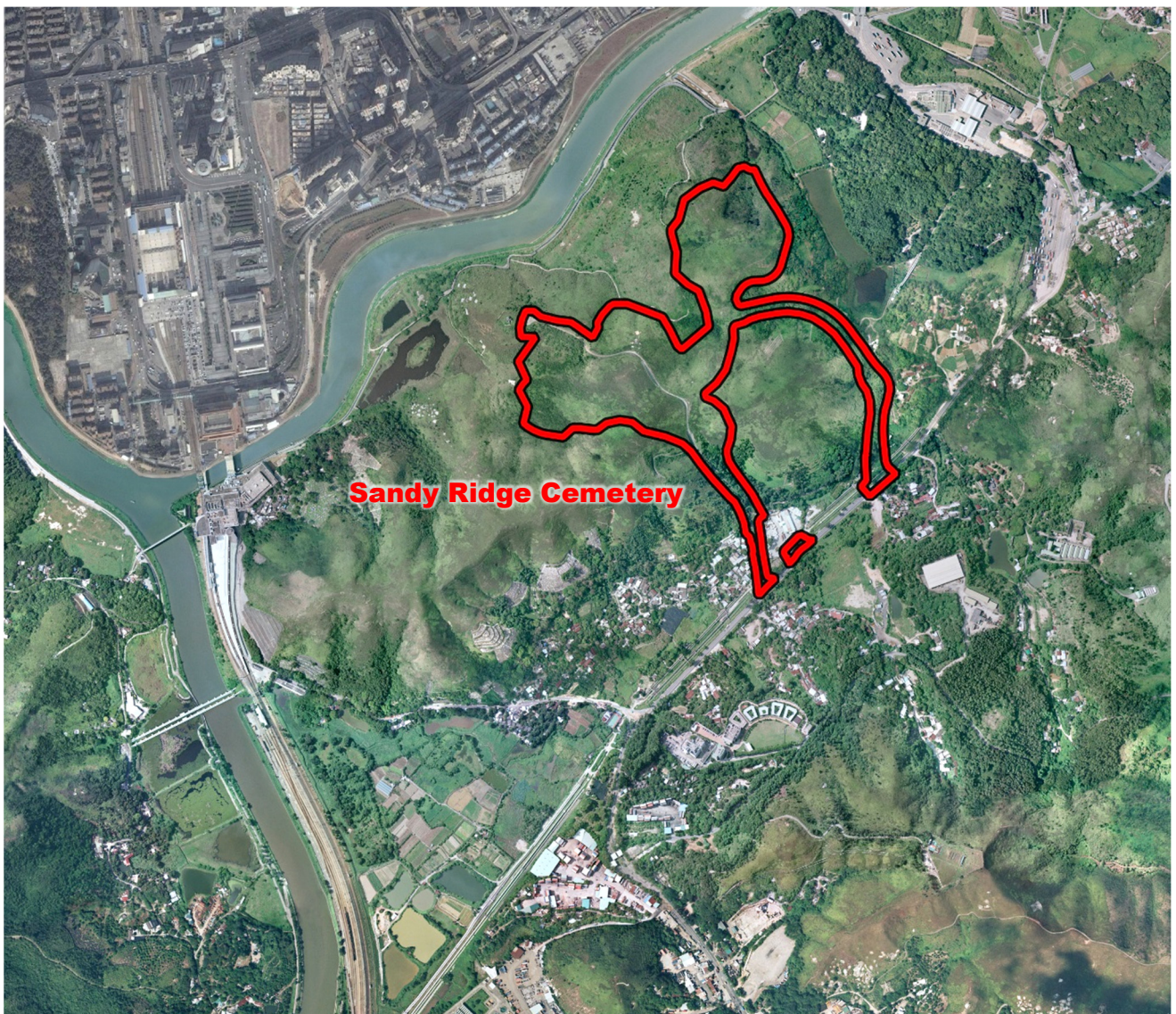


**Agreement No. CE 1/2013 (CE)  
Site Formation and Associated Infrastructural Works for  
Development of Columbarium, Crematorium and Related  
Facilities at Sandy Ridge Cemetery  
– Design and Construction**

**Final Environmental Monitoring and Audit Manual**

**(Ref: REP-054-03)**



Civil Engineering and Development  
Department

**Agreement No. CE1/2013 (CE)**

**Site Formation and Associated  
Infrastructural Works for  
Development of Columbarium,  
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Facilities at Sandy Ridge Cemetery  
– Design and Construction**

**Environmental Monitoring and Audit  
Manual**

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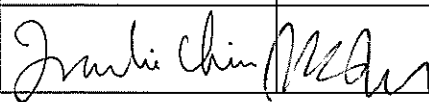
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# Document Verification

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# 1 Introduction

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## 1.1 Background

- 1.1.1.1** As stipulated in the 2010-11 Policy Agenda, the Administration will identify suitable sites for columbarium development across the territory and conduct technical feasibility studies of shortlisted sites to increase supply of columbarium. The Administration will continue to review the provision of cemeteries, columbaria and crematoria facilities and strive to provide more facilities to meet future demand.
- 1.1.1.2** With a growing and aging population in Hong Kong, the number of deaths and the corresponding number of cremations have been rising gradually every year, resulting in an increasing public demand for columbarium facilities. Based on past data, the average annual numbers of deaths and cremations in the next 20 years (i.e. from 2014 to 2033) are estimated to be about 54,000 and 51,000 respectively. Upon completion of the latest reprovisioning projects of Wo Hop Shek and Cape Collinson Crematoria by late 2015, the total annual capacity of all public cremators will be increased from 38,000 sessions to 53,000 sessions. This will sufficiently meet the cremation demand up to around 2024. There is genuine need to construct new crematoria at Sandy Ridge Cemetery to address the demand beyond 2024. As for columbarium, the supply of public niches is uncertain after the completion of the Diamond Hill Columbarium extension, the new public columbarium at Kiu Tau Road in the Wo Hop Shek Cemetery and the Cheung Chau Cemetery extension in 2012 and 2013 providing about 1,500, 43,700 and 1,000 respectively of which allocation of niches would be largely completed in mid 2015. Hence, there is a need to construct new columbarium facilities.
- 1.1.1.3** The Sandy Ridge Cemetery is one of the 24 potential sites for columbarium development in 18 districts announced in three batches in July 2010, December 2010 and April 2011 respectively. Furthermore, it is planned to provide synergistic one-stop services at the Sandy Ridge Cemetery by including at least a funeral parlour and a visitor service centre so as to maximise the convenience to the public. It is hoped that this project will set a new benchmark for the public C&C facilities and services in terms of its functional one-stop services, state-of-the art design incorporating artistic elements of aesthetic appeal where appropriate, greening and landscaping, user-friendly access for visitors and serene surrounding environment. It will be a place where those lost loved ones can rest in eternal peace in a dignified manner, and where family members, relatives and friends can part with and mourn for their loved ones in reasonable privacy, and where visitors will find it pleasant to stay to admire the landscape and the greenery.

- 1.1.1.4** The Sandy Ridge Cemetery is under the management of Food and Environmental Hygiene Department (FEHD) and is located between Lo Wu Boundary Control Point (BCP) and Man Kam To BCP. To the north across Shenzhen River are the residential and commercial areas of Shenzhen. To the east are Man Kam To BCP and San Uk Ling (Indigenous Village). To the south are rural settlements of Sha Ling and existing Government, Institution or Community facilities including the Border District Police Headquarters. To the west are MTR Lo Wu Station, Lo Wu BCP and the hilly terrain of Tai Shek Mo west of the Ng Tung River.
- 1.1.1.5** In March 2011, Food and Hygiene Bureau (FHB) engaged Civil Engineering and Development Department (CEDD) to conduct a feasibility study on the site formation and associated infrastructural works for the development of columbarium facilities providing at least 200,000 niches, a crematorium with 10 cremators, a funeral parlour with 30 service halls and a visitor service centre at Sandy Ridge Cemetery under Agreement No. CE 32/2010 (CE). The feasibility study was substantially completed in September 2012.
- 1.1.1.6** It has been identified in the feasibility study that some elements in the Project are designated projects under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) and require EPs prior to their construction and operation. The Project Profile (No. PP-482/2013) was submitted by CEDD to Environmental Protection Department (EPD) for an Environmental Impact Assessment (EIA) Study Brief under Section 5(1)(a) of the EIAO on 18 February 2013. The EIA Study Brief (EIA Study Brief No.: ESB-257/2013) was formally issued by EPD on 26 March 2013.
- 1.1.1.7** On 28 June 2013, CEDD commissioned Ove Arup & Partners Hong Kong Limited (Arup) under Agreement No. CE 1/2013 to provide consultancy services in respect of Site Formation and Associated Infrastructural Works for Development of Columbarium, Crematorium and Related Facilities at Sandy Ridge Cemetery – Design and Construction (The Assignment). This consultancy also includes the compilation of an EIA Report to fulfil the relevant legislative requirements.
- 1.1.1.8** Subsequent to the issue of the EIA Study Brief No. ESB-257/2013 dated March 2013, the traffic and transport arrangement has been reviewed. In addition to the road widening works at Choi Yuen Road, road widening works along Lin Ma Hang Road are also required within the adjacent areas at Sandy Ridge. Hence, given all these changes, a new Project Profile (PP-503/2014) was submitted to EPD on 13 March 2014. The EIA Study Brief No. 271/2014 was issued by EPD on 23 April 2014.

## 1.2 Purpose of the Manual

1.2.1.1 The purposes of this Environmental Monitoring and Audit (EM&A) Manual are to :

- Guide the set up of an EM&A programme to ensure compliance with the EIA recommendations;
- Specify the requirements for monitoring equipment;
- Propose environmental monitoring points, monitoring frequency etc;
- Propose Action and Limit Level; and
- Propose Event and Action Plan.

1.2.1.2 This Manual outlines the monitoring and audit programme for the construction and operation of the proposed C&C facilities and provides systematic procedures for monitoring, auditing and minimising environmental impacts.

1.2.1.3 Hong Kong environmental regulations and the Hong Kong Planning Standards and Guidelines (HKPSG) have served as environmental standards and guidelines in the preparation of this Manual. In addition, this EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on the EIA Process (TM-EIAO).

1.2.1.4 This Manual contains the following information:

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

**1.2.1.5** For the purpose of this manual, the ER shall refer to the Engineer as defined in the Construction Contract, in cases where the Engineer's powers have been delegated to the ER, in accordance with the Construction Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the environmental monitoring and audit requirements.

## 2 Project Description

### 2.1 General Description of the Project

**2.1.1.1** Section 2 of the EIA Report has described the approaches adopted to avoid and minimise various environmental impacts throughout the design process. The final design has therefore been taken forward as the basis for this EIA to demonstrate that all statutory requirements under EIA Study Brief (ESB-271/2014) and the Environmental Impact Assessment Ordinance (EIAO) are complied with. A brief summary of key elements of the Project is given below:

<u>Area</u>	<u>Proposed Works</u>
Works Within Study Area	<ul style="list-style-type: none"> <li>• Site formation of about 8ha of land for proposed C&amp;C Facilities (including the proposed pick-up and drop-off area for shuttle buses).</li> <li>• Widening of the existing Sha Ling Road (about 900m) - from existing 3m wide to a 7.3m wide single two-lane carriageway, including its associated noise barriers.</li> <li>• Construction of internal roads for C&amp;C Facilities.</li> <li>• Widening of the existing Lin Ma Hang Road (about 1.4km long) – from existing 6m wide to a 7.3m wide single two-lane carriageway, including its associated noise barriers.</li> <li>• Construction of a new road (about 600m) including a section of viaduct connecting platform for Crematorium and Man Kam To Road.</li> <li>• Construction of the pick-up and drop-off point at Man Kam To Road.</li> </ul>
Outside the Columbarium / Crematorium Site	<ul style="list-style-type: none"> <li>• Temporary pick-up and drop-off points of shuttle buses for grave-sweepers during festive periods at MTR Kwu Tung Station, Sheung Shui Landmark North Public Transport Interchange, MTR Fanling Station, and layby at Pak Wo Road near Flora Plaza.</li> <li>• Necessary landscaping, sewerage, waterworks and utility works for the proposed development along Man Kam To Road.</li> <li>• Barging Point at Siu Lam.</li> </ul>

**2.1.1.2** The location plans for the proposed development are shown in **Figures 2.1.1** to **2.1.3**. The plan for the proposed land platform for the C&C facilities at Sandy Ridge Cemetery is shown in **Figure 2.1.1**, and that for the proposed road widening work along Lin Ma Hang Road is shown in **Figure 2.1.2** and the barging point at Siu Lam is

shown in **Figure 2.1.3**. It should be noted that the Crematorium is a separate Schedule 2 designated project and hence the respective project proponent would conduct a separate EIA Report for submission under the EIAO.

## 2.2 Designated Project

**2.2.1.1** The Project comprises the following which are classified as Designated Projects (DPs) as per Schedule 2, Part I of the EIAO:

- Item A.8 – A road or railway bridge more than 100m in length between abutments; and
- Item I.1(b)(vii) – A drainage channel or river training and diversion works which discharges or discharge into an area which is less than 300m from the nearest boundary of an existing or planned conservation area.

**2.2.1.2** One of the new road sections leading from Man Kam To Road up to the platform of the Project comprises of a viaduct section of approximately 300m long. Both ends of the viaduct would need to be in a form as abutments. Since the length between the abutments is more than 100m, it will be a DP under Item A.8 of Schedule 2, Part I of EIAO.

**2.2.1.3** The Conservation Area (CA) at Yuen Leng Chai is located approximately 45m north west of the proposed Project and there is a vertical difference between the proposed platform and the CA. Hence, a portion of the surface run-off from the proposed platform will be drained into this CA. Hence, it will be a DP under Item I.1(b)(vii) of Schedule 2, Part 1 of EIAO.

**2.2.1.4** The locations of the above DPs under the Project are shown in **Figure 2.1.4**.

## 2.3 Concurrent Projects

**2.3.1.1** The C&C facilities that would interface with other major projects and has the potential to lead to cumulative impacts. Expected concurrent / interfacing projects include:

- Operation of the Crematorium at Sandy Ridge;
- Development of Organic Waste Treatment Facilities, Phase 2 (OWTF);
- Police Facilities in Kong Nga Po;
- Widening of Lin Ma Hang Road;
- Liantang / Heung Yuen Wai Boundary Control Point and Associated Works;
- Development of Lok Ma Chau Loop (LMC Loop);

- North East New Territories New Development Area (NENT NDA); and
- Widening of Tolo / Fanling Highway between Island House Interchange and Fanling.

## 2.4 Implementation Programme

**2.4.1.1** According to the latest programme, the construction of the C&C facilities is to commence in 2017. The construction works would take about 5 years and the target commissioning date is in 2022. The tentative construction programme is presented in **Appendix 2.1**.

## 3 Project Organization

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### 3.1 Project Organization

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

3.1.1.2 The leader of the ET shall be an independent party from the Contractor and has relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the ER.

3.1.1.3 The responsibilities of respective parties are:

#### **The Contractor**

- Implement the EIA recommendations and requirements;
- Employ an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit;
- Provide assistance to ET in carrying out monitoring and auditing;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit Levels in accordance with the Event and Action Plans;
- Implement measures to reduce impact where Action and Limit Levels are exceeded; and
- Adhere to the agreed procedures for carrying out compliant investigation.

#### **Environmental Team**

- Set up all the required environmental monitoring stations;
- Monitor various environmental parameters as required in the EM&A Manual;
- Analyse the environmental monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- Carry out site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and take proactive actions to pre-empt problems;
- Audit and prepare audit reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring and audit results to the IEC, Contractor, the ER and EPD or its delegated representative;



- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans;
- Undertake regular on-site audits / inspections and report to the Contractor and the ER of any potential non-compliance;
- Follow up and close out non-compliance actions; and
- Adhere to the procedures for carrying out environmental complaint investigation.

#### **Engineer or Engineer's Representative**

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Assist the Project Proponent in employing an IEC to audit the results of the EM&A works carried out by the ET;
- Comply with the agreed Event Contingency Plan in the event of any exceedance; and
- Adhere to the procedures for carrying out complaint investigations.

#### **Independent Environmental Checker**

- Review the EM&A works performed by the ET (at not less than monthly intervals);
- Audit the monitoring activities and results (at not less than monthly intervals);
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and location of sensitive receivers;
- Report the audit results to the ER and EPD in parallel;
- Review the EM&A reports (monthly and quarterly summary reports) submitted by the ET;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- Report the findings of site inspections and other environmental performance reviews to ER and EPD.

- 3.1.1.4** Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.
- 3.1.1.5** The ET Leader shall have at least 7 years of experience in conducting EM&A for infrastructure projects. His / Her qualification shall be vetted by the ER and the IEC. And the IEC should possess at least 7 years of experience in EM&A.

## 4 Environmental Submission

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### 4.1 Introduction

**4.1.1.1** The Contractor shall prepare the Environmental Management Plan (EMP) (including a Waste Management Plan, WMP), Construction Method Statement prior to the commencement of construction works and obtain approval from ER and IEC and other relevant authorities to encompass the recommended environmental protection / mitigation measures with respect to their latest construction methodology and programme.

### 4.2 Environmental Management Plan

**4.2.1.1** A systematic EMP shall be set up by the Contractor to ensure effective implementation of the mitigation measures, monitoring and remedial requirements presented in EIA, EM&A and Environmental Mitigation Implementation Schedule (EMIS) (See Appendix 13.1 in the EIA Report). The ER and the IEC will audit the implementation status against the EMP and advise the necessary remedial actions required. These remedial actions shall be enforced by the ER through contractual means.

**4.2.1.2** The EMP will require the Contractor (together with its sub-contractors) to define in details how to implement the recommended mitigation measures in order to achieve the environmental performance defined in the Hong Kong environmental legislation and the EIA documentation.

**4.2.1.3** The review of on-site environmental performance shall be undertaken by ER and IEC through a systematic checklist and audit once the construction commences. The environmental performance review programme comprises a regular assessment on the effectiveness of the EMP. Reference should be made to ETWBTC 19 / 2005 “Environmental Management on Construction Sites” or its latest versions, and any other relevant Technical Circulars.

### 4.3 Waste Management Plan

**4.3.1.1** As part of EMP, the Contractor shall include WMP for the construction of the project and prior to the commencement of construction works submit to the ER and IEC for approval. Where waste generation is unavoidable, the opportunities for recycling or reusing should be maximised. If wastes cannot be recycled, recommendations for appropriate disposal routes should be provided in the WMP. A method statement for stockpiling and transportation of the excavated materials and other construction wastes should also be included in the WMP and approved before the commencement of

construction. All mitigation measures arising from the approved WMP shall be fully implemented.

- 4.3.1.2** For the purpose of enhancing the management of Construction and Demolition (C&D) materials including rock, and minimising its generation at source, construction would be undertaken in accordance with the Section 4.1.3 of Chapter 4 in the Project Administration Handbook for Civil Engineering Works (PAH).

## **4.4 Construction Method Statement**

- 4.4.1.1** In case the Contractor would like to adopt alternative construction methods or implementation schedules, it is required to submit details of methodology and equipment to the ER for approval before the work commences. Any changes in construction method shall be reflected in a revised EMP or the Contractor will be required to demonstrate the manner in which the existing EMP should accommodate the proposed changes. The Contractor may need to apply for a Variation of Environmental Permit (VEP) from EPD before commencement of any construction activities.

## 5 Air Quality Impact

---

### 5.1 Introduction

5.1.1.1 The EIA has considered the potential air quality impacts during both the construction and operational phases of the Project. Fugitive dust and vehicular emission would be the key impacts during the construction phase and operational phase respectively.

### 5.2 Mitigation Measures

5.2.1.1 The EIA Report has recommended dust control measures including watering all works area once per hour during working hours. Mitigation measures are not required for the operational phase. All the proposed mitigation measures are summarised in the Environmental Mitigation Implementation Schedule (EMIS) in Appendix 13.1 in the EIA Report.

### 5.3 Air Quality Parameters

5.3.1.1 Monitoring and audit of the Total Suspended Particulate (TSP) levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.

5.3.1.2 One-hour and 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The 24-hour TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval of the IEC, 1-hour TSP levels can be measured by direct reading method which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

5.3.1.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any other local atmospheric factors affecting or affected by site conditions, etc., shall be recorded down in detail. A sample data sheet is shown in **Appendix 5.1**.

### 5.4 Monitoring Equipment

5.4.1.1 High volume samplers (HVSs) complying with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:

- 0.6 – 1.7 m<sup>3</sup> per minute adjustable flow range;

- Equipped with a timing / control device with  $\pm 5$  minutes accuracy for 24 hours operations;
- Installed with elapsed-time meter with  $\pm 2$  minutes accuracy for 24 hours operation;
- Capable of providing a minimum exposed area of  $406\text{cm}^2$ ;
- 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;
- Easily changeable filter; and
- Capable of operating continuously for a 24-hour period.

**5.4.1.2** The ET is responsible for the provision, installation, operation, maintenance, dismantle of the monitoring equipment. They shall ensure that sufficient number of HVSs with an appropriate calibration kit is available for carrying out the baseline monitoring, regular impact 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. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled.

**5.4.1.3** Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at fortnightly intervals. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The concern parties such as IEC shall properly document the calibration data for future reference. All the data should be converted into standard temperature and pressure condition.

**5.4.1.4** 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 in the data sheet as mentioned in **Appendix 5.1**.

**5.4.1.5** If the ET proposes to use a direct reading dust meter to measure 1-hour TSP levels, they shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable results to the HVS. The instrument should also be calibrated regularly, and the 1-hour sampling shall be determined periodically by the HVS to

check the validity and accuracy of the results measured by direct reading method.

**5.4.1.6** Wind data monitoring equipment shall also be provided and set up for logging wind speed and wind direction near the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:

- The wind sensors should be installed at 10m above ground so that they are clear of obstructions or turbulence caused by buildings;
- The wind data should be captured by a data logger, the data shall be downloaded for analysis at least once a month;
- The wind data monitoring equipment should be re-calibrated at least once every six months; and
- Wind direction should be divided into 16 sectors of 22.5 degrees each.

**5.4.1.7** In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.

## **5.5 Laboratory Measurement / Analysis**

**5.5.1.1** 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 should be Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited.

**5.5.1.2** 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 approved by the ER and the measurement procedures shall be demonstrated to the satisfaction of the ER and IEC. IEC shall regularly audit the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader shall provide the ER with one copy of the Title 40 of Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his / her reference.

**5.5.1.3** Filter paper of size 8” x 10” 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-hours and be pre-weighed before use for the sampling.

**5.5.1.4** 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 readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

## 5.6 Monitoring Locations

**5.6.1.1** **Figure 5.1.1** to **Figure 5.1.4** show the locations of the proposed construction dust monitoring station. The status and locations of dust sensitive receivers may change after issuing this manual. If such cases exist, the ET Leader shall proposed updated monitoring locations and seek approval from ER and agreement from the IEC.

**Table 5.1** Construction dust monitoring locations

ID	Location
A1	Village House along Man Kam To Road
A2	Village House at San Uk Ling
A3	Village House at Muk Wu Nga Yiu

**5.6.1.2** When alternative monitoring locations are proposed, the proposed site should, as far as practicable:

- be at the site boundary or such locations close to the major dust emission source;
- be close to the sensitive receptors; and
- take into account the prevailing meteorological conditions.

**5.6.1.3** The ET shall agree with the ER in consultation with the IEC on the position of the HVS for the installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

- a horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
- no two samplers should be placed less than 2 meters apart;
- 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;
- a minimum of 2 meters of separation from walls, parapets and penthouses is required for rooftop samplers;
- a minimum of 2 meters separation from any supporting structure, measured horizontally is required;
- no furnace or incinerator flue is nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20 meters from the dripline;



- any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

**5.6.1.4** The ET may, depending on site conditions and monitoring results, decide whether additional monitoring locations shall be included or any monitoring locations could be removed / relocated during any stage of the construction phase.

## **5.7 Baseline Monitoring**

**5.7.1.1** Baseline monitoring shall be carried out at all of the designated monitoring locations (see **Table 5.1**) for at least 14 consecutive days prior to the commissioning of major construction works to obtain daily 24-hour TSP samples. The selected baseline monitoring stations should reflect baseline conditions at the impact stations. One-hour sampling should also be done at least 3 times per day while the highest dust impact is expected.

**5.7.1.2** During the baseline monitoring, there should not be any major construction or dust generation activities in the vicinity of the monitoring stations. Before commencing baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that, if required, the ER can conduct on-site audit to ensure accuracy of the baseline monitoring results.

**5.7.1.3** In case the baseline monitoring cannot be carried out at the designated monitoring locations, the ET Leader shall carry out the monitoring at alternative locations that can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with the IEC.

**5.7.1.4** In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET 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.

**5.7.1.5** Ambient conditions may vary seasonally and shall be reviewed once every three months. When the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with the IEC and EPD.

## 5.8 Impact Monitoring

- 5.8.1.1** The ET shall carry out impact monitoring during the entire construction period. For regular impact monitoring, the sampling frequency of at least once in every 6 days, shall be strictly observed at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least 3 times in every 6 days should be undertaken when the highest dust impact occurs. Before commencing 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 monitoring results.
- 5.8.1.2** The specific time to start and stop the 24-hour TSP monitoring shall be clearly defined for each location and be strictly followed by the ET.
- 5.8.1.3** In case of non-compliance with the air quality criteria, more frequent monitoring, as specified in the Action Plan in the following section, shall be conducted within the specified timeframe after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified, and agreed with the ER and the IEC.

## 5.9 Action and Limit Levels

- 5.9.1.1** 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 24-hour TSP and 1-hour TSP. **Table 5.2** shows the air quality criteria, namely Action and Limit Levels to be used.

**Table 5.2** Action and Limit Levels for air quality

Parameters	Action	Limit
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 200 \mu\text{g}/\text{m}^3$ , Action level = $(\text{baseline level} * 1.3 + \text{Limit level})/2$ ; For baseline level $> 200 \mu\text{g}/\text{m}^3$ , Action level = Limit level	260 $\mu\text{g}/\text{m}^3$
1-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$ , Action level = $(\text{baseline level} * 1.3 + \text{Limit level})/2$ ; For baseline level $> 384 \mu\text{g}/\text{m}^3$ , Action level = Limit level	500 $\mu\text{g}/\text{m}^3$

## 5.10 Event and Action Plan

**5.10.1.1** Should non-compliance of the air quality criteria occur, actions in accordance with the Action Plan in **Table 5.3** shall be carried out.

**Table 5.3** Event and Action Plan for air quality

Event	Action			
	ET	IEC	ER	Contractor
Action level exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>2. Inform IEC and ER;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase monitoring frequency to daily.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify Contractor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rectify any unacceptable practice;</li> <li>2. Amend working methods if appropriate.</li> </ol>
Action level exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Identify source;</li> <li>2. Inform IEC and ER;</li> <li>3. Advise the ER on the effectiveness of the proposed remedial measures;</li> <li>4. Repeat measurements to confirm findings;</li> <li>5. Increase monitoring frequency to daily;</li> <li>6. Discuss with IEC and Contractor on remedial actions required;</li> <li>7. If exceedance continues, arrange meeting with IEC and</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor on possible remedial measures;</li> <li>4. Advise the ET on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise Implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Ensure remedial measures properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit proposals for remedial to ER within 3 working days of notification;</li> <li>2. Implement the agreed proposals;</li> <li>3. Amend proposal if appropriate.</li> </ol>

Event	Action			
	ET	IEC	ER	Contractor
	ER; 8. If exceedance stops, cease additional monitoring.			
Limit level exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>2. Inform ER, Contractor and EPD;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase monitoring frequency to daily;</li> <li>5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor on possible remedial measures;</li> <li>4. Advise the ER on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Ensure remedial measures properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>Implement the agreed proposals;</li> <li>4. Amend proposal if appropriate.</li> </ol>
Limit level exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Notify IEC, ER, Contractor and EPD;</li> <li>2. Identify source;</li> <li>3. Repeat measurement to confirm findings;</li> <li>4. Increase monitoring frequency to daily;</li> <li>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst ER, ET, and Contractor on the potential remedial actions;</li> <li>2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly;</li> <li>3. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented;</li> <li>4. Ensure remedial measures properly</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Resubmit proposals if problem still not under</li> </ol>

Event	Action			
	ET	IEC	ER	Contractor
	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; 8. If exceedance stops, cease additional monitoring.		implemented; 5. 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.	control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Note:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer’s Representative

## 6 Noise Impact

### 6.1 Introduction

**6.1.1.1** The EIA has considered the potential noise impacts during both the construction and operational phases of the Project. Construction noise from mechanical equipment would be the key impacts during the construction phases in which site clearance and formation works for columbarium and crematorium area, road widening works for Sha Ling Road and Lin Ma Hang Road, slope works, construction of new ramps and tipping halls to facilitate barging point operation etc. would need to be conducted. Road traffic noise from Man Kam To Road, Sha Ling Road and Lin Ma Hang Road would also affect the neighbouring sensitive receivers during operational phase.

### 6.2 Mitigation Measures

#### 6.2.1 Construction Phase

**6.2.1.1** The EIA Report has recommended construction noise mitigation measures including the use of quiet plant and temporary noise barriers, etc. All the proposed mitigation measures are summarised in the EMIS in Appendix 13.1 in the EIA Report.

#### 6.2.2 Operational Noise

**6.2.2.1** A series of noise mitigation measures including absorptive noise barriers and low noise surfacing materials would need to be implemented along Sha Ling Road and Lin Ma Hang Road. These mitigation measures are listed in **Table 6.1** and are shown in **Figure 6.1.1** to **Figure 6.1.5**.

**Table 6.1** Noise mitigation measures for operational phase

Mitigation Measure ID	Location	Type of Mitigation Measures <sup>[1]</sup>
<b>For Existing NSRs</b>		
MM1	Along Sha Ling Road	Approx. 12m long, 2.5m high ANB
MM2	Along Sha Ling Road	Approx. 92m long, 2.5m high ANB
MM3	Along Project Road near Sha Ling Road	Approx. 28m long, 3m high ANB
MM4	Along Project Road near Sha Ling Road	Approx. 51m long, 3m high ANB
MM5	Along Lin Ma Hang Road near San Uk Ling	Approx. 25m long, 4m high ANB
MM6	Along Lin Ma Hang Road near San Uk Ling	Approx. 21m long, 4m high ANB
MM7	Along Lin Ma Hang Road near San Uk	Approx. 14m long, 4m high ANB

Mitigation Measure ID	Location	Type of Mitigation Measures <sup>[1]</sup>
	Ling	
MM8	Along Lin Ma Hang Road near San Uk Ling	Approx. 18m long, 3m high ANB
MM9	Along temporary pullover space opposite San Uk Ling	Approx. 42m long, 3m high ANB
MM10	Along Lin Ma Hang Road opposite San Uk Ling	Approx. 93m long, 3m high ANB
MM11	Along Lin Ma Hang Road near San Uk Ling	Approx. 185m long, low noise surfacing materials
<b>For Planned NSRs <sup>[2]</sup></b>		
MM12	Along Lin Ma Hang Road near Muk Wu Nga Yiu	Approx. 36m long, 5m high ANB
MM13	Along Lin Ma Hang Road near Muk Wu Nga Yiu	Approx. 47m long, 5m high ANB
MM14	Along Lin Ma Hang Road near Muk Wu Nga Yiu	Approx. 31m long, 5m high ANB
MM15	Along Lin Ma Hang Road near Muk Wu Nga Yiu	Approx. 31m long, 5m high ANB
MM16	Along Lin Ma Hang Road near Muk Wu Nga Yiu	Approx. 41m long, 5m high ANB
MM17	Along Lin Ma Hang Road near Muk Wu Nga Yiu	Approx. 340m long, low noise surfacing materials

Note:

[1] ANB – Absorptive noise barrier.

[2] Planned NSRs are assigned within the “V” zone of Muk Wu Nga Yiu.

## 6.3 Noise Monitoring Parameters

### 6.3.1 Noise Monitoring Parameter for Construction Phase

**6.3.1.1** Construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level ( $L_{eq}$ ).  $L_{eq(30min)}$  shall be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays. For all other time periods,  $L_{eq(5min)}$  shall be employed for comparison with the Noise Control Ordinance (NCO) criteria. A sample data sheet is shown in **Appendix 6.1**.

**6.3.1.2** As supplementary information for data auditing, statistical results such as  $L_{10}$  and  $L_{90}$  shall also be obtained for reference.

