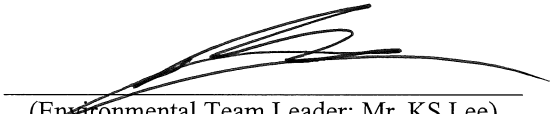


Drainage Services Department

**Contract No. DC/2022/03
Yuen Long Barrage and Nullah
Improvement Schemes**

**Updated Environmental
Monitoring & Audit Manual
v.1.4**

Certified by: 
(Environmental Team Leader: Mr. KS Lee)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties.

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Environmental Protection Department
27th floor, Southorn Centre,
130 Hennessy Road, Wan Chai, Hong Kong.

By Courier

3 May 2024

Dear Sir / Madam,

Contract No. DC/2022/03
Yuen Long Barrage and Nullah Improvement Schemes
(Environmental Permit (EP) No. EP-578/2020 and EP-604/2022)

Submission of Updated Environmental Monitoring & Audit Manual v.1.4

We refer to our Submission of Updated Environmental Monitoring & Audit Manual v. 1.4 on 3 May 2024.

This certification is to supplement the captioned submission in accordance with EP No.: EP-604/2022 Condition 2.11 and No.: EP-578/2020 Condition 2.5. This Updated Environmental Monitoring & Audit Manual v. 1.4 has been certified by Environmental Team Leader as referred to EP No.: EP-604/2022 Condition 2.12 and No.: EP-578/2020 Condition 2.5.

Should you require further information, please do not hesitate to contact our Ms. Betty Choi at 2151 2072 or the undersigned at 2151 2091.

Yours faithfully,
Cinotech Consultants Limited



Mr. KS Lee
Environmental Team Leader

Encl.

c.c.

DSD

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Attn.: Mr. Lee Chak-cho, Joe

Dear Sir

Re: Contract No. DC/2022/03
Yuen Long Barrage and Nullah Improvement Schemes
Submission of Updated Environmental Monitoring & Audit Manual

I refer to Condition 2.11 under Environmental Permit No. EP-604/2021 and Condition 2.5 under Environmental Permit No. EP-578/2020, regarding the submission of Updated Environmental Monitoring and Audit (EM&A) Manual. I hereby verify the captioned "Updated Environmental Monitoring and Audit (EM&A) Manual (v1.4)" dated 3 May 2024.

Should you have any queries, please do not hesitate to contact the undersigned at 2859 5443.

Yours faithfully
MEINHARDT INFRASTRUCTURE AND ENVIRONMENT LTD



Adi Lee

Independent Environmental Checker

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1 INTRODUCTION

1.1 Project Background

1.1.1 Drainage Services Department (DSD) proposed Contract No. DC/2022/03 Yuen Long Barrage and Nullah Improvement Schemes to 1) enhance the flood protection level of Yuen Long Nullah to the required standards, 2) resolve odour problem and enhance the local environment of the town centre section of Yuen Long Nullah, and 3) revitalise Yuen Long Nullah. A location plan of the Project is shown in **Figure 1.1**.

1.1.2 The major works to be executed under the contract shall include but not limited to the followings:

Yuen Long Barrage Scheme (EP-604/2022):

- Construction and operation of the barrage scheme, including pumping stations, a tidal barrier, an E&M control room and a link bridge;
- Local widening and deepening of Yuen Long Nullah;
- Construction and modification of parapet walls along Yuen Long Nullah, Sham Chung River and Kam Tin River;
- Refinements to the existing intersection of Yuen Long Nullah and Yuen Long Bypass Floodway;
- Revitalisation works of Yuen Long Nullah; and
- Decommissioning of the existing low flow pumping station and inflatable dam.

Improvement of Yuen Long Town Nullah (EP-578/2020):

- Provision of a dry weather flow interception system, including the construction of dry weather flow interceptors, a stormwater pumping station and laying of twin rising mains for conveyance of the dry weather flow; and
- Construction of continuous u-channels adjacent to either side of the retaining walls

1.1.3 The proposed works are considered as designated projects under the Environmental Impact Assessment Ordinance (EIAO). Two separate Environmental Impact Assessments (EIAs) were carried out for *Yuen Long Barrage Scheme (YLBS)* (Register No.: AEIAR-228/2021) and *Improvement of Yuen Long Town Nullah (YLTN)* (Register No.: AEIAR-223/2020). Their respective Environmental Permits are EP-604/2022 (issued on 21 January 2022) and EP-578/2020 (issued on 17 September 2020). DSD is the permit holder of both permits.

1.1.4 According to Condition 2.11 of EP-604/2022 and Condition 2.5 of EP-578/2020, an updated Environmental Monitoring and Audit (EM&A) Manual shall be prepared to include the latest EM&A requirements in accordance with the information and recommendations described in the respective EIA Reports and by taking into account any specific site conditions that may be changed before construction of the Project. The updated EM&A Manual shall include but not limited to:

- EP-578/2020: a water quality monitoring plan (WQMP) to detect potential adverse water quality impacts at the Project and downstream area directly affected by the construction of the Project. With reference to the excavation works in the nullah as mentioned in Condition 3.1 of this Permit, the WQMP shall include details of the monitoring locations, monitoring frequency, parameters to be monitored, and additional measures to be taken in the event of heavy rainfall during dry season to ensure that the water quality is not adversely affected; and an Event/Action Plan for water quality monitoring.
- EP-604/2022: a construction dust monitoring plan (CDMP) to monitor dust emission during construction of the Project. The CDMP shall include details of the monitoring locations, monitoring frequency, and parameters to be monitored; and an Event/Action Plan for construction dust monitoring.

1.1.5 As the EM&A requirements in the original EM&A Manuals largely overlap with each other in this Contract, this single Updated EM&A Manual is prepared to consolidate the overall EM&A requirements.

1.2 Purpose of the Manual

1.2.1 This Manual has been prepared based on the EM&A Manuals of *Yuen Long Barrage Scheme* and *Improvement of Yuen Long Town Nullah*, and the Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM). The purpose of the Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A work during construction and operation phase of the Project. It provides systematic procedures for monitoring and auditing the environmental performance of the Project. This Manual contains the following information:

- Appropriate background information on the construction of the Project with reference to relevant technical reports;
- Responsibilities of the Contractor, Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the EM&A requirements during the implementation of the Project;
- Project organisation;
- Requirements with respect to the construction and operational programme schedule and the necessary EM&A programme to track the varying environmental impact;
- Descriptions of the parameters to be monitored and criteria through which performance will be assessed including: monitoring frequency and methodology, monitoring locations (typically, the location of sensitive receivers as listed in the EIA), monitoring equipment lists, event contingency plans for exceedances of established criteria and schedule of mitigation and best practice methods for reduced adverse environmental impacts;
- Procedures for undertaking on-site environmental performance audits as a means of ensuring compliance with environmental criteria;

- Details of the methodologies to be adopted including field, laboratory and analytical procedures, and details on quality assurance and quality control (QA/QC) programme;
- Preliminary definition of Action and Limit (A/L) levels;
- Establishment of Event and Action plans (EAPs);
- Requirements for reviewing pollution sources and working procedures required in the event of exceedances of applicable environmental criteria and/or receipt of complaints;
- Requirements for presentation of EM&A data and appropriate reporting procedures;
- Requirements for review of EIA predictions and the effectiveness of the mitigation measures and the EM&A programme.

1.3 Project Description

Project Scope

1.3.1 The scope of the Project includes reviewing the proposed drainage works and developing detailed designs for the Yuen Long Barrage Scheme (YLBS), improvement works for the Town Centre Section of the Yuen Long Town Nullah (YLTN) by intercepting the polluted dry weather flow for treatment at the Yuen Long Sewage Treatment Works (YLSTW). In retaining the technical feasibility and resilience towards climate change, the flood protection scheme also comprises revitalisation of the nullah in tandem with blue-green infrastructures. A site location plan of the Project is shown in **Figure 1.1**. The general layouts and boundaries of the proposed YLN improvement work and barrage are shown in **Figures 1.2** and **1.4** respectively. The interception scheme for DWF in YLN is presented in **Figure 1.3**. The location plan of proposed barrage is provided in **Figure 1.5**.

1.3.2 The scope, description and scale of the Project are summarised in **Table 1-1**.

Table 1-1 Summary of Project Scope, Description and Scale

Proposed Works	Description and Scale of Works
Yuen Long Barrage Scheme	
Construction and operation of Pumping Stations	A pumping station, housing in one structure, located at the western banks of the downstream YLN.
Construction and operation of Tidal Barrier	Upon completion, the gates would span across YLN at a width of approx. 50m and height at about 7mPD. The updated layout has shifted the tidal barrier upstream by about 60m.
Construction and operation of E&M Control Room	The E&M control room, with a footprint of approx. 860 m ² , houses all the E&M apparatus & facilities for public enjoyment among other ground level open areas. The updated layout has shifted the E&M Control Room westward by about 30m.

Proposed Works	Description and Scale of Works
Construction of Link Bridge	The link bridge provides an access for maintenance personnel between Wang Lok Street and Shan Pui Ho East Road and utility crossings. With intermediate piers, the bridge would be situated downstream of the pumping station, which spans approx. 110m across the nullah.
Local Widening and Deepening of YLN	The updated layout would also widen the nullah by 10m (wide) on each side and deepen its bottom. The updated layout has shifted the upstream end of the local widening of discharge channel by about 90m. The length of the local widening is about 270m in the updated layout. The length, width and depth of the deepening area in the updated layout is about 200m, 70m and -8.46mPD respectively.
Construction & Modification of Parapet Walls	An additional height of approx. 200mm at the top of the existing parapet walls along Kam Tin River (KTR) and additional parapet walls along YLN and Sham Chung River (SCR) would be constructed. The extent of works is approx. 3,000m in total for both banks of KTR and approx. 800m in total for both banks at YLN & SCR.
Refinements to the existing intersection of YLN & YLBF	The proposed works will involve minor excavation and concreting works at the existing concrete diversion structure, resulting in the diversion of additional flow to YLBF for the barrage's operation at the downstream.
Revitalisation of YLN	With the completion of YLBS, there exists revitalisation opportunities within YLN. At a length of approx. 2,100m, vegetation & landscape components would be introduced to enhance the nullah's biodiversity and social connectivity.
Decommissioning of the Existing Low Flow Pumping Station (LFPS) & Inflatable Dam	The function of the existing Kau Hui LFPS and the associated existing inflatable dam that spans approx. 75m across YLN would be replaced by the tidal barrier of the barrage, thus would be decommissioned.
Improvement of Yuen Long Town Nullah	
DWFI System	<ul style="list-style-type: none"> • Construction of DWF interceptors along and within the YLTN; • Construction of continuous 1000 mm × 800 mm u-channels adjacent to either side of the retaining walls; • Construction of a DWF pumping station (17m(L) × 10m(W) × 7m(H)) with capacity of 18,000m³/day; and • Laying twin rising mains of approximately 400 m long with 600 mm diameter each.

Construction Programme

1.3.3 The construction programme for the Project is expected to commence in the fourth quarter of 2023 for completion in 2028.

Table 1-2 Tentative Construction Schedule

Yuen Long Barrage Scheme (EP-604/2022):

Year	2023		2024				2025				2026				2027			
Quarter	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Construction of Barrage Scheme Structure																		
- Master Control Centre (MCC)																		
- Yuen Long Barrage Pumping Station																		
- Tidal Barrier																		
- Pumping Forebay with local deepening																		
- Access Bridge																		
- Main Discharge Channel																		
2. Decommissioning of the existing low flow pumping station and inflatable dam																		
- Modification work of existing low flow pumping station																		
- Removal of Inflatable dam																		
3. Construction and modification of parapet walls																		
- Along Yuen Long Nullah (Kung Um Road)																		
- Along Sham Chung River																		
- Along Kam Tin River																		
4. Revitalisation works of Yuen Long Nullah																		
- Chainage C0+000 to C0+295																		
- Chainage C0+295 to C0+607																		
- Chainage C0+607 to C0+950																		
- Chainage C0+950 to C1+300																		
- Chainage C1+300 to C1+650																		

Yuen Long Town Nullah (EP-578/2020):

Year	2023		2024				2025				2026				2027			
Quarter	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Construction of Dry Weather Flow Interceptor (DWFI) System *																		
- Chainage C0+000 to C0+295																		
- Chainage C0+295 to C0+607																		
- Chainage C0+607 to C0+950																		
- Chainage C0+950 to C1+300																		
- Chainage C1+300 to C1+650																		
2. Construction of Rising Main																		
- Rising Main works																		
3. Construction of Dry Weather Flow (DWF) Pumping Station																		
- DWF Pumping Station																		

* Excavation work in the nullah shall only be carried out during dry season

Construction Works

1.3.4 Construction of the proposed Project comprises the following key activities:

Yuen Long Barrage Scheme (EP-604/2022):

- Construction of the Barrage scheme;
- Modification of flow diversion structures in the intersection of Yuen Long Nullah (YLN) and Yuen Long Bypass Floodway (YLBF);
- Modification of parapet wall along YLN, SCR and KTR; and
- Revitalisation Works in YLN.

Yuen Long Town Nullah (EP-578/2020):

- Ground breaking;
- Excavation works;
- Pipe laying works;
- Backfilling works; and
- Final re-instatement by in-situ concreting.

1.3.5 Construction of the barrage generally involves common civil engineering construction activities such as site clearance, excavation, formwork, substructure and superstructure construction, concreting, landscaping and E&M installation. Revitalisation of YLN involves smaller scale construction activities such as breaking of nullah bed, excavation and landscaping.

1.4 Objective of the EM&A

1.4.1 The broad objective of this Manual is to define the procedures of the EM&A programme for monitoring the environmental performance of the Project during design, construction and operation. The construction and operational impacts arising from the implementation of the Project are described in the EIA Reports. The EIA Reports also specifies mitigation measures and good construction practices that will be needed to comply with the environmental criteria or further minimise the potential impacts. These mitigation measures and their implementation requirements are presented in the Implementation Schedule of Mitigation Measures (see **Annexes A-1 & A-2**).

1.4.2 The main objectives of the EM&A programme are to:

- Provide baseline information against which any short- or long-term environmental impacts of the projects can be determined;
- Provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- Monitor the performance of the Project and the effectiveness of mitigation measures;
- Verify the environmental impacts identified in the EIA;
- Determine Project compliance with regulatory requirements, standards and government policies;
- Take remedial action if unexpected results or unacceptable impacts arise; and
- Provide data to enable an environmental audit to be undertaken at regular intervals.

1.4.3 The EIA Study indicates that an EM&A programme will be required for the pre-construction, construction and operation phases of this Project. A summary of the requirements for each of the environmental parameters is detailed in **Table 1-3**.

Table 1-3 Summary of EM&A Parameters

Parameters	Phases		
	Pre-Construction Phase	Construction Phase	Operation Phase
Air Quality	M	M ^(a) + SI ^(b)	--
Air Quality (Odour)	M	M + SI	--
Noise	M	M + SI	--
Water Quality	M	M + SI	--
Waste	--	SI	--
Ecology	M	M + SI	--
Cultural Heritage	SI ^(c)	SI	--
Landscape and Visual	SI ^(d)	SI	SI

Notes:
 (a) M – Environmental monitoring
 (b) SI - Site inspection
 (c) Prior to construction, condition survey before commencement of construction works.
 (d) Prior to construction, vegetation survey and photographic record of the Project Site at the time of the Contractor's possession.

1.5 Scope of EM&A Programme

1.5.1 The scope of this EM&A programme is to:

- Establish baseline dust and odour patrol at Project Site boundary and implement monitoring requirements for dust and odour patrol monitoring programme during construction;
- Establish baseline noise levels at specified locations and implement monitoring requirements for noise monitoring programme during construction;
- Establish baseline water quality levels for water quality monitoring and implement monitoring requirements for water quality monitoring programme during construction;
- Establish baseline ecological condition for ecological monitoring during construction;
- Establish condition survey of heritage buildings and structures for vibration monitoring during construction;
- Establish baseline landscape and visual resources for landscape and visual monitoring and audit during construction;
- Implement inspection and audit requirements for air quality, noise, water quality, waste management and landscape and visual impacts;
- Liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the significance and implications of the environmental monitoring data;

- Identify and resolve environmental issues and other functions as they may arise from the works;
- Check and quantify the Contractor(s)'s overall environmental performance, implementation of Event and Action Plans (EAPs), and remedial actions taken to mitigate adverse environmental effects as they may arise from the works;
- Conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to verify that necessary mitigation measures are identified and implemented, and to undertake additional ad hoc monitoring and auditing as required by special circumstances;
- Evaluate and interpret environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts predicted in the EIA;
- Manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process;
- Conduct regular site inspections and audits of a formal or informal nature to assess:
 - the level of the Contractor's general environmental awareness;
 - the Contractor's implementation of the recommendations in the EIA and their contractual obligations;
 - the Contractor's performance as measured by the EM&A;
 - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and
 - to advise the site staff of any identified potential environmental issues;
- Produce monthly EM&A reports which summarise EM&A data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.

1.6 Organisation & Structure of the EM&A

1.6.1 The EM&A will require the involvement of the Project Proponent (DSD), Engineer Representative (ER), Environmental Team (ET), Independent Environmental Checker (IEC) and the Contractor(s). The roles and responsibilities of the various parties involved in the EM&A process are further expanded in the following section.

Project Organisation

1.6.2 DSD will establish an ET to conduct the site inspection and monitoring and, to provide specialist advice on implementation of environmental responsibilities.

1.6.3 The ET will have previous relevant experience with managing similarly sized EM&A programmes and the ET Leader will be a recognised environmental professional, with

a minimum of seven years relevant experience in EM&A, impact assessments and environmental management. The ET Leader will be responsible for, and in charge of, the ET; and will be the person responsible for executing the EM&A requirements, and to provide advice (if required) on environmental clauses for Contract Specifications of the Project.

- 1.6.4 DSD will appoint an IEC to verify and validate/ audit the environmental performance of the Contractor(s) and works of the ET, and to maintain strict control of the EM&A process. The IEC will have previous relevant experience with checking and auditing similarly sized EM&A programmes and the IEC will be a recognised environmental professional, with a minimum of seven years relevant experience in EM&A programmes, impact assessments or environmental management.

Roles & Responsibilities

- 1.6.5 Roles and responsibilities of DSD and their ER, Contractor(s), the ET and the IEC are detailed in Sections 1.6.6 through 1.6.10.

- 1.6.6 The roles of DSD:

- Establish an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring data, and site inspection of construction works; and
- Employ an IEC to audit and verify the overall environmental performance of the works and to assess the effectiveness of the ET in their duties.

- 1.6.7 The roles of Engineer Representative (ER):

- Supervise the Contractor's activities and confirm that the requirements in the EM&A Manual and the Contract Documents are fully complied with;
- Develop appropriate contract clauses to confirm that the Contractor(s) will have qualified professionals to interface with the DSD/ ER / ET /IEC to fulfil the EIA/EP requirements;
- Inform the Contractor(s) when action is required to reduce impacts in accordance with the EAPs;
- Adhere to the procedures for carrying out complaint investigation; and
- Participate in joint site inspections undertaken by the ET and IEC.

- 1.6.8 The roles of The Contractor:

- Implement the EIA recommendations and requirements;
- Employ an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring data, and site inspection of construction works;
- Work within the scope of the construction contract and other regulatory requirements;

- Provide assistance to the ET in carrying out environmental monitoring and site inspections;
- Submit proposals on mitigation measures in case of exceedances of the A/L levels in accordance with the EAPs;
- Implement measures to reduce impact where A/L levels are exceeded;
- Implement the corrective actions instructed by DSD / ER / ET / IEC;
- Participate in the site inspections undertaken by the ET and IEC, as required, and undertake any corrective actions instructed by DSD / ER / ET / IEC; and
- Adhere to the procedures for carrying out complaint investigation.

1.6.9 The roles of The Environmental Team:

- Monitor various environmental parameters as required in this Manual;
- Assess the EM&A data and review the success of the EM&A programme in determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise;
- Carry out regular site inspection to investigate the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt issues;
- Review the Contractor's working programme and methodology, and comment as necessary;
- Review and prepare reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring results and conditions to the IEC, Contractor(s), ER, DSD and Environmental Protection Department (EPD);
- Recommend suitable mitigation measures to the Contractor(s) in the case of exceedance of A/L levels in accordance with the EAPs; and
- Adhere to the procedures for carrying out complaint investigation.

1.6.10 The roles of The Independent Environmental Checker:

- Review and audit the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- Arrange and conduct monthly independent site audits of the works;
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring stations, monitoring procedures and locations of sensitive receivers;

- Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
- On an as needed basis, audit the Contractor's construction methodology and agree the appropriate, reduced impact alternative in consultation with DSD, the ER, the ET and the Contractor(s);
- Adhere to the procedures for carrying out complaint investigation;
- Review the effectiveness of environmental mitigation measures and project environmental performance including the proposed corrective measures;
- Review EM&A report submitted by the ET leader and feedback audit results to ET by signing off relevant EM&A proformas; and
- Report the findings of site audits and other environmental performance reviews to DSD, ER, ET, EPD and the Contractor(s).

Key Contact Information

1.6.11 The key contact information of different parties is presented in **Table 1.4**.

Table 1-4 Key Contact Information

Name	Position	Telephone	Facsimile	Email
DSD (Permit Holder)				
Mr. LEE Chak Cho, Joe	Engr/Project Mgt 2	2594 7163	2594 7163	jclee@dsd.gov.hk
Binnies (ER)				
Mr. Alvin YU	Resident Engineer	5223 6155	2601 3988	alvin.yu@binnies-YLB.com
China State - Alchmex JV (Contractor)				
Mr. Brian KAM	Environmental Manager	9456 9541	-	chunghau_kam@cohl.com
Mr. Hench Lai	Environmental Officer	6049 0606	-	sinheng.lai@cohl.com
Cinotech Consultants Limited (ET)				
Mr. KS.Lee	ET Leader	2151 2091	3107 1388	ks.lee@cinotech.com.hk
Meinhardt (IEC)				
Mr. Adi LEE	IEC	2859 5443	-	adilee@meinhardt.com.hk

1.7 Structure of the EM&A Manual

1.7.1 The remainder of the Manual is organized as follows:

- Section 2 lists the EM&A general requirements;
- Section 3 describes the EM&A requirements for air quality;
- Section 4 provides the EM&A requirements for noise;
- Section 5 provides the EM&A requirements for water quality;
- Section 6 describes the audit requirements for waste management and land contamination;
- Section 7 describes the audit requirements for ecology;
- Section 8 describes the audit requirements for fisheries;
- Section 9 describes the audit requirements for cultural heritage;
- Section 10 & 11 describe the audit requirements for landscape and visual;
- Section 12 describes the scope and frequency of environmental site inspection; and
- Section 13 details the reporting requirements for the EM&A programme;
- Annexes A-1 & A-2 includes implementation schedule of mitigation measures;
- Annex B provides a construction phase noise monitoring field record sheet;
- Annex C provides the compliant log;
- Annex D provides sample template for interim notifications of environmental quality limits exceedances;
- Annex E provides a construction phase dust monitoring field record sheet.

2 EM&A GENERAL REQUIREMENTS

2.1 Introduction

- 2.1.1 This section describes the general requirements of the EM&A programme for the Project. The scope of the programme is developed with reference to the findings and recommendations of the EIA Reports.

2.2 Construction Phase EM&A

General

- 2.2.1 Potential environmental impacts, which were identified during the EIA process and are associated with the construction phase of the Project, will be addressed through the monitoring and controls specified in this Manual and in the construction contracts.
- 2.2.2 During the construction phase of the Project, air quality (dust and odour), noise, water quality and ecology will be subject to EM&A, whilst environmental audit being undertaken for air quality, waste management, cultural heritage and landscape and visual as recommended in the EIA. Monitoring of the effectiveness of the mitigation measures will be achieved through the environmental monitoring programme as well as through site inspections. The inspections will include within their scope, mechanisms to review and assess the Contractor(s)'s environmental performance, ensuring that the recommended mitigation measures have been properly implemented, and that the timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations of the EIA Reports.

Environmental Monitoring

- 2.2.3 The environmental monitoring work throughout the Project period will be carried out in accordance with this EM&A and reported by the ET. Monitoring works will cover air quality (dust and odour), noise, water quality and ecology and will form an important part of the whole EM&A programme.

Action and Limit (A/L) Levels

- 2.2.4 A/L Levels are defined levels of impact recorded by the environmental monitoring activities which represent levels at which a prescribed response is required. These Levels are quantitatively defined later in the relevant sections of this Manual and described in principle below:
- *Action Levels*: levels beyond which there is a clear indication of a deteriorating environmental conditions for which appropriate remedial actions are likely to be necessary to prevent environmental quality from falling outside the Limit Levels, which would be unacceptable; and
 - *Limit Levels*: statutory and/or agreed contract limits stipulated in the relevant pollution control ordinances, Hong Kong Planning Standards and Guidelines (HKPSG) or Environmental Quality Objectives established by the EPD. If these are exceeded, works will not proceed without appropriate remedial action, including a critical review of plant and working methods.

Event and Action Plans (EAPs)

2.2.5 The purpose of the EAPs is to provide, in association with the monitoring and audit activities, procedures for ensuring that if any significant environmental incident occurs, the cause will be quickly identified and remediated. This also applies to the exceedances of A/L Levels identified in the EM&A programme.

Site Inspections & Audits

2.2.6 In addition to air quality (odour), noise, water quality and ecological monitoring as a means of assessing the ongoing performance of the Contractor(s), the ET will undertake site inspections of on-site practices and procedures every week. The primary objective of the inspection programme will be to assess the effectiveness of the environmental controls established by the Contractor(s) and the implementation of the environmental mitigation measures recommended in the EIA Reports. The IEC will undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.

2.2.7 Whilst the inspection and audit programme will complement the monitoring activity, the criteria against which inspection / audits to be undertaken will be derived from the Clauses within the Contract Documents which seek to enforce the recommendations of the EIA Reports and the Manual.

2.2.8 The findings of site inspections and audits will be made known to the Contractor(s) at the time of the inspection to enable the rapid resolution of identified non-conformities. Non-conformities, and the corrective actions undertaken, will also be reported in the monthly EM&A Reports.

2.2.9 Section 12 of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols will be designed to address.

Enquiries, Complaints and Requests for Information

2.2.10 Enquiries, complaints and requests for information may occur from a wide range of individuals and organisations including members of the public, Government departments, the press and television media and community groups.

2.2.11 Enquiries, complaints and requests for information concerning the environmental effects of the construction works, irrespective of how they are received, will be reported to DSD and the ER and directed to the ET which will set up procedures for the handling, investigation and storage of such information. The following steps will then be followed:

- 1) The ET Leader will notify DSD and the ER of the nature of the enquiry.
- 2) An investigation will be initiated to determine the validity of the complaint and to identify the source(s) of the issue.
- 3) The Contractor(s) will undertake the following steps, as necessary:
 - investigate and identify source(s) of the issue;

- if considered necessary by DSD following consultation with the ER and IEC, undertake additional monitoring to verify the existence and severity of the alleged complaint;
 - liaise with ER, ET, IEC and EPD to identify remedial measures;
 - implement the agreed mitigation measures;
 - repeat the monitoring to verify effectiveness of mitigation measures; and
 - repeat review procedures to identify further practical areas of improvement if the repeat monitoring results continue to substantiate the complaint.
- 4) The outcome of the investigation and the action taken will be documented on a complaint log (see **Annex C**). A formal response to each complaint received will be prepared by the ET within five working days and submitted to DSD, in order to notify the concerned person(s) that action(s) has been taken.
- 5) Enquires which trigger this process will be reported in the monthly EM&A Reports which will include results of inspections undertaken by the Contractor(s), and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry will not be, in itself, a sufficient reason to introduce additional mitigation measures.

2.2.12 The complainant will be notified of the findings, and audit procedures will be put in place to verify that the issue does not recur.

Reporting

2.2.13 Baseline and impact monitoring, monthly, quarterly and final reports will be prepared by the ET on behalf of DSD and certified by the ET Leader and verified by the IEC. The reports will be submitted to the Contractor(s), ER, DSD and EPD. The monthly EM&A Reports will be prepared and submitted within 10 working days of the end of each reporting month.

Cessation of EM&A

2.2.14 The cessation of EM&A programme is subject to the satisfactory completion of the Final EM&A Report, agreement with the IEC and approval from EPD.

2.3 Operation Phase EM&A

2.3.1 Based on recommendation from the EIA, audit of landscape and visual impacts are required during the operation phase of the Project.

2.3.2 DSD will manage the operation and maintenance of the Project through Contractor(s). The Contractor(s) shall ensure that all conditions of the EP, including operation phase EM&A, are fulfilled. The ET and IEC commissioned by DSD / Contractors will undertake the EM&A as per requirements listed in **Section 1.6.9** and **Section 1.6.10**, respectively, during operation phase.

3 AIR QUALITY

3.1 Introduction

- 3.1.1 According to the EIA, no unacceptable air quality impact is anticipated during both construction and operation phases of the Project. Therefore, dust monitoring programmes are not considered necessary during either the construction or operation phase in the EM&A Manual of the EIA Report. Nevertheless, due to design change to the Barrage Scheme, additional dust monitoring is recommended (see **Section 3.8**).
- 3.1.2 Odour nuisance may occur during construction of the Project. An odour monitoring programme for EP-578/2020 is thus recommended during the construction phase to ensure that the construction of the Project will not cause unacceptable odour impact on the Air Sensitive Receivers (ASRs).
- 3.1.3 Regular environmental site audit is required during the construction phase to ensure the proper implementation of control measures. Detailed site audit requirements are specified in **Section 12**.

3.2 Site Inspection

- 3.2.1 Weekly site inspection will be undertaken by the ET to ensure that control measures as proposed in the EIA Reports are properly implemented to reduce potential air quality impacts during construction.

