

Water Supplies Department

**Ngau Tam Mei Water Treatment
Works Extension**

**Environmental Monitoring and Audit
Manual**

282551-REP-101-04

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 282551

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1 Introduction

1.1 Background

- 1.1.1.1 The existing Ngau Tam Mei Water Treatment Works (NTM WTW) and associated treated water transfer and distribution system were commissioned in 2000 to provide treated water capacity of 230,000m³/day. The treated water is supplied to Yuen Long, Ngau Tam Mei, San Tin and Mai Po Areas.
- 1.1.1.2 With consideration on the planned and potential developments in Yuen Long area, the future water demand will render the existing water treatment capacity of NTM WTW to be exceeded by Year 2030. In this connection, it is necessary to expand and upgrade the existing NTM WTW and treated water transfer and distribution systems by end of 2028 to meet the development programme.
- 1.1.1.3 Ove Arup & Partners Hong Kong Ltd (Arup) was commissioned by the Water Supplies Department (WSD) of the Government of the Hong Kong Special Administrative Region on 15 June 2021 to carry out the Agreement No. CE 78/2020 (WS) on Ngau Tam Mei Water Treatment Works and Primary Service Reservoir Extension – Investigation, Design and Construction.
- 1.1.1.4 The Agreement No. CE 78/2020 (WS) will include the extension of NTM WTW within the site compound with the aim of upgrading the water treatment capability and enhancing the treatment efficiency. It also includes the construction of extension of NTM Fresh Water Primary Service Reservoir (FWPSR) adjacent to the existing FWPSR and laying of fresh water trunk mains of 1600mm from the extended NTM WTW to FWPSR.
- 1.1.1.5 The Study under this Agreement No. CE 78/2020 (WS) will cover the whole Ngau Tam Mei Water Treatment Works Extension Project (hereinafter referred to as the “Study”), which also includes the works under Agreement No. CE 62/2022 (WS) – “Laying of Fresh Water Trunk Mains from Ngau Tam Mei Fresh Water Primary Service Reservoir to Tan Kwai Tsuen and Modification of Raw Water Tunnel Junction (Chamber G) – Design and Construction”.

1.2 Purpose of the Manual

- 1.2.1.1 The purposes of this Environmental Monitoring and Audit (EM&A) Manual are to:
- Guide the set up of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) recommendations;
 - Describe the requirements for site environmental audit; and

- Describe the requirements for reporting for the EM&A.
- 1.2.1.2 This Manual outlines the audit programme for the construction and operation of the Project and provides systematic procedures for auditing and minimising environmental impacts.
- 1.2.1.3 Hong Kong environmental regulations have served as environmental standards and guidelines in the preparation of this Manual. In addition, this EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on the EIA Process (EIAO-TM).
- 1.2.1.4 This Manual contains the following information:
- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), Environmental Team (ET), and the Independent Environmental Checker (IEC) under the context of EM&A;
 - Project organisation for the EM&A works;
 - The basis for, and description of the broad approach underlying the EM&A programme;
 - Requirements for reviewing pollution sources and working procedures required in the event of complaints; and
 - Requirements for presentation of environmental audit and appropriate reporting procedures.
- 1.2.1.5 For the purpose of this manual, the ER shall refer to the Engineer as defined in the Construction Contract, in cases where the Engineer's powers have been delegated to the ER, in accordance with the Construction Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the environmental audit requirements.

2 Project Description

2.1 General Description of the Project

2.1.1.1 Section 2 of the EIA Report has described the approaches adopted to avoid and minimise various environmental impacts throughout the design process. The design has therefore been taken forward as the basis for this EIA to demonstrate that all statutory requirements under the EIA Study Brief (No.: ESB-333/2020) and the EIAO-TM regarding the DP elements under the revised EIAO are complied with.

2.1.1.2 As discussed in **Section 1.1**, the Study will cover the investigation, design and construction of NTM WTW extension, NTM FWPSR extension, Chamber G and fresh water trunk main, and the following works will be included:

- Provision of additional treatment facilities within the existing NTM WTW compound to increase the water treatment capacity of NTW WTW;
- Construction of an extension of NTM FWPSR with a capacity of 54,000m³ adjacent to the existing FWPSR;
- Laying of about 9.5km of fresh water trunk mains of diameters ranging from 1600 mm to 2000 mm for delivery of the treated water from the expanded NTM WTW to the NTM FWPSR and from the FWPSR to the existing fresh water distribution system near Tan Kwai Tsuen; and
- Modification of the existing raw water tunnel junction (Chamber G) located near NTM WTW.

