Emergency Stair at MSC	Heavy Construction Activities	E = 6.6005E-05	- 42.4% work area - 50% reduction by water suppression (watering twice a day) - USEPA AP-42 5th ED., S.13.2.3.3
All Emission Sources	Wind Erosion	E = 2.6953E-06	- USEPA AP-42 5th ED., S.11.9, Table 11.9.4

Note:

- [1] The percentage area under active operation has reconfirmed with Engineer. The percentage active area is estimated based on the actual construction programme and the availability of plant equipment
- [2] Only unit conversion has been conducted in the emission factors in accordance with AP-42.
- [3] Assume 30 working days per month and 8 working hours per day.

3.6.5 The Air Pollution Control (Construction Dust) Regulation specifies that dust suppression measures such as watering shall be applied for the construction site. Dust emission from the site will be reduced by 50% if watering with complete coverage of active construction area twice a day. This assumption was considered in the construction dust impact assessment.

3.6.6 Fugitive Dust Model (FDM) (1993 version) was used to assess potential dust impact from the construction works. The worst case meteorological data was used to predict the 1-hour and 24-hour average TSP concentrations at representative discrete ASRs close to the construction works. As mentioned in Section 3.4.3, assessment level at 1.5m, 5m and 10m are included in the assessment.

3.6.7 The meteorological data used in the model are:

- Wind speed: 1 m/s
- Wind direction: 360 wind direction
- Stability class: D (daytime) & F (night time)
- Surface roughness: 1m
- Mixing height: 500 m

3.7 TSP Daily Concentration

3.7.1 Daily TSP concentrations were calculated as follows:

Daily TSP concentration = (working hour)/24 × (1-hour average maximum TSP concentration during working hours) + (non-working hour)/24 × (1-hour average maximum TSP concentration during non-working hours) + Background.

3.7.2 As mentioned in Section 3.3.2, the background TSP of 78 $\mu g/m^3$ was adopted as an indication of the future TSP background concentration.

3.8 Evaluation of Impacts

3.8.1 The predicted maximum 1-hour and 24-hour average TSP during construction are shown in **Tables 3.5** and **3.6,** respectively.

Table 3.5 Predicted Maximum 1-hour Average TSP Concentrations

ASR	1.5m above ground	5m above ground	10m above ground
A1	186	147	95
A2	350	161	90
A3	203	152	93
A4	484	118	89
A5	247	160	93
A6	145	129	99
A7	182	137	94
A8	202	125	89
A9	108	105	96
A10	99	97	92
A11	206	153	93
A12	268	160	89
A13	224	156	91

ASR	1.5m above ground	5m above ground	10m above ground
A14	149	131	98
A15	163	136	97
A16	260	154	94
A17	365	158	94
A18	168	112	100
A19	103	100	93

Notes: (1) Background concentration is included.
(2) 1-hour TSP criterion of 500μg/m^3 is stipulated in the EIAO-TM.

Table 3.6 Predicted Maximum 24-hour Average TSP Concentrations

ASR	1.5m above ground	5m above ground	10m above ground
A1	120	102	84
A2	179	107	82
A3	126	104	83
A4	223	92	82
A5	142	107	83
A6	105	97	85
A7	120	99	84
A8	126	94	82
A9	91	89	84
A10	87	86	83
A11	127	104	83
A12	150	107	82
A13	134	106	83
A14	106	98	85
A15	115	99	84
A16	153	105	84
A17	191	106	84
A18	112	92	86
A19	89	87	84

Notes: (1) Background concentration is included.
(2) 24-hour TSP criterion of 260μg/m^3 is stipulated in the EIAO-TM.

3.8.2 Based on the above prediction, no exceedance of 1-hour and 24-hour average TSP objective will occur at any representative ASR in the Study Area. From the results, it is found that the maximum 1-hour and 24-hour average TSP concentrations will occur at 1.5m above ground (484μg/m^3 and 223μg/m^3, respectively). Contours of the maximum predicted 1-hour and 24-hour average TSP concentrations at 1.5m above ground are shown in **Figures 3.2** and **3.3** respectively.

3.9 Cumulative Impacts

3.9.1 As mentioned in Section 3.5.4, it is expected that the foundation and infrastructure works of the Tung Ying Building Redevelopment would be completed at the time of the commencement of this Project. Another new commercial development (iSquare) is found at 63 Nathan Road (ex-Hyatt Regency Hong Kong Hotel at the junction of Peking Road and Nathan Road) which is about 95m to the south of the new plant basement works area of the Project. The commercial development is scheduled to open in 2009 and all infrastructure construction works are expected to be completed by July 2009 when this Project start. Thus, cumulative environmental impacts would not be expected.

3.10 Mitigation of Adverse Environmental Impacts

3.10.1 To ensure compliance with the relevant standards, dust mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices shall be incorporated in the contract document to control potential dust emission from the site. The major dust suppression measures include:

- watering of active construction works area twice a day.
- skip hoist for material transport shall be totally enclosed by impervious sheeting.
- every vehicle shall be washed to remove any dusty materials from its body and wheels before leaving a construction site.
- the area where vehicle washing takes place and the section of the road between the washing facilities and the exit point shall be paved with concrete, bituminous materials or hardcores.
- where a site boundary adjoins a road, streets or other accessible to the public, hoarding of not less than 2.4m high from ground level shall be provided along the entire length except for a site entrance or exit.
- every stack of more than 20 bags of cement shall be covered entirely by impervious sheeting places in an area sheltered on the top and the 3 sides.
- all dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.
- the height from which excavated materials are dropped shall be controlled to a minimum practical height to limit fugitive dust generation from unloading.
- stockpile of excavated or dusty materials shall be covered entirely by clean impervious sheeting.
- the load of dusty materials carried by vehicle leaving a construction site shall be covered entirely by clean impervious sheeting to ensure dust materials do not leak from the vehicle.
- instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.

3.11 Evaluation of Residual Impacts

3.11.1 With the implementation of dust suppression measures stipulated in Air Pollution control (Construction Dust) Regulation and watering of active construction works area twice a day during construction, no exceedance of AQO within the Study Area is predicted. Therefore, no adverse residual dust impact is expected.

3.12 Environmental Monitoring and Audit

3.12.1 With the implementation of the proposed dust suppression measures, good site practices and dust monitoring and audit programme, acceptable dust impact are expected at the ASRs. Details of the monitoring requirements such as monitoring locations, frequency of baseline and impact monitoring are presented in the stand-alone EM&A Manual.

4. NOISE IMPACT

4.1 Introduction

4.1.1 This section presents the potential noise impacts arising from the proposed Project during construction and operation phases. It is expected that construction and operation noise impact will arise from the proposed Project. Potential construction and operation noise impacts are evaluated in this study.

4.2 Environmental Legislation, Policies, Plans, Standards and Criteria

General

4.2.1 Noise impacts generated by the construction of this Project have been assessed in accordance with the criteria and methodology given in the Technical Memoranda (TMs) under the Noise Control Ordinance (NCO), and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

4.2.2 The NCO and EIAO provide the statutory framework for noise control. Applicable assessment procedures and standards are set out in three TMs listed below:

- EIAO-TM
- TM on Noise from Construction Work other than Percussive Piling (GW-TM)
- TM on Noise from Construction Work in Designated Areas (DA-TM)
- TM on Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM)

4.3 Construction Noise – General Construction Works

4.3.1 The NCO provides the statutory framework for noise control of construction work, other than percussive piling, using powered mechanical equipment (PME) between the hours of 1900 and 0700 hours or at any time on Sundays and general holiday (that is, restricted hours). Noise control on construction activities taking place at other times is subject to the Criteria for Evaluating Noise Impact stated in Table 1B of Annex 5 in the EIAO-TM. The noise limit is $L_{eq\ (30\ minutes)}$ 75 dB(A) at the façades of dwellings and 70 dB(A) at the façade of schools (65 dB(A) during examinations). The EIAO-TM construction noise criteria are summarised in **Table 4.1**.

4.3.2

Table 4.1 Daytime Construction Noise Criteria

Uses	Noise Level in Leq(30-minutes), dB(A)
Domestic premises	75
Educational Institution	70
Educational Institution (during examination)	65

Note: The above standards apply to uses which rely on opened windows for ventilation

4.3.3 Between 1900 and 0700 hours and all day on Sundays and public holidays, activities involving the use of PME for the purpose of carrying out construction work is prohibited unless a construction noise permit (CNP) has been obtained. A CNP may be granted provided that the Acceptable Noise Level (ANL) for the noise sensitive receivers can be complied with. ANLs are assigned depending upon the area sensitive rating (ASR). The corresponding ANLs for evening and night time periods are given in **Table 4.2**.

Table 4.2 Acceptable Noise Levels

Time Period	Acceptable Noise Level in Leq(5-minutes), dB(A)		
	ASR A	ASR B	ASR C
Evening (1900 to 2300 hours) (1)	60	65	70
Night (2300 to 0700 hours)	45	50	55

Note: (1) Includes Sundays and Public Holidays during daytime and evening

4.3.4 Despite any description or assessment made in this EIA Report on construction noise aspects, there is no guarantee that a Construction Noise Permit (CNP) will be issued for the project construction. The Noise Control Authority will consider a well-justified CNP application, once filed, for construction works within restricted hours as guided by the relevant Technical Memoranda issued under the Noise Control Ordinance. The Noise Control Authority will take into account of contemporary conditions / situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. Nothing in this EIA Report shall bind the Noise Control Authority in making his decision. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution action under the NCO.

4.3.5 Under the DA-TM, the use of five types of Specified Powered Mechanical Equipment (SPME) and three types of Prescribed Construction Work (PCW) within a designated area during restricted hours would require a valid CNP. The SPME includes hand-held breaker, bulldozer, concrete lorry mixer, dump truck and hand-held vibratory poker. The PCW are:

- erecting or dismantling of formwork or scaffolding
- loading, unloading or handling of rubble, wooden boards, steel bars, wood or scaffolding material
- hammering

4.3.6 As defined in the Noise Control Designated Area Plan, all the works areas of the proposed Project are within the Designated Area.

4.3.7 In general, it should not be presumed that a CNP will be granted for carrying out PCW within a designated area during the restricted hours. The CNP may be granted for the execution of construction works during restricted hours involving the use of PME and/or SPME if the relevant Acceptable Noise Levels and criteria stipulated in the GW-TM and DA-TM can be met.

4.3.8 According to the construction programme, most of the proposed construction works will be carried out during non-restricted hours, except for underground tunneling work and some construction activities in order to avoid local traffic impact. In case of any construction activities during restricted hours, it is the Contractor's responsibility to ensure compliance with the NCO and the relevant

TMs. The Contractor will be required to submit CNP application to the Noise Control Authority and abide by any conditions stated in the CNP, should one be issued.

4.4 Fixed Noise in Operation Phase

4.4.1 The major fixed plant noise sources identified are ventilation shafts of the proposed Project which would generate potential noise impact during operation. Fixed noise source such as ventilation noise is controlled by the NCO and IND-TM. The appropriate Acceptable Noise Levels (ANL) generated by fixed plant at neighbouring NSRs are provided in the IND-TM. The representative NSRs in the vicinity of ventilation shafts are located in urban area and are fronting the busy Nathan Road with an annual average daily traffic flow in excess of 30,000 in that road section according to Annual Traffic Census 2006 published by Transport Department. Most of the NSRs will be directly affected by traffic noise. In this connection, the Area Sensitivity Rating (ASR) for these NSRs has been assumed as 'C'. The ANLs for an ASR of 'C' under the IND-TM are shown in Table 4.3. The EIAO-TM recommends that noise standard for fixed noise source are (a) 5 dB(A) below the appropriate ANL, or (b) the prevailing background noise levels (For quiet areas with level 5 dB(A) below the ANL). The existing background noise level dominated by busy traffic along Nathan Road and community noise is expected to be higher than ANL – 5dB(A), therefore, the noise criteria of ANL – 5dB(A) i.e. 65/55 dB(A) (daytime and night-time) have been adopted for the assessment.

Table 4.3 Acceptable Noise Level for Fixed Plant Noise

Time Period	NCO criteria L_{eq} (30-min), dB(A)	EIAO-TM L_{eq} (30-min), dB(A)
	ASR 'C'	ASR 'C'
Daytime and Evening (0700-2300 hours)	70	65
Night-time (2300-0700 hours)	60	55

4.4.2 In any event, the Area Sensitivity Rating assumed in this EIA Report is for indicative assessment. It should be noted that the fixed noise sources are controlled under section 13 of the NCO. At the time of investigation, the Noise Control Authority shall determine noise impact from concerned fixed noise sources on the basis of prevailing legislation and practices being in force, and taking account of contemporary conditions/situations of adjoining land uses. Nothing in this EIA Report shall bind the Noise Control Authority in the context of law enforcement against all the fixed noise sources being assessed.

4.5 Noise Sensitive Receivers

4.5.1 In order to evaluate the construction and operation noise impacts from the proposed Project, representative existing noise sensitive receivers (NSRs) within the Study Area are identified for assessment. Only the first layer of NSRs has been identified for assessment because it provides acoustic shielding to those receivers at further distance behind. As the centrally air-conditioned buildings do not rely on opened windows for ventilation, the noise standard as stipulated in Tables 1A and 1B of Annex 5 of EIAO-TM would not be applicable, and hence these buildings have not been identified for noise impact assessment. **Table 4.4** shows the representative NSRs for this noise impact assessment.

Table 4.4 Summary of Representative Noise Sensitive Receivers

NSR ID	Location	Permitted Land Use	Number of floors	Horizontal Separation from Closest Works Area Boundary (m)
N1	Hai Phong Mansion (53-55 Haiphong Road)	Residential and commercial	15 domestic floors above 3 commercial use floors	17
N2	Majestic House (80 Nathan Road)	Residential and commercial	13 domestic floors above 3 commercial use floors	30
N3	Comfort Building (86-88 Nathan Road)	Residential and commercial	11 domestic floors above 3 commercial use floors	9
N4	Burlington Arcade (90-94C Nathan Road)	Residential and commercial	14 domestic floors above 2 commercial use floors	29
*N5	Milton Mansion (96 Nathan Road)	Residential and commercial	12 floors	19
N6	Pacific Mansion (172-174 Nathan Road)	Residential and commercial	10 domestic floors above 4 commercial use floors	165
N7	Kowloon Mosque and Islamic Centre (105 Nathan Road)	Religionary	3	24 (East façade N7a), 7 (South façade N7b)

Remark: (*) Refer to Section 4.5.2 for the nature of this NSR

4.5.2 According to the occupation permit of Milton Mansion (N5) issued by Building Department, the allowed uses are both commercial and residential. Although it is identified as commercial use during the site survey, it is selected as a representative sensitive receiver in the assessment to study the impact level at this NSR should residential use be happened during the construction period of the Project.

4.5.3 Two construction sites within the study area are found along Nathan Road i.e. 63 Nathan Road (iSquare) and 98 Nathan Road (Tung Ying Building Redevelopment). Both are commercial use. The construction of the Urban Redevelopment Authority (URA) development at Mody Road (hotel and service apartment use) is almost complete. According to the latest Outline Zoning Plan, most of the land uses within the study area are commercial use with a few G/IC, Open Space, Other Specified Uses and a few residential uses along Austin Road. No planned/committed noise sensitive receiver is identified within the study area during a site visit conducted on 9-Oct-2007.

4.5.4 In the absence of the programme of planned/committed noise sensitive developments, construction and fixed noise impact assessment will only focus on existing NSRs. The representative NSRs selected for assessments of construction noise and fixed noise have been shown in **Figure 4.1**. The photographs of the representative NSRs are shown in **Appendix 4.1**. Prior agreement with Environmental Protection Department has been sought on the selected representative assessment points for quantitative noise assessment.

4.6 Assessment Methodology

Construction Noise

4.6.1 The Project is scheduled to commence in June 2009 and to be completed in 2012. According to the construction programme, there are seven major construction tasks. Some individual tasks have different stages. **Table 4.5** summarises the different tasks and the construction periods. Most of the construction tasks are planned to be carried out during unrestricted hours. In case of any construction activities during restricted hours, it is the Contractor's responsibility to ensure compliance with the NCO and the relevant TMs. The Contractor will be required to submit CNP application to the Noise Control Authority and abide by any conditions stated in the CNP, should one be issued.

Table 4.5 Construction Tasks Involved

Tasks	Description	*Construction Period
1	Plant Building	July 2009 to December 2010
2	Entrance A1	November 2010 to November 2011
3	TST Connection Chamber	July 2009 to March 2010
4	Satellite Concourse	November 2009 to January 2012
5	Subway to TST Station	March 2011 to December 2011
6	Subway to Miramar Shopping Centre	February 2011 to December 2011
7	Emergency Stair at Miramar Shopping Centre	July to August 2009 and November 2011 to February 2012

Note: (*) Construction period involving use of powered mechanical equipment only.

4.6.2 The construction noise assessment has been carried out on a weekly basis from the commencement of the Project. The construction tasks of the Project taking place concurrently within 300m of a given NSR are considered to contribute to the cumulative impact at that NSR. Noise sources from the areas greater than this distance have been excluded from the assessment.

4.6.3 In accordance with the EIAO, the methodology outlined in the GW-TM has been used for the assessment of construction noise (excluding percussive piling) and reference has been to the EIAO Guidance Note No.9/2004 on preparing the assessment. Sound Power Levels (SWLs) of the equipment were taken from Table 3 of this TM. Where no SWL was supplied in the GW-TM, reference was made to BS 5228, previous similar studies or from measurements taken at other sites in Hong Kong.

4.6.4 Schedule of powered mechanical equipment (PME) for the different construction tasks during normal daytime working hours is presented in **Appendix 4.2**. The proposed plant inventory and utilization rate adopted in the assessment are

considered practical and adequate in achieving the construction programme. The plant inventory has been provided as an option and the contractor may propose alternative plant schedule should it be considered necessary and appropriate.

4.6.5 The assessment is based on the cumulative SWL of PME likely to be used for each location, taking into account the construction period in the vicinity of the receiver location. To predict the noise level, PME was divided into groups required for each discrete construction task. The objective was to identify the worst case scenario representing those items of PME that would be in use concurrently at any given time. The sound pressure level of each construction task was calculated, depending on the number of plant and distance from receivers. The noise levels at NSRs were then predicted by adding up the SWLs of all concurrent construction tasks.

