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## 1 INTRODUCTION

### 1.1 Project Background

- 1.1.1 The title of the Project is “Widening of Tsuen Wan Road and the associated junction improvement works” (hereafter referred to as the Project).
- 1.1.2 In 2006, Civil Engineering and Development Department (CEDD) engaged consultants to carry out an Environmental Impact Assessment (EIA) under an Investigation Assignment with the project title “Tsuen Wan Road Bypass, Widening of Tsuen Wan Road between Tsuen Tsing Interchange and Kwai Tsing Interchange, and Associated Junction Improvement Works”. The EIA studied the impacts of the project on noise, air quality, water quality, construction waste, cultural heritage, landfill gas hazard, hazard to life, ecology, visual and landscape on both existing and planned developments during construction and operation stages. The EIA report was approved under the EIA Ordinance in December 2008 (EIA Register No.: AEIAR-124/2008).
- 1.1.3 In 2009, CEDD commissioned a Design and Construction (D&C) Assignment on “Tsuen Wan Bypass, Widening of Tsuen Wan Road between Tsuen Tsing Interchange and Kwai Tsing Interchange, and Associated Junction Improvement Works” (the TWB project) to cater for the anticipated increase in traffic demand arising from the developments in the Northwest New Territories, the commissioning of West Rail and its associated property developments as well as other planned developments in Tsuen Wan. By comparing the results of the traffic survey conducted in 2012 with that conducted in 2006, it was revealed that there was a general decrease in the peak hour traffic volume between 2006 and 2012. Moreover, the projected traffic peak hour flow in 2021 as forecast in the survey conducted in 2012 also demonstrated a drop as compared with the traffic flow in 2006.
- 1.1.4 In view of the foregoing, CEDD concluded that there was still adequate road capacity for Tsuen Wan Road (TWR) by 2021 and there was no imminent need to implement the TWB project by that time. It was then agreed in June 2013 to defer the implementation programme of the TWB project.
- 1.1.5 Since then, Transport Department (TD) conducted traffic counts from 2013 and 2015. The traffic counts revealed a general increase in peak hour traffic in 2013 and 2014 when compared with the findings of CEDD’s traffic survey conducted in 2012, while the peak hour traffic in 2015 remained steady.
- 1.1.6 Highways Department (HyD) subsequently took over the project from CEDD. HyD’s traffic review study on TWR traffic conditions conducted in 2016 revealed that the widening of TWR and improvement of associated junctions were needed to cope with the future traffic demand.
- 1.1.7 On 23 May 2019, HyD commissioned AECOM Asia Co. Ltd. to undertake the assignment of Agreement No. CE 61/2018 (HY) Widening of Tsuen Wan Road, Extension of Existing Vehicular Bridge at Texaco Road and the Associated Junction Improvement Works – Investigation. The purpose of the investigation assignment is to examine and review the Initial Scheme, which was basically formulated under the aforementioned CEDD’s D&C Assignment, develop other feasible build forms / alignment options (other Schemes) for the Project. By comparing and evaluating the Initial Scheme and all other Schemes developed, based upon traffic, environmental and land considerations amongst other factors, the Preferred Scheme will be formulated and taken forward to the detailed design and construction stages of the Project.
- 1.1.8 Since approval of the abovementioned EIA report (EIA Register No.: AEIAR-124/2008) in 2008, there are new developments and new sensitive receivers within the study area as well as new assessment requirements for the Project, together with potential changes in project scope, a fresh EIA study is considered required for the Preferred Scheme.

- 1.1.9 The Project comprises the following which are classified as Designated Project (DP) elements under Part I, Schedule 2 of the EIAO<sup>1</sup>:
- Item A.1 – A road which is an expressway, trunk road, primary distributor or district distributor road including new roads, and major extensions or improvements to existing roads; and
  - Item A.8 – A road or railway bridge more than 100 m in length between abutments.
- 1.1.10 The Project will widen individual road sections of the existing TWR and construct slip road to relieve the existing traffic congestion and cope with the anticipated future traffic demand.
- 1.1.11 The anticipated improvement of the traffic performance (i.e. relieving potential traffic congestion, smoother traffic flow, etc.) at individual sections of TWR brought about by the Project will alleviate the air quality and noise impacts associated with traffic congestion during peak hours. While potential noise impact on individual noise sensitive receivers due to the proposed road widening works has been identified, corresponding noise mitigation measures such as noise barriers, noise enclosures and low noise road surfacing will be provided under the Project. Relevant noise impact assessments, the extent and locations of the proposed noise mitigation measures and their mitigation effect of the noise impacts are outlined in **Section 4** of the EIA Report.
- 1.2 The Need for the Project**
- 1.2.1 TWR is an expressway connecting Kwai Chung Road and Tuen Mun Road. TWR provides traffic connection to Tsing Yi through the key junctions at Tsuen Tsing Interchange and Kwai Tsing Interchange, and traffic connection to the road networks of Tsuen Wan and Kwai Chung districts through the slip roads and interchanges along the expressway. Slow-moving traffic, or even worse, traffic congestion during morning peak hours at individual road sections of this expressway were observed from the traffic survey conducted in 2019.
- 1.2.2 Without the implementation of the Project, further traffic congestion is anticipated in 2036 and beyond at the individual road sections concerned at TWR. With the implementation of the Project, the road capacity at individual road sections of TWR will be increased and thus alleviate the anticipated traffic congestion at these road sections.
- 1.3 Consideration of Alternative Options**
- 1.3.1 Detailed investigation on the possibilities of different alternative options, including Tunnel Scheme and Viaduct Scheme, have been conducted. They are brought together with the Initial Scheme for evaluation of the Preferred Scheme of the Project.
- 1.3.2 Throughout the evaluation process of the scheme options for the Project, all environmental considerations including air quality, noise, waste management, landfill gas hazard, landscape and visual and cultural heritage during construction and operation phases have been thoroughly reviewed and evaluated. Other engineering aspects such as traffic, land requirement, buildability, key interface with other development projects as well as public perception, construction time and cost, and maintenance requirements have also been taken into consideration.
- 1.3.3 As the Initial Scheme was formulated more than ten years ago, the clearance between kerblines and the structure erected on the parapet allowed in the design could not meet the requirement of the latest design manual. The aforesaid clearance was thus increased with a view to fulfilling the prevailing design requirement. However, incorporation of the prevailing clearance requirement in the design would render the Initial Scheme technically infeasible due to potential conflict with existing buildings at some locations alongside TWR.

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<sup>1</sup> Amendment of Schedule 2 of EIAO takes effect since 30 June 2023.  
(<https://www.info.gov.hk/gia/general/202306/30/P2023063000275.htm?fontSize=1>)

