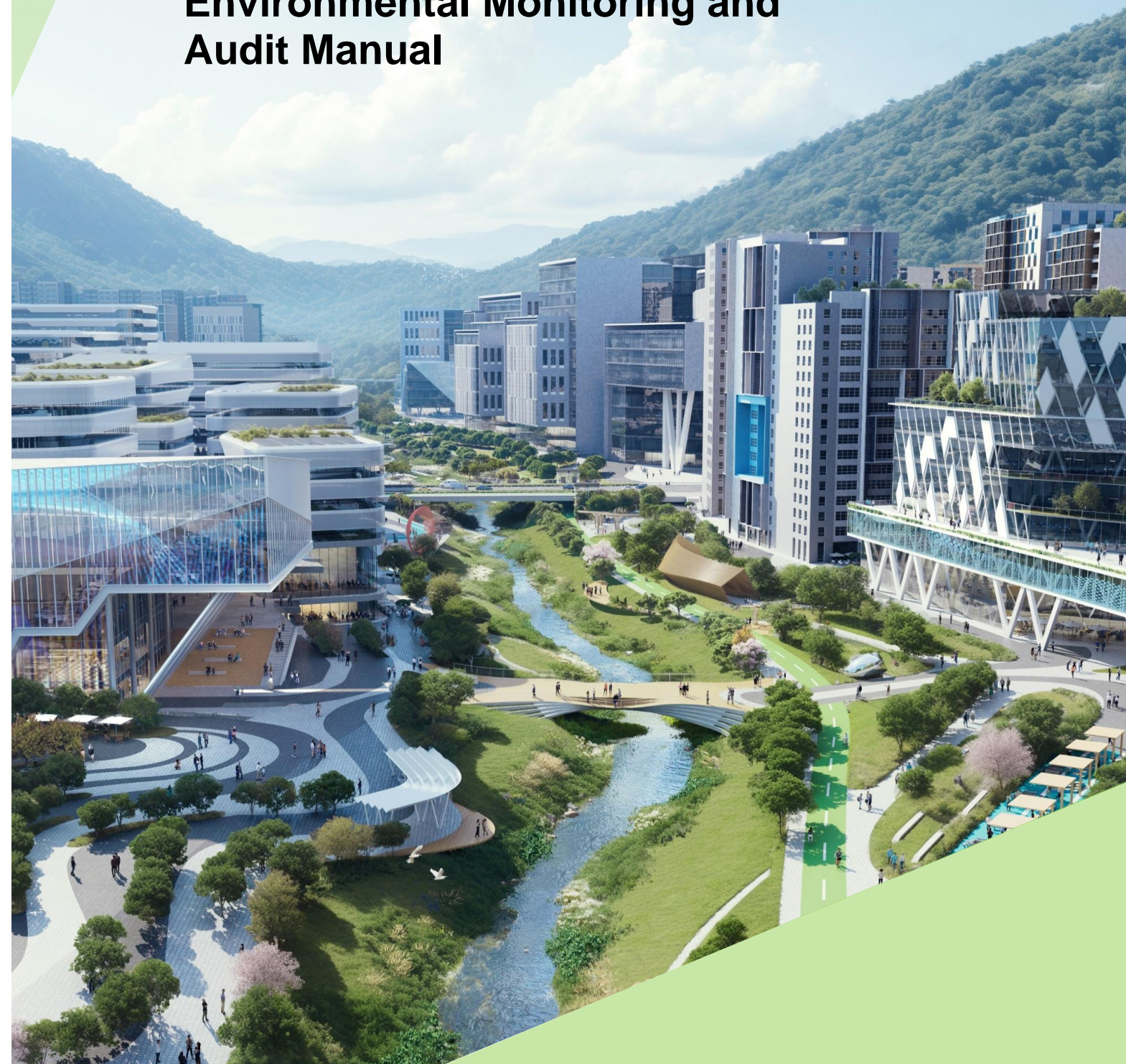


Agreement No. CE 33/2021 (CE)

Development at Ngau Tam Mei Area

Environmental Monitoring and Audit Manual





土木工程拓展署
Civil Engineering and
Development Department



規劃署
Planning Department

Agreement No. CE 33/2021 (CE)

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Environmental Monitoring and Audit Manual

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TABLE OF CONTENTS

1	INTRODUCTION	1-1
1.1	Project Background	1-1
1.2	The Project.....	1-2
1.3	Designated Project under Environmental Impact Assessment Ordinance (EIAO).....	1-2
1.4	Purpose of the Manual.....	1-3
1.5	Development Programme of the Project	1-4
1.6	Project Organisation	1-6
1.7	Structure of the Manual	1-8
2	AIR QUALITY IMPACT	2-1
2.1	Introduction	2-1
2.2	Construction Dust Monitoring Parameters and Equipment	2-1
2.3	Construction Dust Monitoring Stations	2-3
2.4	Construction Dust Impact Monitoring	2-5
2.5	Construction Dust Event and Action Plan.....	2-5
2.6	Construction Dust Mitigation Measures	2-9
2.7	Construction Dust Audit Requirements	2-9
3	NOISE IMPACT	3-1
3.1	Introduction	3-1
3.2	Construction Phase	3-1
3.3	Operational Phase – Road Traffic Noise	3-3
3.4	Operational Phase – Fixed Noise Sources.....	3-4
3.5	Mitigation Measures.....	3-4
3.6	Audit Requirements	3-7
4	WATER QUALITY IMPACT	4-1
4.1	Introduction	4-1
4.2	Construction Phase	4-1
4.3	Mitigation Measures.....	4-10
4.4	Audit Requirement	4-10
5	SEWERAGE AND SEWAGE TREATMENT IMPLICATIONS	5-1
5.1	Introduction	5-1
5.2	EM&A Requirements	5-1
6	WASTE MANAGEMENT IMPLICATIONS	6-1
6.1	Introduction	6-1
6.2	Mitigation Measures.....	6-1
6.3	Audit Requirement	6-1
7	LAND CONTAMINATION	7-1
7.1	Introduction	7-1

7.2	Construction Phase	7-1
7.3	Operational Phase	7-1
8	ECOLOGICAL IMPLICATION (TERRESTRIAL AND AQUATIC)	8-1
8.1	Introduction	8-1
8.2	Mitigation Measures.....	8-1
8.3	Monitoring Requirements.....	8-1
8.4	Audit Requirements	8-4
9	FISHERIES IMPACT	9-1
9.1	Introduction	9-1
9.2	Mitigation Measures.....	9-1
9.3	Monitoring and Audit Requirements	9-1
10	LANDSCAPE AND VISUAL IMPACT	10-1
10.1	Introduction	10-1
10.2	Mitigation Measures.....	10-1
10.3	EM&A Requirement	10-1
11	IMPACT ON CULTURAL HERITAGE	11-1
11.1	Introduction	11-1
11.2	Mitigation Measures.....	11-1
12	HAZARD TO LIFE	12-1
12.1	Introduction	12-1
13	LANDFILL GAS HAZARD	13-1
13.1	Introduction	13-1
14	IMPACT FROM ELECTRIC AND MAGNETIC FIELD	14-1
14.1	Introduction	14-1
15	ENVIRONMENTAL AUDITING	15-1
15.1	Site Inspection	15-1
15.2	Compliance with Legal and Contractual Requirements	15-2
15.3	Choice of Construction Method	15-2
15.4	Environmental Complaints.....	15-3
16	REPORTING	16-1
16.1	General	16-1
16.2	Electronic Reporting of EM&A Information	16-1
16.3	Baseline Monitoring Report	16-1
16.4	Monthly EM&A Reports	16-2
16.5	Quarterly EM&A Summary Reports.....	16-6
16.6	Final EM&A Review Reports for Construction Phase	16-7
16.7	Final EM&A Report for Operational Phase	16-8
16.8	Data Keeping	16-9
16.9	Interim Notifications of Environmental Quality Limit Exceedances	16-10

LIST OF TABLES

Table 1.1	Schedule 2 Designated Projects under the Project	1-2
Table 1.2	Preliminary Construction and Population Intake Schedule.....	1-4
Table 2.1	Proposed Construction Dust Monitoring Stations	2-4
Table 2.2	Summary of Construction Dust Monitoring Programme	2-5
Table 2.3	Current Action and Limit Levels for Impact Monitoring	2-5
Table 2.4	Event and Action Plan for Construction Dust Monitoring.....	2-7
Table 3.1	Action and Limit Levels for Airborne Construction Noise Impact Monitoring.....	3-3
Table 3.2	Proposed Road Traffic Noise Monitoring Stations during Operational Phase.....	3-3
Table 3.3	Extent and Locations of Proposed Direct Noise Mitigation Measures.....	3-4
Table 4.1	Proposed River Water Quality Monitoring Stations for Baseline, Construction Phase and Post-Construction Monitoring	4-4
Table 4.2	Action and Limit Levels for Water Quality Monitoring	4-5
Table 4.3	Event and Action Plan for Water Quality Monitoring	4-7

LIST OF FIGURES

<u>Figure 1.1</u>	Project Location Plan
<u>Figure 1.2</u>	Locations of Designated Projects
<u>Figure 1.3</u>	Recommended Outline Development Plan
<u>Figure 2.1</u>	Locations of Construction Dust Monitoring Stations (Key Plan)
<u>Figure 2.1.1</u>	Locations of Construction Dust Monitoring Stations (Sheet 1 of 4)
<u>Figure 2.1.2</u>	Locations of Construction Dust Monitoring Stations (Sheet 2 of 4)
<u>Figure 2.1.3</u>	Locations of Construction Dust Monitoring Stations (Sheet 3 of 4)
<u>Figure 2.1.4</u>	Locations of Construction Dust Monitoring Stations (Sheet 4 of 4)
<u>Figure 3.1</u>	Locations of Road Traffic Noise Monitoring Stations (Key Plan)
<u>Figure 3.1.1</u>	Locations of Road Traffic Noise Monitoring Stations (Sheet 1 of 2)
<u>Figure 3.1.2</u>	Locations of Road Traffic Noise Monitoring Stations (Sheet 2 of 2)
<u>Figure 4.1</u>	Locations of Water Quality Monitoring Stations
<u>Figure 13.1</u>	Location Plan of Ngau Tam Mei Landfill and Project Site Boundary

LIST OF APPENDICES

<u>Appendix A</u>	Project Organisation
<u>Appendix B1</u>	Preliminary Construction Phasing and Population Intake Schedule
<u>Appendix B2</u>	Tentative Construction Programme
<u>Appendix C</u>	Project Implementation Schedule
<u>Appendix D</u>	On-Site Checking of Monitoring Equipment
<u>Appendix E</u>	Sample Record Sheets
<u>Appendix F</u>	Complaint Handling Procedure
<u>Appendix G</u>	Sample of the Interim Notification

1 INTRODUCTION

1.1 Project Background

- 1.1.1 The Civil Engineering and Development Department (CEDD) and the Planning Department (PlanD) jointly commissioned the Ngau Tam Mei (NTM) Land Use Review Study (the Study) in November 2021 to capitalise on the development opportunities to be brought about by the NTM Station on the proposed Northern Link (hereinafter refer to as NOL Main Line). The Study aims to examine the comprehensive development of the brownfield clusters in NTM, which was subsequently extended to cover a nearby site as identified under the “Green Belt” Review announced in the 2022 Policy Address for holistic planning (hereinafter referred to as “the Project”); to ascertain the feasibility and acceptability of the Project with technical assessments including the statutory Environmental Impact Assessment (EIA); to formulate a Recommended Outline Development Plan (RODP); and to conduct public engagement (PE) for increasing awareness and engagement among stakeholders.
- 1.1.2 The Northern Metropolis Action Agenda (NMAA) promulgated in October 2023 outlines the development positioning of four major zones in the Northern Metropolis (NM). Amongst them, the Innovation and Technology (I&T) Zone covers San Tin Technopole (STT) and NTM. STT will be a hub for clustered I&T development, creating synergy with the Shenzhen I&T Zone. Upon completion of the proposed NOL Main Line in 2034, NTM will only be one station away from STT. It is stated in NMAA that land will be reserved in NTM for use of post-secondary education institutions, with a focus on scientific research to complement the I&T development in STT, promoting “research, academic and industry” collaboration.
- 1.1.3 The 2024 Policy Address announced to reserve land in the NM for the “Northern Metropolis University Town (NMUT)”, and encourage local post-secondary education institutions to introduce more branded programmes, research collaboration and exchange projects with renowned Mainland and overseas institutions in a flexible and innovative manner. It is also stated in the 2024 Policy Address that, land will be reserved in NTM for developing the third medical school and an integrated medical teaching and research hospital (hereinafter referred to as “Integrated Hospital”). As announced in the 2025 Policy Address, a Working Group on Planning and Construction of the University Town (WG) will be set up under the Committee on Development of the NM, to study the development mode for the NMUT and make recommendations on the positioning and vision regarding the development of NMUT sites to devise a clear, industry-led approach. The land in NTM can dovetail with the overall I&T development of the STT and the Hong Kong-Shenzhen Innovation and Technology Park (HSITP) at the Loop, among others, life and health technology industries, and to be used for joint development with the third medical school and an integrated medical teaching and research hospital. The design and implementation of the UniTown will be duly considered by the Education Bureau under the steer of the WG.
- 1.1.4 A 2-month PE was conducted between 14 November 2024 and 13 January 2025 to solicit public views on a Broad Land Use Concept Plan developed under the Study. Taking into account the public views collected in the PE, policy directives, planning and engineering considerations, technical assessments as well as departmental advice, a RODP for the NTM New Development Area (NDA) has been formulated (**Figure 1.3** refers).
- 1.1.5 Locations of the Project Site (including the proposed works sites/areas) and the Development Area are shown in **Figure 1.1**. Located to the south of STT and to the northeast of Yuen Long New Town, the total area of Development Area covers about 130 ha and is currently occupied by Yau Tam Mei Tsuen, scattered brownfield

operations, farmland/fishponds, chicken farm, permitted burial grounds, etc. The Project comprises mainly educational institutions, hospital, other government, institution and community (GIC) facilities, housing, as well as the associated infrastructure works (e.g. road networks, sewage pumping station (SPS), etc.).

- 1.1.6 The NTM Station, the depot and the associated railway facilities under the NOL Main Line within the Project Site will be implemented by another project proponent (i.e. MTR Corporation Limited (MTRCL)), thus the construction and operation of these railway facilities are not part of this Project. The associated environmental impacts arising from the construction and operation of the NOL Main Line were assessed in its approved EIA report (Register No.: AEIAR-259/2024).

1.2 The Project

- 1.2.1 The proposed scope of the Project includes the following principal works elements to support the development of NTM NDA as shown in **Figure 1.1**.