4.6.6 Much of the excavation areas will be decked and this will shield the noise from construction plant operating below the deck. For example, the rock drill used for excavation has noise emission but would be totally enclosed as it will be operated underground below the deck. Considerations will also be given to the location and the orientation of the temporary fixed noise sources required for the ventilation of the works area underneath the decked area. If exhaust above ground is required, it shall be located away from the existing residential building and facing towards the Kowloon Park (transient use). If required, silencer will be provided. It is anticipated that a metal sheet cover with surface density of 10kg/m^2 or more covering the excavation areas would result in at least 20 dB(A) noise reduction. Therefore, a noise reduction of 20 dB(A) was applied for the activities carried out underground. Schematic diagrams showing the typical site arrangement of underground works are shown in **Figures 4.2** and **4.3**.

4.6.7 A positive 3 dB(A) façade correction was added to the predicted noise levels in order to account for the facade effect at each NSR.

Fixed Noise in Operation Phase

4.6.8 In the proposed Project two ventilation shafts, one for exhaust extraction and one for smoke extraction, would be integrated with the Tung Ying Building Redevelopment and Hotel Miramar.

4.6.9 Potential noise impacts arising from the operation of ventilation fans is expected at the sensitive receivers, and this fixed plant noise impact has been assessed in accordance with the IND-TM.

4.6.10 **Table 4.6** summarises the ventilation shafts would be constructed for the proposed Project.

Table 4.6 Ventilation Shafts for the proposed Project

Location	Use
Tung Ying Building	*Exhaust/ Smoke extraction
Hotel Miramar	*Exhaust/ Smoke extraction

Note: (*) The use is either for exhaust or smoke extraction which is still not finalised in the design.

4.6.11 The ventilation fans for the smoke extraction and exhaust are all located underground inside the mezzanine level of the satellite concourse.

4.6.12 The ventilation fans of the smoke extraction shaft are operated for emergency only, however routine test of those ventilation fans would be carried out during day time. The potential impact from the concurrent operation of this shaft during day time period is assessed in the study.

4.6.13 The assessment assumes that all duty ventilation fans are operated for each ventilation shaft. Screening corrections from other buildings / structures and directivity have also been excluded in the assessment. All ventilation fans provided for each ventilation shaft will be installed with silencers.

4.6.14 In the absence of any detailed information and noise specification of the proposed fixed plant, the maximum permissible noise emission levels were determined for future detailed design of the fixed plant.

4.6.15 For the assessment of noise from the fixed plant, the maximum permissible sound power levels (Max SWLs) of the identified fixed noise sources were determined by adopting standard acoustics principles. The following formula was used for calculating the Max SWLs of the fixed plant.

SPL = Max SWL – DC + FC

where

- Sound Pressure Level, SPL in dB(A)
- Maximum Permissible Sound Power Level, Max SWL in dB(A)
- Distance Attenuation, DC in dB(A) = 20 log D + 8 [where D is the distance in metres]
- Façade Correction, FC in dB(A) = 3 dB(A)

4.6.16 A positive 3 dB(A) was added to predicted noise levels at the NSRs due to the façade effect.

4.6.17 No corrections have been applied for tonality, intermittency or impulsiveness. If the noise exhibits any of these characteristics during the operation of the plant, the noise limit should be reduced in accordance with the recommendation given in Section 3.3 of IND-TM.

4.7 Identification of Environmental Impacts

Construction Phase

4.7.1 The scope of this Project includes modification to the existing Entrance A1 and construction of the plant basement below; construction of a satellite concourse with integrated entrances to Tung Ying Building and Hotel Miramar; construction of subways connecting TST station and Miramar Shopping Centre with an integrated entrance and an emergency exit at Miramar Shopping Centre. Potential construction impacts of the Project may arise from the following activities:

- Demolition of existing structure of Entrance A1 and construction of the plant basement below
- Excavation at Entrance A1
- Excavation at the existing Nathan Road southbound carriageway and footpath for satellite concourse, connection chamber and emergency exit
- Construction of two subways by mined excavation
- Road and pavement reinstatement and earthworks

4.7.2 Driven piling and blast method would not be adopted for the construction works. The subway would be built using tunneling by mining method and no tunnel boring machine would be used.

4.7.3 The Tung Ying Building Redevelopment located nearby the proposed works area of this Project would be carried out concurrently. It is expected that the foundation and infrastructure works of the Tung Ying Building Redevelopment will be completed at the time of the commencement of this Project in June 2009. Consequently, cumulative environmental impacts contributed from the Tung Ying Building Redevelopment are envisaged to be insignificant.

4.7.4 Another new commercial development (iSquare) is found at 63 Nathan Road (ex-Hyatt Regency Hong Kong Hotel at the junction of Peking Road and Nathan Road) which is about 95m to the south of the new plant basement works area of the Project. The commercial development is scheduled to open in 2009 and all infrastructure construction works are expected to be completed by July 2009 when this Project start. Hence cumulative environmental impacts generated from this commercial development are not anticipated.

Operation Phase

4.7.5 Ventilation noise affecting sensitive receivers in the study area may arise from the proposed ventilation shafts under the Project.

4.8 Prediction and Evaluation of Environmental Impacts

Construction Phase

4.8.1 For normal daytime working hours, exceedences of the construction noise criteria i.e. $L_{eq\ (30\ minutes)}$ 75 dB(A) for residential uses are predicted at representative NSRs in the absence of mitigation measures.

4.8.2 Details of construction noise calculations and results are presented in **Appendix 4.3**. A summary of the unmitigated construction noise levels of the representative NSRs during normal daytime working hours within the construction period of the Project is listed in **Table 4.7**.

Table 4.7 Summary of Unmitigated Construction Noise Levels at Representative NSRs During Normal Daytime Working Hours

NSR ID	Predicted Noise Levels, dB(A)	Daytime Construction Noise Criteria, dB(A)
N1	56 – 87	75
N2	57 – 81	75
N3	60 - 89	75
N4	62 – 83	75
*N5	62 – 85	*75
N6	46 – 66	75
N7a	55 – 83	75
N7b	46 – 85	75

Note: (*) Noise criteria would be applied only if residential use exist in NSR N5 during the period of construction.

4.8.3 Results show that the predicted noise levels related to the concurrent construction works of the Project at NSRs N1 to N7 are in the range of 46 to 89 dB(A) and will exceed the EIAO-TM noise criteria by up to 14 dB(A). Mitigation measures are considered necessary in order to abate the construction noise impacts at all works areas.

Cumulative Impacts

4.8.4 As described in Sections 4.7.3 and 4.7.4, it is expected that the foundation and infrastructure works of the Tung Ying Building Redevelopment and all infrastructure construction works of the construction site of another commercial development at 63 Nathan Road are expected to be completed at the time of the commencement of this Project. Thus, cumulative environmental impacts are not expected.

Operation Phase

4.8.5 The ventilation shafts are proposed to be installed at the redeveloped Tung Ying Building and Hotel Miramar. As the exact locations of the openings of the two ventilation shafts are still under design, the worst locations (closest to the identified NSRs) at the facades of the two buildings are assumed for the assessment. The assumed worst locations for the shaft openings are shown in **Figure 4.4**. The potentially worst affected NSR is N5 which is the closest identified NSR. Hence N5 was selected for the assessment and the corresponding Max SWLs of the ventilation shafts were determined in accordance with the EIAO-TM criteria by the methodology stated in Section 4.6.14. **Table 4.8** presents a summary of the required Max SWLs for ventilation shafts proposed in the Project. MTRCL would take the responsibility of the design and maintenance of the proposed ventilation system and implement the noise mitigation measures to ensure the noise criteria could be met.

Table 4.8 Summary of Max SWL for Each Ventilation Shaft

*Source Location	**Direction of Shaft Opening	Shortest horizontal distance to N5, m	Maximum SWL at 0700-2300, dB(A)	Maximum SWL at 2300-0700, dB(A)
Tung Ying Building	West (Nathan Road)	17	95	85
	South (Granville Road)	15	94	84
Hotel Miramar	West (Nathan Road)	44	103	93

Note: (*) Only one of the sources would be in operation as the exact locations for exhaust or smoke extraction are still under design.

(**) The vent shaft would be located at one direction only. The exact location of the shaft opening from Tung Ying Building is still under design.

Cumulative Impacts

4.8.6 As described in Sections 4.6.12, routine test of those ventilation fans of the smoke extraction shaft would be carried out during day time. Potential cumulative noise impact from the concurrent operation of both the exhaust and smoke extraction shafts during day time period is anticipated.

4.8.7 In order to have the overall noise impact from the two shafts still meeting the daytime noise criteria, the sound energy from the two shafts should be halfed i.e. the original SWL – 3dB(A). The maximum SWL for the two shafts taking into account the cumulative effect is summarised in **Table 4.9**.

Table 4.9 Summary of Max SWL for Each Ventilation Shaft with Consideration of Cumulative Effect

*Source Location	**Direction of Shaft Opening	Shortest horizontal distance to N5, m	Maximum SWL at 0700-2300, dB(A)	Maximum SWL at 2300-0700, dB(A)
Tung Ying Building	West (Nathan Road)	17	92	85
	South (Granville Road)	15	91	84
Hotel Miramar	West (Nathan Road)	44	100	93

Note: (*) Assuming routine test of the smoke extraction would be carried out in 0700 to 2300 hours only.

4.8.8 As the maximum permissible sound power levels at the ventilation shafts are derived based on the shortest horizontal distance from the nearest assessment point, adverse operation noise impact at all floors of all identified NSRs are not expected provided the fixed plants are designed to meet the Max SWLs.

4.8.9 Operation noise mitigation measures such as silencer and acoustic louver will be implemented wherever applicable to ensure that the above-specified Max SWLs could be achieved.

4.9 Mitigation of Adverse Environmental Impacts

Construction Noise

4.9.1 In order to reduce the excessive noise impacts at the affected NSRs during normal daytime working hours, mitigation measures such as adopting quiet powered mechanical equipment, movable noise barriers and temporary noise barriers are recommended. It is practical to specify the total SWL of all plant to be used on site. The Contractors do not have to use specific items of quiet plant adopted in this assessment, but to use other type of quiet plant, which have the same total SWL, to meet their needs.

Adoption of Quieter PME

4.9.2 In order to reduce the excessive noise impacts at the affected NSRs during normal daytime working hours, quieter PME are recommended. The quieter PME adopted in the assessment were taken from the BS5228: Part 1:1997 and are presented in **Table 4.10**. It should be noted that the silenced PME selected for assessment can be found in Hong Kong.

Table 4.10 Quieter PME Recommended for Adoption during Construction Phase

PME	Power rating/size, weight	Reference	SWL
Hydraulic Breaker, Excavator mounted	52kW	BS C8-12	106
Concrete Lorry Mixer	22kW, 6m^3	BS C6-23	100
Mobile Crane	62kW	BS C7-114	101
Vibratory Poker, Hand-held	2kW each poker	BS C6-20	102

Note: Quieter PME are not applicable for works below decking.

4.9.3 Whilst quieter PME are listed, the Contractor may be able to obtain particular models of plant that are quieter than the PMEs given in GW-TM.

Use of Movable Noise Barrier

4.9.4 The use of movable barrier for certain PME can further alleviate the construction noise impacts. In general, 5 dB(A) reduction for movable PME and 10 dB(A) for stationary PME can be achieved depending on the actual design of movable noise barrier. The Contractor shall be responsible for design of the movable noise barrier with due consideration given to the size of the PME and the requirement of intercepting the line of sight between the NSRs and PME. Barrier material of surface mass in excess of 7 kg/m^2 is recommended to achieve the predicted screening effect.

Use of Noise Enclosure/Acoustic Shed

4.9.5 The use of noise enclosure or Acoustic Shed is to cover stationary PME such as air compressor and concrete pump. With the adoption of the noise enclosure, the PME could be completely screened, and noise reduction of 15 dB(A) can be achieved according to the GW-TM.

Use of Silencer

4.9.6 To reduce noise emission from the ventilation fans, silencers are also recommended to be used in fan ventilation system to attenuate noise generated during fan operation to achieve a noise reduction of 15dB(A). The Contractor shall be responsible for selection of appropriate silencers for the ventilation fans.

Use of Noise Insulating Fabric

4.9.7 Noise insulating fabric (the Fabric) can also be adopted for certain PME (e.g. drill rig, pilling auger etc). The Fabric should be lapped such that no opening or gaps on the joints. Technical data from manufacturer states that by using the Fabric, a noise reduction of over 10 dB(A) can be achieved on noise level (Reference was made from *Modifications to MTRC Tsim Sha Tsui Station Variation of Environmental Permit EP-113/2001/C*). As an conservative approach, a noise reduction of 10 dB(A) for the PME lapped with the Fabric was assumed.

4.9.8 A summary of the assumed noise reduction effects achieved by the movable noise barrier, noise enclosure, silencer and fabric for certain item of PME is presented in **Table 4.11**.

Table 4.11 Noise Mitigation Measures for Certain PME during Construction Phase

PME	Mitigation Measures Proposed	Noise Reduction, dB(A)
Air Compressor	Noise enclosure	15
Compactor, vibratory	Movable noise barrier	5
Concrete pump	Noise enclosure	15
Cutter, Circular, Steel	Movable noise barrier	5
Drill rig, rotary type (diesel)	Noise insulating fabric	10
Electric Winch	Movable noise barrier	10
Grout Mixer	Movable noise barrier	10
Grout Pump	Movable noise barrier	10
Handheld Breaker	Movable noise barrier	10
Hoist, passenger / material (electric)	Movable noise barrier	10
Pilling, earth auger	Noise insulating fabric	10
Poker, vibratory, hand-held	Movable noise barrier	10
Saw, concrete	Movable noise barrier	5
Soil pump	Movable noise barrier	10
Ventilation fan	Silencer	15
Ventilation blower	Silencer	15
Water pump	Movable noise barrier	10
Welder/Generator, portable	Movable noise barrier	10

Note: No mitigation measures are applied for works below decking.

Mitigated Construction Noise Impacts

4.9.9 With the implementation of all above-mentioned mitigation measures, the total SWLs of each activity were predicted, and are presented in **Appendix 4.5**. The predicted noise levels at most of the representative NSRs would comply with the EIAO-TM noise criteria. **Table 4.12** presents the mitigated noise levels during normal daytime working hours at NSRs.

Table 4.12 Mitigated Construction Noise Levels

NSR	Predicted Noise Levels, dB(A)	Daytime Construction Noise Criteria, dB(A)
N1	42 – 79	75
N2	44 – 75	75
N3	45 – 77	75
N4	47 – 76	75
*N5	48 – 78	*75
N6	43 – 61	75
N7a	45 – 75	75
N7b	46 – 77	75

Note: (*) Noise criteria would be applied only if residential use exist in NSR N5 during the period of construction.

Ventilation Noise

4.9.10 With the fixed plant properly designed to meet the maximum SWL listed in **Table 4.8**, there would not be any residual impacts predicted. However, it is still recommended that the following noise reduction measures shall be considered as far as practicable during construction:

- Choose quieter plant such as those which have been effectively silenced.
- Include noise levels specification when ordering new plant (including chillier and E/M equipment).
- Locate fixed plant/louver away from any NSRs as far as practicable.
- Locate fixed plant in walled plant rooms or in specially designed enclosures.
- Locate noisy machines in a basement or a completely separate building.
- Install direct noise mitigation measures including silencers, acoustic louvers and acoustic enclosure where necessary.
- Develop and implement a regularly scheduled plant maintenance programme so that equipment is properly operated and serviced in order to maintain controlled level of noise. The programme should be implemented by properly trained personnel.

4.10 Evaluation of Residual Impacts

Construction Phase

4.10.1 With the implementation of the above-mentioned mitigation measures, the construction noise levels at representative NSRs N2, N6 and N7a are predicted to comply with the noise standards stipulated in the EIAO-TM. Residual construction noise impacts are predicted at NSRs N1, N3, N4, N5 (if N5 would be in residential use during construction phase) and N7b.

4.10.2 The potential residual impacts at the affected NSRs are summarised in **Table 4.13**.

Table 4.13 Construction Noise Residual Impacts

NSR ID	Exceedance of the EIAO-TM Criterion of 75 dB(A)	[1]Approximate number of days with exceedance
N1	1	52 days
	2	24 days
	3	17 days
	4	8 days
N3	1	68 days
	2	30 days
N4	1	30 days
N7b	1	5 days
	2	25 days

Notes: (1) Sums of individual time periods of exceedance according to the tentative construction programme

4.10.3 The highest residual construction noise impacts i.e. 4 dB(A) was predicted at Haiphong Mansion (N1), after implementing the mitigation measures described in **Tables 4.10** and **4.11.** The residual construction noise impacts predicted at Comfort Building (N3) and Burlington Arcade (N4), after implementing the proposed mitigation measures, are not greater 2 dB(A) and 1dB(A) respectively. The sums of the individual exceedance duration are summarised in **Table 4.14**.

Table 4.14 Durations of Construction Noise Residual Impacts

NSR ID	[1]Number of days with exceedance	
	1 to 3 dB(A)	4 dB(A)
N1	93	8
N3	98	0
N4	30	0
N7b	30	0

Notes: (1) Sum of individual time periods of exceedance

4.10.4 It is not expected that Milton Mansion (NSR N5) which is currently in commercial use would involve residential use during the construction period of this Project. However, the potential residual construction noise impact at this NSR was assessed for this scenario. The residual construction noise impacts at the NSR are summarised in **Table 4.15**.

Table 4.15 Construction Noise Residual Impacts at NSR N5

NSR ID	Exceedance of the EIAO-TM Criterion of 75 dB(A)	[1]Approximate number of days with exceedance
N5	1	1 days
	3	30 days

Notes: (1) Sums of individual time periods of exceedance according to the tentative construction programme

4.10.5 The exceedances predicted at the NSRs were mainly due to the proposed construction works to be carried out at works areas of the new plant basement, TST connection chamber and the satellite concourse. The PME inventory adopted for these works has been reviewed. However, the number of proposed PME for each construction activity was found to be minimal and further reduction of the PME number would be impractical for carrying out the construction works. In addition, re-scheduling of the construction programme has been considered. Since the residual construction noise impacts at the sensitive receivers are mainly due to the close proximity of the works area, re-scheduling of the construction programme could not be useful in mitigating the residual impacts.

4.10.6 The feasibility of installing additional mitigation measure in terms of a large noise barrier/enclosure around the site areas has also been considered. However, implementing a large noise barrier/enclosure as an additional mitigation measure would cause the following inconvenience and environmental problems:

- More area at the existing traffic lane and pedestrian path would be occupied due to the foundation of the large noise barrier/enclosure i.e. inconvenience to the pedestrians and drivers.
- Elongated the construction period and additional potential construction noise impact from the installation/un-installation of the noise barrier/enclosure.
- Visual impact to the pedestrians and the nearby residential buildings, shops and hotel, especially low level receivers will be very significant.
- Massive arrangement would be lead to safety problem in case of emergency.
- Mucking out opening could not be arranged in a flexible manner to suit the progress of the excavation. Energy and time wastage in handling of spoil via long routing to the opening would be anticipated.