## 6.3.2 Noise Monitoring Parameter for Operational Phase

- 6.3.2.1** The traffic noise level shall be measured twice within the first year of the road opening. Measurement shall be made in terms of A-weighted  $L_{10}$  over three half-hour periods during the peak traffic hour. Other metrics like  $L_{eq}$  may be added as seen fit.
- 6.3.2.2** As supplementary information for data auditing, statistical results such as  $L_{10}$  and  $L_{90}$  shall also be obtained for reference.

## 6.4 Monitoring Equipment

### 6.4.1 Monitoring Equipment for Construction and Operational Phases

- 6.4.1.1** As referred to in the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter shall 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.
- 6.4.1.2** Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.
- 6.4.1.3** The ET is responsible for the provision, installation, operation, maintenance, dismantle of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled.

## 6.5 Monitoring Locations

### 6.5.1 Monitoring Locations for Construction Phase

- 6.5.1.1** The most representative and affected NSRs were selected as monitoring stations and details could be referred to EIA Report. The locations of construction airborne noise monitoring stations are summarised in table below and shown in **Figure 6.2.1** to **Figure 6.2.4**.

**Table 6.2** Proposed construction noise monitoring locations

Location ID	NSR ID	Description
CN-1	N5-2	Village house to the west of Sha Ling Road



Location ID	NSR ID	Description
CN-2	N9-1	Village house to the north of Man Kam To Road
CN-3	N18-5	Village house near San Uk Ling
CN-4	N21-4	Village house of Muk Wu

**6.5.1.2** The ET shall select the monitoring locations from the above table based on the locations of the construction activities and seek approval from ER and agreement from the IEC and EPD to the proposal. The monitoring locations should be chosen based on the following criteria:

- At locations close to the major site activities which are likely to have noise impacts;
- Close to the most affected existing 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.

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

**6.5.1.4** The ET may, depending on site conditions and monitoring results, decide whether additional monitoring locations shall be included or any monitoring locations could be removed / relocated during any stage of the construction phase.

## 6.5.2 Monitoring Locations for Operational Phase

**6.5.2.1** The locations of road traffic noise monitoring stations are summarised in table below and shown in **Figure 6.3.1** to **Figure 6.3.5**.

**Table 6.3** Proposed road traffic noise monitoring locations

Location ID	NSR ID	Description
ON-1	N5-2	Village house to the west of Sha Ling Road
ON-2	N9-1	Village house to the north of Man Kam To Road
ON-3	N18-5	Village house near San Uk Ling
ON-4	N23-4	Village house of Muk Wu Nga Yiu

**6.5.2.2** The ET shall select the monitoring location and seek approval from ER and agreement from the IEC and EPD to the proposal. The ER/IEC/EPD may also request a closer locations based on on-site conditions and environmental complaint. The monitoring locations should be chosen based on the following criteria:

- At locations close to the noise mitigation measures such as noise barriers;
- Close to the most affected existing 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.

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

## **6.6 Baseline Monitoring**

**6.6.1.1** The ET shall carry out baseline noise monitoring prior to the commencement of the construction works. There shall not be any construction activities in the vicinity of the stations during the baseline monitoring. Continuous baseline noise monitoring for the A-weighted levels  $L_{eq}$ ,  $L_{10}$  and  $L_{90}$  shall be carried out daily for a period of at least two weeks in a sample period of 5 minutes or 30 minutes between 0700 and 1900, and 5 minutes between 1900 and 0700. A schedule on the baseline monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

**6.6.1.2** In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET 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 the ER for approval.

## **6.7 Impact Monitoring**

### **6.7.1 Impact Monitoring for Construction Phase**

**6.7.1.1** During normal construction working hour (0700-1900 Monday to Saturday), monitoring of  $L_{eq, (30min)}$  noise levels (as six consecutive  $L_{eq, (5min)}$  readings) shall be carried out at the agreed monitoring locations once every week in accordance with the methodology in the TM.

**6.7.1.2** In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan, shall be carried

out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

**6.7.1.3** A schedule on the compliance monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

## **6.7.2 Impact Monitoring for Road Traffic Noise during Operational Phase**

**6.7.2.1** The ET should prepare and deposit to EPD, at least 6 months before the operation of the proposed roads under the Project, a monitoring plan for the purpose of assessing the accuracy of traffic noise predictions by comparing the noise impact predictions with the actual impacts. The monitoring plan should contain monitoring locations, monitoring schedules, methodology of noise monitoring including noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. The ET should implement the monitoring plan in accordance with the deposited monitoring plan unless with prior justifications. Monitoring details and results including the comparison between the measured noise levels and the predicted levels should be recorded in a report to be deposited with EPD within one month of the completion of the monitoring. The report should be certified by the ET Leader before deposit with EPD.

**6.7.2.2** Traffic noise monitoring shall be carried out at all the designated traffic noise monitoring stations. The following is an initial guide on the traffic noise monitoring requirements during the operational phase:

- two sets of measurements at the morning traffic peak hour on normal days;
- one set of measurement at the morning traffic peak hour on festival days;
- a concurrent census of traffic flow and percentage heavy vehicles shall be conducted for the Project Road and the existing road network in the vicinity of each measurement points;
- average vehicle speed estimated for Project Road and the existing road network in the vicinity of each measuring points; and
- the three sets of monitoring data shall be obtained within the first year of operation.

**6.7.2.3** Measured noise levels shall be compared with the predicted noise levels by applying appropriate conversion corrections to allow for the traffic conditions at the time of measurement.

## 6.8 Action and Limit Levels

**6.8.1.1** The ET shall compare the construction noise monitoring results with noise criteria. **Table 6.4** shows the noise criteria, namely Action and Limit Levels to be used.

**Table 6.4** Action and Limit Levels for construction noise

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

Note :

If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.

\* Reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.

## 6.9 Event and Action Plan

### 6.9.1 Event and Action Plan for Construction Phase

6.9.1.1 Should non-compliance of the noise criteria occur, actions in accordance with the Action Plan in **Table 6.5** shall be carried out.

**Table 6.5** Event and Action Plan for construction noise

Event	Level	Action			
		ET	IEC	ER	Contractor
Action Exceedance	Level	<ol style="list-style-type: none"> <li>1. Notify IEC, ER and Contractor;</li> <li>2. Carry out investigation;</li> <li>3. Report the results of investigation to the IEC, ER and Contractor;</li> <li>4. Discuss with the Contractor and formulate remedial measures;</li> <li>5. Increase monitoring frequency to check mitigation effectiveness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review the analysed results submitted by the ET;</li> <li>2. Review the proposed remedial measures by the Contractor and advise the ER accordingly;</li> <li>3. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Require Contractor to propose remedial measures for the analysed noise problem;</li> <li>4. Ensure remedial measures are properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit noise mitigation proposals to IEC and ER;</li> <li>2. Implement noise mitigation proposals.</li> </ol>
Limit Exceedance	Level	<ol style="list-style-type: none"> <li>1. Identify source;</li> <li>2. Inform IEC, ER, EPD and Contractor;</li> <li>3. Repeat measurements to</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst ER, ET, and Contractor on the potential remedial actions;</li> <li>2. Review Contractors</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of</li> </ol>

Event	Action			
	ET	IEC	ER	Contractor
	confirm findings; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor’s working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor’s remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures properly implemented; 5. 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.	notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Note:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer’s Representative

**6.9.1.2** For the traffic noise, the measured / monitored noise levels shall be compared with the predicted results and the predicted traffic flow conditions (calculated noise levels based on concurrent traffic census obtained). In case discrepancies are observed, explanation shall be given to justify the discrepancies.

## 7 Water Quality Impact

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### 7.1 Introduction

**7.1.1.1** The EIA Report has assessed the water quality impacts associated with the Project. According to the EIA Report, the water quality impact could be minimised with the implementation of mitigation measures. The water quality monitoring programme as discussed below could ensure the implementation of the recommended mitigation measures and provide continue improvements to the environmental conditions.

### 7.2 Mitigation Measures

**7.2.1.1** The EIA Report has recommended construction phase mitigation measures. All the prepared mitigation measures are summarised in the EMIS in Appendix 13.1 in the EIA Report.

### 7.3 Water Monitoring Parameters

**7.3.1.1** The monitoring shall normally be established by measuring the dissolved oxygen (DO), temperature, turbidity, salinity, pH, stream flow velocity and suspended solids (SS) in water bodies at all designated locations as specified in **Section 7.6**.

**7.3.1.2** The measurements shall be taken at all designated monitoring stations 3 days per week. The interval between two sampling surveys shall not be less than 36 hours.

**7.3.1.3** Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database. DO, pH value, salinity, temperature and turbidity should be measured in-situ whereas other parameters should be determined by an accredited laboratory.

**7.3.1.4** Other relevant data shall also be recorded, including monitoring location / position, time, water depth, tidal stages, weather conditions and any special phenomena or work underway at the construction site.

### 7.4 Monitoring Equipment

#### 7.4.1 Dissolved Oxygen and Temperature Measuring Equipment

**7.4.1.1** The dissolved oxygen (DO) measuring instruments should be portable and weatherproof. The equipment should also complete with cable and sensor, and DC power source. It should be capable of measuring:

- A DO level in the range of 0 – 20 mg/L and 0 – 200% saturation; and



- A temperature of 0 – 45 degree Celsius.

**7.4.1.2** The equipment should have a membrane electrode with automatic temperature compensation complete with a cable.

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

## **7.4.2 Turbidity Measuring Equipment**

**7.4.2.1** The turbidity measuring instruments should be a portable and weatherproof with DC power source. It should have a photoelectric sensor capable of measuring turbidity level between 0 – 1000 NTU (for example, Hach model 2100P or an approved similar instrument).

## **7.4.3 Salinity Measuring Equipment**

**7.4.3.1** A portable salinometer capable of measuring salinity in the range of 0 – 40 parts per thousand (ppt) should be provided for measuring salinity of the water at each monitoring location.

## **7.4.4 pH Measuring Equipment**

**7.4.4.1** A portable pH meter capable of measuring a pH range between 0.0 and 14.0 shall be provided under the specified conditions (e.g., Orion Model 250A or an approved similar instrument).

## **7.4.5 Positioning Equipment**

**7.4.5.1** A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication and Radio Technical Commission for maritime (RTCM) Type 16 error message “screen pop-up” facilities (for real-time auto-display of error messages and DGPS corrections from the Hong Kong Hydrographic Office), or other equipment instrument of similar accuracy, should be provided and used during marine water monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

## **7.4.6 Water Depth Detector**

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

## **7.4.7 Water Sampling Equipment**

**7.4.7.1** A water sampler is required for SS, Ammonia (as N), Nitrite (as N) and Nitrate (as N) monitoring. It should comprise a transparent PVC

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

## **7.4.8 Sample Containers and Storage**

**7.4.8.1** Water samples for SS should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and shipment to the testing laboratory. The samples shall be delivered to the laboratory within 24 hours of collection and be analysed as soon as possible after collection.

## **7.4.9 Calibration of In-Situ Instruments**

**7.4.9.1** The pH meter, DO meter and turbidimeter shall be checked and calibrated before use. DO meter and turbidimeter shall be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at quarterly basis throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring station.

## **7.4.10 Back-up Equipment and Vessels**

**7.4.10.1** Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, malfunction, etc.

**7.4.10.2** The water quality monitoring will involve four monitoring stations and measurements should be conducted within the prescribed tidal conditions in order to ensure the measurement / samples are representative. A multi-probe monitoring equipment set integrated with water sampler(s) is highly recommended to improve the monitoring efficiency. Depending on the actual operation, more than one field survey vessels might be required simultaneously to ensure the monitoring are conducted within the acceptable monitoring period. The ET shall also consider the use of unattended automatic sampling / monitoring devices at fixed stations where monitoring are required throughout the construction period. The use of such unattended automatic devices, however, shall be subject to the approval of the ER, IEC and EPD.

## 7.5 Laboratory Measurement / Analysis

- 7.5.1.1** At least 3 replicate samples from each independent sampling event are required for the SS, copper measurement which shall be carried in a HOKLAS or international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the laboratory measurement and analysis. The laboratory determination work shall start within 24 hours after collection of the water samples. The analysis for suspended solids is presented in **Table 7.1**.

**Table 7.1** Laboratory analysis

Parameters	Analytical Method	Reporting Limit
Suspended Solid (SS)	APHA 2540-D <sup>[1]</sup>	0.5mg/L

## 7.6 Monitoring Locations

- 7.6.1.1** Water quality monitoring will be carried out at 4 locations (M1-M4) of the stream/pond nearby the project site during C&C construction.
- 7.6.1.2** The proposed water quality monitoring locations are shown in **Figure 7.1.1** and listed in **Table 7.2**. The ET shall seek approval from IEC and EPD for any alternative monitoring locations.

**Table 7.2** Locations of proposed water quality monitoring stations

Monitoring Station	Location
M1	Midstream of Nam Hang Stream
M2	Downstream of Nam Hang Stream
M3	Wetland in the Conservation Area (CA) near Yuen Leng Chai
M4	Watercourse across Lin Ma Hang Road, running from east of San Uk Ling to Man Kam To Boundary Control Point

## 7.7 Baseline Monitoring

- 7.7.1.1** Baseline conditions for water quality shall be established and agreed with EPD prior to commencement of construction works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the construction works and to demonstrate the suitability of the proposed impact and control monitoring stations.
- 7.7.1.2** The baseline monitoring shall be conducted for at least 4 weeks prior to the commencement of construction works. The proposed water quality monitoring schedule shall be submitted to EPD by the ET at least 2 weeks before the first day of the monitoring month. The interval between two sets of monitoring shall not be less than 36 hours. EPD shall also be notified immediately for any changes in schedule.
- 7.7.1.3** In general, where the difference in value between the first and second in-situ measurement of DO or turbidity parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings should be taken.
- 7.7.1.4** There should be no construction work in the vicinity of the stations during the baseline monitoring. The baseline data will be used to establish the Action and Limit Levels. The determination of Action and Limit Levels will be discussed in **Section 7.9**.
- 7.7.1.5** **Table 7.3** below summarises the proposed monitoring frequency and water quality parameters for baseline monitoring.

**Table 7.3** Proposed water quality monitoring programme

Item	Baseline Monitoring
Monitoring Period	At least 4 weeks prior to the commencement of construction work
Monitoring Frequency	3 Days in a Week
Monitoring Locations	M1, M2, M3, M4
Monitoring Parameters	Dissolved oxygen (DO), temperature, turbidity, salinity, pH, stream flow velocity and suspended solids (SS).
Intervals between 2 Sets of Monitoring	Not less than 36 hours

## 7.8 Impact Monitoring

- 7.8.1.1** The impact monitoring shall be conducted during construction period. The purpose of impact monitoring is to ensure the implementation of the recommended mitigation measures, provide effective control of any malpractices, and provide continuous improvements to the environmental conditions. The proposed water quality monitoring schedule shall be submitted to EPD by the ET at least 2 weeks before the first day of the monitoring month. The interval between two sets of monitoring shall not be less than 36 hours. EPD shall also be notified immediately for any changes in schedule.
- 7.8.1.2** In general, where the difference in value between the first and second in-situ measurement of DO or turbidity parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings should be taken.
- 7.8.1.3** In case of project-related exceedances of Action and/or Limit Levels, the impact monitoring frequency shall be increased according to the requirement of Event and Action Plan. The details of Event Action Plan will be discussed in **Section 7.10**.
- 7.8.1.4** **Table 7.4** below summarises the proposed monitoring frequency and water quality parameters for and impact monitoring.

**Table 7.4** Proposed water quality monitoring programme

Item	Impact Monitoring
Monitoring Period	During entire construction period
Monitoring Frequency	3 Days in a Week
Monitoring Locations	M1, M2, M3, M4
Monitoring Parameters	Dissolved oxygen (DO), temperature, turbidity, salinity, pH, stream flow velocity and suspended solids (SS)
Intervals between 2 Sets of Monitoring	Not less than 36 hours

## 7.9 Action and Limit Levels

- 7.9.1.1** The Action and Limit Levels for water quality are defined in **Table 7.5** below.

**Table 7.5** Action and Limit Levels for water quality

Parameters	Action Level	Limit Level
DO in mg/L	5 percentile of baseline data. <sup>[1]</sup>	4 mg/L or 1 percentile of baseline data. <sup>[1]</sup>
SS in mg/L	95 percentile of baseline data or 120% of upstream control station. <sup>[2]</sup>	99 percentile of baseline data or 130% of upstream control station. <sup>[2]</sup>
Turbidity in NTU	95 percentile of baseline data or	99 percentile of baseline data or

Parameters	Action Level	Limit Level
	120% of upstream control station. <sup>[2]</sup>	130% of upstream control station. <sup>[2]</sup>

Note:

- [1] For DO, non-compliance occurs when monitoring results is lower than the limits.
- [2] For SS and turbidity, non-compliance occurs when monitoring results is larger than the limits.

## 7.10 Event and Action Plan

**7.10.1.1** Should non-compliance of the criteria occur, action in accordance with the Action Plan in the **Table 7.6** below shall be carried out.

**Table 7.6** Event and Action Plan for water quality

Event	Action			
	ET	IEC	ER	Contractor
Action level exceedance for one sampling day	<ol style="list-style-type: none"> <li>1. Inform IEC, Contractor and ER;</li> <li>2. Check monitoring data, all plant, equipment and Contractor's working methods; and</li> <li>3. Discuss remedial measures with IEC and Contractor and ER.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET, ER and Contractor on the implemented mitigation measures;</li> <li>2. Review proposals on remedial measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC, ET and Contractor on the implemented mitigation measures;</li> <li>2. Make agreement on the remedial measures to be implemented;</li> <li>3. Supervise the implementation of agreed remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify source(s) of impact;</li> <li>2. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>3. Rectify unacceptable practice;</li> <li>4. Check all plant and equipment;</li> <li>5. Consider changes of working methods;</li> <li>6. Discuss with ER, ET and IEC and purpose remedial measures to IEC and ER; and</li> <li>7. Implement the agreed mitigation measures.</li> </ol>
Action level exceedance for more	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement on next day</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET, Contractor and ER on the</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET, IEC and Contractor on the</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify source(s) of impact;</li> </ol>

Event	Action			
	ET	IEC	ER	Contractor
than one consecutive sampling days	<ul style="list-style-type: none"> <li>of exceedance to confirm findings;</li> <li>2. Inform IEC, contractor and ER;</li> <li>3. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>4. Discuss remedial measures with IEC, contractor and ER</li> <li>5. Ensure remedial measures are implemented</li> </ul>	<ul style="list-style-type: none"> <li>implemented mitigation measures;</li> <li>2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>proposed mitigation measures;</li> <li>2. Make agreement on the remedial measures to be implemented ; and</li> <li>3. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures.</li> </ul>	<ul style="list-style-type: none"> <li>2. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>3. Rectify unacceptable practice;</li> <li>4. Check all plant and equipment and consider changes of working methods;</li> <li>5. Discuss with ET, IEC and ER and submit proposal of remedial measures to ER and IEC within 3 working days of notification; and</li> <li>6. Implement the agreed mitigation measures.</li> </ul>
Limit level exceedance for one sampling day	<ul style="list-style-type: none"> <li>1. Repeat measurement on next day of exceedance to confirm findings;</li> <li>2. Inform IEC, contractor and ER;</li> <li>3. Rectify unacceptable practice;</li> <li>4. Check monitoring data,</li> </ul>	<ul style="list-style-type: none"> <li>1. Discuss with ET, Contractor and ER on the implemented mitigation measures;</li> <li>2. Review the proposed remedial measures submitted by Contractor and advise the ER</li> </ul>	<ul style="list-style-type: none"> <li>1. Discuss with ET, IEC and Contractor on the implemented remedial measures;</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on the</li> </ul>	<ul style="list-style-type: none"> <li>1. Identify source(s) of impact;</li> <li>2. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>3. Rectify unacceptable practice;</li> </ul>



Event	Action			
	ET	IEC	ER	Contractor
	<p>all plant, equipment and Contractor's working methods;</p> <p>5. Consider changes of working methods;</p> <p>6. Discuss mitigation measures with IEC, ER and Contractor; and</p> <p>7. Ensure the agreed remedial measures are implemented</p>	<p>accordingly; and</p> <p>3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.</p>	<p>remedial measures to be implemented; and</p> <p>4. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures.</p>	<p>4. Check all plant and equipment and consider changes of working methods;</p> <p>5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and</p> <p>6. Implement the agreed remedial measures.</p>
Limit level exceedance for more than one consecutive sampling days	<p>1. Inform IEC, contractor and ER;</p> <p>2. Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>3. Discuss mitigation measures with IEC, ER and Contractor; and</p> <p>4. Ensure mitigation measures are implemented; and</p> <p>5. Increase the monitoring</p>	<p>1. Discuss with ET, Contractor and ER on the implemented mitigation measures;</p> <p>2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and</p> <p>3. Review and advise the ET and ER on the effectiveness of the implemented mitigation</p>	<p>1. Discuss with ET, IEC and Contractor on the implemented remedial measures;</p> <p>2. Request Contractor to critically review the working methods;</p> <p>3. Make agreement on the remedial measures to be implemented;</p> <p>4. Discuss with ET and IEC on the effectiveness of the implemented</p>	<p>1. Identify source(s) of impact;</p> <p>2. Inform the ER and confirm notification of the non-compliance in writing;</p> <p>3. Rectify unacceptable practice;</p> <p>4. Check all plant and equipment and consider changes of working methods;</p> <p>5. Discuss with ET, IEC</p>

Event	Action			
	ET	IEC	ER	Contractor
	frequency to daily until no exceedance of Limit Level for two consecutive days	measures.	mitigation measures; and 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the dredging activities until no exceedance of Limit level.	and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed remedial measures. 7. As directed by the ER, to slow down or stop all or part of the dredging activities until no exceedance of Limit level.

Note:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer’s Representative

Each step of actions required shall be implemented within 1 working days unless otherwise specified or agreed with EPD.

## 8 Waste Management Implications

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### 8.1 Introduction

**8.1.1.1** The quantity and timing for the generation of waste during the construction phase have been estimated. Measures including the opportunity for on-site sorting, reusing excavated materials etc., are devised in the construction methodology to minimise the surplus materials to be disposed off-site. Proper disposal of chemical waste should be via a licensed waste collector.

### 8.2 Mitigation Measures

**8.2.1.1** All the proposed mitigation measures are stipulated in the EIA Report and summarised in the EMIS in Appendix 13.1 in the EIA Report.

**8.2.1.2** EM&A requirements are required for waste management during the construction phase only and the effective management of waste arising during the construction phase will be monitored through the site audit programme. The aims of the waste audit are:

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

**8.2.1.3** A trip-ticket system should be operated to monitor all movements of chemical wastes which will be collected by a licensed collector to a licensed facility for final treatment and disposal. Recommendations have been made to ensure proper treatment and proper disposal of these wastes in the EIA Report and summarised in the EMIS in Appendix 13.1 in the EIA Report.

**8.2.1.4** According to Section 7.3.3 in the EIA report a Construction & Demolition Material Management Plan (C&DMMP) shall be submitted to the Public Fill Committee (PFC) for approval in the case of C&D materials disposal exceeding 50,000m<sup>3</sup>. The C&DMMP was submitted to the PFC in January 2016 after being approved by the CEDD Vetting Committee. The C&DMMP is currently under the consideration of the PFC.

**8.2.1.5** According to Section 7.3.4 in the EIA report, the Contractor should prepare a Waste Management Plan (WMP) as part of the Environmental Management Plan (EMP) in accordance with the ETWB TC(W) No. 19/2005 for construction phase. The EMP should be submitted to the Engineer for approval. Mitigation measures proposed in the EIA Report and summarised in the EMIS should be adopted.

**8.2.1.6** The types and quantities of waste that would be generated during the operational phase have been assessed. A reputable waste collector should be employed to remove general refuse during routine road cleaning activities on the roads network as stated in the EIA Report and EMIS. It is anticipated there would not be any insurmountable impacts during the operational phase.

## 8.3 Waste EM&A Requirements

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

- Chemical Waste Permits / licenses under the Waste Disposal Ordinance (Cap 354);
- Public Dumping Licence under the Land (Miscellaneous Provisions) Ordinance (Cap 28);
- Marine Dumping Permit under the Dumping at Sea Ordinance (Cap 466); and
- Effluent Discharge Licence under the Water Pollution Control Ordinance; and
- Approval of Construction & Demolition Material Management Plan (C&DMMP).

**8.3.1.2** The Contractor shall refer to the relevant booklets issued by the DEP when applying for the licence/permit and the ET shall refer to these booklets for auditing purposes.

## 8.4 Site Audit Requirements

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

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

## 9 Land Contamination Impact

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### 9.1 Introduction

- 9.1.1.1 The EIA Report has assessed the land contamination associated with the Project.

### 9.2 Proposed Site Investigation for Potentially Contaminated Areas

- 9.2.1.1 As outlined in Sections 8.4 and 8.5 of the EIA report, after site surveys and information request from the relevant authorities, one area, SRC-1, was identified as an area with potentially contaminated land. However, as seen in Figure 3.1 of the Land Contamination Assessment Report (Appendix 8.1 in the EIA Report), approximate 92 % of the site (~7,700m<sup>2</sup>) is located within a private land lot and it is currently under operation. In addition, according to the latest land resumption programme as advised by Engineer, only the western portion of SRC-1 with an area of approximate 1,200m<sup>2</sup> inside private lot would require land resumption for the road widening work at Sha Ling Road and utilities construction works nearby. As such, the necessity of Site Investigation (SI) should focus on this area once the land is resumed and free for access.
- 9.2.1.2 For the remaining 8 % of the site (~620m<sup>2</sup>) which falls within government lot (to the southeast of SRC-1), only paved ground was observed and neither concrete & asphalt production nor open storage activities were observed during the site survey. In addition, review of historical aerial photos (since Year 1973) also revealed no sign of land contamination. As such, SI is considered not required for this strip of land.
- 9.2.1.3 As outlined in Section 8.9 of the EIA report, upon land resumption and prior to environmental SI, re-appraisal of the contaminated site should be carried out once the works area for the Project is confirmed and site access is available (e.g. after land resumption), to identify any hot spots for SI within the southeast and western portions of SRC-1. A complete site walkover checklist should be completed and should any hot spots are identified, complete justification should be provided outlining the potential sources of contamination.

### 9.3 Submission Requirements of CAP, CAR, RAP and RR

- 9.3.1.1 The PP would need to prepare a Contamination Assessment Plan (CAP) presenting the findings of the re-appraisal and strategy of the recommended SI, if required, and submit to EPD for review and approval.
- 9.3.1.2 Following the completion of environmental SI and lab testing works, if required, the Project Proponent would prepare the Contamination Assessment Report (CAR) to present the findings of the SI and evaluate the level and extent of potential contamination.

- 9.3.1.3** If land contamination is identified during the proposed environmental SI and remediation is required, a Remediation Action Plan (RAP) would be prepared.
- 9.3.1.4** A Remediation Report (RR) would also be prepared to demonstrate that the clean-up works are adequate. No construction / development works would be carried out within the potentially contaminated areas in the Study Area prior to the agreement of the RR.
- 9.3.1.5** The implementation schedule are summarised in the EMIS in Appendix 13.1 in the EIA Report.

## 10 Ecology

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### 10.1 Introduction

- 10.1.1.1** The EIA has evaluated the ecological consequences of the Project and recommended ecological mitigation measures to avoid, minimise and compensate the impact arising from the Project.
- 10.1.1.2** Major mitigation measures include the reinstatement of upland grassland along engineered slopes, floral survey for species of conservation interest and transplantation plan (if applicable) and provision of enhancement of woodland in the northwest part of the Project Site. This measure is aimed to provide ecological linkages between two areas of young secondary woodland and provide ecological linkages.
- 10.1.1.3** Though the predicted ecological impacts on floral and faunal species of conservation importance resulting from the Project are generally of lower significance, measures including surveys of floral and faunal species of conservation importance within the proposed works areas, as well as transplantation of such identified species will be carried out to avoid and minimise the impacts to these species.
- 10.1.1.4** In addition, mitigation measures are required to avoid and minimise the potential ecological impact on hydrological condition and water quality of the hillside streams, as well as light disturbance impact on wildlife groups and prevention of hill fires.
- 10.1.1.5** The required mitigation measures adopted to avoid, minimise and compensate for the ecological impacts arising from the Project were identified in **Section 9.7** of the EIA Report and are described in the following sections. The proposed ecological mitigation measures should be checked as an element of the environmental monitoring and audit programme under the Project.

### 10.2 Mitigation Measures

- 10.2.1.1** The proposed mitigation measures for ecological impacts are summarised in the Environmental Mitigation Implementation Schedule (EMIS) in Appendix 13.1 in the EIA Report.

#### **Mitigation for loss of Upland Grassland**

- 10.2.1.2** The impacts of unavoidable loss of 10.4ha of Upland Grassland, and impacts on fauna arising from the loss, disturbance and fragmentation of these habitats, will be mitigated for by reinstatement of Upland Grassland to be reinstated along the engineered slopes (an area of approximately 0.9ha). The reinstatement work aims to put *in situ* hillside grassland soil on the engineering slopes so that the seed bank in the grassland would be preserved and the regenerated floristic composition could be similar to the hillside grassland. Detailed design and proposed management and maintenance will be included in a Grassland Reinstatement Plan to be confirmed with EPD.

- 10.2.1.3** Site clearance works in upland grassland areas should be conducted outside of the bird breeding season (typically 1<sup>st</sup> February to 31<sup>st</sup> July). Irrespective of the foregoing, the upland grassland location should be checked for any evidence of occupation of nests by a qualified ecologist of the ET prior to the commencement of any works activity.
- 10.2.1.4** A Grassland Reinstatement Plan will be prepared by a qualified ecologist/botanist with full details of the findings of a baseline grassland survey, the practical details and methodology of the physical excavation, transport and storage or turves/topsoil and their subsequent reinstatement once the receptor sites have been established, along with an implementation programme of reinstatement, post-reinstatement monitoring and maintenance programme
- 10.2.1.5** The Plan should be submitted to and approved by EPD prior to construction. The approved grassland reinstatement works will be supervised by a qualified ecologist/botanist with relevant experience in habitat reinstatement/rehabilitation.

#### **Flora Survey and Transplantation Plans**

- 10.2.1.6** To mitigate for impacts to the flora of conservation importance including, but not limited to *Aquilaria sinensis*, Bamboo Orchid and Toothed Habenaria, vegetation surveys of impacted works areas should be conducted prior to any vegetation removal. The survey will ascertain the presence, as well as update the conditions, number, locations and habitat types of these species and other rare/protected plant species (if any) identified within construction works areas. The survey will determine the number and locations of the affected individuals of floral species of concern and evaluate the suitability and/or practicality of the transplantation. The survey will be conducted by a qualified ecologist/botanist.
- 10.2.1.7** A Transplantation Plan will be prepared by a qualified ecologist/botanist with full details of the findings of the comprehensive vegetation survey (including number and locations of the affected individuals, and assessment of suitability and/or practicality of the transplantation), locations of the receptor site(s), transplantation methodology, implementation programme of transplantation, post-transplantation monitoring and maintenance programme. The Plan should be submitted to and approved by EPD prior to construction. The approved transplantation works will be supervised by a qualified botanist/ horticulturist/ arborist with relevant experience in transplanting floral species of conservation importance.