3.3 Odour Patrol during Construction Phase

- 3.3.1 Odour patrol should be carried out during the pre-construction and construction phase of the Nullah Improvement Work.
- 3.3.2 Monthly odour patrol should be conducted by trained personnel / competent persons (at least 2 odour patrol members). The odour patrol members should:
- Have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/v required by the European Standard Method (EN 13725);
 - Be free from any respiratory diseases;
 - Not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 minutes before and during the odour patrol; and
 - Take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics.
- 3.3.3 The trained personnel/competent persons should use their nose (olfactory sensors) to sniff odours along the patrol route. The main odour emission sources and the areas affected by the odour nuisance should be identified.
- 3.3.4 The parameter, location and frequency of odour patrol are summarized in **Table 3-1**.

Table 3-1 Parameter, Location and Frequency for Odour Patrol

ASR ID in EIA Report	Odour Patrol Checking Point	Descriptions	Patrol Frequency	Parameters
ASR10	OP1	The Spectra	Monthly on non-rainy day. A total of two times on the monitoring day, in the morning and afternoon, respectively.	Odour Intensity (see Table 3-2)
ASR06	OP2	Wang Fu Court		
ASR04	OP3	Twin Regency		
ASR05	OP4	Yuk Yat Garden		
ASR09	OP5	Yuen Long Long Ping Estate Wai Chow School		
R1	OP6	Sol City		
ASR14	OP7	Healey Building		
ASR17	OP8	Tse King House		
ASR22	OP9	Ma Tin Tsuen - Kung Um Road		
ASR20	OP10	Caritas Yuen Long Chan Chun Ha Secondary School		
ASR16	OP11	CCC Chun Kwong Primary School		
ASR11	OP12	Tai Kiu Tsuen		

3.3.5 Odour patrol should be carried out along the boundary of the Project Site. The actual patrol routing should be proposed by the ET Leader with reference to the construction works locations and programme, and agreement should be obtained from the ER, the IEC and EPD. The tentative routing is shown in **Figure 4**. The odour patrol schedule should be submitted to ER and IEC at least 1 week before the first day of the monitoring month. The ER and IEC should be notified immediately of any changes in schedule.

3.3.6 The odour intensities detected should be categorised as in **Table 3-2**.

Table 3-2 Odour Intensity Level

Class	Odour Intensity	Description
0	Not Detected	No odour perceived or an odour so weak that it cannot be easily characterized or described.
1	Slight	Identified odour, slight
2	Moderate	Identified odour, moderate
3	Strong	Identified odour, strong
4	Extreme	Severe odour

3.4 Baseline Odour Patrol

3.4.1 Prior to the commencement of construction, a baseline odour patrol should be undertaken in the same manner as the odour patrol during the construction phase, except that the odour patrol should be undertaken weekly for one month before commencement of construction of the Project. The objective of the baseline odour patrol is to provide baseline data for determining any odour impacts during the construction phase of the Project.

3.5 Odour Complaint

3.5.1 When a complaint is received regarding odour nuisance, a complaint log should be triggered within 24 hours and kept with the Contractor. The form should include but not be limited to the following:

- Date and time of the complaint;
- Name and contact information of the complainant;
- Location of where the odour nuisance occurred;
- Characteristics of the odour;
- Odour strength;
- Potential Odour Emission Sources;
- Meteorological conditions including temperature, wind speed, wind direction relative humidity at the time of the complaint; and
- Construction activities carried out at the Project Site at the time the nuisance occurred.

3.5.2 The outcome of the investigation and the action taken will be documented on the complaint log. A formal response to each complaint received will be prepared by the ET within five working days and submitted to DSD, in order to notify the concerned person(s) that action(s) has been taken.

3.5.3 Enquires which trigger this process will be reported in the monthly EM&A Reports which will include results of inspections undertaken by the Contractor(s), and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry will not be, in itself, a sufficient reason to introduce additional mitigation measures.

3.6 Action and Limit Levels for Odour Patrol

3.6.1 **Table 3-3** shows the Action and Limit Levels to be used. When the Action and Limit Levels are triggered, investigation should be carried out to identify the cause of exceedance and actions in accordance with the EAP (see **Table 3-4**) should be taken.

Table 3-3 Action and Limit Levels for Odour

	Action Level	Limit Level
Perceived odour intensity and odour complaints	<ul style="list-style-type: none"> • Odour intensity \geq baseline odour intensity recorded on 1 patrol; or • One documented complaint received 	<ul style="list-style-type: none"> • Odour intensity \geq baseline odour intensity recorded on 2 consecutive patrols ^(a)
Note: (a) Limit level is triggered even if exceedance of odour intensity is recorded at a different Odour Patrol Checking Point on the second patrol.		

3.7 Event and Action Plan

3.7.1 The ET Leader should take the following actions during construction phase of the Project when Action/Limit Levels are exceeded:

- Inform the IEC, EPD, Contractor, ER and DSD of the exceedance and any known circumstances associated with the exceedance within 24 hours;
- Investigate the cause of exceedance; and
- Implement the EAP as shown in see **Table 3-4**.

Table 3-4 Event / Action Plan for Odour Monitoring during Construction Phase

Event	Action			
	ET	IEC	ER	Contractor
Exceedance of Action Level	<ul style="list-style-type: none"> • Identify source/ reason of exceedance or complaint • Prepare the odour complaint form or the Notification of Exceedance within 24 hours • Inform DSD, EPD, IEC, ER and Contractor whether the cause of exceedance is due to the Project • Discuss remedial actions with the IEC and the Contractor • Assess effectiveness of Contractor's remedial actions and keep the IEC and Contractor informed of the results 	<ul style="list-style-type: none"> • Review the analyzed results submitted by the ET • Review the proposed remedial measures by the Contractor and advise the ER accordingly • Supervise the implementation of remedial measures 	<ul style="list-style-type: none"> • Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; • Make agreement on the mitigation measures to be implemented 	<ul style="list-style-type: none"> • Rectify any unacceptable practice • Amend working methods as required • Implement amended working methods, if necessary

Event	Action			
	ET	IEC	ER	Contractor
Exceedance of Limit Level	<ul style="list-style-type: none"> Identify source(s)/ reason of exceedance or complaint Prepare the odour complaint form or the Notification of Exceedance within 24 hours Inform DSD, EPD, IEC, ER and Contractor whether the cause of exceedance is due to the Project Assess effectiveness of Contractor's remedial actions and keep the IEC and Contractor informed of the results 	<ul style="list-style-type: none"> Review the analyzed results submitted by the ET Review the proposed remedial measures by the Contractor and advise the ER accordingly Supervise the implementation of remedial measures 	<ul style="list-style-type: none"> Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures Request Contractor to critically review the working methods Make agreement on the mitigation measures to be implemented Assess the effectiveness of the implemented mitigation measures 	<ul style="list-style-type: none"> Rectify any unacceptable practice Submit proposals for remedial actions to IEC within 3 working days of notification Implement the agreed proposal or amend working methods as required Re-submit proposals if problem still not under control

3.8 Construction Dust Monitoring Plan for EP-604/2022

3.8.1 According to the Design Review Report, there will be additional excavated materials (from 60,803 m³ to 141,293 m³) and increased number of trucks (8 per day to 35 per day) to dispose the C&D material/construction waste off-site from Yuen Long Barrage Scheme. Therefore, additional dust monitoring is proposed during construction of the Barrage Scheme.

3.8.2 According to Condition 2.11 of EP-604/2022, this Manual shall include a construction dust monitoring plan (CDMP) and an Event/Action Plan for construction dust monitoring to monitor dust emission during the construction phase of the Project. This section summarizes details of the monitoring locations, monitoring frequency, and monitoring parameters of the proposed dust monitoring works during construction phase.

Monitoring Parameters

3.8.3 The major dusty construction activities of the Project would involve excavation of the Barrage Scheme. Therefore, 1-hour Total Suspended Particulates (TSP) is recommended to be monitored and audited at the proposed monitoring locations during construction phase.

- 3.8.4 The criteria against which ambient air quality monitoring to be assessed are 1-hour TSP limit of $500 \mu\text{g m}^{-3}$. This level is not to be exceeded at ASRs.
- 3.8.5 Monitoring and audit of the TSP levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action shall be undertaken to rectify such situation.
- 3.8.6 1-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The TSP levels should be measured by following the standard method as set out in High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA (hereinafter referred to as "HVS method"). Upon approval of EPD and IEC, an alternative sampling method of using direct reading methods which are capable of producing comparable results as that by the high-volume sampling method can be used to indicate short event impacts.
- 3.8.7 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site, etc., should be recorded down in detail. A sample data sheet is shown in **Annex E**.

Monitoring Equipment

- 3.8.8 High volume sampler (HVS) in compliance with the following specifications should be used for carrying out the 1-hour TSP monitoring:
- $0.6 - 1.7 \text{ m}^3$ per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
 - equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
 - installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
 - capable of providing a minimum exposed area of 406 cm^2 ;
 - flow control accuracy: $\pm 2.5\%$ deviation over 24-hour sampling period;
 - equipped with a shelter to protect the filter and sampler;
 - incorporated with an electronic mass flow rate controller or other equivalent devices;
 - equipped with a flow recorder for continuous monitoring;
 - provided with a peaked roof inlet;
 - incorporated with a manometer;
 - able to hold and seal the filter paper to the sampler housing at horizontal position;
 - easy to change the filter; and
 - capable of operating continuously for 24-hour period.
- 3.8.9 The ET shall be responsible for the provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with appropriate calibration kit is available for carrying out the baseline, regular impacts monitoring and ad-hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated

against a traceable standard at regular intervals, in accordance with requirements stated in the manufacturers operating manual. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled.

- 3.8.10 Initial calibration of the dust monitoring equipment shall be conducted upon installation and prior to commissioning at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by the concerned parties such as the IEC. All the data shall be converted into standard temperature and pressure condition.
- 3.8.11 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded on the data sheet as shown in **Annex E**.
- 3.8.12 If the ET Leader proposes to use a direct reading dust meter to measure 1-hour TSP levels, he shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that of the HVS before it may be used for the 1-hour sampling. The instrument shall also be calibrated regularly, and the 1-hour sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.
- 3.8.13 **Table 3-5** summarizes the proposed equipment to be used for air quality monitoring. Copies of calibration certificates are also attached in this Plan.

Table 3-5 Proposed Air Quality Monitoring Equipment

Equipment	Model and Make	Quantity
1-hour TSP Dust Meter	Sibata Model No.: LD-3B / LD-5R	2
HVS Sampler	TISCH Model: TE-5170	2
Calibrator	TISCH Model: TE-5025A	1

- 3.8.14 Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall 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 shall be observed.
- The wind sensors shall be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
 - The wind data shall be captured by a data logger. The data recorded in the data logger shall be downloaded periodically for analysis at least once a month;
 - The wind data monitoring equipment shall be re-calibrated at least once every six months; and
 - Wind direction should be divided into 16 sectors of 22.5 degrees each.

Laboratory Measurement / Analysis

- 3.8.15 A clean laboratory with constant temperature and humidity control and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory shall be the Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited or other internationally accredited laboratory.
- 3.8.16 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be verified by the IEC and approved by the ER. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IEC.
- 3.8.17 The IEC shall conduct regular audit of the measurement performed by the laboratory so as to ensure the accuracy of measurement results. The ET shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his/her reference.
- 3.8.18 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hour and be pre-weighed before use for the sampling.
- 3.8.19 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1mg. The balance shall be regularly calibrated against a traceable standard.
- 3.8.20 All the collected samples shall be kept in a good condition for 6 months before disposal.

Monitoring Locations

- 3.8.21 Four air monitoring stations (AM) are proposed at representative air sensitive receivers for the additional air quality monitoring programme as they are closest to the proposed Barrage Scheme. **Table 3-6** describes the proposed air quality monitoring locations, which are also depicted in **Figure 5** of this Manual.

Table 3-6 Proposed Air Quality Monitoring Locations

Monitoring Stations	ASR ID in EIA Report	Description
AM1	FPCL1	Fortune Pharmacal Co. Ltd
AM2	SPCH1	Shan Pui Chung Hau Tsuen
AM3	--	Nin Jiom Medicine Manufactory Limited
AM4	HKSM1	HK School of Motoring Safety Centre

- 3.8.22 The status and locations of the air quality sensitive receivers may change after issuing this Plan. The ET shall propose updated monitoring locations and seek approval from ER and IEC and agreement from EPD on the proposal.
- 3.8.23 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:
- i. at the site boundary or such locations close to the major dust emission source;
 - ii. close to the air sensitive receivers as defined in the EIAO-TM;
 - iii. proper position/sitting and orientation of the monitoring equipment; and
 - iv. take into account the prevailing meteorological conditions.
- 3.8.24 The ET shall agree with the IEC on the position of the HVS for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:
- i. a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
 - ii. two samplers shall be placed less than 2 meters apart;
 - iii. the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
 - iv. a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
 - v. a minimum of 2 metres of separation from any supporting structure, measured horizontally is required;
 - vi. no furnace or incinerator flue is nearby;
 - vii. airflow around the sampler is unrestricted;
 - viii. the sampler is more than 20 metres from the dripline;
 - ix. any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;
 - x. permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
 - xi. a secured supply of electricity is needed to operate the samplers.

Baseline Monitoring

- 3.8.25 Baseline monitoring shall be carried out to determine the ambient 1-hour TSP levels at the monitoring locations prior to the commencement of the Project. During the baseline monitoring, there shall not be any construction or dust generating activities in the vicinity of the monitoring stations. The baseline monitoring will provide data for the determination of the appropriate Action levels with the Limit levels set against statutory or otherwise agreed limits.
- 3.8.26 Before commencing the baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.

- 3.8.27 TSP baseline monitoring should be carried out at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works. 1-hour TSP sampling shall be done at least three times per day at each monitoring station. During the baseline monitoring, there should not be any construction or dust generating activities in the vicinity of the monitoring stations. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period. A summary of baseline monitoring is presented in **Table 3-7**.
- 3.8.28 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring location shall be approved by the ER and agreed with IEC.
- 3.8.29 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.
- 3.8.30 If the ET Leader considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels. The revised baseline levels, in turn, the air quality criteria, shall be agreed with the IEC and EPD.

Impact Monitoring

- 3.8.31 The ET shall carry out impact monitoring during construction phase of the Project. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs. In case of non-compliance with the air criteria, more frequent monitoring, as specified in the Action Plan in the following section, should be conducted. This additional monitoring should be continued until the excessive dust emission or the deterioration in the air quality is rectified. The impact monitoring programme is summarized in **Table 3-7**.
- 3.8.32 The monthly schedule of the compliance and impact monitoring programme should be drawn up by the ET one month prior to the commencement of the scheduled construction period. Before commencing the impact monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.

Table 3-7 Proposed Monitoring Parameters and Frequency

Monitoring Stations	Parameter	Period	Frequency
AM1, AM2, AM3 & AM4	1-hour TSP	0700 – 1900	<u>Baseline:</u> 3 times/day for 14 consecutive days before commencement of major construction works <u>Impact:</u> 3 times/day, once every 6 days throughout the construction phase

Event and Action Plan

3.8.33 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. **Table 3-8** shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, action in accordance with the Action Plan in **Table 3-9** shall be carried out.

Table 3-8 Action and Limit Levels for Air Quality (Construction Dust)

Parameters	Action Level *	Limit Level
TSP (1 hr average)	$BL \leq 384 \mu\text{g m}^{-3}$, $AL = (BL * 1.3 + LL)/2$ $BL > 384 \mu\text{g m}^{-3}$, $AL = LL$	$500 \mu\text{g m}^{-3}$

* (1) BL = Baseline level, AL = Action level, LL = Limit level.

Table 3-9 Event and Action Plan for Air Quality (Dust)

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling	1. Identify source, investigate the causes of complaint and propose remedial measures; 2. Inform Contractor, IEC and ER; 3. Repeat measurement to confirm finding; and 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; and 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Notify Contractor.	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; and 3. Amend working methods agreed with the ER as appropriate.

Event	Action			
	ET	IEC	ER	Contractor
<p>Action level being exceeded by two or more consecutive sampling</p>	<ol style="list-style-type: none"> 1. Identify source; 2. Inform Contractor, IEC and ER; 3. Advise the Contractor and ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with Contractor, IEC and ER; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by 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. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.
<p>Limit level being exceeded by one sampling</p>	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; and 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the 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. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification; 4. Implement the agreed proposals; and 5. Amend proposal if appropriate.

Event	Action			
	ET	IEC	ER	Contractor
Limit level being exceeded by two or more consecutive sampling	<ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 4. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

3.9 Mitigation Measures

Construction Phase

3.9.1 Relevant dust control measures stipulated in the Air Pollution Control (Construction Dust) Regulation, and good site practices will be incorporated as the Contract Specifications for implementation throughout the construction period. These include:

- The works area for site clearance and excavation should be sprayed with water before, during and after the operation so as to maintain the entire surface wet.
- Restricting heights from which materials are to be dropped, as far as practicable to reduce the fugitive dust arising from unloading/ loading.
- Immediately before leaving a construction site, all vehicles should be washed to remove any dusty materials from the bodies and wheels. However, all spraying of materials and surfaces should avoid excessive water usage.
- Where a vehicle leaving a construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials will not leak from the vehicle.
- Erection of hoarding along the site boundary, where appropriate.

- Any stockpile of dusty materials should be covered entirely by impervious sheeting; and/or placed in an area sheltered on the top and three sides.
- All dusty materials should be sprayed with water immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.
- Reduce the traffic induced dust dispersion and re-suspension, the travelling speed of vehicles within the site should be controlled.
- Regular maintenance of construction equipment deployed on-site should be conducted to prevent black smoke emission.

3.9.2 Excavated nullah bed materials that are placed on trucks for disposal should be properly covered with tarpaulin sheets during transportation to minimise the release of any potential odour. The odorous excavated material should be placed as far away from the sensitive receivers as possible. Odorous river bed material excavated during construction phase should be removed off-site as soon as practicable within 24 hours to avoid any odour nuisance.

Operation Phase

3.9.3 During operation phase, mitigation measures are considered necessary when materials generated from the maintenance works are found to be odorous, and the following measures should be implemented by the Contractor.

- Temporarily stockpile odorous material as far away from ASRs as possible;
- Temporary stockpiles of odorous material will be properly covered with tarpaulin and should be removed off-site as soon as practically possible within 24 hours to avoid any odour nuisance arising.

3.9.4 To reduce odour impacts from the DWF pumping station, the following measures should be implemented.

- The DWF pumping station should be enclosed inside building structure and maintained with negative pressure;
- The DWF pumping station should be equipped with deodorization unit using activated carbon or other equivalent odour removal techniques with odour removal efficiency of 99.5%;
- The exhaust outlet of the deodorization unit should be located in a direction away from the nearby ASRs, with a view to maximizing the separation distance between the exhaust outlet and the nearest ASR; and
- Regular maintenance of the deodorization unit should be conducted to ensure its effectiveness.

4 NOISE

4.1 Introduction

- 4.1.1 In accordance with the recommendations of the EIA reports, mitigation measures to control impacts from noise generating works have been proposed for the construction phase of the Project. Proposed mitigation measures for noise reduction and control are provided in **Annexes A-1 & A-2**.

4.2 Construction Phase

- 4.2.1 Construction noise monitoring is recommended to ensure compliance with the noise criteria at the Noise Sensitive Receivers (NSRs). Monitoring requirements are detailed below.

Construction Noise Parameters

- 4.2.2 Due to the utilization of Powered Mechanical Equipment (PME) during the construction phase of the Project, potential noise impact to the NSRs in the vicinity of the Project Site is expected.
- 4.2.3 Noise measurements should be carried out in accordance with the guidelines given in Annex – General Calibration and Measurement Procedures of Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM).
- 4.2.4 Construction noise level should be measured in terms of a weighted equivalent continuous sound pressure level (Leq) during the construction phase to check for compliance against limits. Leq (30min) should be used as the monitoring parameter for the construction period between 0700 – 1900 hours on normal working days. For all other time periods, Leq (5min) should be measured for comparison with the Noise Control Ordinance (NCO) criteria. Supplementary information for data auditing (statistical results such as L10 and L90) should also be obtained for reference.

Monitoring Equipment

- 4.2.5 As referred to in 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 may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB. Noise measurements should generally not be made in the presence of fog, rain, wind with a steady speed exceeding 5m s⁻¹ or wind with gusts exceeding 10m s⁻¹. The wind speed should be checked with a portable wind speed meter capable of measuring the wind speed in m s⁻¹. **Table 4-1** summarizes the proposed noise monitoring equipment.

Table 4-1 Proposed Noise Monitoring Equipment

Equipment	Model and Make	Quantity
Integrating Sound Level Meter	BSWA308 SLM (580156, 580287, 570187)	3
Calibrator	SV30A (10965)	1

Monitoring Locations

4.2.6 The noise monitoring locations have been shown in **Figure 2** and **Table 4-2**. The status and location of noise sensitive receiver (NSR) may change before commencement of construction. If such cases exist, the ET Leader should propose updated noise level monitoring locations and seek approval from the ER and the updated locations must be agreed by the IEC and the EPD.

Table 4-2 Proposed Construction Noise Monitoring Location

Monitoring Station ID	NSR ID (YLBS)	NSR ID (YLN)	Distance from Site Boundary (m)	Description	Type of Use
CM1	SPCH1	--	11	Shan Pui Chung Hau Tsuen	Residential
CM2	CCHS1	--	10	Caritas Yuen Long Chan Chun Ha Secondary School	Educational
CM3	MTTN1*	NSR20*	3	Ma Tin Tsuen	Residential
CM4	--	NSR01	12	Tung Tau Wai San Tsuen	Residential
CM5	--	NSR03	8	Twin Regency	Residential
CM6	--	NSR09	8	Tai Kiu Tsuen	Residential
CM7	--	NSR14#	1	CCC Chun Kwong Primary School	Educational

* "Ma Tin Tsuen" was identified as the noise monitoring location in both EIA studies, it is considered to combine as one monitoring station for the Project.

As NSR14 rejected the request for monitoring equipment setup and property entry, the monitoring equipment is proposed to install next to the school at "Chung Sing Path Playground" for baseline monitoring. The impact monitoring is proposed to conduct outside CCC Chun Kwong Primary School with portable noise meter.

4.2.7 When proposing alternative monitoring location, it should be chosen based on the following criteria:

- Locations that are close to the major site activities which are likely to be affected by elevated noise levels;
- Close to the noise sensitive receivers; and
- For monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

4.2.8 The monitoring station(s) should normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is a problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements should be made. For reference, a correction of +3 dB(A) should be made to the free field measurements. The ET

Leader should agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring should be carried out at the same position.

4.3 Baseline Monitoring

- 4.3.1 The ET should carry out baseline noise monitoring prior to the commencement of any construction works. The baseline monitoring should be measured for a continuous period of at least 14 consecutive days at a minimum logging interval of 30 minutes for day-time and 15 minutes (as three consecutive Leq(5min) readings) for evening, holidays and night-time. A schedule of the baseline monitoring should be submitted to the ER, IEC and EPD for agreement before commencement of baseline monitoring.
- 4.3.2 During the baseline monitoring, there should not be any construction activities in the vicinity of the monitoring stations. Any non-Project related construction activities in the vicinity of the stations during the baseline monitoring should be noted and the source(s) and location(s) be recorded.
- 4.3.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the Engineer’s Representative (ER), IEC and EPD to agree on an appropriate set of data to be used as a baseline reference.

4.4 Impact Monitoring

- 4.4.1 Weekly noise monitoring should be carried out at all the designated monitoring stations to obtain one set of 30-minute measurements between 0700-1900 hours during working days. The results shall be recorded in the sample form in **Annex B**. General construction work carrying out during restricted hours is controlled by CNP system under the NCO. The proposed monitoring schedule should be submitted to ER, the IEC and EPD at least 1 week before the first day of the monitoring month. The ER, IEC and EPD should be notified immediately of any changes in schedule.
- 4.4.2 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in **Table 4-3** shall be carried out. This additional monitoring should be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

4.5 Event and Action Plan for Noise

- 4.5.1 The Action and Limit levels for construction noise are defined in **Table 4-3**. Should non-compliance of the noise quality criteria occur, actions in accordance with the Action Plan in **Table 4-4** should be carried out.

Table 4-3 Action and Limit Levels for Construction Noise Monitoring

Time Period	Action Level	Limit Level
0700 – 1900 Hrs on normal weekdays	When one documented compliant is received	<ul style="list-style-type: none"> ▪ 75 dB(A) for residential ▪ 70 dB(A) for schools and 65dB(A) during school examination periods

Table 4-4 Event / Action Plan for Construction Noise Monitoring

Event	Action			
	ET	IEC	ER	Contractor
When Action Level is reached/exceeded	<ul style="list-style-type: none"> • Notify IEC, DSD, EPD, ER and Contractor; • Carry out investigation; • Report the results of investigation to the IEC, DSD, EPD, ER and Contractor; • Discuss with the Contractor and formulate remedial measures; • Increase monitoring frequency to check mitigation effectiveness 	<ul style="list-style-type: none"> • Review the analyzed results submitted by the ET; • Review the proposed remedial measures by the Contractor and advise the ER accordingly; • Supervise the implementation of remedial measures 	<ul style="list-style-type: none"> • Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; • Make agreement on the mitigation measures to be implemented 	<ul style="list-style-type: none"> • Submit noise mitigation proposals to IEC; • Implement noise mitigation proposals
When Limit Level is reached/exceeded	<ul style="list-style-type: none"> • Notify IEC, DSD, EPD, ER and Contractor; • Identify source; • Carry out investigation; • Report the results of investigation to the IEC, DSD, EPD, ER and Contractor; • Discuss with the Contractor and formulate remedial measures; • Increase monitoring frequency to check mitigation effectiveness 	<ul style="list-style-type: none"> • Review the analyzed results submitted by the ET; • Review the proposed remedial measures by the Contractor and advise the ER accordingly; • Supervise the implementation of remedial measures 	<ul style="list-style-type: none"> • Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; • Request Contractor to critically review the working methods; • Make agreement on the mitigation measures to be implemented; • Assess the effectiveness of the implemented mitigation measures 	<ul style="list-style-type: none"> • Submit noise mitigation proposals to IEC; • Implement noise mitigation proposals

4.5.2 In addition, regular environmental site audit is required to ensure the implementation of practical noise control measures, including good site practice, use of quiet PMEs and adoption of mobile noise barriers. Detailed site audit specifications are included in **Section 12** of this EM&A Manual.

4.6 Operation Phase

- 4.6.1 According to the EIA, no unacceptable noise impact is expected during operation of the Project. Therefore, operational noise monitoring is not considered necessary.

4.7 Mitigation Measures

- 4.7.1 The mitigation measures recommended for noise reduction and control are presented in **Section 4** of the EIA Report (Yuen Long Barrage Scheme) and **Section 5** of the EIA Report (Improvement of Yuen Long Town Nullah). They can also be found in **Annexes A-2** and **A-1** of this EM&A Manual respectively.

5 WATER QUALITY

5.1 Introduction

- 5.1.1 In accordance with the recommendations of the EIA reports, mitigation measures have been proposed during the construction phase of the Project to ensure that unacceptable water quality impacts do not occur at the downstream Water Sensitive Receivers (WSRs) as a result of the construction works. Details of the mitigation measures are presented in **Annexes A-1 & A-2**.
- 5.1.2 In addition to the recommended mitigation measures, water quality monitoring should be undertaken during the construction phase of the Project to determine the environmental performance of the Project in terms of its water quality impacts. Appropriate remedial actions should be taken in case the environmental performance criteria are exceeded. Detailed monitoring requirements are presented in the following sections.
- 5.1.3 According to Condition 2.5 of EP-578/2020, the Updated EM&A Manual shall include but not limited to the content below.
- (i) a water quality monitoring plan (WQMP) to detect potential adverse water quality impacts at the Project and downstream area directly affected by the construction of the Project. With reference to the excavation works in the nullah as mentioned in Condition 3.1 of this Permit, the WQMP shall include details of the monitoring locations, monitoring frequency, parameters to be monitored, and additional measures to be taken in the event of heavy rainfall during dry season to ensure that the water quality is not adversely affected; and
 - (ii) an Event/Action Plan for water quality monitoring.

5.2 Construction Phase Monitoring

Water Quality Monitoring Parameters and Frequency

- 5.2.1 Water quality parameters are chosen for monitoring with consideration of the potential water quality impacts from the construction of the Project (i.e. release of polluted water with high suspended sediment (SS) load from the construction works). This would ensure that potential impacts from construction activities of the Project can be readily detected and timely action could be undertaken to rectify the situation. Water quality parameters to be measured are shown in **Table 5-1**.

Table 5-1 Water Quality Monitoring Parameters and Frequency

Parameters	Unit	Monitoring Frequency		
		Baseline monitoring	Impact monitoring	Post Project monitoring
<i>In-situ Measurement</i>				
pH	-	3 days per week for 4 weeks prior to the commencement of construction works	3 days per week throughout the construction period	3 days per week for 4 weeks after the completion of construction works
Water temperature	°C			
Turbidity	NTU			
Dissolved Oxygen (DO)	mg/L			
Dissolved Oxygen (DO)	% saturation			
Salinity	‰ or ppt*			
<i>Laboratory Analysis</i>				
Suspended Solids (SS)	mg/L			

Notes:

For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb.

*‰ (permil), ppt (part per thousand)

5.2.2 In addition to the water quality parameters, other relevant data should also be measured and recorded in field logs, including the coordinates of the sampling, tidal stages, water depth, sampling depth, weather conditions, special phenomena (provide photographs if appropriate) and work activities undertaken around the monitoring and works area that may influence the monitoring results.

Water Quality Monitoring Equipment

5.2.3 For water quality monitoring, the following equipment should be supplied and used by the environmental contractor.

5.2.4 ***Dissolved Oxygen, Temperature and Salinity Measuring Equipment*** - The instrument should be a portable, weatherproof measuring instrument complete with cable, sensor, comprehensive operation manuals, and should be operable from a DC power source. It should be capable of measuring: dissolved oxygen levels in the range of 0–20 mg L⁻¹ and 0- 200% saturation; a temperature of 0-45 °C; and a salinity of 0-35 ppt.