4.10.7 The longest duration of noise exceedance predicted is about 101 days (93 days of 1 to 3 dB(A) and 8 days of 4 dB(A)) at NSR N1. In considering the environmental benefits and the potential inconvenience/problems that may arise, it is considered that a large noise barrier/enclosure not a practical further mitigation measure.

4.10.8 Nevertheless, the good site practices listed below shall be adopted by all Contractors to further ameliorate the noise impacts. Although the noise mitigating effects are not easily quantifiable and the benefits may vary with the site conditions and operating conditions, good site practices are easy to implement and do not impact upon the works schedule.

- Only well-maintained plant shall be operated on-site and plant shall be serviced regularly during the construction program.
- Silencers or mufflers on construction equipment shall be utilised and shall be properly maintained during the construction program.

- Mobile plant, if any, shall be sited as far away from NSRs as possible.
- Machines and plant (such as trucks) that may be in intermittent use shall be shut down between works periods or shall be throttled down to a minimum.
- Plant known to emit noise strongly in one direction shall, wherever possible, be orientated so that the noise is directed away from the nearby NSRs.
- Material stockpiles and other structures shall be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

Operation Phase

4.10.9 No adverse operation residual noise impact are envisaged if the noise emissions from the proposed fixed plant are designed to meet the maximum allowable sound power level with appropriate noise reduction measures in place.

4.11 Environmental Monitoring and Audit

Construction Noise

4.11.1 An EM&A programme is recommended to be established according to the predicted occurrence of noisy activities. All the recommended mitigation measures for daytime normal working activities shall be incorporated into the EM&A programme for implementation during construction. Given the study area is highly interfered by the heavy traffic at Nathan Road, manned regular noise monitoring is recommended. Details of the programme are provided in the stand-alone EM&A Manual. As residual noise impact is predicted in this study, it is recommended to set up a community liaison channel to handle any public enquiry and complaint.

Operation Noise

4.11.2 Any necessary mitigation measures would be implemented to ensure the compliance of the operation noise levels with the EIAO-TM noise criteria.

4.12 Conclusion

Construction Phase

4.12.1 Noise arising from the construction activities of the project will have unavoidable potential impact on the NSRs located in the vicinity of the works areas. Unmitigated cumulative construction noise levels at the representative NSRs are predicted, which are found to be in the range of 46 to 89 dB(A), exceeding the EIAO-TM daytime construction noise limit by up to 14 dB(A).

4.12.2 Mitigation measures are recommended to reduce the noise levels to within the EIAO-TM noise criterion, including good site practices, quieter plant, silencer, movable noise barrier and decking over the excavation areas. With the recommended mitigation measures in place, noise levels at most of the NSRs

are predicted to comply with the EIAO-TM daytime construction noise criterion and no adverse residual construction noise impact is expected. Some NSRs, including N1, N3 and N4 located in close proximity to the works areas, would still be exposed to exceedances by 1 to 4dB(A) for short term.

4.12.3 Whilst this impact assessment does indicate some noise exceedances for limited periods of time, even with the consideration of all practicable mitigation measures, during the actual construction period as much as practically possible will be done to reduce construction noise still further, and there will be on-going liaison with all concerned parties and site monitoring to deal with and minimise any exceedances.

4.12.4 A construction noise EM&A programme is recommended to check the compliance of the noise criteria during normal daytime working hours. As residual noise impact is predicted in this study, it is recommended to set up a community liaison channel to handle any public enquiry and complaint.

Operation Phase

4.12.5 The assessment results indicated that predicted noise levels at all NSRs arising from the fixed plant of the Project will comply with the EIAO-TM criteria, with the noise emissions from the fixed plant controlled to achieve the specified Max SWL by proper noise reduction measures. Thus, no adverse fixed plant noise impacts are expected.

5. CONSTRUCTION WATER QUALITY IMPACT

5.1 General

5.1.1 This section assesses the water quality impact during construction in accordance with the criteria and guidelines given in Annex 6 and Annex 14 of the EIAO TM. Clause 3.5.4 of the EIA Study Brief sets out the scope and requirements of the assessment.

5.1.2 As the construction activities of the Project will be land-based, direct impacts on water bodies will not arise. Nevertheless, the construction activities at the works area may generate surface run-off which may cause adverse water quality impacts if not properly controlled or mitigated. Recommendations for mitigation measures have been made, where necessary, to reduce the identified water quality impacts to an acceptable level.

5.2 Environmental Legislation and Standards

5.2.1 The criteria for evaluating water quality impacts in this EIA Study include:

- Technical Memorandum on Environmental Impact Assessment Process (Environmental Impact Assessment Ordinance) (EIAO TM);
- Water Pollution Control Ordinance (WPCO);
- Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS);
- Hong Kong Planning Standards and Guidelines (HKPSG); and
- Practice Note for Professional Persons (ProPECC), Construction Site Drainage (PN1/94).

5.3 Environmental Impact Assessment Ordinance (EIAO), Cap. 499, S.16

5.3.1 The EIAO TM was issued by the EPD under Section 16 of the EIAO. It specified the assessment method and criteria that was followed in this Study. Reference sections in the EIAO TM provide the details of assessment criteria and guidelines that are relevant to the water quality assessment, including:

- Annex 6 – Criteria for Evaluating Water Pollution; and
- Annex 14 – Guidelines for Assessment of Water Pollution.

5.4 Water Pollution Control Ordinance (WPCO)

5.4.1 The *Water Pollution Control Ordinance* (Cap. 358), in existence since 1980, is the major legislation relating to the protection and control of water quality in Hong Kong. According to the Ordinance and its subsidiary legislation, Hong Kong waters are divided into ten water control zones (WCZ). Corresponding statements of Water Quality Objectives (WQO) are stipulated for different water regimes (marine waters, inland waters, bathing beaches subzones, secondary contact recreation subzones and fish culture subzones) in each of the WCZ based on their beneficial uses. The study area is located within the Victoria Harbour WCZ and the corresponding WQO are listed in **Table 5.1**.

Table 5.1 Summary of Water Quality Objectives for Victoria Harbour WCZ

	Objectives	Sub-Zone
Offensive Odour, Tints	Not to be present	Whole zone
Colour	Not to exceed 50 Hazen units, due to human activity	Inland waters
Visible foam, oil scum, litter	Not to be present	Whole zone
E. coli	Not to exceed 1000 per 100 mL, calculated as the geometric mean of the most recent 5 consecutive samples taken at intervals of between 7 and 21 days	Inland waters
Dissolved Oxygen (DO) within 2 m of the seabed	Not less than 2.0 mg L^{-1} for 90% of samples	Marine waters
Depth-averaged DO	Not less than 4.0 mg L^{-1} for 90% of samples	Marine waters
Dissolved Oxygen	Not less than 4.0 mg L^{-1}	Inland waters
pH	To be in the range of 6.5 - 8.5, change due to human activity not to exceed 0.2	Marine waters
	Not to exceed the range of 6.0 - 9.0 due to human activity	Inland waters
Salinity	Change due to human activity not to exceed 10% of ambient	Whole zone
Temperature	Change due to human activity not to exceed 2 °C	Whole zone
Suspended solids	Not to raise the ambient level by 30% caused by human activity	Marine waters
	Annual median not to exceed 25 mg L^{-1} due to human activity	Inland waters
Ammonia	Annual mean not to exceed 0.021 mg L^{-1} as unionised form	Whole zone
Nutrients	Shall not cause excessive algal growth	Marine waters
	Annual mean depth-averaged inorganic nitrogen not to exceed 0.4 mg L^{-1}	Marine waters
BOD_5	Not to exceed 5 mg L^{-1}	Inland waters
Chemical Oxygen Demand	Not to exceed 30 mg L^{-1}	Inland waters
Toxic substances	Should not attain such levels as to produce significant toxic, carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms.	Whole zone
	Human activity should not cause a risk to any beneficial use of the aquatic environment.	Whole zone

Source: Statement of Water Quality Objectives (Victoria Harbour (Phases One, Two and Three) Water Control Zone).

5.5 Technical Memorandum

5.5.1 Besides setting the WQOs, the WPCO controls effluent discharging into the WCZs through a licensing system. Guidance on the permissible effluent discharges based on the type of receiving waters (foul sewers, storm water drains, inland and coastal waters) is provided in the *Technical Memorandum (TM) on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*. The limits given in the TM cover the physical, chemical and microbial quality of effluents. Any effluent discharge during the construction stage should comply with the standards for effluents discharged into the inshore waters of the Victoria Harbour WCZ, as shown in Table 9a of the TM.

5.6 Practice Notes

5.6.1 A practice note (PN) for professional persons was issued by the EPD to provide environmental guidelines for handling and disposal of construction site discharges. The ProPECC PN 1/94 "Construction Site Drainage" provides good practice guidelines for dealing with various types of discharge from a construction site. Practices outlined in the PN shall be followed as far as possible during construction to minimize the water quality impact due to construction site drainage.

5.7 Baseline Condition

5.7.1 With the implementation of *Harbour Area Treatment Scheme (HATS) Stage 1*, the water quality in middle portion of the Victoria Harbour has been improved.

5.7.2 EPD's routine water quality monitoring programme data from stations VM5 and VM6 (**Figure 5.1**), which are nearest to the Project site, provides an acceptable reference of the baseline water quality for the Project. According to the "2006 Marine Water Quality in Hong Kong" published by the Environmental Protection Department (EPD), a summary of the monitoring data at these stations is given in **Table 5.2**.

Table 5.2 Marine Water Quality of Victoria Harbour WCZ at the Selected Monitoring Station in 2006

Determinand	Monitoring Station		WPCO WQOs (in marine waters)
	VM5	VM6	
Temperature (^oC)	23.7 (17.4-27.5)	23.6 (17.5-27.4)	natural daily level ± 2 ^oC
Salinity (psu)	31.4 (27.3-32.8)	31.5 (27.3-32.8)	natural ambient level ± 10 %
Dissolved Oxygen (mg/L)	5.5 (4.3-7.1)	5.5 (4.0-6.9)	≥ 4 mg L^{-1}
Dissolved Oxygen Bottom (mg/L)	5.4 (3.8-7.3)	5.4 (2.7-7.2)	≥ 2 mg L^{-1}
Dissolved Oxygen (% Saturation)	77 (65-91)	78 (60-89)	N/A
Dissolved Oxygen Bottom (% Saturation)	76 (56-94)	75 (40-93)	N/A
pH	7.9 (7.7-8.1)	7.9 (7.7-8.1)	6.5 - 8.5 (± 0.2 from natural range)
Secchi Disc Depth (m)	1.8 (1.4-2.7)	2.1 (1.5-2.7)	N/A
Turbidity (NTU)	11.6 (6.5-18.5)	11.1 (5.2-14.2)	N/A
Suspended Solids (mg/L)	4.6 (1.7-8.9)	4.5 (2.0-8.9)	≤ natural ambient level + 30%
BOD_5 (mg/L)	1.0 (0.2-1.9)	0.8 (0.1-1.8)	not applicable to marine waters
Ammonia Nitrogen (mg/L)	0.16 (0.09-0.30)	0.16 (0.11-0.25)	N/A
Unionized Ammonia (NH_3-N) (mg/L)	0.005 (0.003-0.008)	0.005 (0.003-0.007)	≤ 0.021 mg L^{-1}
Nitrite Nitrogen (mg/L)	0.027 (0.009-0.093)	0.027 (0.009-0.095)	N/A
Nitrate Nitrogen (mg/L)	0.12 (0.04-0.27)	0.13 (0.04-0.28)	N/A
Total Inorganic Nitrogen (TIN) (mg/L)	0.31 (0.14-0.50)	0.32 (0.16-0.51)	≤ 0.4 mg L^{-1}
Total Kjeldahl Nitrogen (mg/L)	0.40 (0.25-0.58)	0.38 (0.29-0.59)	N/A

Determinand	Monitoring Station		WPCO WQOs (in marine waters)
	VM5	VM6	
Total Nitrogen (mg/L)	0.55 (0.30-0.83)	0.53 (0.34-0.73)	N/A
Ortho-phosphate (mg/L)	0.03 (0.02-0.04)	0.03 (0.02-0.05)	N/A
Total-Phosphorus (mg/L)	0.06 (0.03-0.08)	0.06 (0.03-0.08)	N/A
Silica (as SiO_2) (mg/L)	0.9 (0.3-1.7)	0.9 (0.3-1.8)	N/A
Chlorophyll-α (μg/L)	2.8 (0.9-8.6)	2.9 (0.9-10.1)	N/A
E.coli (cfu/100mL)	7700 (1900-22000)	5500 (650-33000)	not applicable to marine waters
Faecal Coliforms (cfu/100mL)	19000 (3500-65000)	13000 (2500-10000)	N/A

Note: 1. Except as specified, data presented are depth-averaged results.
2. Depth-averaged results at each station are calculated as arithmetic means of measurements at all available depths (i.e. S, M, B) except for *E.coli* and faecal coliforms which are geometric means.
3. Data presented are annual arithmetic means except for *E.coli* and faecal coliforms which are annual geometric means.
4. Data enclosed in brackets indicate the ranges.
5. Shaded cells indicate non-compliance with the WQOs.

5.7.3 Full compliance with the WQO for depth-averaged and bottom dissolved oxygen and depth-averaged NH_3-N was achieved at VM5 and VM6 in 2006.

5.8 Assessment Methodology

5.8.1 The assessment of the potential impact of land-based construction activities on water quality has been undertaken in a qualitative manner. Consideration has been given to controlling potentially harmful impacts from site works and to the use of 'best' practice measures to minimise the potential for discharges of pollutants to the nearby waters of the Victoria Harbour. The assessment of potential water pollution impacts of this Project has involved the following tasks:

- identifying water sensitive receivers in the vicinity of this Project;
- defining type and extent of construction activities with the potential to affect water quality;
- identifying specific locations of those construction activities;
- assessing the potential impacts arising from the construction activities of the Project; and
- recommending mitigation measures for minimising any identified adverse impacts on water quality associated with the Project.

5.9 Identification of Water Sensitive Receivers

5.9.1 The closest water receiving body in the vicinity of the project site is the Victoria Harbour WCZ. Due to the highly urbanised nature of Kowloon Peninsula, there are no natural streams located within 300m from the works site boundary.

5.9.2 There are no marine biological sensitive receivers such as mariculture zones, commercial fisheries, or shell fisheries within the vicinity of the construction site.

5.10 Potential Sources from Construction Activities

5.10.1 Potential sources of water quality impact associated with the proposed construction activities at the works areas of the Project have been identified and include:

- construction runoff and drainage;
- underground works;
- sewage effluent; and
- general construction activities.

5.11 Evaluation of Potential Water Quality Impacts

Construction Runoff and drainage

5.11.1 Construction site runoff comprises:

- runoff and erosion from exposed soil surface, drainage channels and earth working areas;
- wash water from dust suppression sprays and wheel washing facilities; and
- fuel, oil and lubricants from construction vehicles and equipment.

5.11.2 Construction runoff may cause physical, chemical and biological effects. Any increase in sediment loads and debris from the site could accumulate, leading to blocked drainage channels, and associated local flooding when heavy rainfall occurs, as well as affecting the water quality in Victoria Harbour.

5.11.3 Chemical and biological effects may also arise as a result of construction runoff. Primary chemical effects may result from liquids containing significant amounts of concrete and cement-derived materials, including concrete wash. These may include localised increase in turbidity and discoloration, elevation in pH, and accretion of solids. A number of secondary effects may also result in toxic effects to water biota due to elevated pH values, reduce decay rates of faecal micro-organisms and photosynthetic rate due to the decreased light penetration.

5.11.4 No adverse water quality impacts are expected at the Victoria Harbour WCZ given a considerable distance of the WSR from the Project site (more than 0.5 km away). All construction works for the Project will take place in-land and within the proposed work area. With the implementation of adequate construction site drainage and provision of silt removal facilities at the work areas as described in **Section 5.13.2**, there will not be any direct water quality impacts on the Victoria Harbour WCZ.

Underground Works

5.11.5 During wet periods, rainfall and surface runoff entering exposed underground works area can lead to construction runoff with high suspended solids (SS) content. Mitigation shall be designed to reduce the influx of rainwater into the exposed underground works area.

5.11.6 Surface runoff may also be contaminated by grouting chemicals that would be required for the temporary walling works. The wastewater generated during the

underground works will contain high concentrations of SS and require settlement prior to discharge. Oil interceptors shall also be installed to remove the oil, lubricants and grease from the wastewater arising from the underground works.

5.11.7 Ingressive groundwater would be pumped out from underground works area. Pumped water having a high content of SS should be treated on-site prior to off-site discharge.

Sewage Effluent

5.11.8 Sewage is characterised by high levels of BOD, ammonia and *E.coli*. Sewage generated from the construction workforce will have the potential to cause water pollution. However, limited quantity of sewage would be generated, which is mainly arising from the sanitary facilities provided on-site.

5.12 General Construction Site Activities

5.12.1 On-site construction activates may cause water pollution from the following:

- Uncontrolled disposal of debris and rubbish such as packaging, construction materials and refuse etc; and
- Spillages of liquid stored on-site, such as oil, diesel and solvents etc.

5.12.2 However, the effects on water quality from these construction activities are likely to be minimal, provided that site boundaries are well maintained and good construction practices are implemented to ensure that litter, fuel and solvents are stored and handled properly, as detailed in **Sections 6.9.8 – 6.9.9**.

5.13 Mitigation Measures

5.13.1 Recommended mitigation measures for containing and minimizing potential water quality impacts during the construction activities are described below.

Construction Runoff and Site Drainage

5.13.2 Construction runoff and site drainage should be prevented or minimized in accordance with the guidelines stipulated in ProPECC PN 1/94 “Construction Site Drainage”. The specified mitigation measures and practices include the following:

- Provision of perimeter drains to intercept off-site water around the site with internal drainage works and erosion and sedimentation control facilities implemented. These shall be constructed in advance of site formation works and earthworks. Earth bunds or sand bag barriers shall be provided on-site to direct storm water to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the Contractor prior to the commencement of construction.
- All drainage facilities and erosion and sediment control structures shall be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit shall be regularly removed, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.

