

Highways Department

**Agreement No. CE 32/2014 (HY)
Elevated Pedestrian Corridor in
Yuen Long Town
Connecting with Long Ping Station
– Investigation, Design and
Construction**

Executive Summary

REP-045-02

Final | July 2016

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Job number 240246

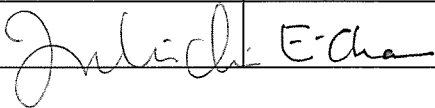
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1 INTRODUCTION

1.1 General

- 1.1.1.1 This Executive Summary summarizes the results of the Environmental Impact Assessment (EIA) for Elevated Pedestrian Corridor in Yuen Long Town Connecting with Long Ping Station – Investigation, Design and Construction Project. The EIA has been prepared in accordance with the requirements of the Environmental Impact Assessment Ordinance (EIAO) and the EIA Study Brief (ESB-278/2014).

1.2 Background

- 1.2.1.1 Over the years, with the completion of major infrastructure improvements including Light Rail Transit (LRT) in late 80s, the operation of Tai Lam Tunnel in 1998 and the West Rail Service in 2003, Yuen Long has been experiencing substantial changes. Rapid growth in major residential developments and large scale integrated developments in Yuen Long Town and its surrounding areas was observed in recent years. These new developments and growing population have further exacerbated the congestion problem in Yuen Long Town and have resulted in surging demand for safe and convenient pedestrian facilities. Inadequate pedestrian facilities are long-standing problems in the town centre of Yuen Long. However, improvements have been constrained by the existing urban characteristics such as the presence of LRT, narrow footpaths along Castle Peak Road - Yuen Long Section.
- 1.2.1.2 The Chief Executive has pledged in his 2008-2009 Policy Address to improve the pedestrian environment in business districts, shopping centres and leisure areas with heavy pedestrian flows as to minimize vehicle-pedestrian conflicts and improve roadside air quality. Amongst other areas with heavy pedestrian flows, Yuen Long Town is selected as one of the key locations.
- 1.2.1.3 The first public engagement for developing pedestrian environmental improvement schemes commenced in 2009 and the proposed elevated pedestrian corridor was presented to Yuen Long District Council Meeting in 2010.
- 1.2.1.4 In September 2011, Highway Department (HyD) commissioned a Feasibility Study (FS) on the major improvement schemes including the proposed elevated pedestrian corridor, which in form of a footbridge, along Yuen Long Town Nullah connecting with West Rail Long Ping Station (WRLPS). A public engagement was conducted in March and April 2013 to consult the public on the preliminary proposals for the major improvement schemes formulated in the FS. The public and Yuen Long District Council expressed support for the proposed footbridge and urged its early implementation.
- 1.2.1.5 The Technical Feasibility Statement (TFS) prepared by HyD for the proposed elevated pedestrian corridor along Yuen Long Town Nullah between WRLPS and Kau Yuk Road with provision for future extension was approved by the Development Bureau in July 2013. The findings of the above FS and the TFS set out the basis for the current proposal for the proposed elevated pedestrian corridor under the Project.

1.3 Designated Projects

- 1.3.1.1 The Project involves construction of an elevated pedestrian corridor of about 540m in length and 6m clear width footbridge along Yuen Long Town Nullah and six pedestrian interchanges. It would also require the construction of pile foundation for the footbridge and box structure on piles for the pedestrian interchanges within the Yuen Long Town Nullah.
- 1.3.1.2 The Project involves construction works at the Yuen Long Town Nullah which eventually discharges into the Mai Po Marshes, a Site of Special Scientific Interest (SSSI). Hence, the Project is classified as a Designated Project (DP) under Item I.1(b)(i) under Part I of the Schedule 2 of the EIAO - 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 site of special scientific interest. Therefore, a detailed EIA for approval by the Director of Environmental Protection (DEP) is therefore required to apply the environmental permit (EP) for the construction and operation of the Project.

1.4 EIA Study Brief

- 1.4.1.1 In accordance with the requirement of Section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499), a Project Profile (PP-514/2014) for the Project was submitted to the Director of Environmental Protection (DEP) for application for an EIA Study Brief in August 2014. Pursuant to Section 5(7)(a) of the EIAO, DEP issued an EIA Study Brief (ESB-278/2014) in September 2014 for this EIA Study.
- 1.4.1.2 The purpose of this EIA Study Brief is to set out the purposes and objectives of the EIA study, the scope of environmental issues which shall be addressed, the requirements that the EIA study shall need to fulfil, and the necessary procedural and reporting requirements. The Applicant shall demonstrate in the EIA report that the criteria in the relevant sections of the Technical Memorandum on Environmental Impact Assessment Process of EIAO (TM-EIAO) are complied with.

2 PROJECT DESCRIPTION

2.1 General Description of the Project

2.1.1.1 The proposed elevated pedestrian corridor is located in the vicinity of Yuen Long Town Nullah. Its alignment would generally follow the nullah, and connects West Rail Long Ping Station to the south of the Kau Yuk Road. The proposed elevated pedestrian corridor will be in form of a footbridge and will be connected to at-grade footpath via a total of six pedestrian interchanges (comprising staircases / lifts / escalators) located along both sides of the nullah. The location and layout of the Project is shown in **Figure 2.1**.

2.1.1.2 As described in the EIA Report, the scope of the Project includes:

- construction of a covered footbridge of about 540m in length and 6m clear width with staircases / lifts / escalators along Yuen Long Town Nullah from West Rail Long Ping Station to the south of the Kau Yuk Road;
- connection of the footbridge with West Rail Long Ping Station;
- connection of the footbridge with at-grade footways in Yuen Long On Ling Road, Castle Peak Road – Yuen Long Section and Kau Yuk Road;
- provision at the southern end of the footbridge to allow for future extension;
- measures for mitigating drainage impact for the sections of Yuen Long Town Nullah underneath the footbridge;
- landscaping and streetscape works of the footpaths along both sides of Yuen Long Town Nullah between West Rail Long Ping Station and Kau Yuk Road; and
- associated civil, road, drainage, geotechnical, traffic aids, utility, diversion street lighting, landscaping, E&M works and environmental mitigation measures and temporary traffic arrangement during construction stage.

2.1.1.3 The proposed elevated pedestrian corridor will be connected to the footways on both sides of Yuen Long On Ning Road, Castle Peak Road – Yuen Long Section and Kau Yuk Road through six pedestrian interchanges to be constructed on the northern and southern sides of these roads along the three existing vehicular bridges supporting the sections of these road across nullah. Each pedestrian interchange will consist of a box structure on pile foundation and will be equipped with staircase, escalator and lift for connection with the deck of the footbridge. Plantation areas would also be included within these pedestrian interchanges. The schematic arrangement of these six pedestrian interchanges are shown in **Figure 2.2** and **Figure 2.3**. Other than the pedestrian interchanges, the proposed footbridge will also be designed to have four viewing platforms which would allow the pedestrians to enjoy the views along the corridor.

2.2 Background and History of the Project

2.2.1 General Increase in Population in Yuen Long District

2.2.1.1 As mentioned in **Section 1.2**, there are numbers of residential and commercial developments in Yuen Long over the last decades, especially in the vicinity of Yuen Long Town. Currently, there is a total of 16 public housing estates, Yuen Long

Industrial Estate, and many private developments and villages etc., in Yuen Long District. While these developments have contributed to the urban transformation and economic vibrancy of the district as a whole, the population within Yuen Long District has also experienced a rapid growth.