5.2.5 It should have a membrane electrode with automatic temperature compensation complete with a cable of not less than 35 m in length. Sufficient stocks of spare electrodes and cable 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).

5.2.6 ***Turbidity Measuring Equipment*** - Turbidity should be measured in situ by the nephelometric method using an instrument that is portable and weatherproof using a DC power source with cable, sensor, and comprehensive operation manuals. This instrument should have a photometric sensor capable of measuring turbidity between 0 - 1000 NTU (e.g. Hach model 2100P or other approved instrument of similar type).

The meter should be calibrated in order to establish the relationship between NTU units and the levels of SS. The turbidity measurement should be carried out on a split water sample from the same water sample collected for suspended solids analysis.

- 5.2.7 **pH Measuring Equipment** - A portable pH meter capable of measuring a range between 0.0 and 14.0 should be provided to measure pH under the specified conditions (e.g. Orion Model 250A or an approved similar instrument).
- 5.2.8 **Electromagnetic Flow Meter** - A hand-held digital electromagnetic flow meter (e.g. model Flo-mate 2000 or other approved similar instrument) should be provided and used to measure water flow rate during water quality monitoring. The measurement should be conducted at fixed sampling points and water depth throughout the monitoring programme.
- 5.2.9 **Positioning Device** - The locations of water quality monitoring stations should be located using a hand-held Global Positioning System (GPS) with way point bearing indication or other equivalent instrument of similar accuracy. This is to ensure that the water sampling locations are accurate and consistent before taking measurements.
- 5.2.10 **Water Sampling Equipment** - A water sampler is required. It should comprise a transparent PVC cylinder, with a capacity at least 500ml, 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 (for example, Kahlsico Water Sampler or an approved similar instrument). If the water sampler cannot be applied due to shallow water depth, smaller sample container should be submerged into mid-water column before collecting water sample.
- 5.2.11 **Water Depth Detector** - A portable, battery-operated echo sounder would be used for the determination of water depth at each designated monitoring station. If echo sounder is not applicable due to low water depth, various sized stainless steel rulers would be used to determine the water depth.
- 5.2.12 **Back-up Equipment** - Sufficient stocks of spare parts should be maintained for replacements when necessary. Back-up monitoring equipment should also be available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

5.2.13 **Table 5-2** summarizes the proposed water quality monitoring equipment.

Table 5-2 Proposed Water Quality Monitoring Equipment

Equipment	Model and Make	Quantity
Water Sampler	Kahlsico Water-Bottle Model 135DW 150	1
Multi-parameter Water Quality System	YSI EXO1 Multi-parameter Sonde	1
Monitoring Position Equipment	“Magellan” Handheld GPS Model GPS-320	1
Water Depth Detector	Fishfinder 140	1

Sampling / Test Protocols

- 5.2.14 All *in-situ* monitoring instruments should be checked and calibrated before use. They should be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before use by laboratory.
- 5.2.15 For the on-site calibration of field equipment, the BS 1427: 1993, Guide to Field and On Site Test Methods for the Analysis of Waters should be observed. 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 equipment is under maintenance, calibration etc.
- 5.2.16 Water samples for SS measurements should be collected in high density polythene bottles, packed in ice (cooled to 4° C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.
- 5.2.17 Three replicate samples should be collected from each of the monitoring events for in situ measurement and lab analysis. It is recommended to take three replicates at each sampling station from each independent sampling event for all parameters in order to ensure a robust statistically interpretable data set.

Laboratory Measurement / Analysis

- 5.2.18 All laboratory work should be carried out in a HOKLAS accredited laboratory. Water samples of about 1,000ml should be collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work should start within the next working day after collection of the water samples. The SS laboratory measurements should be provided within 2 days of the sampling event (48 hours). The analyses should follow the standard methods as described in APHA Standard Methods for the Examination of Water and Wastewater, 21st Edition, unless otherwise specified (APHA 2540D for SS).
- 5.2.19 The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc), detection limits and accuracy. The QA/QC details should be in accordance with requirements of HOKLAS or another internationally accredited scheme.

Monitoring Locations

5.2.20 The monitoring stations have been established to identify potential water quality impacts to WSRs. Locations of the monitoring stations are shown in **Figure 3** with the co-ordinates presented on **Table 5-3**. These monitoring stations are chosen as they are at reasonable distance from the works area and confirmed as the only location capable for water quality monitoring. Descriptions of the monitoring stations are as follows:

- W1 is Impact Station while W2 is Impact Station or Control Station depending on tidal condition. These stations are downstream of the boundary of the Project Site. W1 is located at the Shan Pui River and is approximately 250 m from the boundary of barrage and nullah works, while W2 is located near the Mai Po Inner Deep Bay Ramsar Site and is approximately 2 km from the boundary. Water quality monitoring at these two Stations will help to determine any adverse water quality impacts to the nearest Water Sensitive Receivers which may be caused by the Project's construction activities.
- C1 and C2 are Control Stations which are approximately 2km upstream of the Project Site, covering all the nullah construction works and the proposed flow diversion works & flood walls for the barrage scheme. The control stations are not supposed to be influenced by the construction works. These stations are not affected by tidal condition of Shan Pui River. Water quality monitoring data collected at C1 and C2 will be used to compare with the Impact Stations' data to determine any adverse water quality impacts as a result of the construction works of the Project.
- Mobile Stations should also be monitored for which the location will be determined in accordance with the boundary and number of the active works area during the time of impact monitoring. The Upstream Mobile Station should be located about 50 m upstream of the active works area while the Downstream Mobile Station should be located about 50 m downstream of the active works area.

Table 5-3 Proposed Water Quality Monitoring Stations for the Construction Phase

Station	Description	Station Nature		Easting	Northing
		Mid-ebb	Mid-flood		
W1	Shan Pui River [#]	Impact Station		821405	835653
W2	Shan Pui River near Mai Po Inner Deep Bay Ramsar Site	Impact Station	Control Station	820935	837158
C1 [^]	Kung Um Road Nullah [#]	Control Station*		820720	832119
C2 [^]	San Hui Nullah [#]	Control Station*		821297	832771
UM	Yuen Long Town Nullah	Upstream Mobile Station (Control)*		Located 50 m upstream of the active works area. Location to be determined on-site.	
DM	Yuen Long Town Nullah	Downstream Mobile Station* (Impact)		Located 50 m downstream of the active works area. Location to be determined on-site.	

Notes:

* Not affected by tidal condition. The coordinates of the monitoring stations are for reference only.

W1 from YLBS was chosen to be the proposed W1 of this Project since the W1 from YLN was located inside the site boundary of YLBS. The control points are for the fulfilment of both YLN & YLBS EM&A manuals. In the original EM&A manuals, both C1 are located at the same stream between Kung Um Rd and Kiu Hing Rd, both C2 are located at the same stream between Tai Shu Ha Rd West and Tai Shu Ha Rd East. Considering there are construction works of parapets wall for YLBS, the proposed control points can cover all the nullah, flow diversion and flood wall works area. Since the original locations do not have valid access to the nullah, C1 and C2 were relocated so that samples can be collected from bridge running across the nullah.

[^] As control station C1 and C2 are too far away from the works area at the early construction stage according to the construction program, lack of representative of the monitoring result maybe occurs. Therefore exceedance related to C1 or C2 will not be counted until the commencement of construction works in nullah (i.e. DWIF system).

5.2.21 The locations and suitability of the proposed monitoring stations above are for reference only and shall be reviewed and proposed by the ET and confirmed with the IEC and the EPD before commencement of Baseline Monitoring. The water depth in the Yuen Long Town Nullah and Shan Pui River may not be sufficient to take samples at different depths, especially during dry season or due to tidal action. Therefore, water samples should only be taken at mid-depth. Water sampling works should be conducted with caution to avoid disturbing the bottom sediment.

Monitoring Frequency

5.2.22 As specified in **Table 5-1**, the detailed monitoring frequency requirements are listed below.

Baseline Monitoring

5.2.23 Baseline monitoring should be undertaken three (3) times per week for four (4) weeks at the designated stations prior to the commencement of the construction works. For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb. The interval between two consecutive sets of monitoring should not be less than 36 hours. Baseline monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD one (1) week prior to the commencement of baseline monitoring.

Impact Monitoring

5.2.24 Impact monitoring should be undertaken three (3) times per week during the course of construction works. For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb. The interval between two consecutive sets of monitoring should not be less than 36 hours except when there are exceedances of Action and/or Limit Level, in which case monitoring frequency should be increased. The proposed water quality monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD at least two (2) weeks before the first day of the monitoring month. The ER, the IEC and EPD should be notified immediately of any changes in schedule.

Post-construction Monitoring

5.2.25 Post-construction monitoring will comprise sampling on three (3) days a week for four (4) weeks after completion of the construction works. The monitoring requirements will be the same as the Baseline Monitoring stated in **Section 5.2.23** above. Post-construction monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD two (2) weeks prior to the commencement of Post-construction monitoring.

Action and Limit Levels

5.2.26 Water quality monitoring results will be evaluated against Action and Limit Levels shown in **Table 5-4**.

Table 5-4 Action and Limit Level for Water Quality Monitoring

Parameter	Action Level	Limit Level
SS in mg/L ⁽¹⁾	95%-ile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from control station on the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station compared with corresponding data from control station on the same day
DO in mgL ⁽²⁾	5%-ile of baseline data	4 mg/L or 1%-ile of baseline data
Turbidity in NTU ⁽¹⁾	95%-ile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from control station on the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station compared with corresponding data from control station on the same day

Notes:

- (1) For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- (2) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

Event and Action Plan

5.2.27 Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria are exceeded, the actions in accordance with the Event and Action Plan in **Table 5-5** should be carried out.

5.2.28 In addition to monitoring, regular environmental site audit is required to ensure the proper implementation of good site practices, construction runoff pollution prevention measures, drainage and sewage control measures. Detailed site audit specifications are included in **Section 12** of the Manual.

Table 5-5 Event / Action Plan for Water Quality Monitoring

Event	Action			
	ET	IEC	ER	Contractor
Action Level being exceeded	<ul style="list-style-type: none"> Repeat measurement to confirm findings; Identify source(s) of impact; Inform DSD, IEC, Contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with DSD, IEC, Contractor and ER; Repeat measurement on next day of exceedance 	<ul style="list-style-type: none"> Discuss with DSD, ET, ER and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures 	<ul style="list-style-type: none"> Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented. 	<ul style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment Consider changes of working methods; Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER; Implement the agreed mitigation measures
Limit Level being exceeded	<ul style="list-style-type: none"> Repeat measurement to confirm findings; Identify source(s) of impact; Inform DSD, IEC, Contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with DSD, IEC, ER and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit level 	<ul style="list-style-type: none"> Discuss with DSD, ET, ER and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures 	<ul style="list-style-type: none"> Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures 	<ul style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 3 working days; Implement the agreed mitigation measures

5.3 Mitigation Measures

- 5.3.1 The mitigation measures recommended for water quality aspect are presented in **Section 5** of the EIA Report (Yuen Long Barrage Scheme) and **Section 6** of the EIA Report (Improvement of Yuen Long Town Nullah). They can also be found in **Annexes A-2** and **A-1** of this EM&A Manual respectively. The Contractor should be responsible for the design and implementation of these measures.
- 5.3.2 In the event of complaints, non-compliance or area of improvement being observed, the ET and the Contractor should review the effectiveness of these mitigation measures, design alternative or additional mitigation measures as appropriate and propose to the IEC for approval for implementation of such alternative or additional measures.

5.4 Water Quality Monitoring Plan for EP-578/2020

- 5.4.1 According to Condition 2.5 of EP-578/2020, a water quality monitoring plan (WQMP) shall be prepared to detect potential adverse water quality impacts at the Project and downstream area directly affected by the construction of the Project. With reference to the excavation works in the nullah as mentioned in Condition 3.1 of this Permit, the WQMP shall include details of the monitoring locations, monitoring frequency, parameters to be monitored, and additional measures to be taken in the event of heavy rainfall during dry season (i.e. November to March) to ensure that the water quality is not adversely affected; and an Event/Action Plan for water quality monitoring.
- 5.4.2 According to Hong Kong Observatory, it is noted that flooding may occur in some low-lying or poorly drained areas, and rivers may also overflow during Rainstorm Warning. Therefore, with the enforcement of the Amber, Red or Black Rainstorm Warning, it should be considered as heavy rainfall. As the Project Site is located in low-lying area, the additional water quality monitoring after heavy rainfall is proposed to take place after the day with amber rainstorm signal or above.
- 5.4.3 As this Plan focus on the additional water monitoring after heavy rainfall, the monitoring locations, monitoring frequency, monitoring parameters shall be conducted with the same manner as the regular water quality monitoring programme in this Manual. If the monitoring day overlaps with the regular one, or the site condition is harmful to the sampling staff, no additional monitoring for post-heavy rainfall event is required.

Parameters and Frequency of Additional Water Monitoring

5.4.4 As the water quality monitoring in this Plan shall be conducted with the same manner as the regular water quality monitoring programme in this Manual, the details of the monitoring parameters can be refer to **Table 5-1** of this Manual. The monitoring frequency is presented in **Table 5-6** below.

Table 5-6 Additional Water Quality Monitoring Parameters and Frequency

Parameters	Unit	Monitoring Frequency
<i>In-situ Measurement</i>		
pH	-	Once after the day with amber rainstorm signal or above*
Water temperature	°C	
Turbidity	NTU	
Dissolved Oxygen (DO)	mg/L	
Dissolved Oxygen (DO)	% saturation	
Salinity	‰	
<i>Laboratory Analysis</i>		
Suspended Solids (SS)	mg/L	

Notes: For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb.

* No additional monitoring is needed if the monitoring day overlaps with the regular one or the sampling condition is harmful to the sampling staff.

Locations of Additional Water Monitoring

5.4.5 As the water quality monitoring in this Plan shall be conducted with the same manner as the regular water quality monitoring programme in this Manual, the details of the monitoring locations can be refer to **Section 5.2.20** of this Manual.

Additional Mitigation Measures

5.4.6 The regular mitigation measures recommended for water quality aspect are presented in **Annex A-1** of this Manual. The Contractor should be responsible for the design and implementation of these measures.

5.4.7 Additional mitigation measures are recommended below to prevent potential adverse water quality impacts before or after the heavy rainfall.

- Setup earth berm or embankments around excavation areas or excavated materials to protect excavations from flooding.
- Cover the completed working area or construction materials with proper impervious sheets.

Event and Action Plan of Additional Water Monitoring

- 5.4.8 As the water quality monitoring in this Plan shall be conducted with the same manner as the regular water quality monitoring programme in this Manual, the Event and Action Plan can be refer to **Table 5-5** of this Manual.

6 WASTE MANAGEMENT AND LAND CONTAMINATION

6.1 Waste Management

- 6.1.1 Construction and demolition (C&D) materials will inevitably be produced during the construction phase of the Project. Waste generated during construction works includes construction and demolition materials, sediment, chemical waste, general refuse and floating refuse. Waste types, quantities and timing have been estimated and mitigation measures have been proposed in terms of avoidance-minimisation-reuse-recycling-disposal hierarchy.
- 6.1.2 Potential for reuse of inert C&D material (public fill) from the Project will be rigorously explored during the detailed design stage in an effort to minimise off-site disposal. Provided that there is strict control of C&D materials generated from construction works and that all arising materials are stored, handled, transported and disposed of in accordance with the recommended mitigation measures, potential impact is not expected.
- 6.1.3 The recommended waste management measures shall be enforced by incorporating them into an Environmental Management Plan (EMP) to be prepared by the Contractor. Environmental audit would be necessary to ensure the implementation of proper waste management practices during construction.
- 6.1.4 Auditing should be carried out periodically to determine if waste is being managed in accordance with the relevant environmental legislation and standards (e.g. Waste Disposal Ordinance) and the EMP. The audits should examine all aspects of waste management including waste generation, storage, recycling, treatment, transportation, and disposal. The general site inspections including waste management issues will be undertaken weekly by ET to check all construction activities for compliance with all appropriate environmental protection and pollution control measures, including those set up in the EMP. Meanwhile, waste management audit should also be carried out on monthly basis by the IEC.
- 6.1.5 Unacceptable impacts related to waste management are not expected during operation of the Project. As such, environmental monitoring is not considered necessary during operation of the Project.

6.2 Land Contamination

- 6.2.1 Based on desk-top review and site walkover conducted in the EIA for EP-578/2020 & EP-604/2022, the presence of contaminated land is not expected. As such, environmental monitoring audit for land contamination is considered not necessary.

7 ECOLOGY

7.1 Introduction

- 7.1.1 Potential ecological impacts arising from the construction and operational phases of the Project were assessed in the EIA Reports for EP-604/2022 and EP-578/2020.
- 7.1.2 For EP-604/2022, mitigation measures have been recommended to minimize the potential indirect impacts to the nearby sensitive wetland habitats and associated wildlife, particularly water birds. With the implementation of appropriate mitigation measures, no unacceptable adverse residual impacts would be anticipated. Nonetheless, EM&A is considered necessary during construction of the Project and the requirements are described below.
- 7.1.3 For EP-578/2020, with implementation of mitigation measures for air quality, noise and water quality stipulated in the EIA Report for EP-578/2020, no unacceptable adverse ecological impact arising from the Project during construction and operation phase is anticipated.

7.2 Mitigation Measures

- 7.2.1 The mitigation measures recommended for ecology are summarized in **Section 7** of the EIA Report for EP-604/2022 and **Section 8** of the EIA Report for EP-587/2020. They can also be found in **Annexes A-2** and **A-1** of this EM&A Manual respectively.

7.3 Construction Phase Monitoring and Audit

- 7.3.1 Utilization of the wetland habitats by birds was recorded within the 500m assessment area, where a number of avifauna of conservation importance (particularly overwintering waterbirds) and the recognized sites of conservation importance (including the Ramsar Site, Priority Site, Wetland Conservation Area (WCA), Wetland Buffer Area (WBA), Sites of Special Scientific Interest (SSSIs) and Conservation Area (CA)) were recorded, should be monitored monthly during the construction phase.
- 7.3.2 The area within 100m from the Project boundary should be monitored monthly during the construction phase to check the location and status of any active night roost.

Baseline Ecological Monitoring of Birds

- 7.3.3 The result of the ecological field surveys conducted for the EIA study, which were conducted monthly over a 12-month period between July 2019 and July 2020, will be adopted as the baseline for the evaluation of utilization of the wetland habitats by birds nearby the Project Site and effectiveness of the proposed mitigation measures during the ecological monitoring. The ET should review the applicability of the results of baseline surveys conducted for the EIA and conduct verification surveys as necessary.
- 7.3.4 A Baseline Bird Survey Report should be submitted to relevant Government departments.

Pre-construction Survey of Ardeid Night Roost

- 7.3.5 A pre-construction survey should be conducted to record and verify the status and locations of any active ardeid night roost within 100m of the Project Site boundary. It should also suggest a location as close to the night roost as practicable for monitoring of noise level during construction. The findings of the pre-construction surveys will serve as a reference for the evaluation of usage of ardeid night roost identified and effectiveness of the proposed mitigation measures during the construction phase ecological monitoring. A Report on Pre-construction Survey of Ardeid Night Roost should be submitted to relevant Government departments.

Ecological Monitoring of Birds

- 7.3.6 Monthly ecological monitoring, focusing on avifauna species of conservation importance, and overwintering waterbirds utilising wetland habitats along Shan Pui River and Kam Tin River within 500m from the Project boundary should be conducted during construction phase. For the surveys overlooking the tidal mudflats and mangroves in the Shan Pui River and Kam Tin River, the tidal level at the time of the survey should be taken into consideration and the surveys should be taken when the tidal level is generally 1.5m or below.
- 7.3.7 Avifaunal communities should be surveyed quantitatively along transects and at selected point count locations. All birds heard or seen along the transects should be identified to species level and counted. Noise level should also be recorded. Any changes in site condition or disturbances detected or observed at the monitoring locations, including both construction and non-construction related activities, during each impact monitoring visit should also be recorded.
- 7.3.8 The monitoring results should be compared to pre-construction baseline condition during the dry and wet seasons as summarized in the Baseline Bird Survey Report.
- 7.3.9 The ecological monitoring should be undertaken by experienced ecologist(s) with relevant working experience. Should any unpredicted indirect ecological impacts arising from the proposed Project be detected, remedial measures should be developed and implemented by the Contractor. The monitoring results with comparison to pre-construction baseline condition should be reported in the monthly EM&A Report.

Ardeid Night Roost Monitoring

- 7.3.10 Monthly monitoring of the area within 100m from the Project boundary should be conducted during the construction phase to check the status and location of any active ardeid night roost. The night roost survey should be conducted from one hour before sunset to one hour after sunset. Direct observation should be made from a vantage point which enables an unobstructed view over the area. The species, abundance and time of all ardeids observed at the night roosts during the survey should be recorded, as well as the noise levels. Any changes in site condition or disturbances detected or observed at the monitoring locations, including both construction and non-construction related activities, during each monitoring visit should also be recorded.

- 7.3.11 The ecological monitoring should be undertaken by experienced ecologist(s) with relevant working experience. The usage of the ardeid night roost should be reviewed and analyzed, and if any significant decline is identified, the cause of the decline, with reference to any changes in site condition or disturbances detected, should be reviewed to identify any unpredicted indirect ecological impacts arising from the proposed Project. Remedial measures should be developed and implemented by the Contractor as necessary. On the other hand, if the active night roost is found to have relocated to 100m away from the project boundary naturally, subject to further consultation and agreement with Agriculture, Fisheries and Conservation Department (AFCD)/EPD, restriction on working hours (i.e. no construction works with PME within 100m from the night roost after 17:00 during wet season and after 16:30 during dry season) can be ceased. The monitoring results and evaluation of the usage of the ardeid night roost should be reported in the monthly EM&A Reports.
- 7.3.12 Site audits should be undertaken on weekly basis to check the proper implementation and maintenance of recommended mitigation measures during construction phase of the Project.

7.4 Operation Phase Monitoring and Audit

- 7.4.1 As the potential impacts to ecology during operational phase are all considered minor or insignificant, operational phase monitoring and audit are not required. Monitoring of the effectiveness of the revitalisation will be formulated during the Detailed Design Stage.

8 FISHERIES

8.1 Introduction

- 8.1.1 As no unacceptable adverse fisheries impacts are anticipated during construction or operational phases of the proposed barrage project, no specific monitoring programme for fisheries is required. Regular audits should be undertaken to ensure the effectiveness of the mitigation measures and good site practices recommended during construction phase for further controlling the water quality impacts, as these measures also serve to protect fisheries resources.
- 8.1.2 No fisheries impact assessment was required during EIA study of the proposed Yuen Long Nullah improvement project and therefore EM&A is not required.

8.2 Mitigation Measures

- 8.2.1 The mitigation measures recommended for fisheries impact (i.e., water quality mitigation measures) are presented in **Section 8** of the EIA Report (Yuen Long Barrage Scheme). They can also be found in **Annex A-2** of this EM&A Manual.

9 CULTURAL HERITAGE

9.1 Introduction

9.1.1 According to the cultural heritage impact assessment on the EIA Report (Yuen Long Barrage Scheme), indirect impacts such as vibration, contact with equipment, access issues may arise, mitigation and audit during construction phase will be required for four heritage structures as listed below.

- Village house (HB-17)
- Village house (HB-18)
- Village God Shrine (HB-30)
- Buddhist Stone Tablet (HB-31)

9.2 Mitigation Measures

9.2.1 Mitigation measures have been recommended as summarised in **Section 9** of the EIA Report (Yuen Long Barrage Scheme) for the protection, and secure and safe public access during the construction phase of four, indirectly affected built heritage sites.

Condition Survey (CS)

9.2.2 A condition survey should be carried out by qualified building surveyor or engineer of the Contractor in advance of works for the identified buildings / structures that may be affected by ground-borne vibration. The Condition Survey Report should contain descriptions of the structure, identification of fragile elements, an appraisal of the condition and working methods for any proposed monitoring and precautionary measures that are recommended.

9.2.3 The Condition Survey Report for the identified buildings / structures must be submitted to Antiquities and Monuments Office (AMO) for comment before construction activities commence. The location of proposed monitoring points in the building should avoid damaging the historic fabric and agreed by the owner and AMO. The Contractor should implement the approved monitoring and precautionary measures.

Vibration Monitoring (VM)

9.2.4 Vibration monitoring by the Contractor should be undertaken during the construction works to ensure that safe levels of vibration are not exceeded. An Alert, Alarm and Action (AAA) vibration limit set at 5 / 6 / 7.5 mm/s for heritage buildings (PNAP APP-137- Appendix A) should be adopted. The AAA vibration limit for the buildings to be graded by Antiquities Advisory Board (AAB) should be determined by the future grading. The Condition Survey Report should highlight if the limit should be lowered after the detailed study of the condition of the buildings and structures. A monitoring schedule, the location of monitoring equipment, the frequency of monitoring, reporting requirements and event / action plan should be included in the Condition Survey Report. The location of any monitoring equipment in the building must be approved by the owner and AMO before installation. Reinstatement to all

affected areas is required. Results of the vibration monitoring should be submitted to ET, IEC and ER within agreed timeframe for audit.

Provision of Buffer Zones (BZ)

- 9.2.5 A buffer zone should be provided by the Contractor to separate the building or structure from the construction works. The buffer zone should be clearly marked out by temporary fencing, if temporary fencing is not appropriate signage may be used to identify the heritage item to be avoided. The buffer zone should be made at least 1m from the proposed works or if this is not possible as large as the site restrictions allow.

Provision of Safe Public Access (SPA)

- 9.2.6 Any proposed works in close proximity to buildings or structures used by the public have the potential to create an unsafe environment for members of the public.
- 9.2.7 The Contractor should ensure that safe public access if possible, through provision of clearly marked paths separated from the construction works areas is provided for any such affected cultural heritage structure.

9.3 Monitoring and Audit

Construction Phase

- 9.3.1 The ET, IEC and ER should audit the vibration monitoring, relevant buffer zone requirements and access conditions during the construction phase at least once a month. In the event of exceedance, the event / action plan according to the Condition Survey Report should be followed.

Operation Phase

- 9.3.2 No impact to heritage resources is expected during operation of the Project. As such, monitoring is considered not necessary during operation phase.

10 LANDSCAPE AND VISUAL (YUEN LONG TOWN NULLAH IMPROVEMENT)

10.1 Introduction

10.1.1 The EIA study has recommended to undertake an EM&A programme for the landscape and visual aspects during the design, construction and operation phases of the Project. The design, implementation and maintenance of landscape mitigation measures is a key aspect of the Project and should be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other Project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures. In addition, implementation of the mitigation measures recommended in the EIA will be monitored through the site audit programme.

10.2 Mitigation Measures.

Construction Phase

10.2.1 The following mitigation measures should be implemented during the construction phase of the Project.

Table 10-1 L&V Mitigation Measures for Construction Phase of EP-578/2020

ID	Mitigation Measures	Funding Agency	Implementation Agency
CM1	<u>Good site practice</u> Construction site should be kept clean and tidy and construction material should be stored in order. Canvas sheets should be used to cover the exposed earth. Unused construction and demolition (C&D) debris should be removed as soon as the reinstatement works are completed.	DSD	DSD / Contractor
CM2	<u>Erection of decorative screen hoarding</u> Each site should be provided with decorative screen hoarding compatible with surrounding setting.	DSD	DSD / Contractor
CM3	<u>Tree preservation</u> The existing trees shall be preserved as far as possible. The retained existing trees on site shall be protected carefully during construction. The requirement specified in “Guidelines on Tree Preservation during Development” issued by Development Bureau shall be followed. Tree preservation should include protection measures for existing trees and greenery.	DSD	DSD / Contractor
CM4	<u>Tree transplanting / compensatory tree planting</u> According to the latest design, all trees will be preserved and no tree felling is expected. In case of trees unavoidably affected by the Project during construction, tree transplanting shall be conducted as far as possible. Any unavoidable tree felling shall be mitigated by compensatory tree planting.	DSD	DSD / Contractor

Operation Phase

10.2.2 The following mitigation measures should be implemented during the operation phase of the Project.

Table 10-2 L&V Mitigation Measures for Operation Phase of EP-578/2020

ID	Mitigation Measures	Funding Agency	Implementation Agency	Maintenance/ Management Agency
OM1	A minimum lighting will be maintained at night time as general lighting provision for security reason.	DSD	DSD / Contractor	DSD
OM2	Green roof and shrub planting will be provided for the DWF pumping station. The roof structure will be planted with trees and groundcovers to reduce glaring effect and give a green appearance of the roof structure. Shrub planting is proposed to be planted within the site boundary to further enhance the development with lush greenery.	DSD	DSD / Contractor	DSD
OM3	Vertical greening will be provided on the external walls without the coverage of architectural elements.	DSD	DSD / Contractor	DSD
OM4	The proposed architectural design of the DWF pumping station will utilize the surrounding landscape to blend the buildings with the surrounding environment. The building will maintain a low profile to reduce the visual impact.	DSD	DSD / Contractor	DSD

10.3 Baseline Monitoring

10.3.1 A photographic record of the Project Site at the time of the Contractor's possession should be prepared by the Contractor and approved by the ER. The approved photographic record should be submitted to the Project Proponent, ET, IEC and EPD for record.

10.4 Construction and Post-Construction Phase Audit

10.4.1 A specialist Landscape Sub-Contractor should be employed by the Contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period.

10.4.2 All measures undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the construction phase and first year of the operational phase should be audited by a Registered Landscape Architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. Site inspections should be undertaken at least once every two weeks throughout the construction

period and once every two months during the operational phase. The broad scope of the audit is detailed below but should also be undertaken with reference to the more specific checklist provided in **Table 10-3**. Operational phase auditing will be restricted to the 12 months of the establishment works of the landscaping proposals and thus only the items below concerning this period are relevant to the operational phase.