Site Formation and Engineering Infrastructure Works

- (a) Site formation works including slope cutting and filling and retaining wall installation;
- (b) Engineering infrastructure works comprising roads including district distributor roads, local roads, drainage works including revitalisation works for Ngau Tam Mei Drainage Channel (NTMDC), sewerage provision including a SPS and other utilities works to support the proposed development of the Project;
- (c) Landscaping, streetscaping and ancillary works; and
- (d) Provision of environmental mitigation measures for the works mentioned above.

Other Works

- (a) Developments including GIC facilities, residential development, schools, electrical substations and other facilities to support the proposed development of the Project.

1.3 Designated Project under Environmental Impact Assessment Ordinance (EIAO)

- 1.3.1 The Development Area, covering an area of about 130 ha, constitutes a Designated Project (DP) by virtue of Item 1 under Schedule 3 of the EIAO:
- Item 1 – An urban development or redevelopment project covering an area of more than 50 ha.

- 1.3.2 In addition, the Project also constitutes DPs under Part I, Schedule 2 of the EIAO, which are listed in **Table 1.1** and illustrated in **Figure 1.2**.

Table 1.1 Schedule 2 Designated Projects Under the Project

Ref. No.	Schedule 2 Designated Project		Work Component / Reference in RODP
DP1	Item A.1	A carriageway for motor vehicles that is an expressway, trunk road, primary distributor road or district distributor road	Construction and operation of district distributor road (Road D1) and associated road works at San Tin Highway
DP2	Item I.1(b)	A drainage channel or river training and diversion works located less than 300 m from the nearest boundary of an existing or planned conservation area	Part of Revitalisation of Ngau Tam Mei Drainage Channel and river diversion works located less than 300 m from the nearest boundary of an existing conservation area

DP1 – Construction and Operation of District Distributor Road (Road D1) and associated road works at San Tin Highway

- 1.3.3 The Project will be served by a network of District Distributor (DD) and Local Distributors (LD). Road D1, which is a DD (i.e. Item A.1 of Schedule 2 of the EIAO), is proposed to be a dual two-lane carriageway serving as the main connection road between San Tin Highway and the NTM NDA. Most of the Road D1 will be constructed at-grade, except for an elevated section of approximately 300 m long near Site E.1 and Site R.1, which connects to the proposed elevated junction over the existing San Tin Highway. A connection with the planned NM Highway – San Tin Section is reserved at the east end of Road D1.

DP2 – Part of Revitalisation of Ngau Tam Mei Drainage Channel and river diversion works located less than 300 m from the nearest boundary of an existing conservation area

- 1.3.4 The current NTMDC that sits within the Project Site is mainly a concrete channelised waterway. As part of the blue-green spine concept, the existing concrete channel will be revitalised with a green and ecologically friendly approach for integration with the overall land use planning. Provision of natural substrates that could encourage colonisation of flora and freshwater fauna in the bottom and banks of the revitalised watercourses would be considered, subject to detailed design of the proposed revitalisation measures. The drainage channel would also be widened to increase the hydraulic capacity of the river, creating a resilient and dynamic design. These provisions, including planting of suitable trees, would enable connectivity and usage for mammals and avifauna. Also, landscape and recreation provisions as well as pedestrian walkway and cycling track will be provided along the revitalised NTMDC.
- 1.3.5 Due to the proposed developments, a few watercourses (except NTMDC) within the Project Site will be permanently diverted or removed. Diversion works at these existing watercourses would involve diversion of water flow from their existing routes to the new routes through the proposed covered drainage system of the new development.
- 1.3.6 Part of the NTMDC and a few watercourses in the southeastern part of the NTM NDA are located within 300 m from Conservation Area (CA). Revitalisation and river diversion works within 300 m from CA fall into the category of Item I.1(b), Part I, Schedule 2 of the EIAO.

1.4 Purpose of the Manual

- 1.4.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the set-up of an EM&A programme to ensure compliance with the EIA Study recommendations, to assess the effectiveness of the recommended mitigation measures, to identify any further need for additional mitigation measures or remedial actions, and to provide systematic procedures for monitoring, auditing and minimising environmental impacts associated with the construction and operational activities of the Project.
- 1.4.2 Hong Kong environmental regulations have served as environmental standards and guidelines in the preparation of this Manual. In addition, this Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

1.4.3 This Manual contains the following information:

- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), the Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the EM&A requirements during the course of the Project;
- Project organization for the EM&A work;
- The basis for, and description of the broad approach underlying the EM&A programme;
- Details of the methodologies to be adopted, including all field laboratories and analytical procedures, and details on quality assurance and quality control programme;
- The rationale on which the environmental monitoring data will be evaluated and interpreted;
- Definition of Action and Limit (A/L) levels;
- Establishment of Event and Action plans;
- Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints; and
- Requirements for presentation of EM&A data and appropriate reporting procedures.

1.4.4 This Manual is a dynamic document that should be reviewed regularly and updated as necessary during the construction and operational of the Project. The Contractor should regularly review the mitigation measures and project implementation schedule in **Appendix C** with respect to the design developments and construction methodology.

1.5 Development Programme of the Project

Development Phasing

1.5.1 The Project would be commissioned in phases with the first population intake in Year 2033. Construction of the Project is scheduled to commence in early Year 2027, with completion targeted by 2036 to accommodate the intake of residential population, the UniTown and Integrated Hospital. The preliminary construction schedule under various phases is summarised in **Table 1.2** with reference to **Appendix B1**. The construction programme is presented in **Appendix B2**.

Table 1.2 Preliminary Construction and Population Intake Schedule

Development Stage	Area	Rationale of Phasing	Earliest Date for Commencement of Infrastructure Works	Earliest Date for Availability of Land for Building Works	Anticipated First Occupation/ Population Intake Date
Phase 1	<ul style="list-style-type: none"> • Dedicated Rehousing Estate (DRE) site (RSc.1) • Integrated Hospital (G.8) & adjacent Electricity 	<ul style="list-style-type: none"> • Early handover of the sites for building works (by others) 	Q1 2027	Q4 2028	2033 for DRE site

Development Stage	Area	Rationale of Phasing	Earliest Date for Commencement of Infrastructure Works	Earliest Date for Availability of Land for Building Works	Anticipated First Occupation/ Population Intake Date
	Substation (ESS) site (G.9) • Part of UniTown (G.11) • Sewage pumping station (G.1) • Road network connecting to the Integrated Hospital				
Phase 2	• Remaining UniTown (G.6, G.10, G.11, G.12) • Residential Site (R.3, R.4) • Remaining G/ICs, School (E.1 & E.2), Open Space (O.2, O.5-O.7), Amenity Areas • Majority of road network • NTMDC	• To commence infrastructure works for targeted population intake • To allow early handover of UniTown	Q3 2028	Q2 2031	Q2 2034
Phase 3	• Residential Site R.1, R.2 • Remaining open space • Remaining roadworks, landscape works, riverside & site formation works	• To suit the programme of interfacing projects	Q3 2030	Q3 2032	Q2 2036

Phase 1

- 1.5.2 Phase 1 comprises of site clearance and site formation of sites that would require early completion for handover, including DRE site “RSc.1”, Integrated Hospital “G.8”, ESS “G.9”, part of UniTown “G.11”, sewage pumping station at “G.1” and road network connecting to the Integrated Hospital. The population intake of the DRE site is expected to be in Year 2033.

Phase 2

- 1.5.3 This phase of development aims to support the remaining UniTown and population intake projected for the Year 2034, along with the essential supporting infrastructures. Majority of these areas consist of main road network and road connection from existing road networks. There will be interface with NOL Main Line in this phase.
- 1.5.4 The major site formation and infrastructure works (including site clearance) in this development phase will include:

- Site formation and development for key infrastructures including retention tank, RCPs and utilities laying, etc.;
- Site formation and development for remaining areas of UniTown to facilitate completion for handover;
- Site formation for R.3 and R.4;
- Site formation and development for “E” and “G” sites such as primary school, etc.;
- Road improvement to Chuk Yau Road, Ngau Tam Mei Road and San Tam Road;
- Construction of District Distributor Road D1, proposed road connection to/from STT, Road L1, Road L2, Road L3, associated junction works and slip roads connecting San Tin Highway and local roads, pedestrian and cycling connectivity including cycle bridge, associated pedestrian walkway and cycle tracks;
- Site clearance and revitalisation of NTMDC; and
- Construction of associated open space and amenity areas.

Phase 3

- 1.5.5 The development in this phase is to support the remaining population intake in Year 2036 and to develop the remaining sites that are currently occupied by the transitional housing project in the western part of the NDA and NOL Main Line works area. There will be interface with the transitional housing and NOL Main Line in this phase.
- 1.5.6 The major site formation and infrastructure works in this development phase will include:
- Site formation for R.1 and R.2 after partial demolition of the transitional housing;
 - Development of open space after partial demolition of the transitional housing; and
 - Remaining roadworks, landscape works, riverside and site formation works.

1.6 Project Organisation

- 1.6.1 The roles and responsibilities of the various parties involved in the EM&A process and the organisational structure of the organisation responsible for implementing the EM&A programme are outlined below. The proposed project organisation and lines of communication with respect to environmental protection works are shown in **Appendix A**.

The Contractor

- 1.6.2 The Contractor should report to the ER. The duties and responsibilities of the Contractor are:
- Implement the EIA recommendations and requirements;
 - Strictly adhere to the guidelines and requirements in this Manual;
 - Provide assistance to the ET in carrying out relevant environmental monitoring and auditing, and investigation related to non-compliance;
 - Participate in the joint site inspections undertaken by ET, and undertake corrective action(s) as necessary;

- Provide information / advice to ET regarding works activities which may contribute, or be continuing to the generation of adverse environmental condition(s);
- Submit proposals on mitigation measures in case of exceedances of A/L levels, in accordance with the Event and Action Plans;
- Implement measures to reduce environmental impacts where A/L levels are exceeded until the events are resolved; and
- Adhere to the procedures for carrying out environmental complaint investigation.

Environmental Team

- 1.6.3 The ET should conduct the EM&A programme and ensure the Contractor's compliance with the Project's environmental performance requirements during construction. The ET should be an independent party from the IEC and the Contractor.
- 1.6.4 An ET should be established before the commencement of construction of the Project. The ET should be led and managed by the ET Leader (ETL). The ETL should possess at least 7 years of experience in EM&A and/or environmental management. The ET should monitor the mitigation measures implemented by the Contractor on a regular basis to ensure the compliance with the intended aims of the measures. The duties and responsibilities of the ET are:
- Set up all the required environmental monitoring stations;
 - Monitor various environmental parameters and implementation of environmental mitigation measures as required in this Manual;
 - Review construction programme and methodology, and comment as necessary;
 - Carry out regular and ad hoc site inspections to investigate and audit Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation measures, and anticipate environmental issues for proactive and practicable action before problems arise;
 - Analyse the EM&A data, review the success of EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions, and to identify any adverse environmental impacts arising and report EM&A results to the Contractor, IEC, and the ER;
 - Liaise with IEC on all environmental performance matters, and timely submission of all relevant EM&A proforma for IEC's approval;
 - Audit the relevant document(s)/record(s) and prepare reports on the environmental monitoring data and the site environmental conditions;
 - Review the proposals of remedial measure from the Contractor and recommend suitable mitigation measures in the case of exceedances of A/L levels, in accordance with the Event and Action Plans;
 - Advise the Contractor on environmental improvement, awareness, enhancement matters, etc., on site;
 - Follow up and close out non-compliance actions;
 - Submit the EM&A report(s) to the project proponent and the Environmental Protection Department (EPD) timely; and
 - Adhere to the procedures for carrying out environmental complaint investigation.

Engineer or Engineer's Representative

- 1.6.5 The Engineer is responsible for overseeing the construction works and ensuring that the works are undertaken by the Contractor in accordance with the specification and contractual requirements. The duties and responsibilities of the Engineer with respect to EM&A may include:
- Supervise the Contractor's activities and ensure that the requirements in this Manual are fully complied with;
 - Inform the Contractor when action is required to reduce environmental impacts in accordance with the Event and Action Plans;
 - Participate in joint site inspections and audits undertaken by the ET;
 - Comply with the agreed Event and Action Plans in the event of any exceedance; and
 - Adhere to the procedures for carrying out exceedance and complaint investigations.

Independent Environmental Checker

- 1.6.6 The IEC should be employed by the ER / project proponent before commencement of construction of the Project. The IEC should possess at least 10 years of experience in EM&A and/or environmental management and should be an independent party from the ET and the Contractor. The duties and responsibilities of the IEC are:
- Review and audit at not less than monthly intervals in an independent, objective and professional manner in all aspects of the EM&A programme;
 - Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
 - Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
 - Review the effectiveness of environmental mitigation measures and project environmental performance;
 - On as-needed basis, verify and certify the environmental acceptability of the Environmental Permit (EP) holder's construction methodology (both temporary and permanent works), relevant design plans and submissions under the EP;
 - Carry out random sample check and audit on monitoring data and sampling procedures, etc;
 - Conduct random site inspections;
 - Verify the investigation results of environmental complaint cases and the effectiveness of corrective measures;
 - Verify EM&A report that has been certified by the ETL; and
 - Provide feedback on the audit results to the ET, the ER or the project proponent according to Event and Action Plans in this Manual.

1.7 Structure of the Manual

- 1.7.1 Following this introductory section, the remainder of this Manual is set out as follows:
- Section 2 – Sets out EM&A requirement for air quality impact;
 - Section 3 – Sets out EM&A requirement for noise impact;

- Section 4 – Sets out EM&A requirement for water quality impact;
- Section 5 – Sets out EM&A requirement for sewerage and sewage treatment implications;
- Section 6 – Sets out EM&A requirement for waste management implications;
- Section 7 – Sets out EM&A requirement for land contamination;
- Section 8 – Sets out EM&A requirement for ecological implication (terrestrial and aquatic);
- Section 9 – Sets out EM&A requirement for fisheries impact;
- Section 10 – Sets out EM&A requirement for landscape and visual impact;
- Section 11 – Sets out EM&A requirement for impact on cultural heritage;
- Section 12 – Sets out EM&A requirement for hazard to life;
- Section 13 – Sets out EM&A requirement for landfill gas hazard;
- Section 14 – Sets out EM&A requirement for impact from electric and magnetic field;
- Section 15 – Describes the scope and frequency of environmental site audits and sets out the general requirements of the EM&A programme; and
- Section 16 – Details the EM&A reporting requirements.

