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1. INTRODUCTION

1.1 Project Background

- 1.1.1 Drainage Services Department (DSD) had completed the Drainage Master Plan Study for the Northern New Territories (NNTDMP) to assess the conditions and the adequacy of the drainage capacity of the local drainage systems in the Northern New Territories in 1999. The study recommended a programme of drainage improvement works in the Northern New Territories to be implemented in phases, in order to tackle the flooding problems in the areas. After the completion of the NNTDMP, there were changes in developments within the Ta Kwu Ling areas. In addition, DSD received some new flooding complaints at various areas in Ta Kwu Ling, indicating that further improvement to the drainage systems was required.
- 1.1.2 DSD had carried out a review of the drainage system in Ta Kwu Ling, namely “Review of Drainage Improvement Works at Ta Kwu Ling” in 2016. The review indicates some areas in Ta Kwu Ling cannot meet the required flood protection level and causes severe flooding in the area during heavy rainfall event. Therefore, upon completion of the drainage improvement works, the flood protection level in Ta Kwu Ling would be enhanced to the latest standard and hence alleviate the flooding risk in the area.
- 1.1.3 DSD had commissioned Binnies Hong Kong Limited (Formally known as Black & Veatch Hong Kong Limited) to carry out “Agreement No. CE 89/2017(DS) of Drainage Improvement Works in Ta Kwu Ling – Investigation, Design and Construction” in April 2018.
- 1.1.4 An Environmental Impact Assessment (EIA) Study Brief (ESB-322/2019) for drainage improvement works in Ping Che / Ta Kwu Ling area, which is a designated project, was issued by the Environmental Protection Department (EPD) on 28 October 2019.

2. PROJECT DESCRIPTION

2.1 Location and Description of the Project

2.1.1 The Project Site is shown in [Figure 2.1](#). The scope of the Drainage Improvement Works in Ta Kwu Ling (the Project) comprises the construction of:-

- (i) the improvement of two sections of Ping Yuen River, namely TKL04 (about 1.4km long) and TKL05 (about 2.1km long), in Ta Kwu Ling;
- (ii) the drainage improvement works at Ping Yeung Village, Ta Kwu Ling (about 1050m long in total); and
- (iii) the construction of road drainage system at part of Ping Che Road, Ta Kwu Ling (about 1150m long in total).

2.1.2 Pedestrian and vehicular crossings will be re-provided along the upgraded channel.

2.1.3 Configuration of the proposed drainage channel TKL04 and TKL05 is summarised in [Table 2.1](#) below and presented in [Figure 2.2](#).

**Table 2.1
Configuration of Proposed Drainage Channel TKL04 and TKL05**

| Approx. Length (m) | Proposed Lining Type | Proposed Average Width (m) | Proposed Average Depth (m) |
|--------------------|--------------------------|----------------------------|----------------------------|
| TKL04 | | | |
| 300 | Natural Bedding Material | 5.0 | 3 |
| 700 | Natural Bedding Material | 5.0 | 3 |
| 200 | Natural Bedding Material | 5.0 | 3 |
| 200 | Natural Bedding Material | 9.0 | 3.5 |
| TKL05 | | | |
| 300 | Natural Bedding Material | 10.0 | 3 |
| 600 | Natural Bedding Material | 10.0 | 3 |
| 500 | Natural Bedding Material | 14.0 | 3.5 |
| 400 | Natural Bedding Material | 14.0 | 3.5 |
| 300 | Natural Bedding Material | 21.0 | 3.5 |

2.1.4 For the drainage improvement works at Ping Yeung Village, Ta Kwu Ling, it is proposed to provide approx. 850m of u-channel and approx. 200m of stormwater drains of diameters ranging from 825mm to 1200mm along Ping Yuen Road. For the construction of road drainage system at part of Ping Che Road, Ta Kwu Ling, it is proposed to provide approx. 550m of u-channel and approx. 600m of stormwater drains of diameters ranging from 750mm to 1200mm along Ping Che Road. The

works generally include temporary traffic arrangement, shoring works, excavation, stormwater pipe laying and backfilling works.

- 2.1.5 In addition to the above u-channel and stormwater drains, gullies are proposed to be provided along Ping Che Road.