- The extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the Contractor outside the limit of the works, including any damage to existing trees should be noted;
- All existing trees and vegetation within the study area which are not directly affected by the works are retained and protected;
- The methods of protecting existing vegetation proposed by the Contractor are acceptable and enforced;
- Preparation, lifting transport and re-planting operations for any transplanted trees are conducted in accordance with the approved methodology;
- The planting of new trees, shrubs, groundcover, climbers, ferns, grasses and other plants, together with the replanting of any transplanted trees are carried out properly and within the right season; and
- All necessary horticultural operations and replacement planting are undertaken throughout the Establishment Period to ensure the healthy establishment and growth of both transplanted trees and all newly established plants.

**Table 10-3 L&V Construction/Post-Construction Phase Audit Checklist
(EP-578/2020)**

Area of Works	Items to be Monitored
Advance planting	Monitoring of implementation and maintenance of planting, and against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Protection of all trees to be retained	Identification and demarcation of trees / vegetation to be retained, erection of physical protection (e.g. fencing), monitoring against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Clearance of existing vegetation	Identification and demarcation of trees / vegetation to be cleared, checking of extent of works to minimise damage, monitoring of adjacent areas against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Transplanting of trees	Identification and demarcation of trees / vegetation to be transplanted, monitoring of extent of pruning / lifting works to minimise damage, timing of operations, implementation of all stages of preparatory and translocation works, and maintenance of transplanted vegetation, etc.
Plant supply	Monitoring of operations relating to the supply of specialist plant material (including the collecting, germination and growth of plants from seed) to ensure that plants will be available in time to be used within the construction works.

Area of Works	Items to be Monitored
Soiling, planting, etc.	Monitoring of implementation and maintenance of soiling and planting works and against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Decorative treatment of site hoarding	Implementation and maintenance of mitigation measures, to ensure compliance with agreed designs.
Architectural design and treatment including visually recessive designs, materials, textures and colours.	Implementation and maintenance of mitigation measures, to ensure compliance with agreed designs.
Establishment Works	Monitoring of implementation of maintenance operations during Establishment Period.

10.4.3 In the event of non-conformity the responsibilities of the relevant parties are detailed in the Event /Action plan provided on **Table 10-4**.

Table 10-4 L&V Event / Action Plan (EP-578/2020)

Action Level	ET Leader	IEC	ER	Contractor
Non-conformity Identified	<ol style="list-style-type: none"> 1. Inform Contractor, IEC and ER 2. Discuss remedial measures with IEC, ER and Contractor 3. Monitor remedial measures until rectification has been completed 	<ol style="list-style-type: none"> 1. Check the Contractor's working method 2. Discuss with ETL and Contractor on possible remedial measures 3. Advise ER on effectiveness of proposed remedial measures. 4. Check implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Ensure remedial measures are properly implemented 	<ol style="list-style-type: none"> 1. Amend working methods 2. Propose remedial measures 3. Rectify non-conformity and undertake any necessary remedial measures.

11 LANDSCAPE AND VISUAL (YUEN LONG BARRAGE SCHEME)

11.1 Introduction

11.1.1 The EIA Report has recommended the EM&A for landscape and visual resources is undertaken during both the construction and operational phases of the Project. The implementation and maintenance of landscape mitigation measures is a key aspect of this and shall be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures. In addition, implementation of the mitigation measures recommended by the EIA shall be monitored through the construction phase site audit programme.

11.2 Baseline Monitoring

11.2.1 Baseline monitoring for the landscape and visual resources shall comprise a one off survey to be conducted prior to commencement of any construction works. The commencement date of baseline monitoring shall be agreed between the ET / IEC / DSD / ER to ensure timely submission of the baseline monitoring report to Environmental Protection Department (EPD) and relevant authorities.

11.2.2 This includes a vegetation survey of the entire site area and within compounds undertaken on an “area” basis. Representative vegetation types shall be identified along with typical species composition. An assessment of landscape character shall be made against which future change can be monitored. The landscape resources and elements of particular concern are to be noted.

11.2.3 A photographic record of the site at the time of the contractor’s possession of the site shall be prepared by the contractor and approved the DSD / ER. The approved photographic record shall be submitted to the DSD, ET, IEC and EPD for record.

11.2.4 The landscape and visual baseline shall be determined with reference to the Landscape Resources and Landscape Character Area maps included in the EIA Reports.

11.3 Monitoring and Audit Requirements

11.3.1 An approved landscape contractor shall be employed by the contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period. The establishment works shall be undertaken throughout the contractor’s one year maintenance period which will be within the first operation year of the Project.

11.3.2 All measures undertaken by both the contractor and the landscape contractor during the construction phase and first year of the operation phase shall be audited by a registered landscape architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. Site inspections should be undertaken at least once every two weeks throughout the construction period and once every two months during the operational phase.

11.3.3 The broad scope of the audit is detailed below. Operation phase auditing will be restricted to the 12-months establishment works of the landscaping proposals, with the DSD taking over the maintenance and monitoring after this period, and thus only the items below concerning this period are relevant to the operation phase:

- The extent of the agreed works areas shall be regularly checked during the construction phase. Any trespass by the contractor outside the limit of works, including and damage to existing trees and woodland all noted and remedial action determined.
- The progress of the engineering works all be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.
- All existing trees and vegetation within the study area which are not directly affected by the works shall be retained and protected.
- The methods of protecting existing vegetation proposed by the contractors shall be acceptable and enforced.
- All landscaping works shall be carried out in accordance with the specifications.
- The planting of trees and shrubs shall be carried out properly and within the right season as far as practical.
- The species and mix of the new trees and shrubs to be planted shall be suitable.
- The newly planted trees, shrubs, aquatics and grasses shall be maintained throughout the establishment period, particularly in respect of the following:
 - Regular watering, weeding and fertilising of all tree, shrub and aquatic planting;
 - Firming up of trees after periods of strong winds;
 - Regular checks for eradication of pests, fungal infection, etc.;
 - Pruning of dead or broken branches; and
 - Prompt replacement of dead plants.

11.4 Monitoring Programme

11.4.1 The design, implementation and maintenance of landscape and visual mitigation measures shall be checked to ensure that any potential conflicts between the proposed landscape measures and any other works for the project would be resolved as early as practical without affecting the implementation of the mitigation measures.

11.4.2 Site inspection and audit shall be undertaken as necessary in the construction and operation phases as per **Table 11-1** below.

Table 11-1 Monitoring Programme for Landscape and Visual (EP-604/2022)

Stage	Monitoring Task	Monitoring Report	Form of Approval	Frequency
Detailed Design	Checking of design works against the recommendations of the landscape and visual impact assessments within the EIA shall be undertaken during detailed design and tender stage, to ensure that they fulfil the intention of the mitigation measures. Any changes to the design, including design changes on site shall also be checked.	Report by detailed design engineer / ER confirming that the design conforms to requirements of EP	Approved by DSD or EPD as appropriate	At the end of the Detailed Design Phase
Construction	Checking of the contractor's operations during the construction period.	Report on Contractor's compliance, by ET	Counter signature of report by IEC, ER	Weekly
Establishment Works	Checking of the planting works during the twelve-month Establishment Period after completion of the construction works.	Report on Contractor's compliance, by ET	Counter signature of report by IEC, ER	Every two months
Long Term Management (10 year)	Monitoring of the long-term management of the planting works in the period up to 10 years after completion of the construction works.	Report on Compliance by ET or Maintenance Agency as appropriate	Counter signature of report by Management Agency	Annually

Construction Phase and Establishment Period

11.4.3 An implementation programme will be prepared as required by EIAO-TM. Reference will be made to the DEVB TC(W) No. 6/2015 on Maintenance of Vegetation and Hard Landscape Features which defines the management and maintenance responsibilities for natural vegetation and landscape works, including both soft works and hard works, and authorities for tree preservation and felling. The format of the preliminary arrangement of implementation programme is listed in **Table 11-2** below.

Table 11-2 Preliminary Funding, Implementation, Management and Maintenance Proposal

Landscape and Visual Mitigation Measure ID No.	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
<i>Construction Phase</i>				
CM1 – CM9	Contractor	Contractor	-	-
<i>Operation Phase</i>				
OM1, OM2, OM5, OM6, OM7, OM8, OM10	DSD	DSD	DSD	DSD
OM3 – OM4	DSD	DSD	HAD / HyD / LCSD	HAD / HyD / LCSD
OM9	DSD	DSD	DSD / HAD / LCSD	DSD / HAD / LCSD

11.4.4 The implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period must be supervised by a qualified Landscape Resident Site Staff (Registered Landscape Architect or Professional Member of the Hong Kong Institute of Landscape Architects).

11.4.5 Measures to mitigate landscape and visual impacts during construction shall be checked and monitored by a Registered Landscape Architect to ensure compliance with the intended aims of the measures.

11.4.6 The progress of the engineering works shall be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.

11.4.7 The planting works shall be monitored during the first 10 years of the operation phase of the project. Any areas of vegetation which fails to establish, shall be corrected by the relevant management and maintenance parties at the earliest opportunity. The maintenance requirement of the planting works stated under the Ten-Year Management Programme is included in the monitoring requirement.

11.5 Event and Action Plan

11.5.1 Should non-compliance of the landscape and visual impacts occur, actions in accordance with the Event and Action Plan stated in **Table 11-3** below shall be carried out.

Table 11-3 Event and Action Plan for Landscape and Visual

Action Level	Action			
	ET	IEC	ER	Contractor
Design Check	<ul style="list-style-type: none"> • Check final design conforms to the requirements of EP and prepare report 	<ul style="list-style-type: none"> • Check report. • Recommend remedial design if necessary 	<ul style="list-style-type: none"> • Undertake remedial design if necessary 	<ul style="list-style-type: none"> • --
Non-conformity on one occasion	<ul style="list-style-type: none"> • Identify source • Inform IEC and DSD / ER • Discuss remedial actions with IEC, DSD / ER and Contractor • Monitor remedial actions until rectification has been completed 	<ul style="list-style-type: none"> • Check report • Check Contractor's working method • Discuss with ET and Contractor on possible remedial measures • Advise DSD / ER on effectiveness of proposed remedial measures • Check implementation of remedial measures 	<ul style="list-style-type: none"> • Notify Contractor • Ensure remedial measures are properly implemented 	<ul style="list-style-type: none"> • Amend working methods to prevent recurrence of non-conformity • Propose remedial measures • Rectify damage and undertake additional action necessary
Repeated Non-conformity	<ul style="list-style-type: none"> • Identify source • Inform IEC and DSD / ER • Increase monitoring frequency • Discuss remedial actions with IEC, DSD / ER and Contractor • Monitor remedial actions until rectification has been completed • If non-conformity stops, cease additional monitoring. 	<ul style="list-style-type: none"> • Check monitoring report • Check Contractor's working method • Discuss with ET and Contractor on possible remedial measures • Advise DSD / ER on effectiveness of proposed remedial measures • Supervise implementation of remedial measures 	<ul style="list-style-type: none"> • Notify Contractor • Ensure remedial measures are properly implemented 	<ul style="list-style-type: none"> • Amend working methods to prevent recurrence of non-conformity • Rectify damage and undertake additional action necessary

11.6 Mitigation Measures

11.6.1 The mitigation measures recommended for landscape and visual impact are summarised in **Annex A-2**.

12 CONSTRUCTION SITE AUDIT

12.1 Site Inspection

- 12.1.1 Site inspection should be undertaken regularly in order to inspect the construction activities and ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.
- 12.1.2 The ET Leader should be responsible for formulating the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. The ET Leader should submit a proposal on the site inspection, deficiency and action reporting procedures to the Contractor for agreement and to the IEC and ER for approval.
- 12.1.3 Regular site inspections should be carried out at least once per week. The areas of inspection should not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situation outside the works area which is likely to be affected, directly or indirectly. The ET Leader should make reference to the following information in conducting the inspection:
- a) Recommendations in the EIA study on environmental protection and pollution control mitigation measures;
 - b) On-going result of the EM&A programme;
 - c) Works progress and programme;
 - d) Individual works methodology proposals (which should include proposal on associated pollution control measures);
 - e) The contract specifications on environmental protection;
 - f) Relevant environmental protection and pollution control laws; and
 - g) Previous site inspection results.
- 12.1.4 The Contractor should update the ET Leader with all relevant information of the construction contract for the ET Leader to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works should be submitted to the ER, Contractor and IEC within 24 hours, for reference and for taking immediate action. The Contractor should follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the ET Leader to report on any remedial measures subsequent to the site inspections.
- 12.1.5 The ET shall 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 EM&A programme.

12.2 Compliance with Legal & Contractual Requirement

- 12.2.1 There are statutory requirements on environmental protection and pollution control requirements with which construction of the proposed works must comply.
- 12.2.2 In order to ensure that all construction site works are in compliance with the environmental requirements, all the works method statements submitted by the Contractor to the ER for approval should be sent to the ET Leader for vetting.
- 12.2.3 The ET Leader should also review the progress and programme of the construction works in order to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.
- 12.2.4 The Contractor should provide the update of the relevant documents of the proposed works to the ET Leader so that checking can be carried out. The document should include but not limited to the Work Progress Reports, updated Works Programme, and application letters for different licences / permits under the environmental protection laws, and copies of all the valid licences / permits held at that time. The site diary and environmental records shall also be available for inspection by the relevant parties.
- 12.2.5 After the document review, the ET Leader should advise the ER, Contractor and IEC of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for their follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements, the ET Leader also advise the Contractor and the ER accordingly.
- 12.2.6 Upon receipt of the advice, the Contractor should undertake immediate actions to correct 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.

12.3 Environmental Complaints

24-hour Dedicated Hotline for Public Complaints and Enquiries

- 12.3.1 The Contractor should set up a 24-hour hotline dedicated to the Project to receive and respond to complaints or enquires from the public, media, and community groups in the vicinity of the site throughout the construction period of the Project. The Contractor should display conspicuously the telephone number of the 24-hour hotline on the construction site(s) at all vehicular site entrances / exits or at a convenient location for public information at all times.

Environmental Complaints

12.3.2 Complaints should be referred to the ET Leader for carrying out complaint investigation procedures. The ET Leader should undertake the following procedures upon receipt of any complaint:

- 1) Log complaint and date of receipt onto the complaint database and inform the Contractor, ER, DSD and IEC immediately;
- 2) Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- 3) Identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;
- 4) Advise the Contractor accordingly if mitigation measures are required;
- 5) Review the Contractor's response on the identified mitigation measures, and the updated situation;
- 6) If the complaint is transferred from other sources (e.g. ER, DSD or EPD), submit interim report after endorsement by IEC on status of the complaint investigation and follow-up action within the agreed time frame;
- 7) Undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
- 8) Report the investigation results and the subsequent actions to the complainant (If the source of complaint is from other sources, the results should be reported within the agreed time frame); and
- 9) Record the complaint, investigation, subsequent actions and results in the monthly EM&A reports.

12.3.3 During the complaint investigation work, the Contractor and ER should cooperate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor should promptly carry out the mitigation. The ER should ensure that the measures have been carried out by the Contractor.

12.3.4 A sample Complaint Log is provided in **Annex C**.

13 REPORTING

13.1 General

13.1.1 EM&A reports can be provided in an electronic medium upon agreement with DSD and EPD on the format. The monitoring data (baseline and impact) should also be made available through an internet website that is agreed with relevant authority.

13.1.2 The ET Leader should prepare and submit the following reports:

- Baseline Monitoring Report;
- Monthly EM&A Reports;
- Quarterly EM&A Summary Reports; and
- Final EM&A Review Report

13.1.3 In accordance with Annex 21 of the EIAO-TM, the monthly EM&A reports, quarterly EM&A summary reports and final review EM&A report should be made available to the Director of Environmental Protection (DEP).

13.2 Baseline Monitoring Report

13.2.1 The ET should prepare and submit a Baseline Monitoring Report no less than two (2) weeks before commencement of the works for the Project. The baseline monitoring report should be prepared and certified by the ET leader and verified by the IEC before submission to EPD. Copies of the Baseline Monitoring Report should be submitted to the Contractor(s), the IEC, ER, DSD and EPD as appropriate. The ET should liaise with the relevant parties to confirm the exact number of copies required.

13.2.2 The Baseline Monitoring Report for the construction phase should include the following as a minimum:

1. Up to half a page executive summary;
2. Brief project background information;
3. Drawings showing locations of the baseline monitoring stations;
4. Monitoring results (in both hard and diskette copies) together with the following information:
 - a) monitoring methodology;
 - b) name of laboratory and types of equipment used and calibration details;
 - c) parameters monitored;
 - d) monitoring locations (and depth if applicable);
 - e) monitoring date, time, frequency and duration; and
 - f) QA/QC results and detection limits
5. Details on influencing factors, including:
 - a) major activities, if any, being carried out on the site during the period;
 - b) weather conditions during the period; and
 - c) other factors which might affect the results.

6. Determination of the A/L Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the monitored parameters;
7. Revisions for inclusion in the EM&A Manual; and
8. Comments, recommendations and conclusions.

13.3 Monthly EM&A Reports

13.3.1 The results and findings of the construction phase EM&A work required in this Manual will be recorded in the Monthly EM&A Reports. The Monthly EM&A Report should be prepared and submitted within ten (10) working days of the end of each reporting month and should be prepared and certified by the ET leader and verified by the IEC before submission to EPD. The Monthly EM&A Report should be submitted to the Contractor(s), the IEC, ER, DSD and the EPD, as well as to other relevant departments as required. Before submission of the first Monthly EM&A Report, the ET should liaise with the parties on the exact number of copies and format of the reports in both hard copy and electronic medium.

13.3.2 The ET Leader should review the number and location of monitoring stations and parameters every six months, or on as needed basis, to cater for any changes in the surrounding environment and the nature of works in progress.

13.3.3 Contents of First Monthly EM&A Report should at least include the following:

- 1) Executive summary (1-2 pages), comprising:
 - a. breaches of AL levels;
 - b. complaint Log;
 - c. notifications of any summons and successful prosecutions;
 - d. reporting changes; and
 - e. forecast of impact predictions.
- 2) Basic project information including a synopsis of the project organisation, programme and management structure.
- 3) Environmental Status, comprising:
 - a. works undertaken during the month with illustrations; and
 - b. drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- 4) A brief summary of EM&A requirements including:
 - a. monitoring parameters;
 - b. environmental quality performance limits (A/L levels);
 - c. EAPs;
 - d. environmental mitigation measures, as recommended in the EIA Report; and
 - e. environmental requirements in contract documents.
- 5) Advice on the implementation of environmental protection, mitigation and pollution control measures as recommended in the EIA Report and summarised in the updated implementation schedule.

- 6) Monitoring results (in both hard and diskette copies) together with the following information;
 - a. monitoring methodology;
 - b. name of laboratory and equipment used and calibration details;
 - c. parameters monitored;
 - d. monitoring locations (and depth); and
 - e. monitoring date, time, frequency, and duration;
- 7) Graphical plots of trends of monitored parameters for representative monitoring stations annotated against the following:
 - a. major activities being carried out on site during the period;
 - b. weather conditions during the period; and
 - c. any other factors which might affect the monitoring results
- 8) Advice on the solid and liquid wastes management.
- 9) A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels).
- 10) A review of the reasons for and the implications of non-compliance including a review of pollution sources and working procedures.
- 11) A description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- 12) A summary record of complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints.
- 13) A summary record of notifications of summons, successful prosecutions for breaches of environmental protection/pollution control legislation and actions to rectify such breaches.
- 14) A forecast of the works programme, impact predictions and monitoring schedule for the next one month; and
- 15) Comments, recommendations and conclusions for the monitoring period.

13.3.4 Contents of the Subsequent Monthly EM&A Reports shall at least include the following:

- 1) Executive summary (1-2 pages), including:
 - a. breaches of A/L levels;
 - b. complaint log;
 - c. notifications of any summons and successful prosecutions;
 - d. reporting changes; and
 - e. forecast of impact predictions.

- 2) Environmental status, comprising:
 - a. drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
 - b. summary of non-compliance with the environmental quality performance limits; and
 - c. summary of complaints.
- 3) Environmental issues and actions, comprising:
 - a. review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies);
 - b. description of the actions taken in the event of non-compliance and deficiency reporting;
 - c. recommendations (should be specific and target the appropriate party for action); and
 - d. implementation status of the mitigation measures and the corresponding effectiveness of the measures.
- 4) Appendices, including:
 - a. A/L levels;
 - b. graphical plots of trends of monitored parameters at key stations over the past reporting month for representative monitoring stations annotated against the following: 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;
 - c. monitoring schedule for the present and next reporting period;
 - d. cumulative complaints statistics; and
 - e. details of complaints, outstanding issues and deficiencies.

13.4 Quarterly EM&A Summary Reports

13.4.1 The ET Leader should submit Quarterly EM&A Summary Reports for the construction phase EM&A works only. The Quarterly EM&A Summary Reports should be prepared and certified by the ET leader and verified by the IEC before submission to EPD. The Quarterly EM&A Summary Reports should be submitted to the Contractor(s), the IEC, ER, DSD and the EPD, as well as to other relevant departments as required. These reports should contain at least the following information:

1. Executive summary (up to half a page)
2. Basic project information including a synopsis of the Project organisation, programme, contacts of key management, compliance with EP condition (status of submission) and a synopsis of work undertaken during the quarter.
3. A brief summary of EM&A requirements including:
 - a) monitoring parameters;
 - b) environmental quality performance limits (A/L levels); and
 - c) environmental mitigation measures, as recommended in the EIA Report.

4. Advice on the implementation of environmental protection and pollution control/mitigation measures as recommended in the EIA Report and summarised in the updated Implementation Schedule.
5. Drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
6. 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:
 - a) the major activities being carried out on site during the period;
 - b) weather conditions during the period; and
 - c) any other factors which might affect the monitoring results.
7. Advice on the solid and liquid wastes management.
8. A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels).
9. An Impact Prediction Review will be prepared to compare project predictions with actual impacts for the purpose of assessing the accuracy of predictions on the EIA study. The review will focus on the comparison between the EIA study prediction with the EM&A monitoring results. If any excessive variation was found, a summary of investigation and follow up procedure taken should be addressed accordingly.
10. A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures.
11. A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance.
12. A summarised record of complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken.
13. Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter.
14. Proponents' contacts for the public to make enquiries.

13.5 Final EM&A Review Report

13.5.1 A Final EM&A Review Report should be prepared by the ET at the end of the construction phase. The Final EM&A Review Report should be prepared and certified by the ET leader and verified by the IEC before submission to EPD. The Final EM&A Review Report should be submitted to the Contractor(s), the IEC, ER, DSD and the EPD, as well as to other relevant departments as required. The Final EM&A Review Reports should contain at least the following information:

1. Executive Summary (1-2 pages);
2. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
3. Basic project information including a synopsis of the project organization, contacts for key management staff and a synopsis of work undertaken during the course of the Project;
4. A brief summary of EM&A requirements including:
 - a) environmental mitigation measures as recommended in the EIA Reports;
 - b) environmental impact hypotheses tested;
 - c) environmental quality performance limits (A/L Levels);
 - d) monitoring parameters; and
 - e) Event and Action Plan
5. A summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA Reports and summarised in the updated Implementation Schedule;
6. Graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project including the post-project monitoring for monitoring stations annotated against the following:
 - a) the major activities being carried out on site during the period;
 - b) weather conditions during the period; and
 - c) any other factors which might affect the monitoring results;
7. A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels);
8. A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
9. A description of the actions taken in the event of non-compliance;
10. A summary record of complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

11. A summary record of notifications of summonses 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;
12. A comparison of the EM&A data with the EIA predictions with annotations and explanations for any discrepancies, including a review of the validity of EIA predictions and identification of shortcomings in the EIA recommendations;
13. A review of the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness, including cost effectiveness;
14. A review of the success of the EM&A programme, including a review of the effectiveness and efficiency of the mitigation measures, and recommendations for any improvements in the EM&A programme;
15. A clear cut statement on the environmental acceptability of the project with reference to specific impact hypotheses and a conclusion to state the return to ambient and/or the predicted scenario as the EIA findings.

13.6 Data Keeping

- 13.6.1 Though documents including the field monitoring records, laboratory analysis records, and site inspection forms are not required to be included in the EM&A Reports for submission, they should be kept by the ET Leader and ready for inspection upon request. Relevant information should be clearly and systematically recorded in the documents.
- 13.6.2 Monitoring data should be recorded in magnetic media, and the software copy should be available upon request. The documents and data should be kept for at least one year after the completion of the construction phase EM&A works.

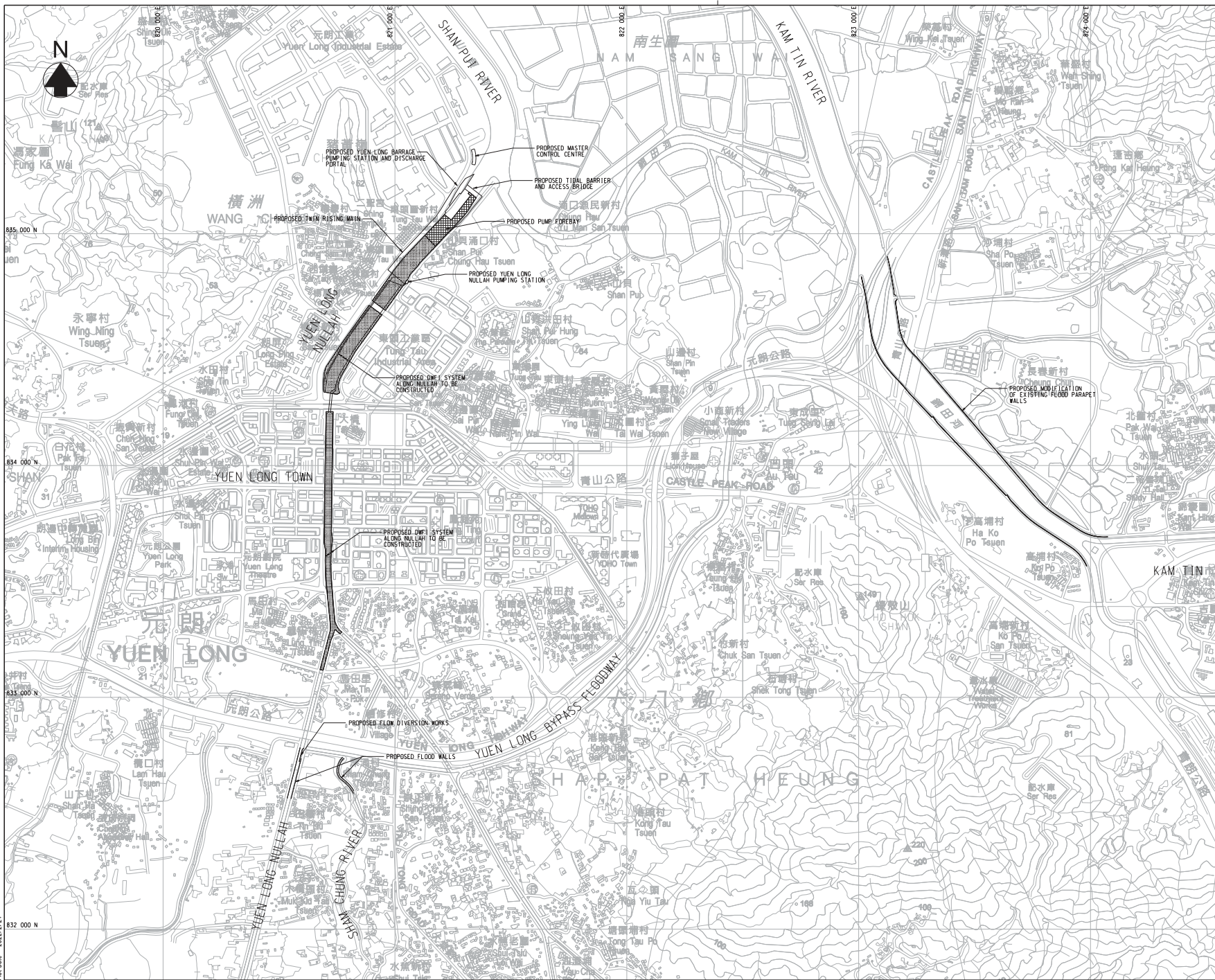
13.7 Electronic Reporting of EM&A Information

- 13.7.1 To enable the public inspection of the Baseline Monitoring Report and Monthly EM&A Reports via the EIAO Internet Website and at the EIAO Register Office, electronic copies of Monthly EM&A Reports should be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF, version 4.0 or later), unless otherwise agreed by EPD and should be submitted at the same time as the hard copies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EM&A Reports should be included in the beginning of the document. Hyperlinks to figures, drawings and tables in the EM&A Reports should be provided in the main text where the respective references are made. Graphics in the reports should be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of the Monthly EM&A Reports must be the same as the hard copies.
- 13.7.2 The environmental monitoring data should be made available to the public via the EIAO Internet Website and the EIAO Register Office.
- 13.7.3 The internet website as described above will enable user-friendly public access to the monitoring data and with features capable of:
- providing access to environmental monitoring data collected since the commencement of works;
 - searching by data;
 - searching by types of monitoring data;
 - hyperlinks to relevant monitoring data after searching; and
 - or otherwise as agreed by EPD.

13.8 Interim Notification of Environmental Quality Limit Exceedances

- 13.8.1 With reference to EAPs, when the environmental quality limits are exceeded, the ET should notify the IEC, Contractor(s), ER, DSD and EPD as appropriate within 24 hours of the identification of the exceedance. The notification should be followed up with each party on the results of the investigation, proposed remediation action and success of the action taken, with any necessary follow-up proposals. A sample form can be found in **Annex D**.

FIGURES



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- NOTES:**
1. ALL LEVELS ARE IN METRES ABOVE HONG KONG PRINCIPAL DATUM.
 2. ALL DIMENSIONS ARE IN METRES.
 3. GRID LINES ARE HONG KONG GRID 1980.