2 AIR QUALITY IMPACT

2.1 Introduction

- 2.1.1 Potential air quality impacts arising from the construction phase of the Project were assessed in the EIA Report. The major air quality impact from the construction works of the Project would mainly be related to construction dust from excavation, material handling, spoil removal and wind erosion. No adverse air quality impact from construction of the Project would be anticipated with the implementation of the proposed mitigation measures. Nonetheless, construction dust monitoring and regular site audit are recommended during the construction phase so as to check compliance with the legislative requirements.
- 2.1.2 Cumulative air quality impact arising from the vehicular emission from existing and planned open roads, proposed Transport Interchange Hub and Public Transport Terminus, existing heavy goods vehicles/coach parking sites, as well as existing and planned industrial emissions were assessed in the EIA Report. No adverse air quality impact on the existing and planned sensitive receivers is anticipated. Hence, no air quality monitoring and site inspections are required during operational phase.
- 2.1.3 Cumulative odour impact from the planned (i.e. the proposed SPS), and existing odour sources (i.e. livestock farms, lard boiling factory, sewage treatment plant at Tam Mei Barracks (TMB)) were assessed in the EIA Report. Adverse cumulative odour impact is not expected with the proposed mitigation measures in place. Hence, no air quality monitoring and site inspections are required during operational phase.
- 2.1.4 This section presents the requirements, methodology, equipment, monitoring locations and criteria for the monitoring and audit of construction dust impact during the construction phase of the Project.

2.2 Construction Dust Monitoring Parameters and Equipment

- 2.2.1 For regulatory purpose, the respirable suspended particulate (RSP) and fine suspended particulate (FSP) levels should be measured by the mean of air sensor such that variation in dust impact on a real-time basis could be observed and any dusty activities occurring in the concerned area can be identified. Weather data including temperature, relative humidity, pressure, wind speed and wind direction should also be monitored simultaneously with air sensor. Other special phenomena and work progress of the concerned site, etc., should also be recorded in detail during monitoring period.
- 2.2.2 An air sensor to be employed should meet the purpose of the monitoring which are 1-hour RSP, and 24-hour RSP and 24-hour FSP concentrations in the ambient air in minute-averaged monitoring data. The air sensor should have a resolution of at least $1\mu\text{g}/\text{m}^3$, an accuracy of $\pm 10\%$ to standard particles, equipped with a shelter to protect the sensor and capable of operating continuously for a 7-day period. It should be capable of detection of RSP and FSP, while size specification would be optional subject to the environmental management strategy of the site. The measurement range and detection limit of the air sensor should be able to measure the full range of particulates commonly found in the ambient, e.g. $0 - 1000\mu\text{g}/\text{m}^3$. The installation and operating procedures of the instrument should be followed by the operation manual supplied by the instrument manufacturer. The ET should propose the instrument model and seek approval from IEC. The ET should follow the operation manual to ensure the normal operation of the instrument.
- 2.2.3 Air sensor network which comprises one or more sensors should be employed near works sites/works areas of the Project to capture the worst cumulative impact from

particulates concentration. Generally, air sensor should be placed at least 1.5 metres above ground, and away from any obstruction, vegetation or emission source which would interfere with the measurement. Other factors of the monitoring location, such as security, availability of power supply and reliable communication (cellular, Wi-Fi, etc.) should also be considered.

- 2.2.4 To ensure the measurements are of acceptable air quality, the ET should calibrate the monitoring equipment regularly. However, air sensor cannot be calibrated in the same way as standard method. Instead, the performance of the air sensor will be checked by a process called collocation which places the sensors near a transfer standard (TS) and operating them simultaneously under the same conditions. Instead of adjusting the physical setting of an air sensor, which is often not possible, correction of raw data or response produced by the air sensor will be carried out to better match the reference monitor data by applying a scaling factor to the raw data.
- 2.2.5 Right before each on-site calibration, the TS itself needs to be calibrated. Federal Reference Method (FRM) or Federal Equivalent Method (FEM) particulate matter (PM) monitor maintained at the accredited laboratories or research institutes are the PM reference monitors available in Hong Kong. The collocation of TS with PM reference monitor should last at least seven days. The TS is usually left collocated with PM reference monitor when not being moved around the sensor network.
- 2.2.6 The TS with known performance characteristics will visit each air sensor on the field for collocation. During collocation, the TS should be placed near the subject sensor (<1m if practicable) so that both devices would be monitoring under the same environment, i.e. the same pollution sources and weather conditions. The TS should be first warmed up for 30 – 60 minutes and then left running with the subject sensor for the collocation period (at least three hours). The measurements from the subject sensor and TS during the collocation period will be statistically analysed.
- 2.2.7 The response of the air sensor should be adjusted if its performance during on-site calibration does not meet the following evaluation criteria. For each device, data below its detection limit will be excluded.

Tier 1: Correlation

1. The minute average measurements from the two devices when subject to linear regression should have a coefficient of determination (R^2)>0.7. The regression line slope should be between 0.75 to 1.25. If these criteria are not met due to narrow range of PM concentration (>30 $\mu\text{g}/\text{m}^3$ and >25 $\mu\text{g}/\text{m}^3$ as recommended span range for RSP and FSP, respectively) during the collocation period, Tier 2 will apply.

Tier 2: Root Mean Squared Error

2. The root mean squared error of the sensor minute average measurements should be <8 $\mu\text{g}/\text{m}^3$ for RSP and <5 $\mu\text{g}/\text{m}^3$ for FSP.
- 2.2.8 On-site checking of the monitoring equipment should be conducted by ET according to **Appendix D**. The collocation of TS and each air sensor on the field should be carried out every month. If an air sensor failed in 3 consecutive collocations, the air sensor should be checked or maintained to improve its performance, or it should be replaced.
- 2.2.9 Wind data monitoring equipment should also be provided and set up at conspicuous locations for logging wind speed and wind direction close to/or at the construction dust monitoring locations. The equipment installation location should be proposed

by the ET and agreed with the ER and the IEC. For installation and operation of wind data monitoring equipment, the following points should be observed.

- a. The wind sensors should be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
- b. The wind data should be captured by a data logger. The data recorded in the data logger should be downloaded for analysis simultaneously;
- c. The wind data monitoring equipment should be re-calibrated at least once every six months; and
- d. Wind direction should be divided into 16 sectors of 22.5 degrees each.

2.2.10 Before commencing the construction dust monitoring, the ET should formulate construction dust monitoring plan with air sensor and submit to IEC to seek their feedback and consent. The plan should include but not limited to the followings:

- Details on the pollutants and environmental parameters to be monitored;
- Describe the equipment and measurement method to be used;
- Address the criteria for placing air sensors;
- Discuss the monitoring locations selected and rationale;
- Describe the criteria for selecting air sensors and test to determine if they are working properly;
- Determine the collocation location and establish the calibration and/or collocation and data correction methods;
- Identify types of data that may be used in the data analysis, including nearby reference monitor data, weather data, etc.;
- List the procedures to maintain and operate air sensors, including site visits, routine maintenance, emergency maintenance, daily data review, periodic collocations, etc.; and
- Describe the data processing (including data checking against Quality Assurance and Quality Control (QA/QC) procedures, data validation, data storage) and reporting requirements.

2.2.11 The ET is responsible for the provision of the monitoring equipment and should provide sufficient number of air sensors for the field work and TS for carrying out continuous impact monitoring and ad-hoc monitoring or collocation.

2.2.12 If the ET proposes alternative dust monitoring equipment / wind data monitoring equipment / methodology after the approval of this Manual, agreement from the IEC should be sought. The instrument should also be calibrated monthly following the requirements specified by the equipment manufacturers.

2.3 Construction Dust Monitoring Stations

2.3.1 The tentative locations of the air sensors are listed in **Table 2.1** and are illustrated in **Figure 2.1**. The actual locations would be subject to site constraints and the ET should agree with IEC on the position of the air sensor for installation taken into account the considerations detailed in **Section 2.2.3**.

Table 2.1 Proposed Construction Dust Monitoring Stations

Monitoring Station No. ⁽¹⁾⁽³⁾	Air Sensitive Receiver (ASR)
DM1	La Maison Vineyard
DM2	The Vineyard / Village House near Vineyard Boulevard
DM3	Greenacres Villa
DM4	Ha San Wai / EMINENT EIS International Preschool
DM5	Wah On Villa / San Wai Tsuen
DM6	Kadoorie Villas
DM7	Sheung Chuk Yuen
DM8	Hongtai Home for the Aged
DM9	Village House ⁽²⁾
DM10	Village House ⁽²⁾
DM11	Village House ⁽²⁾
DM12	Village House ⁽²⁾

Notes:

- (1) RSP and FSP impact monitoring should be conducted at the monitoring stations when there are Project-related major construction activities including site formation, excavation and piling works being undertaken within a radius of 500 m from the monitoring stations.
- (2) Monitoring will not be necessary if the proposed location is demolished/resumed under other project.
- (3) Monitoring station at the ASR should, where practicable, be positioned as close as possible to the works site with major site activities, subject to future liaison and agreement with respective ASR.

2.3.2 The status and locations of construction dust monitoring locations may change after this Manual is issued. In such case, the ET should propose alternative monitoring locations and seek approval from the ER and IEC as well as agreement from the EPD.

2.3.3 When alternative monitoring locations are proposed, the monitoring stations should be chosen based on the following criteria:

- Monitoring at ASRs close to the major site activities which are likely to have air quality impacts;
- Monitoring as close as possible to the ASRs as defined in the EIAO-TM;
- Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring; and
- Take into account the prevailing meteorological conditions.

2.3.4 The ET should agree with the IEC on the position of the instrument. When positioning the instrument, the following points should be noted:

- a horizontal platform with appropriate support to secure the instrument against gusty wind should be provided;
- general housekeeping, cleaning works and other preventative maintenance activities such as checking the operating status of individual monitoring equipment should be carried out to ensure the proper operation of the system;
- the distance between the instrument and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the instrument;

- to ensure representative sampling, the inlet of the instrument should not be obstructed by nearby objects;
- any wire fence and gate, to protect the instrument, should not cause any obstruction during monitoring;
- no furnace or incinerator flue is nearby;
- airflow around the instrument is unrestricted;
- permission must be obtained to set up the instrument and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the instrument.

2.3.5 Subject to site conditions and monitoring results, the ET, with IEC and EPD endorsement, may decide whether the monitoring locations should be removed / relocated during the construction phase.

2.4 Construction Dust Impact Monitoring

2.4.1 The ET should carry out hourly impact monitoring of RSP and FSP continuously with air sensor networks during major construction activity of the Project being undertaken within a radius of 500 m from the monitoring stations. The daily averages of RSP and FSP are to be determined and reported in monthly EM&A Report, together with the hourly RSP data. The impact monitoring programme is summarised in **Table 2.2**.

2.4.2 The monthly collocation schedule should be drawn up by the ET one month prior to the commencement of the scheduled construction period. Before commencement of the collocation, the ET should inform the IEC such that the IEC can conduct an on-site audit.

Table 2.2 Summary of Construction Dust Monitoring Programme

Monitoring Period	Duration	Sampling Equipment	Sampling Parameter	Frequency
Impact Monitoring	Throughout the construction phase ⁽¹⁾	Air Sensor Network	1-hour RSP, and 24-hour RSP and FSP	Continuous (Results to be reported in Monthly EM&A Report)

Note:

(1) Impact monitoring should be conducted at the monitoring stations for 1-hour RSP, and 24-hour RSP and FSP monitoring when there are Project-related major construction activities being undertaken within a radius of 500 m from the monitoring stations.

2.5 Construction Dust Event and Action Plan

2.5.1 The air quality criteria for the impact monitoring should refer to the relevant Air Quality Objectives (AQOs). The ET should compare the impact monitoring results with air quality criteria set up for 1-hour RSP, 24-hour RSP and FSP. **Table 2.3** shows the current air quality criteria, namely A/L levels. The A/L levels may be subject to changes based on the prevailing AQOs implemented at the time of the impact monitoring.

Table 2.3 Current Action and Limit Levels for Impact Monitoring

A/L Level	Parameter	Criteria
Action Level	1-hour RSP level	128 µg/m ³

A/L Level	Parameter	Criteria
Limit Level	24-hour RSP level (Rolling average)	75 µg/m ³
	24-hour FSP level (Rolling average)	37.5 µg/m ³

- 2.5.2 The Event and Action Plan prescribes procedures and actions associated with the outcome of the comparison of air quality monitoring data recorded and the agreed A/L levels. In the cases where exceedances of these A/L levels occur, the ET, the IEC, the ER and the Contractor should strictly observe the relevant actions of the respective Event and Action Plan listed in **Table 2.4**.

Table 2.4 Event and Action Plan for Construction Dust Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
Exceedance for one 1-hour RSP concentration	<ol style="list-style-type: none"> 1. Notify IEC and ER; 2. Check the monitoring data and error messages to confirm if the performance of the monitoring equipment is normal; 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; and 4. Assess effectiveness of Contractor's remedial measures and keep IEC, and ER informed of the results until exceedance stops. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing. 2. Notify Contractor; 3. In consultation with ET and IEC, agree with the Contractor on the remedial measures to be implemented; and 4. Ensure the proposal for remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Identify source(s) of exceedance, and discuss with ER, ET and IEC on possible remedial measures; 2. Implement remedial measures; and 3. Amend working methods if appropriate.
Exceedance for two or more consecutive 1-hour RSP concentration	<ol style="list-style-type: none"> 1. Notify IEC and ER; 2. Check the monitoring data and the performance of monitoring equipment (refer to Appendix D) to confirm if the performance of the monitoring equipment is normal; 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Discuss with IEC, ER and Contractor on possible 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Check Contractor's working method and verify the performance of the monitoring equipment to be checked by ET (refer to Appendix D); 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Review and advise the ET and ER on the effectiveness of the proposed remedial measures; and 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with the ET and IEC, agree with the Contractor on the proposal for remedial measures to be implemented; and 4. Ensure the proposal for remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Identify source(s) of exceedance and discuss with ER, ET and IEC on possible remedial measures; 2. Submit a proposal for remedial measures to ER, IEC and ET within two working days of notification of exceedance for agreement; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
	remedial measures required; and 5. Assess effectiveness of Contractor's remedial measures and keep IEC, and ER informed of the results until exceedance stops; and 6. Notify EPD if the exceedance is confirmed to be related to the Project.	5. Supervise Implementation of remedial measures.		
LIMIT LEVEL				
Exceedance for one 24-hour rolling average RSP concentration record and/or one 24-hour rolling FSP concentration record	1. Notify IEC, ER and Contractor and EPD; 2. Check the monitoring data and the performance of the monitoring equipment (refer to Appendix D); 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Discuss with IEC, ER and Contractor on possible remedial measures required; and 5. Assess effectiveness of Contractor's remedial measures and keep IEC, ER and EPD informed of the results until exceedance stops. 6. Notify EPD if the exceedance is confirmed to be related to the Project.	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; and verify the performance of the monitoring equipment to be checked by ET (refer to Appendix D); 3. Discuss with the ET, ER and Contractor on possible remedial measures; 4. Advise the ET and ER on the effectiveness of the proposed remedial measures; 5. Review Contractors' remedial measures whenever necessary to assure their effectiveness and advise ET and ER accordingly; and 6. Supervise implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with the ET and IEC, agree with the Contractor on the proposal for remedial measures to be implemented; 4. Ensure the proposal for remedial measures properly implemented. 5. If exceedance continues, identify what portion of the work is responsible and instruct the Contractor to stop that portion of work until exceedance is abated.	1. Identify source(s) and discuss with ER, ET and IEC on possible remedial measures; 2. Take immediate action to avoid further exceedance; 3. Submit a proposal for remedial measures to ER, ET and IEC within two working days of notification for agreement; 4. Implement the agreed proposals; 5. Review and resubmit proposals if the problem is still not under control. 6. Stop the relevant portion of works as determined by ER until exceedance is abated.