- 1.3.4 For Tunnel Scheme, climbing lanes at 8% gradient are required at both ends of the tunnel due to the large level difference between the tunnel and the connecting TWR/TMR. This arrangement is undesirable from traffic and vehicle emission perspectives. According to the respective requirement in the Transport Planning and Design Manual (TPDM), a desirable maximum gradient of 4% should be adopted for new roads with a design speed of 80km/h or above. Given no intermediate entry/exit ramps under Tunnel Scheme, the Scheme would be limited with low traffic connectivity with TWR and Tsuen Wan district. The proposed tunnel alignment would also encroach significantly into the planned industrial sites. In general, Tunnel Scheme was not preferable taking into account the above undesirable factors.
- 1.3.5 Viaduct Scheme involves online widening along the existing TWR. Taking into account the environmental considerations and engineering aspects, Viaduct Scheme was pursued as the Preferred Scheme. The scope of proposed works under the Preferred Scheme mainly comprises:
- (i) Widening of a section of an elevated carriageway of TWR between Tai Ho Road and Wing Shun Street, from a three-lane carriageway to a four-lane carriageway on Kowloon bound;
  - (ii) Widening of a section of an elevated carriageway of TWR between Wing Shun Street and Wing Kei Road, from a dual two-lane carriageway to a dual three-lane carriageway;
  - (iii) Widening of a section of an at-grade carriageway of TWR between Wing Kei Road and KTI, from a dual three-lane carriageway to a dual five-lane carriageway;
  - (iv) Widening of a section of an elevated carriageway of TWR between KTI and Container Port Road, from a three-lane carriageway to a four-lane carriageway on Kowloon bound (its implementation is yet to be ascertained and subject to further traffic review);
  - (v) Construction of a slip road connecting TWR (Kowloon bound) to Tsing Tsuen Road (Slip Road C) (its implementation is yet to be ascertained and subject to further traffic review);
  - (vi) Construction of a slip road connecting TWR (Tuen Mun bound) and Hoi Hing Road (Slip Road E);
  - (vii) Provision of noise mitigation measures including noise barriers/enclosures and low noise surfacing materials on associated road sections of Tsuen Wan Road; and
  - (viii) Ancillary works including geotechnical, drainage, waterworks, lighting, landscaping works, installation of traffic aid facilities, etc.
- 1.3.6 The general layout plan of the Preferred Scheme is shown in **Figure 2.4.1, Figure 2.4.2, Figure 2.4.3, Figure 2.4.4, Figure 2.4.5** and **Figure 2.4.6**.

#### 1.4 Consideration of Different Construction Methods for Viaduct

- 1.4.1 The proposed viaduct structures under the Project can be erected by cast in-place concrete construction method, prefabricated steel structure construction method and precast concrete construction method. Having considered the scale and site condition of the proposed viaduct, it is recommended to adopt precast concrete construction method which is a more effective and environmentally friendly approach. The reasons for selection are summarized in **Table 1.1** below.

**Table 1.1 Summary of Selected Construction Method for Viaduct**

<b>Construction Method</b>	<b>Selection Reason</b>
Precast Concrete	<ul style="list-style-type: none"> <li>• Minimise concrete mixing truck travelling in site area, thus minimise potential air and noise impact to be surrounding environment.</li> <li>• Use steel mould as formworks to maximise the reuse of formworks, thus less C&amp;D waste/ materials will be generated.</li> <li>• Shorten construction time, bridge deck construction can be non-linear (multiple work fronts), with minimising on-site potential environmental impacts and cumulative environmental impacts with concurrent projects.</li> <li>• Relatively requires less temporary steel platform for construction of precast structure, thus less C&amp;D waste / materials will be generated.</li> <li>• Carry out precasting works in fabrication yard away from the site.</li> <li>• Better control of quality and workmanship for works in fabrication yard.</li> <li>• More efficient construction works as the deck segments can be casted off-site concurrently with substructure works (i.e. allow time overlap of construction activities).</li> <li>• Durable and less maintenance cost.</li> </ul>

## 1.5 Construction Programme

1.5.1 The construction works of the Project will tentatively commence in 2028. Under scenario without Slip Road C, the Project will tentatively complete in 2033. Under scenario with Slip Road C, the Project will tentatively complete in 2036.

## 1.6 Concurrent Projects

1.6.1 Key concurrent projects in the vicinity of the Project are identified and summarized in **Table 1.2**. Potential cumulative environmental impacts from these concurrent projects (if any) have been considered in this EIA Study.

1.6.2 The major construction works of “Improvement Works at Tsuen Tsing Interchange” (IWTTI project) is anticipated to be completed by 2026, before the commencement of the Project. Hence, no cumulative environmental impacts during construction phase would be anticipated. The cumulative air quality, road traffic noise, landscape and visual impacts from IWTTI project during operation phase have been addressed in this EIA Study.

1.6.3 The site of “Proposed Columbarium Building at Site No. 10 Tsing Tsuen Road” would be located within the air quality and noise impact assessment area of the Project. Hence, its cumulative construction phase impacts have been considered in this EIA Study. Due to the nature of columbarium building, no cumulative environmental impacts during operation phase would be anticipated.

1.6.4 The major construction works of “Flyover from Kwai Tsing Interchange Upramp to Kwai Chung Road” would be completed by 2025, before the commencement of the Project. Hence, no cumulative environmental impacts during construction phase would be anticipated. The cumulative air quality, road traffic noise, landscape and visual impacts from the “Flyover from Kwai Tsing Interchange Upramp to Kwai Chung Road” during operation phase have been addressed in this EIA Study.

1.6.5 Similarly, the major construction works of “Improvement Works at Tai Chung Road Interchange” (IWTCRI project) is anticipated to be completed by 2030, before the commencement of the proposed Slip Road E construction under this Project. Hence, no cumulative environmental impacts during construction phase would be anticipated. The

cumulative air quality, road traffic noise, landscape and visual impacts from IWTCRI project during operation phase have been addressed in this EIA Study.

**Table 1.2 Summary of Concurrent Projects**

Project Name	Target Works Commencement Dates	Target Works Completion Dates	Cumulative Impact Considered / Addressed
Improvement Works at Tsuen Tsing Interchange	2023	2026	Construction Phase: Nil Operation Phase: Air Quality, Noise, Visual and Landscape
Proposed Columbarium Building at Site No. 10 Tsing Tsuen Road	2024	2030	Construction Phase: Air Quality, Noise, Visual and Landscape Operation Phase: Nil
Flyover from Kwai Tsing Interchange Upramp to Kwai Chung Road	2021	2025	Construction Phase: Nil Operation Phase: Air Quality, Noise, Visual and Landscape
Improvement Works at Tai Chung Road Interchange	2028	2030	Construction Phase: Nil Operation Phase: Air Quality, Noise, Visual and Landscape

## 1.7 Public Concerns

1.7.1 The Project Profile was exhibited for public inspection between 18 June 2021 to 1 July 2021. In February – March 2023, the traffic and transport committees under the Kwai Tsing District Council (DC) and Tsuen Wan DC as well as relevant area committees of Kwai Tsing district and Tsuen Wan district were consulted on the proposed works to be taken forward under the Project (i.e. all works items except (iv) and (v) as detailed in Paragraph 1.3.5 above). The traffic and transport committees under the Kwai Tsing DC and Tsuen Wan DC gave support to the proposed works to be taken forward under the Project, and the ACs generally supported/had no comments on the proposed works to be taken forward under the Project. Briefings to the interested group of the residential estates along TWR were also conducted in February – April 2023. During the above consultations and briefing sessions, some LegCo/DC/AC members and local residents raised the following concerns / issues about the Project and the follow-up actions to be taken are summarized in **Table 1.3**.