2.1.1.3 Upon reviewing the potential Designated Project (DP) elements of the Study under Item Q.1 of Part I of Schedule 2 of the revised Environmental Impact Assessment Ordinance (EIAO), the environmental impacts of the construction and operation of the aforementioned works will be addressed in two separate reports:

- The Environmental Impact Assessment (EIA) of the Study (see **Section 2.1.1.4**) would only address DP elements of the Study; and
- A separate Preliminary Environmental Review (PER) report (see **Section 2.1.1.5**) would address the remaining non-DP elements of the Study.

2.1.1.4 The EIA of the Study (hereinafter referred to as the “Project”) would only include Project elements that fall into DP elements (see **Figure 2.1**), which includes the following:

- Laying of about 1km (around 750m from NTM WTW to NTM FWPSR and around 250m from Ching Yau Road to San Tam Road) of fresh water trunk mains of diameter 1600 mm, which encroach into boundary of the

Conservation Area (CA), for delivery of the treated water from the expanded NTM WTW to the NTM FWPSR and from the FWPSR to the existing fresh water distribution system near Tan Kwai Tsuen; and

- Modification of the existing raw water tunnel junction (Chamber G) located near NTM WTW within Lam Tsuen Country Park and CA.

2.1.1.5 A separate PER Report would be prepared to include the non-DP elements of the Study, which are listed below. These elements of the Study would also be considered as concurrent project of the Project.

- Provision of additional treatment facilities within the existing NTM WTW compound to increase the water treatment capacity of NTW WTW;
- Construction of an extension of NTM FWPSR with a capacity of 54,000m³ adjacent to the existing FWPSR; and
- Laying of about 8.5km of fresh water trunk mains of diameters ranging from 1600 mm to 2000 mm, which do not encroach into boundary of Lam Tsuen County Park and CA, for delivery of the treated water from the expanded NTM WTW to the NTM FWPSR and from the FWPSR to the existing fresh water distribution system near Tan Kwai Tsuen.

2.1.1.6 The location and the tentative implementation programme of the Project is shown in **Figure 2.1** and **Appendix 2.1** respectively.

2.2 Designated Project

2.2.1.1 The Project comprises the following which are classified as Designated Project (DP) under Schedule 2, Part I of the EIAO.

- Item Q.1 – All projects including earthworks, dredging works and other building works partly or wholly in an existing country park or a conservation area.

2.3 Implementation Programme

2.3.1.1 According to the latest programme, the construction civil works and E&M installation works are scheduled to commence in Q1 of Year 2025 and completed by Q4 of Year 2030.

3 Project Organization

3.1 Project Organization

3.1.1.1 The proposed project organisation and lines of communication with respect to environmental protection works are shown in **Appendix 3.1**.

3.1.1.2 The responsibilities of respective parties are:

The Contractor

- Implement the EIA recommendations and requirements;
- Provide assistance to ET in carrying out relevant auditing; and
- Adhere to the agreed procedures for carrying out environmental compliant investigation.

Engineer or Engineer's Representative (ER)

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Assist the Project Proponent in employing an ET to undertake environmental audit;
- Assist the Project Proponent in employing an IEC to audit the results of the EM&A works carried out by the ET;
- Participate in joint site inspections and audits undertaken by the ET; and
- Adhere to the procedures for carrying out complaint investigations.

Environmental Team (ET)

- Review the success of EM&A programme, confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions, and to identify any adverse environmental impacts arising;
- Carry out site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation measures, and take proactive actions to pre-empt problems;
- Audit and prepare audit reports on the site environmental conditions;
- Report on the environmental audit results to the IEC, Contractor, the ER or its delegated representative;
- Undertake regular on-site audits / inspections and report to the Contractor and the ER of any potential non-compliance on the requirement as stipulated in the EM&A Manual;
- Advise the Contractor on environmental improvement, awareness, enhancement matters, etc. on site; and
- Adhere to the procedures for carrying out environmental complaint investigation.