2.6 Construction Dust Mitigation Measures

- 2.6.1 Site-specific dust mitigation measures recommended in the EIA Report include watering on active works sites / works areas, exposed areas and haul roads, good site practices and dust suppression measures stipulated in Air Pollution Control (Construction Dust) Regulation. Details of the mitigation measures are presented in **Appendix C**. The Contractor should be responsible for the design and implementation of these measures.

2.7 Construction Dust Audit Requirements

- 2.7.1 Regular site inspection and audit at least once per week should be conducted during the entire construction phase of the Project to ensure the recommended mitigation measures are properly implemented.

3 NOISE IMPACT

3.1 Introduction

- 3.1.1 Construction noise, road traffic noise, fixed noise sources, airborne rail noise and ground-borne rail noise impacts were assessed in the EIA Report.
- 3.1.2 With the mitigation measures in place, no adverse construction noise impact would be anticipated. A Construction Noise Management Plan (CNMP), which contains a quantitative construction noise impact assessment, noise mitigation measures, monitoring and audit programme, event and action plan and implementation schedule should be submitted before tender invitation and before the commencement of construction works to evaluate the potential construction noise impacts and assess the effectiveness and practicality of all proposed noise mitigation measures for the Project. The implementation of the mitigation measures recommended in CNMP should also be audited as part of the EM&A programme. Regular site environmental audit during construction phase is recommended to ensure proper implementation of mitigation measures and good site practices.
- 3.1.3 Although no adverse road traffic noise impact is anticipated from the Project with the proposed mitigation measures in place, road traffic noise levels should be monitored at selected representative noise sensitive receivers (NSRs) located in the vicinity of the proposed at-source mitigation measures, during the first year of road opening and population intake of protected NSRs to ascertain that the recommended at-source mitigation measures are effective in reducing the noise levels.
- 3.1.4 There are no proposed fixed noise sources under the DPs of the Project. For the non-DPs, a quantitative fixed noise impact assessment (FNIA) with consideration of latest available information and cumulative impacts, together with recommendation of appropriate mitigation measures, should be conducted during detailed design stage via various planning/funding/land lease mechanism in accordance with the requirements of the Hong Kong Planning Standards and Guidelines (HKPSG). No specific EM&A requirement would be required.
- 3.1.5 Based on the assessment results in the approved EIA reports for NOL Main Line and High Speed Rail (HSR), no adverse airborne and ground-borne rail noise impact would be anticipated with the mitigation measures in place. Noise monitoring for rail noise is not required during the operational phase of the Project.
- 3.1.6 This section presents the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of construction noise impacts during the construction and road traffic noise impacts during operational phase of the Project.

3.2 Construction Phase

Noise Parameters

- 3.2.1 The construction noise level should be measured in terms of the 30-minute A-weighted equivalent continuous sound pressure level ($L_{eq\ 30min}$), which should be used as the monitoring parameter, for the time period between 0700 and 1900 hours on normal weekdays.
- 3.2.2 Supplementary information for data auditing and statistical results such as L_{10} and L_{90} should also be obtained for reference. A sample data record sheet is shown in **Appendix E** for reference.

Monitoring Equipment and Set up

- 3.2.3 As referred to the requirements of the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications should be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter should be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements should be accepted as valid only if the difference between calibration levels obtained before and after the noise measurement is less than 1.0 dB(A).
- 3.2.4 The construction noise monitoring station should normally be at a point 1 m from the exterior of the noise sensitive facade and be at a position 1.2 m above ground. The ET should agree with the IEC on the monitoring position and the corrections as required according to standard acoustic principles.
- 3.2.5 Noise measurements should be made in accordance with standard acoustic principles and practices in the relation to weather conditions. Noise measurements should not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed should be checked with a portable wind speed meter capable of measuring the wind speed in m/s.
- 3.2.6 The ET is responsible for the provision of the monitoring equipment and should ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring and impact monitoring. All the equipment and associated instrumentation should be clearly labelled. The equipment installation location should be proposed by the ET Leader and agreed with the ER and IEC.

Baseline and Impact Monitoring

- 3.2.7 Baseline noise monitoring should be carried out at the monitoring stations to be designated in the CNMP(s) as appropriate for at least 2 weeks prior to the commissioning of the construction works. During the baseline monitoring, there should not be any construction activities as far as practicable in the vicinity of the designated monitoring stations.
- 3.2.8 During impact monitoring, construction noise monitoring should be carried out at the designated monitoring stations between 0700 and 1900 hours on normal weekdays when there are Project-related construction activities being undertaken within a radius of 300m from the respective monitoring stations.
- 3.2.9 As discussed in **Section 3.1.2**, a CNMP should be submitted to EPD before tender invitation and before the commencement of construction works. Subject to the contractual arrangement, land resumption status and construction programme as well as the assessment findings of quantitative construction noise impact assessment, the details of the construction noise monitoring requirements and audit programme, event and action plan and implementation schedule should be derived and included in the CNMP(s) for agreement with EPD.

Action and Limit Levels

- 3.2.10 The A/L levels for construction noise are defined in **Table 3.1**.

Table 3.1 Action and Limit Levels for Airborne Construction Noise Impact Monitoring

Time Period	Action Level	Limit Level
0700 - 1900 hours on normal weekdays ⁽¹⁾	When one documented complaint is received	75 dB(A) ⁽²⁾

Notes:

(1) If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit issued by the Noise Control Authority have to be followed.

(2) 70 dB(A) for educational institutions and 65 dB(A) during school examination periods.

3.3 Operational Phase – Road Traffic Noise

Noise Parameters

3.3.1 The ET should carry out monitoring of road traffic noise after the works under Contract are completed and upon commencement of operation of the Project's roads. The noise monitoring should be carried out during the first year of road opening. The road traffic noise during operation of the Project's roads should be measured in terms of the A-weighted equivalent of $L_{10(1-hr)}$. During the road traffic noise measurement, traffic count including traffic volume, percentage of heavy vehicles as defined in the *Calculation of Road Traffic Noise* and traffic speed should also be undertaken concurrently. Supplementary information for data auditing and statistical results such as L_{eq} and L_{90} should also be obtained for reference.

3.3.2 Noise measurements should not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed should be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

Monitoring Stations

3.3.3 Representative NSRs that are mostly affected were identified in the EIA Report are selected as the noise monitoring stations in this Manual, with their locations listed in **Table 3.2** and illustrated in **Figure 3.1**. The proposed location at the planned NSR should be defined during detailed design on the basis of the status of the most up-to-date information on the proposed development(s) of the Project.

Table 3.2 Proposed Road Traffic Noise Monitoring Stations during Operational Phase

Monitoring Station ID ⁽¹⁾	NSR ID in EIA Report	Noise Sensitive Receiver
<i>For DPs</i>		
OM2	PN01	Proposed Dedicated Rehousing Estate at RSc.1
OM3	N39	Sheung Chuk Yuen
OM4	N42	Kadoorie Villas
OM5	N19	San Wai Tsuen
OM6	N44 / N19	Wah On Villa / San Wai Tsuen
OM7	N41	Hongtai Home for the Aged
<i>For non-DPs</i>		

OM1	N09	Elegant Park
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Note:

- (1) Monitoring station at NSR should, where practicable, be positioned as close as possible to the Project roads, subject to future liaison and agreement with respective NSR.

3.4 Operational Phase – Fixed Noise Sources

- 3.4.1 For non-DP fixed noise sources, quantitative fixed noise impact assessment, with consideration of latest available information and cumulative impacts, together with recommendation of appropriate mitigation measures, should be conducted during detailed design stage via various planning/funding/land lease mechanism for agreement with Director of Environmental Protection (DEP) in accordance with the requirements of the HKPSG.

3.5 Mitigation Measures

Construction Phase

- 3.5.1 Mitigation measures including good site practices, use of quality powered mechanical equipment and quieter construction methods, and use of temporary movable noise barriers, noise insulating fabric or noise enclosure were recommended in the EIA Report. The implementation schedule for the recommended mitigation measures is presented in **Appendix C**.
- 3.5.2 Construction Noise Management Plan(s) (CNMP(s)) should be prepared based on the best available information before tender invitation and the commencement of construction works, subject to the contract arrangement of the Project and agreement with EPD. The CNMP(s) should include the proposed/exact inventory of noise sources, quantitative construction noise impact assessment, listing of the quieter construction method/equipment, review the effectiveness and practicality of all proposed mitigation measures for minimising the construction noise impact, implementation schedule of the mitigation measures (including implementation party, location, timing of implementation), and the details of the construction noise monitoring requirements and audit program. The CNMPs should be prepared by a Certified Noise Modelling Professional as recognised by the Hong Kong Institute of Qualified Environmental Professionals (HKIQEP), or equivalent as agreed by the DEP.

Operational Phase – Road Traffic Noise

- 3.5.3 Direct road traffic noise mitigation measures including low noise road surfacing (LNRS), noise barriers and acoustic windows/balconies were proposed in the EIA Report to alleviate adverse road traffic noise impact during the operational phase and are presented in **Table 3.3**. The implementation schedule for the recommended mitigation measures is presented in **Appendix C**.

Table 3.3 Extent and Locations of Proposed Direct Noise Mitigation Measures

ID	Type	Vertical Height, m	Approx. Length, m	Location
LNRS1	LNRS	N/A	260	San Tam Road
LNRS2	LNRS	N/A	511	San Tam Road
LNRS3	LNRS	N/A	80	Road L1

ID	Type	Vertical Height, m	Approx. Length, m	Location
LNRS4	LNRS	N/A	68	Road L1
LNRS5	LNRS	N/A	151	Ngau Tam Mei Road
LNRS6	LNRS	N/A	101	Ngau Tam Mei Road
LNRS7	LNRS	N/A	110	Ngau Tam Mei Road
LNRS8	LNRS	N/A	197	Road D1
LNRS9	LNRS	N/A	42	Road D1
LNRS10	LNRS	N/A	55	Road D1
LNRS11	LNRS	N/A	294	Road D1
LNRS12	LNRS	N/A	103	Chuk Yau Road
LNRS13	LNRS	N/A	79	San Tam Road
AW1	Acoustic Windows / Balconies lined with Sound Absorptive Material	N/A	N/A	Site RSc.1 (17 th to 25 th Floor of NAP RSc.1-2e)
AW2	Acoustic Windows / Balconies lined with Sound Absorptive Material	N/A	N/A	Site RSc.1 (13 th to 33 rd Floor of NAP RSc.1-1f)
AW3	Acoustic Windows / Balconies	N/A	N/A	Site RSc.1 (8 th to 25 th Floor of NAPs RSc.1-2a; 5 th to 25 th Floor of NAP RSc.1-2b; 4 th to 25 th Floor of NAP RSc.1-2c; 3 rd to 25 th Floor of NAP RSc.1-2d; 1 st to 16 th Floor of NAP RSc.1-2e)
AW4	Acoustic Windows / Balconies	N/A	N/A	Site RSc.1 (1 st to 42 nd Floor of NAPs RSc.1-1a to RSc.1-1b; 12 th to 42 nd Floor of NAP RSc.1-1c; 1 st to 42 nd Floor of RSc.1-1d; 9 th to 42 nd Floor of RSc.1-1e; 1 st to 12 th and 34 th to 42 nd Floor of RSc.1-1f)

ID	Type	Vertical Height, m	Approx. Length, m	Location
AW5	Acoustic Windows / Balconies	N/A	N/A	Site R.1 (8 th to 37 th Floor of NAP R.1-1a; 2 nd to 37 th Floor of NAP R.1-1b; 5 th to 37 th Floor of NAP R.1-1c; 24 th to 37 th Floor of NAP R.1-1d)
AW6	Acoustic Windows / Balconies	N/A	N/A	Site R.1 (1 st to 37 th Floor of NAP R.1-2d)
AW7	Acoustic Windows / Balconies	N/A	N/A	Site R.1 (26 th to 37 th Floor of NAP R.1-3a; 23 rd to 37 th Floor of NAP R.1-3b; 6 th to 37 th Floor of NAPs R.1-3c to R.1-3d)
AW8	Acoustic Windows / Balconies	N/A	N/A	Site R.1 (11 th to 37 th Floor of NAP R.1-4a; 10 th to 37 th Floor of NAP R.1-4b)
NB1	Vertical Noise Barrier	7	53	San Tin Highway
NB2	Vertical Noise Barrier	4.5	31	San Tam Road
NB3	Vertical Noise Barrier	2.5	43	San Tam Road
NB4	Vertical Noise Barrier	2	18	San Tam Road
NB5	Vertical Noise Barrier	2.5	24	San Tam Road
NB6	Vertical Noise Barrier	4	10	San Tam Road
NB7	Vertical Noise Barrier	4	8	San Tam Road
NB8	Vertical Noise Barrier	2	48	Road D1
NB9	Vertical Noise Barrier	3	189	Road D1
NB10	Vertical Noise Barrier	5.5	80	Road D1
NB11	Vertical Noise Barrier	3	25	Road D1
NB12	Vertical Noise Barrier	4	71	Road D1

ID	Type	Vertical Height, m	Approx. Length, m	Location
NB13	Vertical Noise Barrier	2.5	47	Site A.4
NB14	Vertical Noise Barrier	2	44	Road L1
CB1	7m (H) Vertical Noise Barrier with 3m Cantilever at 45 Degree	7	193	San Tin Highway
CB2	7m (H) Vertical Noise Barrier with 3m Cantilever at 45 Degree	7	118	San Tin Highway

Operational Phase – Fixed Noise Sources

- 3.5.4 The tentative mitigation measures as recommended in the EIA Report for the proposed fixed noise sources under the Project include enclosing pumps and noisy plants inside building structures, proper selection of quiet plant, installation of silencer/acoustic enclosure/acoustic louvre for the exhaust of ventilation system and locating openings of ventilation systems away from NSRs as far as practicable. Details of the suggested mitigation measures are presented in **Appendix C**. These measures should be reviewed and refined as appropriate by the proponent of the proposed fixed noise sources if there are any major design changes during the detailed design phase such that the recommended measures are adequate for alleviating the potential operational fixed noise sources impact.