**Table 1.3 Summary of Concerns and Follow-up Actions**

<b>Concerns / Issues</b>	<b>Follow-up Actions to be Taken</b>
<ul style="list-style-type: none"> <li>Concern on the height of the proposed noise barriers/enclosures</li> </ul>	<ul style="list-style-type: none"> <li>The height of the proposed noise barriers/enclosures will be designed to below the lowest residential floor level of the adjacent residential premises (e.g. City Point) as far as practicable to minimize the visual impact.</li> </ul>
<ul style="list-style-type: none"> <li>Concern on construction noise to the nearby residential estates during the construction phase of the Project</li> </ul>	<ul style="list-style-type: none"> <li>The construction of the Project will be carried out with suitable temporary noise mitigation measures in place. Construction arrangements will be carefully planned in the upcoming project stages such that construction noise impact to the nearby residential estates will be kept to minimum during construction of the Project.</li> </ul>
<ul style="list-style-type: none"> <li>Concern on the potential glare resulted from the top of the proposed noise barriers/enclosures</li> </ul>	<ul style="list-style-type: none"> <li>Roof panels of the proposed barriers/enclosures will be designed in such a way to minimise the potential glare induced.</li> </ul>
<ul style="list-style-type: none"> <li>Request for reviewing the form of the originally proposed noise enclosure fronting the Parc City Block 2 and the Pavilia Bay in view of various environmental concerns (e.g. visual, noise and air quality)</li> </ul>	<ul style="list-style-type: none"> <li>The proposed noise enclosure form at the road section concerned has been reviewed/refined from the form of semi-enclosure to full enclosure. The scope of the proposed noise mitigation measures is given in Section 4 of this Report.</li> </ul>
<ul style="list-style-type: none"> <li>Request for extension of the proposed noise enclosure to cover other sections of TWR fronting the Parc City Block 3 to the Ocean Pride Block 7</li> </ul>	<ul style="list-style-type: none"> <li>According to the result of noise impact assessment, the Project will comply with the EIAO criteria with the proposed noise mitigation measures in place, of which no noise enclosures are required at the TWR sections fronting Parc City Block 3 to Ocean Pride Block 7. Therefore, the requested extension of the noise enclosure is outside the ambit of the Project. The scope of the proposed noise mitigation measures is given in Section 4 of this Report.</li> </ul>
<ul style="list-style-type: none"> <li>Concern on traffic impact on TWR during construction of the Project</li> </ul>	<ul style="list-style-type: none"> <li>The construction of the Project will be carried out with suitable temporary traffic arrangements implemented. Construction arrangements will be carefully planned in the upcoming project stages such that traffic impact on TWR will be kept to minimum during construction of the Project.</li> </ul>

## 2 KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

### 2.1 Air Quality Impact

- 2.1.1 Potential air quality impacts associated with the construction and operation phases of the Project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Clause 3.4.4 and Appendix B of the EIA Study Brief, as well as Annexes 4 and 12 of EIAO-TM. The assessment area for air quality impact assessment is within 500 m from the site boundary of the Project.
- 2.1.2 Potential air quality impacts from the construction works of the Project would mainly be related to construction dust from site clearance, demolition of the existing structure, minor excavation with limited backfilling for column installation, and wind erosion of the limited exposed area. With the implementation of mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation together with the recommended dust suppression measures and adoption of good site practices, no adverse dust impact at air sensitive receivers (ASRs) is anticipated due to the construction activities of the Project. No adverse residual dust impact arising from the Project is anticipated. Regular site inspections as well as dust monitoring should be undertaken to inspect the construction activities and works area to ensure the recommended mitigation measures are properly implemented.
- 2.1.3 Cumulative air quality impact arising from the operation of the Project such as vehicular emission from open roads, nearby chimneys and marine emissions within 500 m study area has been assessed for the operation phase of the Project at the worst Year 2033, which has the highest vehicular RSP, FSP and Nitrogen Oxides (NO<sub>x</sub>) emissions burden within 15 years after commencement of the Project. The results concluded that the predicted 19<sup>th</sup> highest hourly average NO<sub>2</sub>, 10<sup>th</sup> highest daily average RSP, annual average RSP, 19<sup>th</sup> highest daily average FSP and annual average FSP concentrations at all representative ASRs would comply with the respective AQOs when the Project is in operation and noise mitigation measures are in place. For annual average NO<sub>2</sub> concentrations, exceedance of the AQO was found at Wofoo Building (ASR ID 66a), Leader Industrial Centre (ASR ID 71b), Rivera Gardens Block 18 Hoi Fai Mansion (ASR ID 84), Lung Shing Factory Building (ASR ID 102) and Fook Yip Building (ASR ID 142). However, the predicted annual average NO<sub>2</sub> concentrations at these ASRs would be reduced under the "With Project with Direct Noise Remedies" scenario as compared to the "Without Project" Scenario which indicated that during its operation, the Project would bring improvements in air quality by easing the traffic congestions.

### 2.2 Noise Impact

#### Construction Phase

- 2.2.1 Potential noise impacts associated with the construction and operation phases of the Project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Clause 3.4.5 and Appendix C of the EIA Study Brief, as well as Annexes 5 and 13 of the EIAO-TM. The study area for noise impact assessment is defined by a distance of 300 m from the site boundary of the Project.
- 2.2.2 Potential source of noise impact during construction phase of the Project would be the use of Powered Mechanical Equipment (PME) for various construction activities. Major construction works of the Project include site clearance, removal or demolition of existing facilities, piling and foundation of the proposed road works within the Project boundary.
- 2.2.3 The construction noise levels during non-restricted hours at all representative noise sensitive receivers (NSRs) are predicted to comply with the noise standards stipulated in EIAO-TM with the implementation of the recommended mitigation measures and good site practices.
- 2.2.4 The construction noise levels during restricted hours at all representative NSRs are predicted to comply with the noise standards stipulated in EIAO-TM with the implementation of the recommended mitigation measures. No adverse construction noise impact arising

from the Project would be anticipated. No adverse residual construction noise impact arising from the Project would be anticipated. Regular site inspections should be undertaken to inspect the construction activities and works area to ensure the recommended mitigation measures are properly implemented.

#### Operation Phase

- 2.2.5 Road traffic noise in the worst-case scenario of Year 2035 has been adopted for the traffic noise impact assessment. The road sections within 300 m study area have been included in the assessment. Under the unmitigated scenario, the overall predicted noise levels at some of the representative NSRs would exceed the noise criteria. With the implementation of the recommended noise mitigation measures, including low noise road surfacing (LNRS), noise barriers, semi and full enclosures, the noise levels at some of the representative NSRs would comply with the traffic noise criteria, while exceedance would still be predicted at some of the representative NSRs. The exceedances were dominantly contributed by non-Project roads. The contributions from the Project roads to the overall noise levels at all NSRs are predicted to be less than 1.0 dB(A) and all the predicted noise levels of the Project roads would comply with the noise criteria. As such, no adverse road traffic noise residual impact arising from the Project is anticipated and no further mitigation measures would be required.

### **2.3 Water Quality Impact**

- 2.3.1 The water quality impact assessment has been conducted in accordance with the requirements in Annexes 6 and 14 of the EIAO-TM. The Study area for water quality impact assessment covered the Western Buffer and Victoria Harbour (Phase One) Water Control Zone(s) as designated under Water Pollution Control Ordinance (WPCO), including inland water bodies and marine waters within 500m from the site boundary.
- 2.3.2 Minor water quality impact would be associated with land-based construction. Impacts may result from construction works in close proximity to inland watercourse, wastewater generated from general construction activities, construction site runoff, accidental spillage, and sewage from on-site construction workers. The potential impacts could be mitigated and controlled to comply with the WPCO standards by implementing the recommended mitigation measures. With the recommended mitigation measures properly implemented, no unacceptable water quality impact would be expected during the construction phase of the Project. Regular site inspections should be undertaken to inspect the construction activities and works area to ensure the recommended mitigation measures are properly implemented.
- 2.3.3 Potential water quality impacts associated with the operation phase were identified as surface runoff generated from the new paved areas. Provided that the recommended mitigation measures for the drainage system are properly implemented, no unacceptable water quality impact in the operation phase is expected.