#### **Provision of Enhancement Woodland**

- 10.2.1.8** Enhancement planting of native tree species (0.4ha on the filled slope west of the platform and 0.2ha of woodland is created in the valley below MacIntosh Fort in the northwest of the Project Site will provide ecological linkages between existing woodland in the area). By replicating features on the nearby wet woodland, this would provide additional resources for species of conservation concern. Prior to planting, the local topography should be mechanically manipulated to reflect that of the wet woodland, such as a series



of pools and interconnecting ditches to form a range of ephemeral and permeant wetland features, interspersed with woody shrubs and trees to create a closed canopy woodland. It is anticipated that there would be hydrological linkages with the wet woodland and other wetland habitats in the immediate environs. This proposed area for woodland enhancement is currently low-valued upland grassland dominated by *Panicum maximum*, which has developed through succession from abandoned former paddies and agricultural land

#### **Mitigation for Impacts to Water Quality and Hydrology (Construction Phase)**

- 10.2.1.9** Indirect impacts due to potential changes in water quality, hydrology and sedimentation could occur to a series of downstream watercourses and wetland systems (including the wet woodland, marsh and mitigation ponds) during both the construction (for the Platform and Lin Ma Hang Road widening works) and operation stages. In turn, these indirect impacts could affect a range of wetland and wetland-associated fauna, including, but not limited to Two-striped Grass Frog, Pigmy Scrub Hopper, Small Snakehead, *Somanniathelphua zanklon*, *Aquatica leii* and dragonfly larvae of conservation importance.
- 10.2.1.10** Generally, indirect water impact to any aquatic fauna during the construction phase should easily be avoided by implementing water control measures (ETWB TCW No. 5/2005) to avoid direct or indirect impacts any watercourses and good site practices (further details are discussed in Section 6 of the EIA Report).
- 10.2.1.11** There are potential indirect impacts to the hydrology and water quality of Deep Bay (see Section 9.2.3 of the EIA Report) if the rivers passing through the assessment area and which subsequently feed into Deep Bay become polluted or are impacted hydrologically. However given the distance between the assessment area and Deep Bay and the low scale of work required in the proximity of watercourses and the mitigation proposed, it is considered any impacts as to water quality of hydrology to this system likely to be small or negligible during the construction phase of this Project.
- 10.2.1.12** In addition, construction phase impacts on the watercourses and riparian corridor and fauna using these areas will be minimised by erection of a 2m high, solid, dull green site boundary fence on the edge of any active works area or 30m from the watercourse. Where this is not practicable due to site constraints, demarcation fencing will need to be erected to prevent unauthorised encroachment into the riparian corridor by constructions works and traffic. Detailed mitigation measures will be designed at the detailed design stage.

#### **Mitigation for Noise Disturbance (Construction Phase)**

- 10.2.1.13** Site formation and construction are tentatively proposed to cover a 65-month period from mid 2017 to late 2022. The construction work and site formation will be phased in order to reduce overall noise disturbance impacts in particular areas. Furthermore, mitigation measures to control noise disturbance during this phase will involve the selection of quieter plant, use of movable noise barriers and erection of hoarding and fencing to demarcate the site boundary.

**10.2.1.14** Whilst disturbance-sensitive species, notably mammals, have been recorded in the Project boundary, many are nocturnal and there is a high availability of suitable habitats in other areas locally. The wet woodland/woodland complex to the west of the development has a good assemblage of mammals. No piling work will be conducted for the slope works close to this area and noise will be restricted to the construction of a retaining wall structure and backfill in order to create the slope. Works will be restricted to daytime and any construction lighting should be designed and positioned as to not impact on adjacent ecologically sensitive areas. It is therefore considered, through phasing of the site formation works and implementation of appropriate mitigation measures to address noise impacts (see Section 5 of the EIA Report) the potential disturbance impact on the individuals would not constitute significant impact on their population in Hong Kong and therefore the potential disturbance impact on these species is considered as minor.

**Good Site Practices (Construction Phase)**

**10.2.1.15** In order to demonstrate ecological awareness and to minimise the risk of indirect impacts from water pollution, a series of good site practices should be adopted by site staff throughout the construction phase at each works site. Such measures include the containment of silt runoff within the Project boundary, the containment of contaminated soils for removal from the site, appropriate storage of chemicals and chemical waste away from sites of ecological value and the provision of sanitary facilities for on-site workers. Adoption of such measures should permit waste to be suitably contained within the site for subsequent removal and appropriate disposal. Furthermore, to reduce the potential for hill fires appropriate measures should be adopted keep sources of fire (over heated machinery, hot works, smoking areas) away from areas of upland grassland. These are as follows:

- Put up signs to alert site staff about any locations which are ecologically sensitive and measures to prevent accidental impacts;
- Erection of temporary geotextile silt or sediment fences/oil traps around any earth-moving works to trap any sediments and prevent them from entering watercourses;
- Prohibition of soil storage against trees or close to waterbodies;
- Delineation of works site to prevent encroachment onto adjacent habitats and fence off areas which have some ecological value;
- No smoking, hot works or sources of fire close to upland grassland;
- No on-site burning of waste; and
- Waste and refuse in appropriate receptacles.

**Particular Mitigation Measures for Species of Conservation Concern (Construction Phase)**

- 10.2.1.16** There will be a certain amount of vegetation clearance and tree felling required. Many of the trees affected are landscape species; these are often introduced exotic species, with little ecological value, and have been planted for aesthetic appeal and as part of the landscape rehabilitation scheme. The ecological impacts arising from the loss of these trees are not considered to be significant. However, some compensation planting and transplanting of trees will be required only for mitigating landscape and visual impacts (see Section 11 of the EIA Report).
- 10.2.1.17** Suspected breeding of several bird species (including Chinese Francolin, Savannah Nightjar, Golden-headed Cisticola and Plain Prinia) was observed in the upland grassland. Nesting birds would be impacted by tree felling and vegetation removal including cutting of grassland. All nesting birds are protected under Cap. 170. Precautionary checks by a suitably experienced ecologist of the vegetation for the presence of nesting birds should be carried out in the breeding season (February to July) before vegetation clearance. These impacts can be avoided by conducting vegetation clearance during the non-breeding season (tentatively August-January) and phased through the project period to minimise impacts.
- 10.2.1.18** Surveys for breeding birds should follow those outlined for Territory Mapping Methods (Bibby et al. 2000). Areas proposed for vegetation clearance should be separated into plots, the size of which will dependant on the programme of works. Each plot will be walked at a slow pace and the route should approach 50m of every point of the plot and cover as much ground as possible. All birds and their breeding behaviour (including but not limited to direct sight records, calling or singing adults, adults giving alarm calls or other vocalisations which may have strong territorial significance, aggressive encounters between adults, carrying of nesting material, food or faecal sacs, direct observations of birds sitting on, or flushed from, nests) should recorded from these plots. “Pishing” or flushing of birds may help increase observations of breeding territories. These observations should be mapped as accurately as possible to build a picture of breeding territories within each plot, and subsequently the Project site, to aid works programmes. Where breeding territories have been confirmed, a suitable exclusion zone from the nest (distance dependant on species) should be set up (using appropriate demarcation fencing) to prevent unauthorised access or accidental disturbance. It should be noted that nest-finding can be extremely difficult and time consuming and a conservative approach may need to be adopted when providing an exclusion zone. These breeding territories should be monitored weekly until young have fledged and are no longer dependant, or territorial activities have ceased (e.g. through abandonment of nest); following departure from the nest, vegetation clearance can then proceed.
- 10.2.1.19** It is suggested that twice-weekly surveys be conducted, commencing within one hour of sunrise, in order to record new breeding territories and monitor any identified territories. Evening surveys may also be required to survey for territorial and breeding nightjars.

**Mitigation for Impacts to Water Quality and Hydrology (Operational Phase)**

**10.2.1.20** Specific mitigation measures will need to be implemented to prevent indirect impacts on the ecology of the wet woodland (and further down the marsh and mitigation ponds) and the seasonal watercourse to the east of the Project boundary. Mitigation measures are proposed to address any water quality impacts due to the drainage from the proposed platform, and any erosion issues due to the drainage from the proposed platform. These mitigation measures include capturing the surface runoff collected on the platform by a stormwater drainage system with silt traps, which will also be further developed at the detailed design stage; proposed small diameter bore pile system at the foundation of the proposed platform structure would allow a notional free area of about 87 – 91% for groundwater to pass through. In turn, these mitigation measures can minimise impacts to wetland and wetland-associated fauna, including, but not limited to Two-striped Grass Frog, Pigmy Scrub Hopper, Small Snakehead, *Somanniathelphusa zanklon*, *Aquatica leii* and dragonfly larvae of conservation importance.

**10.2.1.21** The stormwater drainage system will be further developed at the detailed design stage.

**Mitigation for Impacts from Street Lighting on fireflies (Operational Phase)**

**10.2.1.22** It is considered that at the detailed design stage, street lighting of similar lux/light intensity as to what is currently present is utilised. Furthermore, as a precautionary measure, it is suggested that deflectors are fixed to the back of the street lights to prevent additional light reaching the marsh and causing adverse impacts to fireflies.

**Mitigation for Impacts for Risk of Fire (Operational Phase)**

**10.2.1.23** The increase in visitors to the columbarium allows greater public access to the upland grassland of Sandy Ridge and in turn, the potential for hill fires is also increased. Fires may emanate from discarded cigarettes and from specific practices during festivals or grave-sweeping ceremonies.

**10.2.1.24** In order to reduce the risk of hill fires, sufficient educational signage should be displayed throughout the columbarium warning people of the risks of fire and strictly prohibits practices that could cause hill fires. This will require input in the detailed design phase.

## **10.3 Audit Requirement**

**10.3.1.1** Site inspections are crucial to monitoring the potential for or occurrence of unforeseen impacts during the construction process. Site audits shall be undertaken during the construction phase of the Project to check that the proposed ecological mitigation measures are properly implemented and maintained as per their intended objectives. Site inspections shall be undertaken by the ET at least once per week during the routine environmental audit as detailed in **Section 15**.

## **10.4 Monitoring Requirements**

**Monitoring of Upland Grassland Reinstatement**

- 10.4.1.1** A Grassland Reinstatement Plan will be prepared by a qualified ecologist/botanist with full details of the findings of a baseline grassland survey, the practical details and methodology of the physical excavation, transport and storage of turves/topsoil and their subsequent reinstatement once the receptor sites have been established, along with an implementation programme of reinstatement, post-reinstatement monitoring and maintenance programme. A contingency plan should be proposed in the Grassland Reinstatement Plan so as to describe the action and limit levels and the action plan if certain performance criteria (such as area of preferred habitat) are not met during the monitoring and maintenance period.
- 10.4.1.2** The Plan should be submitted to and approved by EPD prior to construction. The approved grassland reinstatement works will be supervised by a qualified ecologist/botanist with relevant experience in habitat reinstatement/restoration.
- 10.4.1.3** While implementation of the upland grassland reinstatement scheme and monitoring methodology will be detailed in the Grassland Reinstatement Plan (approved by EPD prior to construction), the key monitoring protocol is proposed below and the monitoring schedule shown in **Table 10.1**.
- 10.4.1.4** Monitoring of the reinstated upland grassland aims to examine the regeneration of the grassy and herbaceous species from the imported grassland topsoil/turves and establishment by self-seeded woody plants on the engineering slopes. The monitoring should be undertaken by means of a walk-through survey by a qualified ecologist/botanist covering all representative areas of the reinstatement area, and quantitative survey on a fixed number of 5m x 5m quadrats in the area.
- 10.4.1.5** During the walk-through survey, the surveyor should inspect the general regeneration of the grassy and herbaceous plants and record the total vegetation coverage on each engineering slope. Within each quadrat, plant species, including vegetation type such as grass, fern, climber, herb, shrub and tree, will be identified and counted, and area of coverage by each vegetation type and any exposed area will be estimated in percentage.
- 10.4.1.6** In addition to the monitoring of reinstatement of upland grassland, other factors which aid in provision of verifiable measurements of the success of establishment, rate of growth and natural recruitment should be monitored along the transects. The surveyor should also check other factors that may be influencing establishment, such as aggressive grasses, forbs or climbers, or human interference.
- 10.4.1.7** The establishment of upland grassland could be higher if the topsoil/turves are laid just prior to early wet season (February/March) of Year 1, a baseline quantitative monitoring and a walk-through survey should be carried out after the completion of the soil reinstatement. The baseline monitoring can also allow remedial measures to be undertaken during the first half of the ensuing wet season (April to June), and quantitative monitoring again in September of the first year to allow monitoring of the upland grassland establishment during the wet season. Six-monthly quantitative monitoring will be carried out in the following Year 2 and Year 3. In addition, walk-through survey will be conducted on a monthly basis in Year 1, while reduced to quarterly in Year 2 and Year 3. The walk-through survey should be undertaken in order to inform

any adaptive or proactive management measurement, such as the need to clear invasive vegetation.

**Table 10.1** Monitoring of vegetation establishment for Upland Grassland Reinstatement Scheme

Reinstatement task/ Monitoring	Year 1				Year 2				Year 3			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Laying of topsoil/ turves	√											
Baseline Monitoring		√										
Quantitative monitoring			√		√		√		√		√	
Walk-through monitoring	M	M	M	M	Q	Q	Q	Q	Q	Q	Q	Q

Notes:

“√” – the reinstatement task or monitoring will be conducted once in the selected quarter;

“M” – the monitoring will be conducted on a monthly basis in the selected quarter;

“Q” – the monitoring will be conducted on a quarterly basis in the selected quarter.

**10.4.1.8** Given that the establishment of grassland habitat (mainly grassy and herbaceous vegetation) is quicker than a woodland restoration, a 3-year monitoring and maintenance period of the upland grassland reinstatement is proposed. The progress and success of the establishment of the reinstated grassland areas should be reviewed throughout the 3-year monitoring and maintenance period. The upland grassland reinstatement should be supervised by a qualified botanist/ecologist with relevant experience in habitat enhancement and rehabilitation. The Upland Grassland Reinstatement Plan above shall be prepared by qualified ecologist/botanist and proposal to be submitted and approved by EPD. The monitoring of the reinstated area shall be conducted by the Environmental Team (ET) and supervised by a qualified botanist/horticulturist/ecologist of the ET. During the 3-year monitoring and maintenance period, the progress and success of the establishment of the reinstated grassland area should be reviewed. Should the establishment of the reinstated grassland areas by end of Year 3 is less satisfactory (including poor vegetation coverage (less than 50%) of the reinstated grassland areas, and undesirable, weedy plant species cover more than 30% of the reinstated grassland areas), the duration of the monitoring and maintenance (throughout the construction phase) would be adjusted subject to the situation and advice provided by the qualified ecologist/ botanist of the Environmental Team.

#### **Enhancement Woodland Area**

**10.4.1.9** Two areas of enhancement woodland planting, totalling 0.6ha, of native tree species is proposed (approximate location is presented in Figure 9.11 of the EIA Report). Proposed list of native tree species is suggested in Table 9.62 of the EIA Report. The Enhancement Woodland Proposal, prepared by a qualified ecologist/botanist, should be submitted to and approved by EPD prior to the commencement of the construction phase. The Proposal should provide the location(s) of the enhancement woodland area, quantity of plant species to be planted, practical details of the planting work, and post-monitoring and maintenance programme. Furthermore, details on the location, programme and

implementation of proposed land formation works and provision of hydrological linkages will need to be included in the detailed design of the Enhancement Woodland Proposal. The monitoring should also include the existing woodland and wet woodland and also part of the Yuen Leng Chai Conservation Area, given the connectivity and ecological linkages between these habitats. A contingency plan should be proposed in the Enhancement Woodland Proposal so as to describe the action and limit levels and the action plan if certain performance criteria are not met during the monitoring and maintenance period.

- 10.4.1.10** While implementation of the enhancement planting and monitoring methodology will be detailed in the Enhancement Woodland Proposal, the key monitoring protocol is proposed below. **Table 10.2** shows the proposed schedule for the planting and monitoring work for the woodland enhancement area.
- 10.4.1.11** Monitoring of the enhancement planting should be undertaken by means of a walk-through survey (by a qualified ecologist/botanist) covering all representative areas of the enhancement area, and quantitative survey on a fixed number of 10m x 10m quadrats in the area. During the walk-through survey, the surveyor should inspect the general health condition and survival of the planted species by direct observation. For quantitative monitoring, the surveyor should measure growth parameter (height and basal diameter), health condition, and survival rate of each planted individual within each surveyed quadrat.
- 10.4.1.12** In addition to the monitoring of the survival and health condition of trees and shrubs, other factors which aid in provision of verifiable measurements of the success of establishment, including canopy cover, rate of growth and any natural recruitment should be monitored along the transects. The surveyor should also check other factors that may be influencing establishment, such as aggressive grasses or forbs, or human interference.
- 10.4.1.13** Given the survival rates of the planted tree whips and shrubs could be higher if the enhancement planting is to be conducted prior to early wet season (February/March) of Year 1, a baseline quantitative monitoring and a walk-through survey should be carried out after the completion of the planting. The baseline monitoring can also allow remedial measures to be undertaken during the first half of the ensuing wet season (April to June), and quantitative monitoring again in September of the first year to allow measurement of the annual growth/ establishment increment during the wet season. Six-monthly quantitative monitoring will be carried out in the following Year 2 to Year 5. In addition, walk-through survey will be conducted on a bi-monthly (once every two months) basis in Year 1, while reduced to quarterly from Year 2 to Year 5. The walk-through survey should be undertaken in order to inform any adaptive or proactive management measurement, such as the need to clear invasive vegetation.

**Table 10.2** Monitoring of vegetation establishment for Enhancement Woodland Area

Enhancement Woodland planting task/ Monitoring	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Planting work	√																			
Baseline Monitoring		√																		
Quantitative monitoring			√			√		√		√		√		√		√		√		√
Walk-through monitoring		Bi-monthly basis since the completion of planting work			Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q

Note:

“√” – the planting work or monitoring will be conducted once in the selected quarter;

“Q” – the monitoring will be conducted on a quarterly basis in the selected quarter.

**10.4.1.14** A 5-year monitoring and maintenance period of the enhancement planting is proposed. Planting of native tree and shrub species should be supervised by a qualified botanist/ horticulturist/ Certified Arborist with relevant experience in reforestation. The Woodland Enhancement Proposal above shall be prepared by qualified ecologist/ botanist and proposal to be submitted and approved by EPD. The monitoring of the enhancement planting shall be conducted by the Environmental Team (ET) and supervised by a qualified botanist/ horticulturist/ ecologist of the ET. During the monitoring and maintenance period, the progress and success of the establishment of the enhancement woodland area and the growth performance should be reviewed. Should the establishment of the enhancement woodland area by end of Year 5 is less satisfactory (including but not limited to poor survival rates (< 70%) of the overall number of the planted seedlings and poor site condition), the duration of the monitoring and maintenance (throughout the construction phase) would be adjusted subject to the situation and advice provided by the qualified ecologist/ botanist of the Environmental Team.

**Monitoring of transplantation of identified floral species of conservation importance**

**10.4.1.15** To mitigate for impacts to the flora of conservation importance including, but not limited to *A. sinensis*, Bamboo Orchid and Toothed Habenaria, vegetation surveys of impacted works areas should be conducted prior to any vegetation removal. The Vegetation Survey Report will ascertain the presence, as well as update the conditions, number, locations and habitat types of these species and other rare/protected plant species (if any) identified within construction works areas. The survey will determine the number and locations of the affected individuals of floral species of concern and evaluate the suitability and/or



practicality of the transplantation. The survey will be conducted by a qualified ecologist/botanist.

**10.4.1.16** As specified in **Section 10.2**, a Transplantation Plan will be prepared by a qualified ecologist/botanist with full details of the findings of the comprehensive vegetation survey (including number and locations of the affected individuals, and assessment of suitability and/or practicality of the transplantation), locations of the receptor site(s), transplantation methodology, and implementation programme of transplantation, post-transplantation monitoring and maintenance programme. While the post-transplantation monitoring programme of the transplanted floral species of conservation importance will be detailed in the Transplantation Plan, the monitoring should include a 12-month post-transplantation/ establishment monitoring on the health and grown performance of the transplanted individuals. Monitoring of the transplanted individuals should be conducted once per week in the first three months after the transplantation and once in each of the following month in the remaining establishment period. During the reminding construction phase of the project, these transplanted individuals should be monitored on a quarterly basis. The monitoring should update the health and growth performance of the transplanted individuals and inform the need any adaptive or proactive management measurement. The monitoring should be undertaken by a qualified ecologist/botanist of the Environmental Team (ET).

**Monitoring of measures to minimise impacts to sensitive habitats during construction**

**10.4.1.17** In order to monitor the effectiveness of measures to minimise impacts on ecologically sensitive habitats from disturbance and pollution, standard faunal transect and sampling surveys should be carried out in the following sensitive habitats:

- Wet Woodland;
- Watercourses;
- Upland Grassland, and;
- Woodland.

*Wetland habitats (including Watercourses and Wet Woodland)*

**10.4.1.18** For wetland habitats, aquatic faunal monitoring should be carried out during a 12-month pre-construction phase, during the construction phase and for the first 12 months of the operational phase.

**Table 10.3** Monitoring of measures to minimise impacts to wet woodland, marsh and watercourses

Phase	Methodology
Pre-construction (Baseline)	Monthly quantitative replicate surveys of aquatic fauna using standardised methodology at fixed points, the number of which should be determined prior to the first monitoring event.
Construction	Monthly quantitative replicate surveys of stream fauna using standardised methodology at the fixed

Phase	Methodology
	points determined in the pre-construction phase.
Post-construction	Monthly quantitative replicate surveys of stream fauna using standardised methodology at the fixed points determined in the pre-construction phase.

**10.4.1.19** Measures to respond to decreases in numbers of aquatic fauna using the watercourses and action and limit levels to trigger these measures are detailed in **Table 10.4**. Monitoring in the post-construction phase should continue for 12 months or until a time when neither the action nor limit levels are exceeded, whichever is the later.

**Table 10.4** Action and limit levels and responses to evidence of declines in aquatic fauna

Action Level	Response	Limit Level	Response
<b>Construction Phase</b>			
Reduction in taxa diversity by 30%	Investigate cause and if cause identified as related to Project instigate remedial action to remove or reduce source of disturbance.	Reduction in taxa diversity by 50%	Investigate cause and if caused identified as related to Project instigate remedial action.
<b>Operational Phase</b>			
Reduction in taxa diversity by 30%	Investigate cause and if cause identified as related to Project review to improve conditions for affected species.	Reduction in taxa diversity by 50%	Investigate cause and if cause identified as related to Project consider and implement additional mitigation measures.

Note:

[1] Whether numbers are significant will depend on species and season. Significance threshold for each species should be reviewed following collection of Baseline survey data. Monitoring of Measures to Minimise Impacts on ecologically sensitive habitats from disturbance and pollution.

*Other Sensitive Habitats (Upland Grassland and Woodland)*

**10.4.1.20** For non-wetland habitats, monitoring of measures to minimise impacts should be carried out during a 12-month pre-construction phase, during the construction phase and for the first 12 months of the operational phase.

**Table 10.5** Monitoring of measures to minimise impacts on ecologically sensitive habitats from disturbance and pollution

Phase	Methodology
Pre-construction (Baseline)	Monthly quantitative surveys of non-aquatic fauna using standard route transect counts.
Construction	Monthly quantitative surveys of non-aquatic fauna using standard route transect counts.
Post-construction	Monthly quantitative surveys of non-aquatic fauna using standard route transect counts.

**10.4.1.21** Measures to respond to decreases in numbers of fauna and action and limit levels to trigger these measures are presented in **Table 10.6** Monitoring in the post-construction phase should continue for 12 months or until a time when neither the action nor limit levels are exceeded, whichever is the later.

**Table 10.6** Action and limit levels and responses to evidence of declines in aquatic fauna

Action Level	Response	Limit Level	Response
<b>Construction Phase</b>			
Reduction in species diversity by 30%	Investigate cause and if cause identified as related to Project instigate remedial action to remove or reduce source of disturbance.	Reduction in taxa diversity by 50%	Investigate cause and if caused identified as related to Project instigate remedial action.
<b>Operational Phase</b>			
Reduction in species diversity by 30%	Investigate cause and if cause identified as related to Project review to improve conditions for affected species.	Reduction in taxa diversity by 50%	Investigate cause and if cause identified as related to Project consider and implement additional mitigation measures.

Note:

[1] Whether numbers are significant will depend on species and season. Significance threshold for each species should be reviewed following collection of Baseline survey data. Monitoring of Measures to Minimise Impacts on ecologically sensitive habitats from disturbance and pollution.

## 11 Fisheries

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### 11.1 Introduction

11.1.1.1 The EIA concluded that the impact of direct loss and indirect disturbance of fish ponds due to the Project was relatively minor with the implementation of mitigation measures.

### 11.2 Mitigation Measures

11.2.1.1 No loss of fish ponds is anticipated and no *in situ* mitigation is required.

11.2.1.2 However, mitigation measures for water quality proposed in the EIA Report are also pertinent in ensuring that fisheries impacts of the project do not occur downstream of the Project area either locally or in Inner Deep Bay.

### 11.3 Audit Requirement

11.3.1.1 There are no monitoring and audit requirements in respect of fisheries.

## 12 Landscape and Visual Impact

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### 12.1 Introduction

**12.1.1.1** The EIA has recommended EM&A for landscape and visual resources to be undertaken during the design, construction and operational stages of the project. The design, implementation and maintenance of landscape mitigation measures is a key aspect of this 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 by the EIA will be monitored through the site audit programme.

### 12.2 Mitigation Measures

**12.2.1.1** The Landscape and Visual Assessment of the EIA proposes a number of mitigation measures to ameliorate the landscape and visual impacts of the Project. These measures include, but are not limited to the following and implementation is summarised in the EMIS in Appendix 13.1 in the EIA Report.

- Reduction of construction stage to the shortest possible time;
- Reduction of construction area and temporary work extend where feasible;
- Incorporation of landscape and visual considerations into the detailed design;
- General good site management;
- Screening of construction works by hoardings/noise barriers around works area in visually unobtrusive colours and to screen construction works;
- Erosion control for Exposed Soil - Excavation works and demolition of existing building blocks;
- Dust control for Exposed Soil - Excavation works and demolition of existing building blocks;
- Tree Protection and Preservation – Woodland, plantation and other vegetation within the Study Area will be protected and preserved as far as possible in accordance with ETWB TCW No. 29/2004 and DEVB TC(W) No. 07/2015;
- Tree Transplantation – Tree(s) will be affected(b) according to the Tree Preservation and Removal Proposal to be carried out;

- Implementing precautionary control measures during construction stage accordingly to ETWB TCW No. 5/2005 – Protection of natural streams/rivers from adverse impacts arising from construction works to avoid direct or indirect impacts any watercourses and good site practices;
- Compensatory Woodland Planting - The arrangement of compensatory planting (e.g. areas of woodland to be compensated and space to be allowed within the Project Site) will be subjected to detailed engineering design, landscape design and planting plan, and is recommended to be implemented prior to the construction activities as far as practical;
- Compensatory Tree Planting for Plantation and Other Vegetated Areas - Compensatory planting should be provided in accordance with DEVB TC(W) No. 07/2015 to compensate for those trees felled;
- Amenity Planting and aesthetic streetscape design of hard landscaping for Pedestrian Walkway, Roadside - Roadside amenity planting should be provided; to enhance the landscape quality of the existing and proposed transport routes. Where space allows for planters, climbers are proposed to cover vertical, hard surfaces of the piers. Shade tolerant plants will be planted, where light is sufficient, to improve aesthetic value of areas under viaducts;
- Greening Works and Contour Grading Works on Cut/ Fill Slopes - Greening works such as hydroseeding/ terraces of shrub or tree planting will be provided where slope gradient allows;
- Landscape design treatment to be provided by relevant government department;
- Architectural and chromatic treatment of the hard architectural and engineering structures and facilities;
- Aesthetic design of the proposed noise barriers;
- Silt traps should be incorporated into design of road gullies for the natural water stream(s), and;
- Lighting control and glare by hooding all lights during both construction and operation.

**12.2.1.2** The landscape and visual mitigation measures proposed should be incorporated in the landscape and engineering design. Mitigation measures to be implemented during construction should be adopted from the start of construction and be in place throughout the entire construction period. Mitigation measures to be implemented during operation should be integrated into the detailed design and built as part of the construction works so that they are in place on commissioning of the Project. Tree transplantation and compensatory planting should be carried out as early as possible in the Project

with transplantation carried out prior to construction starting in any particular area.

## 12.3 Audit Requirement

**12.3.1.1** The measures proposed within the EIA to mitigate the landscape and visual impacts of the Project should be embodied into the detailed landscape design drawings and contract documents including, but not limited to, the protection of existing trees where possible, the transplanting of existing trees, the planting of new trees and shrubs.

**12.3.1.2** The design stage EM&A requirements for landscape and visual resources comprise the audit of the detailed landscaping and visual specifications to be prepared during the detailed design together with ensuring that the design is sensitive to landscape and visual impacts. The landscape and visual auditor shall review the designs as and when they are prepared and liaise with the landscape architect and design engineer to ensure all measures have been incorporated in the design in a format that can be specified to the Contractor for implementation. In the event of non-compliance, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in **Table 12.1**.

**Table 12.1** Monitoring Programme

Stage	Monitoring Task	Monitoring Report	Form of Approval	Frequency
Design	Monitoring of design works against the recommendations of the landscape and visual impact assessments within the EIA should be undertaken by the Engineer and Landscape Architect, to ensure that they fulfil the intentions of the mitigation measures. Any changes to the design, including design changes on site should also be checked.	Report by Engineer confirming that the design conforms to requirements of EP.	Approval by Client	At completion of design stage
Construction	Monitoring of the contractor's operations during the construction period.	Report on Contractor's compliance by ET	Counter-signature of report by IEC	Monthly

Stage	Monitoring Task	Monitoring Report	Form of Approval	Frequency
Establishment Works	Monitoring of the planting works during the 3 year Establishment Period after completion of the construction works. The requirement of all mitigation measures which required to be fulfilled under EIAO in the operation phase will be drawn to the attention of the relevant maintenance agents.	Report on Contractor's compliance by ET	Counter-signature of report by IEC	Bi-monthly



## 13 Impact on Cultural Heritage (Archaeology)

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### 13.1 Introduction

13.1.1.1 The assessment has considered both the construction and operational phases of the project.

### 13.2 Mitigation Measures

13.2.1.1 According to the EIA, an Archaeological Watching Brief (AWB) will be required during the construction phase. The AWB programme is required for an area near the crossing at the south of the proposed connection road to Man Kam To Road at the south eastern foot slopes of Sandy Ridge (**Figure 13.1.1**).

13.2.1.2 In addition, the contractor should be alerted during the construction along Lin Ma Hang Road on the possibility of locating archaeological remains as a precautionary measure. AMO shall be informed immediately in case of discovery of antiquities or supposed antiquities in the subject areas.

13.2.1.3 No mitigation is required during the operational phase. Monitoring and audit programme will not be required.

## 14 Impact on Cultural Heritage (Built Heritage)

### 14.1 Introduction

14.1.1.1 The assessment on built heritage for the Project has been conducted according to the EIA Study Brief. The assessment has considered both the construction and operational phases of the project.

14.1.1.2 The assessment has recommended mitigation measures for some of the historic buildings where impacts would be envisaged.

### 14.2 Mitigation Measures

#### 14.2.1 Construction Phase

14.2.1.1 All the proposed mitigation measures are presented below. A key plan of the concerned heritage resources is shown in **Figures 14.1.1 to 14.1.9**.