3.6 Audit Requirements

- 3.6.1 Regular site environmental audit during the construction phase of the Project should be conducted at least once per week to ensure proper implementation of mitigation measures and good site practices as listed in **Appendix C** and the noise control requirements stated in EPD's "Recommended Pollution Control Clauses for Construction Contracts" to further minimise the potential noise nuisance during construction phase.

4 WATER QUALITY IMPACT

4.1 Introduction

- 4.1.1 Potential water quality impacts arising from the construction and operational phases of the Project were identified and assessed in the EIA Report. With the implementation of the recommended mitigation measures, no adverse water quality impacts from the Project would be expected during the construction and operational phases of the Project. Nevertheless, water quality monitoring at NTMDC should be conducted before, during and after the construction phase. Regular inspections of the construction activities throughout the construction phase should also be conducted to ensure that the recommended mitigation measures are properly implemented. With proper implementation of mitigation measures during detailed design stage, no monitoring or audit is required during the operational phase.

4.2 Construction Phase

Monitoring Parameters

- 4.2.1 Monitoring for Dissolved Oxygen (DO), Dissolved Oxygen Saturation (DO%), temperature, pH, turbidity, salinity, suspended solid (SS) and water depth should be undertaken at all designated monitoring stations. All parameters should be measured in-situ whereas SS should be determined by the laboratory. DO should be presented in mg/L and in % saturation.
- 4.2.2 Other relevant data should also be recorded, including monitoring station / position, time, tidal stages, weather conditions and any special phenomena or work underway at the construction site. A sample data record sheet is shown in **Appendix E** for reference.

Monitoring Equipment

- 4.2.3 The following equipment and facilities should be provided by the ET and used for the water quality monitoring.

Monitoring Position Equipment

- 4.2.4 A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication or other equipment instrument of similar accuracy, should be provided and used during water quality monitoring to ensure the correct position before taking measurement and water samples.

Sampler

- 4.2.5 A water sampler is required. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (e.g. Kahlsico Water Sampler or an approved similar instrument).

Water Depth Detector

- 4.2.6 A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be hand-held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Dissolved Oxygen and Temperature Measuring Instrument

4.2.7 The instrument should be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a DC power source. The equipment should be capable of measuring:

- a DO-level in the range of 0 - 20 mg/L and 0 - 200% saturation; and
- a temperature of 0 - 45 degree Celsius with a capability of measuring to ± 0.1 degree Celsius.

4.2.8 It should have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables should be available for replacement where necessary, for example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument.

4.2.9 Should salinity compensation not be built-in to the DO equipment, in-situ salinity should be measured to calibrate the DO equipment prior to each DO measurement.

Turbidity Measuring Instrument

4.2.10 Turbidity should be measured in-situ by the nephelometric method. The instrument should be portable and weatherproof using a direct current (DC) power source complete with cable, sensor and comprehensive operation manuals. It should have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (e.g. Hach model 2100P or an approved similar instrument). The cable should not be less than 25m in length. The meter should be calibrated in order to establish the relationship between NTU units and the levels of suspended solids.

Salinity Measuring Equipment

4.2.11 A portable salinometer capable of measuring salinity in the range of 0 - 40 parts per thousand (ppt) should be provided for measuring salinity of the water at each monitoring station.

pH Measuring Equipment

4.2.12 The instrument should consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It should be readable to 0.1 pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 should be used for calibration of the instrument before and after use. Details of the method should comply with American Public Health Association (APHA), 19th Edition 4500-HTB.

Sample Containers and Storage

4.2.13 Water samples for SS determination should be stored in suitable containers with no preservative added, packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory and analysed as soon as possible after collection. Sufficient volume of samples should be collected to achieve the detection limit.

Calibration of in-situ Instruments

4.2.14 All in-situ monitoring instruments should be checked, calibrated and certified by a laboratory accredited under Hong Kong Laboratory Accreditation Scheme (HOKLAS) or any other international accreditation scheme before use and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter should be carried out before measurement at each monitoring station.

- 4.2.15 For the on-site calibration of field equipment, the BS 127:1993, Guide to Field and On-Site Test Methods for the Analysis of Water should be observed.
- 4.2.16 Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

Laboratory Measurement / Analysis

- 4.2.17 Analysis of SS level should be carried out in a HOKLAS or other international accredited laboratory that is HOKLAS-equivalent. Sufficient volume of each water sample should be collected at the monitoring stations for carrying out the laboratory SS determination. All samples should be assigned a unique code and accompanied by Chain of Custody sheets.
- 4.2.18 The SS determination work should start within 24 hours after collection of the water samples. The SS analyses should follow the standard method APHA 2540D with a detection limit of 1 mg/L as described in APHA Standard Methods for the Examination of Water and Wastewater, 21st Edition, unless otherwise specified.
- 4.2.19 Detailed testing methods, pre-treatment procedures, instrument use, QA/QC details (such as blank, spike recovery, number of duplicate samples per batch, etc.), detection limits and accuracy should be submitted to EPD for approval prior to the commencement of monitoring programme. EPD may also request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. The testing methods and related proposal should be checked and certified by IEC before submission to EPD for approval.
- 4.2.20 Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis should be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of the method verification may also be required to submit to EPD. In any circumstance, the sample testing should have comprehensive QA/QC control programmes. The laboratory should prepare to demonstrate the programmes to EPD or his representatives when requested.

Monitoring Schedule and Stations

- 4.2.21 The proposed water quality monitoring schedule should be submitted to EPD at least two weeks before the first day of the monitoring month. EPD should also be notified immediately for any changes in schedule. The monitoring stations proposed in this section are indicative and are subject to further review before the construction phase. The locations of monitoring stations may change after issuing this Manual. The proposed monitoring stations should be submitted four weeks before commencement of baseline monitoring for EPD approval.
- 4.2.22 When alternative monitoring stations are proposed, they should be chosen based on the following criteria:
- close to the sensitive receptors which are directly or likely to be affected;
 - for monitoring stations located in the vicinity of the sensitive receptors, care should be taken to cause minimal disturbance during monitoring; and
 - control station should be at representative location of the Project Site and in its undisturbed condition, and should be located both upstream and downstream of the works sites as far as practicable.

- 4.2.23 It is proposed to monitor the water quality at three locations (i.e. M1 to M3) and one control station (i.e. C1) in NTMDC. Impact stations (i.e. M1 to M3) are designated in the vicinity of revitalisation works within the Project Site to measure any elevation of pollutant levels (e.g. SS level) due to the Project. Control station (i.e. C1) is assigned upstream of the NTMDC to compare the monitored water quality from the proposed impact stations (i.e. M1 to M3) with the ambient water quality during the ebb tide and flood tide. All the proposed river water quality monitoring stations are listed in **Table 4.1** and their locations are shown in **Figure 4.1**.

Table 4.1 Proposed River Water Quality Monitoring Stations for Baseline, Construction Phase and Post-Construction Monitoring

Station	Description	Easting	Northing
C1	Control Station	826198	837341
M1	Impact Station	825129	837248
M2	Impact Station	824483	837636
M3	Impact Station	823590	837728

Monitoring Requirements

- 4.2.24 Baseline, impact and post-construction monitoring should be conducted and the following requirements should be followed:
- Measurement should be taken at three water depths, namely, 1m below water surface, mid-depth and 1m above riverbed, except where the water depth is less than 6m, the mid-depth station could be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored. The ET should agree with EPD on all the monitoring stations;
 - Duplicate in-situ measurements and water samples collected from each independent monitoring event are required for all parameters to ensure a robust statistically interpretable dataset;
 - No sampling should be carried out when typhoon signal No. 3 or above or black rainstorm signal is hoisted; and
 - At each measurement depth, two consecutive measurements should be taken. The probes should be retrieved out of the water after the first measurement and then redeployed for the second measurement. When the difference in value between the first and second measurement of on-site parameters is more than 25% of the value of the first reading, the reading should be discarded and further readings should be taken.

Baseline Monitoring

- 4.2.25 Baseline conditions for river water quality should be established and agreed with EPD prior to the commencement of works at NTMDC. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed monitoring stations. A baseline monitoring report should be submitted to EPD at least four weeks before the commencement of works at NTMDC for agreement. The baseline monitoring report should be certified by the ET Leader and verified by IEC before submission to EPD.
- 4.2.26 The baseline conditions should be established by measuring water quality parameters as specified in **Section 4.2.1** and **Section 4.2.2** at the designated monitoring stations as shown in **Table 4.1**. The measurement depths should follow those specified in **Section 4.2.24**. The measurements should be taken at all

designated monitoring stations including control station, three days per week, at mid-flood and mid-ebb tides, for at least four weeks prior to the commencement of works at NTMDC. There should not be any river construction activities in the vicinity of the stations during the baseline monitoring. The interval between two sets of monitoring should not be less than 36 hours.

Impact Monitoring

- 4.2.27 During the construction period of the proposed revitalisation works at NTMDC, impact monitoring should be undertaken three days per week, at mid-flood and mid-ebb tides, with sampling/measurement at all designated monitoring stations including control station as specified in **Table 4.1**. The interval between two sets of monitoring should not be less than 36 hours except where there are exceedances of action and/or limit levels, in which case the monitoring frequency will be increased. The monitoring parameters and measurement depths should follow those specified in **Section 4.2.1**, **Section 4.2.2** and **Section 4.2.24**. Duplicate water samples should be taken and analysed.
- 4.2.28 If the impact monitoring data collected at the monitoring stations (i.e. M1 to M3) indicate that the action or limit levels as shown in **Table 4.2** are exceeded, analysis should be conducted to identify whether the exceedance is caused by Project activities. If the data analysis results indicate that the exceedance is caused by this Project, appropriate actions including lowering the working rate, or rescheduling of works should be taken and additional mitigation measures should be implemented as necessary.

Post-Construction Monitoring

- 4.2.29 Upon completion of all works at NTMDC, a post-project monitoring should be carried out for four weeks in the same manner as the impact monitoring.

Event and Action Plan

- 4.2.30 The A/L levels for water quality are defined in **Table 4.2**. The actions in accordance with the Event and Action Plan in **Table 4.3** should be carried out if the defined Action and/or Limit levels for water quality are exceeded at any designated monitoring points.

Table 4.2 Action and Limit Levels for Water Quality Monitoring

Parameters	Action Level	Limit Level
DO (mg/L)	<u>Surface and Middle</u> 5 percentile of baseline data	<u>Surface and Middle</u> 4 mg/L, or 1 percentile of baseline data
	<u>Bottom</u> 5 percentile of baseline data	<u>Bottom</u> 2 mg/L, or 1 percentile of baseline data
SS (mg/L)	<u>Depth Average</u> 95 percentile of baseline data or 120% of upstream control station at the same tide of the same day	<u>Depth Average</u> 99 percentile of baseline data or 130% of upstream control station at the same tide of the same day

Parameters	Action Level	Limit Level
Turbidity (NTU)	<u>Depth Average</u> 95 percentile of baseline data or 120% of upstream control station at the same tide of the same day	<u>Depth Average</u> 99 percentile of baseline data or 130% of upstream control station at the same tide of the same day

Remarks:

- (1) "Depth Average" is calculated by taking the arithmetic means of reading of all sampling depths.
- (2) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- (3) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- (4) All the figures given in the table are for reference only and EPD may amend the figures whenever it is considered as necessary.

Table 4.3 Event and Action Plan for Water Quality Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> 1. Repeat in-situ measurement on next day of exceedance to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and ER; and 4. Check monitoring data, all plant, equipment and Contractor's working methods. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor's working methods. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing. 	<ol style="list-style-type: none"> 1. Inform the ER and confirm notification of the non-compliance in writing; and 2. Check all plant and equipment and rectify unacceptable practice.
Action level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> 1. Repeat in-situ measurement on the next day of exceedance to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and ER; 4. Check monitoring data, all plant and equipment, and Contractor's working methods; 5. Discuss additional mitigation measures with IEC and Contractor and ensure mitigation measures are implemented; and 6. Prepare to increase the monitoring frequency to daily. 	<ol style="list-style-type: none"> 1. Discuss with ET and Contractor on the mitigation measures and advise the ER accordingly; 2. Assess the effectiveness of the implemented mitigation measures; and 3. Check monitoring data submitted by ET and Contractor(s)'s working methods. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Discuss with IEC on the proposed mitigation measures and agree on the mitigation measures to be implemented; 3. Ensure additional mitigation measures are properly implemented; and 4. Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Inform the ER and confirm notification of the non-compliance in writing; 2. Check all plant and equipment and rectify unacceptable practice; 3. Consider changes of working methods; 4. Discuss with ET and IEC and propose mitigation measures to ER within three working days; and 5. Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> 1. Repeat in-situ measurement on the next day of exceedance to confirm findings; 	<ol style="list-style-type: none"> 1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Discuss with IEC, ET and Contractor on the proposed mitigation measures and 	<ol style="list-style-type: none"> 1. Inform the ER and confirm notification of the non-compliance in writing;

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
	<ol style="list-style-type: none"> Identify reasons for non-compliance and source(s) of impact; Inform IEC, Contractor and ER; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss additional mitigation measures with IEC, ER and Contractor and ensure mitigation measures are implemented; and Increase the monitoring frequency to daily until no exceedance of limit level. 	<ol style="list-style-type: none"> submitted by Contractor and advise the ER accordingly; and Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> agree on the mitigation measures to be implemented; Ensure additional mitigation measures are properly implemented; Assess the effectiveness of the implemented mitigation measures; and Request Contractor to critically review the working methods. 	<ol style="list-style-type: none"> Check all plant and equipment and rectify unacceptable practice; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to ER within three working days; and Implement the agreed mitigation measures.
Limit level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> Repeat in-situ measurement on next day of exceedance to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IEC, Contractor and ER; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss additional mitigation measures with IEC, ER and Contractor and ensure mitigation measures are implemented; and Increase the monitoring frequency to daily until no exceedance of limit level. 	<ol style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Discuss with IEC, ET and Contractor on the proposed mitigation measures and agree on the mitigation measures to be implemented; Ensure additional mitigation measures are properly implemented; Assess the effectiveness of the implemented mitigation measures; Request Contractor to critically review the working methods; and Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction 	<ol style="list-style-type: none"> Inform the ER and confirm notification of non-compliance in writing; Check all plant and equipment and rectify unacceptable practice; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to ER within three working days; Implement the agreed mitigation measures; and As directed by the ER, to slow down or to stop all or part of the construction activities.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
			activities until no exceedance of limit level.	