### **2.4 Waste Management Implication**

- 2.4.1 The assessment of waste management implications has been conducted in accordance with the criteria and guidelines as stated in the requirements given in Clause 3.4.7 and Appendix E of the EIA Study Brief, as well as Annexes 7 and 15 of the EIAO-TM.
- 2.4.2 Construction and Demolition (C&D) materials will be generated from construction works of the Project such as road widening/reconfiguration works, slope formation works, retaining works, re-provision/modification of existing elevated bridge/underpass/footbridge, site clearance, site formation and excavation for bridge foundation. Based on the latest layout, the volume of C&D materials is estimated to be approximately 17,860 m<sup>3</sup> of inert material and 900 m<sup>3</sup> of non-inert material.
- 2.4.3 Inert C&D materials from the above construction works would be reused on-site as far as practicable subject to the review of detailed design stage before exported off site for or

delivered to Public Filling Reception Facilities (PFRF) (Tuen Mun Area 38 Fill Bank) for beneficial use in other projects with potential fill demand. Non-inert waste will be recycled as far as possible before disposed of at landfill (West New Territories Landfill (WENT)). Opportunities in minimisation of generation and maximisation of reuse would be continually investigated during the detailed design and construction phases. With the implementation of the recommended good site practices and mitigation measures for the handling, transportation and disposal of the identified waste types, no adverse environmental impacts associated with waste management is anticipated.

- 2.4.4 The quantities of land-based sediment to be excavated are expected to be approximately 2,100m<sup>3</sup> from the Project.
- 2.4.5 The excavated land-based sediment will be treated using Stabilization/Solidification (S/S) technique and will be reused on site (e.g. as backfilling materials). With the implementation of the recommended mitigation measures, no adverse environmental impacts would be expected from excavation and handling of land-based sediment.
- 2.4.6 With the implementation of the recommended mitigation measures, no adverse environmental impacts would be expected from the transportation and treatment of excavated land-based sediment.
- 2.4.7 Other waste materials, including general refuse and chemical waste will also be generated throughout construction. Provided that these identified wastes are handled, transported and disposed of using the recommended methods and that good site practices would be strictly followed, adverse environmental impacts are not expected. Regular site inspections should be undertaken to inspect the construction activities and works area to ensure the recommended mitigation measures are properly implemented.
- 2.4.8 It is expected that no waste will be generated during operation phase of the Project. As such, it is considered that there would be no adverse environmental impacts associated with waste management implications during operation phase.

## **2.5 Land Contamination**

- 2.5.1 The land contamination assessment has been conducted in accordance with the criteria and guidelines as stated in the requirements given in Clause 3.4.8 and Appendix F of the EIA Study Brief, as well as Clause 3.1 of Annex 19 of the EIAO-TM.
- 2.5.2 Based on the site appraisal, three potentially contaminated sites (i.e. DSD Maintenance Depot, LandsD Site Depot and former Gin Drinkers Bay Landfill) were identified within the Project Area. However, no excavation works under the Project would be proposed within the DSD Maintenance Depot and the identified hotspot areas within the LandsD Site Depot. For the former Gin Drinkers Bay Landfill (currently the Kwai Chung Park), filling and placement of cover soils were completed during the restoration of the landfill and only shallow excavation would be anticipated for the encroached portion of the site under the Project. Furthermore, no potential land contamination issues were identified in the existing Kwai Chung Park. Therefore, no land contamination impacts associated with these three sites to the Project are anticipated.
- 2.5.3 From the above, no land contamination impact arising from Project is anticipated. No further Site Investigation (SI) works at the Project Area is required. Having said that, should there be any design changes in the future leading to excavation works in the areas identified with potential land contamination issues within the three potentially contaminated sites, a Contamination Assessment Plan (CAP) will be prepared and SI works will be proposed to study the potential land contamination issues.

## **2.6 Landfill Gas Hazard**

- 2.6.1 The landfill gas hazard assessment has been conducted in accordance with the criteria and guidelines as stated in the requirements given in Clause 3.4.9 and Appendix G of the EIA

Study Brief. Under Annexes 7 and 19 of the EIAO-TM, landfill gas hazard assessment (LFGHA) is required for any development within the Consultation Zone (CZ). The Project falls within CZ of Gin Drinkers Bay Landfill (GDBL) therefore, LFGHA is required for the Project. The assessment has been undertaken in accordance with ProPECC PN 3/96 – *Landfill Gas Hazard Assessment for Development Adjacent to Landfill*; and EPD/TR8/97 – *Landfill Gas Hazard Assessment Guidance Note*.

- 2.6.2 Overall assessment of risk classifies the Project construction phase as a “Low” risk situation, however the guidelines and recommendations relating to general hazards which may be encountered during construction and an outline of safety requirements as stated in Chapter 8 of the Landfill Gas Hazard Assessment Guidance Note may be used to form the basis of Specification Clauses for incorporation in Contract Documentation.
- 2.6.3 During the operation phase, for maintenance of Tsuen Wan Road, resurfacing or other maintenance works will be carried out at open space and any risk from landfill gas are unlikely. Overall operation phase is classified as a “Low” risk situation. Since no indoor activity is anticipated for road user, no specific mitigation is required.
- 2.6.4 Provided that the safety requirements stated in Chapter 8 of the Landfill Gas Hazard Assessment Guidance Note are implemented properly, the safety of the site workers and future users thereafter would be safeguarded, and no adverse landfill gas hazard is anticipated.

## **2.7 Hazard to Life**

- 2.7.1 According to the latest PHI register, Yau Kom Tau Water Treatment Works (YKTWTW) is not considered as a PHI. No hazard to life assessment for liquid chlorine related issue is required for YKTWTW and no adverse impact during construction and operation phase is anticipated.

## **2.8 Impact on Cultural Heritage**

- 2.8.1 The Cultural Heritage Impact Assessment has been conducted in accordance with Clause 3.4.12 and Appendix J of the EIA study brief, as well as Annexes 10 and 19 of the EIAO-TM.
- 2.8.2 As no built heritage resource is identified within the Project boundary or 100m assessment area, no impact during the construction phase and operation phase would be anticipated. No mitigation measure would be required.
- 2.8.3 No SAI is identified within the assessment area. The natural terrain in the assessment area has been largely modified and the potential archaeological resources would have been disturbed by rapid developments of the new town, such as reclamation and modern fill lands for high-rise buildings and new road networks since the 1920s. As no marine works is required for the Project, no impact on marine archaeology would be anticipated. Hence, no archaeological impact would be anticipated during the construction phase and operation phase. No mitigation measure would be required. As a precautionary measure, AMO should be informed immediately in case of discovery of antiquities or supposed antiquities in the course of works, so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with AMO.

## **2.9 Landscape and Visual Impact**

- 2.9.1 Landscape and visual impact assessment has been assessed in accordance with Clause 3.4.11 and Appendix I of the EIA study brief, Annexes 10 and 18 of the EIAO-TM as well as the Environmental Impact Assessment Ordinance (EIAO) Guidance Note No. 8/2010.
- 2.9.2 The Project will inevitably result in some landscape and visual impacts during construction and operation phases. These impacts have been minimized through careful consideration of alternatives to minimize works areas within the existing road system, and incorporation of sensitive and aesthetic external designs of noise mitigation structures with minimum

disturbance to the existing landscape quality and appropriate landscape and visual treatments along the Project.