##### Graded Historic Buildings

**Table 14.1** Mitigation Recommendations for MacIntosh Fort

Graded Historic Building	Mitigation Recommendation
MacIntosh Fort at Nam Hang (GB-01) (Grade 2) (Figure 14.1.2)	<ul style="list-style-type: none"> <li>The Alert, Alarm and Action (AAA) vibration limit will be set at 5/6/7.5mm/s.</li> <li>Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. A monitoring proposal will be submitted to AMO for comment before commencement of work.</li> <li>A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer. A condition survey proposal will be submitted to AMO for comment before commencement of work.</li> </ul>

##### Other Built Heritage

**Table 14.2** Mitigation Recommendations for Other Impacted Heritage Features

Resource	Mitigation Recommendation
Earth God Shrine (HB-01) (Figure 14.1.3)	<ul style="list-style-type: none"> <li>A cartographic and photographic survey should be conducted for shrine that will require relocation prior to the construction works. The survey report should be submitted</li> </ul>

Resource	Mitigation Recommendation
	<p>to AMO for record purposes prior to relocation.</p> <ul style="list-style-type: none"> <li>• The shrine should be relocated to a suitable location in the close vicinity to allow for continuing worship by public.</li> </ul>
<p>Tin Hau Temple (HB-02) (Figure 14.1.4)</p>	<ul style="list-style-type: none"> <li>• Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. The action vibration limit will be set 25 mm/s.</li> <li>• A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer.</li> </ul>
<p>San Uk Ling Village Entrance Gate (HB-03) (Figure 14.1.9)</p>	<ul style="list-style-type: none"> <li>• Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. The action vibration limit will be set 25 mm/s.</li> <li>• A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer.</li> <li>• A buffer zone should be provided to separate the building or walls of the building from the construction works. The buffer zone should be clearly marked out by temporary fencing. 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.</li> <li>• Protective covering in the form of plastic sheeting on a movable fence should be provided for external or internal walls and surfaces (that contain historical elements) in close proximity to works areas, i.e. areas where a buffer zone alone cannot provide</li> </ul>

Resource	Mitigation Recommendation
	sufficient protection from equipment and works activities.
Cheung Ancestral Hall (HB-04) (Figure 14.1.9)	<ul style="list-style-type: none"> <li>• Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. The action vibration limit will be set 25 mm/s.</li> <li>• A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer.</li> </ul>
No. 9 San Uk Ling Village House (HB-05) (Figure 14.1.9)	<ul style="list-style-type: none"> <li>• Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. The action vibration limit will be set 25 mm/s.</li> <li>• A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer.</li> </ul>
Buddhist Shrine (HB-06) (Figure 14.1.3)	<ul style="list-style-type: none"> <li>• Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. The action vibration limit will be set 25 mm/s.</li> <li>• A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer.</li> <li>• A buffer zone should be provided to</li> </ul>

Resource	Mitigation Recommendation
	<p>separate the building or structure from the construction works. The buffer zone should be clearly marked out by temporary fencing. 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.</p> <ul style="list-style-type: none"> <li>• Protective covering in the form of plastic sheeting on a movable fence should be provided for external walls and surfaces (that contain historical elements) in close proximity to works areas, i.e. areas where a buffer zone alone cannot provide protection from equipment and works activities.</li> <li>• The contractor should ensure that safe public access through provision of clearly marked paths separated from the construction works areas is provided for any such affected cultural heritage structure. It is recommended that safe public access to the grave sites be provided during the construction works.</li> </ul>
<p>Buddhist Shrine (HB-07) (Figure 14.1.3)</p>	<ul style="list-style-type: none"> <li>• Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. The action vibration limit will be set 25 mm/s.</li> <li>• A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer.</li> <li>• 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 fencing. 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.</li> <li>• Protective covering in the form of plastic sheeting on a movable fence should be provided for external walls and surfaces (that contain historical elements) in close</li> </ul>

Resource	Mitigation Recommendation
	<p>proximity to works areas, i.e. areas where a buffer zone alone cannot provide protection from equipment and works activities.</p> <ul style="list-style-type: none"> <li>The contractor should ensure that safe public access through provision of clearly marked paths separated from the construction works areas is provided for any such affected cultural heritage structure. It is recommended that safe public access to the grave sites be provided during the construction works.</li> </ul>

### Graves

**Table 14.3** Mitigation Recommendations for Graves

Resource	Mitigation Recommendations
Yuen Clan Urns and Plaque (G-01) (Figure 14.1.5)	<ul style="list-style-type: none"> <li>Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded and as such appropriate vibration monitoring on the building should be complied with as appropriate. The action vibration limit will be set 25 mm/s.</li> <li>A condition survey should be undertaken by the project proponent to determine the present condition of graded historic building and to recommend protective measures to ensure that the building is not damaged by the construction works. A condition survey must be carried out by qualified building surveyor or engineer.</li> <li>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 fencing. 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.</li> <li>Protective covering in the form of plastic sheeting on a movable fence should be provided for external walls and surfaces (that contain historical elements) in close proximity to works areas, i.e. areas where a buffer zone alone cannot provide protection from equipment and works activities.</li> <li>The contractor should ensure that safe public access through provision of clearly marked paths separated from the construction works areas is provided for any such affected cultural heritage structure. It is recommended that safe public access to the grave sites be provided during the construction works.</li> </ul>
Cheung Clan Grave (G-02) (Figure 14.1.5)	

Resource	Mitigation Recommendations
Yuen Clan Grave (G-10) (Figure 14.1.2)	<ul style="list-style-type: none"> <li>The contractor should ensure that safe public access through provision of clearly marked paths separated from the construction works areas is provided for any such affected cultural heritage structure. It is recommended that safe public access to the grave sites be provided during the construction works.</li> </ul>
Cheung Clan Grave (G-11) (Figure 14.1.7)	

## 14.2.2 Operational Phase

14.2.2.1 The operation of the crematorium will not impose any additional adverse impacts on built heritage. No mitigation will be required.

## 14.3 Audit Requirements

14.3.1.1 The ET shall audit the relevant condition survey and ground-borne vibration to ensure that the peak vibration levels are not exceeded.

**Table 14.3:** Audit requirements and frequency

ID	Structure / buildings	Audit Requirements	Audit frequency
GB-01	MacIntosh Fort at Nam Hang	The Alert, Alarm and Action (AAA) vibration limit will be set at 5/6/7.5 mm/s.	On a weekly basis throughout the construction period
HB-02	Tin Hau Temple	The action vibration limit will be set 25 mm/s.	On a weekly basis throughout the construction period
HB-03	San Uk Ling Village Entrance Gate	The action vibration limit will be set 25 mm/s and Buffer zone of minimum 1m and plastic sheeting on a movable fence to ensure protection for building from works	On a weekly basis throughout the construction period
HB-04	Cheung Ancestral Hall	The action vibration limit will be set 25 mm/s.	On a weekly basis throughout the construction period
HB-05	No. 9 San Uk Ling Village House	The action vibration limit will be set 25 mm/s.	On a weekly basis throughout the construction period
HB-06	Buddhist Shrine	The action vibration limit will be set 25 mm/s. Buffer zone of	On a weekly basis throughout the construction period

ID	Structure / buildings	Audit Requirements	Audit frequency
		minimum 1m and plastic sheeting on a movable fence around shrine to ensure protection	
HB-07	Buddhist Shrine	The action vibration limit will be set 25 mm/s. Buffer zone of minimum 1m and plastic sheeting on a movable fence around shrine to ensure protection	On a weekly basis throughout the construction period
G-01	Yuen Clan Urns and Plaque	The action vibration limit will be set 25 mm/s. Buffer zone of minimum 1m and plastic sheeting on a movable fence around shrine to ensure protection. Ensure public access.	On a weekly basis throughout the construction period
G-02	Cheung Clan Grave	The action vibration limit will be set 25 mm/s. Buffer zone of minimum 1m and plastic sheeting on a movable fence around shrine to ensure protection. Ensure public access.	On a weekly basis throughout the construction period
G-10	Yuen Clan Grave	Ensure safe public access	On a weekly basis throughout the construction period
G-11	Cheung Clan Grave	Ensure public access	On a weekly basis throughout the construction period

**14.3.1.2** In addition, the appropriate vibration monitoring on the attached built heritage resources will be agreed with BD/GEO under the requirement of Buildings Ordinance and/or Blasting Permit as appropriate. The project proponent should ensure that vibration levels are controlled to appropriate level. Vibration monitoring should be carried out by the contractor.



## 15 Site Environmental Audit

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### 15.1 Site Inspection

- 15.1.1.1** Site inspection provides a direct means to initiate and enforce specified environmental protection and pollution control measures. These shall be undertaken routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.
- 15.1.1.2** The ET shall be responsible for formulating the environmental site inspection programme as well as the deficiency and action reporting system, and for carrying out the site inspections. The proposal for rectification, if any, should be prepared and submitted to the ET Leader and IEC by the Contractor.
- 15.1.1.3** Regular site inspections shall be carried out and led by the ER and attended by the Contractor and ET at least once per week during the construction phase. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situations outside the works area which is likely to be affected, directly or indirectly, by the construction site activities of the Project. The ET shall make reference to the following information in conducting the inspection. During the inspection, the following information should be referred to:
- (i) EIA Report recommendations on environmental protection and pollution control mitigation measures;
  - (ii) works progress and programme;
  - (iii) individual works methodology proposals (which shall include the proposal on associated pollution control measures);
  - (iv) contract specifications on environmental protection;
  - (v) relevant environmental protection and pollution control legislations;  
and
  - (vi) previous site inspection results.

- 15.1.1.4** The Contractor shall keep the ER and ET Leader updated with all relevant environmental related information on the construction contract necessary for him to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be recorded and followed up by the Contractor in an agreed time-frame. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET, to report on any remedial measures subsequent to the site inspections.
- 15.1.1.5** The ER, ET and the Contractor should also carry out ad-hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of a valid environmental complaint, or as part of the investigation work, as specified in the Action Plan for the EM&A programme.

## **15.2 Environmental Compliance**

- 15.2.1.1** There are statutory requirements on environmental protection and pollution control requirements with which construction activities must comply.
- 15.2.1.2** In order to ensure the works comply with corresponding requirements, all method statements of works should be submitted by the Contractor to the ER for approval and to the ET Leader to ensure sufficient environmental protection and pollution control measures have been included. The Environmental Mitigation Implementation schedule (EMIS) is summarised in Appendix 13.1 in the EIA Report. Any proposed changes to the mitigation measures shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report.
- 15.2.1.3** The ER and ET shall also review the progress and programme of the works to check that relevant environmental legislations have not been violated, and that any foreseeable potential for violating laws can be prevented.
- 15.2.1.4** The Contractor should provide the update of the relevant documents to the ET Leader so that checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, method statements, any application letters for different licences / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary and environmental records shall also be available for inspection by the relevant parties.
- 15.2.1.5** After reviewing the document, the ET shall advise the IEC and Contractor of any non-compliance with legislative requirements on environmental protection and pollution control so that they can timely take follow-up actions as appropriate. If the follow-up actions may still result in potential violation of environmental protection and pollution control requirements, the ER and ET should provide further advice to the Contractor to take remedial action to resolve the problem.

**15.2.1.6** Upon receipt of the advice, the Contractor shall undertake immediate actions to correct the situation. The ER and ET shall follow up to ensure that appropriate action has been taken in order to satisfy legal requirements.

## **15.3 Choice of Construction Method**

**15.3.1.1** At times during the construction phase the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA study. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the Project. It is the responsibility of the Contractor and ET, in accordance with established standards, guidelines and EIA study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET shall provide a copy of the Proactive Environmental Protection Proforma as shown in **Appendix 15.1** to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

## **15.4 Environment Complaints**

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

- The Contractor to log complaint and date of receipt onto the complaint database and inform the ER, ET and IEC immediately;
- The Contractor to investigate, with the ER and ET, the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the Project with the support of additional monitoring frequency and stations, if necessary;
- The Contractor to identify remedial measures in consultation with the IEC, ET and ER if a complaint is valid and due to the construction works of the Project;
- The Contractor to implement the remedial measures as required by the ER and to agree with the ET and IEC any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures;
- The ER, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;

- The ET to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstances leading to the complaint do not recur;
- If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up actions stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by the EPD; and
- The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

## 16 Reporting

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### 16.1 General

- 16.1.1.1** Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted on diskettes or other approved media. The formats for air quality, noise and water quality monitoring data to be submitted shall be separately agreed.
- 16.1.1.2** The ET is responsible for establishing and maintaining a dedicated website throughout the entire construction period for publishing all the relevant environmental monitoring data (including but not limited to the baseline and impact monitoring). The ET shall propose the format and functionality of the website for agreement with the ER and IEC prior to publishing of data. Once the monitoring data are available (e.g. noise, dust, water quality etc) and vetted by the IEC, the ET is responsible to upload the relevant data to the dedicated website.
- 16.1.1.3** Types of reports that the ET shall prepare and submit include baseline monitoring report, monthly EM&A report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports shall be made available to the Director of Environmental Protection.

### 16.2 Baseline Monitoring Report

- 16.2.1.1** The baseline monitoring report shall include at least the following:
- (i) up to half a page executive summary;
  - (ii) brief project background information;
  - (iii) drawings showing locations of the baseline monitoring stations;
  - (iv) monitoring results (in both hard and diskette copies) together with the following information:
    - monitoring methodology;
    - name of laboratory and types of equipment used and calibration details;
    - parameters monitored;
    - monitoring locations;
    - monitoring date, time, frequency and duration; and
    - quality assurance (QA) / quality control (QC) results and detection limits;
  - (v) details of influencing factors, including:

- major activities, if any, being carried out on the site during the period;
  - weather conditions during the period; and
  - other factors which might affect monitoring results;
- (vi) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- (vii) revisions for inclusion in the EM&A Manual; and
- (viii) comments, recommendations and conclusions.

**16.2.1.2** The baseline monitoring report shall record any variation or changes on the landscape baseline (landscape resources and landscape character areas) from the approved EIA report during pre-project period for the purpose of determining the nature and ranges of natural variation and to establish the nature of changes. Any changes on the relevant mitigation measures due to the baseline conditions shall be recorded, summarized, and reviewed for the reasons on the changes.

## 16.3 Monthly Monitoring Reports

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

**16.3.1.2** The ET should prepare and submit a Baseline Environmental Monitoring Report at least one month before commencement of construction of the Project. Copies of the Baseline Environmental Monitoring Report should be submitted to the IEC, ER and EPD. The ET should liaise with the relevant parties on the exact number of copies require.

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

### **First Monthly EM&A Report**

**16.3.1.4** The first monthly EM&A report shall include at least the following:

- (i) Executive summary (1-2 pages):
- breaches of Action and Limit levels;
  - compliant log

- notifications of any summons and successful prosecutions;
  - reporting changes; and
  - future key issues.
- (ii) Basic project information:
- project organization including key personnel contact names and telephone numbers;
  - programme;
  - management structure; and
  - works undertaken during the month.
- (iii) Environmental status:
- advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
  - works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
  - drawings showing the project are, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
- (iv) A brief summary of EM&A requirements including:
- all monitoring parameters;
  - environmental quality performance limits (Action and Limit levels);
  - Event-Action Plans;
  - environmental mitigation measures, as recommended in the project EIA study final report; and
  - environmental requirements in contract documents.
- (v) Implementation status
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report.
- (vi) Monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
  - name of laboratory and types of equipment used and calibration details;
  - monitoring parameters;
  - monitoring locations;

- monitoring date, time, frequency, and duration;
  - weather conditions during the period;
  - any other factors which might affect the monitoring results; and
  - QA / QC results and detection limits.
- (vii) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
  - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
  - review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
  - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (viii) Others
- an account of the future key issues as reviewed from the works programme and work method statements;
  - advice on the solid and liquid waste management status;
  - record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
  - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.

### **Subsequent monthly EM&A Reports**

#### **16.3.1.5** Subsequent monthly EM&A reports shall include at least the following:

- (i) Executive summary (1-2 pages):
- breaches of Action and Limit levels;
  - compliant log
  - notifications of any summons and successful prosecutions;



- reporting changes; and
  - future key issues.
- (ii) Basic project information:
- project organization including key personnel contact names and telephone numbers;
  - programme;
  - management structure; and
  - works undertaken during the month; and
  - any updates as needed to the scope of works and construction methodologies.
- (iii) Environmental status:
- advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
  - works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
  - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- (iv) Implementation status
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report.
- (v) Monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
  - name of laboratory and types of equipment used and calibration details;
  - monitoring parameters;
  - monitoring locations;
  - monitoring date, time, frequency, and duration;
  - weather conditions during the period;
  - any other factors which might affect the monitoring results; and
  - QA / QC results and detection limits.
- (vi) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(vii) Others

- an account of the future key issues as reviewed from the works programme and work method statements;
- advice on the solid and liquid waste management status;
- record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.

(viii) Appendices

- Action and Limit levels;
- graphical plots of trends of the monitoring parameters at key stations over the past four reporting periods 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 that might affect the monitoring results.
- monitoring schedule for the present and next reporting period;
- cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

## 16.4 Final EM&A Review Reports

**16.4.1.1** The EM&A programme should be terminated upon the completion of the construction activities that have the potential to result in significant environmental impacts.

**16.4.1.2** Prior to the proposed termination, it may be advisable to consult relevant local communities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project Proponent followed by approval from the Director of Environmental Protection.

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

- (i) Executive summary (1-2 pages):
- (ii) Drawings showing the project are, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (iii) Basic project information including a synopsis of the project organization, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
- (iv) A brief summary of EM&A requirements including:
  - environmental mitigation measure, as recommended in the project EIA Report;
  - environmental impact hypotheses tested;
  - environmental quality performance limits (Action and Limit levels);
  - all monitoring parameters;
  - Event and Action Plans;
- (v) A summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report, summarised in the updated implementation schedule;
- (vi) Graphical plots and the statistical analysis of the trends of monitoring parameter over the course of the project, including the post-project monitoring for all monitoring stations annotated against:
  - the major activities being carried out on site during the period;
  - weather conditions during the period; and
  - any other factors which might affect the monitoring results;
- (vii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (viii) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- (ix) A description of the actions taken in the event of non-compliance;

- (x) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;
- (xi) A review of the validity of EIA predictions and identification of shortcomings in EIA recommendations;
- (xii) Comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme); and
- (xiii) Recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

## 16.5 Data Keeping

- 16.5.1.1** No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in magnetic media form, and the software copy must be available upon request. Data format shall be agreed with EPD. All documents and data shall be kept for at least one year following completion of the construction contract.

## 16.6 Interim Notifications of Environmental Quality Limit Exceedances

- 16.6.1.1** With reference to the Event and Action Plans, when the environmental quality performance limits are exceeded and if they are proven to be valid, the ET should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to the IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notification is presented in **Appendix 16.1**.

## Appendix 2.1

### Tentative Construction Programme



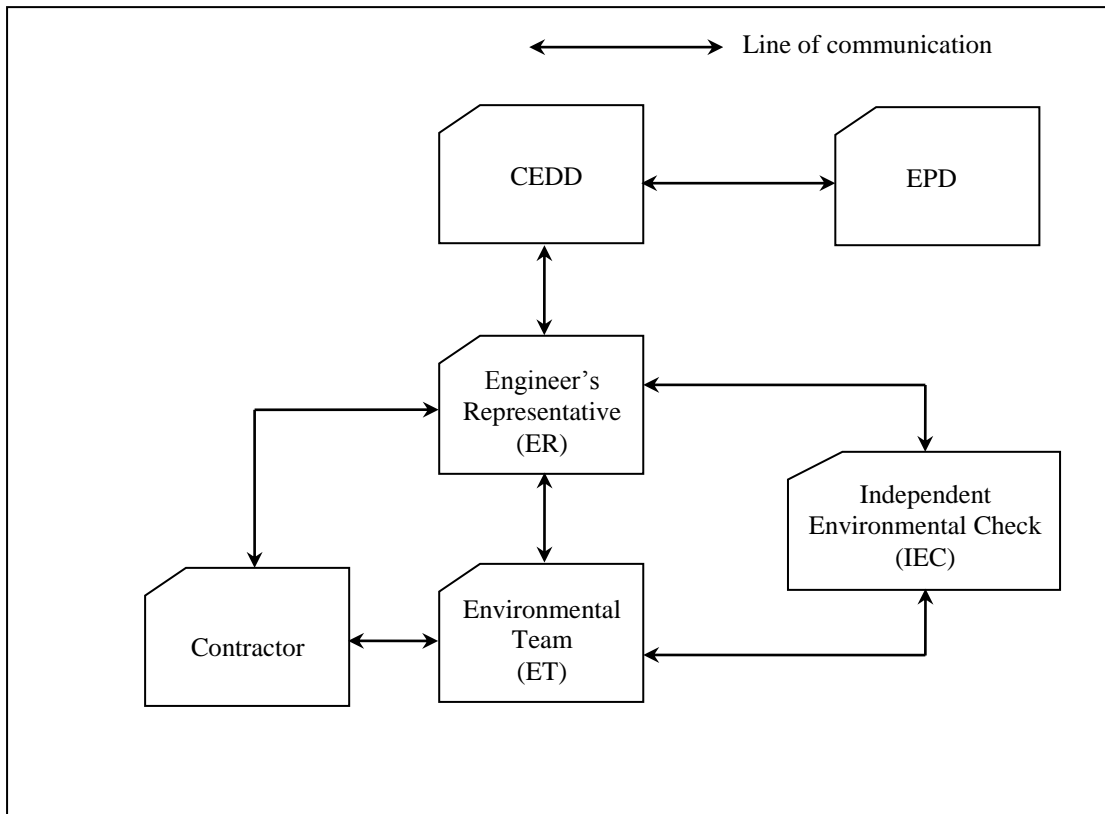
**Job Title: Site Formation and Associated Infrastructural Works for Development of Columbarium, Crematorium and Related Facilities at Sandy Ridge Cemetery**  
**Heading: Construction Programme**

Works	2017					2018					2019					2020					2021					2022																					
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
Columbarium area Site formation, retaining wall, slope work and internal road construction																																															
Crematorium Area Site formation, slope work and internal road construction																																															
Construction of viaduct and new road connecting crematorium area and Man Kam To Road																																															
Widening of Sha Ling access road																																															
Utilities laying																																															
Lin Ma Hang Road widening																																															
Lin Ma Hang Road slope work																																															

## Appendix 3.1

### Project Organization for Environmental Works

## Project Organization for Environmental Works





## Appendix 5.1

### Sample Data Sheet for TSP Monitoring

### Data Sheet for TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (C)	
	Hi (in.)	
	Qsi (Std. m <sup>3</sup> )	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (C)	
	Hf (in.)	
	Qsf (Std. m <sup>3</sup> )	
Average Flow Rate (Std. m <sup>3</sup> )		
Total Volume (Std. m <sup>3</sup> )		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (µg/m <sup>3</sup> )		

Name & Designation

Signature

Date

Field Operator :

Laboratory Staff :

Checked by :

## Appendix 6.1

### Sample Data Sheet for Construction Noise Monitoring

### 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 <sub>90</sub> (dB(A))	
	L <sub>10</sub> (dB(A))	
	Leq      (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

Name & Designation

Signature

Date

Recorded By      :

Checked By      :

## Appendix 15.1

### Proactive Environmental Protection Proforma

## Proactive Environmental Protection Proforma

Ref: \_\_\_\_\_

Ref <sup>(1)</sup>	Proposed Construction Method <sup>(2)</sup>	Location/ Working Period	Anticipated Impacts	Recommended Mitigation Measures

*Notes:*

(1) *EIA Ref/EM&A Log Ref/Design Document Ref*

(2) *Details of equipment, vehicles, plants, processes, technologies for the option of construction method*

Reviewed by Environmental Team Leader: \_\_\_\_\_

Date \_\_\_\_\_

Approved by Independent Checker (Environment): \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix 16.1

### Sample Template for Interim Notification

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

**Incident Report on Action Level or Limit Level Non-compliance**

Project	
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	

Location Plan

Prepared by :

Designation :

Signature :

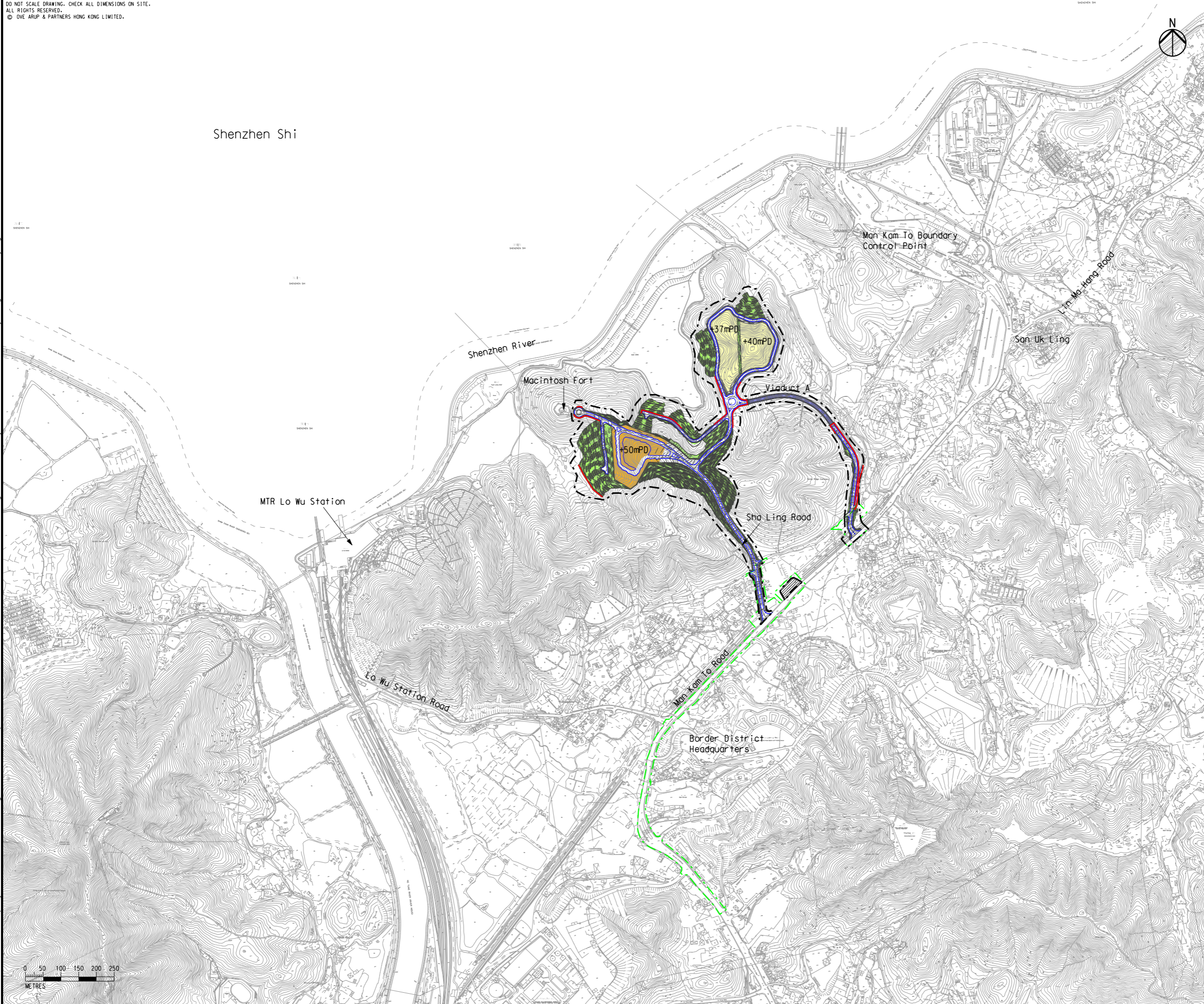
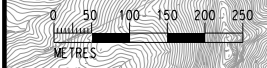
Date :



Shenzhen Shi



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 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20160226 Revised Final\_v1\Figure 2.1.1 - Project Location Plan at Sandy Ridge Cemetery.dgn



- Legend**
- Project Boundary
  - Utilities Construction
  - Proposed Access Road
  - Proposed Viaduct
  - Proposed Platform for Crematorium, Funeral Parlour and Visitor Service Centre
  - Proposed Platforms for Columbarium
  - Proposed Pick-up and Drop-off Point
  - Proposed Cut / Fill Slope
  - Retaining Wall

Rev	Description	By	Date
H	EIGHTH ISSUE	GL	02/16
G	SEVENTH ISSUE	GL	01/16
F	SIXTH ISSUE	GL	12/15
E	FIFTH ISSUE	GL	10/15

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 Site Formation and Associated Infrastructural Works for Development of Columbarium, Crematorium and Related Facilities at Sandy Ridge Cemetery - Design and Construction

Drawing title  
Project Location Plan at Sandy Ridge Cemetery

Drawing no. <span style="font-size: 18pt; font-weight: bold;">Figure 2.1.1</span>		Rev. <span style="font-size: 18pt; font-weight: bold;">H</span>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:10000 @A3		Status <span style="font-weight: bold;">PRELIMINARY</span>	

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Legend

 Project Boundary



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A	FIRST ISSUE	GL	07/14
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 Cemetery - Design and Construction

Drawing title  
**Project Location Plan  
 at Lin Ma Hang Road**

Drawing no. <b>Figure 2.1.2</b>		Rev. <b>D</b>	
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Scale 1:5000 @A3		Status <b>PRELIMINARY</b>	

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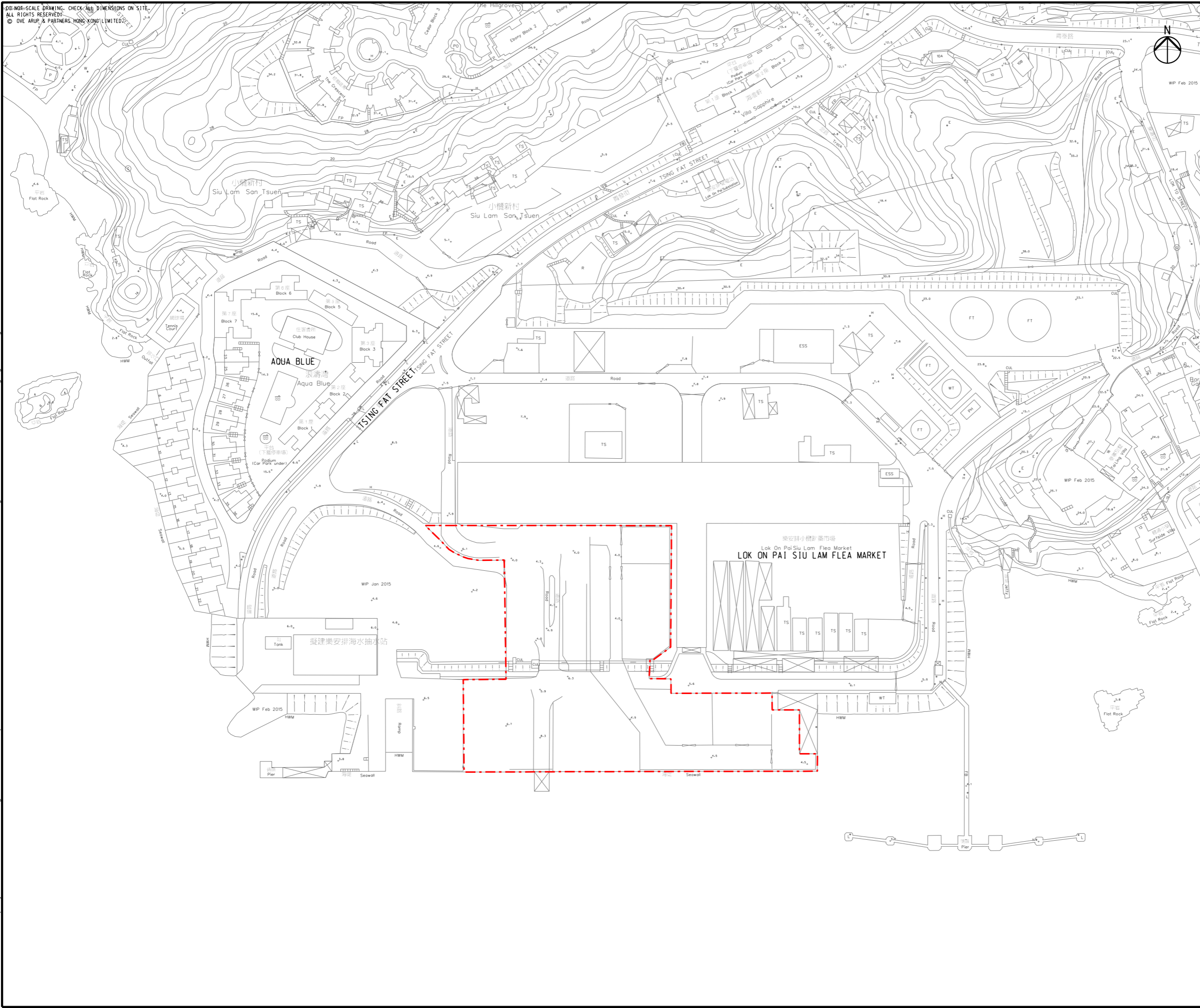
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Printed by : 12/22/2015  
 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20151222 Final\Figure 2.1.2 - Project Location Plan at Lin Ma Hang Road.dgn



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Printed by : 10/26/2015  
 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20151016 Revised Draft\_v1\Figure 2.1.3 - Location of Barging Point.dgn



Legend

Barging Point Area

Rev	Description	By	Date
A	FIRST ISSUE	GL	10/15

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Drawing title  
**Location of Barging Point**



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GL		A	
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Scale	Status		
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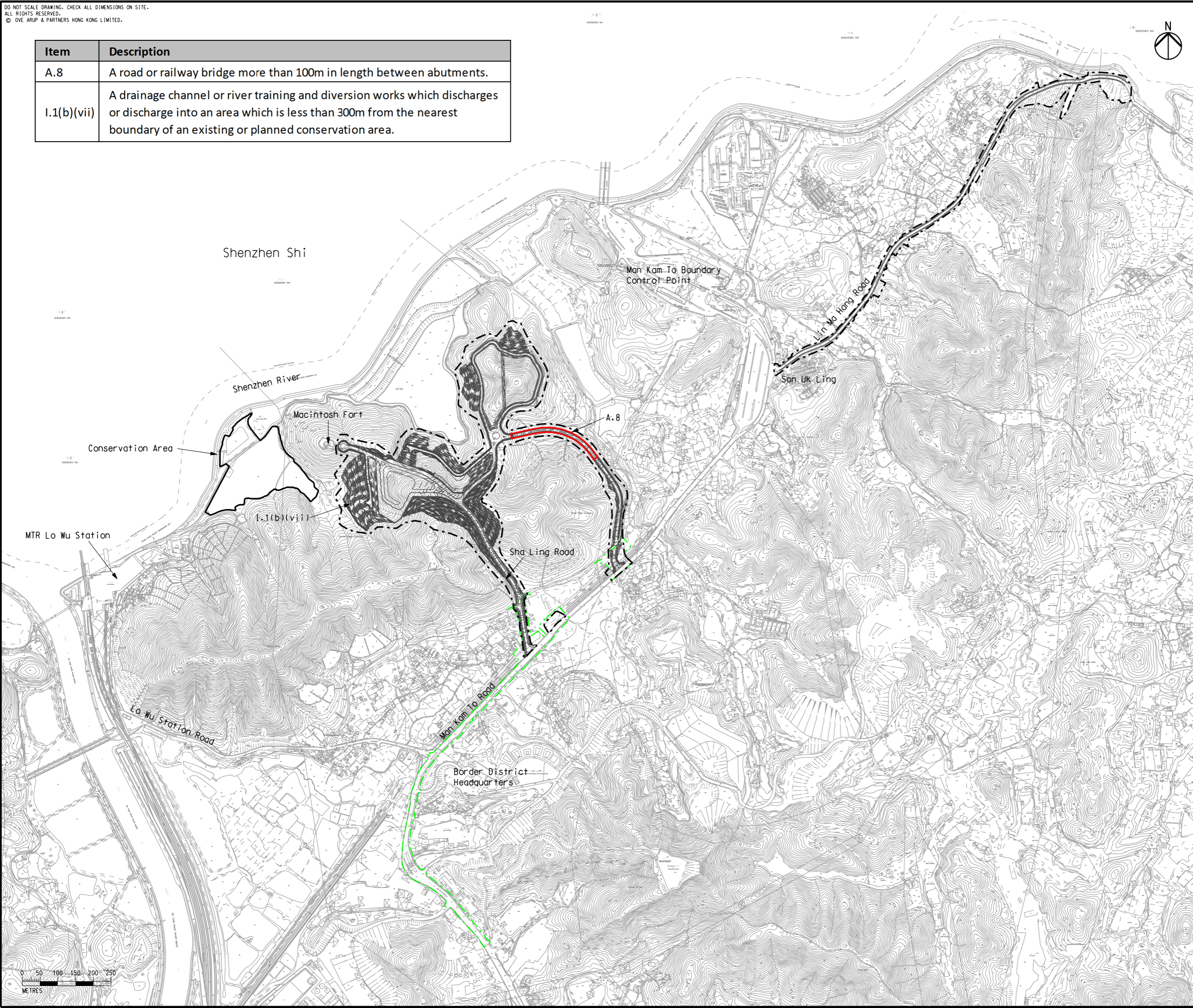
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Item	Description
A.8	A road or railway bridge more than 100m in length between abutments.
I.1(b)(vii)	A drainage channel or river training and diversion works which discharges or discharge into an area which is less than 300m from the nearest boundary of an existing or planned conservation area.