2.2 Need of the Project

- 2.2.1 Currently, Ta Kwu Ling areas are susceptible to flooding under the existing drainage system. Under the “Review of Drainage Improvement Works at Ta Kwu Ling” carried out by DSD in 2016, it was identified that the areas at Ta Kwu Ling could not meet the required flood protection level according to the latest land use changes ([Figure 2.3](#)). This includes taking into account of various factors including sedimentation at the river bed, meander river alignments, vegetation growth along riverbanks and projected Climate Change impacts in the hydraulic analysis. The proposed drainage improvement works aims to alleviate the flooding problems at Ta Kwu Ling areas.

2.3 Benefits of the Project

- 2.3.1 The public spaces adjacent to TKL04 and TKL05 will be constructed in form of open space, wetland and woodland. The detail usage will be further reviewed in the detailed design stage to refine the design such as types of leisure facilities, planting species and landscaping details etc. The proposed woodland and wetland can create ecological linkage with nearby habitats, provide extra water storage capacity in the area, enhance biodiversity by improving or re-creating stream habitat to attract faunal species (i.e. birds and fishes), improve the amenity value by incorporating water feature and provide foraging area for fauna, especially water birds, which maybe roosting and nesting at the nearby woodland. Also, the open space is designed for community gathering and leisure in order to enhance the unity in Ta Kwu Ling area.
- 2.3.2 As there are no proper access to the existing watercourses of TKL04 and TKL05, maintenance works for most areas of the watercourses are very difficult. The safety of the workers carrying out the maintenance works and the services for handling flood complaints were also affected. Upon completion of the Project, proper access will be provided to facilitate the maintenance works. Only environmental friendly materials will be used for the construction of the access, which will be further explored in detailed design stage.
- 2.3.3 To implement the key concept of Blue-Green Infrastructure by revitalising water bodies by incorporating green and ecoconservation elements into the Project, ideas include planting in river channels and along riverbanks, use of natural river bedding, preserving river ecosystems, enhancing various wildlife growth and introducing landscape designs, which promote greening, biodiversity and

- environmental beautification while improvement to the drainage system could be achieved. For the purpose of blue-green infrastructure, this Project can create an environment with lush vegetation and beautiful waterscape for the public to get close to the water bodies and treasure the natural resources.
- 2.3.4 The Project adopted concept of Blue-Green Infrastructure together with the improvement of the drainage system, and subsequently improved the ecological connectivity among areas in adjacent to Ping Yuen River.
- 2.3.5 Vegetation and landscaping elements would be introduced to the Project to enhance the watercourses' biodiversity and social connectivity in Ta Kwu Ling.
- 2.3.6 In additions, the applicability and extent of solar energy will be evaluated during the detailed design stage of the Project. The use of photo-voltaic (PV) module will be adopted for flooding alarm system, street lighting and other E&M devices as far as possible.

2.4 Construction Methods and Sequences of Work

Proposed works at TKL04 and TKL05

- 2.4.1 The improvement works to TKL04 and TKL05 include widening and deepening of the channels. The proposed work at respective workfronts would be carried out along the channels on a section-by-section basis to minimize the period of nuisance to the nearby sensitive receivers and the need for temporary drainage diversion. Each section of the channels will be widened and deepened by excavation. Construction of embankments, channel bed and access roads on both sides of the channel will follow after the excavation.

Proposed Works at Ping Che Road and Ping Yeung Village

- 2.4.2 For cost effectiveness, the proposed works for underground drainage pipes would be implemented by open cut method as far as practicable. In the locations subject to site constraints, trenchless method will be adopted. The proposed work at respective workfronts would be carried out on a section-by-section basis to minimize the period of nuisance to the nearby sensitive receivers during construction.
- 2.4.3 For the works on public roads, temporary traffic management will be carried out to minimize the traffic impact to the public.
- 2.4.4 Utility survey will be carried out before any excavation works to ensure no existing utilities would clash with the proposed works.

- 2.4.5 When open-cut method is adopted, trench excavation will be carried out for laying of drainage pipe. For excavation greater than 1.2m, sheetpiles with struts and wales will be constructed as temporary support to the trench. After laying of the drainage pipe, the trench will be backfilled and the road surface will be reinstated.
- 2.4.6 When trenchless method is adopted, an insertion pit and a receiving pit will be constructed at both ends of the proposed drainage pipe. The drainage pipe is constructed from the insertion pit to the receiving pit by trenchless method, such as pipe jacking method. The pits will be backfilled and the road surface will be reinstated after the pipe laying works.

2.5 Construction Programme

- 2.5.1 The construction programme for the proposed works is tentatively expected to start in 2024 for completion by 2028.

3. SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT FINDINGS

3.1 Introduction

3.1.1 This Section summarises the findings of the EIA associated with the construction and operation activities at the tributary sections TKL04 and TKL05 of Ping Yuen River, Ping Yeung Village and Ping Che Road.

3.2 Air Quality

3.2.1 Construction works of the Project will inevitably generate some fugitive dust, especially during the excavation of the proposed channel. With the section-by-section construction approach, the areas of excavation works should be limited in scale. Regular site wetting will also help to control wind-blown dust nuisances.

3.2.2 Excavation and handling of riverbed sediment may cause odour impacts during construction and operation. With the implementation of good site practice, odour nuisance is not anticipated.

3.2.3 Through proper implementation of dust control measures required under the *Air Pollution Control (Construction Dust) Regulation*, and the *Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation*, construction fugitive dust should be controlled at source to satisfactory levels.

3.2.4 Maintenance works for the Project will be small-scale in nature. During the operation phase, the Project will unlikely cause any adverse air quality impacts in terms of dust and odour.

3.2.5 In order to ensure and demonstrate that mitigation measures are properly implemented during the construction stage for reducing the air quality impacts from the Project, monthly site inspections and audits will be conducted as part of the Environmental Monitoring and Audit (EM&A) Programme.

3.3 Noise

3.3.1 A construction noise assessment has been conducted to predict the noise levels at the representative noise sensitive receivers (NSRs) due to the construction of the Project. Practicable mitigation measures, including good construction site practices, use of quiet Powered Mechanical Equipment (PME), and temporary noise barriers and noise enclosures, are recommended. With the implementation of the recommended mitigation measures, construction noise levels at the representative NSRs will fully comply with the relevant noise criteria. No adverse cumulative impact is also anticipated.

3.3.2 No adverse noise impact is anticipated during operation phase as the Project does not have fixed noise source during operation.

3.4 Water Quality

3.4.1 The potential sources of water quality impacts associated with the construction and operation of the Project have been identified and the potential impacts were evaluated.

3.4.2 Potential impacts arising from the proposed construction works are predicted to be largely confined to the specific works areas. With proper implementation of the recommended mitigation measures, in particular the establishment of dry conditions for excavation works within the existing watercourse and good construction site practices as recommended in relevant regulatory guidelines, no adverse water quality impacts associated with the proposed drainage improvement works is anticipated.

3.4.3 Adverse water quality impacts are not expected during the operation phase as the Project will not generate any new pollution loads and the maintenance works to remove excessive silt, vegetation, debris and obstructions are small scale in nature. After completion of the works, drainage channel TKL04 and TKL05 may alter the pattern of sediment deposition and erosion along the downstream section of Ping Yuen River and Shenzhen River. With regular maintenance works at these downstream sections to remove excessive sediments it is not anticipated that the Project will lead to any unacceptable adverse water quality impacts by altering their sediment deposition and erosion pattern.

3.4.4 With the implementation of the recommended mitigation measures, it is expected that unacceptable residual water quality impacts would not arise from the construction and operation of the Project. Nevertheless, a monitoring programme is recommended during construction phase to verify the predictions of the EIA and ensure compliance with the assessment criteria.

3.5 Waste Management

3.5.1 Wastes generated by the construction activities are likely to include Construction and Demolition (C&D) materials from the construction works, general refuse from the workforce and chemical waste from any maintenance of construction plant and equipment. Provided that these identified wastes arisen are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed in terms of the avoidance-minimisation-reuse-recycling-disposal hierarchy, there would be no adverse environmental impacts.

3.5.2 The recommended measures in this EIA can be enforced by incorporating them into the waste management requirements in the Waste Management Plan (WMP)

as part of the Environmental Management Plan (EMP). Environmental site audit would be necessary to ensure the implementation of proper waste management practices during construction.

- 3.5.3 For the operation phase, debris, silt and chemical waste are expected to be produced by maintenance works of the river. Such waste will be removed by manual means and disposed to designated facilities after the clearance works. There would be no adverse environmental impacts anticipated.

3.6 Land Contamination

- 3.6.1 A land contamination assessment has been conducted for this Project. Based on historical information and current land uses, four Concerned Area were identified with potential contamination issue and require further Site Inspection (SI). Findings of the site appraisal and proposed soil and groundwater sampling and testing plan are presented in the Contamination Assessment Plan (CAP) of the EIA.