- 2.9.3 The Study Area of the Project is covered under the draft Tsuen Wan Outline Zoning Plan (OZP) No. S/TW/36 (28.4.2023) and draft Kwai Chung OZP No. S/KC/31 (18.11.2022). The proposed road works mainly aligned adjoining or above the existing road networks. There is major change on the Government Institution or Community at the existing carparks and amenity areas along TWR, involving the construction of elevated and at-grade roads. For the east of TWR, major changes include small portion of Amenity Area at Kwai Chung Park affected by the proposed roads, and small portion of Open Space at Kwai Shun Street Playground affected by the construction of widened TWR and slip roads at Tuen Mun bound.
- 2.9.4 A total of 1496 nos. of trees which include 79 nos. of species and 34 nos. of dead trees have been surveyed. *Casuarina equisetifolia* is the major species with 237 nos. of trees was surveyed. Total 5 nos. of trees are considered "trees of particular interest" (TPI) as defined in the Guidelines for Tree Risk Assessment and Management Arrangement issued by DEVB within the work boundary. Among 5 nos. of TPI, 3 nos. of *Lagerstroemia speciosa* and 1 no. of *Michelia x alba* are under the protected species listed in Forestry Regulations (subsidiary legislation of the Forests and Countryside Ordinance, Cap. 96) and 1 no. of tree is with DBH over 1000mm in common landscape and hillside species. No tree is registered in the Register of Old and Valuable Trees under this Project. Amongst the 1496 existing trees, 1064 existing trees are proposed to be retained, 431 trees will be unavoidably affected by the Project (including 13 nos. of undesired *Leucaena leucocephala* and 12 nos. of dead trees) and thus are proposed to be felled, and the remaining one tree is proposed to be transplanted.
- 2.9.5 Opportunities for tree compensation within the Project boundary have been fully explored and compensatory planting has been incorporated in the proposed mitigation measures as much as practicable. A total of 418 nos. of light standard trees is proposed to be planted at the existing Kwai Chung Park to compensate the loss trees and instate the greening and landscape character of the affected area. Compensatory planting in a ratio of 1:1 is provided. The proposed species are commonly used in urban environment so as to reinstate and enhance the surrounding landscape value. Reference could be made to Greening Master Plan issued by CEDD and Street Tree Selection Guide promulgated by DEVB. Mix of native tree species will be proposed with reference to Guiding Principles on Use of Native Plant Species in Public Works Projects promulgated by DEVB to improve the vegetation diversity, enhance ecological value and re-creation of vegetation habitat for areas along the Project.
- 2.9.6 Appropriate landscape and visual mitigation measures are proposed during construction phase such as preservation of existing vegetation, transplanting of affected trees, control of night-time lighting glare, erection of decorative screen hoarding, management of construction activities and facilities and reinstatement of temporarily disturbed landscape areas, and during operation such as compensatory planting for loss of existing trees, landscape reinstatement and treatment of slopes, maximization of roadside planting, re-provision of affected open space, visually pleasing aesthetic treatment on noise barriers and noise enclosures and aesthetically pleasing design for carriageways and other highways structures. Regarding mitigated visual impact, it is predicted that there would be insubstantial to moderate/substantial residual impact on the Visually Sensitive Receivers (VSRs) during construction, and would be insubstantial to moderate/substantial on day 1 of operation and be further reduced to insubstantial to moderate in year 10 of operation.
- 2.9.7 In sum, it is considered that the residual landscape and visual impacts are acceptable with mitigation measures implemented during construction and operation phases.

## 2.10 Impact Summary

- 2.10.1 A summary of the environmental impacts associated with the Project is presented in **Table 2.1**.

**Table 2.1 Summary of Environmental Impacts.**

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
<b>Air Quality Impact</b>					
<b>Construction Impact</b>					
Representative existing residential, commercial developments and government uses within 500m from the boundary of the Project Site	<ul style="list-style-type: none"> <li>No adverse dust impact from construction activities considering the small scale of the project, and works will be undertaken at multiple work fronts at different construction periods.</li> <li>No adverse air quality impact from fuel combustion from use of Powered Equipment (PME) in view of Air Pollution Control (Non-Road Mobile Machinery) (Emission) Regulation.</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 4 and 12 of the EIAO-TM</li> <li>Air Quality Objectives (AQO)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	The approved non-road mobile machinery (NRMMs) under NRMM Regulation (excluding exempted NRMMs) would be used on site and NRMMs supplied with mains electricity instead of diesel-powered should be adopted as far as possible to minimize the potential emission from NRMMs.  Dust suppression measures and good site practices <ul style="list-style-type: none"> <li>Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather</li> <li>Use of frequent watering for particularly dusty construction areas and areas close to ASRs</li> <li>Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to</li> </ul>	<ul style="list-style-type: none"> <li>No adverse residual impacts anticipated.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				frequent usage, watering shall be applied to aggregate fines <ul style="list-style-type: none"> <li>• Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs</li> <li>• Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations</li> <li>• Establishment and use of vehicle wheel and body washing facilities at the exit points of the site</li> <li>• Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading area of barging point, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods</li> <li>• Provision of not less than 2.4m high hoarding from ground level along site boundary where adjoins a road, streets or other accessible to the public</li> </ul>	

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				<p>except for a site entrance or exit</p> <ul style="list-style-type: none"> <li>• Imposition of speed controls for vehicles on site haul roads</li> <li>• Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs</li> <li>• Instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise</li> <li>• Locate all the dusty activities away from any nearby ASRs as far as practicable</li> <li>• Erect higher hording at the location with ASRs in immediate proximity to the project site boundary.</li> <li>• All malodorous materials shall be placed as far as possible from any ASRs.</li> <li>• The stockpiled malodorous materials shall be covered entirely by plastic tarpaulin sheets.</li> <li>• The malodorous materials shall be removed from site as</li> </ul>	