- 2.2.1.2 According to the Population Census in Year 2011, the population in Yuen Long District has increased from 449,070 in Year 2001 to 578,529 in Year 2011, which is equivalent to approximately a 29% increase within 10 years. When compared to other Districts, Yuen Long District is one of those districts that has been experiencing a rapid growth in population.

2.2.2 Traffic Congestion in Yuen Long Town Centre

- 2.2.2.1 All the existing and new population would inevitably generate traffic that would commute within the district or travel to other districts as necessary. For those commuting within the district, Yuen Long Town Centre is one of the mostly visited area where most of the commercial activities are located (e.g. along Yuen Long On Ning Road, Castle Peak Road – Yuen Long Section, etc), and where the West Rail Long Ping Station is also located. Other than road-based traffic, the existing and new population would also generate significant pedestrian movements at road levels. The traffic flow and pedestrian flow are much higher especially during morning and afternoon peaks, and public holidays.

- 2.2.2.2 Given the existing issue on road-based traffic and pedestrian movements, it would be beneficial to have a convenient north-south pedestrian corridor connecting West Rail Long Ping Station to Yuen Long Town Centre, which would help reducing the needs of the road-based traffic by encouraging the use of West Rail and improving the pedestrian condition by diverting pedestrian flow from at-grade footpath to the proposed elevated pedestrian corridor.

2.2.3 Existing Constraints in Yuen Long Town Centre

- 2.2.3.1 As the Yuen Long Town Centre has been developed for decades, some sections of the existing infrastructures such as roads, footpaths and pedestrian crossing facilities may be facing issues in handling the current circumstances. As a result, issues on traffic congestion and vehicle-pedestrian conflicts within the Yuen Long Town Centre have been identified and discussed in Yuen Long District Council (DC).

- 2.2.3.2 During meetings of Yuen Long DC in recent years (e.g. 7th DC meeting in Year 2012, 2nd DC meeting in Year 2013, 2nd DC meeting in Year 2014, etc), many DC members agreed that there were serious traffic congestion and vehicle-pedestrian conflicts problem within Yuen Long Town Centre. The circumstances were more serious at Castle Peak Road – Yuen Long Section and Kau Yuk Road, as well as footpaths along them, especially during peak hours, weekends and public holidays. The existing relatively narrow footpaths (e.g. Castle Peak Road, Kau Yuk Road, Yuen Long On Ning Road, etc) were not capable to cope with the high pedestrian flow and hence resulting in safety concern, especially for those requiring special considerations including the elderly, wheelchair users and baby cart users etc. For example, there are about 10 bus stops and LRT stations located long the Castle Peak Road – Yuen Long Road. During the peak hour, the passengers of the buses or shuttle buses have occupied certain space of the existing narrow footpaths and causing blockages of the footpaths. Similarly, there are numbers of schools within Yuen Long Town Centre. Narrow footpaths near the schools are occupied by the students during peak hour and thus blockage of footpaths were observed.

2.2.3.3 Besides, Yuen Long Town Centre has been already developed with numbers of residential buildings in high density. Hence, there is limited space for widening the footpaths unless expanding towards the roads. In fact, expanding the footpaths toward the roads will further exacerbate the existing traffic congestion problem.

2.2.4 Public Supports

2.2.4.1 The Chief Executive has pledged in his 2008-2009 Policy Address to improve the pedestrian environment in business districts, shopping centres and leisure areas with heavy pedestrian flows as to minimize vehicle-pedestrian conflicts and improve roadside air quality. Amongst other areas with heavy pedestrian flows, Yuen Long Town is selected as one of the key locations.

2.2.4.2 The first public engagement for developing pedestrian environmental improvement schemes was commenced in 2009 and the proposed elevated pedestrian corridor was presented to Yuen Long District Council Meeting in 2010.

2.2.4.3 Subsequently, HyD commissioned a Feasibility Study (FS) “*CE 4/2011 (HY) - Improvements to Pedestrian Environment in Yuen Long Town*” which recommended a number of improvement schemes to formulate potential solutions to the vehicle-pedestrian conflicts issues. The FS recommended an elevated pedestrian corridor along Yuen Long Town Nullah connecting with the West Rail Long Ping Station.

2.2.4.4 During the public engagement conducted in March and April 2013, the public and Yuen Long DC expressed support for the proposed elevated pedestrian corridor and urged its early implementation. In addition, some DC members have requested early implementation of the proposed an elevated pedestrian corridor during the first special meeting of Traffic and Transport Committee under Yuen Long DC (DC Paper No. 65/2013).

2.2.5 Purposes of the Proposed Elevated Pedestrian Corridor Connecting to Long Ping Station

2.2.5.1 The key purpose of the proposed elevated pedestrian corridor are to 1) provide a north-south pedestrian corridor within Yuen Long Town Centre to divert the pedestrian flow from the ground level footpaths; 2) provide a convenient access to the West Rail Long Ping Station with ancillary facilities (e.g. elevators); and 3) act as a convenient pedestrian crossing facilities across busy roads within Yuen Long Town Centre.

2.2.5.2 After completion of the Project, this will help relieving the traffic and pedestrian congestion situation at ground level as well as minimizing vehicle-pedestrian conflicts, hence significantly improve the walking environment in the area.

2.3 Environmental Benefits of the Project

2.3.1 Minimizing the Potential Nuisance from Vehicular Emission and Noise on the Pedestrian

2.3.1.1 The Project can minimize the potential nuisance from vehicular emission and noise by providing an alternative access connecting the West Rail Long Ping Station and the southern part of the Yuen Long Town Centre, such as residential buildings and schools along Kau Yuk Road and Castle Peak Road – Yuen Long Section. Besides, it could alleviate the existing conflicts between pedestrians and vehicles.

2.3.1.2 Under the current situation, there are three major existing north-south pedestrian routes in Yuen Long Town Centre from Kau Yuk Road to West Rail Long Ping Station, including (1) along Hong Lok Road and eastern side of the nullah, (2) along Kik Yeung Road and western side of the nullah, and (3) along Fung Nin Road, On Shun Street and Chun Yin Square. According to the latest traffic study, the footpaths across Castle Peak Road - Yuen Long Section and Kau Yuk Road are the busiest sections of these three pedestrian routes. The estimated maximum pedestrian flow of these sections ranged from about 1750 to 7310 per hour in Year 2022. With the proposed elevated pedestrian corridor, the maximum pedestrian flow of these three pedestrian routes would be reduced to about 760 to 4,640 per hour. Over 50% of the pedestrian flow at most of those sections at the north-south at-grade pedestrian routes will be diverted to the proposed elevated pedestrian corridor. The Project can therefore minimize the potential nuisance from vehicular emission and noise by diverting pedestrian on the at-grade footpaths to the proposed elevated pedestrian corridor.

2.3.2 Enhanced Visual and Landscape Resources at Street Level

2.3.2.1 The existing Yuen Long Nullah is a view corridor in north-south direction and is a visual resource within Yuen Long Town Centre. However, the visual amenity of the existing nullah is generally less satisfactory due to the hard concrete surface and channelization.