- Exposed slope/soil surface shall be covered by tarpaulin as soon as possible to reduce the potential of soil erosion. Arrangements should always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm. Other measures that need to be implemented before, during and after rainstorms are summarized in ProPECC PN 1/94.
- Open stockpiles of construction materials (e.g. aggregates, sand and fill material) or construction wastes on-site of more than $50m^3$ shall be covered with tarpaulin or similar fabric during rainstorms.
- Construction works shall be programmed to minimise surface excavation works during the rainy seasons (April to September). All exposed earth areas shall be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed surfaces shall be covered by tarpaulin or other means.
- Manholes shall always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.
- Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94.
- All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequate designed and sited wheel washing facilities shall be provided at every construction site exit, where practicable. Wash-water shall have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road shall be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.
- Oil interceptors shall be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors shall be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass shall be provided for the oil interceptors to prevent flushing during heaving rain.
- Construction solid waste, debris and rubbish on site shall be collected, handled and disposed of properly to avoid water quality impacts. Requirements from solid waste management are detailed in Section 6 of the Report.

5.13.3 By adopting the above mitigation measures with Best Management Practices (BMPs), no adverse water quality impact of construction runoff and site drainage is anticipated.

Underground Works

5.13.4 Underground works shall be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September).

5.13.5 Uncontaminated discharge shall pass through settlement tanks prior to off-site discharge. A discharge licence under the WPCO would be required for discharge to the stormwater drain. It may be a stipulation of the WPCO licence to require the Contractor to monitor the quality/quantity of the discharge to show compliance with the conditions of the licence.

5.13.6 The wastewater, including surface runoff and ingressive groundwater in underground area, with a high concentration of SS shall be treated (e.g. by settlement in tanks with sufficient retention time) before discharge. Oil interceptors shall also be installed to remove the oil, lubricants and grease from the wastewater.

Sewage Effluent

5.13.7 Temporary sanitary facilities, such as portable chemical toilets, shall be employed on-site where necessary to handle sewage from the workforce. A licensed contractor would be responsible for appropriate disposal of waste matter and maintenance of these facilities.

5.14 General Construction Site Activities

5.14.1 Debris and rubbish generated on-site shall be collected, handled and disposed of properly to avoid being flushed or blown by wind into the drainage culvert. Stockpiles of cement and other construction materials should be kept covered when not being used.

5.14.2 Oils and fuels shall only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents, all fuel tanks and storage areas shall be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund shall be drained of rainwater after a rain event.

5.15 Evaluation of Residual Impacts

5.15.1 With the full implementation of the recommended mitigation measures for the construction phase of the proposed Project, no unacceptable residual impacts on water quality are expected.

5.16 Environmental Monitoring and Audit

5.16.1 Water quality monitoring is not considered necessary during the construction phase as no unacceptable water quality impact is expected. However, it is recommended that regular site inspections be undertaken to inspect the construction activities and works area in order to ensure the recommended mitigation measures are properly implemented. Any effluent discharges from the site will be required to comply with the terms and conditions of a discharge licence, issued by EPD, under the WPCO.

5.17 Conclusions

5.17.1 The key issue in terms of water quality during the construction phase of the Project is construction runoff and site drainage, underground works, sewage effluent and general construction site activities. Minimisation of water quality deterioration can be achieved through implementing adequate mitigation measures such as control measures on site runoff and drainage from the works

areas to minimise construction runoff, and on-site treatment of site runoff and drainage prior to discharge. Proper site management and good housekeeping practices will also be required to ensure that construction wastes and other construction-related materials will not enter the drainage culvert. Sewage effluent arising from the construction workforce shall also be handled through provision of portable toilets.

5.17.2 With the implementation of these recommended mitigation measures (**Section 5.13**), the construction works for the Project is not expected to result in unacceptable impacts on water quality. Site inspections shall be undertaken routinely to inspect the works areas in order to ensure the recommended mitigation measures are properly implemented.

6. WASTE MANAGEMENT

6.1 Introduction

6.1.1 This section identifies the types of solid wastes that are likely to be generated during the construction phase of the Project and evaluates the potential environmental impacts that may result from these wastes in accordance with the criteria and guidelines given in Annex 7 and Annex 15 of the EIAO TM.

6.1.2 It is recognised that the quantity of waste associated with the construction works is relatively small and will mainly involve excavated material. Besides, given the progressive nature of the construction works, the quantity of excavated material generated daily would be limited. Nevertheless, given the density of the built-up area surrounding the project site, proper waste management is considered necessary to avoid generation of any significant environmental impact associated with the handling, collection and disposal of construction waste. Environmental mitigation measures required to mitigate these environmental impacts were identified and recommended.

6.1.3 Waste management during the operational phase will be similar to the existing operation of TST MTR Station and the other MTR Stations and is not expected to be key issue of the EIA study.

6.2 Environmental Legislation and Standards

6.2.1 The criteria and guidelines for assessing waste management implications are set out in Annex 7 and Annex 15 of the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM), respectively.

6.2.2 The following legislation relates to the handling, treatment and disposal of wastes in the Hong Kong SAR and has been used in assessing potential impacts:

- Waste Disposal Ordinance (Cap. 354)
- Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354)
- Land (Miscellaneous Provisions) Ordinance (Cap. 28)
- Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation

6.3 Waste Management

6.3.1 The *Waste Disposal Ordinance* (WDO) prohibits the unauthorised disposal of wastes. Construction waste is defined as any substance, matter or thing that is generated from construction work and abandoned, whether or not it has been processed or stockpiled before being abandoned, but does not include any sludge, screenings or matter removed in or generated from any desludging, desilting or dredging works. Under the WDO, wastes can be disposed of only at designated waste disposal facilities.

6.3.2 Under the WDO, the *Chemical Waste (General) Regulation* 1992 provides regulations for chemical waste control, and administers the possession, storage, collection, transport and disposal of chemical wastes. The Environmental Protection Department (EPD) has also issued a ‘guideline’ document, the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes (1992)*,

which details how the Contractor should comply with the regulations on chemical wastes.

6.3.3 The *Public Cleansing and Prevention of Nuisances Regulation* provides control on illegal tipping of wastes on unauthorised (unlicensed) sites.

6.4 Construction and Demolition (C&D) Materials

6.4.1 The current policy related to the disposal of C&D material is documented in the Works Branch Technical Circular No. 2/93, '*Public Dumps*'. Construction and demolition materials that are wholly inert, namely public fill, should not be disposed of to landfill, but taken to public filling areas, which usually form part of reclamation schemes. The *Land (Miscellaneous Provisions) Ordinance* requires that dumping licences be obtained by individuals or companies who deliver public fill to public fill reception facilities. The Civil Engineering & Development Department (CEDD) issues the licences under delegated powers from the Director of Lands.

6.4.2 Under the *Waste Disposal (Charges for Disposal of Construction Waste) Regulation*, enacted in January 2006, construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert material. Construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert material, and construction waste delivered to a public fill reception facility for disposal must consist entirely of inert material.

6.4.3 Measures have been introduced under Environment, Transport and Works Bureau (ETWB) TCW No. 33/2002, "Management of Construction and Demolition Material Including Rock" to enhance the management of construction and demolition material, and to minimize its generation at source.

6.5 Assessment Methodology

6.5.1 The criteria for assessing waste management implications are outlined in Annex 7 of the EIAO-TM. The methods for assessing potential waste management impacts during the construction phase follow those presented in Annex 15 of the EIAO-TM and include the following:

- Estimation of the types and quantities of the wastes to be generated.
- Assessment of potential impacts from the management of solid waste with respect to potential hazards, air and odour emissions, noise, wastewater discharge and transport.
- Assessment of impacts on the capacity of waste collection, transfer and disposal facilities.

6.6 Prediction and Evaluation of Environmental Impacts

6.6.1 The construction activities to be carried out for the proposed Project will generate a variety of wastes that can be divided into distinct categories based on their composition and ultimate method of disposal. The identified waste types include:

- Construction and demolition (C&D) materials
- General refuse
- Chemical waste

6.6.2 Each type of waste arising is described below, together with an evaluation of the potential environmental impacts associated with generation, handling, storage, transport and disposal of each waste type. Prior to consideration of disposal options for each waste type, opportunities for waste reduction, reuse, or recycling were identified.

Construction and Demolition Materials

6.6.3 The main construction and demolition (C&D) materials is excavated material from underground works. The estimated total volume of C&D material is estimated to be 26,160m^3. A breakdown of the estimated quantities of C&D materials from the different work areas of the Project is given in **Table 6.1**.

Table 6.1 Estimated Quantities of C&D Materials

Construction Area	Rock, m^3	Artificial Hard Material, m^3	Soil Materials, m^3			Total, m^3
	Grade III or above – MDG/SDG	Bituminous / Concrete pavement	Fill	Grade IV & V	Others	
Plant basement	2400	125	2600	3025	435	8585
TST Connection Chamber	0	15	115	135	135	400
Satellite Concourse	410	210	2640	2640	2310	8210
Subway TST	0	170	0	3390	105	3665
Subway MSC	4,150	175	0	105	0	4430
Emergency stair at MSC	585	15	80	80	110	870
						26,160

6.6.4 Based on the current scheme for the northern subway, an estimated total quantity of approximately 3,140m^3 imported general fill is required for backfilling the plant basement, TST connection chamber and satellite concourse. The possibility to retain some of the excavated material generated on-site for subsequently reuse as backfill material after the completion of the construction was evaluated with Project Engineers but not considered practicable. Given the necessary lane-by-lane progressive approach to the construction activities in order to maintain the traffic on Nathan Road, the works area available for the construction works will be very limited. Storage of excavated material on-site is not considered practicable as the site is small and could become a source of nuisance to the public and concerns on the nearby OVTs; and therefore, there are constraints on reused on C&D Material. Nonetheless, the possibilities for re-use/ temporary storage of C&D material will be further explored by the Contractor.

Table 6.2 Summary of C&D Materials Generated, Reused and Disposed

C&D materials		Quantity of C&D Material m^3		
		General	Reused (with constraints)	Disposed
Soil Material	**Fill**	5,435	2,140	3,295
	Grade IV & V	9,375	1,000	8,375
	Others	3,095	0	3,095
Rock	**Grade III as above – MDG/SDG**	7,545	0	7,545

		Quantity of C&D Material m^3		
Artificial material	**Bituminous/Concrete pavement**	710	0	710
	Sub Total	**26,160**	**3,140**	**23,020**

6.6.5 The Construction Contractor should prepare a Waste Management Plan (WMP) on waste reduction, re-use, recycling and disposal practice. The excavated material is expected to be the only major source of C&D materials, which will be inert suitable for reuse in public fill reception facility. The amount on C&D waste will be insignificant and shall be disposed of at landfills when encountered. Owing to a small amount of C&D generated in this project (max of 26,160m^3), the surplus material might be disposed of at the planned Construction and Demolition (C&D) Material Handling Facility at TKO Area 137, as the last resort.

6.6.6 The excavated material generated daily onsite shall be delivered to a truck parked within the works area and delivered to another project site, a public fill reception facility or other reclamation sites as appropriate. Assuming a 8 hours working day and a truck capacity of 7.5m^3, it can be calculated that the average number of trucks involved is 0.6 per hour.

6.6.7 The final destinations of the excavated material will be determined, subject to the availability of public fill reception facilities, by the Waste Management Plan to be prepared by the Contractor and agreed with CEDD. Provided that a trip-ticket system is established for the disposal of the inert C&D material, as recommended in **Section 6.9.2**, and that good site practices are adhered to, adverse environmental impacts and nuisance would not be expected.

6.6.8 The generation of C&D materials is considered to be small and is not envisaged to have any adverse impact on the capacity of landfills and public fill reception facilities.

Chemical Waste

6.6.9 The maintenance and servicing of construction plant and equipment may generate some chemical wastes such as cleaning fluids, solvents, lubrication oil and fuel. It is difficult to quantify the amount of chemical waste that will arise from the construction activities since it will be dependent on the Contractor's on-site maintenance requirements and the amount of plant utilised. Because of the limited available works area, there would only be very limited maintenance and servicing of plant and equipment on-site. It is anticipated that the quantity of chemical waste, such as lubricating oil and solvent produced from plant maintenance, will be small and in the order of a few cubic metres per month. The amount of chemical waste to be generated will be quantified in the site Waste Management Plan to be prepared by the Contractor.

6.6.10 Chemical wastes arising during the construction phase may pose environmental, health and safety hazards if not stored and disposed of in an appropriate manner as stipulated in the *Waste Disposal (Chemical Waste) (General) Regulations*. The potential hazards include:

- Toxic effects to workers
- Adverse impacts on water quality from spills

- Fire hazards

6.6.11 Materials classified as chemical wastes will require special handling and storage arrangements before removal for appropriate treatment at the Chemical Waste Treatment Centre (CWTC) or other licensed facility. Wherever possible opportunities should be taken to reuse and recycle materials. Mitigation and control requirements for chemical wastes are detailed in **Section 6.9.8**. Provided that the handling, storage and disposal of chemical wastes are in accordance with these requirements, adverse environmental impacts would not be expected to result.

General Refuse

6.6.12 The construction workforce will generate general refuse comprising food scraps, waste paper, empty containers, etc. Such refuse shall be properly managed so intentional or accidental release to the surrounding environment does not occur. Disposal of refuse at sites other than approved waste transfer or disposal facilities shall be prohibited. Effective collection of site wastes will be required to prevent waste materials being blown around by wind or creating an odour nuisance or pest and vermin problem. Waste storage areas shall be well maintained and cleaned regularly. With the implementation of good waste management practices at the site, adverse environmental impacts would not be arise from the storage, handling and transportation of workforce wastes.

6.7 Mitigation Measures

Good Site Practices

6.7.1 Adverse impacts related to waste management are not expected to arise, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities include:

- Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site.
- Training of site personnel in proper waste management and chemical waste handling procedures.
- Provision of sufficient waste disposal points and regular collection for disposal.
- Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors.
- A Waste Management Plan should be prepared and submitted to the Engineer for approval. One may make reference to ETWB TCW No. 19/2005 for details.
- A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.

6.7.2 In order to monitor the disposal of C&D materials at public fill reception facilities, as appropriate, and to control fly tipping, a trip-ticket system shall be included as one of the contractual requirements. One may make reference to ETWB TCW No. 31/2004 for details. The use of a trip-ticket system is required to avoid any illegal or unplanned dumping of waste generated by the Project.

Waste Reduction Measures

6.7.3 Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:

- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.
- Encourage collection of aluminium cans, PET bottles and paper by providing separate labelled bins to enable these wastes to be segregated from other general refuse generated by the work force.
- Any unused chemicals or those with remaining functional capacity shall be recycled.
- Proper storage and site practices to minimise the potential for damage or contamination of construction materials.
- Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.

6.7.4 Because of the limited available works area, the possibility for segregation, storage and reuse of materials would be limited.

6.7.5 In addition to the above measures, specific mitigation measures are recommended below for the identified waste arisings to minimise environmental impacts during handling, transportation and disposal of these wastes.

Construction and Demolition Material

6.7.6 Within stockpile areas, the following measures shall be taken to control potential environmental impacts or nuisance:

- covering stockpile of C&D material entirely by clean impervious sheet to reduce potential dust impact;
- locating stockpiles to minimise potential visual impacts; and
- minimizing land intake of stockpile areas as far as possible.

6.7.7 When disposing C&D material at a public fill reception facility, the material shall only consist of soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt. The material shall be free from marine mud, household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be unsuitable by the Filling Supervisor.

Chemical Wastes

6.7.8 After use, chemical wastes (for example, cleaning fluids, solvents, lubrication oil and fuel) should be handled according to the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Spent chemicals should be collected by a licensed collector for disposal at the CWTC or other licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

General Refuse

6.7.9 General refuse shall be stored in enclosed bins or compaction units separate from C&D material. A licensed waste collector shall be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area shall be provided to reduce the occurrence of 'wind blown' light material.

6.8 Evaluation of Residual Impacts

6.8.1 With the implementation of the recommended mitigation measures for the handling, transportation and disposal of the identified waste arisings, no residual impact is expected to arise during the construction of the proposed Project.

6.9 Environmental Audit

6.9.1 Waste management will be the contractor's responsibility to ensure that all wastes produced during the construction of the Project are handled, stored, recycled, reused, transported and disposed of in accordance with good waste management practices and EPD's regulations and requirements. The recommended mitigation measures shall form the basis of the site Waste Management Plan to be developed by the Contractor in the construction stage and deposited with EPD.

6.9.2 It is recommended that the waste generated during the construction will be audited periodically to determine if wastes are being managed in accordance with approved procedures and the site Waste Management Plan. In addition, the routine site inspections should check the implementation of the recommended good site practices and other waste management mitigation measures.

6.10 Conclusion

6.10.1 Wastes generated by the construction activities are likely to include C&D materials from the construction works, general refuse from the workforce and chemical waste from any maintenance of construction plant and equipment. Provided that these identified waste arisings are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts will not be anticipated during the construction works.

7. LANDSCAPE AND VISUAL IMPACT ASSESSMENT

7.1 Introduction

7.1.1 This chapter outlines the landscape and visual impact assessment associated with MTR Tsim Sha Tsui Station Northern Subway.

7.1.2 The assessment includes:

- a definition of the scope and contents of the study, including a description of the assessment methodology,
- a review of the relevant planning and development control framework,
- a baseline study providing a comprehensive and accurate description of the baseline landscape resources and Visual Sensitive Receivers (VSRs),
- recommendation of appropriate mitigation measures and associated implementation programmes,
- identification of the potential landscape and visual impacts and prediction of their magnitude and potential significance, before and after the mitigation measures, and
- an assessment of the acceptability or otherwise of the predicted residual impacts, according to the five criteria set out in Annex 10 of the EIAO-TM.

7.1.3 The landscape and visual impact assessment follows the criteria and guidelines as stated in Annexes 10 and 18 of the EIAO TM. Colour photographs showing baseline conditions, and photomontages and illustrative materials supporting conclusions are provided and the locations of all key viewpoints are clearly mapped. Photomontages at representative locations provide comparison between existing views, proposals on day 1 after completion without mitigation measures, on day 1 completion with mitigation measures, and in year 10 after with mitigation measures in accordance with EIAO Guidance Note No. 8/2002.