- 3.6.2 All the Concerned Areas were still in operation and not accessible for SI at the time of EIA. Although the Project Area, excluding the Concerned Areas, is not identified as potentially contaminated sites during the course of this CAP study, change in land use before commencement of works, if any, could cause potential land contamination. Further works, including site appraisal and submission of supplementary CAP(s), Contamination Assessment Report(s) (CAR(s)) / Remediation Assessment Plan(s) (RAP(s)) and Remediation Report(s) (RR(s)), shall be carried out by future project proponent to confirm the land conditions prior to commencement of any proposed construction works for subsequent developments. The further works shall follow EPD's Guidance Manual, Guidance Note and Practice Guide and according to Section 7.11 of the EIA.

- 3.6.3 With the implementation of above further works, contaminated sites, if any, would be identified and the extent of contaminated soil / groundwater can be located and cleaned-up accordingly. No contamination causing insurmountable impacts to the future land users is expected.

3.7 Ecology

- 3.7.1 The ecological impact assessment has been carried out based on literature reviews and the updated ecological survey conducted between February 2020 and December 2020, which covered both wet and dry seasons. According to the works alignment, the Project will cause potential habitat loss to abandon agricultural land (8.64ha), agricultural land (2.70ha), channel (0.89ha), developed area (4.24ha), pond (0.13ha), watercourse (2.45ha) and woodland (1.05ha).

- 3.7.2 Majority of the identified impacts are considered to be low or negligible in the absence of mitigation measures. However, the potential impacts on loss of

watercourse and woodland, ecological impact to flora and fauna species of conservation importance and Ping Che Egretty during construction phase are considered as low to moderate. Necessary mitigation measures were proposed for the above potential impacts in the EIA.

- 3.7.3 Furthermore, in order to maintain the ecological connectivity among areas in adjacent to Ping Yuen River, provision of animal corridors at the upgraded channels as an enhancement measure would be provided. Access points of the animal corridors would be provided in certain intervals and located away from traffic road as far as practicable.
- 3.7.4 No major activities would be conducted during the operational phase. The routine maintenance and the operation of the completed drainage channel would not cause potential ecological impact.
- 3.7.5 With the implementation of the mitigation measures recommended in this assessment, there will be no residual ecological impact from the project and off-site mitigation measures would not be required.

3.8 Fisheries

- 3.8.1 The baseline review and site surveys indicated that, besides Ping Che Aquaponics Farm, no active fishponds, pond fish culture activities have been identified within the assessment area. With proper implementation of the water quality mitigation measures during construction and operational phases of the Project, no indirect impact to pond fish culture activities in the North West New Territories (NWNT) area, oyster culture and fishing ground in Deep Bay area is expected. Fisheries impact arising from construction and operation of the Project is therefore not anticipated.

3.9 Cultural Heritage

- 3.9.1 As there is no archaeological potential area has been identified at the Works Area of the Project, no archaeological impact is anticipated during construction and operation.
- 3.9.2 As a precautionary measure, the Antiquities and Monuments Office (AMO) should be informed immediately in case of discovery of antiquities or supposed antiquities in the course of excavation under the Antiquities and Monuments Ordinance (Cap. 53), so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with AMO.
- 3.9.3 There is no declared or proposed monuments and Government identified sites in the Cultural Heritage Assessment Area.

- 3.9.4 6 nos. of Graded historic buildings and 1 no. of new built heritage item for grading assessment are located in proximity of the proposed works. In view of the large separation distance between the identified items and the Works Area, no impact is anticipated.
- 3.9.5 2 nos. of Grade 3 historic buildings and 16 nos. of built heritage items are located in proximity of the proposed works are potentially affected by vibration impact. The recommended mitigation measures include, design proposal, method of works and choice of machinery should be targeted to minimize potential adverse impacts to these heritage sites. Also, during pre-construction stage of the Project and implemented by the works contractor, a baseline condition survey and baseline vibration impact assessment be conducted by a qualified building surveyor or qualified structural engineer to evaluate on the necessary construction vibration monitoring and structural strengthening measures, hence fulfills the standard requirement.
- 3.9.6 With the implementation of the mitigation measures recommended, the potential impact of the Project during construction phase would be diminished and controlled to acceptable levels, no adverse residual impacts are anticipated.