- LEGEND:**
- PROPOSED NULLAH MODIFICATION WORKS
 - PROPOSED PUMP FOREBAY

02/22	ISSUE FOR TENDER	SC
Initial	Designed	Checked
YSW	CHT	SZ
Date	NOV2021	NOV2021
NOV2021	NOV2021	NOV2021

Contract no. **DC2022/03**

YUEN LONG BARRAGE AND NULLAH IMPROVEMENT SCHEMES

Drawing title
**Figure 1.1
LOCATION PLAN**

Drawing no. **400171/B/GN/01001**

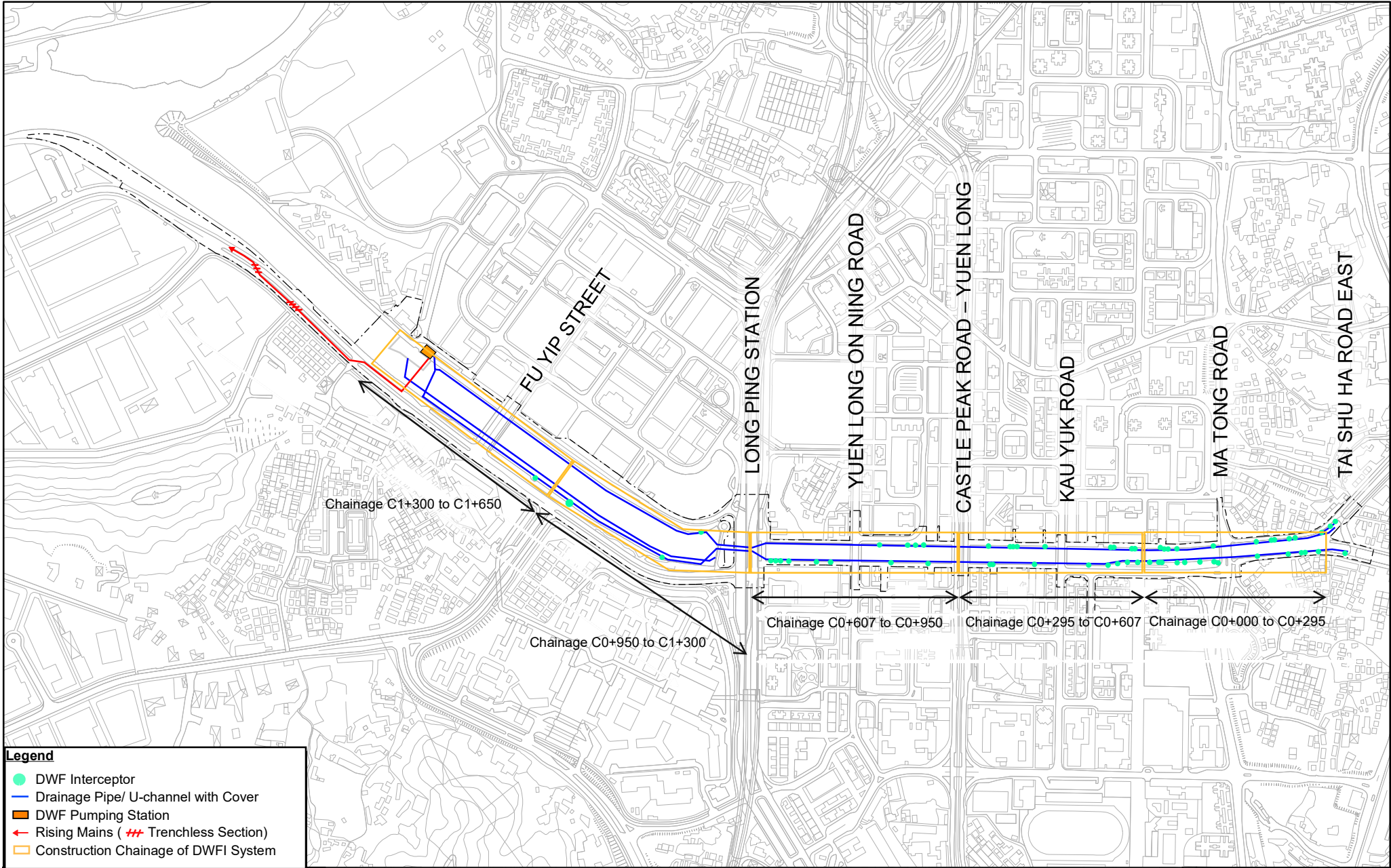
Scale
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A3 1:15000

香港特別行政區政府渠務署
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

binnes
BINNES HONG KONG LIMITED
賓尼新工程顧問有限公司

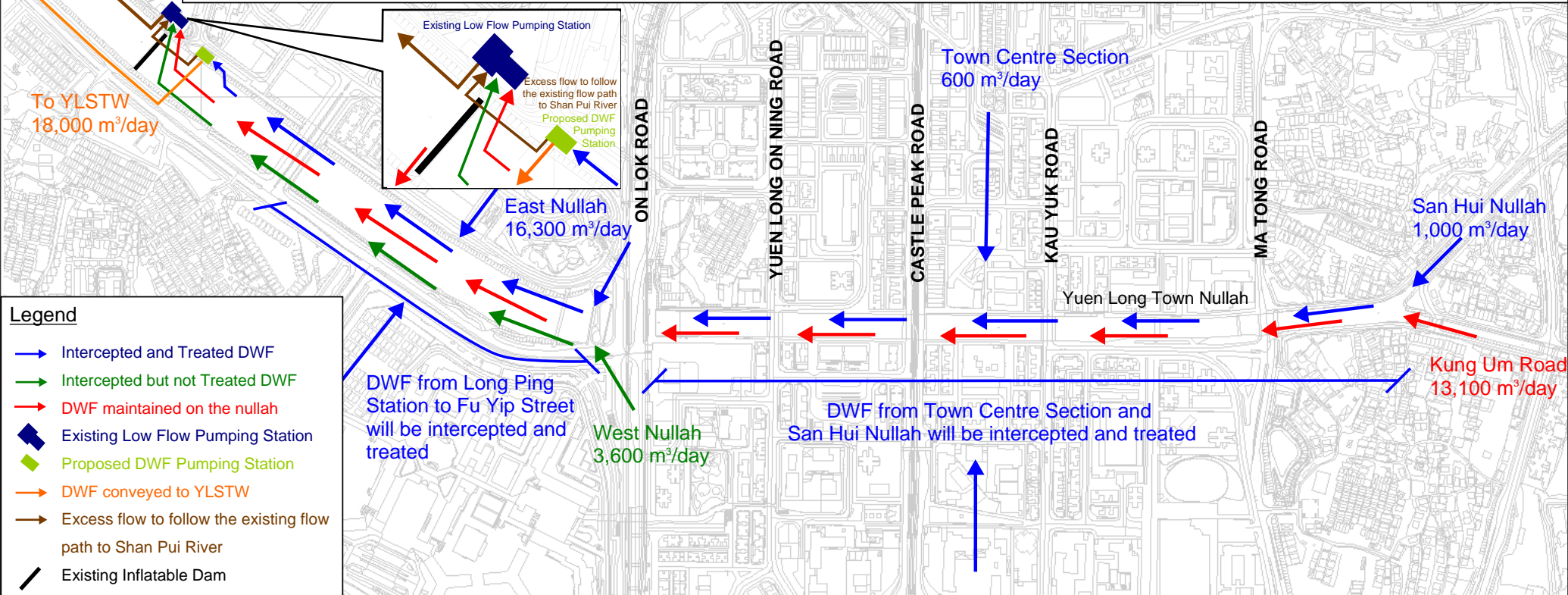
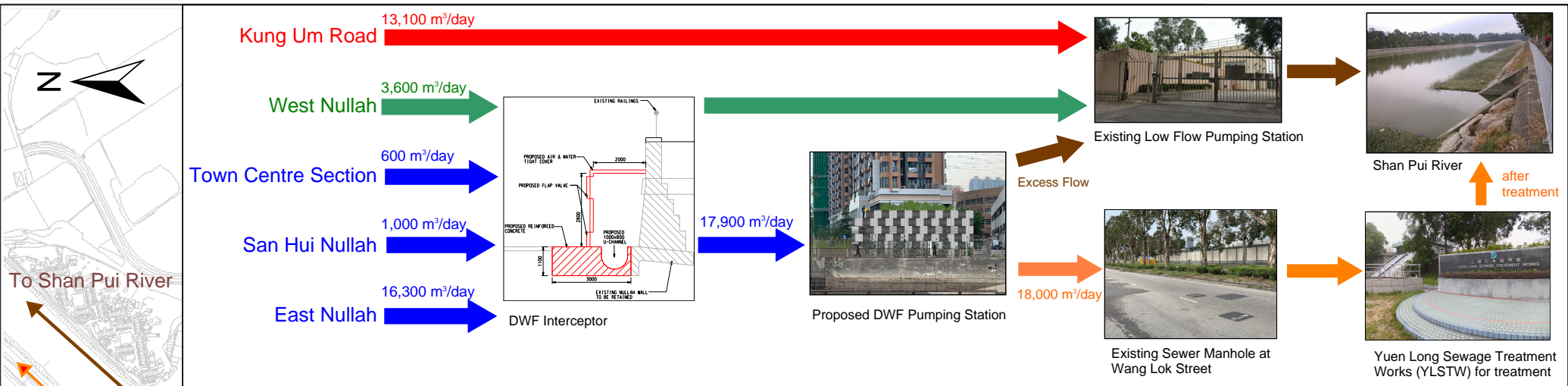
Plot Date - 2022/2/24

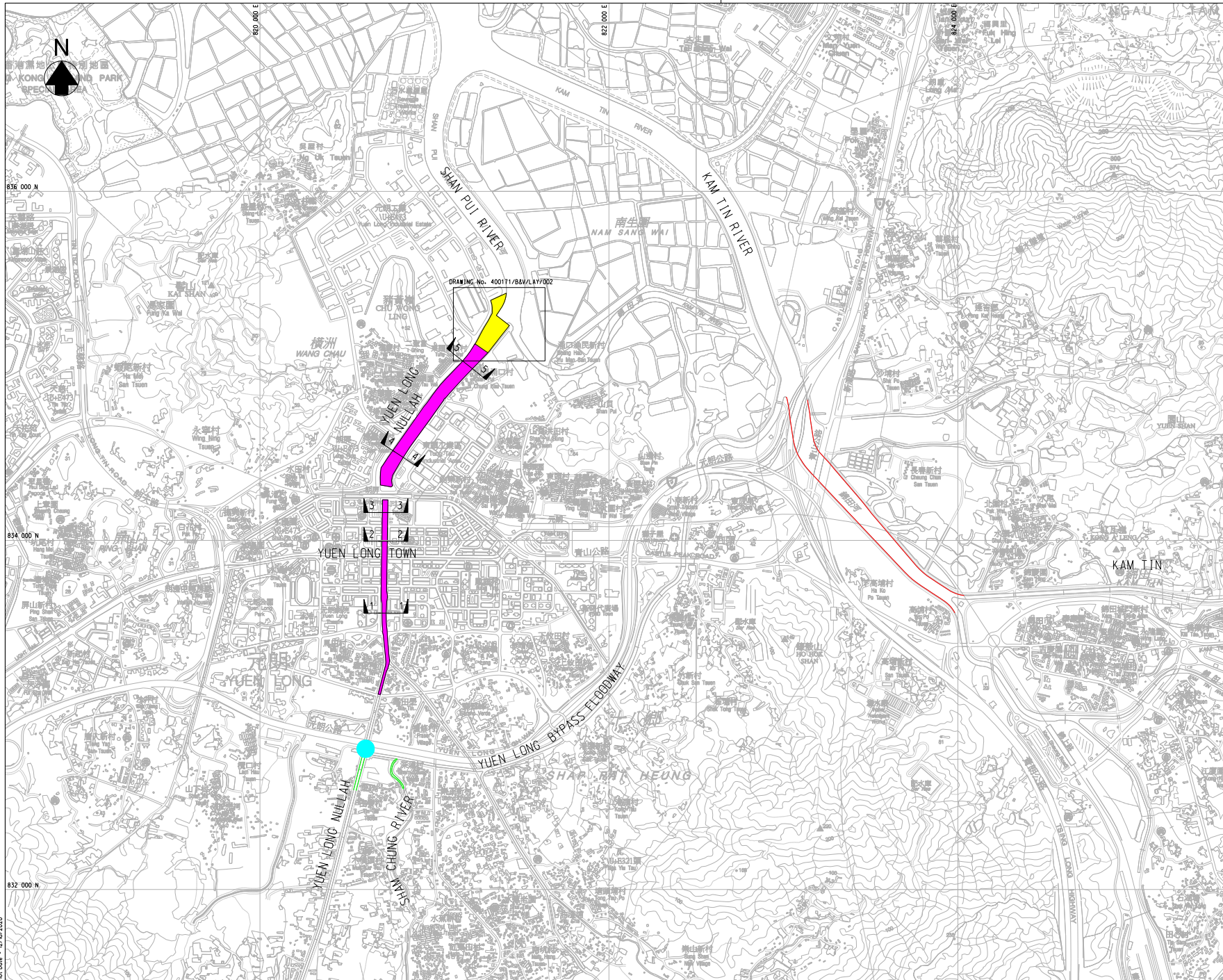
CAD Filename - Y:\Daily Work\02 From other HK Projects\400171\NGN\400171-B-GN-01001.dgn



- Legend**
- DWF Interceptor
 - Drainage Pipe/ U-channel with Cover
 - DWF Pumping Station
 - ← Rising Mains (## Trenchless Section)
 - Construction Chainage of DWFI System

DRAWING NO.	Figure 1.2		REVISION
SCALE:	NOT TO SCALE		DATE:
DESIGNED		CHECKED	





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NOTE:

1. REFER TO DRAWING NO. 400171/BAV/LAY/501 & 502 FOR SECTIONS OF REVITALIZATION WORKS IN YUEN LONG MULLAH

LEGEND:

- CONSTRUCTION OF BARRAGE
- REVITALIZATION OF EXISTING MULLAH
- CONSTRUCTION OF PARAPET WALLS
- MODIFICATION OF EXISTING PARAPET WALLS
- PROPOSED DRAINAGE WORKS

Revision	Date	Description	Initial		
		Designed	Checked	Drawn	Checked
Initial		SNG	CKW	SZ	CKW
Date	FEB2020	FEB2020	FEB2020	FEB2020	FEB2020
Approved					

Contract no. **CE 932017 (DS)**

Contract title
YUEN LONG BARRAGE SCHEME - INVESTIGATION, DESIGN AND CONSTRUCTION

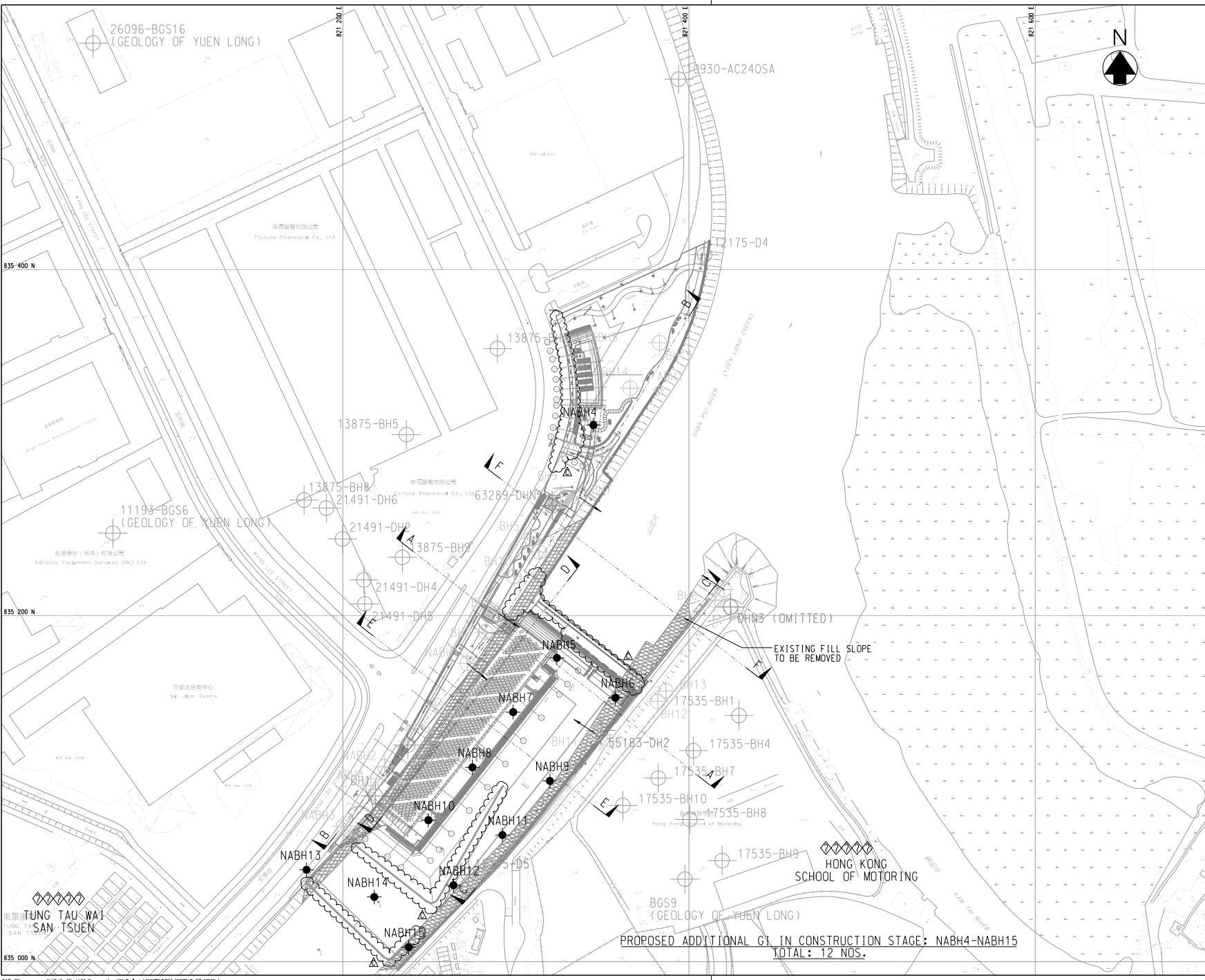
Drawing title
LOCATION PLAN

Drawing no. **FIGURE 1.4** Revision **-**

Scale **A3 1 : 20 000**

香港特別行政區政府渠務署
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION DRAINAGE SERVICES DEPARTMENT

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博達工程顧問有限公司



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- LEGEND:**
- EXISTING BOREHOLES
 - INCLINED BOREHOLES
 - PROPOSED NEW ADDITIONAL BOREHOLES IN CONSTRUCTION STAGE
 - PROPOSED RETAINING WALL
 - FILL SLOPE TO BE REMOVED
 - PROPOSED PUMPING FOREBAY PILE CAP
 - BACKFILL

C	05/22	TENDER ADDENDUM NO.3	SC
B	04/22	TENDER ADDENDUM NO.2	SC
A	03/22	TENDER ADDENDUM NO.1	SC
-	02/22	ISSUE FOR TENDER	SC
Revision	Date	Description	Initial
	Designed	Checked	Drawn
Initial	TA	LKM	SZ
Date	JAN2022	JAN2022	JAN2022
Approved			

Contract no. DC/2022/03

Contract title
YUEN LONG BARRAGE AND NULLAH IMPROVEMENT SCHEMES

Drawing title
SITE SPECIFIC GROUND INVESTIGATION LAYOUT & PROPOSED ADDITIONAL G1 IN CONSTRUCTION STAGE

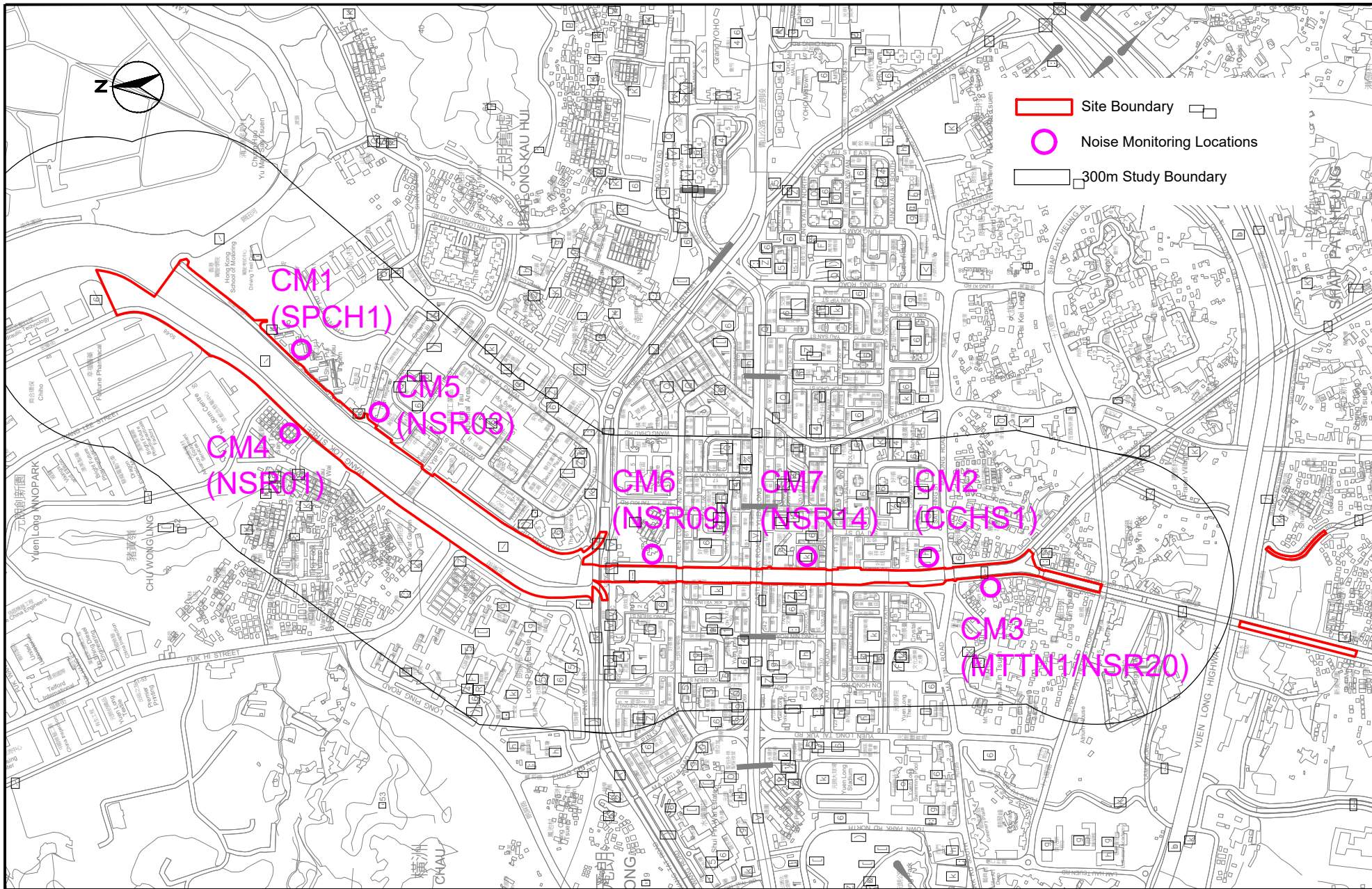
Drawing no. Figure 1.5

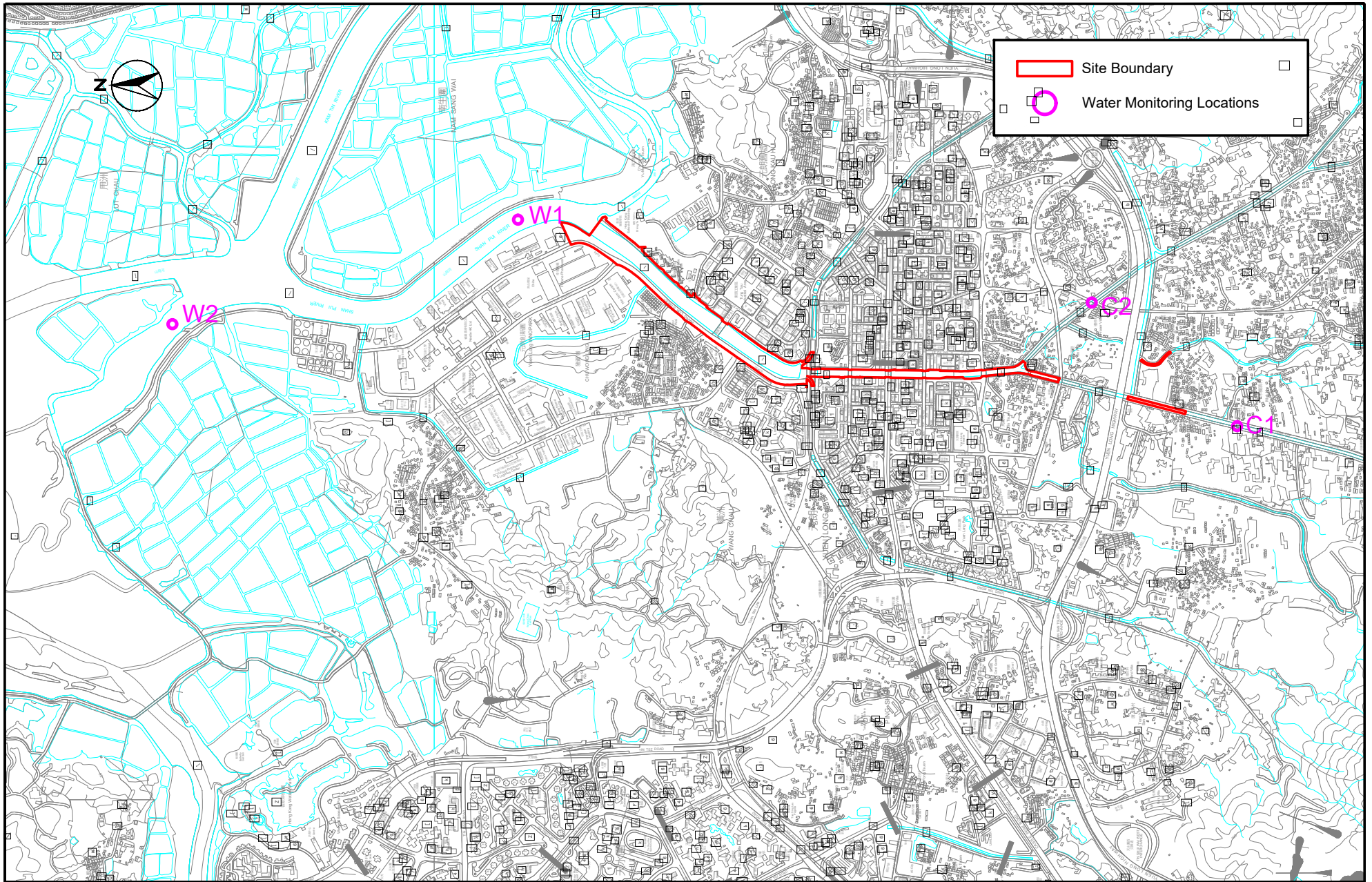
Scale A1 1 : 1000 A3 1 : 2000

香港特別行政區政府渠務署
THE GOVERNMENT OF THE SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

binnies
BINNIES HONG KONG LIMITED
賓尼士工程顧問有限公司

PROPOSED ADDITIONAL G1 IN CONSTRUCTION STAGE: NABH4-NABH15
TOTAL: 12 NOS.