7.2 Environmental Legislation, Standards and Guidelines

7.2.1 The following legislation, standards and guidelines are applicable to landscape and visual impact assessment associated with the construction and operation of the project:

- Environmental Impact Assessment Ordinance (Cap.499.S.16) and the Technical Memorandum on EIA Process (EIAO TM), particularly Annexes 10 and 18,
- Environmental Impact Assessment Ordinance Guidance Note 8/2002,
- Town Planning Ordinance (Cap 131),
- ETWB TCW No. 2/2004 - Maintenance of Vegetation and Hard Landscape Features,
- ETWB TCW No. 29/2004 - Registration of Old and Valuable Trees, and Guidelines for their Preservation,
- ETWB TCW No. 3/2006 - Tree Preservation,
- Hong Kong Planning Standards and Guidelines, particular Chapter 4 and Chapter 11,

- Land Administration Office Instruction (LAOI) Section D-12 - Tree Preservation,
- Study on Landscape Value Mapping of Hong Kong,
- WBTC No. 25/92 - Allocation of Space for Urban Street Trees, and
- WBTC No. 7/2002 - Tree Planting in Public Works.

7.3 Assessment Methodology

7.3.1 Landscape and visual impacts have been assessed separately for the construction and operational phases.

7.3.2 The assessment of landscape impacts has involved the following procedures:

- **Identification of the baseline landscape resources found within the study area**. This is achieved by site visit and desktop study of topographical maps, information databases and photographs.
- **Assessment of the degree of sensitivity to change of the landscape resources.** This is influenced by a number of factors including:
  - quality and maturity of landscape resources/characters,
  - rarity of landscape resources/characters,
  - whether is considered to be of local, regional, national or global importance,
  - whether there are any statutory or regulatory limitations/requirements relating to the landscape resource/characters, and
  - ability of the landscape resource/character to accommodate change.

The Sensitivity of each landscape resources and character areas is classified as follows:

High: Important landscape or landscape resources of particularly distinctive character or high importance, sensitive to relatively small changes.

Medium: Landscape or landscape resources of moderately valued landscape characteristics reasonably tolerant to change.

Low: Landscape or landscape resources of low valued landscape characteristics highly tolerant to change.

- **Identification of potential sources of landscape impacts**. These are the various elements of the construction works and operational procedures that would generate landscape impacts.
- **Identification of the magnitude of landscape impacts.** The magnitude of the impact (or magnitude of change) depends on a number of factors including:
  - the physical extent of the impact,
  - compatibility of the project with the surrounding landscape,
  - duration of impacts i.e. whether it is temporary (short, medium or long term), under construction and operation phases, and
  - reversibility of change.

The magnitude of landscape impacts is classified as follows:

Large: The landscape or landscape resources would suffer a major change.

Intermediate: The landscape or landscape resources would suffer moderate change.

Small: The landscape or landscape resources would suffer slight or barely perceptible change.

Negligible: The landscape or landscape resources would suffer no discernible change.

- **Identification of potential landscape mitigation measures.** Mitigation measures may take the form of
  - adopting alternative design or revisions to the basic engineering the architectural design to prevent and/or minimize adverse impacts,
  - remedial measures such as colour and textural treatment of physical, engineering and building features,
  - compensatory measures such as the implementation of landscape design measures (e.g. tree planting, creation of new open space etc) to compensate for unavoidable adverse impacts and to attempt to generate potentially beneficial long term impacts.

  A programme for the mitigation measures is provided. The agencies responsible for the funding implementation, management and maintenance of the mitigation measures are identified.

- **Predicted significance of landscape impacts before and after the implementation of the mitigation measures**. By synthesizing the magnitude of the various impacts and the sensitivity of the various landscape resources it is possible to categories impacts in a logical, well-reasoned and consistent fashion. **Table 7.1** shows the rationale for dividing the degree of significance into four thresholds, namely insubstantial, slight, moderate, and substantial, depending on the combination of a negligible-small-intermediate-large magnitude of impact and a low-medium-high degree of sensitivity of landscape resource/character.

Table 7.1 Relationship between Receptor Sensitivity and Impact Magnitude in Defining Impact Significance

	Large	**Moderate**	**Moderate / Substantial**	**Substantial**
	Intermediate	**Slight / Moderate**	**Moderate**	**Moderate / Substantial**
Magnitude of Impact (Change)	Small	**Insubstantial / Slight**	**Slight / Moderate**	**Moderate**
	Negligible	**Insubstantial**	**Insubstantial**	**Insubstantial**
		Low	Medium	High

Receptor Sensitivity (of Landscape Resource, Landscape Character Area or VSRs)

- **Prediction of Acceptability of Impacts**. An overall assessment of the acceptability, or otherwise, of the impacts according to the five criteria set out in Annex 10 of the EIAOTM.

7.3.3 The assessment of visual impacts has involved the followings:

- **Identification of Zones of Visual Influence (ZVIs) during the construction and operational phase of the project.** This is achieved by site visit and desktop study of topographic maps and photographs, and preparation of cross-section to determine visibility of the project from various locations.
- **Identification of Visual Sensitive Receivers (VSRs) within the Zone of Visual Influence (ZVIs) at construction and operational stages.** These are the people who would reside within, work within, play within, or travel through, the ZVIs.
- **Assessment of the degree of sensitivity to change of the VSRs.** Factors considered include:
  - the type of VSRs, which is classified according to whether the person is at home, at work, at school, at play, or travelling. Those who view the impact from their homes are considered to be highly sensitive as the attractiveness or otherwise of the outlook from their home will have a substantial effect on their perception of the quality and acceptability of their home environment and their general quality of life. Those who view the impact from their workplace and at school are considered to be only moderately sensitive as the attractiveness or otherwise of the outlook will have a less important, although still material, effect on their perception of their quality of life. The degree to which this applies depends on whether the workplace is industrial, retail or commercial. Those who view the impact whilst taking part in an outdoor leisure activity may display varying sensitivity depending on the type of leisure activity. Those who view the impact whilst travelling on a public thoroughfare will also display varying sensitivity depending on the speed of travel.
  - other factors which are considered (as required by EIAO GN 8/2002) include the value and quality of existing views, the availability and amenity of alternative views, the duration or frequency of view, and the degree of visibility.

The sensitivity of VSRs is classified as follows:

High:	The VSR is highly sensitive to any change in their viewing experience.
Medium:	The VSR is moderately sensitive to any change in their viewing experience.
Low:	The VSR is only slightly sensitive to any change in their viewing experience.

- Identification of relative numbers of VSRs. This is expressed in term of whether there are very few, few, many or very many VSRs in any one category of VSR.
- **Identification of potential sources of visual impacts.** These are the various elements of the construction works and operational procedures that would generate visual impacts.

- **Assessment of the potential magnitude of visual impacts.** Factors considered include:
  - the compatibility with the surrounding landscape,
  - the duration of the impact,
  - the reversibility of the impact,
  - the scale of the impact and distance of the source of impact from the viewer, and
  - the degree of visibility of the impact, and the degree of which the impact dominates the field of vision of the viewer.

The magnitude of visual impacts is classified as follows:

Large:	The VSRs would suffer a major change in their viewing experience.
Intermediate:	The VSRs would suffer a moderate in their viewing experience.
Small:	The VSRs would suffer a small change in their viewing experience.
Negligible:	The VSRs would suffer no discernible change in their viewing experience.

- **Identification of potential visual mitigation measures**. These may take the form of adopting alternative designs or revisions to the basic engineering and architectural design to prevent and/or minimise adverse impacts, remedial measures such as colour and textural treatment of building features, and tree planting to screen the roads and associated bridge structures. A programme for the mitigation measures is provided. The agencies responsible for the implementation, management and maintenance of the mitigation measures are identified and their approval-in-principle has been sought.

- **Prediction of the significance of visual impacts before and after the implementation of the mitigation measures**. By synthesising the magnitude of the various visual impacts and the sensitivity of the VSRs, and the numbers of VSRs that are affected, it is possible to categorise the degree of significance of the impacts in a logical, well-reasoned and consistent fashion. **Table 7.1** shows the rationale for dividing the degree of significance into four thresholds, namely, insubstantial, slight, moderate and substantial, depending on the combination of a negligible-small-intermediate-large magnitude of impact and a low-medium-high degree of sensitivity of VSRs.

The significance of visual impacts is categorised as follows:

Substantial:	Adverse / beneficial impact where the proposal would cause significant deterioration or improvement in existing visual quality.
Moderate:	Adverse / beneficial impact where the proposal would cause a noticeable deterioration or improvement in existing visual quality.
Slight:	Adverse / beneficial impact where the proposal would cause a barely perceptible deterioration or improvement in existing visual quality.
Insubstantial:	No discernible change in the existing visual quality.

- **Prediction of Acceptability of Impacts**. An overall assessment of the acceptability, or otherwise, of the impacts according to the five criteria set out in Annex 10 of the EIAOTM.

7.3.4 It is assumed that funding, implementation, management and maintenance of the mitigation proposals can be satisfactorily resolved according to the principles in ETWB TCW 3/2006. All mitigation proposals in this report are practical and achievable within the known parameters of funding, implementation, management and maintenance. The suggested agents for the funding and implementation (and subsequent management and maintenance, if applicable) are indicated in **Tables 7.5** and **7.6.** Approval-in-principle to the implementation, management and maintenance of the proposed mitigation measures is being sought from the appropriate authorities.

7.4 Scope and Content of the Study

7.4.1 The Study Area is shown in **Figure 7.1**. According to EIA Study Brief No. ESB-168/2007, the study area for the landscape impact assessment shall include areas along Nathan Road in the proximity of the Project and at Haiphong Road in the proximity of the proposed new plant basement. Boundary for the visual impact assessment shall be defined by the visual envelope of the Project and associated works.

7.5 Review of Planning and Development Control Framework

Review of the Outline Zoning Plans (OZPs)

7.5.1 In this study, Tsim Sha Tsui Outline Zoning Plan (No. S/K1/22 dated 17 October 2006) is reviewed.

7.5.2 Entrance A1 Upgrade is located on the “O” zone. The footprint of the upgraded entrance is slightly larger than the existing one. The existing structure is twenty-six years old. The design intention of the Entrance A1 Upgrade is to create a transparent glass box feature with improved vertical access into the station, which includes escalators to the existing Adit A1 and disabled lift to the station. The intention of using a transparent structure is to minimize the visual bulkiness and provide better visual integration with the surrounding. The disabled lift will serve street and the Kowloon Park entrance which will enhance connectivity from the park and the street into the station. Those proposed works will also improve the circulation flow at the northern end of TST Station. The Entrance A1 Upgrade will not have any insurmountable impacts on the landscape planning framework, including areas of high landscape value, open space and amenity area as shown in the OZP.

7.5.3 As part of the emergency evacuation requirements for the subway an Emergency Exit is located in the east footpath and planter of Nathan Road in front of Miramar Shopping Centre. To minimize any sight line problems and visual impacts as blockage to the Miramar Shopping Centre ground level shops, the above-ground structure of this stair will be the same level as the adjacent planter. The parapet is finished with materials similar to adjacent planter to provide total integration and is considered visually compatible with the existing urban context.

Review of the Greening Master Plan (GMP)

7.5.4 Greening Master Plan (GMP) for TST Area by Civil Engineering Development Department (CEDD) plans to upgrade the landscape quality by planting more greenery along the Nathan Road in the future, most of the trees and palms proposed by the CEDD are common species and with medium amenity value and high survival rate after tree transplanting. Some of these trees will be affected by this project during the construction period and are proposed to be transplanted where practical and possible. After completion of construction works, all the greenery will be replanted in accordance the Greening Master Plan. As such, the proposed project will not have any significant impact on the oval greening master plan proposal.

7.6 Baseline Study

Landscape Resources

7.6.1 The baseline landscape resources that will be affected during the Construction Phase and Operation Phase, together with their sensitivity to change, are described below. The locations of baseline landscape resources are mapped in **Figure 7.2**. Photo views illustrating the landscape resources, along Nathan Road in the proximity of the Project and at Haiphong Road in the proximity of the proposed new plant basement, are illustrated in **Figures 7.2.1, 7.2.2** & **7.2.3**. For ease of reference and co-ordination between text, tables and figures, each landscape resource is given an identity number.

Existing Open Space

7.6.2 Kowloon Park is the main open space identified within the study area. Only the main entrance of Kowloon Park will have interfacing issue with the proposed project.

Existing Trees

7.6.3 There are a number of existing trees in the planting along central median of Nathan Road, along roadside planting area in front of Miramar Shopping Centre, in front of Park Lane Shopper's Boulevard and along Haiphong Road. Along Nathan Road in the proximity of the Project and at Haiphong Road in the proximity of the proposed new plant basement, there are 22 OVTs identified along Nathan Road and Haiphong Road. The crown of these OVTs are shown in **Figure 7.2**. In general, the spread of root for OVTs shall be approximately equal to the crown spread. Most of the trees along Haiphong Road are growing within raised planters & root spread would be contained within the planter. There are two OVTs (T73 and T78) growing on the natural slope above the planters/retaining wall of Haiphong Road, and roots are anchoring on the slope.

7.6.4 Existing open space and existing vegetation are the key landscape resources identified within the Study Area. These resources are shown in **Figure 7.2** and described as **Table 7.2**.

Landscape Character Area

7.6.5 Identification of LCA has made reference to Study on Landscape Value Mapping of Hong Kong. There is one LCA identified within the study area which is Tsim Sha Tsui Organic Mixed Urban Development Landscape. An aerial photograph

showing the baseline landscape character areas and resources are shown in Figure 7.2A.

Table 7.2 List of the Landscape Resources and Their Sensitivity to Change

Id. No.	Landscape Resource	Description	Sensitivity to Change (Low, Medium, High)
LR01	Existing Planting Strip along central median of Nathan Road	There are 17 palms (*Wodyetia bufurcata*) along the central median of Nathan Road. They are at approx. 6m high with medium health and amenity value. It is noted that these trees are planted after April 2007 under CEDD's Green Master Plan for Tsim Sha Tsui.	Medium
LR02	Roadside planting in front of Miramar shopping centre	There are 4 trees found in the roadside planter in front of Miramar Shopping Centre. They are all Ficus microcarpa and one of them is OVTs. Two more OVTs are located near by Heritage Resource Centre of the Antiquities & Monuments Office. All the OVTs are Ficus microcarpa.	High
LR03	Roadside planting in front of Park Lane Shopper's Boulevard	There are approximate 20 trees along the roadside planting area along Nathan Road, of which 17 nos. are OVTs (*Ficus microcarpa*) with high amenity value and good health.	High
LR04	Street planting along Haiphong Road	There are approximate 12 trees found along the Haiphong Road, of which 2 are OVTs. Dominant species are *Caryata ochiandra, Washingtonia robusta* and *Delonix regia*. The trees are of medium to high amenity value and good health.	High
LR05	Entrance of Kowloon Park	Entrance of Kowloon Park is between existing Entrance A1 and Kowloon Mosque and Islamic Centre. There is a triangular planter with climbers (*Lonicera japonica* and *Pyrostegia ignea*) climbing on the steel arch across the entrance and three palms are located next to Kowloon Mosque and Islamic Centre. Four new trees were planted under GMP, they are *Elaeocarpus apiculatus*.	Medium
LCA	Tsim Sha Tsui Organic Mixed Urban Development Landscape	The proposed work area belongs to Tsim Sha Tsui Organic Mixed Urban Development Landscape in which identified as a Urban Landscape Types, for predominantly residential, commercial and retail lands uses. This character area has less sensitive on high-rise & low-rise commercial/institutional, high-rise, medium-rise and low-rise residential development; but more sensitive on industrial or port-related, storage/warehousing and railway or major highway development; and not applicable to the reclamation, quarry or landfill and golf course development.	Low

Zone of Visual Influence (ZVI)

7.6.6 The ZVI are the same during the construction and operation phases as surrounding buildings are all at high level. The Zone of Visual Influence for the Project is illustrated in **Figure 7.3**. Photo views illustrating the Visual Sensitive Receivers (VSRs) within the study area are illustrated in **Figures 7.3.1** to **7.3.2** Due to the district land area, the ZVI is quite intensive and is generally defined by the following buildings:-

- To the east by Golden Crown Court, Cheong Hing Building, Mass Resources Development, Manson House, Majestic House, HSBC Building, Comfort Building, Burlington Arcade, Milton House, Hotel Miramar and Miramar Shopping Centre;
- To the west by Hai Phong Mansion, Health Education Exhibition & Resource Centre, Heritage Resource Centre of the Antiquities & Monuments Office, St. Andrew's Church, Kowloon Mosque and Islamic Centre and Park Lane Shopper's Boulevard;.

Visual Sensitive Receivers (VSRs)

7.6.7 **Table 7.3** lists out the key VSRs found within the ZVIs. For ease of reference, each VSR is given an identity number, which is used in all relevant tables and figures in this report. The sensitivity to changes for each VSRs are tabled in **Table 7.3**.

Table 7.3 Visual Sensitive Receivers (VSRs) and Their Sensitivity to Change

Id. No.	Key Visual Sensitive Receivers (VSRs)	Type of VSRs	Number of Individuals (Many/ Medium/ Few/ Very Few)	Quality of Existing View (Good/ Fair/ Poor)	Availability of Alternative Views (Yes/ No)	Minimum Distance between VSRs and Impact Source (m)	Degree of Visibility (Full/ Partial/ Glimpse)	Frequency of View (Very Frequent/ Frequent/ Occasional/ Rare)	Sensitivity to Change (Low, Medium, High)
C01	Parmanand House	Commercial/ Residential	Few	Fair	Yes	~40	Partial	Occasional	Medium
C02	Hai Phong Mansion	Commercial/ Residential	Few	Fair	Yes	~20	Partial	Occasional	Medium
C03	Mirador Mansion	Commercial/ Residential	Few	Fair	Yes	~80	Partial	Occasional	Medium
C04	Golden Crown Court, Cheong Hing Building and Mass Resources Development Building	Commercial/ Residential	Few	Fair	Yes	~40	Partial	Occasional	Medium
C05	Manson House and Majestic House	Commercial/ Residential	Few	Fair	Yes	~30	Partial	Occasional	Medium
C06	HSBC Building, Comfort Building, Burlington Arcade and Milton Mansion	Commercial/ Residential	Few	Fair	Yes	~30	Partial	Occasional	Medium
C07	Hotel Miramar	Commercial	Few	Fair	Yes	~10	Partial	Occasional	Medium
C08	Miramar Shopping Centre	Commercial	Very Few	Fair	Yes	~5	Partial	Occasional	Low
C09	Park Lane Shopper's Boulevard	Commercial	Very Few	Fair	Yes	~10	Partial	Occasional	Low
CDA01	CADD Redevelopment Area	Commercial	Very Few	Fair	Yes	~20	Partial	Occasional	Low
GIC01	Health Education Exhibition & Resource Centre	Institutional	Very Few	Fair	Yes	~5	Glimpse	Rare	Low
GIC02	Kowloon Mosque and Islamic Centre	Institutional	Very Few	Fair	Yes	~20	Partial	Occasional	Low
GIC03	Heritage Resource Centre of the Antiquities & Monuments Office and St. Andrew's Church	Institutional	Very Few	Fair	Yes	~50	Partial	Rare	Low
T01	Nathan Road – Vehicular and Pedestrian	Travelling	Many	Fair	Yes	0	Glimpse	Frequent	Low
O01	Open Space	Travelling	Many	Fair	Yes	0	Partial	Frequent	Medium

7.7 Landscape Impact Assessment

Sources of Landscape Impacts

Construction Phase

7.7.1 Sources of impacts in the construction phase would include:

- construction of the plant basement and Entrance A1 upgrade,
- construction of emergency exit,
- construction of satellite concourse,
- construction of subway/connection chamber,
- utilities diversions,
- temporary site access areas, site cabins and heavy machinery,
- increased road traffic congestion,
- temporary traffic arrangement,
- after dark lighting, and
- dust during dry weather.