4.3 Mitigation Measures

- 4.3.1 Mitigation measures recommended for mitigation of construction phase water quality impacts are provided in the **Appendix C** of this Manual. The Contractor should be responsible for the design and implementation of the mitigation measures.

4.4 Audit Requirement

- 4.4.1 Weekly site audits including site inspections and compliance audits should be conducted to ensure that the recommended good site practices and the recommended mitigation measures listed in **Appendix C** are properly implemented by the Contractor during the construction phase of the Project. It can also provide an effective control of any malpractices and therefore achieve continual improvement of environmental performance on site.
- 4.4.2 In the event that the recommended mitigation measures are not fully or properly implemented, deficiency should be recorded and reported to the site management. Suitable actions are to be carried out to:
- investigate the problems and the causes;
 - issue action notes to the Contractor who is responsible for the works;
 - implement remedial and corrective actions immediately;
 - re-inspect the site conditions upon completion of the remedial and corrective actions; and
 - record the event and discuss with the Contractor for preventive actions.
- 4.4.3 Apart from site audit, relevant documents including licences and permits should be reviewed and audited for compliance with the legislation and contract requirements.

5 SEWERAGE AND SEWAGE TREATMENT IMPLICATIONS

5.1 Introduction

- 5.1.1 Potential sewerage and sewage treatment implications arising from the construction and operational phases of the Project were identified and assessed in the EIA Report. It is anticipated that the proposed developments under the Project would be sustainable from sewerage collection, treatment and disposal prospective, and thus there would be no identified insurmountable sewerage and sewage treatment implications arising from the Project. Therefore, no specific EM&A requirement would be required.

5.2 EM&A Requirements

- 5.2.1 No environmental monitoring and audit requirements would be required.

6 WASTE MANAGEMENT IMPLICATIONS

6.1 Introduction

- 6.1.1 Construction and demolition (C&D) materials, chemical waste, general refuse, excavated sediment, desilted materials and floating refuse would be generated during the construction phase. It is the Contractor's responsibility to ensure all the waste arisen from the Project are properly handled, stored, transported and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines. Provided that these wastes are handled, stored, transported and disposed of using approved methods and that the recommended good site practices and relevant legislation are strictly followed, adverse environmental impacts would not be expected.
- 6.1.2 Municipal solid waste, chemical waste, clinical waste and desilted materials would be generated during the operational phase. The proposed waste infrastructures including refuse collection points and a community recycling centre will provide convenient collection of recyclables from the local community, and to create synergy to achieve better operational efficiency and environmental sustainability. Provided that the wastes are handled, stored, transported and disposed of using approved methods, no adverse environmental impacts would be anticipated with the implementation of good waste management practices. Monitoring and audit programme for the operational phase of the Project would not be required.

6.2 Mitigation Measures

- 6.2.1 Mitigation measures are recommended in the EIA Report and **Appendix C** provides the implementation schedule of the recommended mitigation measures during both construction and operational phases.
- 6.2.2 Waste generated during the construction activities should be audited weekly by the ET. The ET should check whether the Contractor has implemented the recommended good site practices, waste reduction measures and other mitigation measures. All aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal should be considered. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislations and contract requirements.
- 6.2.3 With the appropriate handling, storage and removal of waste arisings during the construction and operation of the Project as presented in **Appendix C**, the potential to cause adverse environmental impacts would be minimised.

6.3 Audit Requirement

- 6.3.1 Regular audits and site inspections should be carried out by the ER, ET and Contractor during construction phase to ensure that the recommended good site practices and the recommended mitigation measures in **Appendix C** are properly implemented by the Contractor. The audit should concern all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements. In addition, the routine site inspection should check the implementation of the recommended good site practices and other waste management mitigation measures.

- 6.3.2 The requirements of the environmental audit programme are set out in **Section 15** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

7 LAND CONTAMINATION

7.1 Introduction

- 7.1.1 Land contamination assessment was conducted for the Project. Site appraisal, in the form of desktop review and site walkover, had been carried out to identify the past and current potentially contaminating land uses within the Project Site.
- 7.1.2 As the concerned sites are currently inaccessible and still in operation, and the construction works would not commence until 2027, further land contamination assessment, including further site appraisal and submission of Contaminated Assessment Plan(s) (CAP(s)), should be conducted for the whole Project Site at a later stage of the Project when site access is available to confirm the existing land uses / activities, identify the presence of any potential contamination sources, and address any new contamination issues. The associated site investigation (SI) works and any necessary remediation action will be recommended to be carried out after operation of concerned site(s) has ceased but prior to the commencement of construction works. The recommended further assessment and remediation works, including the submission of CAP(s), Contamination Assessment Report(s) (CAR(s))/Remediation Action Plan(s) (RAP(s)) and Remediation Report(s) (RR(s)) would follow the relevant Guidance Manual, Guidance Note and Practice Guide and be submitted to EPD for approval.

7.2 Construction Phase

- 7.2.1 Remediation works, if necessary, would be carried out after the operation of concerned site(s) has ceased but prior to the commencement of construction works. Mitigation measures for the remediation works, if necessary, as recommended in the EIA Report, **Appendix C** of this Manual and future RAP(s) should be implemented during the remediation works. EM&A should be carried out in the form of weekly site inspection to ensure the recommended mitigation measures are properly implemented and findings of the audit should be reported in the EM&A reports.

7.3 Operational Phase

- 7.3.1 As any soil / groundwater contamination would be identified and properly treated prior to commencement of construction works at the concerned site(s), no land contamination is anticipated during the operational phase. Specific EM&A requirement is therefore not required.

8 ECOLOGICAL IMPLICATION (TERRESTRIAL AND AQUATIC)

8.1 Introduction

- 8.1.1 Potential ecological impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. There would be no direct impact on LTCP, CAs, Wetland Conservation Area (WCA) and Priority Site for Enhanced Conservation. A small section of cycle track and the associated connection are located in the developed area/wasteland habitat in Yau Mei San Tsuen area, within the Wetland Buffer Area (WBA). Mitigation measures are recommended to minimise the potential direct and indirect impacts to the nearby recognised sites of conservation importance, ecologically sensitive areas, natural habitats, as well as the associated wildlife. With the implementation of appropriate mitigation measures, no unacceptable adverse residual impacts would be anticipated. Nonetheless, EM&A is considered necessary during pre-construction and construction of the Project, and the requirements are described below.

8.2 Mitigation Measures

- 8.2.1 The mitigation measures recommended in the EIA Report to minimise potential ecological impacts are stated in **Appendix C**.

8.3 Monitoring Requirements

Transplantation of Flora Species of Conservation Importance

- 8.3.1 All flora species of conservation importance should be protected and preserved as far as practicable. Nonetheless, four flora species of conservation importance (i.e. *Aquilaria sinensis*, *Aralia chinensis*, *Brainea insignis* and *Ceratopteris thalictroides*) are located within the Project footprint. In case of unavoidable loss of flora species of conservation importance, transplantation of the affected individuals to nearby suitable habitat(s) should be implemented prior to the commencement of site clearance. Prior to the commencement of site clearance, a detailed Pre-Construction Vegetation Survey should be conducted by a qualified botanist / ecologist with at least 5 years of relevant experience to confirm the locations and health conditions of these flora species of conservation importance. All individuals suitable for transplantation would be identified and rescued, and transplanted to suitable receptor site(s).
- 8.3.2 A Plant Protection and Transplantation Proposal (PPTP) should be prepared by qualified botanist / ecologist with at least 5 years of relevant experience and should be submitted for approval from relevant Government departments (e.g. Agriculture Fisheries and Conservation Department (AFCD) and Environmental Protection Department (EPD)) at least 2 months before works commencement. The PPTP should describe the screening / selection of receptor site(s), details of the transplantation methodologies and subsequent monitoring programme, such as monitoring frequency, monitoring parameter.
- 8.3.3 Upon the transplantation of the identified individuals, a post-transplantation monitoring should be implemented to monitor the health conditions and survival of the transplanted individuals. A 3-year establishment period would be provided for the flora species of conservation importance to be transplanted. Monitoring of the transplanted plants should be conducted bi-weekly in the first three months and monthly throughout the remaining establishment period. Details of post-transplantation monitoring programme such as monitoring frequency, parameters, maintenance works and remedial actions should also be recommended in the PPTP for approval.

Translocation of Fauna Species of Conservation Importance

Amphibian Species of Conservation Importance

- 8.3.4 One amphibian species of conservation importance (i.e. Chinese Bullfrog) was recorded within the Project Site in current survey and literature review. The species should be translocated to nearby suitable habitat(s), such as the wetland habitats in the vicinity of the Project Site, including the WCA and Other Specified Uses (Wetland Conservation Park) to the west of San Tin Highway, prior to the commencement of site clearance. A detailed pre-construction fauna survey, focusing on the locations where they were previously recorded within the Project Site, should be conducted by a qualified ecologist with at least 7 years of relevant experience to identify and record the affected individuals prior to commencement of site clearance.
- 8.3.5 Capture and translocation approach should be adopted for amphibian species of conservation importance (i.e. Chinese Bullfrog) within the Project Site. Both adults and tadpoles should be included in the scope of translocation. The pre-construction fauna survey, capture and translocation should be conducted during night-time when amphibians are relatively active in order to maximise the capture rate. A Capture and Translocation Proposal with details of the capture and translocation methodologies, screening / selection of receptor site(s), and capture and translocation process should be prepared by qualified ecologist with at least 7 years of relevant experience and be submitted for approval from relevant Government departments (e.g. AFCD and EPD) at least two months before works commencement.
- 8.3.6 A three-year post-translocation monitoring programme for the targeted amphibian species of conservation importance is required for determining the success of the mitigation. Direct observation and counting, mark-recapture and active search would be potential methodology for the monitoring programmes. Detailed methodology, schedule and frequency of monitoring programme would be provided in the corresponding Capture and Translocation Proposal.

Aquatic Fauna Species of Conservation Importance

- 8.3.7 Three aquatic species of conservation importance (i.e. two freshwater crab species, *Cryptopotamon anacoluthon* and *Nanhaipotamon hongkongense*, and one freshwater fish species, Small Snakehead) were recorded in semi-natural watercourse in the vicinity of the Project Site from current survey and literature review. The species should be translocated to nearby suitable habitat(s) prior to the commencement of site clearance. A pre-construction fauna survey, focusing on the locations where they were previously recorded within the Project Site, should be conducted by a qualified ecologist with at least 7 years of relevant experience to identify and record the affected individuals prior to the commencement of site clearance.
- 8.3.8 The identified individuals of aquatic species of conservation importance within the Project footprint should be captured and translocated to suitable receptor site(s). The hillside unpolluted natural watercourses within the LTCP to the south of the Project Site could be potential receptor sites for the crab species, while the natural or semi-natural watercourse at further upstream section of watercourse W8 or W8c outside the Project Site might be the potential receptor site for the fish species. Preparation of Capture and Translocation Proposal with details of capture and translocation methodologies, screening / selection of receptor site(s), and capture and translocation process should be conducted by qualified ecologist with at least 7 years of relevant experience and submitted for approval from relevant Government departments (e.g. AFCD) at least two months before works commencement.

- 8.3.9 A three-year post-translocation monitoring programme for the abovementioned crab and fish species of conservation importance is required for determining the success of mitigation. Direct observation and counting, mark-recapture and active search are potential methodology for the monitoring programme. Detailed methodology, schedule and frequency of monitoring programme would be provided in the corresponding Capture and Translocation Proposal.

Wetland Compensation

- 8.3.10 A proposed wetland compensation site of 2.55 ha situated between Tsing Long Highway and San Tam Road at Sha Po area adjacent to Kam Tin River is identified (Figure 9.7 in the EIA Report refers) to compensate for the loss of marsh/reed and natural watercourse habitats. A Habitat Creation and Management Plan (HCMP) should be prepared by a qualified ecologist with at least 7 years of relevant experience to form the basis of the proposed wetland compensation site and submit for approval from relevant Government departments (e.g. AFCD and EPD) during detailed design stage, at least two months before commencement of site clearance of marsh/reed habitat and natural watercourse under the Project. The HCMP should cover habitat design and construction methods, monitoring protocol with particular focus on detailed design and implementation details of the proposed wetland compensation site.
- 8.3.11 Monitoring should be conducted by a qualified ecologist with at least 7 years of relevant experience after the establishment of the proposed wetland compensation site. Parameters of monitoring should focus on the abundance of target species and the habitat conditions (e.g. water depth, water quality and condition of the wetland vegetation, etc.) and presence of fauna species. Management programmes (e.g. water control, structural maintenance, supplemental planting, pest control, repair of damage, etc.) should be conducted as necessary according to the approved HCMP.

Pre-construction Survey and Nest Control for Nest of White-throated Kingfisher

- 8.3.12 According to the recent survey, an active nest of White-throated Kingfisher was found in the mud wall in hillside plantation behind TMB. Despite the active nest was recorded outside the Project Site, as a mitigation measure, pre-construction survey and nest control should be implemented to avoid direct injury to breeding pairs, chicks or eggs of this species of conservation importance.
- 8.3.13 Pre-construction survey should be conducted by qualified ecologist in breeding season (April to July), with special attention given to the specific breeding habitat of White-throated Kingfisher and to identify the locations and condition of the nest of this species within Project Site. All breeding/nesting behaviour of White-throated Kingfisher identified and associated detailed nest control measures should be presented in the Pre-construction Survey Report, which should be submitted for approval from relevant Government departments (e.g. AFCD and EPD) no later than two months before commencement of works at the mud wall along hillside plantation behind TMB.
- 8.3.14 Nest control measures should be implemented in non-breeding season (i.e. late August to early March) to discourage breeding behaviour within the Project Site prior to construction works in Ngau Tam Shan. To discourage the nesting of White-throated Kingfisher, the mud wall and mud wall tunnels within the Project Site on Ngau Tam Shan should be sealed in non-breeding season. Prior to the implementation of nest control measures, the holes on the mud wall within the Project Site should be surveyed carefully by qualified ecologists to ensure no avifauna and / or eggs are present. The detailed schedule of specific nest control measures would be subject to the findings of the pre-construction survey and Nest Control Proposal.