2.3.2.2 As part of this Project, landscape and streetscape works will be conducted at the footpaths along both side of Yuen Long Town Nullah between West Rail Long Ping Station and Kau Yuk Road. With the provision of these landscape and streetscape works, the visual and landscape resources along the nullah at the street level will be enhanced and provide beneficial visual impact to the pedestrians.

2.4 Scenarios without Project

2.4.1.1 As discussed in **Section 2.2.1**, there has been a significant increase in various developments in the vicinity of Yuen Long Town Centre and the situation would likely to continue. This has increased both road-based traffic and pedestrian flow within the district. The existing traffic congestion and vehicle-pedestrian conflicts within Yuen Long Town Centre will be further exacerbated if there is no improvement works.

2.4.1.2 If the Project is not implemented, the pedestrian will need to access the West Rail Long Ping Station by crossing numbers of busy roads. Due to the increased pedestrian at the ground level and road traffic activities, the congestion problem and vehicle-pedestrian conflicts in the area would continue and cause safety concern. Besides, the pedestrian will not be able to enjoy the benefits of using the elevated corridor which is further away from the roads and hence less nuisance caused by the noise and emission from road based vehicles.

2.4.1.3 Furthermore, the degree of convenience to access the West Rail Long Ping Station will also affect the choice of transportation method. If the Project is not implemented, the pedestrian will need to cross numbers of roads and hence spend more time before arriving the train station. As a result, some of the local residents, especially those living to the south of the Castle Peak Road – Yuen Long Section may choose other transportation modes rather than the more environmental railway system. This increase in road-based traffic will contribute to the traffic congestion problem and associated environmental nuisance in the area.

- 2.4.1.4 To summarise, the “Without-project” option is not preferred due to the consideration of the environmental impacts associated with the traffic congestion problems and pedestrian safety issues associated with vehicle-pedestrian conflicts.

2.5 Implementation Programme

- 2.5.1.1 The construction of the elevated pedestrian corridor and associated works is anticipated to commence in 2018 for completion in Year 2022. It is anticipated that the development will be commissioned in phases. In order to main sufficient capacity for the passage of flow over the entire nullah during construction phase, the construction activities at the eastern side, central part and western side of the nullah would be conducted separately to minimize the potential hydraulic impact. The tentative implementation programme is summarised in **Table 2.1** below.

Table 2.1 Summary of the tentative implementation programme

Construction Activities	Tentative Implementation Programme
Site Clearance (Eastern Side of the nullah)	Q1 2018
Site Clearance (Western Side of the nullah)	Q2 2019
Temporary Erection (Eastern Side of the nullah)	Q2 2018 to Q4 2018
Temporary Erection (Western Side of the nullah)	Q2 2019 to Q4 2019
Temporary Erection (Central part of the nullah)	Q4 2020
Piling Works (Eastern Side of the nullah)	Q4 2018 to Q1 2019
Piling Works (Western Side of the nullah)	Q4 2019 to Q1 2020
Piling Works (Central part of the nullah)	Q4 2020 to Q1 2021
Column and Table Top Construction	Q2 2020 to Q4 2020
Pedestrian Interchanges Superstructure Construction	Q2 2020 to Q1 2021
Deck Structure and Steel Works	Q2 2020 to Q4 2021
Parapet Wall Construction, and Associated Landscape and Streetscape Works	Q4 2021 to Q2 2022

3 SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Approach to Environmental Impact Assessment

3.1.1.1 The EIA process provides a means of identifying, assessing and reporting the environmental impacts and benefits of the project. It is an iterative process that has been followed in parallel with the design process to identify the potential environmental effects of various design option, and develop alternatives as well as mitigations measures to be incorporated into the design, construction and operation of the Project. Feedback and advice obtained from the various stakeholder engagement activities have been suitably considered and incorporated into the EIA process where appropriate. Mitigation measures have been proposed to avoid some potential environmental impacts, or to minimize or mitigate to acceptable levels.

3.2 Air Quality

3.2.1 Introduction

3.2.1.1 Potential air quality associated with the construction and operational phases of the project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Section 3.4.1 of the EIA Study Brief as well as Section 1 of Annex 4 and Annex 12 of the TM-EIAO.

3.2.2 Construction Phase

3.2.2.1 Construction dust is the key pollutant during the construction phase of the Project which would be generated from various construction works, including site clearance, temporary erection and piling works, and wind erosion of the Site. Given that the construction works will be confined within small works areas scattered along the length of the proposed elevated pedestrian corridor of about 540m and the construction activities will be undertaken at moving multiple work fronts, no significant dust emission will be generated from the Project during the construction works. In addition, majority of the construction works with potential dust generation will be conducted within the Yuen Long Town Nullah that is about 4m to 5m lower than the ground level of the surrounding ASRs. Hence, significant dust dispersion from the work area to the ASRs is also considered unlikely. Therefore, adverse construction dust impact is not anticipated from the Project.

3.2.2.2 For fuel combustion equipment, the emission from the PMEs is considered relatively small and will not cause adverse air quality impact due to the implementation of Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation on 1 June 2015 that only approved or exempted non-road machinery are allowed to be used in construction sites.

3.2.2.3 For construction vehicles, there would be in total of not more than 10 trips per hour and the vehicles would leave the site through two different vehicles exits (one located near Tai Shu Ha Road West and one located near Wang Lok Street). The emissions from construction vehicles are considered relatively small and will not cause adverse air quality impact.

3.2.2.4 No adverse odour impact is anticipated as there would be very small quantity of sediment generated and stored on-site simultaneously. Nevertheless, odour control

measures are recommended in Section 4.4.3 of the EIA report to minimize the potential odour emission from the Project.

3.2.3 Operational Phase

3.2.3.1 The Project is an elevated pedestrian corridor with associated infrastructures. There will be no air pollutants and odour emission during operation of the Project. Therefore, adverse cumulative air quality impact is not anticipated.

3.3 Noise

3.3.1 Introduction

3.3.1.1 Potential noise impacts associated with the construction and operational phase of the project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Section 3.4.2 and Appendix B of the EIA Study Brief, as well as Annex 5 and Annex 13 of the TM-EIAO.

3.3.2 Construction Airborne Noise

3.3.2.1 Potential construction airborne noise impact would be caused by various construction activities including site clearance, temporary erection, piling works, column and table top construction, superstructure and steelworks, parapet wall construction, and associated landscape and streetscape works.

3.3.2.2 Construction airborne noise assessment has been conducted to evaluate the noise impact during the construction phase. Based on the assessment results, the unmitigated construction airborne noise would exceed the noise criteria at some existing and planned Noise Sensitive Receivers (NSRs). A package of noise mitigation measures such as good site practices, use of quiet plant and working methods, use of shrouds / temporary noise barriers and enclosures to screen noise from relatively static powered mechanical equipment (PME), scheduling of construction works outside examination periods in critical area, alternative use of plant items within one worksite have therefore been proposed to mitigate construction airborne noise impacts. The assessment results indicate that, with the implementation of the above mitigation measures and good site practices, all NSRs including residential premises and would comply with the stipulated noise criterion. Therefore adverse construction airborne noise is not anticipated.

3.3.3 Construction Groundborne Noise

3.3.3.1 Piling rigs would be used in the Project instead of percussive piling. In addition, no drilling, blasting or Tunnel Boring Machine will be employed during the construction works. Hence, no adverse construction groundborne noise impact is anticipated during the construction phase.