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				soon as possible and shall not be stockpiled overnight at the site. • Loading of the malodorous materials onto the dump trucks shall be controlled to avoid spillage.	
<b>Operation Impact</b>					
Existing and planned residential, commercial developments and government uses within 500m from the boundary of the Project Site	<p><u>NO<sub>2</sub></u></p> <ul style="list-style-type: none"> <li>1-hr average conc :108 -191 µg/m<sup>3</sup></li> <li>Annual average conc :14.07 - 41.52 µg/m<sup>3</sup></li> <li>For the ASRs with exceedance of AQO for annual NO<sub>2</sub>, there would be a decrease in annual average NO<sub>2</sub> concentration compared to the “Without Project” Scenario.</li> </ul> <p><u>RSP</u></p> <ul style="list-style-type: none"> <li>24-hr average conc :59 - 63 µg/m<sup>3</sup></li> <li>Annual average conc :26 - 29 µg/m<sup>3</sup></li> </ul> <p><u>FSP</u></p> <ul style="list-style-type: none"> <li>24-hr average conc :32 - 35 µg/m<sup>3</sup></li> <li>Annual average conc :14 - 17 µg/m<sup>3</sup></li> </ul>	<p><u>NO<sub>2</sub></u></p> <ul style="list-style-type: none"> <li>1-hr average conc :200 µg/m<sup>3</sup> (Number of exceedances allowed: 18)</li> <li>Annual average conc :40 µg/m<sup>3</sup></li> </ul> <p><u>RSP</u></p> <ul style="list-style-type: none"> <li>24-hr average conc :100 µg/m<sup>3</sup> (Number of exceedances allowed: 9)</li> <li>Annual average conc :50 µg/m<sup>3</sup></li> </ul> <p><u>FSP</u></p> <ul style="list-style-type: none"> <li>24- hr average conc :50 µg/m<sup>3</sup> (Number of exceedances allowed: 18)</li> <li>Annual average conc :25 µg/m<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>No adverse air quality impact during the operation phase of the Project is anticipated, thus mitigation measure is deemed not necessary.</li> </ul>	<ul style="list-style-type: none"> <li>No adverse residual impacts anticipated.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
<b>Noise Impact</b>					
<b>Construction Impact</b>					
Representative existing noise sensitive developments (e.g. residential) within 300m from the boundary of the Project Site	<ul style="list-style-type: none"> <li>63 – 92 dB(A)</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 5 and 13 of the EIAO-TM</li> <li>Leq<sub>(30 min)</sub> 75dB(A) at 1m from the façade of residential dwellings</li> <li>Leq<sub>(30 min)</sub> 70dB(A) at 1m from the façade of educational institutions which rely on openable window for ventilation (Leq<sub>(30 min)</sub> 65dB(A) during examinations)</li> </ul>	<ul style="list-style-type: none"> <li>0 – 17 dB(A)</li> </ul>	<ul style="list-style-type: none"> <li>Quality PME prescribed in EPD's Quality Powered Mechanical Equipment (QPME) database</li> <li>Temporary movable noise barriers, full enclosure for PME</li> <li>Good site practices                             <ul style="list-style-type: none"> <li>Only well-maintained plant should be operated on site and plant should be serviced regularly</li> <li>Silencers or mufflers on construction plant should be utilized and should be properly maintained</li> <li>Mobile plant should be sited as far away from sensitive uses as possible</li> <li>Machines and plant that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum</li> <li>Plant known to emit noise strongly in one direction should, where possible, be</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>No adverse residual impacts anticipated.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				orientated so that noise is directed away from the nearby sensitive uses <ul style="list-style-type: none"> <li>Material stockpiles and other structures should be effectively utilized to screen noise from on-site construction activities</li> </ul>	
<b>Operation Impact</b>					
Representative existing and planned residential developments, educational institutions, clinic, etc. within 300m from the boundary of the Project Site	<ul style="list-style-type: none"> <li>Predicted overall noise levels: 54 – 85 dB(A)</li> <li>Predicted noise levels of the Project roads: 0 – 75 dB(A)</li> <li>Contribution from Project roads: 0 – 13 dB(A)</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 5 and 13 of the EIAO-TM</li> <li>L<sub>10(1 hour)</sub> 70dB(A) at 1m from the façade of residential dwellings</li> <li>65 dB(A) at 1 m from the external façades of schools, places of public worship, courts of law, places where unaided voice communication is required</li> </ul>	<ul style="list-style-type: none"> <li>Exceedance of the noise criteria by up to 16 dB(A)</li> <li>The exceedances are dominantly contributed by the existing roads at some Representative NSRs, while at some other Representative NSRs, the exceedances are dominantly contributed by Project Roads</li> </ul>	<ul style="list-style-type: none"> <li>Low Noise Road Surfacing</li> <li>Proposed Noise Barriers and Enclosures</li> </ul>	<ul style="list-style-type: none"> <li>No adverse residual impacts anticipated.</li> </ul>
<b>Water Quality Impact</b>					
<b>Construction Impact</b>					
Representative WSRs within 500m from the boundary of the Project Site	The potential sources of water quality impact associated with the construction works include:	<ul style="list-style-type: none"> <li>Annexes 6 and 14 of the EIAO-TM</li> <li>Water Quality Objectives for the Western Buffer and</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Mitigation measures and good site practices in ProPECCPN</li> </ul>	<ul style="list-style-type: none"> <li>No adverse residual impacts anticipated.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	<ul style="list-style-type: none"> <li>Wastewater from general construction activities</li> <li>Construction site run-off</li> <li>Construction work at modified watercourses in the east and west of Tsuen Tsing Interchange, plus nearby Kwai Chung Park</li> <li>Sewage effluent from construction workforce</li> <li>Accidental spillage of chemicals</li> </ul>	<ul style="list-style-type: none"> <li>Victoria Harbour (Phase One) WCZs</li> <li>Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS)</li> <li>Practical Note for Professional Persons (ProPECC) PN 1/94</li> <li>Environmental, Transport and Works Bureau (ETWB) Technical Circular (Works) No. 5/2005</li> <li>Water Supplies Department (WSD) Water Quality Criteria (for flushing water intake)</li> </ul>		<ul style="list-style-type: none"> <li>1/94 "Construction Site Drainage"</li> <li>Practices in ETWB TC (Works) No. 5/2005 "Protection of natural streams / rivers from adverse impacts arising from construction works"</li> <li>Waste Disposal Regulation</li> <li>Provision of interim treatment facilities, such as chemical toilets, for construction workforce</li> </ul>	
<b>Operation Impact</b>					
Representative WSRs within 500m from the boundary of the Project Site	Potential water quality impacts associated with the operation phase include: <ul style="list-style-type: none"> <li>Non-point source surface run-off from new impervious areas</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 6 and 14 of the EIAO-TM</li> <li>Water Quality Objectives for the Western Buffer and Victoria Harbour (Phase One) WCZs</li> <li>Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems,</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Adequate design in silt trap for the new road drainage which take into account the guidelines in ProPECC PN 5/93.</li> <li>Best Storm Water Management Practices and Storm Water Pollution Control Plan to reduce non-point source pollution.</li> </ul>	<ul style="list-style-type: none"> <li>No adverse residual impacts anticipated.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		Inland and Coastal Waters (TM-DSS) • ProPECC PN 5/93			
<b>Waste Management Implication</b>					
<b>Construction Impact</b>					
C&D materials, excavated land-based sediment, chemical wastes and general refuse	<ul style="list-style-type: none"> <li>• Around 900m<sup>3</sup> of non-inert C&amp;D materials (of which 800m<sup>3</sup> will be reused) and 17,860m<sup>3</sup> of inert C&amp;D materials (of which 10,000m<sup>3</sup> will be reused) will be generated from site clearance/set-up/plant mobilization, excavation/foundation works, piling works, pile cap/pier/abutment construction and slopeworks.</li> <li>• Around 2,100m<sup>3</sup> of excavated land-based sediment expected to be generated from construction of new bridge piers for modification of existing TWR viaduct and new supporting columns for proposed noise enclosures.</li> <li>• Small quantity of chemical wastes in the order of a few cubic meters per month.</li> <li>• Around 65kg per day of general refuse will be generated from construction works and on-site staff and workers.</li> </ul>	<ul style="list-style-type: none"> <li>• Annexes 7 and 15 of the EIAO-TM</li> <li>• Waste Disposal Ordinance (Cap. 354)</li> <li>• Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)</li> <li>• Land (Miscellaneous Provisions) Ordinance (Cap. 28)</li> <li>• Public Health and Municipal Services Ordinance – Public Cleansing and Prevention of Nuisances Regulation (Cap. 132BK)</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of good site practices, waste reduction measures and proper storage, collection and transport of waste.</li> </ul>	<ul style="list-style-type: none"> <li>• No adverse residual impact anticipated</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
<b>Operation Impact</b>					
N/A	<ul style="list-style-type: none"> <li>It is expected that no waste will be generated during the operation phase of the Project.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>No mitigation measures to be provided as the Project would not cause adverse impacts.</li> </ul>	<ul style="list-style-type: none"> <li>No adverse residual impact anticipated.</li> </ul>
<b>Land Contamination</b>					
Onsite construction workers and future occupants	<ul style="list-style-type: none"> <li>No land contamination impact arising from the Project is anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>Annex 19 of the EIAO-TM</li> <li>Guidance Note for Contaminated Land Assessment and Remediation (EPD, 2007)</li> <li>Practice Guide for Investigation and Remediation of Contaminated Land (EPD, 2011)</li> <li>Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management (EPD, 2007)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>As no land contamination impact arising from the Project is anticipated, no mitigation measures were considered necessary.</li> </ul>	<ul style="list-style-type: none"> <li>No residual impact is anticipated.</li> </ul>