Legend

-  Project Boundary
-  Utilities Construction

Printed by : 3/3/2016  
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Drawing title  
**Locations of  
 Designated Projects**

Drawing no. <b>Figure 2.1.4</b>		Rev. <b>G</b>	
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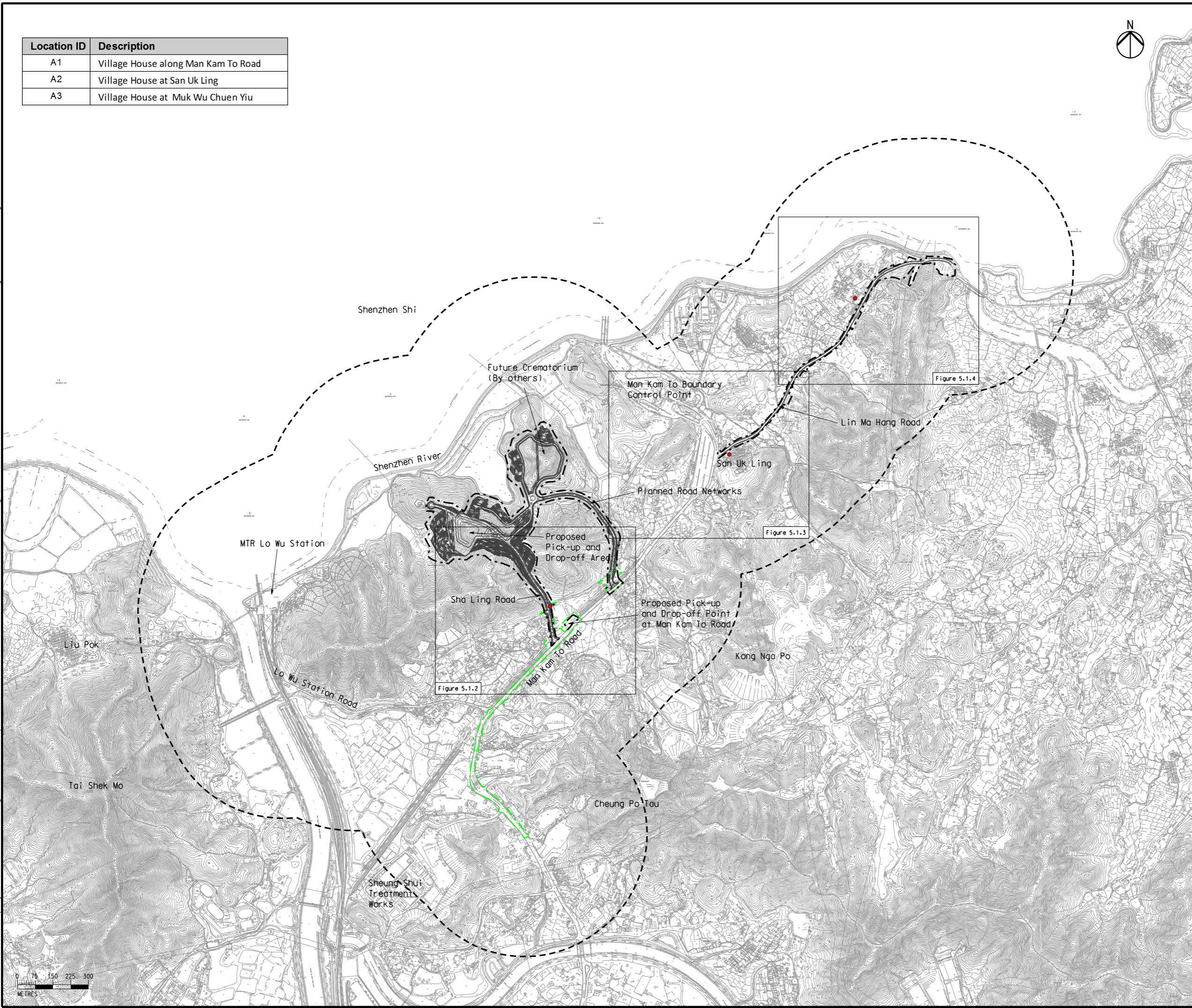
Location ID	Description
A1	Village House along Man Kam To Road
A2	Village House at San Uk Ling
A3	Village House at Muk Wu Chuen Yiu



Legend

- Project Boundary
- Utilities Construction
- 500m Assessment Area
- Proposed Construction Dust Monitoring Locations

Printed by : 2/29/2016 2:29:13 PM  
 G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20160226 Revised Final\_V1\Figure 5.1.1 - Locations of Construction Dust Monitoring (Sheet 1 of 4).dgn



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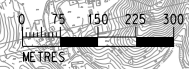
Drawing title  
**Locations of Construction Dust Monitoring (Sheet 1 of 4)**

Drawing no. <b>Figure 5.1.1</b>		Rev. <b>F</b>	
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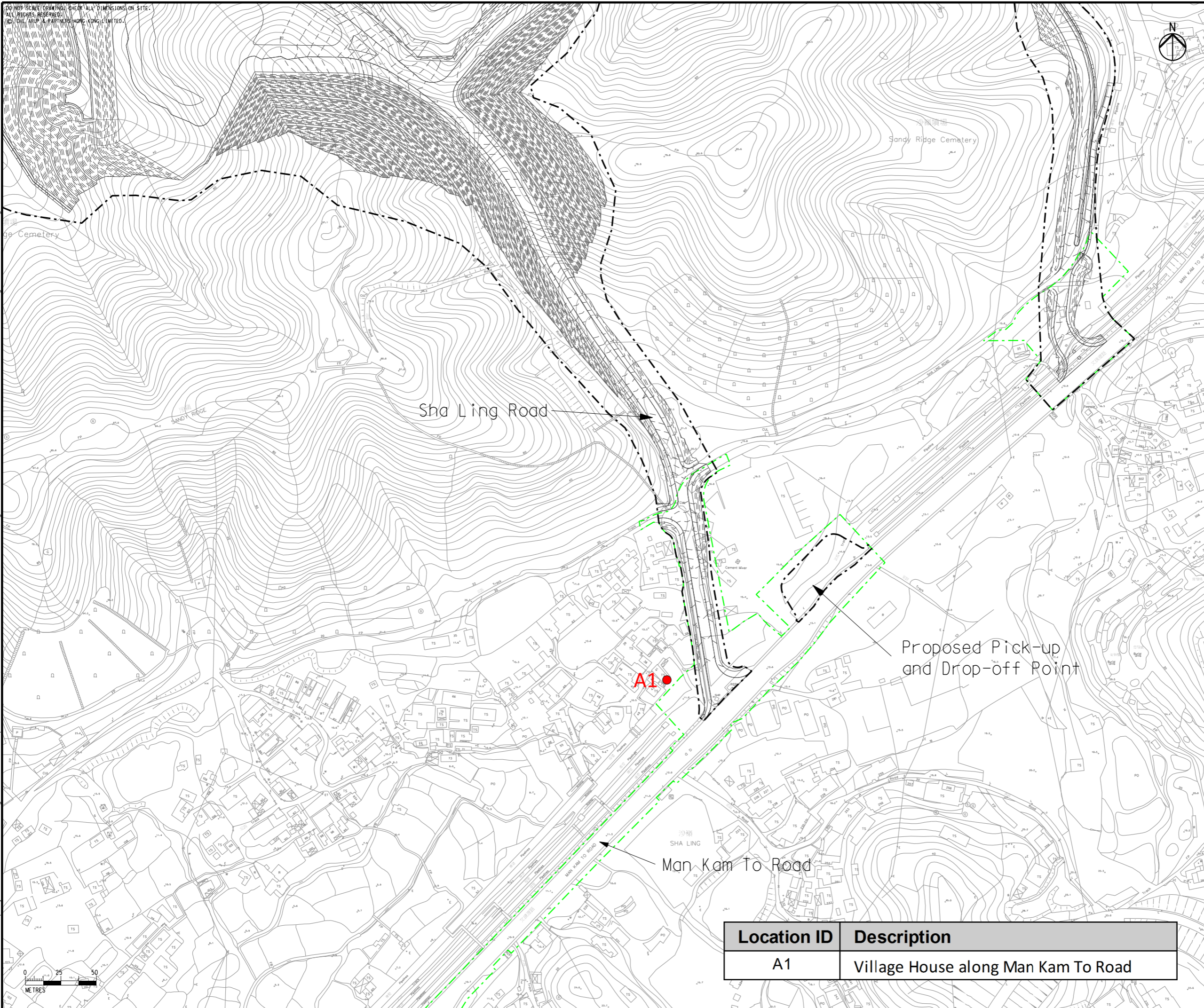


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**Legend**

- Project Boundary
- Utilities Construction
- Proposed Construction Dust Monitoring Location

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Drawing title  
**Locations of Construction Dust Monitoring (Sheet 2 of 4)**

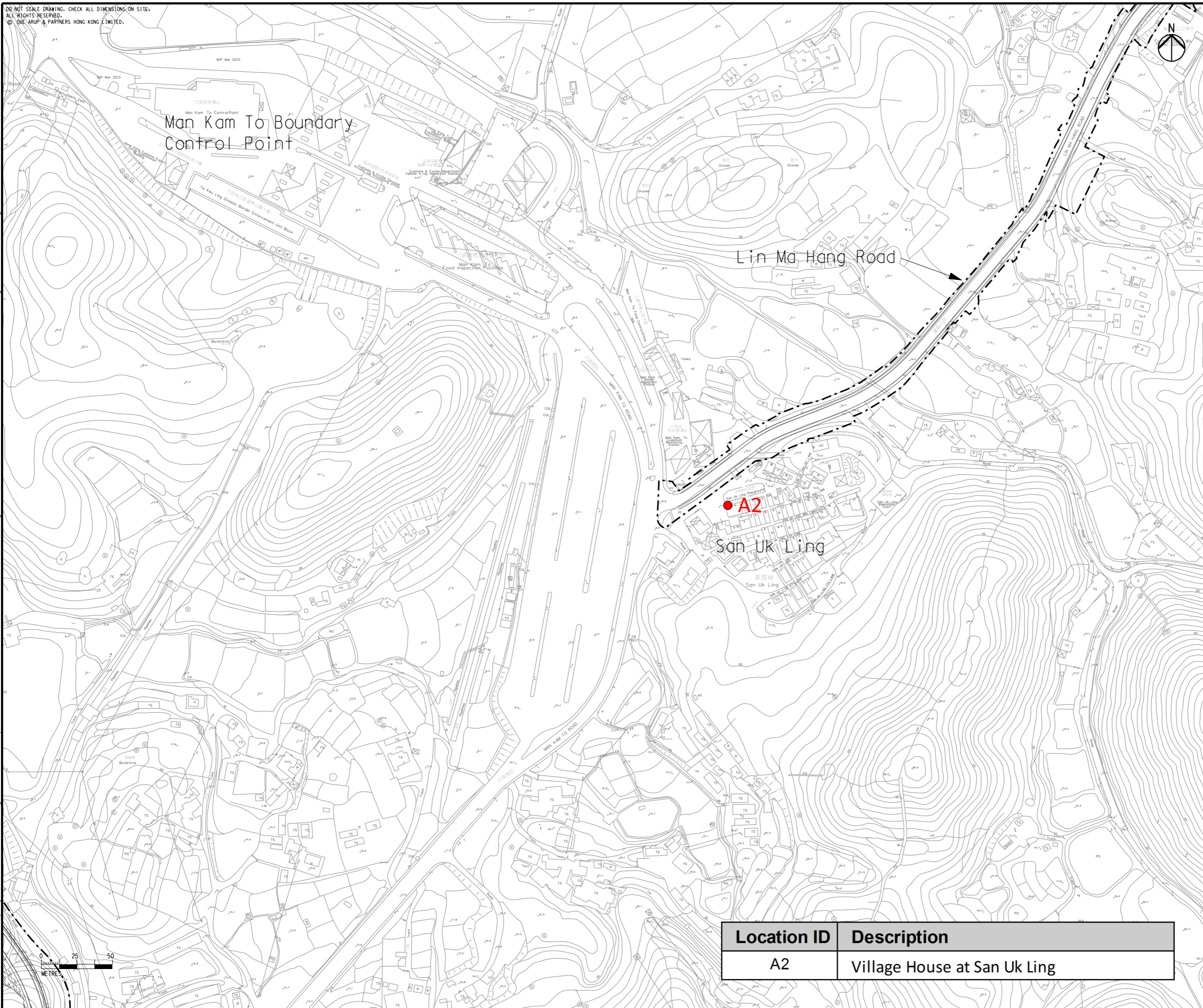
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Location ID	Description
A1	Village House along Man Kam To Road



**Legend**

- Project Boundary
- Proposed Construction Dust Monitoring Location

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Drawing title  
**Locations of Construction Dust Monitoring (Sheet 3 of 4)**

Drawing no. <b>Figure 5.1.3</b>		Rev. <b>E</b>	
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Location ID	Description
A2	Village House at San Uk Ling

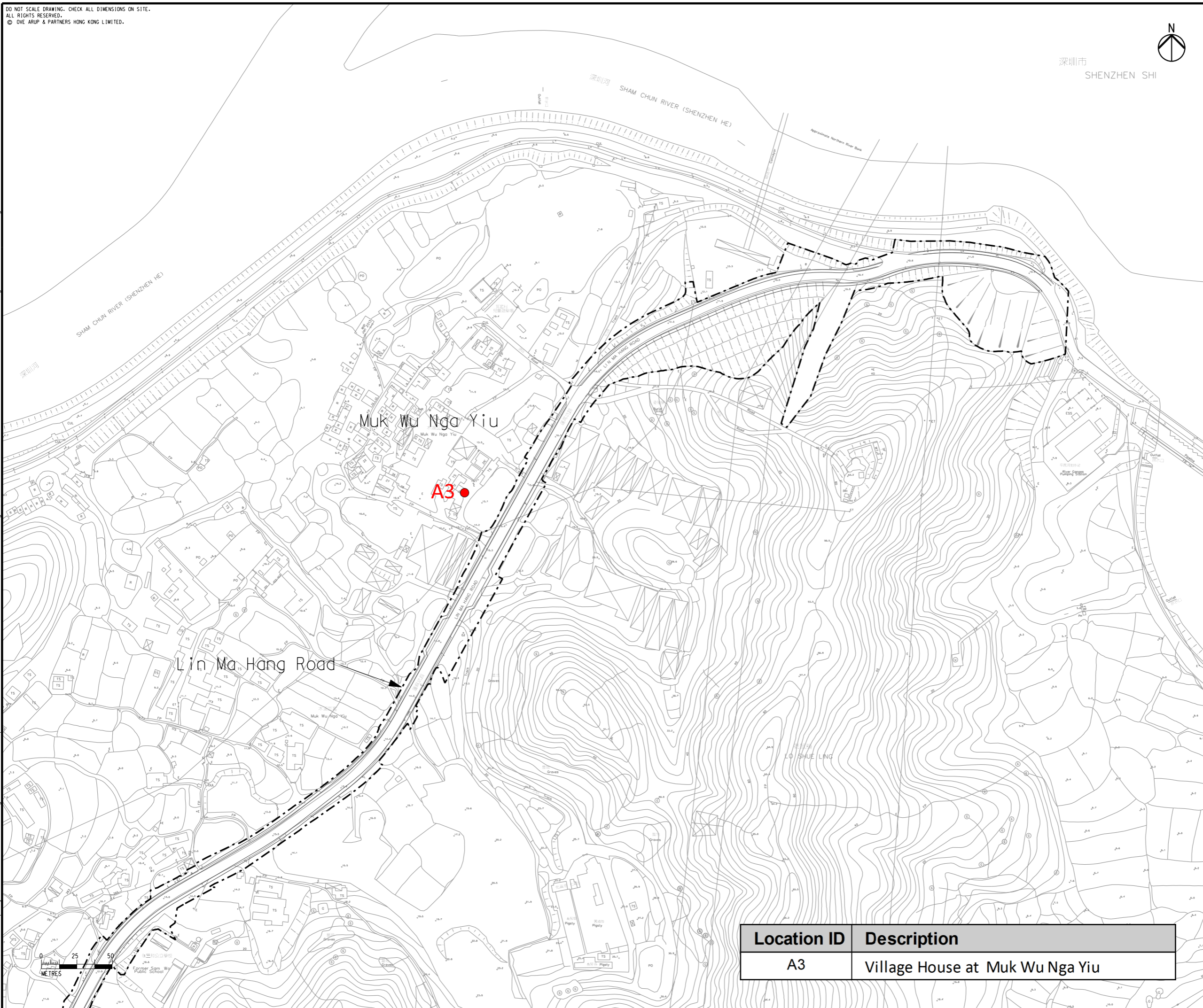
深圳市  
 SHENZHEN SHI



Legend

- Project Boundary
- Proposed Construction Dust Monitoring Location

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Drawing title  
**Locations of Construction  
 Dust Monitoring  
 (Sheet 4 of 4)**

Drawing no.		Rev.	
GL		E	
Date	Checked	EL	Approved
02/16	EL	ST	ST
Scale	Status		
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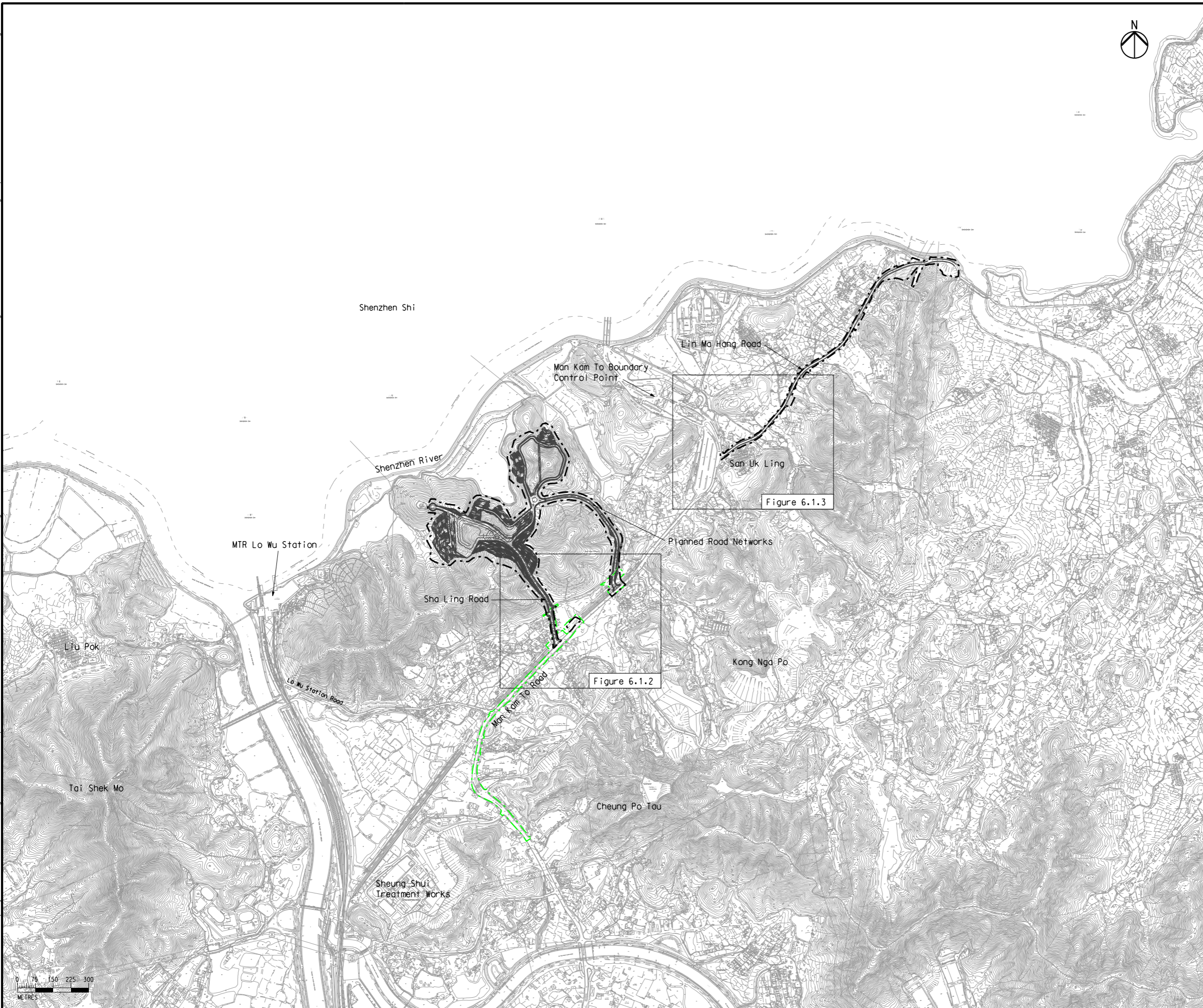
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Location ID	Description
A3	Village House at Muk Wu Nga Yiu



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 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20160226 Revised Final\Figure 6.1.1 - Extents and Locations of Noise Mitigation Measures (for Existing Representative NSRs) (Sheet 1 of 3).dgn



**Legend**

- Project Boundary
- Utilities Construction

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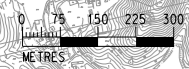
Drawing title

### Extents and Locations of Noise Mitigation Measures (for Existing Representative NSRs) (Sheet 1 of 3)

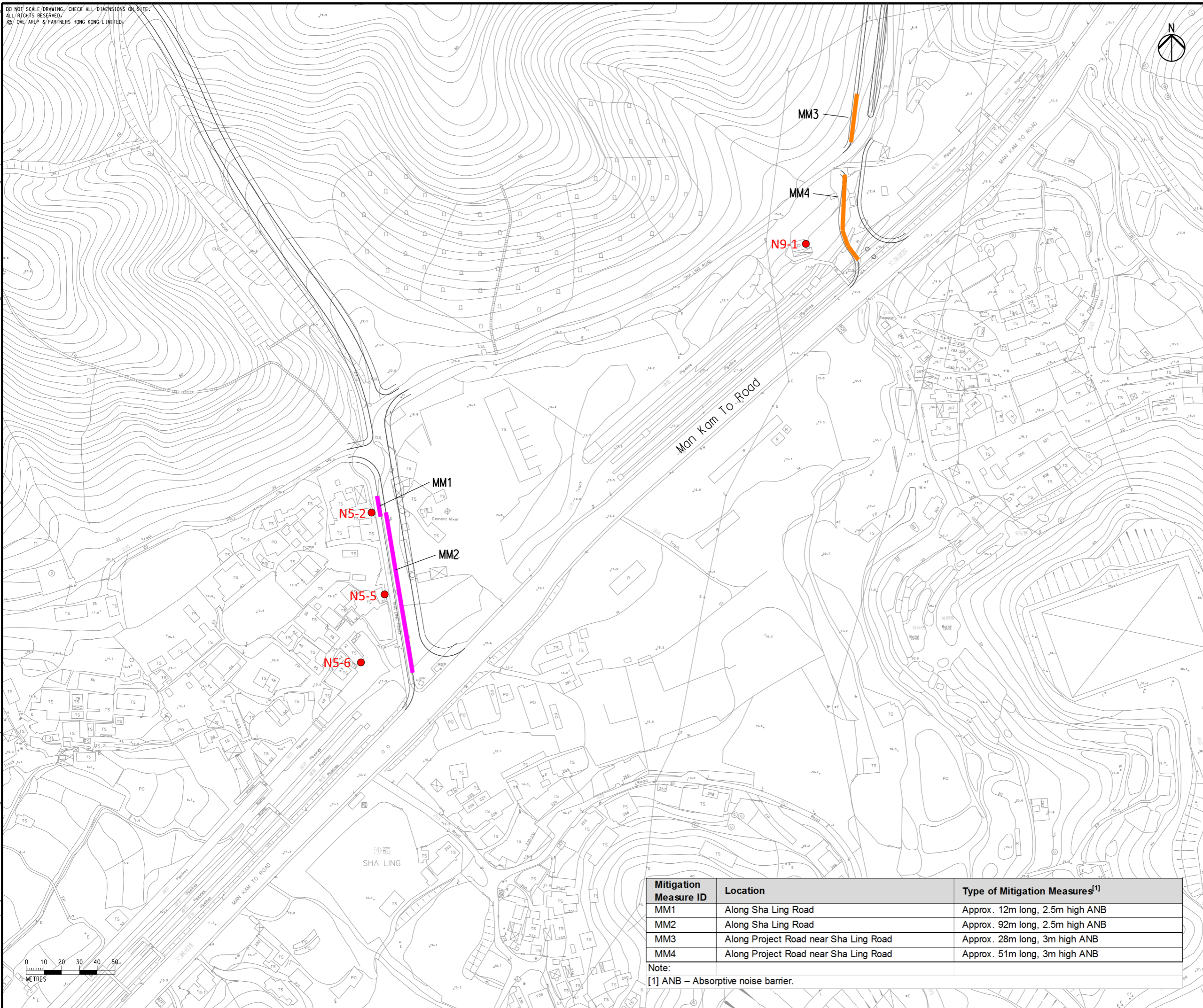
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**Legend**

- Proposed Road Network
- 2.5m Absorptive Noise Barrier
- 3m Absorptive Noise Barrier
- Representative Noise Sensitive Receivers (Road Traffic Noise)

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 Infrastructural Works for Development  
 of Columbarium, Crematorium and  
 Related Facilities at Sandy Ridge  
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Drawing title  
**Extents and Locations of  
 Noise Mitigation Measures  
 (for Existing  
 Representative NSRs)  
 (Sheet 2 of 3)**

Drawing no. <b>Figure 6.1.2</b>		Rev. <b>F</b>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:2000 @A3		Status <b>PRELIMINARY</b>	

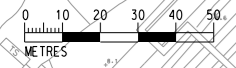
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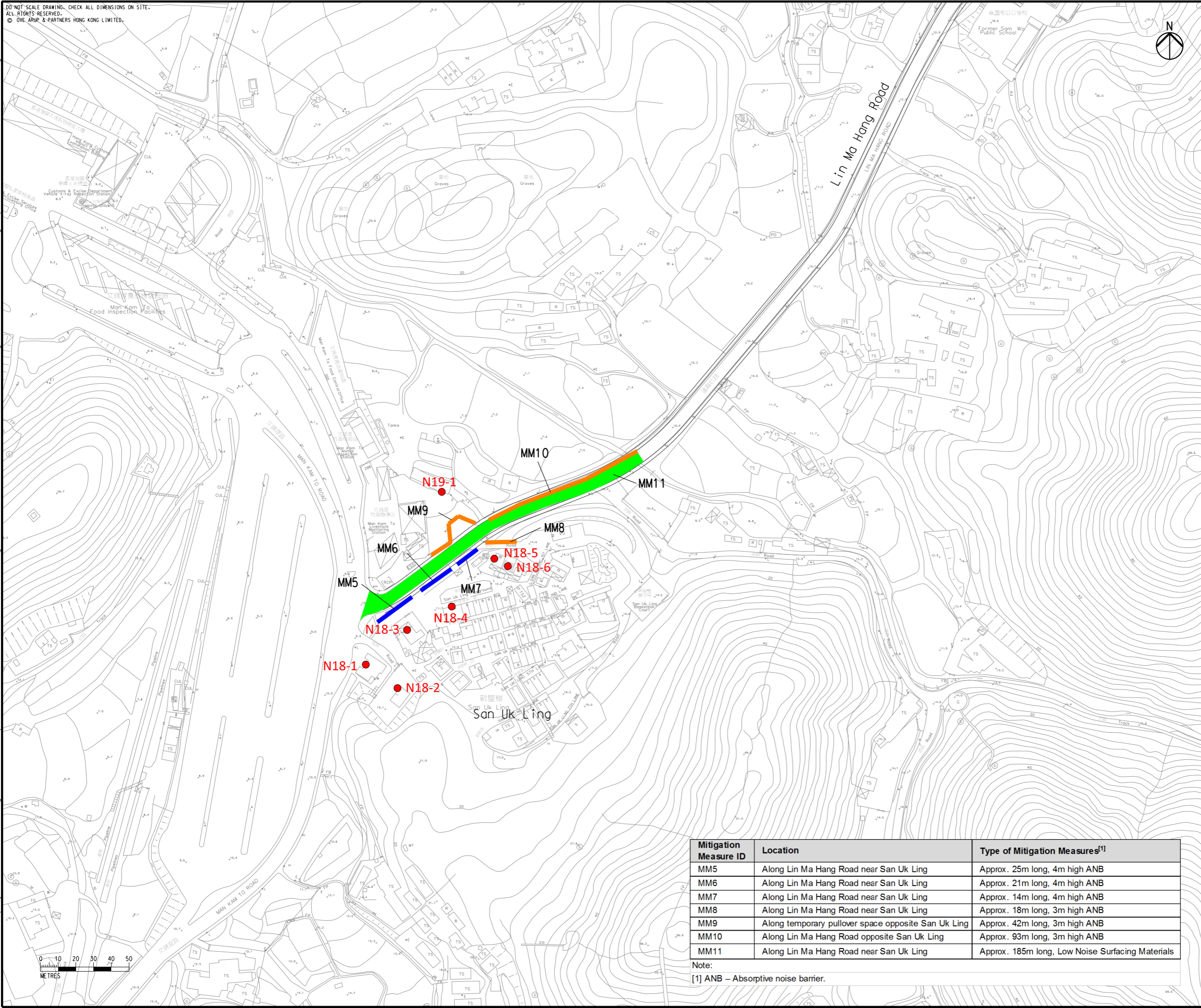


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Mitigation Measure ID	Location	Type of Mitigation Measures <sup>[1]</sup>
MM1	Along Sha Ling Road	Approx. 12m long, 2.5m high ANB
MM2	Along Sha Ling Road	Approx. 92m long, 2.5m high ANB
MM3	Along Project Road near Sha Ling Road	Approx. 28m long, 3m high ANB
MM4	Along Project Road near Sha Ling Road	Approx. 51m long, 3m high ANB

Note:  
 [1] ANB – Absorptive noise barrier.