3.3.4 Operational Noise

3.3.4.1 The Project is an elevated pedestrian corridor with associated infrastructures. There will be no major noise sources during operation of the Project. Therefore, adverse cumulative noise impact is not anticipated.

3.4 Water Quality

3.4.1 Introduction

3.4.1.1 Potential water quality impacts associated with the construction and operational phase of the project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Section 3.4.3 and Appendix C of the EIA Study Brief, as well as Annex 6 and Annex 14 of the TM-EIAO.

3.4.2 Construction Phase

3.4.2.1 Potential water quality impacts would arise from construction activities within Yuen Long Town Nullah (e.g. excavation, piling, construction of pile cap, etc), construction surface runoff (including accidental chemical spillage) and sewage from site workforce. Mitigation measures, such as implementation of the temporary cofferdams, use of portable chemical toilets, sewage holding tank, avoidance of stockpiling materials near the dry weather flow channel, avoidance of major excavation during high stream flow, etc., will be implemented on site to mitigate the potential water quality impact. Best management practice as stipulated in the Practice for Professional Persons on Construction Site Drainage, Environmental Protection Department, (ProPECC PN 1/94) should be followed. An emergency contingency plan would also be prepared by the Contractor to state the details of actions in case there is accidental spillage of chemicals or leakage of polluting water into the nullah. This emergency contingency plan should be prepared prior to the commencement of construction works and submitted to IEC, Engineer and EPD for approval. With the full implementation of the mitigation measures recommended in Section 6.6 of the EIA report, no adverse impacts are anticipated.

3.4.2.2 Cofferdams and temporary platform will be constructed during construction of columns and box culverts to prevent release of the suspended solid and other pollutants into the nullah water. The construction activities at the eastern side, central part and western side of the nullah would be conducted separately to minimize the potential hydraulic impact in order to maintain sufficient capacity for the passage of flow over the entire nullah during construction phase. Since the construction works and use of cofferdams will be implemented in phases, not all the cofferdams would be in place concurrently. Besides, the construction works within the nullah would be conducted during the dry seasons. The Contractor would be requested to carry out detail design of the cofferdams in accordance with the DSD Technical Circular No. 14/2000 “Temporary Flow Diversions and Temporary Works Affecting Capacity in Stormwater Drainage System” and DSD Practice Note No. 1/2004 “Design Rainfall Depth for Temporary Works within the Dry Season” to avoid adverse impact on the drainage characteristics of the nullah. This arrangement will ensure that the impacts on the hydrology and water quality of the nullah would be insignificant. Therefore, no adverse impact is anticipated.

3.4.3 Operational Phase

3.4.3.1 The surface runoff from the elevated pedestrian corridor may contain grit, oil and debris from the pedestrians. Proper drainage system including gratings at the gully inlets will be provided to remove grit and debris before the runoff discharge to the public storm water drainage system or the Yuen Long Town Nullah. With such implementation, no adverse water quality impact is anticipated.

3.4.3.2 There are 2 footbridge columns and a total of 6 box culverts at the pedestrian interchanges will be located within the nullah which will reduce the volume of the

nullah by about 720 m³ (i.e. 1.3%) for the section under the elevated pedestrian corridor. As these permanent structures will decrease the cross-section area of the nullah, the water level of the nullah will be increased, especially during high flow conditions. Therefore, mitigation measures, such as construction of parapet wall, use of lens-shaped footbridge column to reduce head loss, etc., will be required to mitigate the flood risk generated by the Project. With the recommended mitigation measure in Section 6.7 of the EIA report, the flood risk can be mitigated to acceptable level and adverse water quality impact is therefore not anticipated.

3.5 Waste Management Implications

3.5.1 Introduction

3.5.1.1 The types of waste that would be generated during the construction and operation phases of the project have been identified. The potential environmental impacts that may result from these waste materials have been assessed in accordance with Section 3.4.4 and Appendix D of the EIA Study Brief as well as the criteria and guidelines outlined in Annex 7 and Annex 15 of the TM-EIAO.

3.5.2 Construction Phase

3.5.2.1 Potential waste management implications from the generation of waste during the construction phase have been evaluated. Strategic mitigation measures, including the opportunity for on-site sorting, reusing C&D materials, etc., are devised to minimize the surplus materials to be disposed. Recommendations have been made for implementation by the Contractor during the construction period to minimize waste generation and off-site disposal. The estimated amount of different types of wastes to be generated during construction phase and the respective proposed management options are summarised in following table.

Table 3.1 Estimated amount of different types of wastes to be generated during construction phase

Waste types	Total generated (m ³)	Total On-site reuse (m ³)	Total off-site reuse and disposal (m ³)	Stage(s) of the materials arising	Management options
<i>Inert C&D materials</i>					
Inert soft C&D materials ^[1]	15,330	3,785	11,545	Excavation	Tuen Mun Area 38 Fill Bank (Proposed)
Rock ^[2]	5,120	0	5,120	Excavation	Tuen Mun Area 38 Fill Bank (Proposed)
Artificial hard materials ^[3]	3,040	0	3,040	Construction and Demolition	Tuen Mun Area 38 Fill Bank (Proposed)
<i>Non-inert C&D materials</i> ^[4]					
Non-inert C&D materials	5,870	0	5,870	Excavation/ Construction and Demolition	WENT Landfill (Proposed)
<i>Others</i>					

Waste types	Total generated (m ³)	Total On-site reuse (m ³)	Total off-site reuse and disposal (m ³)	Stage(s) of the materials arising	Management options
Excavated Sediment	<100	0	<100	Excavation	Type 1 – Open Sea Disposal
Chemical waste	100 L/month	0	100 L/month	Excavation/ Construction and Demolition	Chemical Waste Treatment Centre
General refuse	130 kg/day	0	130 kg/day	Throughout the whole construction programme	Collected and disposed by licensed collector to Recyclers/ Landfill
General sewage	30 m ³ /day	0	30 m ³ /day	Throughout the whole construction programme	Sanitary facilities to be provided on-site and maintained by licensed collector

Note:

- [1] “Inert soft C&D materials” include, but not limited to, top soil, excavated soil etc.
- [2] “Rock” includes all grade rock.
- [3] “Artificial hard material” includes, but not limited to, broken concrete, asphalt, bitumen and granular materials etc.
- [4] “Non-inert C&D materials” includes, but not limited to, bamboo, timber, paper and plastic etc.

3.5.2.2 The wastes (e.g. non-inert C&D materials, vegetation, general refuse) generated from the Project will be transferred to designated landfill site for disposal. And surplus inert C&D materials will be transferred to the designated public fill reception facilities. For other wastes including sediment, chemical wastes, general refuse and sewage would be delivered to respective receiving facilities by future contractors. Less than 100m³ excavated sediment to be arisen from the Project is estimated to be of Cat. L and is proposed for Type 1 - Open Sea Disposal.

3.5.2.3 For chemical waste, the amount of wastes that will arise will be highly dependent on the contractor’s on-site maintenance practice and the number of plant and vehicles utilized. Nevertheless, it is anticipated that the quantity of chemical wastes would be small. With the implementation of the mitigation measures recommended in the EIA report, no adverse impact is anticipated.

3.5.2.4 For general refuse and sewage, no adverse impact is anticipated with the implementation of mitigation measures, such as good waste management practices, provision of portable toilet, etc, recommended.