- 8.3.15 Preparation of Nest Control Proposal, pre-construction survey, and the nest control measures should be conducted by a qualified ecologist with at least 7 years of relevant experience to ensure the control measures and the subsequent works would not injure any breeding pairs, chicks or eggs.

Other Minimisation Measures

- 8.3.16 As described in **Section 2** to **Section 4**, EM&A programmes were recommended to ensure compliance of the potential air quality, noise impacts and water quality impact respectively (e.g. potential dust emission during construction phase, potential noise exceedance from construction noise, and potential water pollution). Monitoring requirements are further stated in the corresponding sections. Regular site environmental audit during construction phase is also recommended to ensure proper implementation of mitigation measures and good site practices.

8.4 Audit Requirements

- 8.4.1 Regular site environmental audits should be undertaken on weekly basis to ensure proper implementation and maintenance of the recommended mitigation measures during the construction phase of the Project.

9 FISHERIES IMPACT

9.1 Introduction

- 9.1.1 Potential fisheries impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. No adverse residual impact on fisheries resources would be expected from the Project.

9.2 Mitigation Measures

- 9.2.1 The mitigation measures recommended in the EIA Report to minimise potential fisheries impacts are provided in **Appendix C**.

9.3 Monitoring and Audit Requirements

- 9.3.1 With the implementation of water quality mitigation and precautionary measures proposed in Section 5 of the EIA Report, the potential water quality impacts arising from the Project would be minimised. Given that the monitoring and audit requirement for potential water quality impact are provided in the EM&A programme recommended in **Section 4**, no specific EM&A programme is required for the potential fisheries impact.

10 LANDSCAPE AND VISUAL IMPACT

10.1 Introduction

- 10.1.1 The EIA has recommended landscape and visual mitigation measures to be undertaken during both the construction and operational phases of the Project. The design, implementation and maintenance of landscape and visual mitigation measures should be checked to ensure that they are fully realised such that any potential conflicts between the proposed landscape and visual measures and any other works of the Project could be resolved as early as practicable without affecting the implementation of the mitigation measures.

10.2 Mitigation Measures

- 10.2.1 The proposed mitigation measures of landscape and visual impacts are summarised in **Appendix C**. The landscape and visual mitigation measures proposed should be incorporated in the detailed landscape and engineering design. The construction phase mitigation measures should be adopted from the commencement of the construction and should be in place throughout the entire construction period. Mitigation measures for the operational phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.
- 10.2.2 Any potential conflicts among the proposed mitigation measures, the Project works, and operational requirements should also be identified and resolved as early as practicable. Any changes to the mitigation measures should be incorporated in the detailed design.

10.3 EM&A Requirement

- 10.3.1 The construction phase EM&A of the mitigation measures should be carried out as part of the site audit programme. EM&A during operational phase of the Project should be carried out within the 12-month establishment period of the landscape and visual mitigation measures by the corresponding implementation agency to ensure the proposed mitigation measures in the EIA and as depicted in the Landscape and Visual Mitigation Plan are fully implemented.
- 10.3.2 All mitigation measures proposed in the EIA and implemented by the Contractor should be audited by Registered Landscape Architect (RLA), as a member of the Environmental Team, on a regular basis to ensure compliance with the intended aims of the measures. The mitigation measures proposed should be included in the detailed engineering design and landscape design drawings and contract document. Site inspection should be undertaken monthly throughout the construction period. In particular, the extent of the agreed works areas should be regularly checked during the construction phase. The landscape auditor should audit the proposed mitigation measures in the EIA to ensure that they are fully implemented during construction and the 12-month establishment period during operational phase.

11 IMPACT ON CULTURAL HERITAGE

11.1 Introduction

- 11.1.1 Baseline study, comprising of desktop research and field evaluation were conducted and the findings indicated the presence of built heritage and archaeological resources within the 300 m assessment area for the Project. Both direct (i.e. demolition of other identified items) and indirect impacts (i.e. ground-borne vibration, settlement and tilting) were anticipated during the construction phase of the Project. Archaeological potential areas were also identified within the Project Site.

11.2 Mitigation Measures

- 11.2.1 The recommended mitigation measures as presented in **Appendix C** and summarised below should be implemented to mitigate the impacts on built heritage and archaeological heritage resources.

Built Heritage

Construction Phase

Cartographic and Photographic Record

- 11.2.2 A total of seven other identified items (i.e. DD104 Lot 4186 S.E (Residence) (YTMT01); DD104 Lot 4187 S.B (Watchtower) (YTMT02); Remnants of Nam Shan Monastery (YTMT03); Subsidiary Station of San Yau Vegetable Marketing Co-operative Society, Ltd. (YTMT04); Lee's Boundary Stone (YTMT07); Mailbox No. 299 (NB04) and Grave of Mr. Man Chiu Pak and His Wife (NB09)) located within the Project Site will be subject to direct impact due to demolition. Cartographic and photographic record, and other documentation means (including 3D scanning), should be carried out for these buildings/structures prior to the commencement of the construction works by the contractor(s) at the respective locations for record purposes and future use. For NB09, implementation details would be subject to discussion between project proponent(s) and stakeholders. If the former Yau Tam Mei Primary School (YTMT06) is confirmed to be demolished in later stage, preservation by record should also be conducted for the school.

Monitoring of Ground-borne Vibration, Tilting and Ground Settlement

- 11.2.3 Located within or adjacent to the Project Site, eight other identified items, including Wai Cheung Ancestral Hall (HB1219), San Yau Vegetable Marketing Co-operative Society, Ltd (YTMT05), DD104 Lot 2729 (Residence) (WTT01), Nos. 16-17, San Wai Tsuen (SW03), No. 25A, San Wai Tsuen (SW04), Mailbox No. 35 (NB02), Mailbox No. 169 (NB03) and Chun Chi Education Park (NB08), may experience indirect impacts of ground-borne vibration, tilting and settlement. The future contractor(s) should implement standard control measures on ground-borne vibration, tilting and settlement by drawing necessary references from relevant government guidelines, including but not limited to the Code of Practice for Foundations¹ and Practice Note for Authorised Person, Registered Structural Engineers and Registered Geotechnical Engineers APP-137 (PNAP APP-137)².

¹ Buildings Department. (2024). *Code of Practice for Foundations 2017 (2024 Edition)*. Retrieved from <https://www.bd.gov.hk/doc/en/resources/codes-and-references/code-and-design-manuals/FoundationCode2017.pdf>.

² Buildings Department. (2024). *Practice Note for Authorised Person, Registered Structural Engineers and Registered Geotechnical Engineers (PNAP) – Ground-borne Vibration and Ground Settlement arising from Pile Foundation and Excavation and Lateral Support Work (APP-137)*. Retrieved from <https://www.bd.gov.hk/doc/en/resources/codes-and-references/practice-notes-and-circular-letters/pnap/APP/APP137.pdf>.

- 11.2.4 During the construction phase, monitoring of ground-borne vibration, tilting and ground settlement should be implemented by the contractor(s) on these other identified items when there are construction works nearby. The monitoring should be incorporated with a set of Alert, Alarm and Action (3As) system. The proposed 3As criteria should be further confirmed via pre-construction condition survey and an assessment on the effects of ground-borne vibrations, settlements and tilting on the concerned buildings.
- 11.2.5 Considering that HB1219 is proposed to be preserved in situ within the Project Site, standard measures of pre-construction condition survey, as suggested in PNAP APP-137, should be conducted on HB1219 for better understanding on its structural condition. The survey should be undertaken by registered structural engineers or heritage specialists. The methodology for the condition survey should be proposed by the registered structural engineer(s) or heritage specialist(s). The results of the pre-construction condition survey should form a baseline and taken into consideration when formulating the abovementioned monitoring proposal (**Sections 11.2.3 to 11.2.4** refer) and buffer zone (**Section 11.2.6** refers). A post-construction condition survey should also be carried out to confirm its structural stability. If preservation of YTMT06 in situ is confirmed in subsequent stages, the abovementioned standard control measures (i.e. condition survey, ground-borne vibration, tilting and ground settlement) should also be conducted for the school.

Buffer Zone

- 11.2.6 A buffer zone should be reserved for HB1219 by the project proponent or its contractor(s) according to the results of the pre-construction condition survey in the design layout of the Project for mitigating potential adverse vibration impact arising from construction works. No piling works should be allowed within the buffer zone during the construction phase. The said buffer zone could be contained within the proposed Open Space O.3. If preservation of YTMT06 in situ is confirmed in subsequent stages, same measures should also be conducted for the school.

Physical Barriers

- 11.2.7 The contractor(s) should enforce protocol to forbid any light machinery, such as handheld jackhammer, or heavy machinery to come into direct contact with HB1219. Protective covering or sheltering should be provided for HB1219 during construction activities in proximity to avoid potential damages through direct contact with construction machineries. Physical protective barriers/covers, intervention/cushioning materials, or structural strengthening with minimal impact to the building fabric might need to be set up to protect the building if necessary. If preservation of YTMT06 in situ is confirmed in subsequent stages, physical barriers should be also deployed for the school during construction phase.

Dust Suppression

- 11.2.8 As HB1219, YTMT05 and YTMT06 (if preserved in situ) are located within or in close proximity of the Project Site, dust nuisance from the construction works nearby might have potential impact to the buildings and their users. Therefore, *Air Pollution Control (Construction Dust) Regulation* shall be followed. Dust suppression measures and good site practice should be adopted by the contractor(s) during the construction phase in order to avoid dust accumulation on these buildings.

Temporary Change of Access

- 11.2.9 There would be a temporary change of access to HB1219, YTMT05 and YTMT06 (if preserved in situ) during the construction phase. A safe access route to the

concerned buildings should be maintained by the contractor(s) for conducting any mitigation measures.

Awareness to Other Identified Items in Close Proximity

- 11.2.10 A total of eight other identified items are located in proximity to the Project Site, namely YTMT05, WTT01, SW03, SW04, NB02, NB03, NB05 and NB08. To ensure no direct disturbance would be caused to the physical fabrics of these items, project proponent(s), subsequent developer(s) and contractor(s) should be aware of these items when construction works are carrying out nearby. Management measures should be deployed by the contractor(s), such as briefing to site staff before commencement of construction works and posting notices at site office(s).

Operational Phase

Revitalisation

- 11.2.11 HB1219 is proposed to be preserved in situ within the land use of Open Space (O.3). Any revitalisation proposed for the building in later stages should be further reviewed by the future project proponent(s) or subsequent developer(s).
- 11.2.12 YTMT06 is located within the land use of Government, Institution or Community (G.11). If the preservation of YTMT06 in situ is confirmed in subsequent stages, opportunity for potential revitalisation of the school should be explored by future project proponent(s) or subsequent developer(s).

Archaeology

- 11.2.13 Based on the desktop review and the findings of previous archaeological surveys, there are high archaeological potential areas located within the Project Site, namely Ngau Tam Mei Site of Archaeological Interest (SAI), Ngau Tam Mei Archaeologically Sensitive Area (ASA) and Ngau Tam Mei (North) ASA. Direct impact on archaeological heritage is anticipated during the construction phase.
- 11.2.14 Archaeological excavation is necessary to be conducted at the Ngau Tam Mei SAI within the Project Site in order to obtain adequate archaeological information of the area, and retrieve the archaeological data, if any, before commencement of works involving soil disturbance at the respective area, subject to future land resumption status and discussion with Antiquities and Monuments Office (AMO) in later stages.
- 11.2.15 A comprehensive review has been conducted in the EIA Report based on all available information at this stage, in order to safeguard any archaeological resources that might have existed within the Project Site. Considering the potential direct impact to both Ngau Tam Mei ASA and Ngau Tam Mei (North) ASA where have high archaeological potential, archaeological survey-cum-excavation is recommended to be conducted at these areas. The aim is to obtain adequate archaeological information of these areas for verifying their archaeological potential, and retrieve the archaeological data, if any, before commencement of works involving soil disturbance at the respective areas. It should be subject to future land resumption status and discussion with AMO in later stages.
- 11.2.16 Considering the potential direct impact to both the low-lying agricultural fields and hilly landscape within the Project Site where possess moderate-low archaeological potential, archaeological survey should be conducted to obtain adequate archaeological information of these areas for verifying their archaeological potential, and retrieve the archaeological data, if any, before commencement of works involving soil disturbance at the respective areas. It should be subject to future land resumption status and discussion with AMO in later stages.

- 11.2.17 The low archaeological potential areas identified in the archaeological assessments of the EIA studies for NOL Main Line and San Tin / Lok Ma Chau Development Node (STLMC DN) within the Project Site is considered as having acceptable impact, while there would be no impact on archaeological heritage by the Project for the areas that have been disturbed heavily due to modern development and have no archaeological potential. As a precautionary measure and pursuant to the Antiquities and Monuments Ordinance (Cap. 53), the project proponent is required to inform the AMO immediately in case of discovery of antiquities or supposed antiquities in the course of works, so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with and to the satisfaction of AMO.

12 HAZARD TO LIFE**12.1 Introduction**

- 12.1.1 Since there are no existing and planned hazardous facilities within and in the vicinity of the Development Area, no hazard to life impact is anticipated. Mitigation measures and EM&A are considered not necessary.

13 LANDFILL GAS HAZARD**13.1 Introduction**

- 13.1.1 A small portion of the Project Site lies within the consultation zone of the closed and restored Ngau Tam Mei Landfill as shown in **Figure 13.1**.
- 13.1.2 Qualitative landfill gas (LFG) hazard assessment in Section 14 of the EIA Report indicates that potential hazard associated with LFG presents “Very Low” risk during both construction and operational phases of the Project, and thus no mitigation measures are therefore required. However, appropriate precautionary and protective measures as suggested in Section 14 of the EIA Report should be considered. EM&A is considered not necessary.

14 IMPACT FROM ELECTRIC AND MAGNETIC FIELD

14.1 Introduction

- 14.1.1 Section 15 of the EIA Report indicates that, based on previous EIA studies, the electric and magnetic field generated by the existing 400 kV overhead cables located within/in the vicinity of the Development Area are well below the stipulated guidelines issued by International Commission on Non-ionizing Radiation Protection (ICNIRP) in Year 1998. Therefore, no adverse impacts would be anticipated, and no specific electric and magnetic field monitoring programme is required.