Independent Environmental Checker (IEC)

- Review the EM&A works performed by the ET (at not less than monthly intervals) in an independent, objective and professional manner;
- Report the audit results to the ER and Environmental Protection Department (EPD);
- Review the EM&A reports (monthly and quarterly summary reports) submitted by the ET;
- Check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- Report the findings of site inspections and other environmental performance reviews to ER and EPD.

3.1.1.3 Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme of the Project.

4 Air Quality Impact

4.1 Introduction

4.1.1.1 The EIA has considered the potential air quality impacts during construction phase of the Project. No adverse air quality impacts would be anticipated during the construction phase with the good site practices and recommended mitigation measures. Nevertheless, regular site environmental inspection is recommended to ensure proper implementation of mitigation measures and good site practices. The EIA has also concluded that there will be no adverse air quality impacts during operational phase and hence, mitigation measures, environmental monitoring and site inspections during operational phase are not required.

4.2 Mitigation Measures

4.2.1 Construction Phase

4.2.1.1 In order to reduce the air quality impact from the Project, watering on exposed work sites and other good site practices should be implemented. Mitigation measures to control the exhaust emissions from construction plant and equipment are also required. All the recommended good practices are summarised in the Environmental Mitigation Implementation Schedule (EMIS) in **Appendix 4.1**.

4.2.2 Operational Phase

4.2.2.1 Adverse air quality impacts during operational phase are not anticipated. Hence, mitigation measures are not required.

4.3 Environmental Monitoring and Site Audit Requirements

4.3.1 Construction Phase

4.3.1.1 Good practices and mitigation measures have been recommended in the EIA Report. The Contractor shall be responsible for the design and implementation of these good practices and mitigation measures. Regular audit and site inspection at least once per week should be carried out during the construction phase by the Contractor and ET to ensure that the recommended good practices have been properly implemented by the Contractor.

4.3.2 Operational Phase

4.3.2.1 Adverse air quality impacts during operational phase are not anticipated. Hence, monitoring and audit are not required.

5 Noise Impact

5.1 Introduction

- 5.1.1.1 The EIA Report has considered the potential noise impacts associated with the construction and operation of the Project. Airborne construction noise arising from the construction activities of the proposed fresh water trunk mains would be the major potential noise impacts during the construction phase. For modification of Chamber G, all proposed works will be underground and adverse noise impact is not anticipated. With the implementation of mitigation measures, noise levels at all NSRs including residential premises could comply with the EIAO-TM daytime construction noise criterion. Nevertheless, regular site environmental inspection during the construction phase is recommended. Groundborne construction noise is anticipated from the modification of Chamber G, nonetheless, the closest existing representative NSRs at Ngau Tam Village are located at more than 300m away from the modification works of Chamber G. Given the large separation distance, adverse groundborne construction noise impacts from the modification of Chamber G are not anticipated.
- 5.1.1.2 For operational phase, as there are no planned fixed noise sources for the modification of Chamber G and the fresh water trunk mains, no representative NSRs would be affected by fixed noise source impacts. Thus, mitigation measures and monitoring are not required.

5.2 Mitigation Measures

5.2.1 Construction Phase

- 5.2.1.1 Adverse airborne construction noise impact is not anticipated with the implementation of mitigation measures such as the use of quieter construction methods/ equipment, good site practices, use of quality powered mechanical equipment (QPME), silencer, retractable noise barrier, temporary noise barriers and noise enclosures to screen noise from relatively static PMEs, etc. Moreover, the future Contractor shall prepare a Construction Noise Management Plan (CNMP) to review and assess the effectiveness of the noise mitigation measures quantitatively. All the recommended mitigation measures and good site practices are summarised in the EMIS given in **Appendix 4.1**.
- 5.2.1.2 The closest existing representative NSRs at Ngau Tam Mei Village are located at more than 300m away from the modification works of Chamber G. Given the large separation distance, adverse groundborne construction noise impacts from the modification of Chamber G are not anticipated.

5.2.2 Operational Phase

- 5.2.2.1 As there are no planned fixed noise sources for the modification of Chamber G and the fresh water trunk mains, no representative NSRs would be affected by the fixed noise source impacts. Hence, no adverse fixed noise sources impacts are anticipated.

5.3 Environmental Monitoring and Site Audit Requirements

5.3.1 Construction Phase

- 5.3.1.1 Mitigation measures have been recommended in the EIA Report. The Contractor shall be responsible for the design and implementation of these good practices and mitigation measures. Regular audits and site inspection at least once per week should be carried out during the construction phase by the Contractor and ET to ensure that the recommended mitigation measures and good practices have been properly implemented by the Contractor.