3.5.3 Operational Phase

3.5.3.1 It is anticipated that the operation of the proposed pedestrian corridor would only generate small quantity of wastes from users, of which mainly are general refuses. The waste generated should be managed to prevent waste materials from being blown around by wind, flushed or leached into the nullah, or creating an odour nuisance or pest and vermin problem. With the implementation of the waste management measures, such as provision of refuse collection bins and recycling bins, no adverse impact is anticipated.

3.6 Land Contamination

- 3.6.1.1 The potential land contamination issue associated with the project have been assessed by following the guidelines in Section 3.1 and 3.2 of Annex 19 of the TM-EIAO as specified in Section 3.4.4 and Appendix D of the EIA Study Brief.
- 3.6.1.2 Upon review of historical aerial photo and site reconnaissance, it was observed that the Project Area has been a channelized watercourse lined with concrete and concrete-paved pedestrian footpath for more than 20 years. Also, no historical or existing contaminating activities are identified within the nullah area and the associated concrete-paved footpaths. No soil contamination is anticipated in the Project Area.

3.7 Ecology

- 3.7.1.1 The potential ecological impacts have been assessed by following the guidelines in Annex 8 and Annex 16 of the TM-EIAO as well as Section 3.4.5 and Appendix E of the EIA Study Brief.
- 3.7.1.2 The proposed elevated pedestrian corridor will be situated in a highly urbanized town area. There is no site of conservation importance within the Project Area or the 500m assessment area. The Yuen Long Nullah beneath the proposed elevated pedestrian corridor is a modified open water channel with concrete paved throughout the nullah.
- 3.7.1.3 The Project Area is a highly urbanized and limited information on the ecological condition is available. Site visits were conducted in January, March and September 2015 to identify any ecological resources within the Project Area and 500m Assessment Area. No habitat or species of conservation importance is identified within the Project Area. Due to the highly developed and disturbed status, the ecological value of the Project Area and within 500m assessment area is considered low.
- 3.7.1.4 The major construction works would take place in the Yuen Long Town Nullah. The nullah is connected to Shan Pui River, which is hydrological linked to the ecological sensitive area further downstream, including various habitats in the Wetland Buffer Area and Wetland Conservation Area. Mitigation measures are proposed and must be strictly followed to prevent deterioration of water quality of the nullah to avoid adverse impact to the ecological sensitive areas downstream. With proper implementation of the mitigation measures, the generation of pollutants and their release to the nullah would be minimised and no significant adverse residual impact is anticipated.

3.8 Landscape and Visual

3.8.1 Introduction

- 3.8.1.1 A landscape and visual impact assessment has been carried out in accordance with Section 3.4.6 and Appendix F of the EIA study brief, and Annexes 10 and 18 of the TM-EIAO.
- 3.8.1.2 The major sources of impacts on existing landscape and visual sensitive receivers during both construction phase and operational phase were identified. For construction phase, the major sources of impact include the construction of the footbridge, piers of footbridge, pedestrian interchange and landscape area as well

as construction traffic, laying down of utilities, temporary site access areas, site cabins and heavy machinery, and dust during dry weather. For operational phase, the major sources of impact include the footbridge, pedestrian interchange, piers of footbridge and extensive landscaped spaces.

- 3.8.1.3 Within the landscape and visual impact assessment study area, a total of 17 major landscape resources (LR), 7 major landscape character areas (LCAs) and 31 representative Visual Sensitive Receivers (VSRs) were identified and may be affected by the development. In addition, a tree survey was carried out determine the potential impacts on existing trees.

3.8.2 Tree Survey

- 3.8.2.1 A tree survey was conducted in May 2015 to assess all existing trees within the Project works limit. A total of 125 trees belonging to 26 species were recorded. Among these 125 trees, there is no Registered Old and Valuable Tree (OVT), “Important Tree” and stonewall tree. Five trees, *Ailanthus fordii*, which are rare and precious tree species included in “Rare and Precious Plants of Hong Kong” or “Forest and Countryside Ordinance” (Cap 96) were identified, but they are located far away from the project site and will not be affected by the Project.

- 3.8.2.2 Based on the assessment results, there are approximately 38 trees will be affected due to the construction of the proposed works, in which 1 of them will be transplanted and 37 trees will be felled. None of these affected trees are LCSD Champion Trees and Registered Old and Valuable Trees. All of them are common species. All those trees with high amenity value but unavoidably affected by the works will be transplanted where possible. Detailed tree preservation, transplanting and felling including compensatory planting proposal shall be separately submitted to relevant government departments for approval. Based on the proposed works, trees will be planted along roadside amenity areas and new open spaces to compensate for the loss of existing trees.

3.8.3 Construction Phase

- 3.8.3.1 Based on the impact assessment findings, mitigation measures covering all relevant landscape and visual aspects are proposed to be implemented during construction. These include protection of retained trees, transplanting of trees those are unavoidably affected, compensatory trees planting, control of night-time lighting and erection of decorative screen hoarding compatible with the surrounding setting.

- 3.8.3.2 After implementing the recommended mitigation measures, all LRs and LCAs either anticipated to experience residual impacts of moderate to slight significance or insubstantial impacts by the proposed development. For VSRs, leisure and recreational users along the footbridges crossing Yuen Long Nullah and some residential VSRs which located close to the interchange structure are still anticipated to have substantial visual impacts, besides that, all other VSRs are either anticipated to experience residual impacts of moderate to slight significance impacts.

3.8.4 Operational Phase

- 3.8.4.1 Based on the impact assessment findings, mitigation measures covering all relevant landscape and visual aspects are proposed to be implemented during the operational phase. These include compensatory trees planting, aesthetic design of the footbridge, use of visually unobtrusive and non-reflective building materials,

avoidance of excessive height and bulk of buildings structure, proper design of the streetscape elements in a manner that responds to the local context and minimize potential landscape and visual impacts, suitable directional of lighting units to minimize unnecessary light spill, maximization of soft landscape and roadside tree planting.

- 3.8.4.2 After implementing the recommended mitigation measures, most LR, LCAs and VSRs are either anticipated to experience residual impacts of slight significance, or insubstantial impacts by the proposed development, except the view point from leisure and recreational users along the footbridges crossing of Yuen Long Nullah which still have substantial visual impact due to the blockage of the view corridor by the footbridge. Besides that, some residential VSRs which located close to the interchange area will still have moderate visual impact. However, considering the fact that visual obstructions to particular VSRs are unavoidable even with alternative alignments to the footbridge and the site constraints that limit the further adoption of visual mitigation measures, it is considered that the proposed development has fully explored alternative methods to avoid, reduce and alleviate the identified visual impact. The proposed footbridge is therefore considered as marginally acceptable in visual point of view.

3.8.5 Conclusion

- 3.8.5.1 In accordance with the criteria and guidelines for evaluating and assessing impacts as stated in Annex 10 and 18 of the TM-EIAO, it is considered that the overall landscape impact of the project are considered to be acceptable with mitigation measures and visual impact of the project is considered to be marginally acceptable with mitigation measures.

3.9 Cultural Heritage

3.9.1 Introduction

- 3.9.1.1 As required under Section 3.4.7 of the EIA study brief, a cultural heritage impact assessment has been conducted. This includes a built heritage assessment and an archaeological impact assessment, to evaluate the impacts on known or potential cultural heritage resources in the 100m assessment area. The cultural heritage impact assessment follows the requirements of Annex 10 and 19 of the TM-EIAO as well as Appendix G and Appendix G-1 of the EIA study brief.