Operation Phase

7.7.2 The sources of impacts of the project at the operational stage would be:

- Upgrade of entrance A1, and
- Emergency exit.

Nature and Magnitude of Unmitigated Landscape Impacts in Construction Phase

7.7.3 The magnitude of the impacts, before implementation of mitigation measures, on the landscape resources and character areas that would occur in the construction phase are described and tabulated in **Table 7.4**. All impacts are adverse unless otherwise stated.

7.7.4 Based on the temporary works, all OVTs are not affected by the works. The crown and root of OVTs are preserved in situ.

Table 7.4 Significant Landscape Impacts of the Proposed Works during Construction Phase

Id No.	Landscape Resources	Source of Impact	Description of Impacts	Magnitude of Impacts
LR01	Existing Planting Strip along central median of Nathan Road	Construction of : • Satellite Concourse • Subway/Connection Chamber • Temporary traffic arrangement	• There will be impact on 17 palms during construction period, all of them are *Wodyetia bufurcata*, temporary transplanting is recommended during the construction period.	Intermediate

Id No.	Landscape Resources	Source of Impact	Description of Impacts	Magnitude of Impacts
LR02	Roadside planting in front of Miramar shopping centre	Construction of Emergency exit at Subway MSC	• There are 4 trees found in the roadside planter in front of Miramar Shopping Centre. They are all *Ficus microcarpa* and one of them is OVTs. • Two more OVTs are located near by Heritage Resource Centre of the Antiquities & Monuments Office. • All the OVTs are *Ficus microcarpa*	Intermediate
LR03	Roadside planting in front of Park Lane Shopper's Boulevard	No impact	• No Impact	Negligible
LR04	Street planting along Haiphong Road	Construction of : • Plant Basement • Reconstruction of Entrance A1	• 3 trees will be affected. They are *Delonix regia* of poor amenity value. These trees are recommended to be felled as the survival rate of transplanting is considered as low. Compensatory planting is recommended that 4 nos. trees are to be planted within the area further to completion of works.	Intermediate
LR05	Entrance of Kowloon Park	Construction of : • Plant basement • Reconstruction of Entrance A1	• There will be impact on the triangular planter and the steel arch will be removed during construction stage. • There will be impact on 3 palms during construction period; all of them are *Roystonea regia* of medium amenity value. Temporary transplanting is recommended during the construction period. • There will be impact on 4 new planted trees under GMP, all of them are *Elaeocarpus apiculatus* of medium amenity value. Temporary transplanting is recommended during the construction period. • Access to Health Education Exhibition and Resource Centre will be	Intermediate

Id No.	Landscape Resources	Source of Impact	Description of Impacts	Magnitude of Impacts
			temporarily blocked during the construction period for approx. 2.5 months.	
LCA	Tsim Sha Tsui Organic Mixed Urban Development Landscape	Construction of : • Satellite concourse • Subway/connection chamber • Emergency exit • Plant Basement and Entrance A1 upgrade • Temporary traffic arrangement	• Totally 30 trees will be affected.	Intermediate

Remark : Affected trees are trees which would be felled or transplanted.

Nature and Magnitude of Unmitigated Landscape Impacts in Operation Phase

7.7.5 The magnitude of the impacts, before implementation of mitigation measures, on the landscape resources that will occur in the operation phase are slight, as only a small planting area is deducted for the proposed emergency exit. The landscape areas around Entrance A1 and the roadside planting along the central median of Nathan Road will be reinstated after construction.

Landscape and Visual Mitigation Measures in Construction and Operation Phase

7.7.6 The proposed landscape and visual mitigation measures in the construction and operation are listed in **Tables 7.5** and **7.6** below, together with an indication of Funding, Implementation and Maintenance Agencies. Generally, all landscape mitigation measures are to be implemented as early as possible. Tentative date for such implementation shall follow the programme of project works as tabled in Section 2.7.

Table 7.5 Proposed Mitigation Measures for Construction Phase

ID No.	Proposed Mitigation Measures	Funding and Implementation Agency
Landscape		
CM1[1]	Existing trees including OVTs to be retained on site shall be carefully protected and maintained during construction. Encroachment of any works close to the drip line of OVTs should be avoided.	MTRCL
CM2	Trees of high amenity and survival rate after transplanting which unavoidably affected by the works shall be transplanted where practical.	MTRCL
Visual		
CM3[1]	Control of night – time lighting.	MTRCL
CM4	Erection of decorative screen hoarding compatible with surrounding setting.	MTRCL

Note: (1) Mitigation measures refer to Good Site Practices

Table 7.6 Proposed Mitigation Measures for Operation Phase

ID No.	Proposed Mitigation Measures	Funding and Implementation Agency	Maintenance/ Management Agency
Landscape			
OM1[2]	Aesthetic design of Entrance A1 (Minimisation of building bulk and adoption of transparent material) and Emergency Exit	MTRCL	MTRCL
OM3	Planting of 4 nos. of *Delonix regia* or species as agreed with LCSD along Haiphong Road	MTRCL	LCSD
Visual			
OM2	Reinstatement of Kowloon Park entrance	MTRCL	LCSD

Note: (2) Aesthetic design treatment of Entrance A1 and Emergency Exit refers to Figure 7.5.1 to 7.5.3.

Programme of Implementation of Landscape and Visual Mitigation Measures

7.7.7 The Construction Phase Measures (CM1 to CM4) listed above shall be adopted from the commencement of construction and shall be in place throughout the entire construction period. The design principles (OM1) shall be implemented so that the measures are in place at the date of commissioning of the Project. Reinstatement of the entrance to Kowloon Park (OM2) shall be implemented upon the completion of construction.

Prediction of Significance of Landscape Impacts

7.7.8 The potential significance of landscape impacts during the construction and operation phases, before and after mitigation, is provided below in **Table 7.7**. The assessment follows the proposed methodology and assumes that the appropriate mitigation measures identified in **Tables 7.5** and **7.6** above would be implemented, and the full effect of the soft landscape mitigation measures would be realized after 10 years.

Residual Landscape Impacts in Construction and Operation Phase

7.7.9 Residual impacts of moderate to insubstantial significance are summarized as below.

Impact on Existing Trees

7.7.10 Based on detailed tree survey, during the construction period, approximately 30 trees will be affected by construction works. There are no rare species or endangered species but common species. Those trees with good amenity value and high survival rate after transplanting which unavoidably affected by the work will be transplanted where possible. Based on preliminary tree survey information, all trees to be affected are proposed to be transplanted except the 3 nos. of *Delonix regia* along Haiphong Road. Further to the completion of the construction works, the transplanted trees would be re-planted on-site. Moreover, compensatory planting of 4 nos. of trees along Haiphong Road is proposed. Detailed tree preservation, transplanting and compensatory planting proposals shall be submitted to relevant government departments for approval in accordance with ET WBTC no. 3/2006. After completion of the engineering works and implementation of tree preservation and transplanting works, the residual impacts on existing trees are considered as slight with mitigation measures.

Impact on OVTs

7.7.11 The residual impacts on OVTs are considered as insubstantial with mitigation measures as no OVTs will be affected. The crown and root of OVTs will be preserved in situ.

7.7.12 The proposed emergency exit in front of the Miramar Shopping Centre has been designed to place well away from the OVT in the roadside planter. It will be located at approximately 12m from the trunk of the OVT and approximately 5m away from its drip line. Nevertheless, appropriate protection measures for the OVT as recommended by Professor C.Y. Jim of the University of Hong Kong are proposed. Extra care will be taken to ensure that the OVT will not be unduly affected.

- Measures stipulated in the ETWB TCW No. 29/ 2004 will be followed as appropriate.
- The area will be instituted to guard against intrusion into Cordon Zone (CZ).
- The CZ should not be allowed to become a resting place, eating or recreational space for workers.
- No construction crews, vehicles or equipment should be allowed for enter the CZ.

- Construction materials and equipment should not be stored inside the CZ.
- Construction wastewater or effluent should not flow into the CZ.
- Exhaust fames and hot air emanated by construction machines should not drift into the tree crown.
- The existing concrete paving and soil within CZ should be kept intact to avoid disturbing the soil and the enclosed roots.
- As far as practicable, construction equipment with a short rig or body should be employed to avoid conflicts with the tree crown.
- Grouting will be carried out in a controlled and effective manner for the protection of tree roots along Nathan Road.
- A programme of close monitoring of tree condition before (baseline evaluation), during and for one year after completion of construction, shall be instituted at regular intervals.
- Induction seminar will be organized to coach construction workers and their supervisors of the need and the precautions to protect the tree.
- Precautionary measures, such as site inspection on tree condition, shall be conducted to protect the trees during the construction stage.

Impacts on LCA

7.7.13 The proposed work area belongs to Tsim Sha Tsui Organic Mixed Urban Development Landscape, during the construction phase there will be moderate temporary impact due to the construction activities.

7.7.14 During the operation phase, the proposed structures are relatively small in scale and less sensitive to Tsim Sha Tsui Organic Mixed Urban Development Landscape. There will not be any insurmountable impacts.

Impact on Entrance to Kowloon Park

7.7.15 During construction phase, a temporary access to Kowloon Park near Entrance A1 would be provided during construction stage. There will be minimal impact on the park users and circulation to and within Kowloon Park/ Health Education Exhibition and Resource Centre. Since the impact is temporary in nature, it is considered that the residual impact is moderate.

7.7.16 During the operation phase, the wide stairway leading to Kowloon Park (15m wide) will be permanently narrowed (approx. 2m) by the expansion of Entrance A1. The persons using this entrance throughout the day are relatively small and the reduction is width will not have any impact to the level of service of the pedestrian user. As the new disabled lift serves the Kowloon Park entrance directly from the station, substantial users will by pass the existing stairs and use the new lift.

Table 7.7 Significance of Landscape Impacts in the Construction and Operation Phases

Id. No.	Landscape Resources	Sensitivity to Change (Low, Medium, High)	Magnitude of Change (Negligible, Small, Intermediate, Large)		Impact Significance before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Impact Significance Day 1 after Mitigation (Insubstantial, Slight, Moderate, Substantial)		Impact Significance 10 years after Mitigation (Insubstantial, Slight, Moderate, Substantial)
			Construction	Operation	Construction	Operation		Construction	Operation	Operation
LR01	Existing Planting Strip along central median of Nathan Road	Medium	Intermediate	Negligible	Moderate	Insubstantial	CM2	Slight	Insubstantial	Insubstantial
LR02	Roadside planting in front of Miramar shopping centre	High	Intermediate	Small	Moderate	Slight	CM1, CM2, OM1	Slight	Slight	Slight
LR03	Roadside planting in front of Park Lane Shopper's Boulevard	High	Negligible	Negligible	Negligible	Negligible	Not required	Negligible	Negligible	Negligible
LR04	Street planting along Haiphong Road	High	Intermediate	Small	Moderate	Slight	CM1, CM2, OM1, OM3	Slight	Slight	Insubstantial
LR05	Entrance of Kowloon Park	Medium	Intermediate	Small	Moderate	Slight	CM1, CM2, OM1, OM3	Moderate	Slight	Slight
LCA	Tsim Sha Tsui Organic Mixed Urban Development Landscape	Low	Intermediate	Negligible	Moderate	Insubstantial	CM1, CM2, OM1, OM3	Moderate	Insubstantial	Insubstantial

7.8 Visual Impact Assessment

Potential Sources of Visual Impacts

7.8.1 The sources of visual impacts due to the Project would create varying levels of visual impact during the construction and operation phases. The main sources of visual impacts of proposed MTR Tsim Sha Tsui Station Northern Subway consists of the followings in the construction and operation phases:

Construction Phase

- Construction of the plant basement and Entrance A1 upgrade;
- Emergency exit in front of Miramar Shopping Centre;
- Construction of satellite concourse during construction period; and
- Construction of subway / connection chamber.

Operation Phase

- Upgrade of entrance A1 (proposed transparent glass structure is to be built at the junction of Nathan Road and Haiphong Road); and
- Emergency exit.

Visual Mitigation Measures

7.8.2 The proposed Visual Mitigation Measures in the Construction and Operation Phases are summarized in **Tables 7.5** and **7.6**, together with an indication of Funding, Implementation, Management and Maintenance Agencies.

Prediction of Significance of Visual Impacts

7.8.3 An assessment of the potential significance of the visual impacts during the construction and operation phases, before and after mitigation is provided in detail in **Table 7.8**. This follows the methodology outlined in Section 7.3 and assumes that the appropriate mitigation measures identified in **Tables 7.5** and **7.6** above would be implemented, and that the full effect of the soft landscape mitigation measures would be realized after ten years.

Residual Visual Impacts

Construction Phase

7.8.4 Residual visual impacts in the Construction Phase are listed out in **Table 7.8**. In the Construction Phase, after the implementation of proposed mitigation measures, there will still be some residual visual impacts as shown in **Table 7.8**.

Operation Phase

7.8.5 Residual visual impacts in the Operation Phase are listed out in **Table 7.8**. Photomontages showing the residual impact are shown in **Figure 7.4.1** to **7.4.3**. In the Operation Phase, after the implementation of proposed mitigation measures, there will still be some residual visual impacts as shown in **Table 7.8**.

Conclusion on Visual Impact Assessment

During the construction period

7.8.6 The residents, pedestrian, vehicle users, offices and commercial buildings around will have direct, close views of construction works including the plant basement, upgrading works for Entrance A1, satellite concourse, connection chamber and emergency exit. During the construction period, decorative hoardings, use of temporary decking and limiting the area of the work site are proposed to establish to minimize the visual affect. There is expected to be moderate residual impact to Nathan Road users and Kowloon Park Users. Impacts on other VSRs are considered as slight to insubstantial.

During the operation period

7.8.7 The proposed transparent glass box of Entrance A1 will reduce the bulky effect of the new structure (See **Figure 7.4.1**). It is considered that the new Entrance A1 is compatible with the adjacent urban setting.

7.8.8 Proposed emergency exit is proposed within the planter in front of Miramar Shopping Centre and is integrated with the exiting planter. The stair is level with the planter wall to reduce the visual impacts to the ground level shops at Miramar Shopping Centre and the sightline problems to vehicle users on Nathan Road (See **Figure 7.4.2** and **7.4.3**). There will not be any significant visual impact.

7.8.9 As a whole, the residual impacts on VSRs are slight to insubstantial.

Table 7.8 Significance of Visual Impacts in the Construction and Operation Phases (Note: All impacts adverse unless otherwise noted.)

Id No	Key Visual Sensitive Receiver (VSR)	Receptor Sensitivity (Low, Medium, High)	Main Source of Visual Impacts	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Impact Significance without Mitigation Measures (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance with Mitigations (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
				Construction	Operation	Construction	Operation			Day 1	Year 10
C01	Parmanand House	Medium	Reconstruction of Entrance A	Negligible	Negligible	Insubstantial	Insubstantial	Not required	Insubstantial	Insubstantial	Insubstantial
C02	Hai Phong Mansion	Medium	Reconstruction of Entrance A	Small	Small	Moderate	Moderate	CM3, CM4, OM2	Slight	Slight	Slight
C03	Mirador Mansion	Medium	Reconstruction of Entrance A	Negligible	Negligible	Insubstantial	Insubstantial	Not required	Insubstantial	Insubstantial	Insubstantial
C04	Golden Crown Court, Cheong Hing Building and Mass Resources Development Building	Medium	Reconstruction of Entrance A	Small	Small	Slight	Slight	CM3, CM4, OM2	Slight	Slight	Slight
C05	Manson House and Majestic House	Medium	Reconstruction of Entrance A Construction of satellite concourse Construction of subway/ connection chamber	Small	Small	Slight	Slight	CM3, CM4, OM2	Slight	Slight	Slight
C06	HSBC Building, Comfort Building, Burlington Arcade and Milton Mansion	Medium	Reconstruction of Entrance A Construction of satellite concourse Construction of subway/ connection chamber	Small	Small	Slight	Slight	CM3, CM4	Slight	Slight	Slight

Id No	Key Visual Sensitive Receiver (VSR)	Receptor Sensitivity (Low, Medium, High)	Main Source of Visual Impacts	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Impact Significance without Mitigation Measures (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance with Mitigations (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
				Construction	Operation	Construction	Operation			Day 1	Year 10
C07	Hotel Miramar	Medium	Construction of Emergency Exit Construction of satellite concourse Construction of subway/ connection chamber	Small	Small	Slight	Slight	CM3, CM4	Slight	Slight	Slight
C08	Miramar Shopping Centre	Low	Construction of Emergency Exit Construction of satellite concourse Construction of subway/ connection chamber	Small	Small	Slight	Slight	CM3, CM4	Slight	Slight	Slight
C09	Park Lane Shopper's Boulevard	Low	Construction of satellite concourse Construction of subway/ connection chamber	Small	Small	Slight	Insubstantial	CM3, CM4	Slight	Insubstantial	Insubstantial
CDA01	CADD Redevelopment Area	Low	Construction of Emergency Exit Construction of satellite concourse Construction of subway/ connection chamber	Small	Negligible	Slight	Insubstantial	CM3, CM4	Slight	Insubstantial	Insubstantial

Id No	Key Visual Sensitive Receiver (VSR)	Receptor Sensitivity (Low, Medium, High)	Main Source of Visual Impacts	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Impact Significance without Mitigation Measures (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance with Mitigations (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
				Construction	Operation	Construction	Operation			Day 1	Year 10
GIC01	Health Education Exhibition & Resource Centre	Low	Reconstruction of Entrance A	Negligible	Negligible	Insubstantial	Insubstantial	CM3, CM4, OM2	Insubstantial	Insubstantial	Insubstantial
GIC02	Kowloon Mosque and Islamic Centre	Low	Reconstruction of Entrance A Construction of satellite concourse Construction of subway/ connection chamber	Small	Small	Slight	Slight	CM3, CM4, OM2	Slight	Slight	Insubstantial
GIC03	Heritage Resource Centre of the Antiquities & Monuments Office and St. Andrew's Church	Low	Construction of Emergency Exit	Negligible	Negligible	Insubstantial	Insubstantial	CM3, CM4,	Insubstantial	Insubstantial	Insubstantial
T01	Nathan Road – Vehicular and Pedestrian	Low	Reconstruction of Entrance A Construction of Emergency Exit Construction of satellite concourse Construction of subway/ connection chamber	Intermediate	Small	Moderate	Slight	CM3, CM4, OM2	Moderate	Slight	Insubstantial

Id No	Key Visual Sensitive Receiver (VSR)	Receptor Sensitivity (Low, Medium, High)	Main Source of Visual Impacts	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Impact Significance without Mitigation Measures (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance with Mitigations (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
				Construction	Operation	Construction	Operation			Day 1	Year 10
O01	Open Space Users in Kowloon Park	Medium	Reconstruction of Entrance A Construction of satellite concourse Construction of subway/ connection chamber	Intermediate	Intermediate	Moderate	Moderate	CM3, CM4, OM2	Moderate	Slight	Insubstantial

* C = Commercial, GIC = Government/Institution/Community, CDA = Comprehensive Development Areas, T = Transport related (land)

7.9 Conclusion

7.9.1 The Project is located in Tsim Sha Tsui district which is an urban area with mixture of commercial and residential developments. The proposed works are along Nathan Road from Cameron Road junction to Miramar Shopping Centre near Kimberley Road.