5.3.2 Operational Phase

- 5.3.2.1 As there are no planned fixed noise sources for the modification of Chamber G and the fresh water trunk mains, no representative NSRs would be affected by the fixed noise source impacts. Hence, monitoring and audit are not required.

6 Water Quality Impact

6.1 Introduction

- 6.1.1.1 The EIA Report has assessed the potential water quality impacts associated with the construction and operation of the Project. According to the EIA Report, adverse water quality impacts are not anticipated during the construction and operational phases with proper implementation of the recommended mitigation measures and good site practices. Nevertheless, regular site environmental inspection is recommended during the construction phase to ensure that the recommended mitigation measures are properly implemented. No monitoring or audit is required in the operational phase.

6.2 Mitigation Measures

6.2.1 Construction Phase

- 6.2.1.1 During the construction phase, mitigation measures including good site practices to control construction runoff, provision of portable chemical toilets to collect the sewage from workforce, etc. are recommended. All recommended mitigation measures are summarised in the EMIS in **Appendix 4.1**.

6.2.2 Operational Phase

- 6.2.2.1 During the operational phase, considering that the proposed works would only result in marginal increase in stormwater runoff during the operational phase of the Project, no adverse water quality impacts are expected. Hence, no mitigation measures are required.

6.3 Environmental Monitoring and Site Audit Requirements

6.3.1 Construction Phase

- 6.3.1.1 Mitigation measures have been recommended in the EIA Report. The Contractor shall be responsible for the design and implementation of these good practices and mitigation measures. Regular audits and site inspection at least once per week should be carried out during the construction phase by the Contractor and ET to ensure that the recommended good practices have been properly implemented by the Contractor.

6.3.2 **Operational Phase**

- 6.3.2.1 Adverse water quality impacts during operational phase are not anticipated. Hence, monitoring and audit are not required.

7 Waste Management Implications

7.1 Introduction

7.1.1.1 The quantity, quality and timing for the generation of waste during construction phase have been estimated in the EIA Report. Measures including the opportunity for on-site sorting, reusing Construction and Demolition (C&D) materials etc., are devised in the construction methodology to minimise the surplus materials to be disposed. Chemical waste should be collected by licensed chemical waste collectors for proper disposal. During the operational phase, no waste generation is anticipated.

7.2 Mitigation Measures

7.2.1 Construction Phase

7.2.1.1 All the proposed mitigation measures during construction phase are stipulated in the EIA Report and summarised in **Appendix 4.1**. A Waste Management Plan (WMP), as a part of the Environmental Management Plan (EMP), should be prepared in accordance with ETWB TC (W) No.19/2005 and submitted to the Engineer for approval. A Construction and Demolition Material Management Plan (C&DMMP) will also be submitted separately during EIA stage to the Public Fill Committee (PFC) for approval.

7.2.1.2 Waste will be handled in accordance with the relevant legislation and guidelines and with the implementation of the proposed mitigation measures, no adverse environmental impacts from waste management are anticipated. EM&A is required for waste management during the construction phase and the effective management of waste arising during the construction phase will be monitored through the site audit programme. The aims of the waste audit are:

- To ensure the waste arising from the works are handled, stored, collected, transferred and disposed of in an environmental acceptable manner; and
- To encourage the reuse and recycling of material.

7.2.1.3 A trip-ticket system should be operated to monitor all movements of both inert and non-inert C&D materials for disposal at public fill reception facilities and landfill respectively, all dump trucks engaged should be equipped with GPS or equivalent system for tracking and monitoring. Chemical wastes will be collected by licensed chemical waste collectors to licensed facilities for final treatment and disposal. Recommendations have been made in the EIA Report to ensure proper treatment and proper disposal of these wastes and summarised in **Appendix 4.1**.

7.2.2 Operational Phase

7.2.2.1 As it is anticipated that no waste would be generated during the operational phase, mitigation measures are not required.

7.3 Environmental Monitoring and Site Audit Requirements

7.3.1 Construction Phase

7.3.1.1 The Contractor shall be required to pay attention to the environmental standard and guidelines and carry out appropriate waste management and obtain the relevant licenses/ permits for waste disposal. The ET shall ensure that the Contractor has obtained from the appropriate authorities the necessary waste disposal permits or licenses including:

- Public Dumping License under the Land (Miscellaneous Provisions) Ordinance (Cap 28); and
- Approval of C&DMMP.