3.9.2 Built Heritage

- 3.9.2.1 A literature review conducted for the built heritage impact assessment has collated relevant information on Declared Monuments and Graded Historic Buildings. A field survey was also conducted for built heritage to identify other built heritage resources. Results indicates that there is no Declared Monuments within 100m assessment area. Besides, there are one proposed Grade 3 Historic Building (i.e. Entrance Tower of Tai Kiu Tsuen) and one Nil Graded Historic Building (i.e. No. 21 Tai Kiu Tsuen) located about 110m and 90m away from the work area. However, no adverse direct and indirect impact from the Project is anticipated due to the large separation distance of these heritage resources and the work area.

3.9.3 Archaeology

- 3.9.3.1 A literature review for archaeological impact assessment was conducted. No site of archaeological interest, government historical site and area of significant

archaeological potential were identified within the 100m assessment area. As the area of the Project will be confined within the Yuen Long Town Nullah and footpath along the nullah, no potential impact is anticipated and no archaeological survey is considered necessary for the Project.

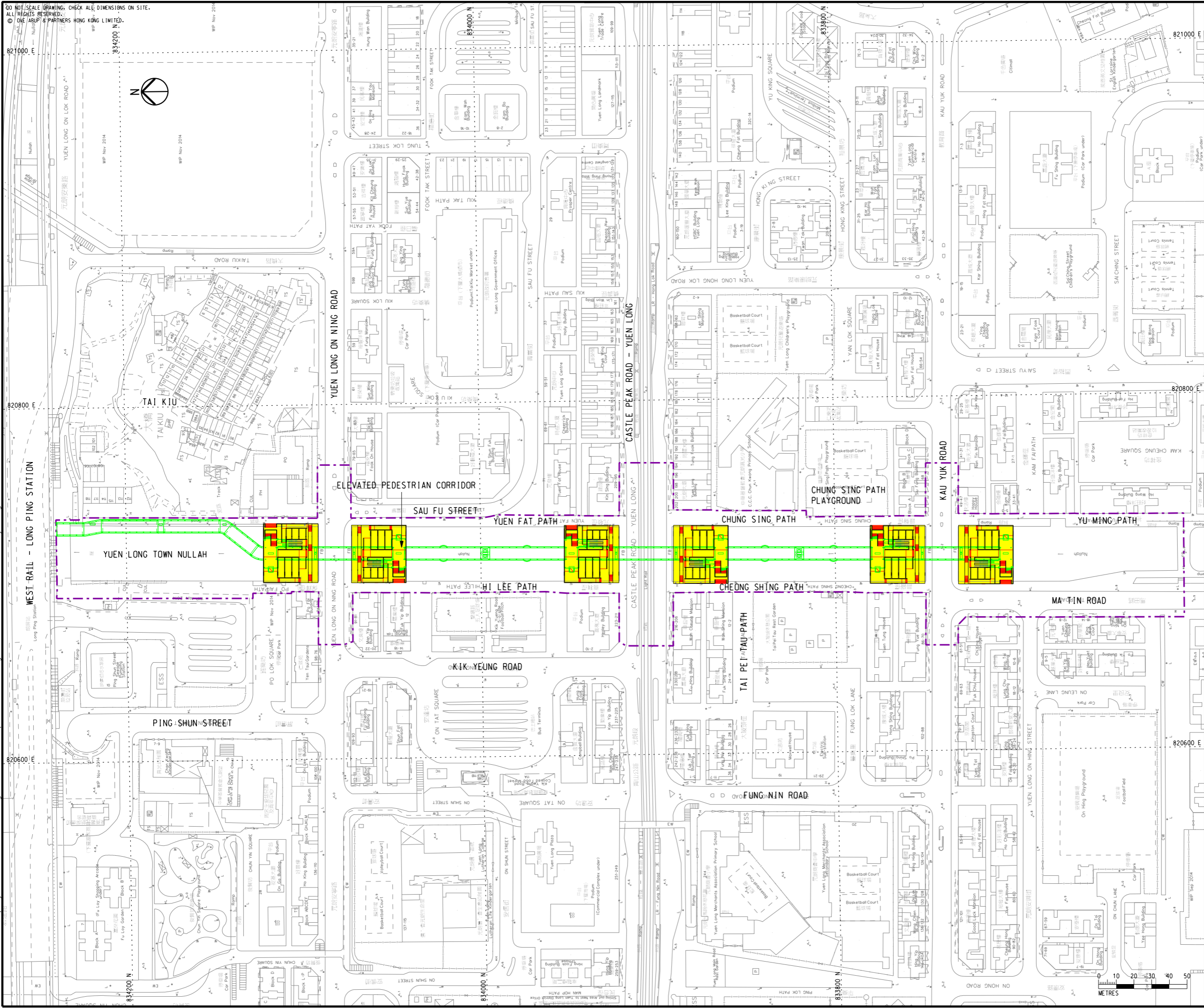
3.10 Environmental Monitoring and Audit

- 3.10.1.1 The Environmental Monitoring and Audit (EM&A) requirements and the mitigation measures to be implemented during construction and operation phases of the project have been specified in the EM&A Manual. The EM&A Manual contains full details of the proposed baseline and impact monitoring programmes, as well as performance specifications, audit requirements and monitoring procedures. The EM&A programme will be implemented throughout the entire construction period and operation period to regularly monitor the environmental impacts on the neighbouring sensitive receivers.

4 OVERALL CONCLUSION

- 4.1.1.1 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 elevated pedestrian corridor in Yuen Long Town connecting with Long Ping Station. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards.
- 4.1.1.2 Overall, the EIA concluded that the Project would comply with the requirements of the EIAO and TM-EIAO with the implementation of the recommended mitigation measures during the construction and operation phases. The schedule of implementation of the recommended mitigation measures has been provided in the EIA report. An EM&A programme has also been recommended to check the effectiveness of the recommended mitigation measures.

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LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED FOOTBRIDGE
- PEDESTRIAN INTERCHANGE

D	FOURTH ISSUE	GL	05/16
C	THIRD ISSUE	GL	03/16
B	SECOND ISSUE	GL	01/16
A	FIRST ISSUE	GL	10/15
Rev	Description	By	Date

Consultant
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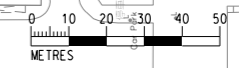
Contract No. and Title
Agreement No. CE 32/2014 (HY)
Elevated Pedestrian Corridor in
Yuen Long Town connecting with
Long Ping Station
– Investigation, Design and Construction