<b>Landfill Gas Hazard</b>					
Construction Phase					
Workers in excavations or temporary offices, stores, etc (those directly in contact with the ground) sited within the landfill consultation zone during construction or future operational maintenance	<ul style="list-style-type: none"> <li>Landfill gas can present a number of potential hazards if not adequately controlled. Landfill gas has the potential to cause asphyxiation, fire or explosion as it migrates into and</li> </ul>	<ul style="list-style-type: none"> <li>Annex 7 and Annex 19 of the TM</li> <li>ProPECC PN 3/96 – Landfill Gas Hazard Assessment for Development Adjacent to Landfill</li> </ul>	<ul style="list-style-type: none"> <li>Areas within the waste boundary and 250m Consultation Zone of GDBL</li> </ul>	<ul style="list-style-type: none"> <li>Undertaking of a landfill gas monitoring programme with implementation of actions in the event of concentrations meeting thresholds stated in the EM&amp;A manual as referenced from Chapter 8 of the Landfill Gas Hazard</li> </ul>	<ul style="list-style-type: none"> <li>No residual impacts are anticipated.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	accumulates in confined air spaces during excavation and foundation work and/or maintenance of drains or other underground services. Other susceptible locations include site huts and similar poorly ventilated enclosures that exist during construction.	<ul style="list-style-type: none"> <li>• EPD/TR8/97 – Landfill Gas Hazard Assessment Guidance Note</li> </ul>		Assessment Guidance Note	
<b>Operation Phase</b>					
As above in the event that deep excavations are required for future maintenance	<ul style="list-style-type: none"> <li>• As above</li> </ul>	<ul style="list-style-type: none"> <li>• Chapter 8 of EPD/TR8/97</li> </ul>	<ul style="list-style-type: none"> <li>• Areas within the waste boundary and 250m Consultation Zone of GDBL</li> </ul>	<ul style="list-style-type: none"> <li>• Implementing measures stated in Chapter 8 of EPD/TR8/97</li> </ul>	<ul style="list-style-type: none"> <li>• No residual impacts are anticipated.</li> </ul>
<b>Impact on Cultural Heritage</b>					
<b>Construction Impact</b>					
Cultural heritage resources	<ul style="list-style-type: none"> <li>• No impact would be anticipated during the construction phase.</li> </ul>	<ul style="list-style-type: none"> <li>• Antiquities and Monuments Ordinance (Cap.53)</li> <li>• Environmental Impact Assessment Ordinance (EIAO) (Cap.499) and EIAO-TM Annexes 10 and 19</li> <li>• Guidance Note on Assessment of Impact on Sites of Cultural Heritage in Environmental Impact</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• No mitigation measures would be required.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		Assessment Studies <ul style="list-style-type: none"> <li>• Hong Kong Planning Standards and Guidelines Chapter 10</li> <li>• Guidelines for Cultural Heritage Impact Assessment</li> </ul>			
<b>Operation Impact</b>					
Cultural heritage resources	<ul style="list-style-type: none"> <li>• No impact would be anticipated during the operation phase.</li> </ul>	<ul style="list-style-type: none"> <li>• Antiquities and Monuments Ordinance (Cap.53)</li> <li>• Environmental Impact Assessment Ordinance (EIAO) (Cap.499) and EIAO-TM Annexes 10 and 19</li> <li>• Guidance Note on Assessment of Impact on Sites of Cultural Heritage in Environmental Impact Assessment Studies</li> <li>• Hong Kong Planning Standards and Guidelines Chapter 10</li> <li>• Guidelines for Cultural Heritage Impact Assessment</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• No mitigation measure would be required.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
<b>Landscape and Visual</b>					
<b>Construction Impact</b>					
Landscape Resources (LRs)	<ul style="list-style-type: none"> <li>Moderate landscape impact on LR 4.1 (Tsuen Wan Park), LR 4.4 (Kwai Chung Park), LR 4.5 (Kwai Shun Street Playground).</li> <li>Slight/moderate landscape impact on LR 1 (Vegetation on Slope and Roadside Planting).</li> <li>Insubstantial landscape impact on LR 2 (Vegetation within G/IC Site), LR 3 (Waterbody in Rambler Channel), LR 4.2 (Tsuen Wan Promenade and Tsuen Wan Riviera Park), LR 4.3 (Other Open Spaces in Tsuen Wan), LR 4.6 (Other Open Spaces in Kwai Tsing), LR 5 (Landscape Areas in Residential Development in Tsuen Wan).</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 10 and 18 of the EIAO-TM</li> <li>Environmental Impact Ordinance Guidance Note 8/2010</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Preservation of Existing Vegetation</li> <li>Transplanting of Affected Trees</li> <li>Control of Night-time Lighting Glare</li> <li>Erection of Decorative Screen Hoarding</li> <li>Management of Construction Activities and Facilities</li> <li>Reinstatement of Temporarily Disturbed Landscape Areas</li> </ul>	<ul style="list-style-type: none"> <li>Slight/moderate landscape impact on LR 4.1, LR 4.4, LR 4.5.</li> <li>Insubstantial/slight landscape impact on LR 1.</li> <li>Insubstantial landscape impact on LR 2, LR 3, LR 4.2, LR 4.3, LR 4.6, LR 5.</li> </ul>
Landscape Character Areas (LCAs)	<ul style="list-style-type: none"> <li>Moderate landscape impact on LCA 1 (Transportation Corridor Landscape LCA), LCA 5.1 (Tsuen Wan Park Urban Landscape LCA), LCA 5.2 (Kwai Chung Park Urban Landscape LCA).</li> <li>Slight/moderate landscape impact on LCA2.2 (Kwai Chung Industrial Urban Landscape</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 10 and 18 of the EIAO-TM</li> <li>Environmental Impact Ordinance Guidance Note 8/2010</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Preservation of Existing Vegetation</li> <li>Transplanting of Affected Trees</li> <li>Control of Night-time Lighting Glare</li> <li>Erection of Decorative Screen Hoarding</li> </ul>	<ul style="list-style-type: none"> <li>Slight/moderate landscape impact on LCA 1, LCA 5.1, LCA 5.2.</li> <li>Insubstantial/slight landscape impact on LCA 2.2, LCA 4.1.</li> <li>Insubstantial landscape impact on LCA 2.1, LCA 3.1, LCA 3.2, LCA 4.2, LCA 6, LCA 7, LCA 8.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	<p>LCA), LCA 4.1 (Tsuen Wan Miscellaneous Urban Fringe Landscape LCA).</p> <ul style="list-style-type: none"> <li>• Insubstantial/slight landscape impact on LCA 4.2 (Kwai Chung Muscellaneous Urban Fringe Landscape LCA).</li> <li>• Insubstantial landscape impact on LCA 2.1 (Tsuen Wan Industrial Urban Landscape LCA), LCA 3.1 (Tsuen Wan Residential Urban Landscape LCA), LCA 3.2 (Kwai Chung Residential Landscape LCA), LCA 6 (Mixed Modern Comprehensive Urban Development Landscape LCA), LCA 7 (Cemetery Landscape LCA), LCA 8 (Strait Landscape LCA).</li> </ul>				
Visually Sensitive Receivers (VSRs)	<ul style="list-style-type: none"> <li>• Substantial visual impact on REC-7.</li> <li>• Moderate visual impact on R-4, REC-2, REC-5, GIC-1, GIC-2, GIC-3, GIC-6, T-1, T-6.</li> <li>• Moderate/substantial visual impact on R-7, R-8, O-1, O-2, O-3, O-5, T-2, T-4, T-5.</li> <li>• Slight/moderate visual impact on R-2, R-3, REC-1, O-4.</li> <li>• Insubstantial/slight visual impact on R-1, R-5, REC-3,</li> </ul>	<ul style="list-style-type: none"> <li>• Annexes 10 and 18 of the EIAO-TM</li> <li>• Environmental Impact Ordinance Guidance Note 8/2010</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Preservation of Existing Vegetation</li> <li>• Transplanting of Affected Trees</li> <li>• Control of Night-time Lighting Glare</li> <li>• Erection of Decorative Screen Hoarding</li> <li>• Management of Construction Activities and Facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate/substantial residual visual impact on REC-7.</li> <li>• Moderate residual visual impact on R-7, R-8, O-1, O-2, O-3, O-5, T-2, T-4, T-5.</li> <li>• Slight/moderate residual visual impact on R-4, REC-2, REC-5, GIC-1, GIC-2, GIC-3, GIC-6, T-1, T-6.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	REC-4. • Insubstantial visual impact on other VSRs.			• Reinstatement of Temporarily Disturbed Landscape Areas • Reinstatement of Affected Slopes	• Insubstantial/slight residual visual impact on R-2, R-3, REC-1, O-4. • Insubstantial residual visual impact on other VSRs.
<b>Operation Impact</b>					
Landscape Resources (LRs)	• Moderate landscape impact on LR 4.1 (Tsuen Wan Park), LR 4.4 (Kwai Chung Park), LR 4.5 (Kwai Shun Street Playground). • Slight/moderate landscape impact on LR 1 (Vegetation on Slope and Roadside Planting). • Insubstantial landscape impact on LR 2 (Vegetation within G/IC Site), LR 3 (Waterbody in Rambler Channel), LR 4.2 (Tsuen Wan Promenade and Tsuen Wan Riviera Park), LR 4.3 (Other Open Spaces in Tsuen Wan), LR 4.6 (Other Open Spaces in Kwai Tsing), LR 5 (Landscape Areas in Residential Development in Tsuen Wan).	• Annexes 10 and 18 of the EIAO-TM • Environmental Impact Ordinance Guidance Note 8/2010	• N/A	• Compensatory Planting for Loss of Existing Trees • Landscape Reinstatement and Treatment of Slopes • Maximization of Roadside Planting • Re-provision of Affected Open Space • Visually Pleasing Aesthetic Treatment on Noise Barriers and Noise Enclosures • Aesthetic Pleasing Design for Carriageways and Other Highways Structures	• Slight/moderate residual impact during day 1 of operation and insubstantial/slight residual impact during year 10 of operation on LR 4.1, LR 4.4, LR 4.5. • Insubstantial/slight residual impact during day 1 of operation and insubstantial residual impact during year 10 of operation on LR 1. • Insubstantial residual impact during day1 and year 10 of operation on LR 2, LR 3, LR 4.2, LR 4.3, LR 4.6, LR 5.
Landscape Character Areas (LCAs)	• Moderate landscape impact on LCA 1 (Transportation Corridor Landscape LCA), LCA 5.1 (Tsuen Wan Park Urban Landscape LCA), LCA 5.2	• Annexes 10 and 18 of the EIAO-TM • Environmental Impact Ordinance Guidance Note 8/2010	• N/A	• Compensatory Planting for Loss of Existing Trees • Landscape Reinstatement and Treatment of Slopes	• Slight/moderate residual impact during day 1 of operation and insubstantial/slight residual impact during