7.3.1.2 The Contractor shall refer to EPD's Guidance Notes for License Application when applying for the license/ permit and the ET shall refer to these Guidance Notes for auditing purposes.

7.3.1.3 Regular audits and site inspections at least once per week should be carried out during the construction phase by the ET to ensure that the recommended good site practices and other mitigation measures recommended in the EIA Report and in **Appendix 4.1** are properly implemented by the Contractor. The audits should concern all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, a Waste Management Plan (WMP) as part of the Environmental Management Plan (EMP) shall be prepared. Documents including licenses, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements.

7.3.1.4 The requirements of the environmental audit programme are set out in **Section 14** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

7.3.2 Operational Phase

7.3.2.1 As it is anticipated that no waste would be generated during the operational phase, monitoring and audit are not required.

8 Land Contamination Impact

8.1 Introduction

- 8.1.1.1 The EIA Report has assessed the land contamination associated with the Project. Based on desktop review findings, the information collected during the site surveys and from relevant government departments, no land contamination issue within the assessment area is anticipated.

8.2 Mitigation Measures

- 8.2.1.1 Potentially contaminating land uses or activities within the Project Site were not identified and hence mitigation measures are not required.

8.3 Environmental Monitoring and Site Audit Requirements

8.3.1 Construction Phase

- 8.3.1.1 Environmental monitoring and audit are not required for construction phase.

8.3.2 Operational Phase

- 8.3.2.1 Environmental monitoring and audit are not required for operational phase.

9 Ecology

9.1 Introduction

9.1.1.1 The EIA Report has evaluated the ecological impacts associated with the construction and operation of the Project and recommended ecological mitigation measures to avoid, minimise and compensate the impact arising from the Project.

9.2 Mitigation Measures

9.2.1 Construction Phase

9.2.1.1 The proposed mitigation measures for ecological impacts are summarised in the EMIS in **Appendix 4.1**.

9.2.1.2 To minimise disturbances to the nearby habitats and associated wildlife, the mitigation measures proposed under other environmental aspects of the EIA Report should be implemented during the construction phase.

9.2.1.3 Good site practice should be enforced, and effective mitigation measures are required. In particular, the Practice Note for Professional Persons (ProPECC Note PN 2/23) on Construction Site Drainage provides guidelines for the handling and disposal of construction discharges. It should be followed strictly to control site runoff and wastewater generated during the construction phase. Other mitigation measures during construction phase are listed as follows:

- Erect fences along the boundary of the works area before the start of works to prevent vehicle movements and encroachment of personnel onto adjacent natural habitats. Regularly check the boundaries to ensure that they are not breached;
- Avoid any damage and disturbance, particularly to minimise risk of filling and illegal dumping, to the adjacent habitats during construction;
- Avoid directing lighting from works sites towards adjacent habitats and any other ecologically sensitive areas;
- Prohibit and prevent open fires within the site boundary during construction and provide temporary fire-fighting equipment in work areas to minimise the possibility of hill fires;
- Cover excavated material or stockpiles of construction material with tarpaulin during rain events to prevent the washing of these materials into adjacent watercourses and ponds;
- Cover stockpiles of loose material and carrying out dust suppression spraying on all access roads to mitigate dust generation;

- Provide waste skips to collect general refuse and construction waste, which should be disposed regularly and properly off-site;
- Proper selection of quiet plant aiming to reduce the tonality at NSRs;
- Installation of silencer / acoustic enclosure / acoustic louvre for the exhaust of ventilation system; and

9.2.1.4 To minimise impacts to the groundwater table, the following groundwater control measures proposed in Chapter 5 of the EIA Report (see **Section 5.7.6**) should be duly followed.

9.2.2 Operational Phase

9.2.2.1 Since both direct and indirect ecological impacts are considered insignificant, no mitigation measures are required.

9.3 Environmental Monitoring and Site Audit Requirements

9.3.1 Construction Phase

9.3.1.1 Regular audit and site inspection at least once per week should be undertaken to inspect the construction activities and works areas to ensure the recommended mitigation measures are properly implemented.

9.3.2 Operational Phase

9.3.2.1 Since both direct and indirect ecological impacts are considered insignificant, no environmental monitoring and site audit are required during operational phase.