Drawing title
LOCATION OF THE PROJECT

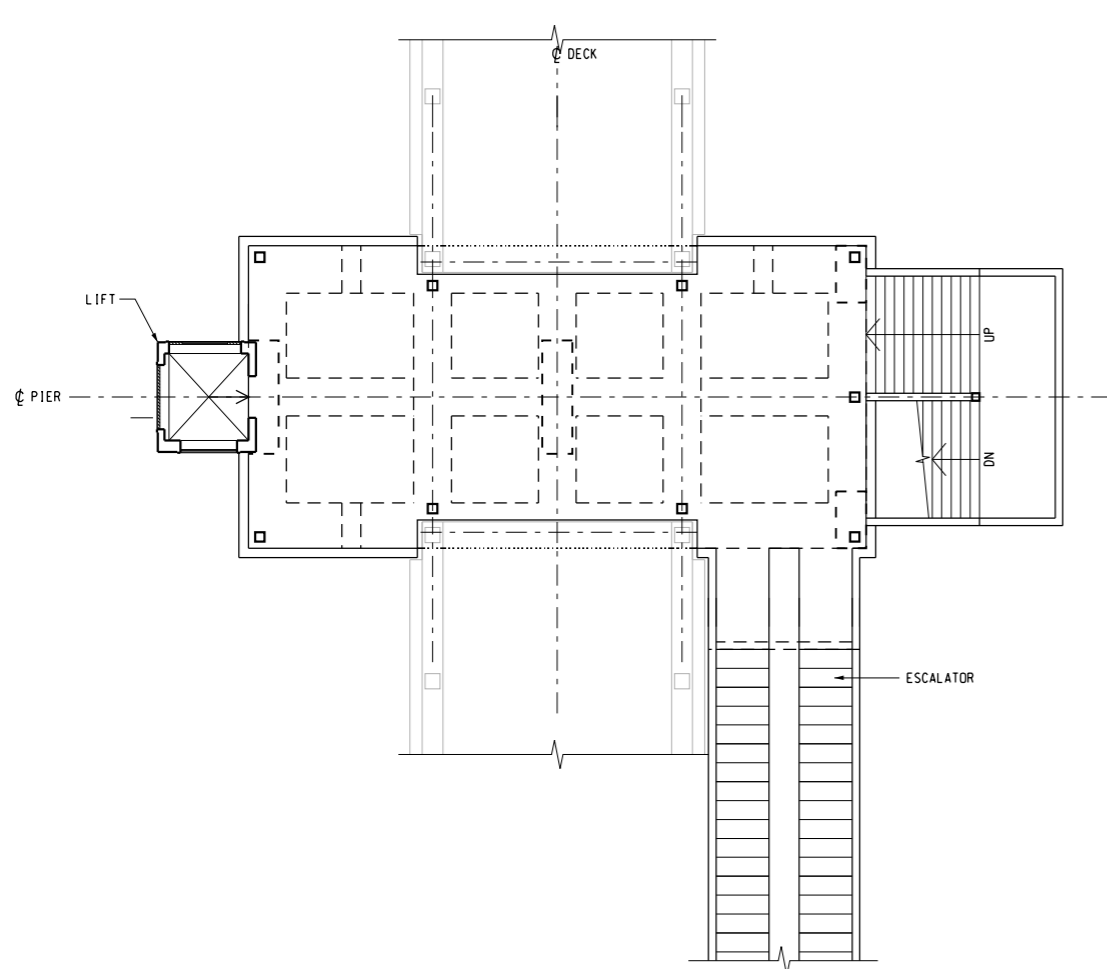
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Drawn GL	Date 05/16	Checked FC	Approved ST
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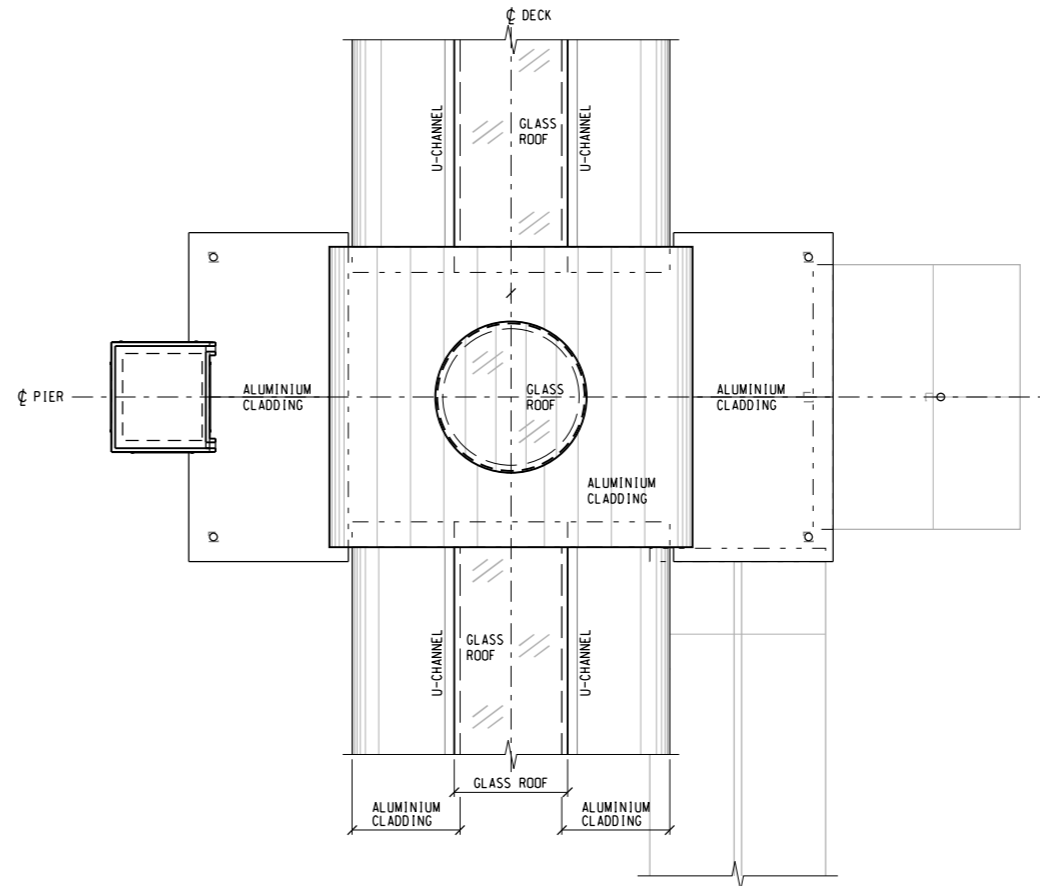