**Legend**

- Proposed Road Network
- 3m Absorptive Noise Barrier
- 4m Absorptive Noise Barrier
- Low Noise Surfacing Materials
- Representative Noise Sensitive Receivers (Road Traffic Noise)

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 Related Facilities at Sandy Ridge  
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Drawing title  
**Extents and Locations of  
 Noise Mitigation Measures  
 (for Existing  
 Representative NSRs)  
 (Sheet 3 of 3)**

Drawing no. <b>Figure 6.1.3</b>		Rev. <b>E</b>	
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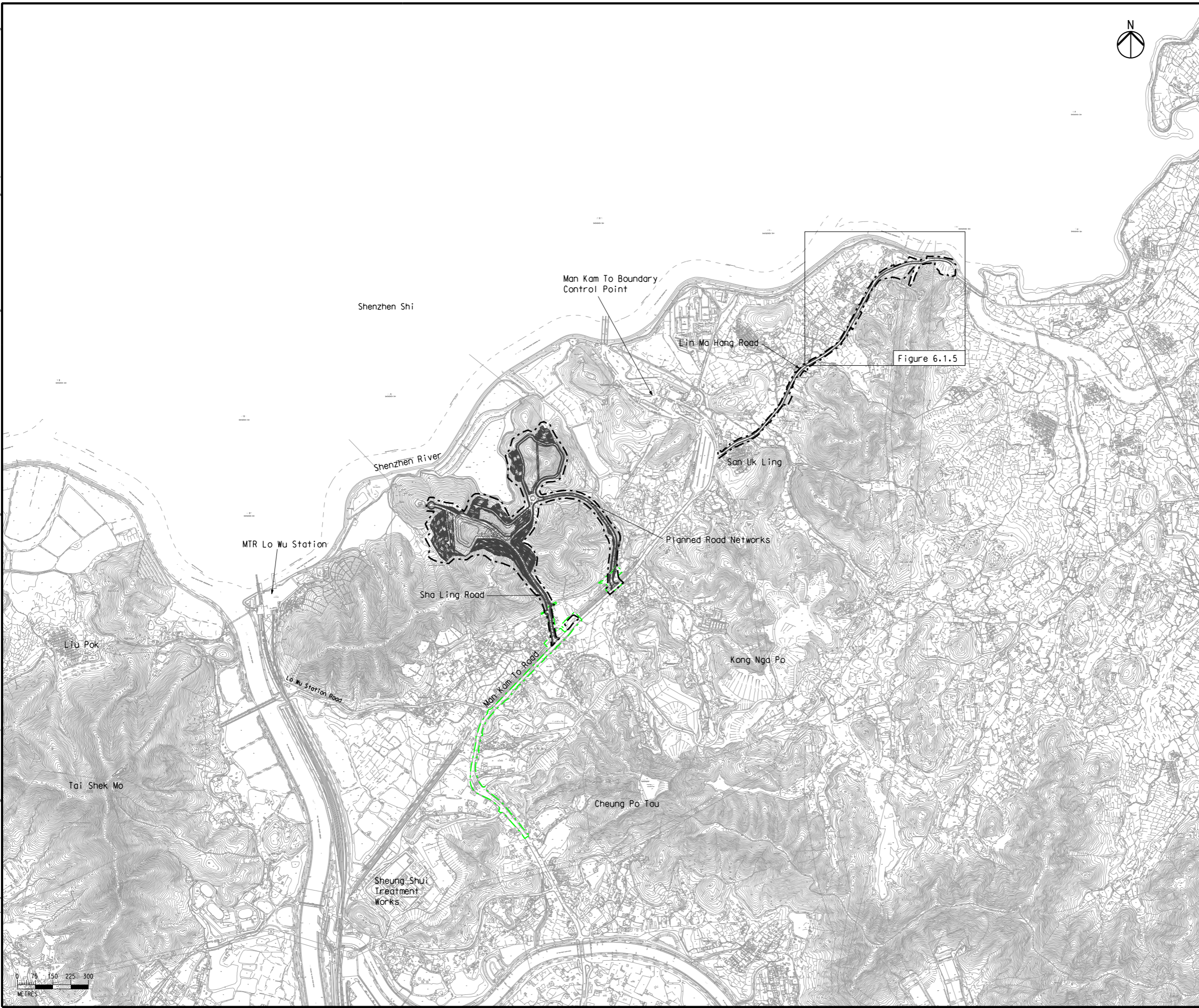
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Mitigation Measure ID	Location	Type of Mitigation Measures <sup>[1]</sup>
MM5	Along Lin Ma Hang Road near San Uk Ling	Approx. 25m long, 4m high ANB
MM6	Along Lin Ma Hang Road near San Uk Ling	Approx. 21m long, 4m high ANB
MM7	Along Lin Ma Hang Road near San Uk Ling	Approx. 14m long, 4m high ANB
MM8	Along Lin Ma Hang Road near San Uk Ling	Approx. 18m long, 3m high ANB
MM9	Along temporary pullover space opposite San Uk Ling	Approx. 42m long, 3m high ANB
MM10	Along Lin Ma Hang Road opposite San Uk Ling	Approx. 93m long, 3m high ANB
MM11	Along Lin Ma Hang Road near San Uk Ling	Approx. 185m long, Low Noise Surfacing Materials

Note:  
 [1] ANB – Absorptive noise barrier.

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**Legend**

- Project Boundary
- Utilities Construction

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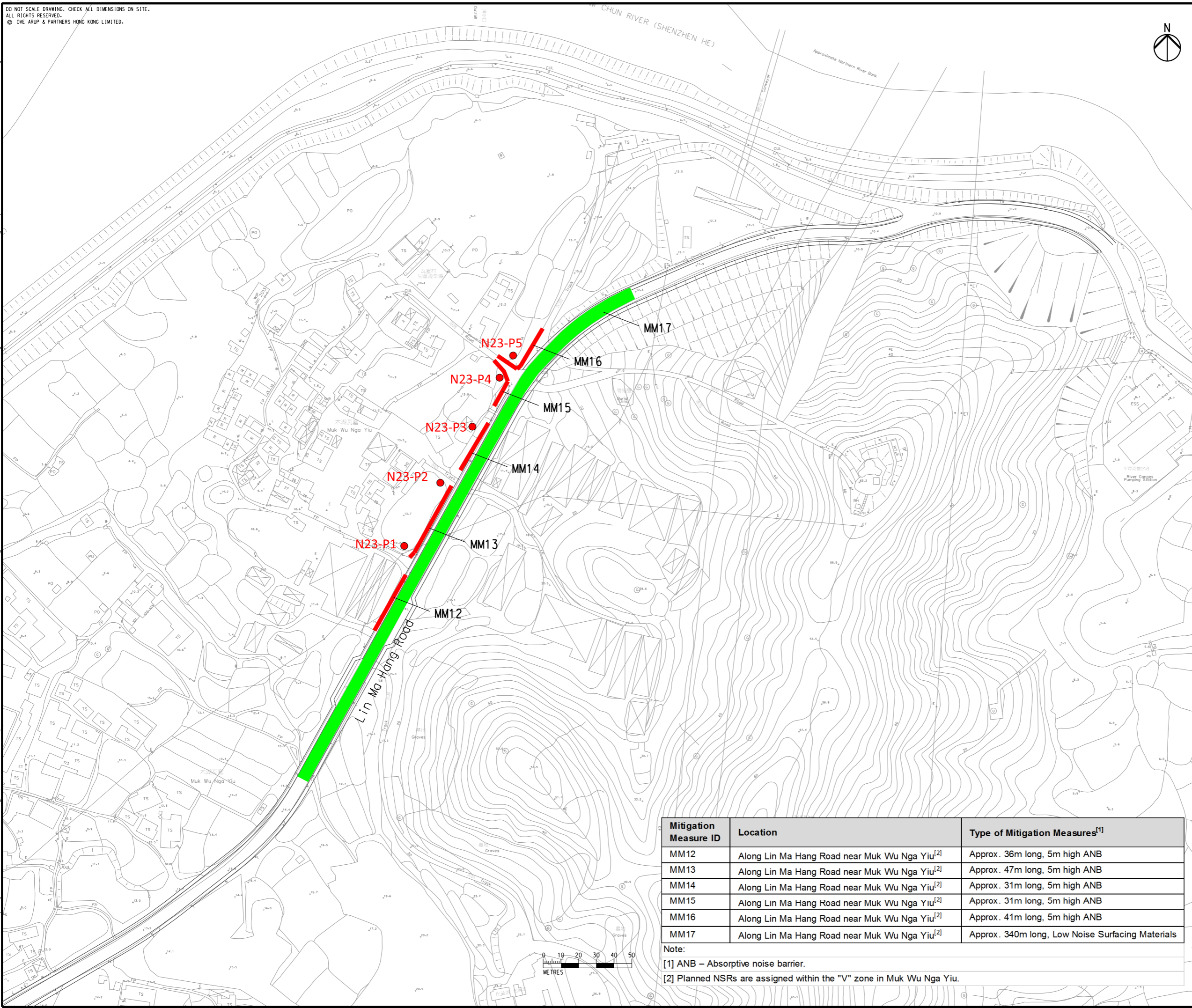
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Drawing title  
**Extents and Locations of Noise Mitigation Measures (for Planned Representative NSRs) (Sheet 1 of 2)**

Drawing no.	Figure 6.1.4	Rev.	G
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Legend

- Proposed Road Network
- 5m Absorptive Noise Barrier
- Low Noise Surfacing Materials
- Representative Noise Sensitive Receivers (Road Traffic Noise)

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Drawing title  
**Extents and Locations of  
 Noise Mitigation Measures  
 (for Planned  
 Representative NSRs)  
 (Sheet 2 of 2)**

Drawing no. <b>Figure 6.1.5</b>		Rev. <b>E</b>	
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Mitigation Measure ID	Location	Type of Mitigation Measures <sup>[1]</sup>
MM12	Along Lin Ma Hang Road near Muk Wu Nga Yiu <sup>[2]</sup>	Approx. 36m long, 5m high ANB
MM13	Along Lin Ma Hang Road near Muk Wu Nga Yiu <sup>[2]</sup>	Approx. 47m long, 5m high ANB
MM14	Along Lin Ma Hang Road near Muk Wu Nga Yiu <sup>[2]</sup>	Approx. 31m long, 5m high ANB
MM15	Along Lin Ma Hang Road near Muk Wu Nga Yiu <sup>[2]</sup>	Approx. 31m long, 5m high ANB
MM16	Along Lin Ma Hang Road near Muk Wu Nga Yiu <sup>[2]</sup>	Approx. 41m long, 5m high ANB
MM17	Along Lin Ma Hang Road near Muk Wu Nga Yiu <sup>[2]</sup>	Approx. 340m long, Low Noise Surfacing Materials

Note:  
 [1] ANB – Absorptive noise barrier.  
 [2] Planned NSRs are assigned within the "V" zone in Muk Wu Nga Yiu.



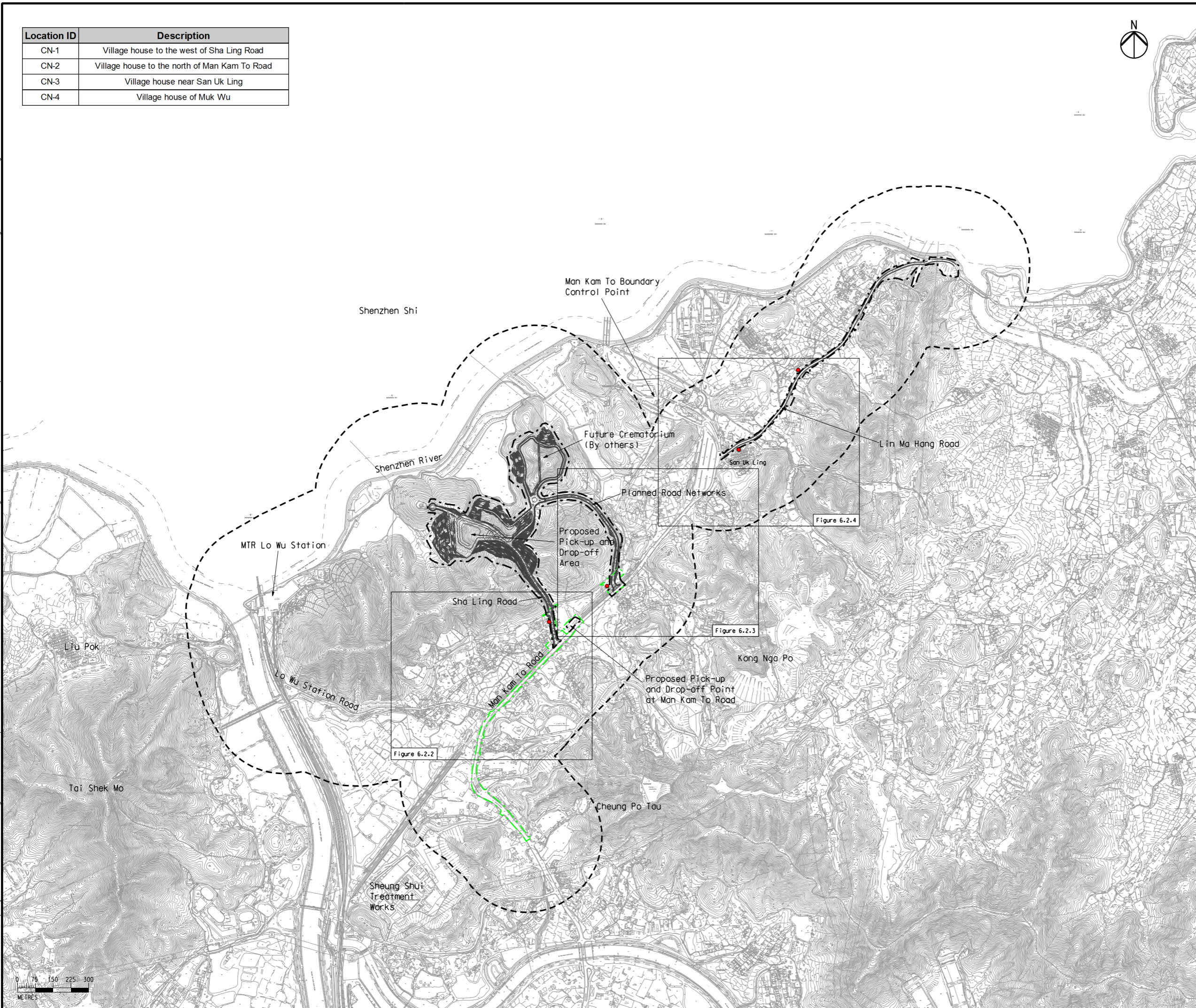
Location ID	Description
CN-1	Village house to the west of Sha Ling Road
CN-2	Village house to the north of Man Kam To Road
CN-3	Village house near San Uk Ling
CN-4	Village house of Muk Wu



Legend

- Project Boundary
- Utilities Construction
- 300m Assessment Area
- Proposed Construction Noise Monitoring Locations

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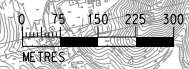
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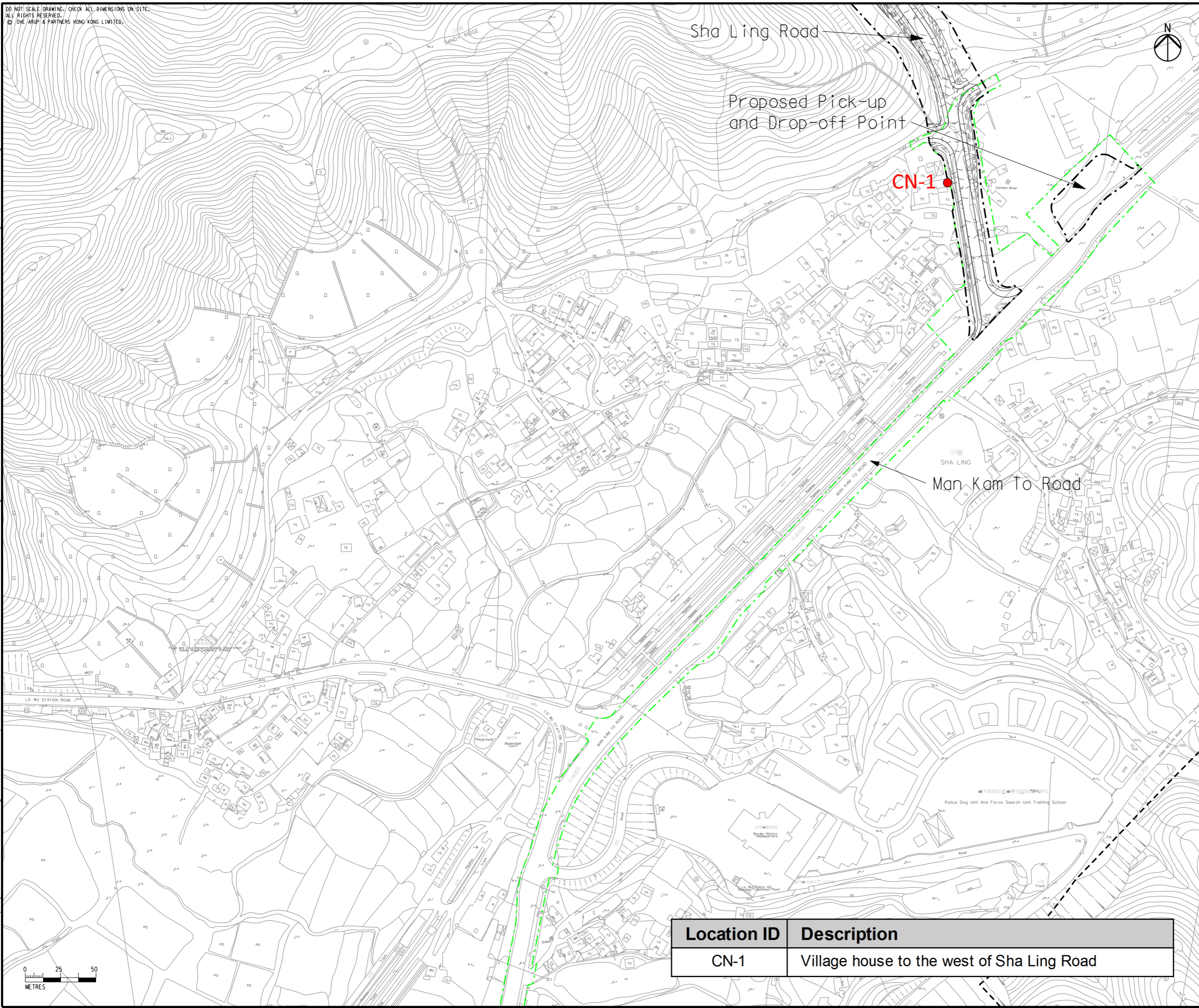
Drawing title  
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Drawing no. <b>Figure 6.2.1</b>		Rev. <b>F</b>	
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**Legend**

- Project Boundary
- Utilities Construction
- 300m Assessment Area
- Proposed Construction Noise Monitoring Locations

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 Related Facilities at Sandy Ridge  
 Cemetery - Design and Construction

Drawing title  
**Locations of Proposed  
 Construction Noise  
 Monitoring  
 (Sheet 2 of 4)**

Drawing no. <b>Figure 6.2.2</b>		Rev. <b>E</b>	
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Location ID	Description
CN-1	Village house to the west of Sha Ling Road

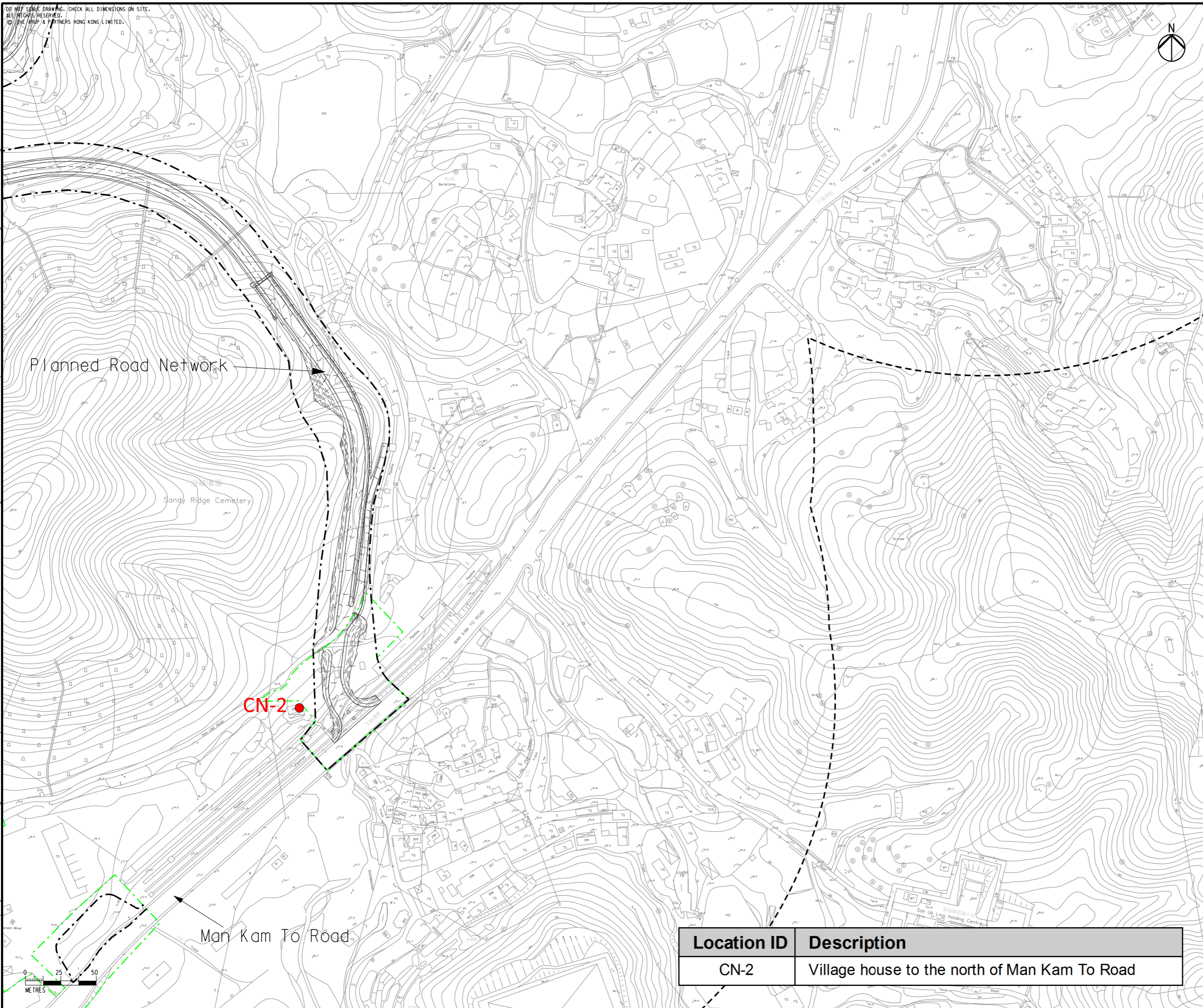
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Legend

- Project Boundary
- Utilities Construction
- 300m Assessment Area
- Proposed Construction Noise Monitoring Locations

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 Related Facilities at Sandy Ridge  
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Drawing title  
**Locations of Proposed  
 Construction Noise  
 Monitoring  
 (Sheet 3 of 4)**

Drawing no. <b>Figure 6.2.3</b>		Rev. <b>E</b>	
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Location ID	Description
CN-2	Village house to the north of Man Kam To Road



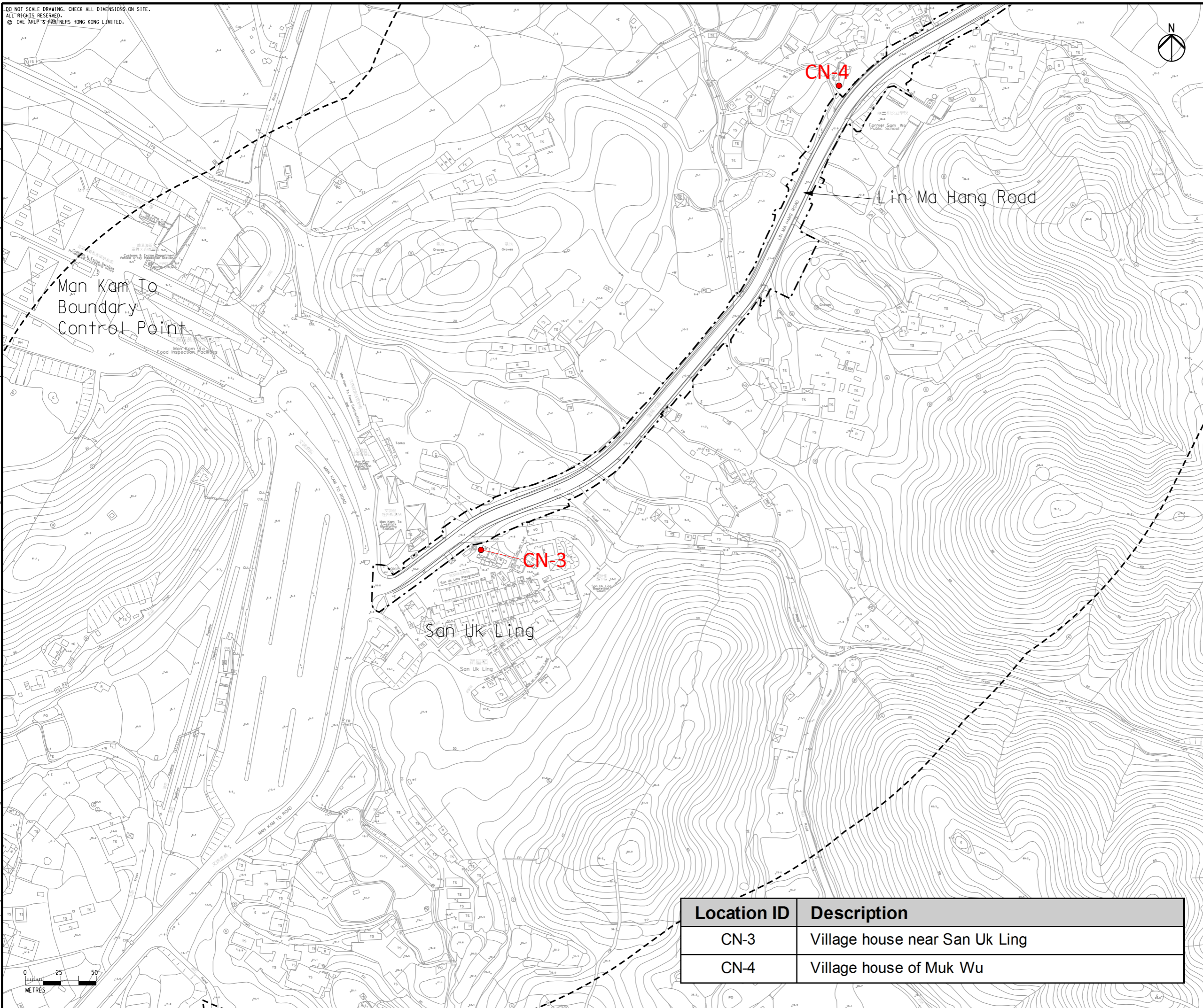
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Legend

- Project Boundary
- 300m Assessment Area
- Proposed Construction Noise Monitoring Locations

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Location ID	Description
CN-3	Village house near San Uk Ling
CN-4	Village house of Muk Wu

Rev	Description	By	Date
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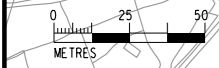
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**Locations of Proposed Construction Noise Monitoring (Sheet 4 of 4)**

Drawing no. <b>Figure 6.2.4</b>		Rev. <b>E</b>	
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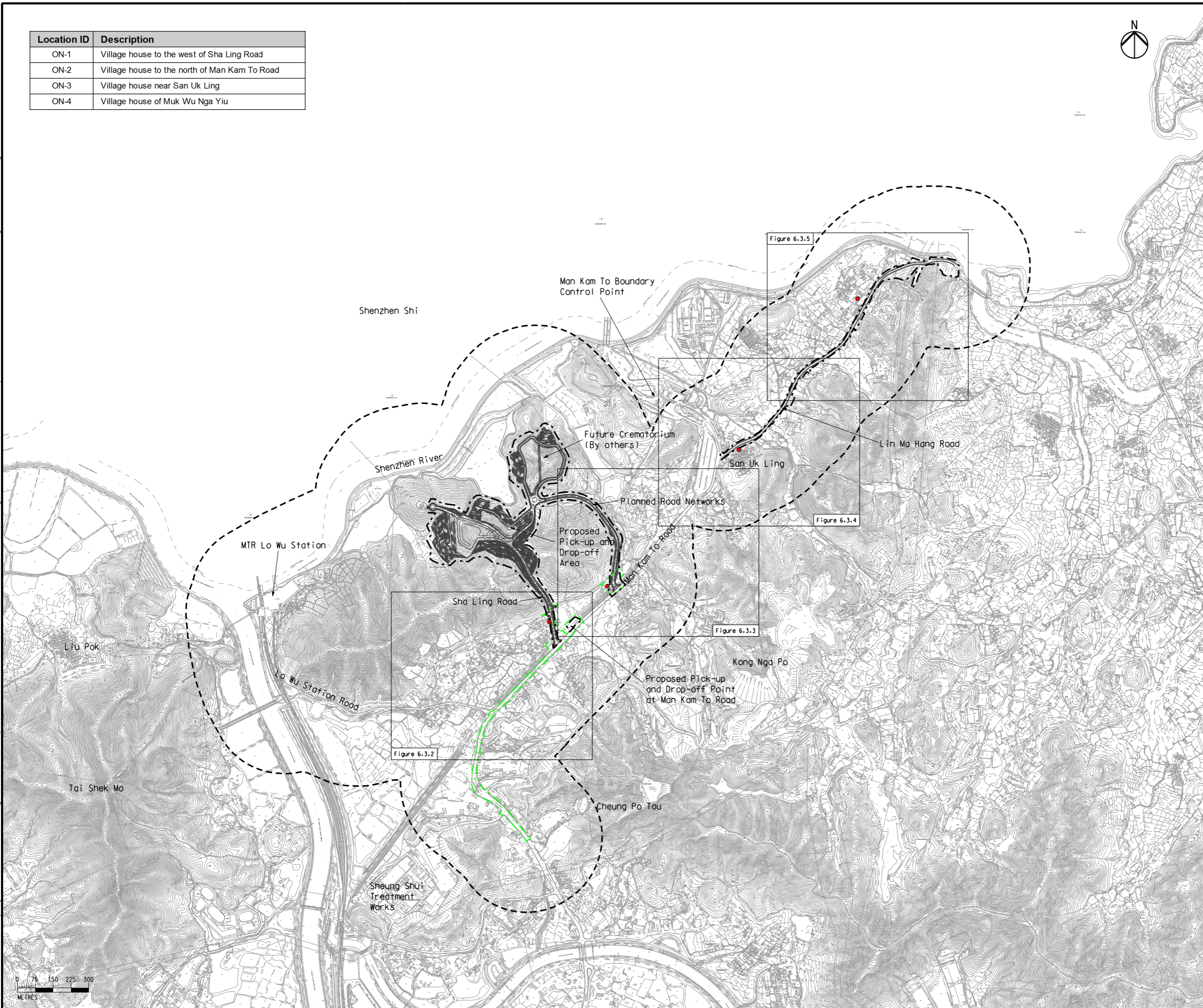
Location ID	Description
ON-1	Village house to the west of Sha Ling Road
ON-2	Village house to the north of Man Kam To Road
ON-3	Village house near San Uk Ling
ON-4	Village house of Muk Wu Nga Yiu



Legend

- Project Boundary
- Utilities Construction
- 300m Assessment Area
- Proposed Road Traffic Noise Monitoring Locations