10 Fisheries

10.1 Introduction

- 10.1.1.1 The EIA Report has evaluated the fisheries impacts associated with the construction and operation of the Project and recommended mitigation measures to avoid, minimise and compensate the impact arising from the Project.

10.2 Mitigation Measures

10.2.1 Construction Phase

- 10.2.1.1 The proposed mitigation measures for fisheries impacts are summarised in the EMIS in **Appendix 4.1**.
- 10.2.1.2 Good site practises as specified in the Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 2/23) should be followed to prevent potential indirect impacts on the pond area.
- 10.2.1.3 Standard mitigation measures to control site runoff and other pollutants caused by construction activities and good site practices will be implemented during the construction phase of the Project. As for surface runoff, implementation of the recommended mitigation measures for water quality impacts would prevent the adverse water quality impacts to the nearby environment. Excavated material and other inert construction wastes produced will also be transferred to proper recipients.
- 10.2.1.4 Temporary traffic arrangements should be instigated to maintain or provide alternative access to ponds during construction phase (should it be required). The detailed arrangement can be discussed with the Contractor before the construction period.

10.2.2 Operational Phase

- 10.2.2.1 No fisheries impacts during the operational phase of the Project have been identified. Operational phase indirect impacts are considered to be negligible.

10.3 Environmental Monitoring and Site Audit Requirement

- 10.3.1.1 No specific fisheries monitoring and audit are required for both construction and operational phases.

11 Landscape and Visual

11.1 Introduction

11.1.1.1 The EIA has recommended that EM&A for landscape and visual resources is undertaken during the design, construction and operational phases of the Project. The design, implementation and maintenance of landscape mitigation measures should be checked to ensure that any potential conflicts between the proposed landscape measures and any other works of the Project would be resolved at early as practical without affecting the implementation of the mitigation measures.

11.2 Mitigation Measures

11.2.1.1 The landscape and visual impact assessment of the EIA report proposes a number of mitigation measures to ameliorate the landscape and visual impacts of the Project. These measures are listed in **Table 11.1** below and the implementation is summarised in the EMIS in **Appendix 4.1**.

Table 11.1 – Mitigation measures for the construction and operational phases

Mitigation Measure Code	Summary Description	Mitigate Landscape Impacts	Mitigate Visual Impacts
Construction Phase			
CM1	Careful Site Planning and Management	✓	✓
CM2	Careful Design of Slope Works, if any	✓	✓
CM3	Tree Preservation	✓	
CM4	Tree Transplanting/ Compensatory Tree Planting	✓	
CM5	Regular Inspection of Retained Trees	✓	
CM6	Minimisation of Light Impact		✓
CM7	Reinstatement of Temporarily Disturbed Areas	✓	✓

11.2.1.2 Mitigation measures to be implemented during construction should be adopted from the start of construction and be in place throughout the entire construction period.

11.3 Environmental Monitoring and Audit Requirement

11.3.1.1 Audits should be carried out during construction phase to ensure all the recommended landscape and visual mitigation measures in the EIA are properly and effectively implemented and to ensure compliance with the intended aims of the measures. The EM&A comprises auditing of proper mitigation measures and site practices to reduce landscape and visual impacts as discussed in **Section 11.2**.

Site inspections should be undertaken by the ET at least twice a month during the construction period.

12 Cultural Heritage

12.1 Introduction

12.1.1.1 The EIA report has identified cultural heritage resources, including archaeology and built heritage for the Project. None of them will be adversely impacted during construction and operational phases of the Project. Thus, monitoring and audit are considered not necessary but an archaeological precautionary measure has been recommended during construction phase of the Project which is further detailed below.

12.2 Mitigation Measures

12.2.1 Construction Phase

12.2.1.1 The Ngau Tam Mei (NTM) Site of Archaeological Interest (SAI) will not be impacted by the Project and no other archaeological resources and archaeological potential areas were identified within cultural heritage assessment area, no mitigation measure is required.

12.2.1.2 As a precautionary measure, the project proponent and his/her contractor are required to inform Antiquities and Monuments Office (AMO) immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53) are discovered during the course of works.

12.2.1.3 As no direct and indirect impact on built heritage items are identified, no built heritage mitigation measure is required.

12.2.2 Operational Phase

12.2.2.1 As no direct and indirect impact on built heritage items are identified, no built heritage mitigation measure is required.