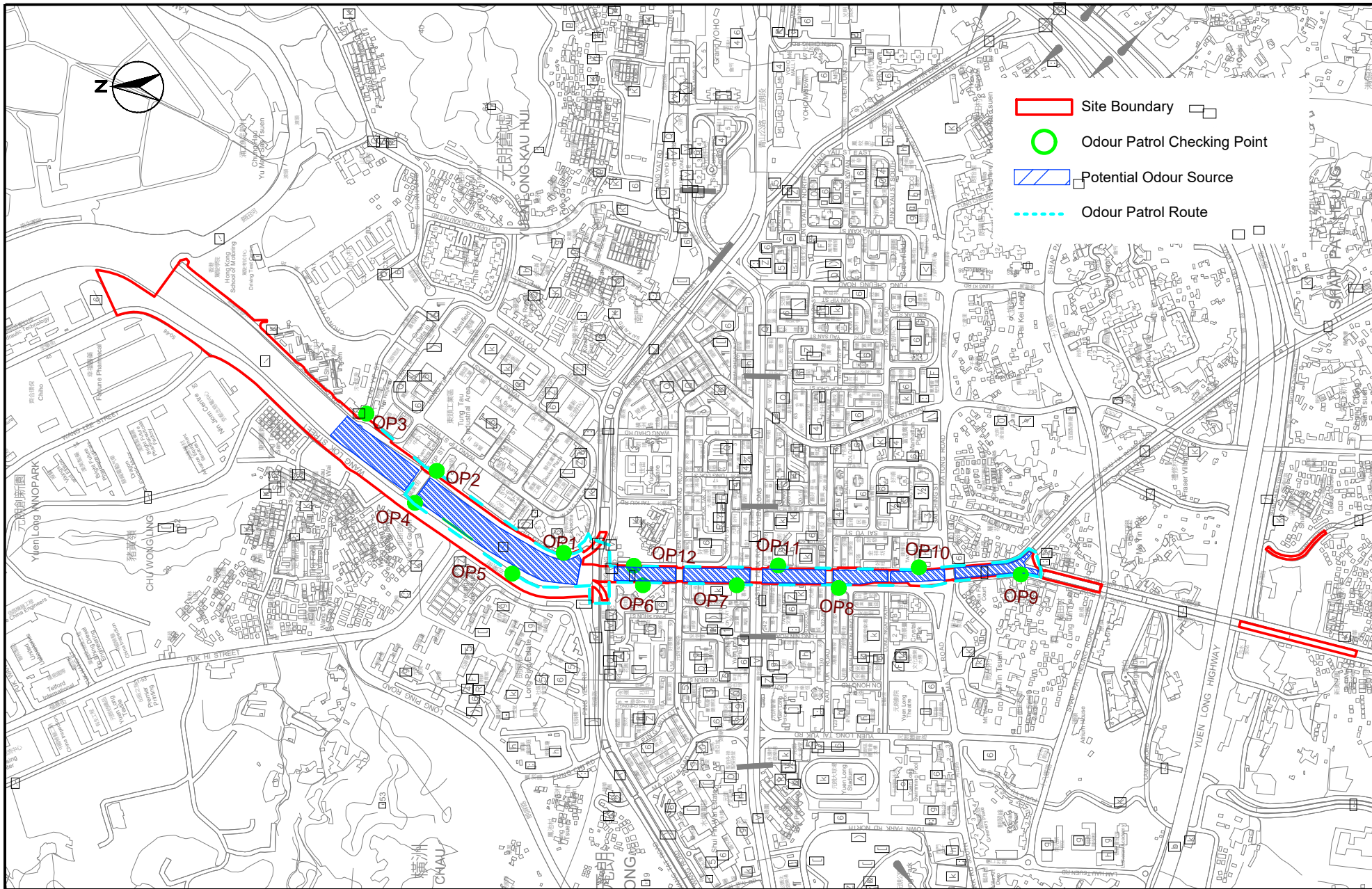
Contract No. DC/2022/03

Yuen Long Barrage and Nullah Improvement Schemes

Proposed Water Quality Monitoring Locations



SCALE	1:16000 @ A3	DATE	Sep 2023
CHECK	BC	DRAWN	WY
JOB No.	MA23101	DRAWING No.	3
		REV	-

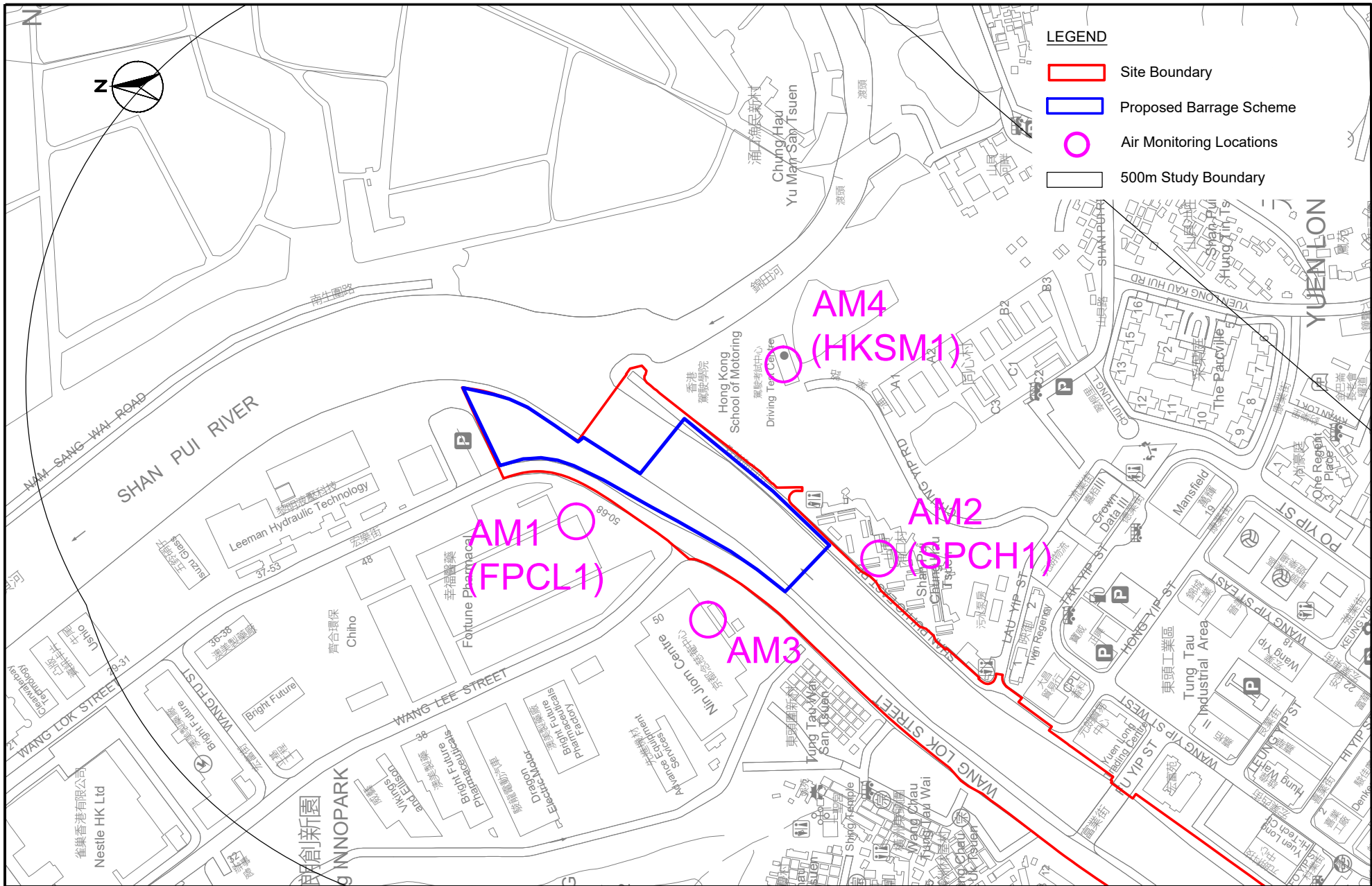


- Site Boundary
- Odour Patrol Checking Point
- Potential Odour Source
- Odour Patrol Route



Contract No. DC/2022/03
Yuen Long Barrage and Nullah Improvement Schemes
Proposed Odour Patrol Route

SCALE	1:8000 @ A3	DATE	Sep 2023
CHECK	BC	DRAWN	CF
JOB No.	MA23101	DRAWING No.	4
		REV	-



SCALE	1:4000 @ A3	DATE	Oct 2023
CHECK	BC	DRAWN	WY
JOB No.	MA23101	DRAWING No.	5
		REV	-

**ANNEX A-1
IMPLEMENTATION SCHEDULE OF
IMPROVEMENT TO YUEN LONG
NULLAH**

Improvement to Yuen Long Town Nullah

Annex A-1 Implementation Schedule of Environmental Protection Measures for the Project

EIA &EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
1. Air Quality Measures								
S4.8	<p>Relevant dust control measures stipulated in the <i>Air Pollution Control (Construction Dust) Regulation</i>, and good site practices will be incorporated as the Contract Specifications for implementation throughout the construction period. These include:</p> <ul style="list-style-type: none"> • The works area for site clearance and excavation should be sprayed with water before, during and after the operation so as to maintain the entire surface wet. • Restricting heights from which materials are to be dropped, as far as practicable to reduce the fugitive dust arising from unloading/ loading. • Immediately before leaving a construction site, all vehicles should be washed to remove any dusty materials from the bodies and wheels. However, all spraying of materials and surfaces should avoid excessive water usage. • Where a vehicle leaving a construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials will not leak from the vehicle. • Erection of hoarding along the site boundary, where appropriate. • Any stockpile of dusty materials should be covered entirely by impervious sheeting; and/or placed in an area sheltered on the top and three sides. • All dusty materials should be sprayed with water immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • Reduce the traffic induced dust dispersion and re-suspension, the travelling speed of vehicles within the site should be controlled. • Regular maintenance of construction equipment deployed on-site will be 	Whole Site	Contractor(s)		✓			Air Pollution Control (Construction Dust) Regulation

(1) Unless otherwise stated, the reference refers to the relevant section of the EIA Report.

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	conducted to prevent black smoke emission.							
S4.8	Excavated nullah bed materials that are placed on trucks for disposal should be properly covered with tarpaulin sheets during transportation to minimise the release of any potential odour. The odorous excavated material should be placed as far away from the sensitive receivers as possible. Odorous river bed material excavated during construction phase should be removed off-site as soon as practicable within 24 hours to avoid any odour nuisance.	Whole Site	Contractor(s)		✓		✓	-
S4.8	During operation phase, mitigation measures are considered necessary when materials generated from the maintenance works are found to be odorous, and the following measures should be implemented by the Contractor. <ul style="list-style-type: none"> Temporarily stockpile odorous material as far away from ASRs as possible; and Temporary stockpiles of odorous material will be properly covered with tarpaulin and should be removed off-site as soon as practically possible within 24 hours to avoid any odour nuisance arising. 	Whole Site	Contractor(s)				✓	
S4.8	To reduce odour impacts from the DWF pumping station, the following measures should be implemented. <ul style="list-style-type: none"> The DWF pumping station should be enclosed inside building structure and maintained with negative pressure; The DWF pumping station should be equipped with deodourization unit using activated carbon or other equivalent odour removal techniques with odour removal efficiency of 99.5%; The exhaust outlet of the deodourization unit should be located in a direction away from the nearby ASRs, with a view to maximizing the separation distance between the exhaust outlet and the nearest ASR; and Regular maintenance of the deodourization unit should be conducted to ensure its effectiveness. 	DWF pumping station	Contractor(s)				✓	

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
S4.11 of EIA Report, S3.3 and S3.4 of EM&A Manual	Weekly site inspection and monthly odour patrol measurement.	Whole Site	ET & IEC	✓	✓			
2. Noise								
S5.8	<p>The following good site practices should be followed during the construction of the Project:</p> <ul style="list-style-type: none"> • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction phase; • Silencers or mufflers on construction equipment should be utilized where required and should be properly maintained during the construction phase; • Mobile plant, if any, should be sited as far from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities. 	Whole Site	Contractor(s)		✓			-
S5.8	Use quiet PME as far as practicable to mitigate the construction noise impact.	Whole Site	Contractor(s)		✓			-
S5.8	Noise insulating sheet would be adopted for PME such as drill rig. The noise insulating sheet should be deployed such that there would be no opening or gaps on the joints.	Whole Site	Contractor(s)		✓			-

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
S5.8	In view of the close proximity between NSRs and the works areas for construction of DWFI system, fixed temporary noise barriers shall be deployed at the working section as far as practicable. Fixed temporary noise barriers of 3m in height with skid footing should be used and located within a few metres of stationary plant and mobile plant such that the line of sight to the NSR is blocked by the barriers. The length of the barrier should be at least five times greater than its height. The noise barrier material should have a sufficient surface density of at least 7 kg/m ² and have no openings or gaps.	Works Areas for DWFI System	Contractor(s)		✓			A Practical Guide for the Reduction of Noise from Construction Works
S5.8	Scheduling of construction activities with identified grouping of PMEs. Only one group of PME would be operated at any one time for each construction activity for reducing the construction noise impact.	Whole Site	Contractor(s)		✓			-
S5.8	<u>Special arrangement during examination period</u> <ul style="list-style-type: none"> The contractor shall liaise with the school management about the arrangements during examination weeks. PMEs shall not be used at the closest works areas (i.e. Section B1 for NSR14 and Section A3 for NSR18) during the examination period. 	Relevant Works Areas for Construction of DWFI System	Contractor(s)		✓			
S5.8	During operation phase, the following measures shall be implemented as far as practicable to minimise the potential impact: <ul style="list-style-type: none"> Quieter plant should be chosen as far as practical; Include noise levels specification when ordering new plant items; All openings, including louvres for ventilation and machine room doors should be oriented away from the NSRs as far as practicable; Silencers, acoustic louvres or acoustic doors should be used where necessary; 	DWF pumping station	Contractor(s)				✓	

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	and <ul style="list-style-type: none"> Develop and implement a regularly scheduled plant maintenance programme so that plant items are properly operated and serviced. The programme should be implemented by properly trained personnel. 							
S5.7	The specified SWLs presented in Annex 5C-3 of the EIA Report should be included in the tender specification.	DWF pumping station	Contractor(s)				✓	
S5.11 of EIA and S4.4 of EM&A Manual	Weekly noise monitoring at five monitoring stations and weekly site inspection and audit of construction activities.	Whole Site	ET & IEC	✓	✓			Environmental Impact Assessment Ordinance
3. Water Quality								
S6.7	<u>General Construction Site Practice</u> The Contractor should observe and comply with the <i>Water Pollution Control Ordinance</i> and its subsidiary regulations and obtain a discharge license under the Ordinance. The Contractor should carry out the Project works in such a manner as to minimize adverse impacts on the water quality during execution of the works. In particular he should arrange his method of working to minimize the effects on the water quality within and outside the Project Site and on the transport routes. In addition, the management of construction site drainage from the Project will follow guidelines provided in <i>ProPECC PN 1/94</i> .	Excavation Site	Contractor(s)		✓			-
S6.7	<u>Construction Site Runoff and Drainage</u> Proper site management measures should be implemented to control site runoff and drainage, and thereby prevent high sediment loadings from reaching downstream	Whole Site	Contractor(s)		✓			ProPECC PN 1/94 "Construction Site Drainage"

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>sections of the river/stream and adjacent agricultural land, if any. The Contractor should follow the practices, and be responsible for the design, construction, operation and maintenance of all the mitigation measures. The design of the mitigation measures should be submitted by the Contractor to the Engineer for approval. These mitigation measures shall include the following practices to minimize site surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge:</p> <ul style="list-style-type: none"> • Before commencing any work, all sewer and drainage connections should be sealed to prevent debris, soil, sand etc. from entering public sewers/drains. • Provision of perimeter channels to intercept storm-runoff from outside the site. These should be constructed in advance of the construction works. • Temporary ditches such as channels, earth bunds or sand bag barriers should be included to facilitate runoff discharge into the stormwater drain, via a sand/silt basin/trap. • Works programme should be designed to minimize works areas at any one time, thus minimizing exposed soil areas and reducing the potential for increased siltation and runoff. • Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove the sand/silt particles from run-off where necessary. These facilities should be properly and regularly cleaned and maintained. These facilities should be carefully planned to ensure that they would be installed at appropriate locations to capture all surface water generated on site. • Careful programming of the works to avoid excavation works during the rainy season. • Temporary access roads (if any) should be protected by crushed gravel and exposed slope surfaces shall be protected when rainstorms are likely; and • Open stockpiles of construction materials on-site should be covered with tarpaulin or similar fabric during rainstorms to prevent erosion. 							

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
S6.7	<p><u>Use of Containment Structures and Diversion Channels</u></p> <p>The use of containment structures and diversion channels is recommended wherever practicable to facilitate a dry or at least confined excavation within the nullah. For example, nullah water should be contained within the works area before the commencement of excavation by the use of sand bag barriers. Water within the contained area should be discharged to the nullah before excavation commences to create the dry conditions. Nullah water should also be diverted from the works area through the use of diversion channel constructed by materials such as concrete blocks. Details of the containment structures and diversion channels should be provided by the Contractor to the Engineer for approval before commencement of construction works for the Project. By limiting or confining the works areas the extent of disturbance to the surrounding water bodies will be significantly reduced, and thus resulting impacts on water quality from sediment re-suspension will be reduced. Furthermore, excavation works in the nullah should be carried out during periods of low flow (dry season from November to March) as far as practicably to reduce impacts on downstream water quality and sensitive receivers. These measures will be implemented to ensure compliance with the <i>Water Pollution Control Ordinance</i> and its subsidiary regulations.</p>	Whole Site	Contractor(s)		✓			-
S6.7	<p><u>Sewage and Wastewater Discharge</u></p> <p>All discharges during the construction phase of the Project are required to comply with the <i>Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-ICW)</i> issued under Section 21 of the WPCO. Domestic sewage/wastewater generated by workforce on-site should be collected in a suitable storage facility such as portable chemical toilets. An adequate number of portable toilets will be provided during the construction phase. These toilets should be maintained in a state that will not deter the workers from using them. The collected sewage/wastewater will be discharged into the foul</p>	Whole Site	Contractor(s)		✓			Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-ICW) issued under Section 21 of the WPCO

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	sewer or transferred to the Government sewage treatment works by a licensed collector.							
S6.7	<p><u>Storage and Handling of Oil, Other Petroleum Products and Chemicals</u></p> <p>The following mitigation measures should be implemented for the storage and handling of oil, other petroleum products and chemicals:</p> <ul style="list-style-type: none"> Waste streams classifiable as chemical wastes should be properly stored, collected and treated for compliance with Waste Disposal Ordinance or Disposal (Chemical Waste) (General) Regulation requirements. All fuel tanks and chemical storage areas should be provided with locks and be sited on paved areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled oil, fuel and chemicals from reaching the receiving waters. Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance. Vehicle and plant servicing areas, vehicle wash bays and lubrication bays should, as far as possible, be located within roofed areas. The drainage in these covered areas should be connected to foul sewers via a petrol interceptor. 	Whole Site	Contractor(s)		✓			Waste Disposal Ordinance or Disposal (Chemical Waste) (General) Regulation
S6.7	<p><u>Handling of Spillage / Leakage</u></p> <p>In the event that accidental spillage or leakage of hazardous substances / chemical wastes occur, the response procedures as listed below should be followed. It should be noted that the procedures below are not exhaustive and the contractor should propose other response procedures in the emergency contingency plan based on the particular types and quantities of chemicals or hazardous substances used, handled and stored on-site.</p> <ul style="list-style-type: none"> Oil leakage or spillage should be contained and cleaned up immediately. Waste 	Whole Site	Contractor(s)		✓			Waste Disposal Ordinance

EIA &EM&A Ref. (1)	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>oil should be collected and stored for recycling or disposal in accordance with the Waste Disposal Ordinance.</p> <ul style="list-style-type: none"> • Instruct untrained personnel to keep at a safe distance well away from the spillage area. • If the spillage / leakage involves highly toxic, volatile or hazardous waste, initiate emergency evacuation and call the emergency service. • Only trained persons equipped with suitable protective clothing and equipment should be allowed to enter and clean up the waste spillage / leakage area. • Where the spillage/ leakage is contained in the enclosed storage area, the waste can be transferred back into suitable containers by suitable handheld equipment, such as hand operated pumps, scoops or shovels. If the spillage / leakage quantity is small, it can be covered and mixed with suitable absorbing materials such as tissue paper, dry soft sand or vermiculite. The resultant slurry should be treated as chemical waste and transferred to suitable containers for disposal. • For spillage / leakage in other areas, immediate action is required to contain the spillage / leakage. Suitable liquid absorbing materials such as tissue paper, dry soft sand or vermiculite should be used to cover the spill. The resultant slurry should be treated as chemical waste and transferred to suitable containers for disposal. • Areas that have been contaminated by chemical waste spillage / leakage should be cleaned. While water is a soluble solvent for aqueous chemical wastes and water soluble organic waste, kerosene or turpentine should be used for organic chemical wastes that are not soluble in water. The waste from the cleanup operation should be treated and disposed of as chemical waste. • In incidents where the spillage / leakage may result in significant contamination of an area or risk of pollution, the EPD should be informed immediately. 							

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
S6.7	<p><u>Maintenance Works</u></p> <p>The following considerations should be included in planning for the maintenance works during operation:</p> <p>(a) Maintenance of the channels should be restricted to annual silt removal when the accumulated silt will adversely affect the hydraulic capacity of the channel, except during emergency situations where flooding risk is imminent. Desilting should be carried out by hand or light machinery during the dry season when water flow is low.</p> <p>(b) Vegetation removal should be limited to manual cutting to be carried out during dry season and only when growth of vegetation is very likely to impede channel flow.</p> <p>(c) Phasing of the works should be considered to better control and reduce any impacts caused. Where possible, works should be carried out along half width of the drainage channel in short sections. A free passage along the drainage channel is necessary to avoid forming stagnant water in any phase of the works.</p> <p>(d) Containment structures (such as sand bags barrier) should be provided for the desilting works area to facilitate a dry or at least confined working area within the drainage channel.</p> <p>(e) The locations for the disposal of the removed materials should be identified and agreement sought with the relevant departments before commencement of the maintenance works. Temporary stockpile of waste materials should be located away from the channel and properly covered. These waste materials should be disposed of in a timely and appropriate manner.</p> <p>(f) Effective temporary flow diversion scheme should be implemented and the generated wastes should be collected and disposed off-site properly to avoid adversely affecting the water quality of the drainage system.</p>	Maintenance works area	Contractor(s)				✓	-
S6.7	<p><u>Emergency Response Plan</u></p>	Project Site	DSD				✓	-

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>An Emergency Response Plan should be developed before the commencement of the Project's operation in order to provide details on the emergency arrangement in case of breakdown of the DWFI system.</p> <p>The proposed system includes overflowing pipes with outlets on both sides of the nullah. When water rises to a certain level, stormwater within the underground system will be released and directly discharged into the nullah. This prevents further back-up into the upstream system and the side branches. The discharge of stormwater directly into the nullah is consistent with the existing drainage pattern.</p>							
S6.10 of EIA and S5.2 of EM&A Manual	<p>Baseline monitoring should be undertaken for three times per week for a period of four weeks before commencement of the construction works to establish baseline water quality conditions of the area.</p> <p>Impact monitoring should be undertaken for three times per week during the construction period to obtain water quality data of the area throughout the construction period for comparison with the baseline water quality data and hence determine any water quality impacts from the construction activities.</p> <p>Post Project monitoring should also be undertaken three times per week for four weeks after the completion of construction works.</p>	Upstream and downstream of the Work Area	Contractor(s)	✓	✓	✓		-
4. Waste Management								
S7.6	<p><u>General</u></p> <p>The HKSAR Government's construction and demolition waste management policy follows the same hierarchy as for other wastes i.e. in order of desirability: avoidance, minimisation, recycling, treatment and safe disposal of waste.</p>	Contract mobilisation	Contractor(s)	✓	✓			<p>Waste Disposal Ordinance</p> <p>DEVB TC(W) No 6/2010, Trip Ticket</p>

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>Training of construction staff should be undertaken by the contractor about the concept of site cleanliness and appropriate waste management procedures. The contractor should develop and provide toolbox talk for on-site sorting of C&D materials to enhance worker's awareness in handling, sorting, reuse and recycling of C&D materials. Requirements for staff training should be included in the contractor's Environmental Management Plan (EMP).</p> <p>Good planning and site management practice should be employed to eliminate over ordering or mixing of construction materials to reduce wastage. Proper storage and site practices will minimise the damage or contamination of construction materials.</p> <p>Where waste generation is unavoidable, the potential for recycling or reuse should be rigorously explored. If waste cannot be recycled, disposal routes described in the EMP should be followed. A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be implemented. In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to DEVB TC(W) No. 6/2010 for details.</p> <p>Regular cleaning and maintenance of the waste storage area should be provided.</p>							System for Disposal of Construction & Demolition Materials
S7.6	<p><u>On-site Sorting, Reuse and Recycling</u></p> <p>All waste materials should be segregated into categories covering:</p> <ul style="list-style-type: none"> • Inert C&D materials suitable for reuse on-site; • Inert C&D materials suitable for public fill reception facilities; • Recyclable C&D waste for recycling; • Remaining C&D waste for landfill; • Chemical waste; and • General refuse for landfill. 	Contract mobilisation	Contractor(s)		✓			Waste Disposal Ordinance WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>Proper segregation and disposal of construction waste should be implemented. Separate containers should be provided for inert and non-inert wastes.</p> <p>Sorting is important to recover materials for reuse and recycling. Specific area should be allocated for on-site sorting of C&D materials and to provide a temporary storage area for those sorted materials. If area is limited, all C&D materials should at least be sorted on-site into inert and non-inert components. Non-inert materials (C&D waste) such as bamboo, timber, vegetation, packaging waste and other organic materials should be reused and recycled wherever possible and disposed of to designated landfill only as a last resort. Inert materials (public fill) such as concrete, stone, clay, brick, soil, asphalt and the like should be separated and reused in this or other projects (subject to approval by the relevant parties in accordance with the <i>DEVB TC(W) No. 6/2010</i>) before disposed of at a public filling facility operated by CEDD. Steel and other metals should be recovered from demolition waste stream and recycled.</p> <p>The reuse of inert materials such as soil, rock and broken concrete should be maximised. Waste should be separated into fine, soft and hard materials. With the use of a crusher coarse material can be crushed to make it suitable for use as fill material where fill is required in the works. This minimises the use of imported material and maximises use of the C&D material produced.</p>							<p>Tidiness.</p> <p>DEVB TC(W) No. 6/2010</p>
S7.6	<p><u>Excavated Materials</u></p> <p>Control measures for temporary stockpiles on-site should be taken in order to minimize the noise, generation of dust, pollution of water and visual impact. These measures include:</p> <ul style="list-style-type: none"> • Surface of stockpiled soil should be regularly wetted with water especially during dry season; • Disturbance of stockpiled soil should be minimized; 	Contract mobilisation	Contractor(s)	✓	✓			<p>Waste Disposal Ordinance</p> <p>DEVB TC(W) No. 6/2010</p>

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<ul style="list-style-type: none"> • Stockpiled soil should be properly covered with tarpaulin especially when heavy rain storms are predicted; • Stockpiling areas should be enclosed where space is available; • Stockpiling location should be away from the water bodies; and • An independent surface water drainage system equipped with silt traps should be installed at the stockpiling area. <p>The identification of final disposal sites for C&D materials generated by the construction works will be considered during the detailed design stage of the Project when the volume and types of C&D materials can be more accurately estimated. The Public Fill Committee of CEDD should be consulted on designated outlets (e.g. public filling area) for public fill, whilst EPD should be consulted on landfills for C&D waste. Disposal of C&D waste to landfill must not have more than 50% (by weight) inert material. The C&D waste delivered for landfill disposal should contain no free water and the liquid content should not exceed 70% by weight:</p> <p>In order to avoid dust or odour impacts, any vehicle leaving a works area carrying C&D waste or public fill should have their load covered up before leaving the construction site.</p> <p>C&D materials should be disposed of at designated public fill reception facilities or landfills. Disposal of these materials for use at other construction projects is subject to the approval of the Engineer and/or other relevant reception authorities. Furthermore, unauthorized disposal of C&D materials in particular on private agricultural land is prohibited and may be subject to relevant enforcement and regulating actions. The disposal of public fill and C&D waste will be controlled through trip-ticket system in accordance with <i>DEVB TC(W) No. 6/2010</i>.</p>							
S7.6	<p><u>Chemical Waste</u></p> <p>Where the construction processes produce chemical waste, the contractor must</p>	Whole Site	Contractor(s)		✓			Waste Disposal (Chemical Waste)

EIA &EM&A Ref. (1)	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>register with EPD as a chemical waste producer. Wastes classified as chemical wastes are listed in the <i>Waste Disposal (Chemical Waste) (General) Regulation</i>. These wastes are subject to stringent disposal routes. EPD requires information on the particulars of the waste generation processes including the types of waste produced, their location, quantities and generation rates. A nominated contact person must be registered with EPD. An updated list of licensed chemical waste collector can be obtained from EPD.</p> <p>Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the <i>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i> published by EPD, and should be collected by a licensed chemical waste collector.</p> <p>Suitable containers should be used for specific types of chemical wastes, containers should be properly labelled (English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations), resistance to corrosion, stored safely and closely secure. Stored volume should not be kept more than 450 liters unless the specification has been approved by the EPD. Storage area should be enclosed by three sides by a wall, partition of fence that is at least 2 m height or height of tallest container with adequate ventilation and space.</p> <p>Hard standing, impermeable surfaces draining via oil interceptors should be provided in works area compounds. Interceptors should be regularly emptied to prevent release of oils and grease into the surface water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain. Oil and fuel bunkers should be bunded and/or enclosed on three sides to prevent discharge due to accidental spillages or breaches of tanks. Bunding should be of sufficient capacity to accommodate 110% of the volume of the largest container or 20% of the total volume of waste, whichever is largest. Waste collected from any grease traps should be collected and disposed of by a licensed contractor.</p>						<p>(General) Regulation</p> <p>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</p> <p>DEVB TC(W) No. 6/2010</p>	

EIA &EM&A Ref. (1)	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>Lubricants, waste oils and other chemical wastes are likely to be generated during the maintenance of vehicles and mechanical equipment. Used lubricants should be collected and stored in individual containers which are fully labelled in English and Chinese and stored in a designated secure place. If possible, such waste should be sent to oil recycling companies, and the empty oil drums collected by appropriate companies for reuse or refill.</p> <p>The registered chemical waste producer (i.e. the contractor) has to arrange for the chemical waste to be collected by licensed collectors. The licensed collector should regularly take chemical waste to a licensed chemical waste treatment facility (such as the Chemical Waste Treatment Centre in Tsing Yi). A trip ticket system operates to control the movement of chemical wastes.</p> <p>No lubricants, oils, solvents or paint products should be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site.</p>							
S7.6	<p><u>General Works Waste</u></p> <p>Concrete Waste</p> <p>Dry concrete waste (considered as public fill) should be sorted out from the other wastes and recycled for reuse or sorted out for disposal at designated public filling facilities.</p> <p>Wooden Materials</p> <p>All wooden materials used on-site should be kept separate from other wastes to avoid damage and to facilitate reuse. Timber which cannot be reused should be sorted out from other waste and stored separately from all inert waste before being</p>	Whole Site	Contractor(s)		✓			<p>Waste Disposal (Chemical Waste) (General) Regulation</p> <p>WBTC No. 19/2001 - Metallic Site Hoardings and Signboards</p>

EIA &EM&A Ref. (1)	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>disposed of to landfill.</p> <p>Reusable steel or concrete panel shutters, fencing and hoarding and signboard should be used as a preferred alternative to items made of wood, to minimise wastage of wood. Attention should be paid to WBTC No. 19/2001 - Metallic Site Hoardings and Signboards to reduce the amount of timber used on construction sites. Metallic alternatives to timber are readily available and should be used rather than new timber. Precast concrete units should be adopted wherever feasible to minimize the use of timber formwork.</p> <p>Only waste material need be taken to a landfill. It should be separated from recyclable wood and steel materials. As for all waste types these materials should be reused on-site or other approved sites before disposal is considered as an option. Disposal to landfill should only be considered as a final option. Contractors are responsible for storage of re-useable materials on-site.</p> <p>General Refuse</p> <p>General refuse generated on-site should be stored in enclosed bins or skips and collected separately from other construction and chemical wastes and disposed of at designated landfill. A temporary refuse collection point should be set up by the contractor to facilitate the collection of refuse by licensed contractors. The removal of waste from the site should be arranged on a daily or at least on every second day by the contractor to minimise any potential odour impacts, minimise the presence of pests, vermin and other scavengers and prevent unsightly accumulation of waste.</p> <p>The recyclable component of the general waste generated by the workforce, such as aluminium cans, paper and cleansed plastic containers should be separated from other waste. Provision and collection of recycling bins for different types of recyclable waste should be set up by the contractor. The contractor should also be responsible for arranging recycling companies to collect these materials.</p>							