15 ENVIRONMENTAL AUDITING

15.1 Site Inspection

- 15.1.1 Site inspection is one of the most effective and direct tools to trigger and enforce specified environmental protection and pollution control measures. Site inspection should be undertaken regularly during the construction phase to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented for the activities associated with the Project.
- 15.1.2 The ET should be responsible for formulating the environmental site inspection programme as well as the deficiency and remedial action reporting system, and for carrying out the site inspections. He should submit a proposal for site inspection and deficiency and remedial action reporting procedures to the Contractor for agreement, and to the Engineer's Representative (ER) for approval. The proposal for rectification, if any, should be prepared and submitted to the ETL and IEC by the Contractor.
- 15.1.3 Regular site inspections should be carried out and led by the ER and attended by the Contractor and ET at least once per week during the construction phase, while the IEC should undertake regular site audit at least once per month to audit and verify the overall environmental performance of the works and to assess the effectiveness of the ET and Contractor in their duties. The areas of inspection should not be limited to the environmental conditions and the pollution control and mitigation measures within the Project Site, it should also review the environmental conditions of locations that are beyond the boundary of the Project Site that are likely to be affected directly or indirectly by the construction activities of the Project. The following information should be referred during the inspection:
- The EIA Report and EM&A recommendations on environmental protection and pollution control mitigation measures;
 - Ongoing results of the EM&A programme;
 - Works progress and programme;
 - Individual works methodology proposals (which should include the proposal on associated pollution control measures);
 - Contract specifications on environmental protection and pollution prevention control;
 - Relevant environmental protection and pollution control legislations; and
 - Previous site inspection results undertaken by the ET and others.
- 15.1.4 The Contractor should keep the ER and ET updated with all relevant environmental related information on the construction contract necessary for him/her to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be submitted to the IEC and the Contractor within 24 hours for reference and for taking immediate remedial action. The Contractor should follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and remedial action reporting system formulated by the ET, to report on any remedial measures subsequent to the site inspections.
- 15.1.5 The ER, IEC, ET and the Contractor should also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan for the EM&A programme.

15.2 Compliance with Legal and Contractual Requirements

- 15.2.1 To ensure that the works are in compliance with the statutory requirement, all method statements of works should be submitted by the Contractor to the ER for approval and to the ET for vetting to ensure sufficient environmental protection and pollution control measures have been included. The implementation schedule of the proposed mitigation measures is summarised in **Appendix C**. Any proposed changes to the mitigation measures shown in **Appendix C** should be certified by the ET and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report.
- 15.2.2 The ER and ET should also review the progress and programme of the works to check that relevant environmental legislations have not been violated, and that any foreseeable potential for violating laws can be prevented.
- 15.2.3 The Contractor should provide the update of the relevant documents to the ET so that works checking could be carried out effectively. The document should at least include the updated Works Progress Reports, updated Works Programme, method statements, any application letters for licences / permits under the environmental protection legislations, and copies of all valid licences / permits. The site diary should also be available for the inspection by the relevant parties.
- 15.2.4 After reviewing the documentation, the ET should advise the Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control so that they can timely take follow-up actions as appropriate. If the follow-up actions may still result in violation of environmental protection and pollution control requirements, the ER and ET should provide further advice to the Contractor to take remedial action to resolve the problem.
- 15.2.5 Upon receipt of the advice, the Contractor should undertake immediate action to remedy the situation. The ER and ET should follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

15.3 Choice of Construction Method

- 15.3.1 At times during the construction phase, the Contractor may propose alternative construction method(s) that had not been assessed in the EIA Report. The Contractor should submit a proposal which provides the details of the proposed alternative construction method and the associate construction equipment to the ER, ETL and IEC for approval before commencement of the proposed works. The Contractor's options for alternative construction method(s) may introduce adverse environmental impacts into the Project, and therefore the Contractor and ET should review and determine, in accordance with established environmental standards and guidelines, as well as the recommendations and requirements in the EIA Report, the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET should provide a copy of the Proactive Environmental Protection Proforma as shown in **Appendix E** to the IEC for verification before commencement of the proposed works. The IEC should verify the review of the alternative construction method(s) and endorse the proposal(s) on the basis of no adverse environmental impacts.
- 15.3.2 In case the Contractor needs to update the mitigation measures and/or the project implementation schedule as a result of alternative construction method(s) or other condition (e.g. site constraint(s)), the ET should also review the latest recommendation of mitigation measures and/or project implementation schedule by submission of a Proactive Environmental Protection Proforma as shown in

Appendix E. The IEC should verify the Proforma and conduct audit to confirm proper implementation of the alternative measures.

15.4 Environmental Complaints

15.4.1 The following procedures should be undertaken upon receipt of any environmental complaint (**Appendix F** refers):

- The Contractor to log complaint and date of receipt onto the complaint database and inform the ER, ET and IEC immediately;
- The Contractor to investigate, with the ER and ET, the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the Project with the support of additional monitoring frequency and stations, if necessary;
- The Contractor to identify remedial measures in consultation with the IEC, ET and ER if a complaint is valid and due to the construction works of the Project;
- The Contractor to implement the remedial measures as required by the ER and to agree with the ET and IEC any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures;
- The ER, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;
- The ET/Contractor to undertake additional monitoring if necessary and audit to verify the situation, and oversee that circumstances leading to the complaint do not recur;
- If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up action stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by the EPD; and
- The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

16 REPORTING

16.1 General

- 16.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) should also be submitted in electronic format. The formats for noise and water quality monitoring data to be submitted are shown in **Appendix E**.
- 16.1.2 Types of reports that the ET Leader should submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and final EM&A report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final EM&A reports should be made available to the DEP.

16.2 Electronic Reporting of EM&A Information

- 16.2.1 To facilitate public inspection of the baseline monitoring report and various EM&A reports via the EIAO Internet website and at the EIAO register office, electronic copies of these reports should be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF Adobe 11 Pro version or later), unless otherwise agreed by EPD and should be submitted at the same time as the hardcopies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of these reports should be included at the beginning of the document. Hyperlinks to all figures, drawings and tables in these reports should be provided in the main text from where the respective references are made. All graphics in these reports should be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of these reports must be the same as the hard copies. The summary of the monitoring data taken should be included in the various EM&A Reports to allow for public inspection via the EIAO Internet website.

16.3 Baseline Monitoring Report

- 16.3.1 Baseline Environmental Monitoring Report(s) should be prepared within 10 working days of completion of the baseline monitoring and then certified by the ET Leader. Copies of the Baseline Environmental Monitoring Report should be submitted to the Contractor, the IEC, the ER and EPD. The ET Leader should liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format should be agreed with EPD prior to submission.
- 16.3.2 The baseline monitoring report should include, but not be limited to the following:
- i. up to half a page executive summary;
 - ii. brief project background information;
 - iii. drawings showing locations of the baseline monitoring stations;
 - iv. an updated construction programme with milestones of environmental protection / mitigation activities annotated;
 - v. monitoring results (in both hard and soft copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;

- monitoring locations (and depth);
 - monitoring date, time, frequency and duration; and
 - QA/QC results and detection limits.
- vi. details on influencing factors, including:
- major activities, if any, being carried out on the site during the period;
 - weather conditions during the period; and
 - other factors which might affect results.
- vii. determination of the A/L Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis should conclude if there is any significant difference between control and impact stations for the parameters monitored;
- viii. revisions for inclusion in the EM&A Manual; and
- ix. comments, recommendations and conclusions.

16.4 Monthly EM&A Reports

- 16.4.1 The results and findings of all EM&A work required in the Manual should be recorded in the monthly EM&A reports certified by the ET Leader. The EM&A report should be prepared and submitted within 10 working days at the end of each reporting month, with the first report due the month after construction commences. Each monthly EM&A report should be submitted to the following parties: the Contractor, the IEC, the ER and EPD. Before submission of the first EM&A report, the ET Leader should liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.
- 16.4.2 The ET leader should review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

First Monthly EM&A Report

- 16.4.3 The first monthly EM&A report should include at least but not be limited to the following:
- i. executive summary (1-2 pages):
 - breaches of A/L levels;
 - complaint log;
 - notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.
 - ii. basic project information:
 - project organisation including key personnel contact names and telephone numbers;
 - construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - management structure, and

- works undertaken during the month.
- iii. environmental status:
 - works undertaken during the month with illustrations (such as location of works, percentage of fines in the fill materials used, etc); and
 - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
- iv. a brief summary of EM&A requirements including:
 - all monitoring parameters;
 - environmental quality performance limits (A/L levels);
 - Event-Action Plans;
 - environmental mitigation measures, as recommended in the EIA Report; and
 - environmental requirements in contract documents.
- v. implementation status:
 - advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation schedule.
- vi. monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - graphical plots of the monitored parameters in the month annotated against:
 - o the major activities being carried out on site during the period;
 - o weather conditions that may affect the results; and
 - o any other factors which might affect the monitoring results;
 - any other factors which might affect the monitoring results; and
 - QA/QC results and detection limits.
- vii. report on non-compliance, complaints, notifications of summons and successful prosecutions:
 - record of all non-compliance (exceedances) of the environmental quality performance limits (A/L levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;

- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

viii. others:

- an account of the future key issues as reviewed from the works programme and work method statements;
- advice on the solid and liquid waste management status;
- a forecast of the works programme, impact predictions and monitoring schedule for the next three months;
- compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies; and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

Subsequent monthly EM&A Reports

16.4.4 Subsequent monthly EM&A reports should include the following:

i. executive summary (1 - 2 pages):

- breaches of A/L levels;
- complaints log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

ii. environmental status:

- construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection / mitigation measures for the month;
- works undertaken during the month with illustrations including key personnel contact names and telephone numbers; and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

iii. implementation status:

- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation schedule.

- iv. monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - graphical plots of the monitored parameters in the month annotated against:
 - o the major activities being carried out on site during the period;
 - o weather conditions that may affect the results; and
 - o any other factors which might affect the monitoring results.
 - any other factors which might affect the monitoring results; and
 - QA/QC results and detection limits.
- v. report on non-compliance, complaints, and notifications of summons and successful prosecutions:
 - record of all non-compliance (exceedances) of the environmental quality performance limits (A/L levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- vi. others:
 - an account of the future key issues as reviewed from the works programme and work method statements;
 - advice on the solid and liquid waste management status;
 - a forecast of the works programme, impact predictions and monitoring schedule for the next three months;
 - compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies; and

- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

vii. appendix

- A/L levels;
- graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - o major activities being carried out on site during the period;
 - o weather conditions during the period; and
 - o any other factors that might affect the monitoring results.
- monitoring schedule for the present and next reporting period;
- cumulative statistics on complaints, notifications of summons and successful prosecutions;
- outstanding issues and deficiencies

16.5 Quarterly EM&A Summary Reports

16.5.1 A quarterly EM&A summary report of around five pages should be produced by the ET Leader and should contain at least the following information. Apart from these, the first quarterly summary report should also confirm that the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works. Each quarterly EM&A report should be submitted to the following parties: the IEC, the ER and EPD.

- i. executive summary (1 - 2 pages);
- ii. basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;
- iii. a brief summary of EM&A requirements including:
 - monitoring parameters;
 - environmental quality performance limits (A/L levels); and
 - environmental mitigation measures, as recommended in the EIA Report.
- iv. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation schedule;
- v. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- vi. graphical plots of the trends of monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
 - the major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors which might affect the monitoring results.

- vii. advice on the solid and liquid waste management status;
- viii. a summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels);
- ix. a brief review of the reasons for and the implications of non-compliance, including a review of pollution sources and working procedures;
- x. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- xi. a summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- xii. a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;
- xiii. comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and
- xiv. proponents' contacts and any hotline telephone number for the public to make enquiries.

16.6 Final EM&A Review Reports for Construction Phase

- 16.6.1 The EM&A program for construction phase should be terminated upon completion of those construction activities that have the potential to result in a significant environmental impact.
- 16.6.2 The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project Proponent followed by final approval from the DEP.
- 16.6.3 The final EM&A report should be prepared by the ET Leader and contain at least the following information. The Final EM&A Review report should be submitted to the following parties: the IEC, the ER and EPD.
 - i. executive summary (1 - 2 pages);
 - ii. basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
 - iii. a brief summary of EM&A requirements including:
 - monitoring parameters;
 - environmental quality performance limits (A/L levels); and
 - environmental mitigation measures, as recommended in the EIA Report.
 - iv. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation status proformas;

- v. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- vi. graphical plots of the trends of monitored parameters over the course of the project, including the post-project monitoring for all monitoring stations annotated against:
 - the major activities being carried out on site during the period;
 - weather conditions during the period;
 - any other factors which might affect the monitoring results; and
 - the return of ambient environmental conditions in comparison with baseline data.
- vii. compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;
- viii. provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
- ix. advice on the solid and liquid waste management status;
- x. a summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels);
- xi. a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- xii. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- xiii. a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- xiv. review monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
- xv. a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of breaches, investigation, follow-up actions taken and results;
- xvi. review the practicality and effectiveness of the EIA process and EM&A programme (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme), recommendations (for example, any improvement in the EM&A programme); and
- xvii. a conclusion to state the return of ambient and / or the predicted scenario as per EIA findings.

16.7 Final EM&A Report for Operational Phase

- 16.7.1 A final EM&A review report for operational phase should be submitted after completion of operation monitoring. The final EM&A review report for operation phase should contain at least the following information:
- i. executive summary (1 - 2 pages);
 - ii. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and/or control stations;

- iii. basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
- iv. a brief summary of EM&A requirements including:
 - Environmental mitigation measures for operation stage, as recommended in the project EIA Report;
 - environmental impact hypotheses tested;
 - environmental quality performance limits (Action and Limit levels);
 - all monitoring parameters;
 - Event and Action Plans;
- v. a summary of the implementation status of environmental protection and pollution control / mitigation measures for operation stage, as recommended in the project EIA Report and summarised in the updated implementation schedule;
- vi. graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the project, including:
 - the major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors which might affect the monitoring results;
- vii. a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- viii. a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- ix. a description of the actions taken in the event of non-compliance;
- x. a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;
- xi. a review of the validity of EIA predictions for operation stage and identification of shortcomings in EIA recommendations;
- xii. comments (for example, a review of the effectiveness and efficiency of the mitigation measures, the performance of the environmental management system, and the overall EM&A programme for operation stage); and
- xiii. recommendations and conclusions (for example, a review of success of the overall EM&A programme for operational stage to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

16.8 Data Keeping

- 16.8.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document should be well kept by the ET Leader and be ready for inspection upon request. All relevant information should be clearly and systematically recorded in the document. Monitoring data should also be recorded in electronic format, and the software copy must be available upon request. Data

format should be agreed with the EPD. All documents and data should be kept for at least one year following completion of the construction contract.

16.9 Interim Notifications of Environmental Quality Limit Exceedances

- 16.9.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notifications is presented in **Appendix G**.