12.3 Environmental Monitoring and Site Audit Requirements

12.3.1.1 As the Project would not generate or induce any additional cultural heritage impact during both construction and operational phases of the Project, monitoring and audit are considered not necessary.

13 Hazard to Life

13.1 Introduction

- 13.1.1.1 The EIA report summarised the potential hazard-to-life impact from the liquid chlorine storage and dangerous goods (DG) facilities in the NTM WTW. There would be no liquid chlorine stored at the NTM WTW during both construction and operational phases and the associated potential risk would be limited. The use of explosives during the construction phase would not be required for the modification of Chamber G and the potential risk induced would be eliminated.

13.2 Mitigation Measures

13.2.1 Construction Phase

- 13.2.1.1 No potential risk would be anticipated as there would not be any liquid chlorine remained in the NTM WTW in both construction and operational phase and the use of explosives would not be required for the modification of Chamber G. Hence, mitigation measures are not required.

13.2.2 Operational Phase

- 13.2.2.1 No specific mitigation measures are required as no potential risk is anticipated during operational phase. Hence, mitigation measures are not required.

13.3 Environmental Monitoring and Site Audit

13.3.1 Construction Phase

- 13.3.1.1 No potential risk would be anticipated during the construction phase and no mitigation measures are required. Hence, monitoring and audit are not required. The Contractor should ensure that there is no liquid chlorine storage at NTM WTW before the commencement of the construction works of the Project.

13.3.2 Operational Phase

- 13.3.2.1 No specific mitigation measures are required as no potential risk is anticipated during operational phase. Hence, monitoring and audit are not required.

14 Site Environmental Audit

14.1 Site Inspection

- 14.1.1.1 Site inspection provides a direct means to initiate and enforce specified environmental protection and pollution control measures. These shall be undertaken routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.
- 14.1.1.2 The ET shall be responsible for formulating the environmental site inspection programme as well as the deficiency and action reporting system, and for carrying out the site inspections. The proposal for rectification, if any, should be prepared and submitted to the ET Leader and IEC by the Contractor.
- 14.1.1.3 Regular site inspections shall be carried out and led by the ER and attended by the Contractor and ET at least once per week during the construction phase. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situations outside the works area which is likely to be affected, directly or indirectly, by the construction site activities of the Project. The ET shall make reference to the following information in conducting the inspection. During the inspection, the following information should be referred to:
- (i) EIA Report and EM&A Manual recommendations on environmental protection and pollution control mitigation measures;
 - (ii) ongoing results of the EM&A programme;
 - (iii) works progress and programme;
 - (iv) individual works methodology proposals (which shall include the proposal on associated pollution control measures);
 - (v) contract specifications on environmental protection;
 - (vi) relevant environmental protection and pollution control legislations; and
 - (vii) previous site inspection results undertaken by the ET and others.
- 14.1.1.4 The Contractor shall keep the ER and ET Leader updated with all the relevant environmental related information on the construction contract necessary for him to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be recorded and followed up by the Contractor in an agreed time-frame. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET, to report on any remedial measures subsequent to the site inspections.

- 14.1.1.5 The ER, 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 a valid environmental complaint, or as part of the investigation work, as specified in the Event and Action Plans for the EM&A programme.

14.2 Environmental Compliance

- 14.2.1.1 There are statutory requirements on environmental protection and pollution control requirements with which construction activities must comply.
- 14.2.1.2 In order to ensure the works comply with statutory requirements, all method statements of works should be submitted by the Contractor to the ER for approval and to the ET Leader to ensure sufficient environmental protection and pollution control measures have been included. The EMIS is summarised in **Appendix 4.1**. Any proposed changes to the mitigation measures shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report.
- 14.2.1.3 The ER and ET shall also review the progress and programme of the works to check that relevant environmental legislation has not been violated, and that any foreseeable potential for violating laws can be prevented.
- 14.2.1.4 The Contractor should provide the update of the relevant documents to the ET Leader so that checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, method statements, any application letters for different licenses / permits under the environmental protection laws, and copies of all valid licenses / permits. The site diary and environmental records shall also be available for inspection by the relevant parties.
- 14.2.1.5 After reviewing the document, the ET shall advise the IEC and the Contractor of any non-compliance with legislative requirements on environmental protection and pollution control so that they can timely take follow-up actions as appropriate. If the follow-up actions still result in potential 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.
- 14.2.1.6 Upon receipt of the advice, the Contractor shall undertake immediate actions to correct the situation. The ER and ET shall follow up to ensure that appropriate action has been taken in order to satisfy legal requirements.