3.10 Landscape and Visual

- 3.10.1 Residual landscape impacts remain negligible on most of the Landscape Resources and Landscape Character Areas. Minor residual landscape impacts are anticipated on numbers of watercourse, agricultural land and lowland agricultural landscape. Certain number of trees will be unavoidably felled in order to facilitate this Project, but these will be adequately compensated for with compensatory planting of over 600 trees within the Project Site. Watercourse and agricultural land will be affected by channelisation works of the Project and the residual impacts are considered moderate at construction, minor to moderate at Day 1 of operation and reduce to minor by Year 10 of operation with proper implementation of the recommended mitigation measures.
- 3.10.2 Residual visual impacts for majority of the receivers are considered minor or negligible at Day 1 and will be diminished to negligible at Year 10 of operation.
- 3.10.3 According to *Annex 10* of the *EIAO-TM*, the Landscape and Visual Impacts of this Project, are considered acceptable with mitigation measures.

4. SUMMARY OF ENVIRONMENTAL OUTCOME

4.1 Estimated Population Protected from Various Environmental Impacts

4.1.1 With the adoption of the recommended mitigation measures during construction phase, the potential environmental impacts associated with the Project will be minimized to acceptable levels. There would be no adverse residual environmental impacts to the sensitive receivers in the vicinity of the Project.

4.2 Environmentally Sensitive Areas and Species with Conservation Concern Protected

4.2.1 With the consideration of various alternative design and construction methods, the Project will avoid or minimize the impact to environmentally sensitive areas. Also, mitigation measures during construction phase will be implemented to protect the species with conservation concern, including *Aquilaria sinensis*, *Cephalanthus tetrandrus*, *Mucuna championii*, *Neottopteris nidus* and *Chinese Bullfrog*, located adjacent to the works area.

4.3 Key Environmental Problems Avoided

4.3.1 Key issues in terms of water quality would be related to excavation works for the construction phase. To minimize potential impacts on water quality during the channel construction, the excavation and widening works would be carried out in dry condition, by diverting the stream flow from upstream by a temporary drainage channel with temporary sheet piles, earth bunds or barriers, so that the works area will remain dry for later excavation and widening works.

4.3.2 Noise levels exceedance at the representative NSRs during construction phase is anticipated for unmitigated scenario. With adopting the quiet PMEs, temporary noise barrier and good site practices, no exceedance of the construction noise criteria is anticipated.

4.4 Environmental Mitigation Measures Recommended

4.4.1 The environmental benefits of environmental mitigation measures are listed below:

- **Air Quality:** Implementation of good house-keeping, dust suppression measures, such as water spraying, and effective management of excavation and handling of riverbed sediment would avoid/minimize dust emissions and odour issue during construction phase.
- **Noise:** Use of quiet equipment and implementation of temporary noise barriers would reduce the construction noise impact to the neighbouring noise sensitive receivers.

- **Water Quality:** Implementation of good site practices and establishment of dry conditions for excavation works to avoid/minimize polluted site runoff from the Project to neighbouring water sensitive receivers
- **Waste Management:** Implementation of waste reduction and good management control could minimize environmental implication from on-site waste storage.
- **Land Contamination:** With the implementation of further works, contaminated sites, if any, would be identified and the extent of contaminated soil / groundwater can be located and cleaned-up by biological treatment and physical / chemical treatment.
- **Ecology:** The potential ecological impact of the Project during construction phase is low to moderate. With the implementation of tree transplantation or compensatory tree planting and mitigation measures for species of conservation importance, there will be no residual ecological impact. Provision of animal corridors at the upgraded channels as an enhancement measure would be provided.
- **Fisheries:** With proper implementation of the water quality mitigation measures during construction and operational phases, no indirect impact on pond fish culture activities in the North West New Territories (NWNT) area, oyster culture and fishing ground in Deep Bay area is expected.
- **Cultural Heritage:** With the implementation of the mitigation measures recommended, the potential impact of the Project during construction phase would be diminished and controlled to acceptable levels, no adverse residual impacts are anticipated.
- **Landscape and Visual:** Landscape and visual impacts are acceptable with the implementation of mitigation measures.

5. ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENT

- 5.1.1 An Environmental Monitoring and Audit (EM&A) Manual has been prepared to monitor and audit the relevant air quality, noise, water quality, waste management, land contamination, ecology, fisheries, cultural heritage and landscape & visual impacts.
- 5.1.2 Monitoring has been recommended at designated sensitive receivers during the construction phase of the Project. Environmental site audit should be conducted weekly throughout the construction phase to ensure that the proposed mitigation measures are implemented.

6. CONCLUSION

- 6.1.1 The environmental impact assessment has concluded that no unacceptable environmental impacts are envisaged as a result of the construction and operation of the Project, provided that the recommended mitigation measures are implemented.