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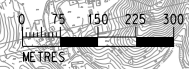
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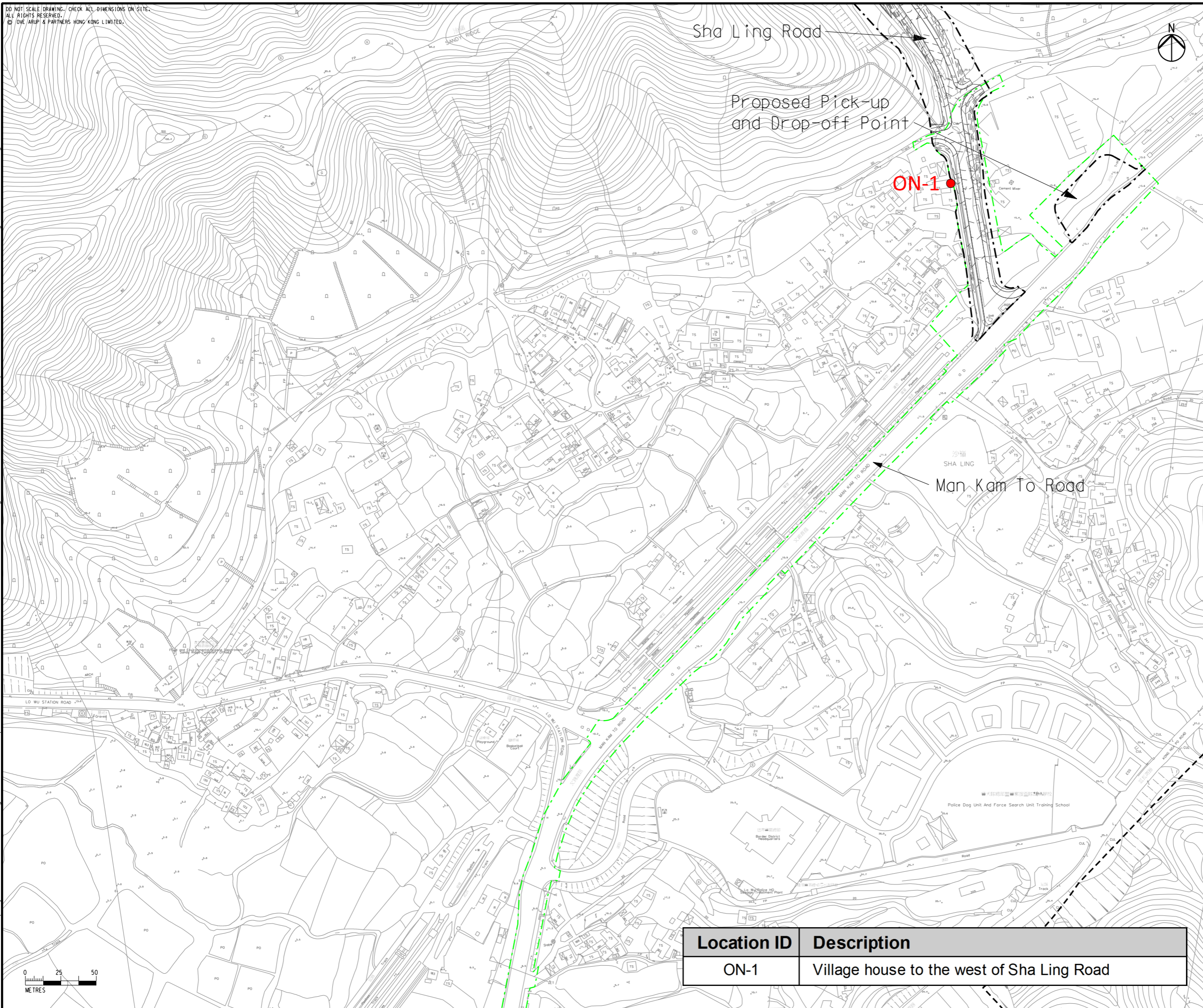
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Drawing title  
**Locations of Proposed Road Traffic Noise Monitoring (Sheet 1 of 5)**

Drawing no. <b>Figure 6.3.1</b>		Rev. <b>F</b>	
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**Legend**

- Project Boundary
- Utilities Construction
- 300m Assessment Area
- Proposed Road Traffic Noise Monitoring Locations

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Drawing title  
**Locations of Proposed  
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 (Sheet 2 of 5)**

Drawing no. <b>Figure 6.3.2</b>		Rev. <b>E</b>	
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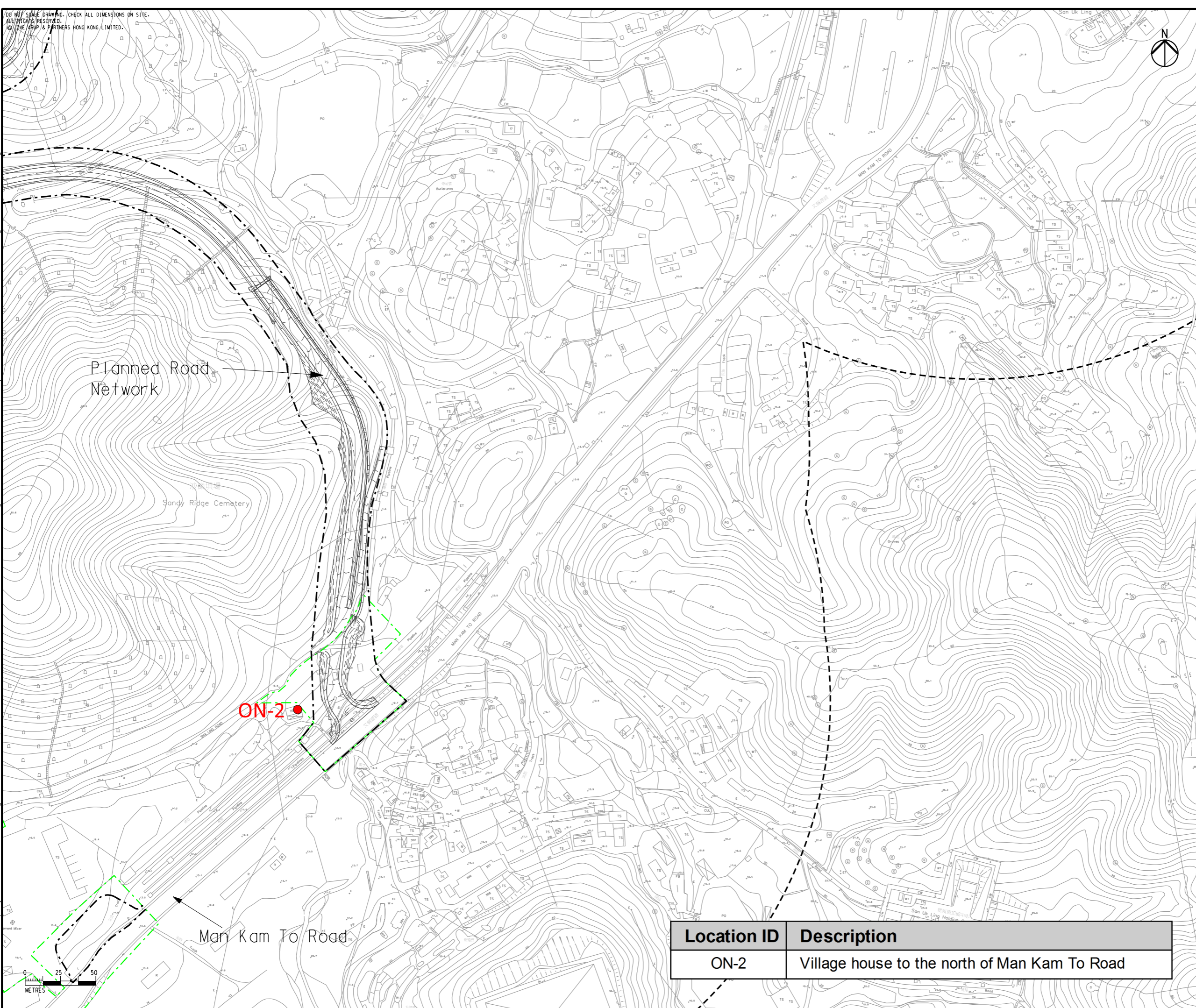
Location ID	Description
ON-1	Village house to the west of Sha Ling Road

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- Legend**
- Project Boundary
  - Utilities Construction
  - 300m Assessment Area
  - Proposed Road Traffic Noise Monitoring Locations

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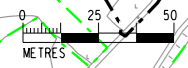


Planned Road Network

Sandy Ridge Cemetery

ON-2

Man Kam To Road



Location ID	Description
ON-2	Village house to the north of Man Kam To Road

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 Cemetery - Design and Construction

Drawing title  
**Locations of Proposed  
 Road Traffic Noise  
 Monitoring  
 (Sheet 3 of 4)**

Drawing no. <b>Figure 6.3.3</b>		Rev. <b>E</b>	
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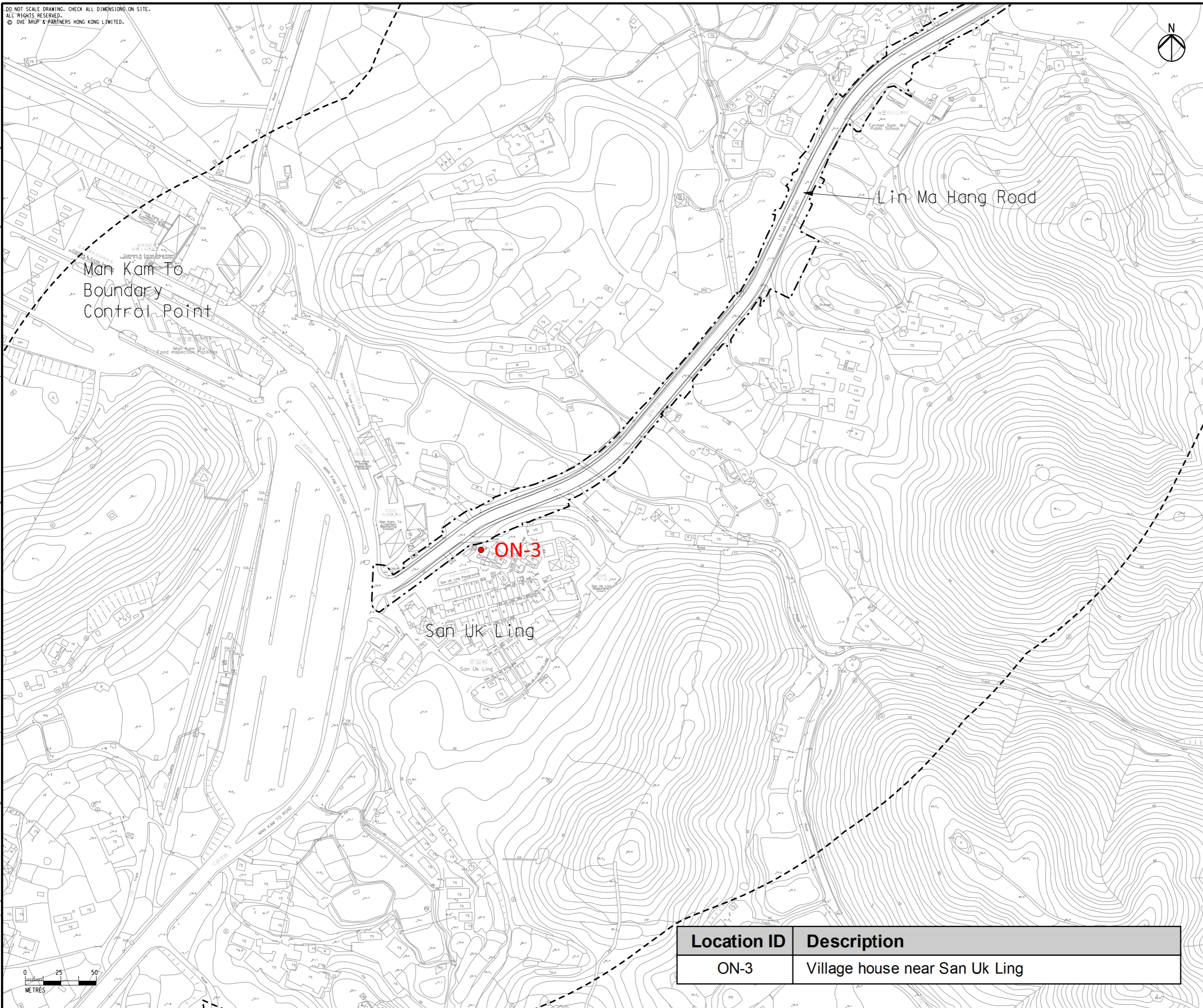
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Legend

- Project Boundary
- 300m Assessment Area
- Proposed Road Traffic Noise Monitoring Locations

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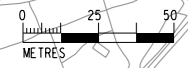


Man Kam To  
Boundary  
Control Point

Lin Ma Hang Road

ON-3

San Uk Ling



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Drawing title  
**Locations of Proposed  
 Road Traffic Noise  
 Monitoring  
 (Sheet 4 of 5)**

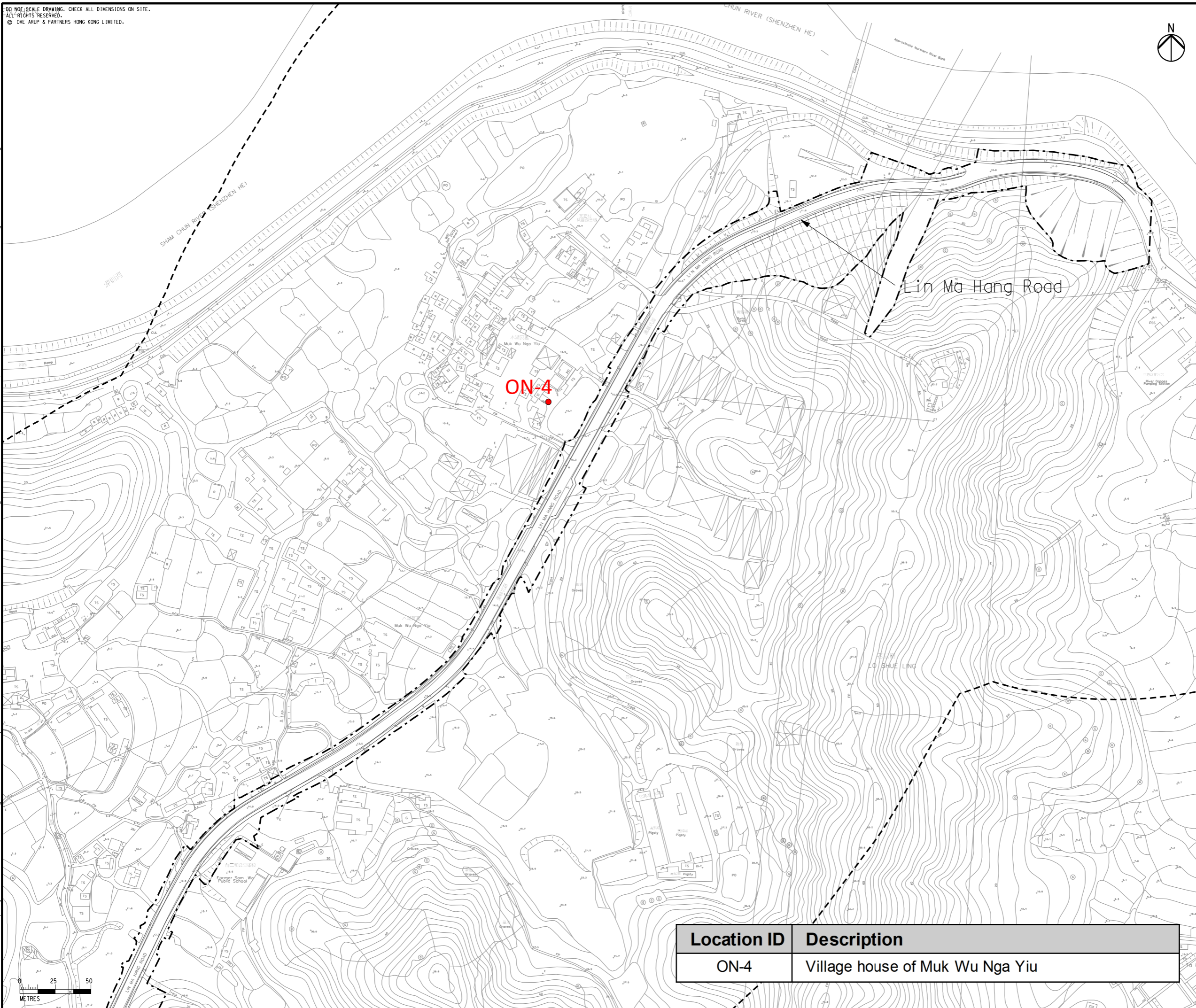
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Location ID	Description
ON-3	Village house near San Uk Ling

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**Legend**

- Project Boundary
- 300m Assessment Area
- Proposed Road Traffic Noise Monitoring Locations



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 Related Facilities at Sandy Ridge  
 Cemetery - Design and Construction

Drawing title  
**Locations of Proposed  
 Road Traffic Noise  
 Monitoring  
 (Sheet 5 of 5)**

Drawing no. <b>Figure 6.3.5</b>		Rev. <b>E</b>	
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Location ID	Description
ON-4	Village house of Muk Wu Nga Yiu

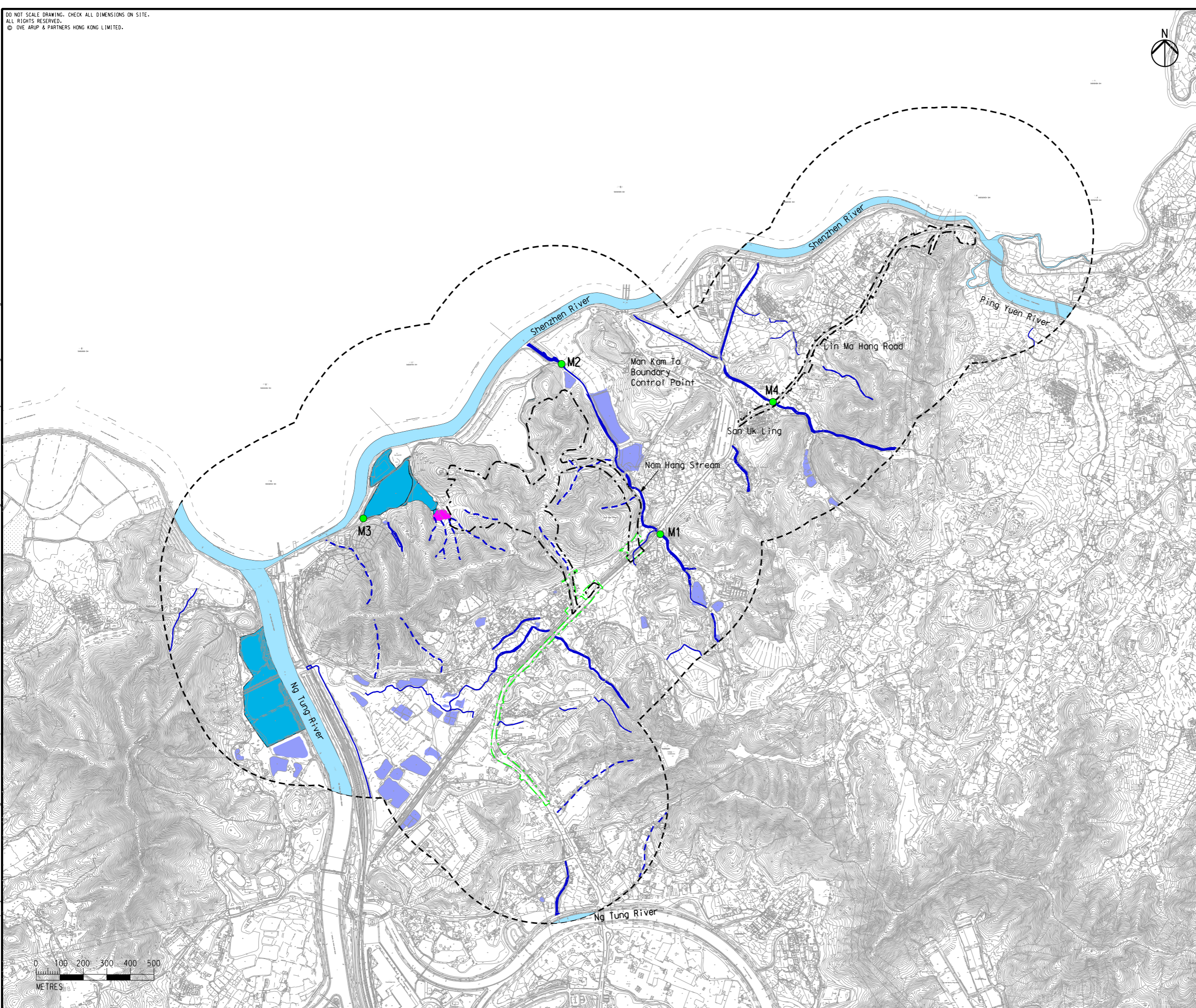




Legend

- Project Boundary
- Utilities Construction
- 500m Assessment Area
- Channelized River
- Pond
- Watercourse
- Conservation Area (CA)
- Wet Woodland
- Seasonal Watercourse
- Baseline Monitoring Station

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Drawing title  
**Water Quality Monitoring  
 Locations**

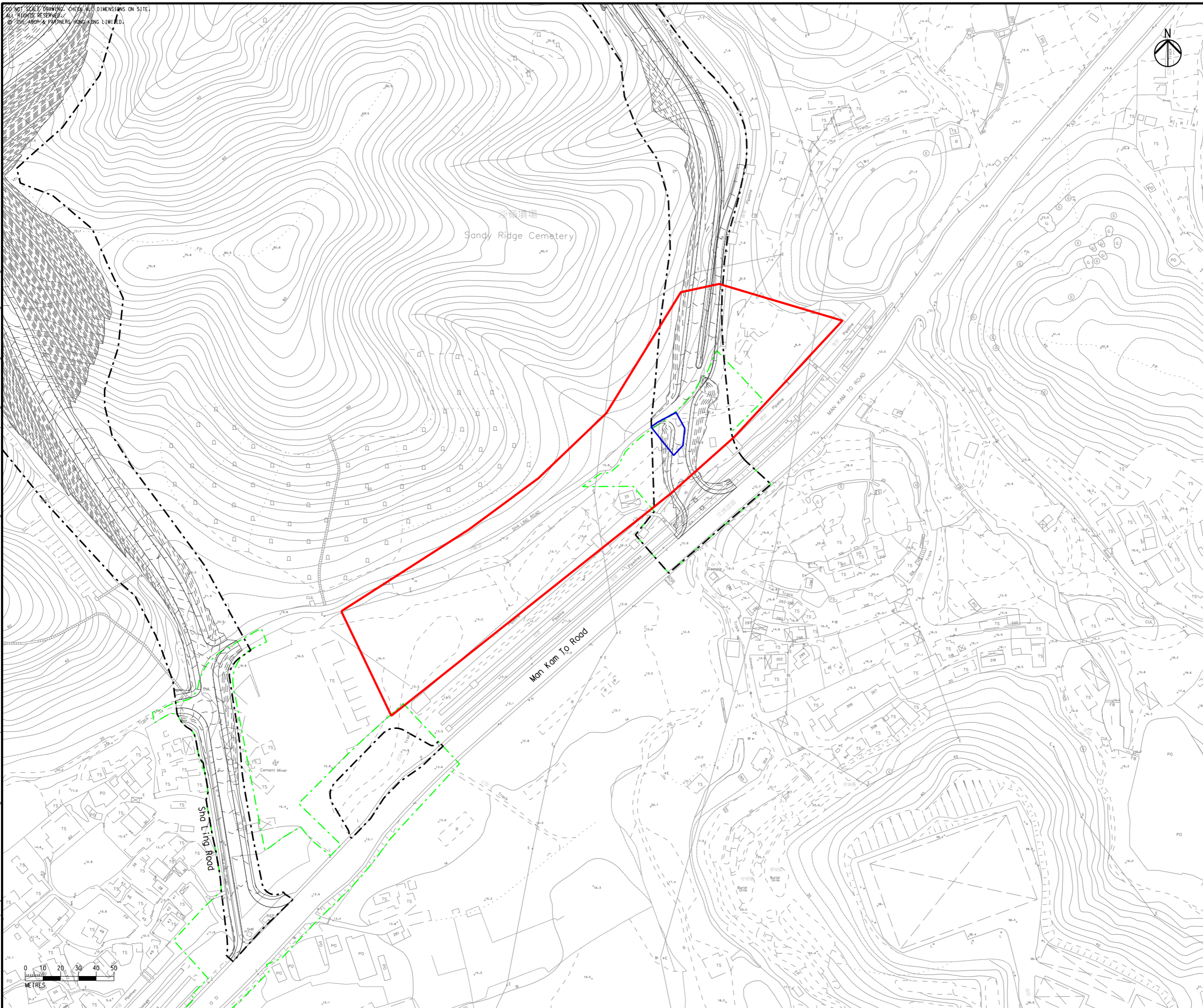
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**Legend**

- Project Boundary
- Utilities Construction
- Proposed Area for Archaeological Watching Brief
- Licence Area

Ref:  
 Archaeological Survey Licence no. 367

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Drawing title  
**Area Requiring Archaeological Watching Brief**

Drawing no. <b>Figure 13.1.1</b>		Rev. <b>D</b>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:2000 @A3		Status <b>PRELIMINARY</b>	

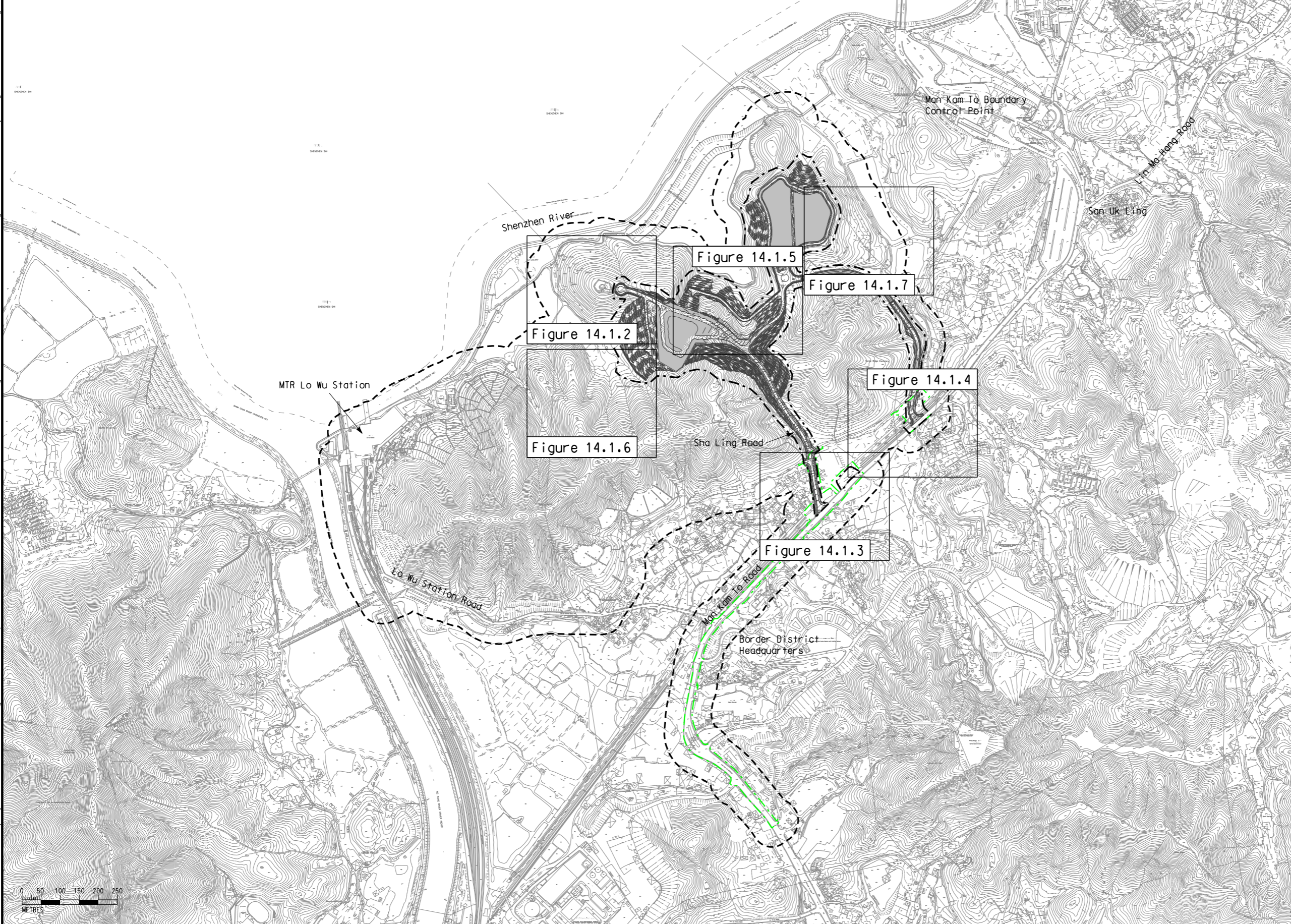
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Shenzhen Shi



Legend

-  Project Boundary
-  Utilities Construction
-  50m Assessment Boundary

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Drawing title  
**Locations of Built Heritage  
 Resources - Sandy Ridge  
 (Sheet 1 of 7)**

Drawing no. <b>Figure 14.1.1</b>		Rev. <b>F</b>	
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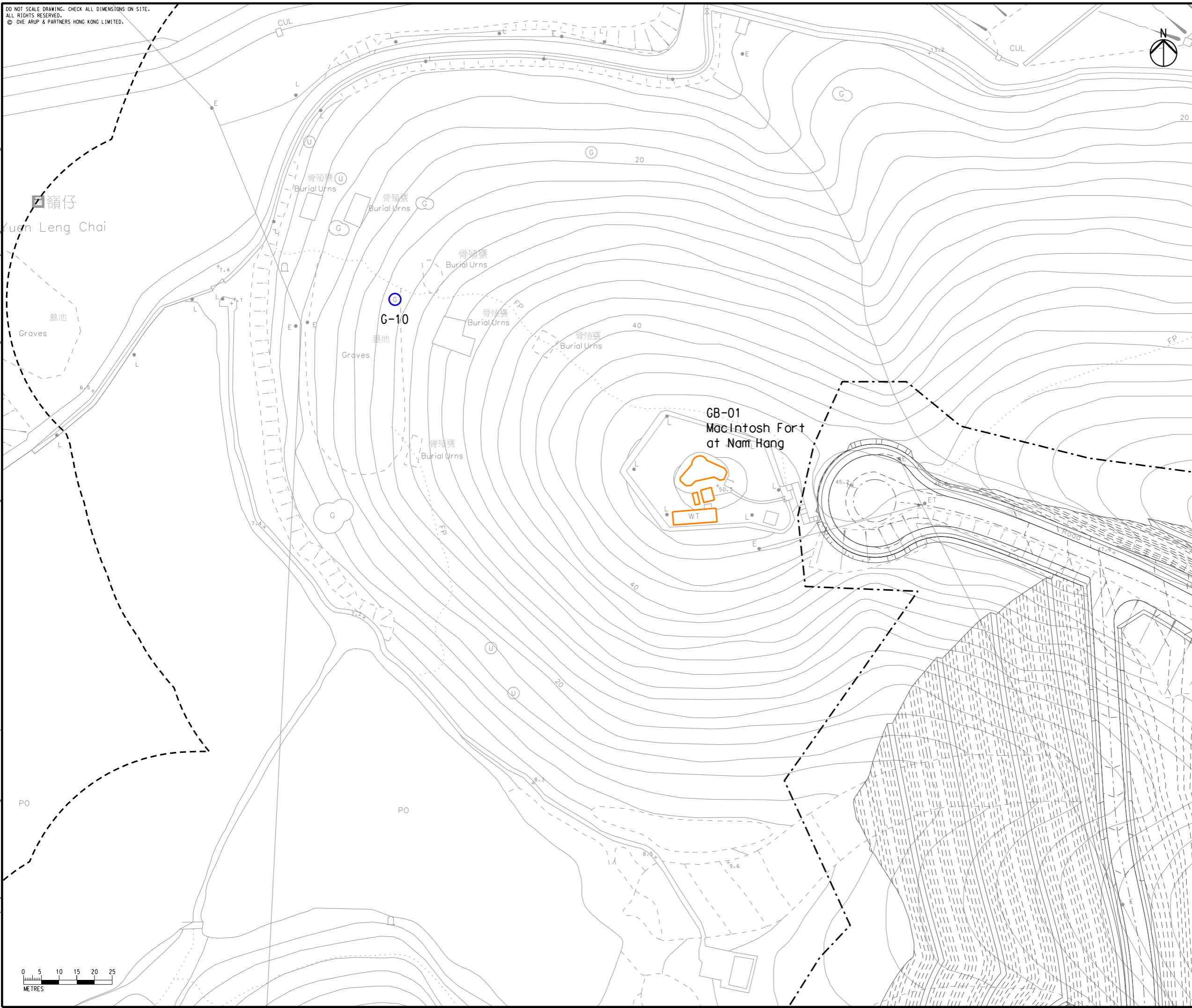