14.3 Choice of Construction Method

- 14.3.1.1 At times during the construction phase, the Contractor may submit method statements for various aspects of construction. This state of affairs would only

apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA study. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the Project. It is the responsibility of the Contractor and ET, in accordance with established standards, guidelines and EIA study recommendations and requirements, to review and determine 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 shall provide a copy of the Proactive Environmental Protection Proforma as shown in **Appendix 14.1** to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

14.4 Environment Complaints

14.4.1.1 The following procedures should be undertaken upon receipt of any environmental complaint:

- 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;
- 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;
- The ER, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;
- The ET to undertake audit to verify the situation if necessary, 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 actions stipulated above, including the details of the remedial measures 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 in the monthly EM&A reports.

15 Reporting

15.1 General

- 15.1.1.1 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.
- 15.1.1.2 Types of reports that the ET shall prepare and submit include monthly EM&A report and final EM&A report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final EM&A reports shall be made available to the Director of Environmental Protection.

15.2 Monthly Reports

- 15.2.1.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET and endorsed by the IEC. The EM&A report shall be prepared and submitted to EPD within 10 working days of the end of each reporting month, with the first report within the month after major construction works commences. Copies of each monthly EM&A report shall be submitted to the following parties: the IEC, the ER and EPD. Before submission of the first EM&A report, the ET shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

First Monthly EM&A Report

- 15.2.1.2 The first monthly EM&A report shall include at least the following:
- (i) Executive summary (1-2 pages):
 - compliant 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;
 - programme;
 - management structure; and
 - the work undertaken during the month.
 - (iii) Environmental status:

- advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
 - works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
 - drawings showing the project area and any environmental sensitive receivers
- (iv) A brief summary of EM&A requirements including:
- 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.
- (vi) Report on complaints, and notifications of summons and successful prosecutions:
- record of all complaints received 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 legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary; and
 - review of the reasons for and the implications of complaints, summons and prosecutions including review of pollution sources and working procedures.
- (vii) 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;
 - record of any project changes from the originally proposed as described in the EIA Report (e.g. construction methods, mitigation proposals, design changes, etc.); and

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

Subsequent Monthly EM&A Reports

15.2.1.3 Subsequent monthly EM&A reports shall include at least the following:

- (i) Executive summary (1-2 pages):
 - compliant 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;
 - programme;
 - management structure; and
 - the work undertaken during the month; and
 - any updates as needed to the scope of works and construction methodologies.
- (iii) Environmental status:
 - advice on the status of statutory environmental compliance such as the status of compliance with the EP conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
 - works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
 - drawings showing the Project area and any environmental sensitive receivers.
- (iv) Implementation status
 - advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report.
- (i) Report on complaints, and notifications of summons and successful prosecutions:
 - record of all complaints received 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 legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary; and
- review of the reasons for and the implications of complaints, summons and prosecutions including review of pollution sources and working procedures.

(ii) 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;
- record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
- comments (for example, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

(iii) Appendices

- cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

15.2.1.4 Upon completion of the Project, the Contractor should conduct the commissioning test for fixed noise sources and the ET should incorporate the results of the test into the subsequent monthly EM&A report.

15.3 Final EM&A Review Report

15.3.1.1 The EM&A program should be terminated upon completion of the construction activities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the ER and the Project Proponent followed by approval from the Director of Environmental Protection.

15.3.1.2 The final EM&A report should contain at least the following information:

- (i) Executive summary (1-2 pages):
- (ii) Drawings showing the Project area and any environmental sensitive receivers;

- (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 measure, as recommended in the EIA Report; and
 - environmental impact hypotheses tested.
- (v) A summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report, and summarised in the updated implementation schedule;
- (vi) A summary record of all complaints received for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;
- (vii) A review of the validity of EIA predictions and identification of shortcomings in EIA recommendations;
- (viii) Comments (for example, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme); and
- (ix) Recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

15.4 Data Keeping

- 15.4.1.1 No site-based documents (such as site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. All documents and data shall be kept for at least one year following completion of the construction contract for construction phase EM&A.