7.9.2 No significant impact on the planning and development control framework as the affected areas are small and the proposed development are compatible with the adjacent development framework.

7.9.3 There are approximate 30 trees affected during the construction period and none of them are OVTs. The crown and root of OVTs shall be preserved insitu. Based on preliminary tree survey information, all affected trees except 3 nos. at Haiphong Road shall be transplanted. Compensatory planting is proposed for the felled trees. A detailed tree preservation, transplanting and compensatory planting proposals will be submitted to relevant government department for approval in accordance ET WBTC no. 3/2006 separately.

7.9.4 The proposed work area belongs to Tsim Sha Tsui Organic Mixed Urban Development Landscape Character. During the construction, there will be moderate residual impact due to the temporary works. During operation, the residual impact will be insubstantial as the proposed works blend in well with the existing urban landscape character.

7.9.5 During construction phase, a temporary access to Kowloon Park near Entrance A1 would be provided during construction stage. There will be minimal impact on the park users and circulation to and within Kowloon Park/ Health Education Exhibition and Resource Centre. Since this impact is temporary in nature, it is considered that the residual impact is moderate.

7.9.6 During the operation phase, the stairway to Kowloon Park will be reduced by about 2m by the new Entrance A1 Upgrade structure. As the existing stairway is 15m wide and pedestrian using this area is relatively low, the impact is considered as slight.

7.9.7 The residents, pedestrian, vehicle users, offices and commercial buildings around will have direct, close views of construction of the works including satellite concourse, connection chamber, reconstruction of plant basement and Entrance A1 and emergency exit. During the construction period, decorative hoardings and the use of temporary decking and by limiting the area of the work site are proposed to minimize the visual affect. There is expected to be slight to insubstantial to high rise VSRs and moderate to low level VSRs such as Nathan Road users and Kowloon Park users.

7.9.8 Overall, it is considered that the residual landscape and visual impacts of the proposed project are considered acceptable with mitigation measures during construction and operation.

8. BUILT HERITAGE IMPACT ASSESSMENT

8.1 Introduction

8.1.1 This section will identify and assess any adverse impacts to any heritage resources within the project Study Area and propose measures to avoid and/ or mitigate these impacts. All heritage resources will be identified as part of the Built Heritage Impact Assessment (BHIA) with special attention paid to the following known structures; The Former Kowloon British School (Declared Monument), Block S4 of the Former Whitfield Barracks (Grade III Historical Building) and the old retaining wall on Haiphong Road. The assessment will follow the Criteria and Guidelines for Assessing the Cultural Heritage Impacts as Stated in Annex 10 and 19 of the Technical Memorandum of the EIAO. Any potential physical disturbance during both the Construction and Operational Phases will be identified and the extent of the effects will be assessed and measures recommended for avoidance of any such identified disturbance through alternative design options and construction methods where applicable.

8.2 Environmental Legislation and Standards

8.2.1 Legislation, Standards, Guidelines and Criteria relevant to the consideration of Cultural Heritage impacts under this study include the following:

- Antiquities and Monuments Ordinance
- Environmental Impact Assessment Ordinance
- Hong Kong Planning Standards and Guidelines
- Technical Memorandum on Environmental Impact Assessment Process
- Criteria for Cultural Heritage Impact Assessment

Antiquities and Monuments Ordinance

8.2.2 The Antiquities and Monuments Ordinance (Cap.53) provides the statutory framework to provide for the preservation of declared monuments. The Ordinance also contains the statutory procedures for the declaration of monument which can be any place, building, site or structure, which the Antiquities Authority considers to be of public interest by reason of its historical, archaeological or palaeontological significance.

8.2.3 Under Section 6 and subject to sub-section (4) of the Ordinance, the following acts are prohibited in a proposed monument or monument, except under permit;

- To excavate, carry on building works, plant or fell trees or deposit earth or refuse on or in a proposed monument or monument.
- To demolish, remove, obstruct, deface or interfere with a proposed monument or monument.

8.2.4 The discovery of an Antiquity, as defined in the Ordinance must be reported to the Antiquities Authority (the Authority), or a designated person. The Ordinance also provides that, the ownership of every relic discovered in Hong Kong after the commencement of this Ordinance shall vest in the Government from the moment of discovery. The Authority on behalf of the Government may disclaim ownership of the relic.

Hong Kong Planning Standards and Guidelines

8.2.5 Chapter 10 of the HKPSG details the principles of conservation, the conservation of natural landscape and habitats, historic buildings and archaeological sites. It also addresses the issue of enforcement. The appendices list the legislation and administrative controls for conservation, other conservation related measures in Hong Kong, and Government departments involved in conservation. It also intones that planning should include a respect for local activities, culture and tradition.

Technical Memorandum on Environmental Impact Assessment Process

8.2.6 The general criteria and guidelines for evaluating and assessing impacts to Cultural Heritage are listed in *Annexes 10 and 19 of the Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM). The guidelines state that preservation in totality and measures for the integration of sites of cultural heritage into the proposed project will be a beneficial impact. It also states that destruction of a site of cultural heritage must only be undertaken as a last resort.

Criteria for Built Heritage Impact Assessment

8.2.7 This document, as issued by the Antiquities and Monuments Office (AMO), outlines the specific technical requirement for conducting terrestrial archaeological and built heritage impact assessments (BHIA). It includes the parameters and scope for the Baseline Study, specifically desk-based research, field survey and the reporting requirements. Besides, the prerequisite conditions for conducting impact assessment and mitigation measures are presented in detail.

8.3 Assessment Methodology

Baseline Study

8.3.1 A desk-based study was undertaken to determine the presence of historical occupation of the Study Area and thus to assess the potential for built heritage resources to be present. Information was gathered from the following sources; the AMO published and unpublished papers and studies; publications on relevant historical, anthropological and other cultural studies; unpublished archival, papers, records; collections and libraries of tertiary institutions; historical documents which can be found in Public Records Office, Lands Registry, District Lands Office, District Office, Museum of History; cartographic and pictorial documentation.

8.3.2 In addition to the desk-based review, in cases where the sources of information proved to be inadequate or where the project area had not been adequately studied before, field survey was conducted to assemble the necessary data.

Study Area

8.3.3 As there was no project study boundary listed in the project brief, a study area with 300 meter boundary was made reference to previous approved railway EIA Studies i.e. Kowloon Southern Link and Western Island Line. It was chosen to ensure that a comprehensive inventory of all historical buildings that could possibly be affected by the proposed works would be included in the report.

Resources to be Covered by the Built Heritage Impact Assessment

8.3.4 The resources shall include, but will not be limited to the following;

- All pre 1950 structures, which include any built feature (apart from graves and historical land use features, which are dealt with separately), such as domestic structures, ancestral halls, temples, shrines, monasteries and nunneries, village gates, wells, schools, historic walls, bridges and stone tablets;
- Any post 1950 structure deemed to possess features containing architectural or cultural merit;
- All Declared and Proposed Monuments and Graded Historical Buildings as issued by the AMO;
- All Government Historic Sites Identified by AMO;
- All pre-war clan graves; and
- Cultural landscape features, such as fung shui woods and ponds, historical tracks and pathways, stone walls and terraces, ponds and other agricultural features.

Impact Assessment and Mitigation Recommendations

8.3.5 Prediction and Identification of both direct and indirect impacts that may affect the built heritage resources within the project Area will be undertaken with special attention paid to the built heritage resources identified in the project Study Brief. Preservation in totality must be taken as the first priority. If, due to site constraints and other factors, only preservation in part is possible, this must be fully justified with alternative proposals or layout designs which confirm the impracticability of total preservation. Mitigation measures shall not be recommended or taken as de facto means to avoid preservation of heritage sites. They must be proved beyond all possibilities to be the only practical course of action. If avoidance of the heritage site is not possible, amelioration can be achieved by minimizing the potential impacts. As well, any disturbance to heritage resources that may cause physical damage should be avoided wherever possible through alteration of design, construction method or protective measures as appropriate.

8.4 Results of the Desk Based Study

Previous Investigations

Kowloon Southern Link - Contract No GSA-5100: EIA and Associated Services: Cultural Heritage Impact Assessment (Archaeological Assessments Ltd 2003)

8.4.1 The built heritage impact assessment for the project included the Study Area for the current project. The built heritage resources associated with the Former Whitfield Barracks were included in the field survey as was the Former Kowloon British School, the Fuk Tak Koo Mui Temple (a modern temple building located near the corner of Canton and Haiphong Roads), St. Andrew's Church Compound, a 1930's high rise structure at #190 Nathan Road and the historical retaining wall and War Department Boundary Stone at the Southwest Corner of Kowloon Park.

Agreement No CE 39/2002(DS) Drainage Improvement in East Kowloon - Cultural Heritage Impact Assessment (Archaeological Assessments Ltd 2004)

8.4.2 The built heritage impact assessment for this project included the South-eastern sections of the current project Study Area. The report identifies the following built heritage resources found in the current project Study Area; The Former Kowloon British School, The Hong Kong Observatory, St. Andrew's Church Compound and the building at #190 Nathan Road.

Historical Background

8.4.3 The historical village of Tsim Sha Wai is thought to have been situated in the vicinity of Hanoi Road, with the remainder of the southern part of the peninsula consisting of open hilly terrain with the southern section described as a "rocky and precipitous" southern shore with a sandy shore running between the promontories that were to become the site of the Marine Police Station (Water Police Station in the 19th Century) and Signal Hill (Hayes 1966). In general it can be stated that the earliest British occupation was primarily for military purposes, as can be seen in the large portions of the district that were controlled by the War Department at the time, including the Former Whitfield Barracks, which ceased military ownership in 1967 and is currently Kowloon Park.

Declared Monuments and Graded Historical Buildings

8.4.4 The following inventory of Declared Monuments was compiled using the list of Declared Monuments as issued by the Antiquities and Monuments Office as of 11 July 2008.

The Former Kowloon British School

8.4.5 The building currently houses the Antiquities and Monuments Office of LCSD. The building was originally constructed in 1900 as a school for foreign residents living in Hong Kong through a donation of $15 000 by Sir Robert Ho Tung. The school is Victorian style structure modified to accommodate the local climate through addition of wide verandahs, high ceilings and pitched roofs. It was officially opened in 1902 (AMO File).

The Hong Kong Observatory

8.4.6 The Hong Kong Observatory is a colonial style building built in 1883. It is a rectangular two storey building with arched windows, columns and long verandahs (Rodwell 1992). It is currently being used as an administrative centre for the observatory (AMO File).

Whitfield Barracks, Kowloon West II Battery (Grade I Historical Building)

8.4.7 The West Battery is currently part of a children's adventure playground in Kowloon Park. The battery was constructed between 1878 and 1899 and probably abandoned in 1916. The battery still retains original features, such as renovated gun emplacements and 5 inch breech loading naval guns that were discovered during works in Chatham Road in 1980 (AMO File).

St. Andrew's Church Compound (Grade II Historical Building)

8.4.8 The church was completed in 1906. It is a cruciform shaped structure with a bell tower at the front of typical Gothic style architecture with pointed arches and arched windows. The church is the oldest Protestant Church in Kowloon. During the Japanese Occupation it was converted into a Shinto Shrine. The church was restored in 1959 and a multi-storied Christian Centre was constructed in 1977 (AMO File).

Whitfield Barracks Blocks 58, S4, S61 and S62 (Grade III Historical Buildings)

8.4.9 The site of the former Whitfield Barracks is now the location of Kowloon Park. The barracks were established in 1861 and the buildings constructed in the 1880's. There are four remaining former barracks buildings, S61 and S62 were originally constructed by 1910 and served as the Hong Kong Museum of History from 1983 to 1998, they have recently been converted into the Hong Kong Heritage Discovery Centre, Block S4 is currently being used as an educational centre (it should be noted that two granite columns removed from the former building belonging to the Eu Yan Sang Medicine Company have been relocated to the platform in front of Block S4 at 1992). and Block 58 was used as storage for the Hong Kong Museum of History (AMO File). The principal Eu Yan Sang shop was located at Queen's Road Central at 1926 which was moved from the 1st Bonham Strand shop. At that time, there was a silver knight statue and a pair of rock lions (together with two columns) at the entrance which made the characteristic landmark of the shop. At 1992, this principal shop was moved to the opposite of the road and the current pair of columns was relocated to the front entrance of the Health Education Exhibition Centre (S4).

Non-Graded Built Heritage Resources

8.4.10 There is an historical retaining wall running along Northern side of Haiphong Road. An interesting feature located at the south west corner of the retaining wall on Haiphong Road is a War Department Boundary Marker, showing the location of the exact southwest corner of the original Whitfield barracks, one of the earliest mapped lots in Kowloon (AMO Files).

8.4.11 The Fuk Tak Koo Mui Temple is a modern structure located behind the temporary market at the western end of Haiphong Road.

8.4.12 The 1930's high rise structure at the corner of Nathan and Austin Roads has ground floor walls that are covered by modern material. The 3 upper stories are covered in render designed to imitate masonry. The north facing wall has a balcony on each of the upper floors. There is a canopy over the top balcony.

8.5 Results of the Field Survey

8.5.1 All of the project Study Area was covered by the field survey for the BHIA, no additional built heritage resources were identified apart from those listed in the desk-based study. A catalogue of the resources as surveyed for the project can be found in **Appendix 8.2**. All resources apart from the Hong Kong Observatory (due to restricted access) were covered by the field survey. 1:1000 scale maps showing the boundary of all of the resources can be found in **Annex 1** through **5** in **Appendix 8.1**.

8.6 Prediction and Identification of Impacts

Construction Phase

8.6.1 Blasting and tunnel boring machine has been ruled out for the construction of the proposed subway or associated works. For the construction of the plant basement and satellite concourse, a temporary cofferdam wall will be formed using sheet piles to be installed by non-vibratory piler, while other piling works will include "bored piles" type.

8.6.2 As indentified in Section 8.5, there is a heritage building presently in use as an Education Centre is comprised of two parts ~ the Heritage Structure (which defined as the brick-built structure) and a Modern Extension built in r.c. partly over the existing Entrance A1 subway, which we have not considered to be part of the Heritage Structure. The Heritage Structure can itself be divided into two portions. The section, nearer to the modern extension, that has been retrofitted with steel beams, as part of the conversion to its modern use, through the external walls below the roof structure and are supported on independent steel columns on pad footings outside the building. The second part is further away from the planned construction works and has not been modified.

8.6.3 Proximity of the excavation for the plant basement is close to the heritage structure and there is a possibility that settlement can occur if works are not carried out cautiously. The excavation for the plant basement will be firmly supported to minimise any movement that will be induced from soil movement. The historical building Block S4 has already been subjected to dewatering and settlement from TST Station construction in the 1976 to 1979 (these settlements are largely irreversible and can not be generated again by lowering the water table to the same extent). However, it is proposed that the ground water table shall be maintained to its present level around the structure during construction to eliminate the potential for settlement. Furthermore, during the 1979 construction, there is a line of piles left in place from the 1979 works (between the subway structure and the heritage structure) creating a stiff wall between the plant basement excavation and the heritage structure thereby reducing any potential for settlement. The existing A1 subway structure is also very stiff and will also act as a reinforcing beam to reduce any further ground movement anticipated in the area.

8.6.4 Section of the building which is composed of a modern extension and the (brick) heritage structure and supplementary steel props will adapt itself to any settlement (which is considered to be minimal) without any dramatic events.

8.6.5 On the other hand, potential visual impact to the built heritage resources may arise due to construction works at surface.

Operation Phase

8.6.6 The upgrading and construction of above ground entrances have the potential to have adverse visual impacts on the environmental setting of built heritage resources.

8.7 Evaluation of Impacts

Construction Phase

8.7.1 The following built heritage resources have been identified in the project Study Area, and is within 300 metres of the proposed works area, see **Table 8.1**. The layout plan for the proposed works can be found in the Subway Layout Plan, **Figure 2.1**.

Table 8.1: Distance of the Identified Resources in the Project Study Area from the Proposed Works

Resource	Map Ref in Appendix 8.1	*Closest distance to works boundary, m [1, 2,3]
Block S4 (Former Whitfield Barracks) (NRS-05) [1]	**Annex 1**	5
Block 58 (Former Whitfield Barracks) (NRS-06) [1]	**Annex 1**	150
Block S61 and S62 (Former Whitfield Barracks) (NRS-07a and b) [1]	**Annex 2**	170
Retaining wall of the Former Whitfield Barracks (NRS-08) [1]	**Annex 1**	5
War Department Boundary Stone marker (NRS-09) [2]	**Annex 1**	270
Fuk Tak Koo Mui Temple (NRS-10) [2]	**Annex 1**	170
Former Kowloon West II Battery (NRS-11) [2]	**Annex 3**	260
Former Kowloon British School (NRS-12) [1]	**Annex 4**	60
St. Andrew's Church (NRS-13) [2]	**Annex 4**	125
Hong Kong Observatory (NRS-14) [2]	**Annex 4**	140
Building at 190 Nathan Road (NRS-15) [2]	**Annex 5**	240

Note:
[1] Resources specifically required for detailed assessment under ESB
[2] Supplementary background information in the area for the public
[3] Approximate horizontal distance to the closest works location i.e. piling or excavation locations but not the site hoarding boundary.