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Legend

-  Project Boundary
-  50m Assessment Boundary
-  Built Heritage
-  Historical Clan Grave

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E	FIFTH ISSUE	GL	12/15
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Contract No. and Title:  
Agreement No. CE 1/2013(CE)  
Site Formation and Associated  
Infrastructural Works for Development  
of Columbarium, Crematorium and  
Related Facilities at Sandy Ridge  
Cemetery - Design and Construction

Drawing title  
**Locations of Built Heritage  
Resources - Sandy Ridge  
(Sheet 2 of 7)**

Drawing no. <b>Figure 14.1.2</b>		Rev. <b>G</b>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:1000 @A3		Status <b>PRELIMINARY</b>	

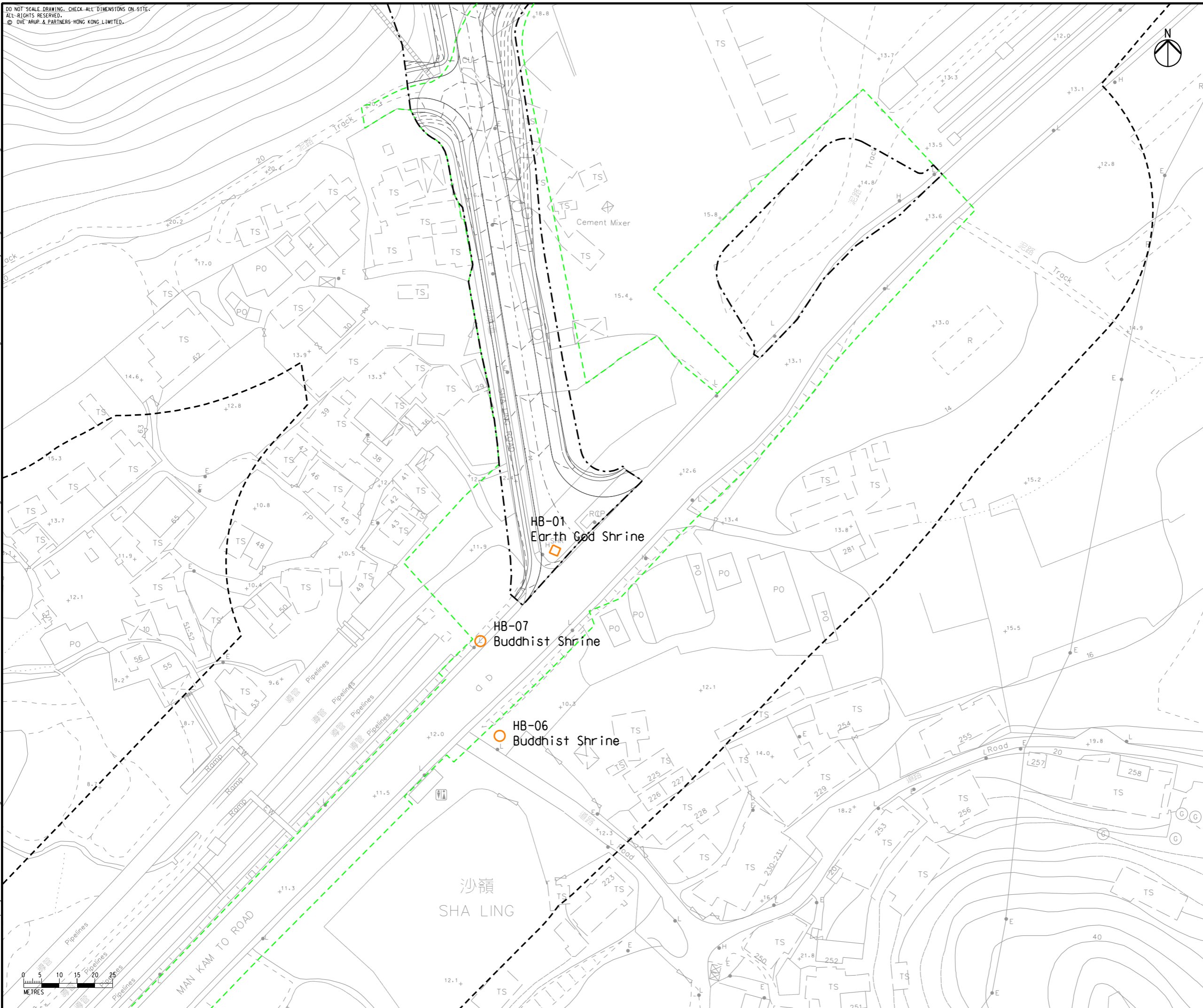
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 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20160226 Revised Final\_V1\Figure 14.1.3 - Locations of Built Heritage Resources - Sandy Ridge (Sheet 3 of 7).dgn



**Legend**

- Project Boundary
- Utilities Construction
- 50m Assessment Boundary
- Built Heritage

Rev	Description	By	Date
F	SIXTH ISSUE	GL	02/16
E	FIFTH ISSUE	GL	12/15
D	FOURTH ISSUE	GL	10/15
C	THIRD ISSUE	GL	01/15

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 Related Facilities at Sandy Ridge  
 Cemetery - Design and Construction

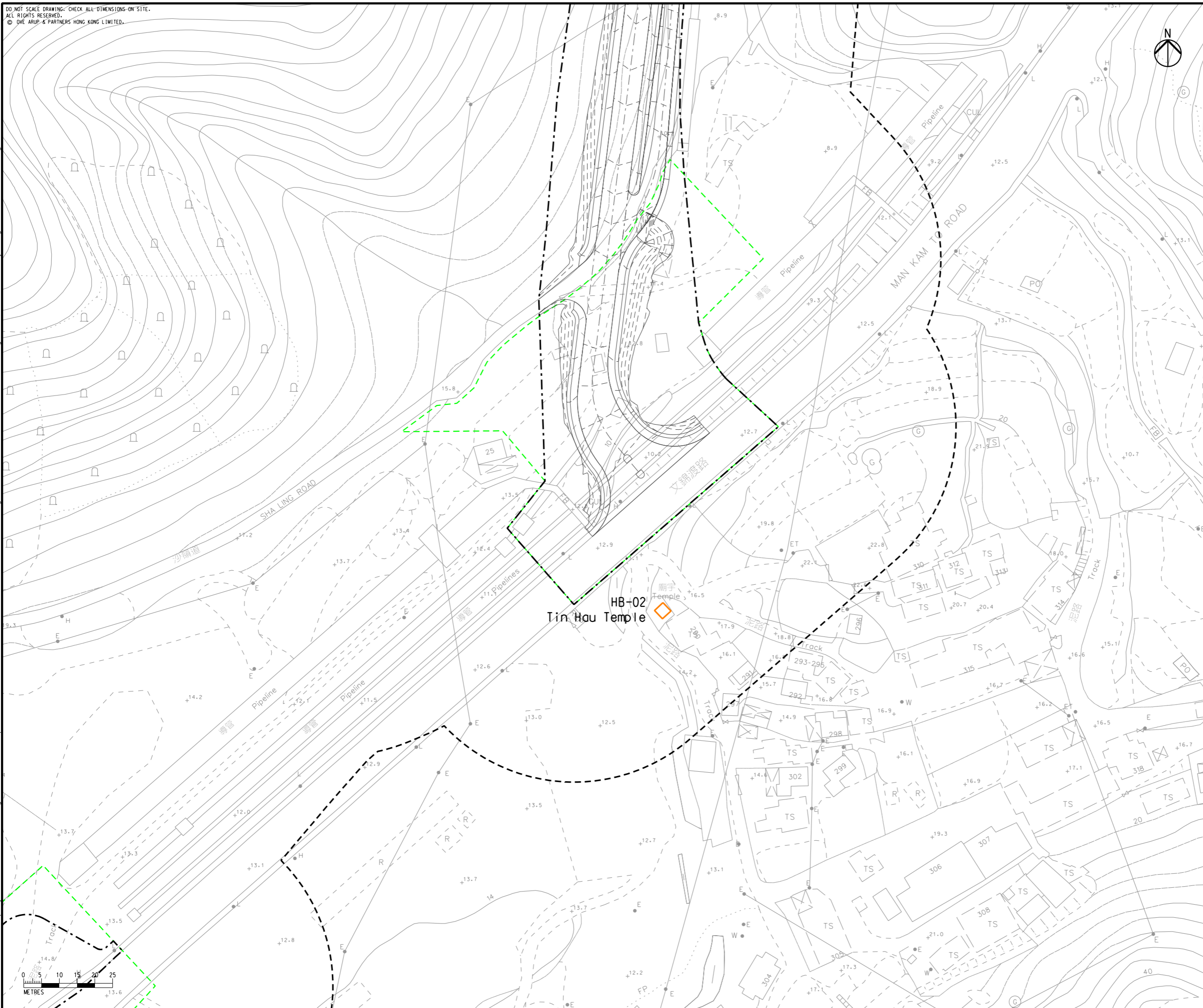
Drawing title  
**Locations of Built Heritage  
 Resources - Sandy Ridge  
 (Sheet 3 of 7)**

Drawing no. <b>Figure 14.1.3</b>		Rev. <b>F</b>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:1000 @A3		Status <b>PRELIMINARY</b>	

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**Legend**

- Project Boundary
- Utilities Construction
- 50m Assessment Boundary
- Built Heritage

E	FIFTH ISSUE	GL	02/16
D	FOURTH ISSUE	GL	12/15
C	THIRD ISSUE	GL	10/15
B	SECOND ISSUE	GL	11/14
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 Agreement No. CE 1/2013(CE)  
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 Infrastructural Works for Development  
 of Columbarium, Crematorium and  
 Related Facilities at Sandy Ridge  
 Cemetery - Design and Construction

Drawing title  
**Locations of Built Heritage  
 Resources - Sandy Ridge  
 (Sheet 4 of 7)**

Drawing no.		Rev.	
Figure 14.1.4		E	
Drawn	Date	Checked	Approved
GL	02/16	EL	ST
Scale	Status		
1:1000 @A3	PRELIMINARY		

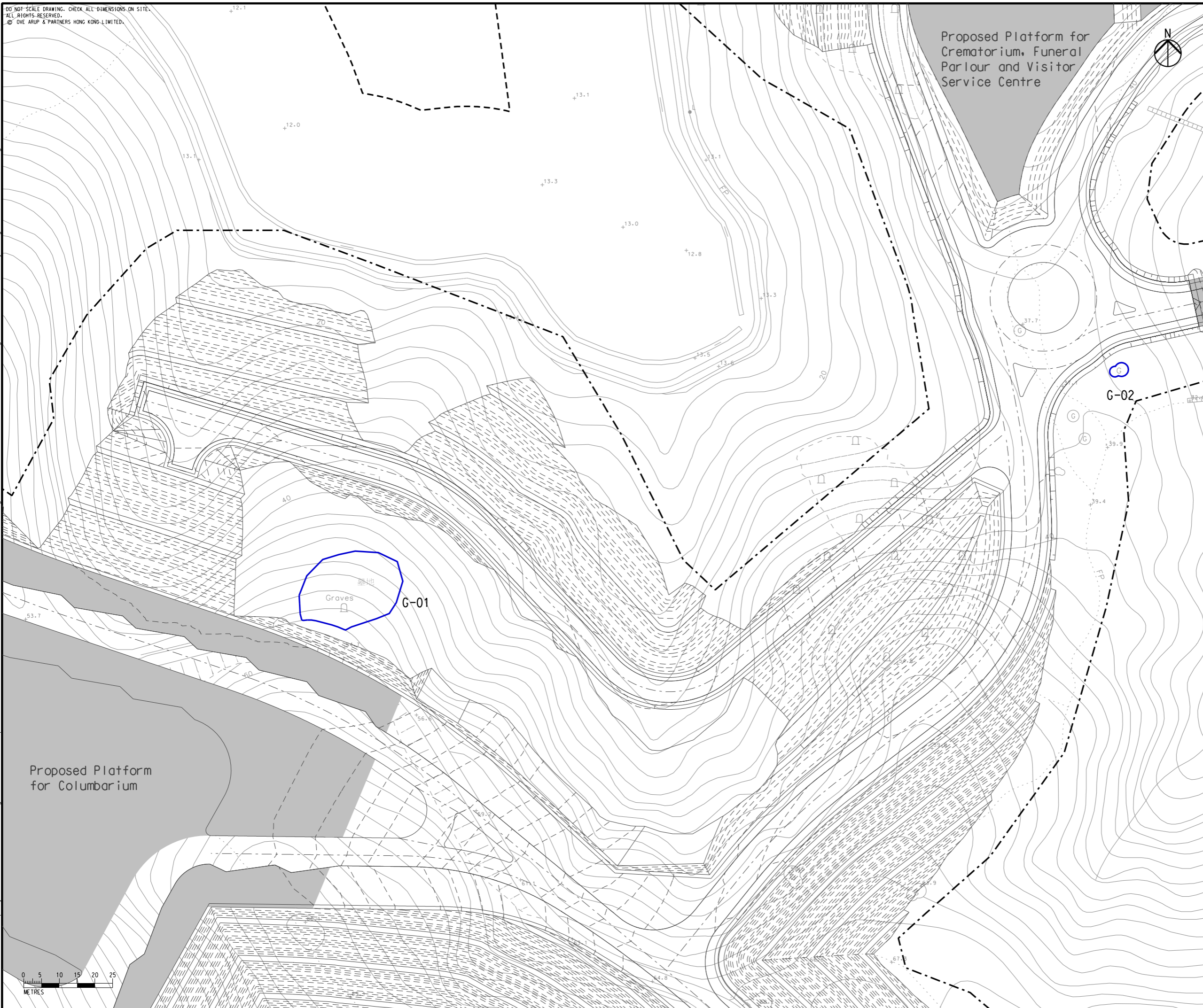
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 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20160226 Revised Final\_V1\Figure 14.1.5 - Locations of Built Heritage Resources - Sandy Ridge (Sheet 5 of 7).dgn



**Legend**

- Project Boundary
- 50m Assessment Boundary
- Historical Clan Grave

F	SIXTH ISSUE	GL	02/16
E	FIFTH ISSUE	GL	01/16
D	FOURTH ISSUE	GL	12/15
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 Agreement No. CE 1/2013(CE)  
 Site Formation and Associated Infrastructural Works for Development of Columbarium, Crematorium and Related Facilities at Sandy Ridge Cemetery - Design and Construction

Drawing title  
Locations of Built Heritage Resources - Sandy Ridge (Sheet 5 of 7)

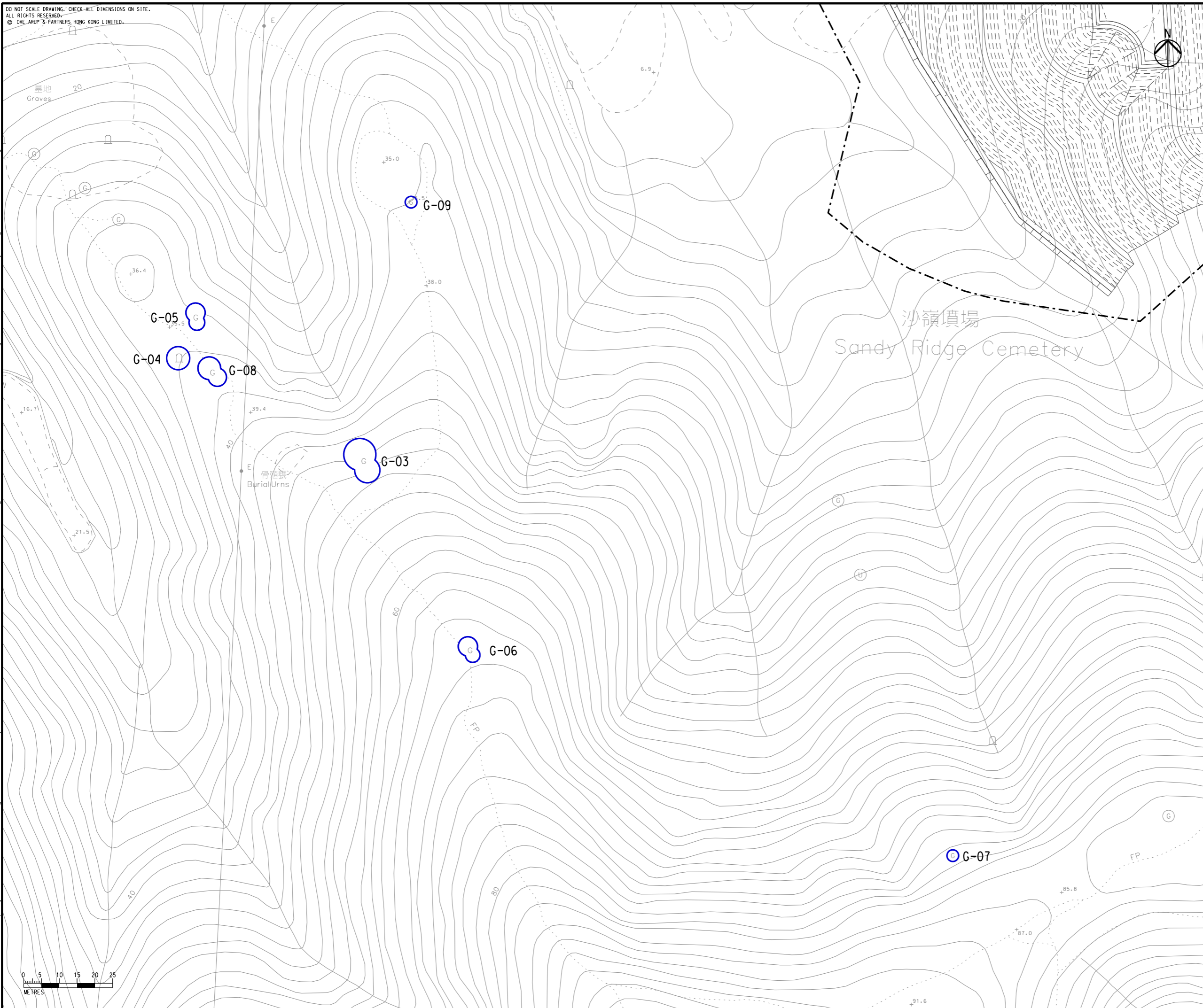
Drawing no. <span style="font-size: 18pt; font-weight: bold;">Figure 14.1.5</span>		Rev. <span style="font-size: 18pt; font-weight: bold;">F</span>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:1000 @A3		Status <span style="font-weight: bold;">PRELIMINARY</span>	

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 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20160226 Revised Final\_V1\Figure 14.1.6 - Locations of Built Heritage Resources - Sandy Ridge (Sheet 6 of 7).dgn



**Legend**

- Project Boundary
- 50m Assessment Boundary
- Historical Clan Grave

Rev	Description	By	Date
E	FIFTH ISSUE	GL	02/16
D	FOURTH ISSUE	GL	12/15
C	THIRD ISSUE	GL	10/15
B	SECOND ISSUE	GL	11/14

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Drawing title  
**Locations of Built Heritage Resources - Sandy Ridge (Sheet 6 of 7)**

Drawing no. <b>Figure 14.1.6</b>		Rev. <b>E</b>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:1000 @A3		Status <b>PRELIMINARY</b>	

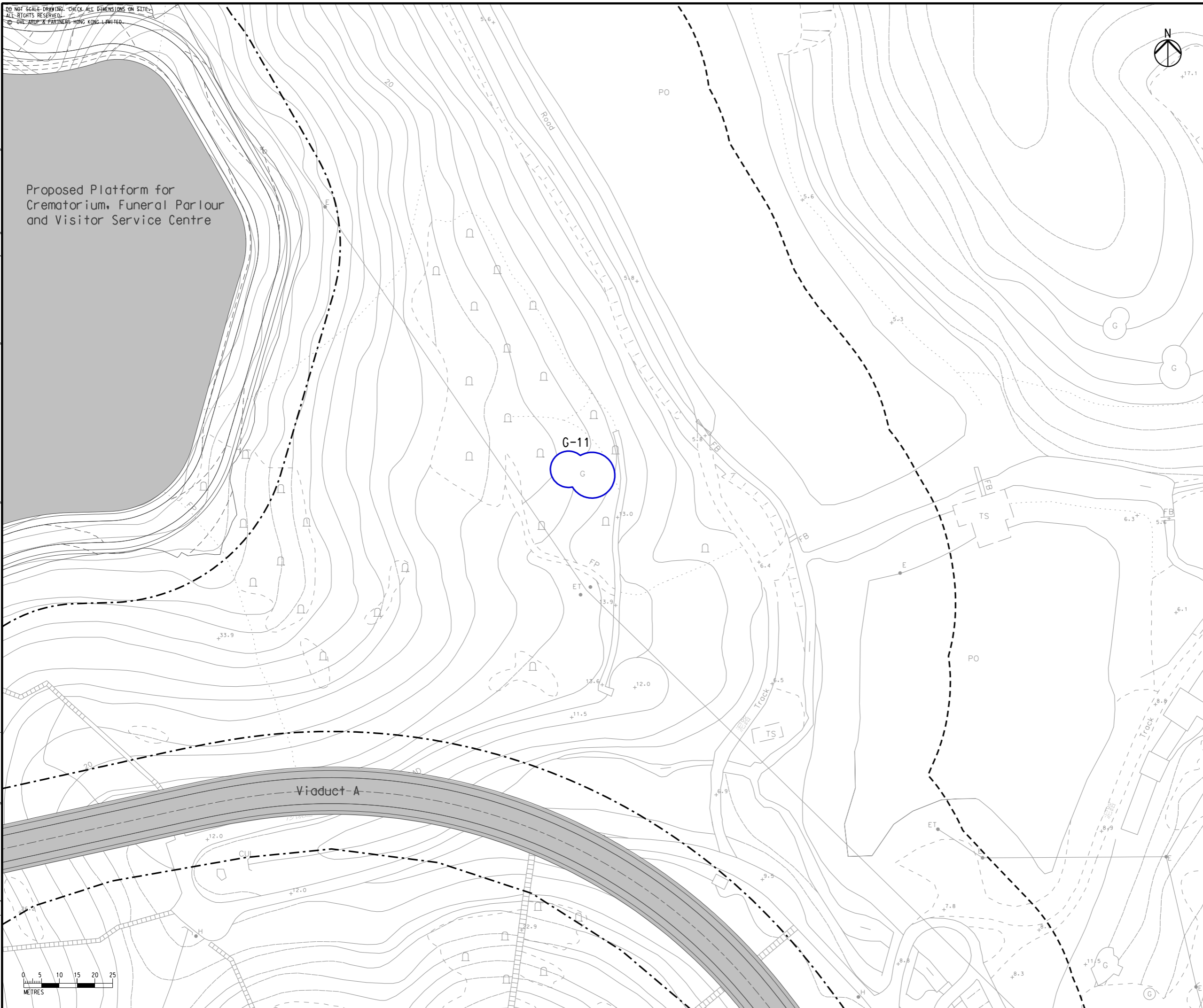
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 Filename : G:\env\project\231448\13 Drawing Deliverables\Reports\018 EM&A Manual\20160226 Revised Final\_V1\Figure 14.1.7 - Locations of Built Heritage Resources - Sandy Ridge (Sheet 7 of 7).dgn



**Legend**

- Project Boundary
- 50m Assessment Boundary
- Historical Clan Grave

E	FIFTH ISSUE	GL	02/16
D	FOURTH ISSUE	GL	12/15
C	THIRD ISSUE	GL	10/15
B	SECOND ISSUE	GL	11/14
Rev	Description	By	Date

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Drawing title  
**Locations of Built Heritage Resources - Sandy Ridge (Sheet 7 of 7)**

Drawing no. <b>Figure 14.1.7</b>		Rev. <b>E</b>	
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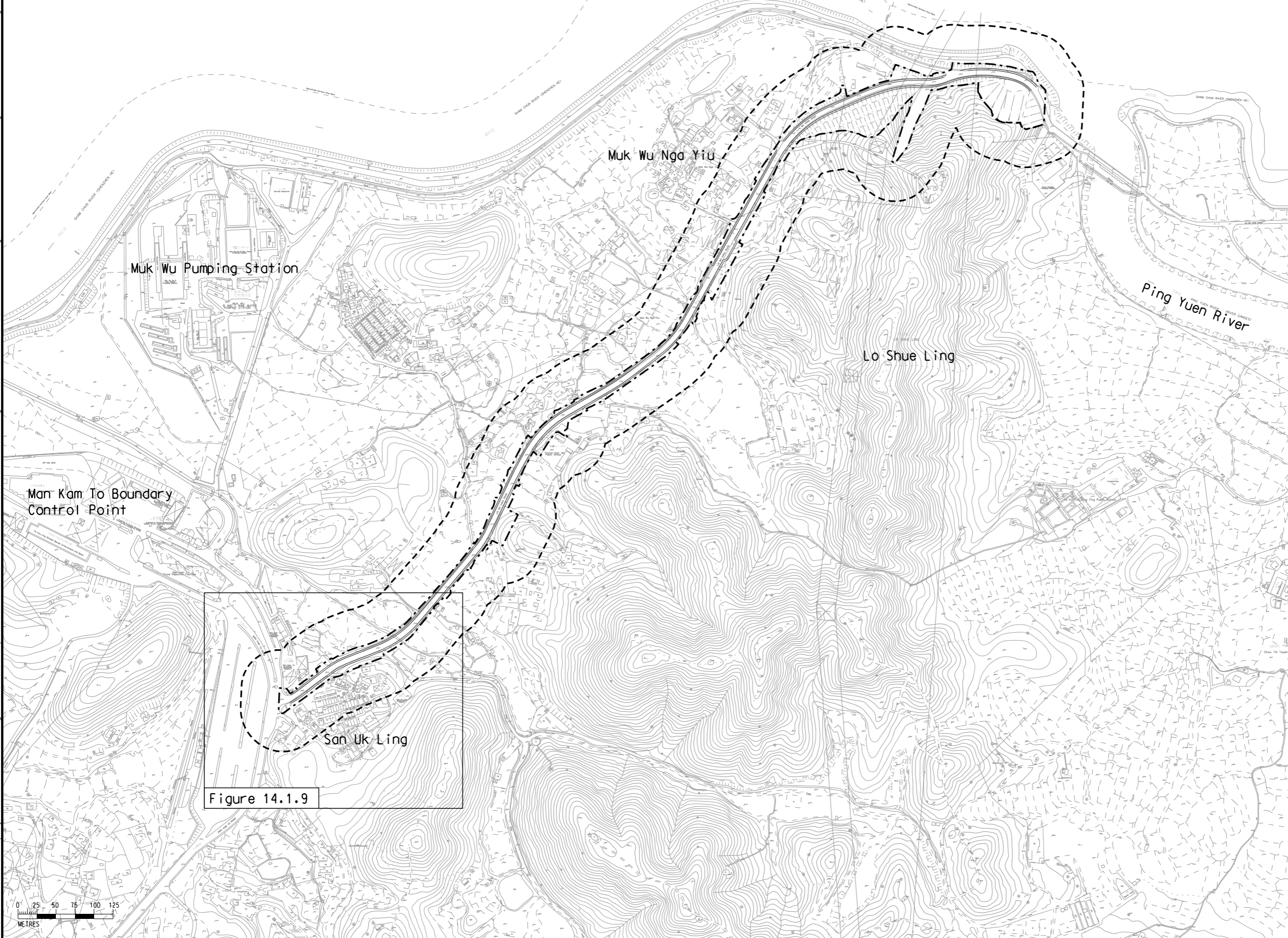


Figure 14.1.9



**Legend**

- Project Boundary
- 50m Assessment Boundary

D	FOURTH ISSUE	GL	02/16
C	THIRD ISSUE	GL	10/15
B	SECOND ISSUE	GL	11/14
A	FIRST ISSUE	GL	06/14
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Drawing title

Locations of Built Heritage Resources - Lin Ma Hang Road  
(Sheet 1 of 2)

Drawing no.		Rev.	
Figure 14.1.8		D	
Drawn	Date	Checked	Approved
GL	02/16	EL	ST
Scale	Status		
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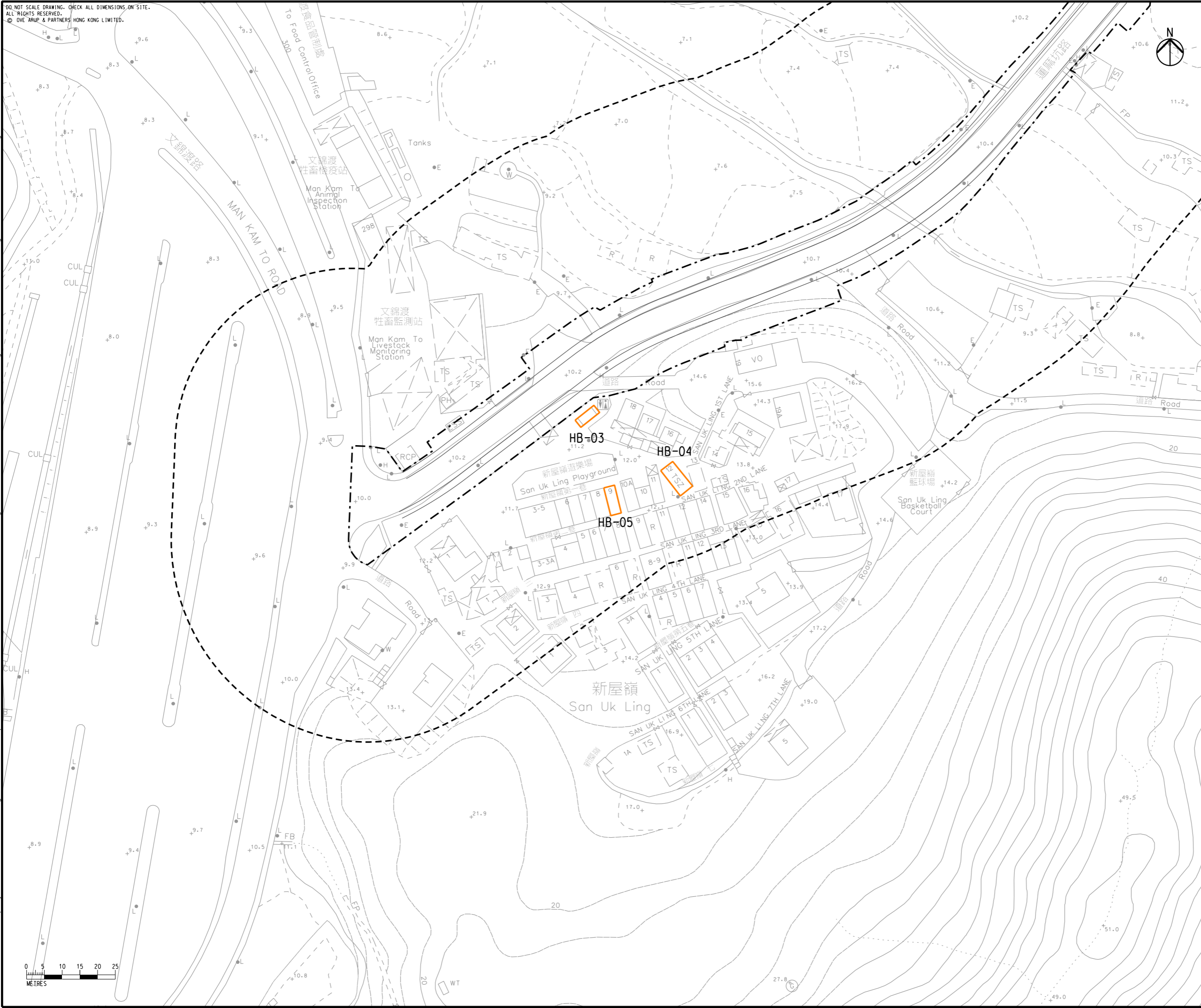
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**Legend**

- Project Boundary
- 50m Assessment Boundary
- Built Heritage

D	FOURTH ISSUE	GL	02/16
C	THIRD ISSUE	GL	10/15
B	SECOND ISSUE	GL	11/14
A	FIRST ISSUE	GL	06/14
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Drawing title  
**Locations of Built Heritage  
 Resources - Lin Ma Hang  
 Road  
 (Sheet 2 of 2)**

Drawing no. <b>Figure 14.1.9</b>		Rev. <b>D</b>	
Drawn GL	Date 02/16	Checked EL	Approved ST
Scale 1:1000 @A3		Status <b>PRELIMINARY</b>	

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