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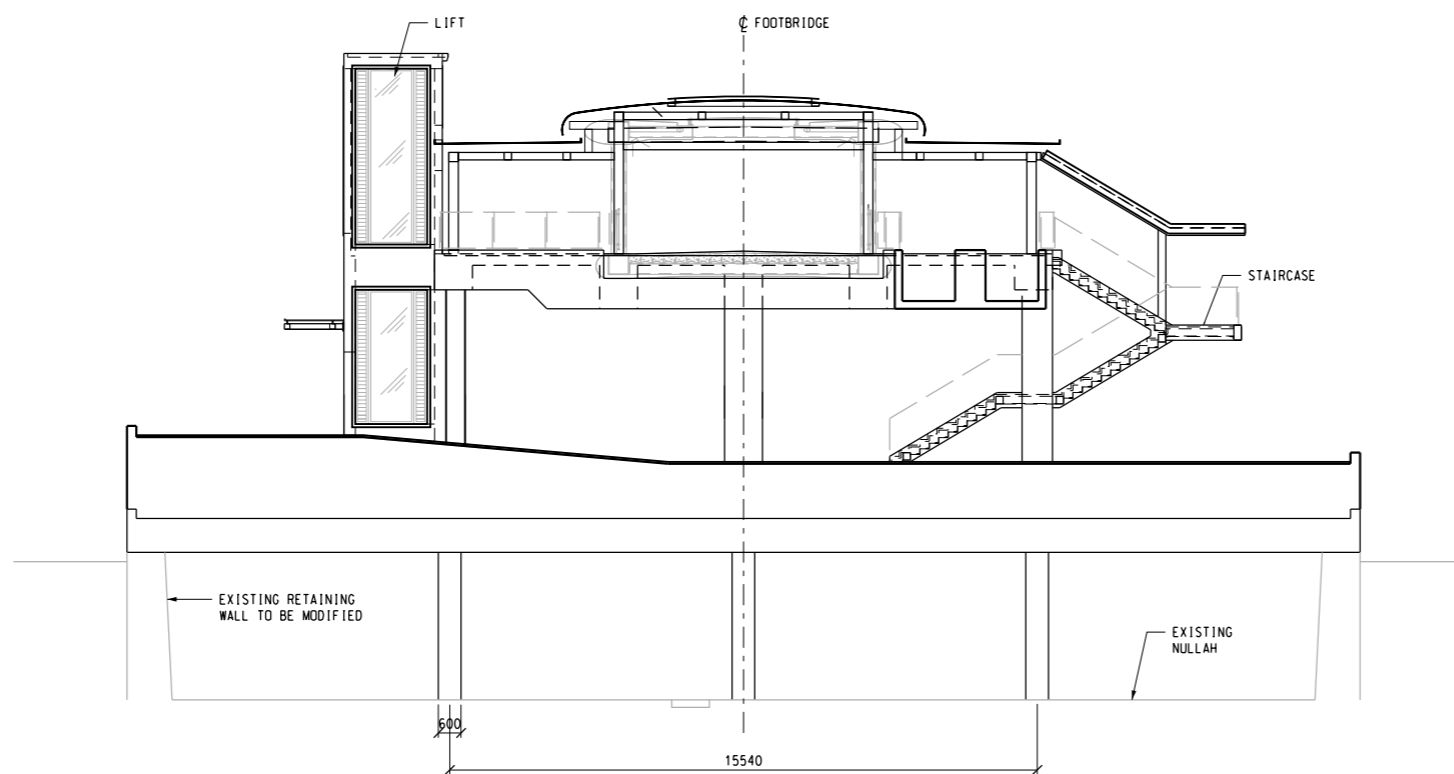
TYPICAL PLAN OF INTERCHANGE AT DECK LEVEL

1:100



TYPICAL PLAN OF INTERCHANGE AT DECK ROOF LEVEL

1:100



TYPICAL CROSS-SECTION OF PEDESTRIAN INTERCHANGE

1:100

Rev	Description	By	Date
B	SECOND ISSUE	EN	05/16
A	FIRST ISSUE	EN	03/16

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Project title
 Agreement No. CE 32/2014 (HY)
 Elevated Pedestrian Corridor in
 Yuen Long Town connecting with
 Long Ping Station
 – Investigation, Design and Construction

Drawing title
**PEDESTRIAN CORRIDOR
 ALONG YUEN LONG TOWN NULLAH
 PEDESTRIAN INTERCHANGE
 GENERAL ARRANGEMENT
 SHEET 2 OF 1**

Drawing no. FIGURE 2.2		Rev. B	
Drawn RC	Date 03/16	Checked KYL	Approved EC
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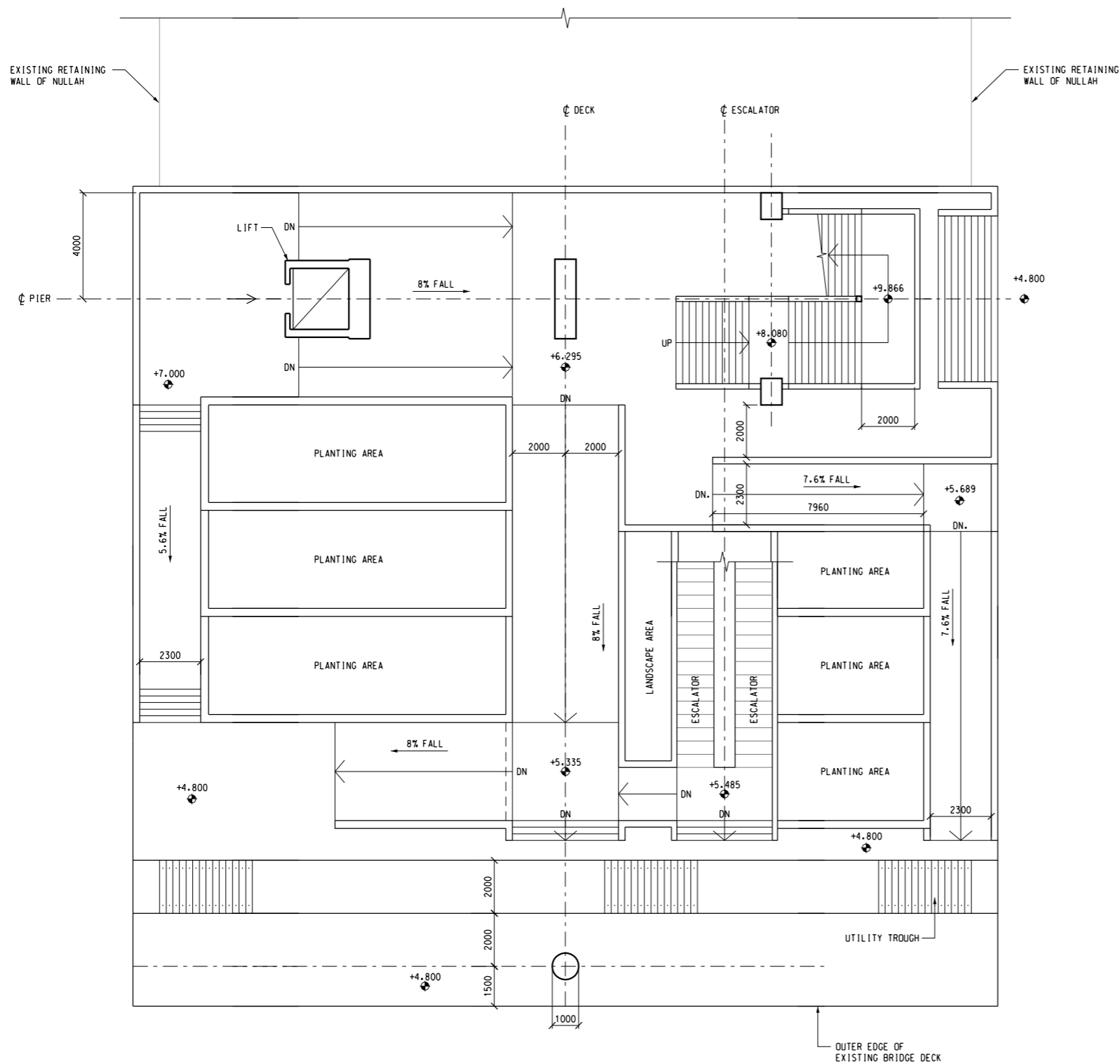
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LEGEND

+7.000

PROPOSED LEVEL



TYPICAL PLAN OF PEDESTRIAN INTERCHANGE AT GROUND LEVEL

Rev	Description	By	Date
B	SECOND ISSUE	EN	05/16
A	FIRST ISSUE	EN	03/16

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**PEDESTRIAN CORRIDOR
 ALONG YUEN LONG TOWN NULLAH
 PEDESTRIAN INTERCHANGE
 GENERAL ARRANGEMENT
 SHEET 2 OF 2**

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