8.7.2 From **Table 8.1,** the majority of the built heritage resources are located far away from the proposed construction works, i.e. they are situated between 60 and 270 metres away. Other than NRS-05 and NRS-08, all other identified resources are located at a significant distance away from the project and therefore will not be impacted upon by the proposed construction works.

8.7.3 The resources NRS-05 and NRS-08 i.e. Block S4 of the former Whitfield Barracks and the retaining wall of the Former Whitfield Barracks are located in close proximity to the proposed works area of the Plant Basement. Section 8.6 has identified the settlement and visual impacts.

8.7.4 As mentioned above, Block S4 (Heritage structure) has undergone various degrees of modification and modernization. The heritage section has been modernised with structural beams. The current façade of the building is a modern addition and windows are modern along the sides of the building. The construction works will require the temporary removal of the two columns (east of brick wall of modern extension). The two granite columns will be stored securely during construction period, and reinstated back to its original location after completion of works. Hence, the impact will be minimized.

8.7.5 The excavation of the plant basement could induce settlement around the heritage building, as there is an existing line of piles from 1979 MTR construction including the existing entrance A1 subway which acts as a stiff reinforcing beam, anticipated settlement is considered minimal. With a ground water regime to maintain the ground water draw-down around the present level, no settlement from dewatering of the plant basement is expected.

8.7.6 Precautions shall be taken throughout the constructions stage to prevent any damage to the historical building. Moreover, MTRCL is required to instigate an assurance system and control scheme to ensure the management of the construction works are at a standard not inferior to that required under the Building Ordinance.

8.7.7 There is a potential temporary visual impact from the cut-and-cover construction works which could be minimized by erecting sensitively designed hoardings.

Operation Phase

8.7.8 The Block S4 of the former Whitfield Barracks, which is used as the Health Education Exhibition and Resource Centre, is situated in close proximity to the site of the proposed upgrading of the existing MTR Entrance A1 of the Tsim Sha Tsui MTR Station (less than 20 metres). The photomontage for the Entrance A1 Upgrade is shown in **Figure 8.1**. No adverse visual impacts will arise from the operation of the upgraded entrance based upon the following assessment:

- The current surroundings of Block S4 outside of Kowloon Park do not have any historical connection with the historical function of the structure as part of the Whitfield Barracks and the proposed upgrading of the entrance will not impact on any resources associated with the former Whitfield Barracks;
- Block S4 is a renovated historical structure and the current façade of the building is a modern addition;
- The upgraded Entrance A1 will not alter the existing character of the urban setting of Block S4, photographs of the existing environment are provided in **Plates 1** through **4** in **Appendix 8.3**;

8.7.9 As the modified Entrance A1 is situated approximately 330 metres from the Former Kowloon British School, it will not have any adverse impacts on this recorded resource. Entrances Q1, Q2 and Q3 are all situated underground and will have no visual impacts at ground level. A map showing the location of the identified built heritage resources can be seen in **Annex 6** in **Appendix 8.1**.

8.7.10 The old retaining wall on Haiphong Road is not a visually sensitive structure and will not be adversely impacted by Entrance A1 during the operation phase.

8.8 Mitigation Recommendations

Construction Phase

8.8.1 Temporary visual impact during construction phase could be minimized by the use of sensibly designed hoardings. Regarding the construction near the historical buildings, the impacts has identified as minimal. However, precautions shall be taken throughout the constructions stage to prevent any damage to the historical building. Moreover, MTRCL is required to instigate an assurance system and control scheme to ensure the management of the construction works are at a standard not inferior to that required under the Building Ordinance.

8.8.2 In addition, before the commencement of the construction work, the Contractor shall also consult AMO on any other mitigation measures that would be required administratively or under Antiquities and Monuments Ordinance. The Contractor shall implement these requirements from AMO during the construction period. Method statement of the removal/reinstate works for two granite columns should be agreed with AMO by the Contractor.

Operation Phase

8.8.3 No adverse impacts to the identified resources are anticipated during the operation phase of the project and hence no mitigation measures will be required.

8.9 Conclusions

8.9.1 The proposed works will not cause any insurmountable adverse impacts if the mitigation measures as presented are adopted. The Contractor will be responsible for implementing the recommended measures.

9. ENVIRONMENTAL MONITORING AND AUDIT (EM&A) REQUIREMENTS

9.1 Introduction

9.1.1 This EIA Study has focused on the assessment of the identified potential impacts and recommended necessary mitigation measures associated with the construction and operation of the Project.

9.1.2 To ensure effective and timely implementation of the recommended mitigation measures, it is considered necessary to develop EM&A procedures and mechanisms in order to alleviate those residual impacts to comply with the requirements of the EIAO-TM.

9.1.3 This chapter provides an outline of the EM&A requirements for the Project. A detailed scope of work will be provided in the EM&A Manual, prepared in accordance with Annex 21 of the EIAO-TM and EPD's EM&A Guidelines for Development Projects in Hong Kong.

9.1.4 The objectives of carrying out EM&A for the Project include the following:

- to provide a database against which any short or long term environmental impacts of the Project can be determined;
- to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- to monitor the performance of the Project and the effectiveness of mitigation measures;
- to verify the environmental impacts predicted in this EIA;
- to determine project compliance with regulatory requirements, standards and government policies;
- to take remedial action if unexpected problems or unacceptable impacts arise; and
- to provide data to enable an environmental audit.

9.1.5 The following sections summarise the recommended EM&A requirements. Details of EM&A are provided in a stand-alone EM&A Manual.

9.2 Construction Air Quality Impact

9.2.1 No exceedances of the HKAQO criteria were predicted at ASRs in the vicinity of the construction sites. With implementation of the proposed dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation, good site practices and regular dust monitoring and audit, the potential dust impact would be minimized and comply with HKAQO.

9.2.2 Dust monitoring requirements are recommended in the EM&A Manual to ensure the efficiency of the control measures.

9.3 Noise Impact

Construction Phase

9.3.1 An EM&A programme is recommended to be established according to the predicted occurrence of noisy activities. All the recommended mitigation measures for daytime normal working activities shall be incorporated into the EM&A programme for implementation during construction. Details of the programme are provided in the stand-alone EM&A Manual.

Operation Phase

9.3.2 Any necessary mitigation measures would be implemented to ensure the compliance of the operation noise levels with the EIAO-TM noise criteria.

9.4 Construction Water Quality Impact

9.4.1 The water quality assessment concluded that the identified water quality impacts can be minimized by implementing the recommended mitigation measures for the construction works, such as control measures on site runoff and drainage from the works areas and proper site management and good housekeeping practices. No unacceptable residual water quality impact was expected and hence water quality monitoring was considered not necessary during the construction phase. Any effluent discharges from the site would be required to comply with the terms and conditions of a discharge licence, issued by EPD, under the WPCO. It is recommended that regular site inspections be undertaken during the construction activities and works areas in order to ensure the recommended mitigation measures are properly implemented.

9.5 Waste Management

9.5.1 Waste management will be the contractor's responsibility to ensure that all wastes produced during the construction of the Project are handled, stored and disposed of in accordance with the recommended good waste management practices and EPD's regulations and requirements. The mitigation measures recommended in Section 6 shall form the basis of the site Waste Management Plan to be developed by the Contractor at the construction stage.

9.5.2 It is recommended that the waste generated during the construction shall be audited periodically to determine if wastes are being managed in accordance with approved procedures and the site Waste Management Plan. The audits shall look at all aspects of waste management including waste generation, storage, transport and disposal. An appropriate audit programme will need to be undertaken. In addition, the routine site inspections shall check the implementation of the recommended good site practices and other waste management mitigation measures.

9.6 Landscape and Visual Impact

Construction Phase

9.6.1 Based on detail tree survey, during the construction period, approximately 30 trees will be affected due to the construction of MTR Tsim Sha Tsui Station Northern Subway. None of the OVTs are affected by the works. Appropriate protection measures will be implemented for the OVT near the proposed

Emergency Exit in front of the Miramar Shopping Centre. Those affected trees with good amenity value and high survival rate after transplanting which are unavoidably affected by the work will be transplanted where possible. Detailed tree preservation, transplanting including compensatory planting proposals shall be submitted to relevant government departments for approval in accordance with ET WBTC no. 3/2006.

9.6.2 The proposed work area belongs to Tsim Sha Tsui Organic Mixed Urban Development Landscape, during the construction phase, although the proposed work is not high sensitive to this zone, there will be moderate residual impact due to the temporary works.

9.6.3 Health Education Exhibition and Resource Centre can be accessed from Kowloon Park by two entrances, during construction phase, one of the entrances nearby Entrance A1 to Kowloon Park will be blocked for approximate 2.5months, slightly inconvenience to the park and exhibition centre users may occur, the residual impacts are considered as moderate.

Operation Phase

9.6.4 The residual impacts on existing trees are considered as insubstantial.

9.6.5 The impacts on entrance to Kowloon Park during operation phase are considered as slight with mitigation measures as reinstatement will be provided.

9.6.6 The overall visual impact to the VSRs are considered as slight to insubstantial, with mitigation measures, as the proposed structures are low and with aesthetic facades.

9.7 Built Heritage Impact

9.7.1 It is recommended to use appropriately designed hoardings to minimise the potential temporary visual impacts from the cut-and-cover construction in the vicinity of the two identified resources i.e. Block S4 of the former Whitfield Barracks and the retaining wall of the Former Whitfield Barrack. Regarding the construction near the historical buildings, the impacts has identified as minimal. However, precautions shall be taken throughout the constructions stage to prevent any damage to the historical building. Moreover, structural monitoring system, including pre-construction survey shall be designed and implemented by a Registered Structural Engineer from the Contractor to ensure compliance with the Building Ordinance.

9.7.2 EM&A requirements for landscape and visual impacts will also be applicable for the protection of heritage resources.

10. CONCLUSIONS AND RECOMMENDATIONS

10.1.1 This EIA Report has provided an assessment of the potential environmental impacts associated with the construction and operation phases of the Tsim Sha Tsui Station Northern Subway Project.

10.1.2 The identified key environmental issues below have been assessed in this EIA report, in accordance with the EIA Study Brief (No. ESB-168/2007) registered under the EIAO for the Project:

- Construction air quality impact;
- Noise impact;
- Construction water quality impact;
- Waste management impact;
- Landscape and visual impact; and
- Built heritage impact.

10.1.3 The findings of this EIA study have determined the likely nature and extent of environmental impacts predicted to arise from the construction and operation of the Project. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards.

10.1.4 Overall, the EIA study for the proposed Project, with the implementation of the proposed mitigation measures for construction and operation phases, would comply with all applicable environmental standards and legislation except construction noise impact.

10.1.5 Residual noise impacts during daytime construction are predicted at certain NSRs. Exceedances of the EIAO-TM criterion of 75 dB(A) are in a range of 1 to 4 dB(A).

10.1.6 **Table 10.1** summarises the environmental outcomes that have accrued from environmental considerations and analysis during the EIA process and implemented in design of the Project and the recommended mitigation measures. Environmental monitoring and audit mechanisms have been recommended, where necessary, to verify the accuracy of the EIA predictions and the effectiveness of recommended mitigation measures.

Table 10.1 Summary of Key Environmental Outcomes

Key Environmental Issue	Environmental Outcomes and Mitigation Measures
Population Benefited and Environmental Sensitive Areas Protected	
Population Benefited	The proposed Project is located in the urban area of Tsim Sha Tsui along Nathan Road of section from Haiphong Road to Miramar Shopping Centre near Kimberley Road junction. The population benefitted from the mitigation measures recommended in this EIA Study are dominantly the residential and commercial sensitive receivers of the high rise buildings in the close proximity to the works areas.
Environmentally Sensitive Receivers Protected	Sensitive receivers along the proposed works areas have been identified including residential buildings, commercial buildings, service apartment, hotels, shops, religionary, G/IC

Key Environmental Issue	Environmental Outcomes and Mitigation Measures
	and heritage buildings. A package of mitigation measures has been recommended to protect these sensitive receivers to the maximum practicable extent. Referring to the assessment results, all sensitive receivers can be protected to meet the relevant criteria during the operation phase. Residual environmental impacts are not anticipated except there would be residual construction noise impacts at some of the noise sensitive receivers with exceedances by 1 to 4 dB(A) for short term even after exhausting all practicable direct noise mitigation measures. A community liaison channel to be set up would handle any public enquiry and complaint.
Key Environmental Problems Avoided	
Avoidance or Minimization of Above-Ground Structure	Most part of the proposed Project is underground structure. During construction phase, the cut-and–cover components of the scheme have been limited to Satellite Concourse, Plant Basement, Connection Chamber and Emergency Exit Stair. During operation phase, the above ground structures are only the modified Entrance A1 and the integrated ventilation shafts. As a result, the number of sensitive receivers would be minimized.
Environmental Friendly Designs Adopted and Environmental Benefits	
Orientation of Ventilation Shafts	In order to minimize the associated noise impacts from the operation of the proposed ventilation shafts, the detailed design will maximise the possibility of the shaft opening to face away from the neighboring sensitive receivers, where practicable. This will ensure that noise generated would be minimal by the design itself. Adequate attenuation will also be incorporated into the detailed design to ensure compliance with the relevant statutory noise criteria.
Alignment	The Old and Valuable Trees (OVTs) are protected by shifting the subway alignment towards the east side of Nathan Road away from the row of OVTs on west footpath of Nathan Road in the design. The entrances proposed at the western footpath of Nathan Road were not further pursued that no OVTs would be affected.
Environmental Friendly Construction	The TNS subway is the most direct and shortest link to the proposed entrances, i.e. minimise the extent of the construction works area and limit the works area to the section of Nathan Road. The subway tunnels which form of a large proportion of the project are to be constructed using tunnelling by mining method. The environmental benefits include: - minimal airborne noise and dust impacts on nearby sensitive receivers; - minimal impact on the traffic and pedestrians at street level during construction. Although there are potential disbenefits associated with the use of cut-and-cover methods in terms of dust and airborne

Key Environmental Issue	Environmental Outcomes and Mitigation Measures
	noise emission during construction. These impacts can be mitigated through undertaking the bulk excavation activities under a road deck, phasing and sequence of construction activities associated with the site clearance and temporary deck construction, as well as implementation of sufficient dust and noise mitigation measures during the execution of the construction activities.
Construction Air Quality	No exceedances of the AQO criteria were predicted at ASRs in the vicinity of the construction sites. No adverse dust impacts is expected on the identified ASRs with the implementation of dust suppression measures stipulated in Air Pollution control (Construction Dust) Regulation.
Noise	NSRs in the vicinity of the construction sites will be affected during construction of the TNS Project. With the adoption of quieter plant, movable noise barrier, noise enclosure and noise insulating fabric and good site practices, most of the representative NSRs were predicted to comply with the EIAO-TM noise criteria. Some residual construction noise impact will be expected at certain NSRs located close to the works areas with the proposed mitigation measures are in place. Good site practices could ameliorate the noise impacts. The Noise Control Authority will consider a well-justified Construction Noise Permit (CNP) application for construction works within restricted hours as guided by the relevant Technical Memoranda issued under the Noise Control Ordinance. The Noise Control Authority will take into account of contemporary conditions / situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. Despite any description made in this EIA Report on construction noise aspects, there is no guarantee that a CNP will be issued for the project construction.
Construction Water Quality	The key issue in terms of water quality during the construction phase of the Project will be construction runoff and site drainage, underground works, sewage effluent and general construction site activities. Minimisation of water quality deterioration can be achieved through implementing adequate mitigation measures such as control measures on site runoff and drainage from the works areas to minimise construction runoff, and on-site treatment of site runoff and drainage prior to discharge. Proper site management and good housekeeping practices will also be required to ensure that construction wastes and other construction-related materials would not enter the drainage culvert.

Key Environmental Issue	Environmental Outcomes and Mitigation Measures
	With the implementation of these recommended mitigation measures (**Section 5.13**), the construction works for the Project is not expected to result in unacceptable impacts on water quality. Site inspections shall be undertaken routinely to inspect the works areas in order to ensure the recommended mitigation measures are properly implemented.
Waste Management	Wastes generated by the construction activities are likely to include C&D materials from the construction works, general refuse from the workforce and chemical waste from any maintenance of construction plant and equipment. Provided that these identified waste arisings are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts is not be anticipated during the construction works.
Landscape and Visual	No significant impacts on the planning and development control framework as the affected areas are small compared to the overview. Based on detail tree survey, during the construction period, approximately 30 trees will be affected by the construction of MTR Tsim Sha Tsui Station Northern Subway. None of them are OVTs. Most of the affected trees are proposed to be transplanted with the exception of the 3 nos. of *Delonix regia* of poor condition along Haiphong Road. Re-planting of all transplanted trees and compensatory planting at Haiphong Road are proposed. Appropriate protection measures will be implemented for the OVT nearby the emergency exit. The overall residual impacts on OVTs are considered as insubstantial with mitigation measures. The overall residual impacts on entrance to Kowloon Park are considered as slight with mitigation measures as reinstatement will be provided after construction. The overall visual impact to the VSRs are considered as slight to insubstantial with mitigation measures during operation phase, as the proposed structures are low and with aesthetic facades. Overall, it is considered that the residual landscape and visual impacts of the proposed project are considered acceptable with mitigation measures during construction and operation.
Built Heritage	It is proposed to use sensitively designed hoardings to mininise any visual impacts to the two built heritage

Key Environmental Issue	Environmental Outcomes and Mitigation Measures
	structures. 10.1.7 Regarding the construction near the historical buildings, the impacts has identified as minimal. However, precautions shall be taken throughout the constructions stage to prevent any damage to the historical building. Moreover, structural monitoring system, including pre-construction survey shall be designed and implemented by a Registered Structural Engineer from the Contractor to ensure compliance with the Building Ordinance. The proposed works will not cause any insurmountable adverse impacts during operation phase.

10.1.8 The implementation schedule of the proposed mitigation measures for the Project is presented in **Appendix 10.1**. For recommended mitigation measures of each key environmental issue, the location and timing for the measures have been clearly identified as well as the parties responsible for implementing the measures.