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	<p>(Kwai Chung Park Urban Landscape LCA).</p> <ul style="list-style-type: none"> <li>• Slight/moderate landscape impact on LCA2.2 (Kwai Chung Industrial Urban Landscape LCA), LCA 4.1 (Tsuen Wan Miscellaneous Urban Fringe Landscape LCA).</li> <li>• Insubstantial/slight landscape impact on LCA 4.2 (Kwai Chung Miscellaneous Urban Fringe Landscape LCA).</li> <li>• Insubstantial landscape impact on LCA 2.1 (Tsuen Wan Industrial Urban Landscape LCA), LCA 3.1 (Tsuen Wan Residential Urban Landscape LCA), LCA 3.2 (Kwai Chung Residential Landscape LCA), LCA 6 (Mixed Modern Comprehensive Urban Development Landscape LCA), LCA 7 (Cemetery Landscape LCA), LCA 8 (Strait Landscape LCA).</li> </ul>			<ul style="list-style-type: none"> <li>• Maximization of Roadside Planting</li> <li>• Re-provision of Affected Open Space</li> <li>• Visually Pleasing Aesthetic Treatment on Noise Barriers and Noise Enclosures</li> <li>• Aesthetic Pleasing Design for Carriageways and Other Highways Structures</li> </ul>	<p>year 10 of operation on LCA 1, LCA 5.1, LCA 5.2.</p> <ul style="list-style-type: none"> <li>• Insubstantial/slight residual impact during day 1 of operation and insubstantial residual impact during year 10 of operation on LCA 2.2, LCA 4.1.</li> <li>• Insubstantial residual impact during day 1 and year 10 of operation on LCA 2.1, LCA 3.1, LCA 3.2, LCA 4.2, LCA 6, LCA 7, LCA 8.</li> </ul>
<p>Visually Sensitive Receivers (VSRs)</p>	<ul style="list-style-type: none"> <li>• Substantial visual impact on REC-7.</li> <li>• Moderate visual impact on R-4, REC-2, REC-5, GIC-1, GIC-2, GIC-3, GIC-6, T-1, T-6.</li> <li>• Moderate/substantial visual impact on R-7, R-8, O-1, O-2,</li> </ul>	<ul style="list-style-type: none"> <li>• Annexes 10 and 18 of the EIAO-TM</li> <li>• Environmental Impact Ordinance Guidance Note 8/2010</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Compensatory Planting for Loss of Existing Trees</li> <li>• Landscape Reinstatement and Treatment of Slopes</li> <li>• Maximization of Roadside Planting</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate/substantial residual visual impact during day 1 of operation and moderate residual visual impact during year 10 of operation on REC-7.</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	<p>O-3, O-5, T-2, T-4, T-5.</p> <ul style="list-style-type: none"> <li>• Slight/moderate visual impact on R-2, R-3, REC-1, O-4.</li> <li>• Insubstantial/slight visual impact on R-1, R-5, REC-3, REC-4.</li> <li>• Insubstantial visual impact on other VSRs.</li> </ul>			<ul style="list-style-type: none"> <li>• Re-provision of Affected Open Space</li> <li>• Visually Pleasing Aesthetic Treatment on Noise Barriers and Noise Enclosures</li> <li>• Aesthetic Pleasing Design for Carriageways and Other Highways Structures</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate residual visual impact during day 1 of operation and slight/insubstantial residual visual impact during year 10 of operation on R-7, R-8, O-1, O-2, O-3, O-5, T-2, T-4, T-5.</li> <li>• Slight/moderate residual visual impact during day 1 of operation and insubstantial/slight residual visual impact during year 10 of operation on R-4, REC-2, REC-5, GIC-1, GIC-2, GIC-3, GIC-6, T-1, T-6.</li> <li>• Insubstantial/slight residual visual impact during day 1 of operation and insubstantial residual visual impact during year 10 of operation on R-2, R-3, REC-1, O-4.</li> <li>• Insubstantial residual visual impact during day 1 and year 10 of operation on other VSRs.</li> </ul>

### **3 ENVIRONMENTAL MONITORING AND AUDIT**

- 3.1.1 Environmental Monitoring and Audit (EM&A) requirements for air quality, noise, water quality, waste management, landfill gas hazard, cultural heritage as well as landscape and visual have been recommended, with regular site inspection and audits during construction phase to ensure that the recommended mitigation measures are properly implemented. The EM&A requirements are specified and detailed in the EM&A Manual.

## **4 CONCLUSION**

- 4.1.1 The findings of the EIA provided information on the nature and extent of the environmental impacts likely to arise from the construction and operation of the Project. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards.
- 4.1.2 Overall, the EIA concluded that with the implementation of the proposed mitigation measures during the construction and operation phases of the Project, the Project would comply with the requirements of the EIA Study Brief and EIAO-TM. The schedule of implementation of the proposed mitigation measures has been provided in the EIA Report. An EM&A programme has also been recommended with a view to checking the effectiveness of the proposed mitigation measures.