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	<p>Floating Refuse</p> <p>Any floating refuse trapped within the Project Area shall be collected by contractor and disposed to landfill.</p>							
S7.6	<p>During operation phase, the silt materials and debris collected during maintenance should be properly packed and transported to designated landfill for disposal as soon as possible. All chemical waste should be properly stored, labelled and removed by licensed waste collectors in accordance with Waste Disposal (Chemical Waste) (General) Regulation.</p>	Whole Site	Contractor(s)				✓	Waste Disposal (Chemical Waste) (General) Regulation
S7.9	<p>To facilitate monitoring and control over the contractors' performance on waste management, a waste monitoring and audit programme will be implemented throughout the construction phase and a Waste Management Plan (WMP) will be prepared and implemented by the contractor in accordance with ETWB TC(W) No. 19/2005. The aims of the monitoring and audit programme are.</p> <ul style="list-style-type: none"> • To review the WMP, which will form part of the EMP in accordance with ETWB TC(W) No. 19/2005, including the quantities and types of C&D materials generated, reused and disposed of off-site; the amount of fill materials exported from/imported to the site and the quantity of timber used in temporary works construction for each process/activity; • To monitor the implementation and achievement of the WMP on site to assess its effectiveness; and • To monitor the follow-up actions on deficiencies identified. <p>Site inspections will be undertaken each week. Particular attention will be given to the contractor's provision of sufficient spaces, adequacy of resources and facilities for on-site sorting and temporary storage of C&D materials. The C&D materials to be disposed of from the site will be visually inspected to ensure the absence of non-</p>	All facilities	Contractor(s)		✓			ETWB TC(W) No. 19/2005

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
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	<p>inert materials (e.g. general refuse, timber, etc). The waste to be disposed of at landfills will as practicable contain no observable inert or reusable/recyclable C&D materials (e.g. soil, broken rock, metal, and paper/cardboard packaging, etc). Any irregularities observed during the site inspections will be raised promptly to the contractor for rectification.</p> <p>The findings of the waste inspections will be reported in the monthly Environmental Monitoring and Audit Report.</p>							
5. Ecology								
S8.9	The construction of rising main shall be conducted outside dry season (i.e. November to March) as an avoidance measure.	Site within WBA (i.e. rising mains)	Contractor(s)		✓			-
S8.9	With implementation of mitigation measures for air quality, noise and water quality stipulated in Sections 4.8, 5.8 and 6.7, no unacceptable adverse ecological impact arising from the Project during construction phase is anticipated.	Whole Site	Contractor(s)		✓			-
6. Landscape & Visual								
S9.6	<p><u>Good site practice</u> Construction site should be kept clean and tidy and construction material should be stored in order. Canvas sheets should be used to cover the exposed earth. Unused construction and demolition (C&D) debris should be removed as soon as the reinstatement works are completed.</p>	Whole Site	Contractor(s)		✓			-
S9.6	<p><u>Erection of decorative screen hoarding</u> Each site should be provided with decorative screen hoarding compatible with surrounding setting.</p>	Whole Site	Contractor(s)	✓	✓			-
S9.6	<p><u>Tree preservation</u> The existing trees shall be preserved as far as possible. The retained existing trees on</p>	Whole Site	Contractor(s)	✓	✓			

EIA & EM&A Ref. (1)	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Pre-C	C	Post-C	O	
	site shall be protected carefully during construction. The requirement specified in “Guidelines on Tree Preservation during Development” issued by Development Bureau shall be followed. Tree preservation should include protection measures for existing trees and greenery.							
S9.6	<u>Tree transplanting / compensatory tree planting</u> According to the latest design, all trees will be preserved and no tree felling is expected. In case of trees unavoidably affected by the Project during construction, tree transplanting shall be conducted as far as possible. Any unavoidable tree felling shall be mitigated by compensatory tree planting.	Whole Site	Contractor(s)	✓	✓	✓		
S9.6	A minimum lighting will be maintained at night time as general lighting provision for security reason.	DWF Pumping Station	Contractor(s)				✓	
S9.6	Green roof and shrub planting will be provided for the DWF pumping station. The roof structure will be planted with trees and groundcovers to reduce glaring effect and give a green appearance of the roof structure. Shrub planting is proposed to be planted within the site boundary to further enhance the development with lush greenery.	DWF Pumping Station	Contractor(s)		✓	✓	✓	
S9.6	Vertical greening will be provided on the external walls without the coverage of architectural elements.	DWF Pumping Station	Contractor(s)		✓	✓	✓	
S9.6	The proposed architectural design of the DWF pumping station will utilize the surrounding landscape to blend the buildings with the surrounding environment. The building will maintain a low profile to reduce the visual impact.	DWF Pumping Station	Contractor(s)	✓	✓	✓	✓	
S7.3 of EM&A Manual	A photographic record of the Project Site at the time of the Contractor’s possession should be prepared by the Contractor and approved by the Engineer Representative (ER).	Whole Site	Contractor(s)	✓				
S7.4 of EM&A Manual	A specialist Landscape Sub-Contractor should be employed by the Contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period.	Whole Site	Contractor(s)		✓	✓		

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location of the Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
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S7.4 of EM&A Manual	All measures undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the construction phase and first year of the operation phase should be audited by a Registered Landscape Architect, as a member of the Environmental Team (ET), on a regular basis to ensure compliance with the intended aims of the measures.	Whole Site	ET		✓	✓		
S7.4 of EM&A Manual	Site audits should be undertaken at least once every two weeks during the construction phase of the Project and once every two months during the operation phase to ensure that the proposed mitigation measures and good site practices proposed to manage and mitigate landscape and visual impacts, are implemented.	Whole Site	ET		✓	✓		

**ANNEX A-2
IMPLEMENTATION SCHEDULE OF
YUEN LONG BARRAGE SCHEME**

Yuen Long Barrage Scheme

Annex A-2 Implementation Schedule of Environmental Protection Measures for the Project

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
3. Air Quality Measures								
S3.8	<p>Relevant dust control measures stipulated in the <i>Air Pollution Control (Construction Dust) Regulation</i>, and good site practices will be incorporated as the Contract Specifications for implementation throughout the construction period. These include:</p> <ul style="list-style-type: none"> • The works area for site clearance and excavation should be sprayed with water before, during and after the operation so as to maintain the entire surface wet. • Restricting heights from which materials are to be dropped, as far as practicable to reduce the fugitive dust arising from unloading/ loading. • Immediately before leaving a construction site, all vehicles should be washed to remove any dusty materials from the bodies and wheels. However, all spraying of materials and surfaces should avoid excessive water usage. • Where a vehicle leaving a construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials will not leak from the vehicle. • Erection of hoarding along the site boundary, where appropriate. • Any stockpile of dusty materials should be covered entirely by impervious sheeting; and/or placed in an area sheltered on the top and three sides. • All dusty materials should be sprayed with water immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • Reduce the traffic induced dust dispersion and re-suspension, the travelling speed of vehicles within the site should be controlled. 	Whole Site / Construction Phase	Contractor(s)		✓			Air Pollution Control (Construction Dust) Regulation

⁽¹⁾ Unless otherwise stated, the reference refers to the relevant section of the EIA Report.

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	<ul style="list-style-type: none"> Regular maintenance of construction equipment deployed on-site will be conducted to prevent black smoke emission. 							
S3.8	Excavated river bed materials that are placed on trucks for disposal should be properly covered with tarpaulin sheets during transportation to minimise the release of any potential odour. The odorous excavated material should be placed as far away from the sensitive receivers as possible. Odorous river bed material excavated during construction phase should be removed off-site as soon as practicable within 24 hours to avoid any odour nuisance.	Whole Site / Construction Phase	Contractor(s)		✓			-
S3.8	<p>During operation phase, mitigation measures are considered necessary when materials generated from the maintenance works are found to be odorous, and the following measures should be implemented by the Contractor.</p> <ul style="list-style-type: none"> Temporarily stockpile odorous material as far away from ASRs as possible; Temporary stockpiles of odorous material will be properly covered with tarpaulin and should be removed off-site as soon as practically possible within 24 hours to avoid any odour nuisance arising; and Regular inspection at inlet chamber of existing pumping facilities to prevent accumulation of debris/materials at the inlet screens causing odour nuisance. 	Whole Site / Operation Phase	Project Proponent				✓	-
4. Noise								
S4.8	<p><u>Good Construction Site Practice</u></p> <p>Good construction site practice and noise management can considerably reduce the potential noise impact of the construction activities on nearby NSRs. The noise benefits of these practices can vary according to specific site conditions and operations. Since the effect of the good construction site practices could not be quantified, the mitigated noise levels calculated in the subsequent sections have not taken account of this effect. The following site practices should be followed during</p>	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	<p>the construction of the Project:</p> <ul style="list-style-type: none"> • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction phase; • Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction phase; • Mobile plant, if any, should be sited as far away from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities. 							
S4.8	<p><u>Use of Quiet PME</u></p> <p>The use of quiet PME is considered to be a practicable means to mitigate the construction noise impact. Quiet PME is defined as a PME having actual SWL lower than the value specified in the GW-TM. The total SWL of all plant items to be used on-site at each works area will be specified so that flexibility is allowed for the Contractor to select plant items to suit the construction needs.</p>	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM GW-TM
S4.8	<p><u>Adoption of Movable Noise Barriers</u></p> <p>The use of noise barriers will be an effective means to mitigate the noise impact arising from the construction works, particularly for low-rise NSRs. With reference to EIAO Guidance Note No. 9/2010 Preparation of Construction Noise Assessment Under the Environmental Impact Assessment Ordinance (EIAO GN No. 9/2010), the use of movable barrier for certain PME could generally provide a 5 dB(A) reduction for movable PME and 10 dB(A) for stationary PME.</p>	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM EIAO Guidance Note No. 9/2010

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
S4.8	<p><u>Use of Noise Insulation Sheet</u></p> <p>Noise insulating sheet would be adopted for PME such as drill rig. The noise insulating sheet should be deployed such that there would be no opening or gaps on the joints. With reference to the approved EIA Report for West Island Line (WIL) (Register No.: AEIAR-126/2008 approved on 23 Dec 2008) and MTRC Contract C4420 Tsim Sha Tsui Modification Noise Assessment Report for VEP (July 2003), a reduction of over 10 dB(A) could be achieved with the use of the noise insulating sheet. For a conservative assessment, a noise reduction of 10 dB(A) for the PME with deployment of noise insulating sheet was assumed in this assessment.</p>	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM
S4.8	<p><u>Adoption of Fixed Temporary Noise Barriers</u></p> <p>In view of the close proximity between NSRs and the works areas for revitalisation works inside nullah, fixed temporary noise barriers will be deployed at the working section as far as practicable. Fixed temporary noise barriers of 3m in height with skid footing should be used and located within a few metres of stationary plant and mobile plant such that the line of sight to the NSR is blocked by the barriers. The length of the barrier should be at least five times greater than its height. The noise barrier material should have a sufficient surface density of at least 7 kg/m² and have no openings or gaps. Reference has been made to EIAO GN No. 9/2010; it is anticipated that the major noise source of movable PMEs, such as breaker, water pump, concrete lorry mixer and excavator, will be located within the nullah at a level lower than the top of the proposed fixed temporary noise barrier, and therefore these barriers could produce at least a 5 dB(A) noise reduction.</p>	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM
S4.8	<p><u>Scheduling of PME / Construction Activities</u></p> <p><i>The maximum predicted construction noise level at the nearest secondary school is 69 dB(A). This comply with the noise criteria of 70dB(A) during normal school days</i></p>	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	<p><i>but exceed the criteria of 65 dB(A) during examination period. However, this potential exceedance can be avoided with following arrangement:</i></p> <ul style="list-style-type: none"> The contractor could liaise with the school management about the arrangements during examination weeks; and PMEs shall not be used at the closest works areas (i.e. near CCHS1) during the examination period; 							
S4.8	<p><u>Quieter Methods</u></p> <p>Handheld or excavator mounted concrete breaker is a traditional mechanical equipment for concrete breaking and removal. Using such equipment will generate loud noise, with sound power levels generally range from 108 dB(A) to 122 dB(A). The adoption of quieter equipment or methods for concrete breaking or removal could be less noisy or could reduce the noise propagation when necessary. These include high pressure water jet system, handheld concrete crusher, medium duty breaker, blade saw, wire saw and noise enclosure. These measures shall be adopted if the use of quiet PME is not sufficient in reducing the construction noise level.</p>	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM
S4.8	<p>While no unacceptable noise impact is expected due to the operation of fixed plant items, it is still recommended that the following measures be implemented as far as practicable to minimise the potential impact:</p> <ul style="list-style-type: none"> Quieter plant should be chosen as far as practical; Include noise levels specification when ordering new plant items; All openings, including louvres for ventilation and machine room doors should be oriented away from the NSRs as far as practicable; Silencers, acoustic louvres or acoustic doors should be used where necessary; and Develop and implement a regularly scheduled plant maintenance programme so that plant items are properly operated and serviced. The programme should be implemented by properly trained personnel 	YLBS / Detailed Design Phase and Operation Phase	Detailed Design Engineer / Project Proponent	✓			✓	EIAO-TM Noise Control Ordinance (NCO)

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
S4.8	Testing and commissioning of the proposed pumping stations would be carried out prior to operation. Noise monitoring would be carried out by the Contractor to ensure fixed noise sources impact would comply with the relevant noise standards.	YLBS / Prior to Operation	Contractor(s)				✓	EIAO-TM NCO
5. Water Quality								
S5.8	<u>General Construction Site Practice</u> The Contractor should observe and comply with the <i>Water Pollution Control Ordinance</i> and its subsidiary regulations and obtain a discharge license under the Ordinance. The Contractor should carry out the Project works in such a manner as to minimize adverse impacts on the water quality during execution of the works. In particular, the Contractor should arrange the working method to minimize the effects on the water quality within and outside the Project Site and on the transport routes. In addition, the management of construction site drainage from the Project will follow guidelines provided in <i>ProPECC PN 1/94</i> .	Whole Site / Construction Phase	Contractor(s)		✓			Water Pollution Control Ordinance (WPCO) EIAO-TM ProPECC PN 1/94
S5.8	<u>Concreting Works</u> Runoff should be carefully channelled to prevent concrete-contaminated water from entering watercourses. Adjustment of pH can be achieved by adding a suitable neutralising reagent to wastewater prior to discharge. Re-use of the supernatant from the sediment pits for washing out of concrete lorries should be practised. Any exceedance of acceptable range of pH levels in the nearby water bodies caused by inadvertent release of site runoff containing concrete should be monitored and rectified under the EM&A programme for this Project.	Whole Site / Construction Phase	Contractor(s)		✓			WPCO EIAO-TM ProPECC PN 1/94
S5.8	<u>Construction Site Runoff and Drainage</u> Proper site management measures should be implemented to control site runoff and drainage, and thereby prevent high sediment loadings from reaching downstream	Whole Site / Construction Phase	Contractor(s)		✓			WPCO EIAO-TM ProPECC PN 1/94

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				Des	C	Post-C	O	
	<p>sections of the river/stream. The Contractor should follow the practices, and be responsible for the design, construction, operation and maintenance of all the mitigation measures. The design of the mitigation measures should be submitted by the Contractor to the Engineer for approval. These mitigation measures shall include the following practices to minimize site surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge:</p> <ul style="list-style-type: none"> • Before commencing any work, all sewer and drainage connections should be sealed to prevent debris, soil, sand etc. from entering public sewers/drains. • Provision of perimeter channels to intercept storm-runoff from outside the site. These should be constructed in advance of the construction works. • Temporary ditches such as channels, earth bunds or sand bag barriers should be included to facilitate runoff discharge into the stormwater drain, via a sand/silt basin/trap. • Works programme should be designed to minimize works areas at any one time, thus minimizing exposed soil areas and reducing the potential for increased siltation and runoff. • Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove the sand/silt particles from run-off where necessary. These facilities should be properly and regularly cleaned and maintained. These facilities should be carefully planned to ensure that they would be installed at appropriate locations to capture all surface water generated on site. • Careful programming of the works to avoid excavation works during the rainy season. • Temporary access roads (if any) should be protected by crushed gravel and exposed slope surfaces shall be protected when rainstorms are likely; and • Open stockpiles of construction materials on-site should be covered with tarpaulin or similar fabric during rainstorms to prevent erosion. 							
S5.8	<p><u>Use of Containment Structures and Diversion Channels</u></p> <p>The use of containment structures and diversion channels is recommended wherever</p>	Whole Site / Construction Phase	Contractor(s)		✓			WPCO EIAO-TM

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	<p>practicable to facilitate a dry or at least confined excavation within the nullah. For example, nullah water should be contained within the works area before the commencement of excavation by the use of concrete blocks or sand bag barriers. Water within the contained area should be discharged to the nullah before excavation commences to create the dry conditions. Dredging/sediment removal works shall not be carried out in open waters. Nullah water should also be diverted from the works area through the use of diversion channel constructed by materials such as concrete blocks. Indicative details of the containment structures and diversion channels are provided in Drawing No. 400171/B&V/EIA/503 and would be provided by the Contractor to the Engineer for approval before commencement of construction works for the Project. By limiting or confining the works areas the extent of disturbance to the surrounding water bodies will be significantly reduced, and thus resulting impacts on water quality from sediment re-suspension will be reduced. These measures will be implemented to ensure compliance with the Water Pollution Control Ordinance and its subsidiary regulations.</p>							
S5.8	<p><u>Sewage and Wastewater Discharge</u></p> <p>All discharges during the construction phase of the Project are required to comply with the <i>Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-ICW)</i> issued under Section 21 of the WPCO. Domestic sewage/wastewater generated by workforce on-site should be collected in a suitable storage facility such as portable chemical toilets. An adequate number of portable toilets will be provided during the construction phase. These toilets should be maintained in a state that will not deter the workers from using them. The collected sewage/wastewater will be discharged into the foul sewer or transferred to the Government sewage treatment works by a licensed collector.</p>	Whole Site / Construction Phase	Contractor(s)		✓			WPCO EIAO-TM Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-ICW)
S5.8	<p><u>Storage and Handling of Oil, Other Petroleum Products and Chemicals</u></p> <p>The following mitigation measures should be implemented for the storage and handling of oil, other petroleum products and chemicals:</p> <ul style="list-style-type: none"> Waste streams classifiable as chemical wastes should be properly stored, 	Whole Site / Construction Phase	Contractor(s)		✓			Waste Disposal Ordinance (WDO) Waste Disposal (Chemical Waste)

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
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	<p>collected and treated for compliance with <i>Waste Disposal Ordinance or Disposal (Chemical Waste) (General) Regulation requirements</i>.</p> <ul style="list-style-type: none"> All fuel tanks and chemical storage areas should be provided with locks and be sited on paved areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled oil, fuel and chemicals from reaching the receiving waters. Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance. Vehicle and plant servicing areas, vehicle wash bays and lubrication bays should, as far as possible, be located within roofed areas. The drainage in these covered areas should be connected to foul sewers via a petrol interceptor. 							(General) Regulation
S5.8	<p><u>Handling of Spillage / Leakage</u></p> <p>In the event that accidental spillage or leakage of hazardous substances / chemical wastes occur, the response procedures as listed below should be followed. It should be noted that the procedures below are not exhaustive and the contractor should propose other response procedures in the emergency contingency plan based on the particular types and quantities of chemicals or hazardous substances used, handled and stored on-site.</p> <ul style="list-style-type: none"> Oil leakage or spillage should be contained and cleaned up immediately. Waste oil should be collected and stored for recycling or disposal in accordance with the <i>Waste Disposal Ordinance</i>. Instruct untrained personnel to keep at a safe distance well away from the spillage area. If the spillage / leakage involves highly toxic, volatile or hazardous waste, initiate emergency evacuation and call the emergency service. Only trained persons equipped with suitable protective clothing and equipment should be allowed to enter and clean up the waste spillage / leakage area. Where the spillage/ leakage is contained in the enclosed storage area, the waste can be transferred back into suitable containers by suitable handheld 	Whole Site / Construction Phase	Contractor(s)		✓			WDO

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	<p>equipment, such as hand operated pumps, scoops or shovels. If the spillage / leakage quantity is small, it can be covered and mixed with suitable absorbing materials such as tissue paper, dry soft sand or vermiculite. The resultant slurry should be treated as chemical waste and transferred to suitable containers for disposal.</p> <ul style="list-style-type: none"> • For spillage / leakage in other areas, immediate action is required to contain the spillage / leakage. Suitable liquid absorbing materials such as tissue paper, dry soft sand or vermiculite should be used to cover the spill. The resultant slurry should be treated as chemical waste and transferred to suitable containers for disposal. • Areas that have been contaminated by chemical waste spillage / leakage should be cleaned. While water is a soluble solvent for aqueous chemical wastes and water soluble organic waste, kerosene or turpentine should be used for organic chemical wastes that are not soluble in water. The waste from the cleanup operation should be treated and disposed of as chemical waste. • In incidents where the spillage/ leakage may result in significant contamination of an area or risk of pollution, the EPD should be informed immediately. 							
S5.8	<p><u>Maintenance Works</u></p> <p>Maintenance may be necessary for the revitalised YLTN at regular intervals to remove excessive silts, vegetation, debris and obstruction.</p> <p>The following considerations should be included in planning for the maintenance works during operation:</p> <p>(a) Maintenance of the channels should be restricted to annual silt removal when the accumulated silt will adversely affect the hydraulic capacity of the channel, except during emergency situations where flooding risk is imminent. Desilting should be carried out by hand or light machinery during the dry season (October to March) when water flow is low.</p> <p>(b) Phasing of the works should be considered to better control and reduce any impacts caused. Where possible, works should be carried out along half</p>	Whole Site / Operation Phase	Project Proponent				✓	-

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	<p>width of the drainage channel in short sections. A free passage along the drainage channel is necessary to avoid forming stagnant water in any phase of the works.</p> <p>(c) Containment structures (such as sand bags barrier) should be provided for the desilting works area to facilitate a dry or at least confined working area within the drainage channel.</p> <p>(d) The locations for the disposal of the removed materials should be identified and agreement sought with the relevant departments before commencement of the maintenance works. Temporary stockpile of waste materials should be located away from the channel and properly covered. These waste materials should be disposed of in a timely and appropriate manner.</p> <p>(e) Effective temporary flow diversion scheme should be implemented and the generated wastes should be collected and disposed off-site properly to avoid adversely affecting the water quality of the drainage system.</p>							
S5.8	Practicable designs including energy dissipators or orientation of the pump outlets will be optimised in the detail design stage to dissipate excess energy of flowing water downstream such that the hydraulic performance of the downstream will be similar to the existing condition.		Contractor(s)	✓				
S5.11 of EIA and S5.2 of EM&A Manual	<p>Baseline monitoring should be undertaken for three times per week for a period of four weeks before commencement of the construction works to establish baseline water quality conditions of the area. Impact monitoring should be undertaken for three times per week during the construction period to obtain water quality data of the area throughout the construction period for comparison with the baseline water quality data and hence determine any water quality impacts from the construction activities. Post Project monitoring should also be undertaken three times per week for four weeks after the completion of construction works.</p> <p>The following parameters will be monitored under the water quality monitoring</p>	Upstream and downstream of the Work Area / Before, During and After Construction	ET and IEC	✓	✓	✓		EIAO-TM

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	<p>programme:</p> <ul style="list-style-type: none"> • pH (in situ measurement); • Water temperature (°C) (in situ measurement); • Salinity (ppt) (in situ measurement); • Dissolved Oxygen (DO) (% saturation and mg/L) (in situ measurement); • Turbidity (NTU) (in situ measurement); and • Suspended Solids (SS) (mg/L) (laboratory analysis). 							
S5.11	Weekly site inspections and audits will be conducted to ensure that the recommended mitigation measures are properly implemented during the construction stage.	Whole Site / Construction Phase	ET and IEC		✓			EIAO-TM
6. Waste Management								
S6.6	<p><u>General</u></p> <p>The HKSAR Government's construction and demolition waste management policy follows the same hierarchy as for other wastes i.e. in order of desirability: avoidance, minimisation, recycling, treatment and safe disposal of waste.</p> <p>Training of construction staff should be undertaken by the contractor about the concept of site cleanliness and appropriate waste management procedures. The contractor should develop and provide toolbox talk for on-site sorting of C&D materials to enhance worker's awareness in handling, sorting, reuse and recycling of C&D materials. Requirements for staff training should be included in the contractor's Environmental Management Plan (EMP).</p> <p>Good planning and site management practice should be employed to eliminate over ordering or mixing of construction materials to reduce wastage. Proper storage and site practices will minimise the damage or contamination of construction materials.</p> <p>Where waste generation is unavoidable, the potential for recycling or reuse should be rigorously explored. If waste cannot be recycled, disposal routes described in the</p>	Whole Site / Detailed Design and Construction Phase	Detailed Design Engineer / Contractor(s)	✓	✓			<p>WDO</p> <p>DEVB TC(W) No 6/2010</p> <p>ETWB TC(W) No. 19/2005</p>

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	<p>EMP should be followed. A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be implemented. In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to <i>DEVB TC(W) No. 6/2010</i> for details.</p> <p>Regular cleaning and maintenance of the waste storage area should be provided.</p> <p>Control measures for temporary stockpiles on-site should be taken in order to minimize the noise, generation of dust, pollution of water and visual impact. These measures include:</p> <ul style="list-style-type: none"> • Surface of stockpiled soil should be regularly wetted with water especially during dry season; • Disturbance of stockpiled soil should be minimized; • Stockpiled soil should be properly covered with tarpaulin especially when heavy rain storms are predicted; • Stockpiling areas should be enclosed where space is available; • Stockpiling areas should be located away from the water bodies; and • An independent surface water drainage system equipped with silt traps should be installed at the stockpiling area. <p>The identification of final disposal sites for C&D materials generated by the construction works will be considered during the detailed design stage of the Project when the volume and types of C&D materials can be more accurately estimated. The Public Fill Committee of CEDD should be consulted on designated outlets (e.g. public filling area) for public fill, whilst EPD should be consulted on landfills for C&D waste. Disposal of C&D waste to landfill must not have more than 50% (by weight) inert material. The C&D waste delivered for landfill disposal should contain no free water and the liquid content should not exceed 70% by weight.</p> <p>In order to avoid dust or odour impacts, any vehicle leaving a works area carrying C&D waste or public fill should have their load covered up before leaving the</p>							

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	<p>construction site.</p> <p>C&D materials should be disposed of at designated public fill reception facilities or landfills. Disposal of these materials for the use at other construction projects is subject to the approval of the Engineer and/or other relevant reception authorities. Furthermore, unauthorized disposal of C&D materials in particular on private agricultural land is prohibited and may be subject to relevant enforcement and regulating actions. The disposal of public fill and C&D waste will be controlled through trip-ticket system in accordance with DEVB TC(W) No. 6/2010.</p>							
S6.6	<p><u>On-site Sorting, Reuse and Recycling</u></p> <p>All waste materials should be segregated into categories covering:</p> <ul style="list-style-type: none"> • Inert C&D materials suitable for reuse on-site; • Inert C&D materials suitable for public fill reception facilities; • Recyclable C&D waste for recycling; • Remaining C&D waste for landfill; • Chemical waste; and • General refuse for landfill. <p>Proper segregation and disposal of construction waste should be implemented. Separate containers should be provided for inert and non-inert wastes.</p> <p>Sorting is important to recover materials for reuse and recycling. Specific area should be allocated for on-site sorting of C&D materials and to provide a temporary storage area for those sorted materials. If area is limited, all C&D materials should at least be sorted on-site into inert and non-inert components. Non-inert materials (C&D waste) such as bamboo, timber, vegetation, packaging waste and other organic materials should be reused and recycled wherever possible and disposed of to designated landfill only as a last resort. Inert materials (public fill) such as concrete, stone, clay, brick, soil, asphalt and the like should be separated and reused in this or other projects (subject to approval by the relevant parties in accordance with the <i>DEVB TC(W) No. 6/2010</i>) before disposed of at a public filling facility</p>	Whole Site / Construction Phase	Contractor(s)		✓			<p>WDO</p> <p>WBTC Nos. 6/2002 and 6/2002A</p> <p>DEVB TC(W) No. 6/2010</p> <p>ETWB TC(W) No. 19/2005</p>

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	<p>operated by CEDD. Steel and other metals should be recovered from demolition waste stream and recycled.</p> <p>The reuse of inert materials such as soil, rock and broken concrete should be maximised. Waste should be separated into fine, soft and hard materials. With the use of a crusher coarse material can be crushed to make it suitable for use as fill material where fill is required in the works. This minimises the use of imported material and maximises use of the C&D material produced.</p>							
S6.6	<p><u>Excavated Sediments</u></p> <p>The sediment should be excavated, handled, transported and disposed of in a manner that would minimize adverse environmental impacts.</p> <p>Requirements of the Air Pollution Control (Construction Dust) Regulation, where relevant, shall be adhered to during excavation, transportation and disposal of the sediment.</p> <p>In order to minimize the exposure to contaminated materials, workers shall, if necessary, wear appropriate personal protective equipment (PPE) when handling contaminated sediments. Adequate washing and cleaning facilities shall also be provided on site.</p> <p>For off-site disposal, the basic requirements and procedures specified under ETWB TC(W) No. 34/2002 shall be followed. Marine Fill Committee (MFC) of CEDD is managing the disposal facilities in Hong Kong for the excavated sediment, while EPD is the authority of issuing marine dumping permit under the Dumping at Sea Ordinance (DASO).</p> <p>To ensure disposal space is allocated for the Project, the Project Proponent should be responsible for obtaining agreement from MFC on the rationale for sediment removal and the allocation of the disposal site. The contractor(s), on the other hand, should be responsible for the application of the marine dumping permit under DASO</p>	Works Site requiring sediment excavation / Construction Phase	Contractor(s)		✓		<p>Air Pollution Control (Construction Dust) Regulation</p> <p>ETWB TC(W) No. 34/2002</p> <p>Dumping at Sea Ordinance (DASO)</p> <p>WPCO</p> <p>WDO</p>	

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	<p>from EPD for the sediment disposal.</p> <p>The excavated sediments are expected to be loaded onto the barge at public barging point of which the exact location will be determined by the contractor(s) and agreed by EPD/CEDD and transported to the designated disposal sites allocated by MFC. The excavated sediment would be disposed of according to its determined disposal options and ETWB TC(W) No. 34/2002.</p> <p>Stockpiling of contaminated sediments should be avoided as far as possible. If temporary stockpiling of contaminated sediments is necessary, the excavated sediment should be covered by tarpaulin and the area should be placed within earth bunds or sand bags to prevent leachate from entering the ground, nearby drains and surrounding water bodies. The stockpiling areas for contaminated sediments should be paved with impermeable linings to avoid contamination to underlying soil or groundwater. Separate and clearly defined areas should be provided for stockpiling of contaminated and uncontaminated materials. Leachate, if any, should be collected and discharged according to the Water Pollution Control Ordinance (WPCO).</p> <p>In order to minimize the potential odour / dust emissions during excavation and transportation of the sediment, the excavated sediments shall be wetted during excavation / material handling and shall be properly covered when placed on trucks or barges. Loading of the excavated sediment to the barge shall be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water.</p> <p>The barge transporting the sediments to the designated disposal sites shall be equipped with tight fitting seals to prevent leakage and shall not be filled to a level that would cause overflow of materials or laden water during loading or transportation. In addition, monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as specified by the DEP.</p>							

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S6.6	<p><u>Chemical Waste</u></p> <p>Where the construction processes produce chemical waste, the contractor must register with EPD as a chemical waste producer. Wastes classified as chemical wastes are listed in the Waste Disposal (Chemical Waste) (General) Regulation. These wastes are subject to stringent disposal routes. EPD requires information on the particulars of the waste generation processes including the types of waste produced, their location, quantities and generation rates. A nominated contact person must be registered with EPD. An updated list of licensed chemical waste collector can be obtained from EPD.</p> <p>Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published by EPD, and should be collected by a licensed chemical waste collector.</p> <p>Chemical waste should be stored away from channels or water bodies.</p> <p>Suitable containers should be used for specific types of chemical wastes. The containers should be properly labelled (in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations), resistance to corrosion, stored safely and closely secured. Stored volume should not be kept more than 450 liters unless the specification has been approved by the EPD. Storage area should be enclosed by three sides by a wall, partition of fence that is at least 2 m height or height of tallest container with adequate ventilation and space.</p> <p>Hard standing, impermeable surfaces draining via oil interceptors should be provided in works area compounds. Interceptors should be regularly emptied to prevent release of oils and grease into the surface water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain. Oil and fuel bunkers should be bunded and/or enclosed on three sides to prevent discharge due to accidental spillages or breaches of tanks. Bunding should be of sufficient capacity to accommodate 110% of the</p>	Whole Site / Construction Phase	Contractor(s)		✓			<p>Waste Disposal (Chemical Waste) (General) Regulation</p> <p>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</p> <p>DEVB TC(W) No. 6/2010</p>

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	<p>volume of the largest container or 20% of the total volume of waste, whichever is largest. Waste collected from any grease traps should be collected and disposed of by a licensed contractor.</p> <p>Lubricants, waste oils and other chemical wastes are likely to be generated during construction. Used lubricants should be collected and stored in individual containers which are fully labelled in English and Chinese and stored in a designated secure place. If possible, such waste should be sent to oil recycling companies, and the empty oil drums collected by appropriate companies for reuse or refill.</p> <p>The registered chemical waste producer (i.e. the contractor) has to arrange for the chemical waste to be collected by licensed collectors. The licensed collector should regularly take chemical waste to a licensed chemical waste treatment facility (such as the Chemical Waste Treatment Centre in Tsing Yi). A trip ticket system operates to control the movement of chemical wastes.</p> <p>No lubricants, oils, solvents or paint products should be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site.</p>							
S6.6	<p><u>General Works Waste</u></p> <p>Concrete Waste</p> <p>Dry concrete waste (considered as public fill) should be sorted out from the other wastes and recycled for reuse or sorted out for disposal at designated public filling facilities.</p> <p>Wooden Materials</p> <p>All wooden materials used on-site should be kept separate from other wastes to avoid damage and to facilitate reuse. Timber which cannot be reused should be sorted out from other waste and stored separately from all inert waste before being</p>	Whole Site / Construction Phase	Contractor(s)		✓			WDO WBTC No. 19/2001

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	<p>disposed of to landfill.</p> <p>Reusable steel or concrete panel shutters, fencing and hoarding and signboard should be used as a preferred alternative to items made of wood, to minimise wastage of wood. Attention should be paid to WBTC No. 19/2001 - Metallic Site Hoardings and Signboards to reduce the amount of timber used on construction sites. Metallic alternatives to timber are readily available and should be used rather than new timber. Precast concrete units should be adopted wherever feasible to minimize the use of timber formwork.</p> <p>Only waste material need be taken to a landfill. It should be separated from recyclable wood and steel materials. As for all waste types these materials should be reused on-site or other approved sites before disposal is considered as an option. Disposal to landfill should only be considered as a final option. Contractors are responsible for storage of re-useable materials on-site.</p> <p>General Refuse</p> <p>General refuse generated on-site should be stored in enclosed bins or skips and collected separately from other construction and chemical wastes and disposed of at designated landfill. A temporary refuse collection point should be set up by the contractor to facilitate the collection of refuse by licensed contractors. The removal of waste from the site should be arranged on a daily or at least on every second day by the contractor to minimise any potential odour impacts, minimise the presence of pests, vermin and other scavengers and prevent unsightly accumulation of waste.</p> <p>The recyclable component of the general waste generated by the workforce, such as aluminium cans, paper and cleansed plastic containers should be separated from other waste. Provision and collection of recycling bins for different types of recyclable waste should be set up by the contractor. The contractor should also be responsible for arranging recycling companies to collect these materials.</p> <p>Floating Refuse</p>							

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	Any floating refuse trapped within the Project Area shall be collected by contractor and disposed to landfill.							
S6.6	The screenings, silt materials and debris collected during operation and maintenance should be properly packed and transported to the designated landfill for disposal as soon as possible. All chemical waste should be properly stored, labelled and removed by licensed waste collectors in accordance with Waste Disposal (Chemical Waste) (General) Regulation.	Whole Site / Operation Phase	Project Proponent				✓	Waste Disposal (Chemical Waste) (General) Regulation
S6.9	<p>To facilitate monitoring and control over the contractors' performance on waste management, a waste monitoring and audit programme will be implemented throughout the construction phase and a Waste Management Plan (WMP) will be prepared and implemented by the contractor in accordance with ETWB TC(W) No. 19/2005. The aims of the monitoring and audit programme are:</p> <ul style="list-style-type: none"> To review the WMP, which will form part of the EMP in accordance with ETWB TC(W) No. 19/2005, including the quantities and types of C&D materials generated, reused and disposed of off-site; the amount of fill materials exported from/imported to the site and the quantity of timber used in temporary works construction for each process/activity; To monitor the implementation and achievement of the WMP on site to assess its effectiveness; and To monitor the follow-up actions on deficiencies identified. <p>Site inspections will be undertaken each week. Particular attention will be given to the contractor's provision of sufficient spaces, adequacy of resources and facilities for on-site sorting and temporary storage of C&D materials. The C&D materials to be disposed of from the site will be visually inspected to ensure the absence of non-inert materials (e.g. general refuse, timber, etc.). The waste to be disposed of at landfills will as practicable contain no observable inert or reusable/recyclable C&D materials (e.g. soil, broken rock, metal, and paper/cardboard packaging, etc.). Any irregularities observed during the site inspections will be raised promptly to the</p>	Whole Site / Construction Phase	Contractor(s)		✓			WDO ETWB TC(W) No. 19/2005

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	contractor for rectification. The findings of the waste inspections will be reported in the monthly Environmental Monitoring and Audit Report.							
7. Ecological								
	<i>Avoidance</i>							
S7.8	While the Project Site is situated within the WBA, the site and construction works are designed to be confined to the Yuen Long Town Nullah that direct impacts on all other recognized sites of conservation importance including Ramsar Site, Priority Site, WCA, WBA (outside the Project Site), SSSI and CA would be avoided.	Whole Site / Detailed Design Phase	Detailed Design Engineer	✓				EIAO-TM
S7.8	According to the ecological survey data from present study, Shan Pui River recorded a relatively higher abundance of waterbirds in dry season. In order to minimize the construction noise disturbance on the nearby wetland habitats and the associated disturbance-sensitive overwintering/migratory waterbirds, which are most abundant during the dry season months, the comparatively disturbing construction works i.e. percussive piling works and demolition using breakers mounted on excavators, would therefore be scheduled outside the dry season (i.e. November to March, which is the peak overwintering period of waterbirds).	Whole Site / Construction Phase	Contractor(s)		✓			EIAO-TM
	<i>Minimisation</i>							
S7.8	<u>Consideration of alternative construction methods</u> – Concrete crusher would be used for demolition works to be undertaken during dry season months and demolition using breakers mounted on excavators should only be undertaken during wet season when the wetland habitats nearby the Project Site are less sensitive outside the peak overwintering.	YLBS / Construction Phase	Contractor(s)		✓			EIAO-TM
S7.8	Due to ground conditions and programme constraints, percussive piling works would likely be unavoidable. In considering the construction noise, ecological impact and other environmental constraints, the quieter foundation methods,	YLBS / Construction Phase	Contractor(s)		✓			EIAO-TM

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	including bored piling by reverse circulation drill, raft foundation and shallow foundation, would be adopted as far as possible.							
S7.8	<u>Careful phasing of construction activities</u> – The programme and phasing of the construction activities have been carefully planned to localise the construction disturbance within and to reduce the duration of high level of disturbances on sensitive wetland habitats and associated waterbirds. The proposed works will be conducted in 3 primary phases stated in Chapter 2 of EIA report. For example, excavation works within watercourse will be conducted in dry season to minimize the impacts to water quality and release of contaminants to aquatic habitats. Besides, the pumping stations and tidal barriers will not be constructed simultaneously, but will be constructed by 2 sections (one pumping station and half of tidal barriers at a time), to maintain the ecological connectivity.	YLBS / Construction Phase	Contractor(s)		✓			EIAO-TM
S7.8	<u>Use of noise barriers/acoustic screens</u> – In order to further minimise the overall impacts on the nearby wetland habitats and associated waterbirds, particularly to the wetland habitats adjacent to the Project Site, noise barriers with absorptive materials of about 2-3m high will be erected along the sensitive sides of the Project Site, throughout the construction phase. The purpose is to screen the construction noise and human disturbance from the waterbirds during construction phase.	YLBS / Construction Phase	Contractor(s)		✓			EIAO-TM
S7.8	Adequate noise barriers should also be provided for the demolition using breakers mounted on excavators and percussive piling works, to further minimise the construction noise disturbance from these construction activities. Movable noise barriers should be provided to breakers mounted on excavator used for demolition works and acoustic mat should be provided to the piling plants around the rig. The contractor should provide enclosure for construction equipment, especially static plants (e.g. generator), as appropriate to minimise the noise disturbance as far as practicable.	YLBS / Construction Phase	Contractor(s)		✓			EIAO-TM
S7.8	As ardeid night roost was recorded beside the Project Site of Kam Tin River, noise barriers with absorptive materials of about 2-3m high should be erected along the side close to the night roost location, that would screen human disturbance and noise	Works Site of Kam Tin River within	Contractor(s) – ecologists		✓			EIAO-TM

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	disturbance to the night roost. As night roost may change from time to time, a pre-construction survey is recommended for areas within 100m from the Project boundary to confirm the location and status of the night roost. No construction works should be undertaken within 100m from any night roost confirmed by the pre-construction survey after 17:00 from February to September and 16:30 from October to January to avoid disturbance to avoid disturbance.	100m of ardeid night roost / Construction Phase						
S7.8	<u>Use of quality powered mechanical equipment</u> – The Quality Powered Mechanical Equipment (QPME) system was developed by EPD to benchmark construction equipment items that are new, notably quieter, more environmentally friendly and efficient by QPME Labels. The contractor should source QPMEs for construction as far as practicable to further minimise the overall construction noise and other disturbance to the nearby wetland habitats and associated waterbirds to the maximum practical extent.	YLBS / Construction Phase	Contractor(s)		✓			EIAO-TM
S7.8	<u>Operation of tidal barrier to allow brackish waters flushing in</u> – In order to mitigate the impacts of fragmentation in particular the water connectivity between the YLTN Section 4 and Shan Pui River, as well as the loss of brackish water habitat at YLTN Section 4, measures are being explored to retain the habitat between the existing inflatable dam and the proposed barrage as far as practicable. The operation of tidal barrier will be closed during high tide above 0.5mPD and will be opened below 0.5mPD (Appendix 2.4 of EIA report). The situation now is the waters from Deep Bay start flushing in above ~0.2mPD during high tide. Hence, the waters with sediment from Deep Bay can still be flushed into YLTN Section 4 from ~0.2-0.5mPD during high tide before closure of tidal barriers. The operation would facilitate an exchange of water, similar to the existing conditions, according to tidal fluctuations and enhance ecological connectivity through periodic opening of the tidal barriers. Additionally, the feasibility of a proposed 300mm x 300mm ecological trench underneath the soffit of the tidal barriers is being investigated to serve a similar purpose when the barriers are closed. The necessary operation modes would be further explored in the Detailed Design Stage.	YLBS / Detailed Design Phase and Operation Phase	Detailed Design Engineer / Project Proponent	✓			✓	EIAO-TM

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
S7.8	<i>Discharge design to minimize the scouring effect to tidal mudflat</i> – The performance of the discharge system would be assessed against the YLBS’ maximum discharge (i.e. under 200-year rainstorm event) and the configuration of the pumping stations is being optimised. Apart from under design weather events, no significant increase in discharge is anticipated as a result of the barrage. The orientation of the outlet and angle of discharge will be designed to prevent localized turbulent flows which could lead to scouring of the river bed and bank, thereby minimising significant changes to the existing sedimentation pattern / mudflats in Shan Pui River and Old Kam Tin River. Energy dissipators could be designed at the outlet to protect the downstream Shan Pui River from erosion by further reducing the flow velocity.	YLBS / Detailed Design Phase and Operation Phase	Detailed Design Engineer / Project Proponent	✓			✓	EIAO-TM
S7.8	<i>Reducing glare/lighting</i> – No night-time construction works would be required under this Project (construction hours: 07:00 – 19:00) while the operations of the pumping stations and E&M room will be unmanned, only safety light will be turned on. In light of the presence of light sensitive mammal species of conservation importance, Great Cormorants that roost on trees at Nam Sang Wai and Bent-winged Firefly, the overall reduction of glare during both construction and operation phases should also be considered. A balance between lighting for safety, and avoiding excessive lighting can be achieved through the use of directional lighting to avoid light spill into sensitive areas, and control/timing of lighting periods of some facilities. Major construction site lighting should point inward and downward to minimize glare disturbance to wildlife at night. The intensity of light should also be controlled to the lowest possible level. To avoid the potential disturbance impact on the Bent-winged Firefly, any outdoor lighting associated with the construction works of the barrage after 1800 should be avoided during May to September.	YLBS / Detailed Design Phase, Construction Phase and Operation Phase	Detailed Design Engineer / Contractor(s) / Project Proponent	✓	✓		✓	EIAO-TM
	Mitigation							
S7.8	<i>Translocation of Gobiopterus macrolepis</i> – Within YLTN Section 4 of the Project Site, fish species of conservation importance i.e. <i>Gobiopterus macrolepis</i> was recorded. Direct impact to this species is likely in the works area of the tidal barrier during construction phase, and translocation of this species is recommended. Capture-and-translocation of this fish species will be implemented in the works area	YLTN Section 4 / Before construction	Contractor(s) – ecologists		✓			EIAO-TM

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	of the tidal barrier and pumping station prior to construction works to minimize the impacts on this species of conservation importance.							
S7.8	The capture-and-translocation exercise should be undertaken by ecologists with relevant experience. Besides the primary target of <i>Gobiopterus macrolepis</i> , other aquatic species of conservation importance should also be translocated if encountered during the capture exercise. Captured individuals will be released to suitable habitats with records of the species during the exercises. As the works area of the tidal barrier subjects to tidal influence, it is recommended the capture exercise should be conducted during low tide, to allow the fish or other aquatic fauna evacuate with the tide. Measures to prevent recolonization of aquatic fauna in the works area should be formulated.	YLTN Section 4 / Before construction	Contractor(s) – ecologists		✓			EIAO-TM
S7.8	<i>Gobiopterus macrolepis</i> were recorded along the Shan Pui River, Kam Tin River, the confluence of Shan Pui River and Kam Tin River, and the reedbed in Nam Sang Wai, all these locations can be considered as potential receptor sites for fish translocation. As the abundance of this species was higher in the reedbed of Nam Snag Wai, it is considered a more favourable habitat for this species and hence the priority of the receptor site would be there.	YLTN Section 4 / Before construction	Contractor(s) – ecologists		✓			EIAO-TM
S7.8	The detailed fish translocation plan and ecologists involved in the translocation should be submitted to relevant authorities including AFCD for approval prior to commencement of the fish translocation. The plan should include brief description on pre-translocation fish survey, translocation methodology, identification of fish receptor site, post-translocation monitoring methodology, and measures to prevent recolonization of aquatic fauna in the works area of the tidal barrier.	YLTN Section 4 / Before construction	Contractor(s) – ecologists					
8. Fisheries								
S8.8	The proposed works are confined within the Proposed Project Boundary. Fishponds within the assessment area have been avoided.	Whole Site / Construction Phase	Contractor(s)		✓			-

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
S8.8	<p>Controlling Site Runoff</p> <p>In order to minimize the potential indirect fisheries impacts due to deterioration of water quality on the adjacent ponds as much as possible, guidelines for handling and disposal of construction discharges as well as appropriate mitigation measures and good site practices as detailed in Water Quality Chapter to control runoff from the construction site and prevent runoff and drainage water with high levels of suspended solids and oil / grease from directly entering the nearby fishponds. In particular, measures and good site practices stipulated in the ProPECC PN 1/94 "Construction Site Drainage" and in ETWB TC (Works) No. 5/2005 "Protection of Natural Streams / Rivers from Adverse Impacts Arising from Construction Works" to minimise surface runoff and the chance of erosion should be followed to minimise potential impacts to nearby fisheries resources. Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Construction works should be programmed to minimize soil excavation in the wet season (i.e. April to September). If soil excavation cannot be avoided in these months or at any time of year when rainstorms are likely, temporarily exposed slope surfaces should be covered e.g. by tarpaulin, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds; • Construction works close to the inland waters should be carried out in the dry season as far as practicable where the flow in the surface channel or stream is low; • Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric. Intercepting channels should be provided (e.g. along the crest / edge of excavation) to prevent storm run-off from washing across exposed soil surfaces. Arrangements should always be in place in such a way that adequate surface protection measures can be safely carried out well before the arrival of rainstorm; • Surface run-off from construction sites should be discharged into storm drains via adequately designed sand / silt removal facilities such as sand traps, silt traps and sedimentation basins; • Earthworks final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate 	Whole Site / Construction Phase	Contractor(s)		✓			<p>ProPECC PN 1/94</p> <p>ETWB TC(W) No. 5/2005</p> <p>WPCO</p>

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	<p>drainage like intercepting channels should be provided where necessary.</p> <ul style="list-style-type: none"> • Good site practices should be adopted to remove rubbish and litter from construction sites so as to prevent the rubbish and litter from spreading from the site area. It is recommended to clean the construction sites on a regular basis. • Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly (as well as at the onset of and after each rainstorm) to prevent overflows and localized flooding. 							
S8.8	<p>Minimizing Chance of Accidental Spillage and Potential Contamination of Surface Water and Groundwater</p> <p>The Contractor must register as a chemical waste producer if chemical wastes would be produced from the construction activities. The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes.</p> <p>Any service shop and maintenance facilities should be located on hard standings within a bunded area, and sumps and oil interceptors should be provided. Maintenance of vehicles and equipment involving activities with potential leakage and spillage should only be undertaken within the areas appropriately equipped to control these discharges.</p> <p>Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance. The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the Waste Disposal Ordinance details the requirements to deal with chemical wastes. General requirements are given as follows:</p> <ul style="list-style-type: none"> • Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport. • Chemical waste containers should be suitably labelled, to notify and warn the personnel who are handling the wastes to avoid accidents. • Storage area should be selected at a safe location on site and adequate space 	Whole Site / Construction Phase	Contractor(s)		✓			<p>WDO</p> <p>Waste Disposal (Chemical Waste) (General) Regulation</p> <p>The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the Waste Disposal Ordinance</p>

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	should be allocated to the storage area.							
S8.11 of EIA and S8.1 of EM&A Manual	As no unacceptable adverse fisheries impacts are anticipated during construction or operational phases, no specific monitoring programme for fisheries is required. Regular audits should be undertaken to ensure the effectiveness of the mitigation measures and good site practices recommended during construction phase for further controlling the water quality impacts, as these measures also serve to protect fisheries resources.	Whole Site / Construction Phase	ET and IEC		✓			EIAO-TM
9. Built Heritage								
S9.6	A condition survey will be carried out by qualified building surveyor or engineer in advance of works for identified buildings that may be affected by ground-borne vibration. The Condition Survey Report should contain descriptions of the structure, identification of fragile elements, an appraisal of the condition and working methods for any proposed monitoring and precautionary measures that are recommended.	Heritage structures HB-17, HB-18, HB-30 / Before Construction	Contractor(s)		✓			-
S9.6	Vibration monitoring should be undertaken during the construction works to ensure that safe levels of vibration are not exceeded. An Alert, Alarm and Action (AAA) vibration limit set at 5 / 6 / 7.5 mm/s for heritage buildings (PNAP APP-137-Appendix A) should be adopted. The AAA vibration limit for the buildings to be graded by AAB should be determined by the future grading. The condition survey report should highlight if the limit should be lowered after the detailed study of the condition of the buildings and structures. A monitoring schedule, the location of monitoring equipment, the frequency of monitoring, reporting requirements and action plan should be included in the condition survey report. The location of any monitoring equipment in the building must be approved by the owner and AMO before installation. Reinstatement to all affected areas is required.	Heritage structures HB-17, HB-18, HB-30 / Construction Phase	Contractor(s)		✓			PNAP APP-137-Appendix A
S9.6	A buffer zone should be provided to separate the building or structure from the construction works. The buffer zone should be clearly marked out by temporary	Heritage structures	Contractor(s)		✓			-

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	fencing, if temporary fencing is not appropriate signage may be used to identify the heritage item to be avoided. The buffer zone should be made at least 1m from the proposed works or if this is not possible as large as the site restrictions allow.	HB-17, HB-18, HB-30, HB-31 / Construction Phase						
S9.6	Any proposed works in close proximity to buildings or structures used by the public have the potential to create an unsafe environment for members of the public. The contractor should ensure that safe public access if possible, through provision of clearly marked paths separated from the construction works areas is provided for any such affected cultural heritage structure.	Heritage structures HB-17, HB-18, HB-30, HB-31 / Construction Phase	Contractor(s)		✓			-
10. Landscape and Visual								
S10.7.4	<p>CM1 - The construction area and contractor's temporary works areas should be minimised to reduce visual impacts and avoid impacts on adjacent landscape.</p> <p>CM2 - Reduction of construction period to practical minimum.</p> <p>CM3 - Phasing of the construction stage to reduce visual impacts during the construction phase.</p> <p>CM4 - Construction traffic kept to a practical minimum.</p> <p>CM5 - Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours.</p> <p>CM6 - Avoidance of excessive height and bulk of site buildings and structures.</p> <p>CM7 - Control of night-time lighting by hooding all lights and through minimisation of night working periods.</p> <p>CM8 - All existing trees shall be carefully protected during construction. Detailed Tree Protection Specification shall be provided in the Contract Documents. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas.</p> <p>CM9 - Trees unavoidably affected by the works shall be transplanted where practical. A detailed Tree Transplanting Specification shall be provided in the</p>	Whole Site / Construction Phase	Contractor(s)		✓			DEVB TC(W) No. 4/2020

EIA & EM&A Ref. ⁽¹⁾	Environmental Protection Measures	Location / Timing of the Measures	Implementation of Agent	Implementation Stage*				Relevant Legislation & Guidelines
				Des	C	Post-C	O	
	Contract Specification, if applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme.							
S10.7.4	<p>OM1 - Enhanced nullah bed with replacement of concrete lining with natural substrates and planting.</p> <p>OM2 - Enhanced nullah sides with appropriate hard and soft finishes and parapet treatments.</p> <p>OM3 - Enhanced adjacent streetscape with paving, planting and furniture in a manner that responds to the existing and planned urban context.</p> <p>OM4 - Additional viewpoints, seating areas and open space within or adjacent to nullah.</p> <p>OM5 - Enhanced nullah crossings including vehicular, pedestrian and utility bridges with upgraded finishes and treatments.</p> <p>OM6 - Sensitively designed barrage and structures in terms of scale, height and bulk (visual weight).</p> <p>OM7 - Barrage and drainage works visually integrated with their surroundings through use of appropriate building materials and finishes.</p> <p>OM8 - Barrage lighting units to be directional and minimise unnecessary light spill and glare. For further details, see “Charter on External Lighting” and “Guidelines on Industry Best Practices for External Lighting Installations” promulgated by the Environmental Bureau.</p> <p>OM9 - Compensatory tree planting for all felled trees in accordance with relevant Government tree protection requirements. (Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under the relevant technical circulars during the detailed design phase).</p> <p>OM10 - Green roofs and vertical greening on barrage pumping stations and E&M control building.</p>	Whole Site including Barrage / Detailed Design and Operation Phase	Detailed Design Engineer / Project Proponent	✓			✓	-

* Des = Design; C = Construction; Post-C = Post Construction / Before Operation; O = Operation

**ANNEX B
NOISE MONITORING FIELD RECORD
SHEET**

Noise Monitoring Field Record Sheet

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length (min.)		
Noise Meter Model/ Identification		
Calibrator Model/ Identification		
Measurement Results	L ₉₀ (dB(A))	
	L ₁₀ (dB(A))	
	L _{EQ} (dB(A))	
Major Construction Noise Source(s) during Monitoring		
Other Noise Source(s) during Monitoring		
Remarks		

Name & Description Signature Date

Recorded by: _____

Checked by: _____

**ANNEX C
COMPLAINT LOG**

Complaint Log

Ref:

Log Ref	Date	Location	Complainant/ Date of Contact	Details of Complaint	Investigation / Mitigation Action	File Closed

Filed by Environmental Team Leader:

Date:

**ANNEX D
SAMPLE TEMPLATE FOR INTERIM
NOTIFICATIONS OF ENVIRONMENTAL
QUALITY LIMITS EXCEEDANCES**

Agreement No. DC/2022/03

Yuen Long Barrage and Nullah Improvement Schemes

Incident Report on Action Level or Limit Level Non-compliance

Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	
Prepared by	
Designation	
Signature	

**ANNEX E
DUST MONITORING FIELD RECORD
SHEET**

1-hr TSP Air Quality Monitoring

Field Operation Data Log Sheet

Equipment	Model	Equipment No.	Last Calibration/Due Date
Laser Dust Monitoring			/

Monitoring Location	AM / AM		
Description of Location	Fortune Pharmacal Co. Ltd / Shan Pui Chung Hau Tsuen		
Sampling Date and Time			
Weather Condition	Sunny / Fine / Cloudy / Windy / Rainy		
Measuring Parameters	TSP		
	1st hour	2nd hour	3rd hour
Display Value			
For LD-3B : - Display Value ÷ 60 mins x (K Factor:)			
For LD-5R & HAL-HPC301 : - Display Value x (Correlation Factor:)			
Mass Concentration ($\mu\text{g}/\text{m}^3$)			
Site Condition	Main Construction Site		
	Other Construction Site		
Remarks			

	Name	Signature	Date
Recorded By			
Checked By			

**1-hr TSP Air Quality Monitoring
Field Operation Data Log Sheet**

AM1 / AM2

Station: _____

Sampling Date & Time: From: _____ (: am/pm) Collection Date: _____

Operators: _____ Weather: Sunny Cloudy Windy Rainy
Wind: Strong Mild Calm

High Volume Sampler	Model no.	TE-5170
	Blower Motor Serial no.	
	Last Calibration / Due Date	

TSP - Total Suspended Particulates Sampler			
Equipment No.		Set Point	
Slope, m		Intercept, b	
	Initial, I	Final, f	
Ambient Pressure (mmHg), Pa			
Ambient Temperature (K), Ta			
Delta (in. of Water), W			
$Y = [W \times (Pa/760) \times (298/Ta)]^{1/2}$			
Standard flow, Qstd (m ³ /min) = (Y - b)*0.0283/m			
Elapsed Timer Indicator (Hours), T			
Filter Identification no.			
Weight of Filter (g)			
Weight of Particulate (g)			
Mean Standard Flow, $Qstd_{avg} = (Qstd_i + Qstd_f)/2$			
Total Time, Total Time = (Tf - Ti) x 60			
Standard Volume, $Vstd (m^3) = Qstd_{avg} \times \text{Total Time}$			
Particulate Concentration (µg/m³)			
Observed Construction Activities	Main Construction Site		
	Other Construction Site		

Remarks: _____

Conducted by: _____ Signature: _____ Date: _____

Checked by: _____ Signature: _____ Date: _____