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13. SUMMARY OF ENVIRONMENTAL OUTCOMES

13.1 Introduction

13.1.1 This *Section* summarises the key environmental outcomes arising from the EIA Study in accordance with clause 3.6.1 of the EIA Study Brief (ESB-322/2019). The EIA (covering air quality, noise, water quality, waste management, land contamination, ecology, fisheries, cultural heritage and landscape & visual) has concluded that no unacceptable environmental impacts are envisaged due to the construction and operation of the Project with the implementation of the recommended mitigation measures. No long-term unacceptable impact on the environment is anticipated.

13.1.2 *Chapter 2* of this EIA have presented the alternative options considered relating to the design, construction and operation of the Project.

13.2 Environmental Benefits of the Project

13.2.1 The implementation of DIWTKL embodies a comprehensive solution in providing adequate drainage performance & flood resilience to Ta Kwu Ling.

13.2.2 The public spaces will be constructed in form of open space, wetland and woodland. The detail usage will be further explored in the detailed design stage to refine the design such as types of leisure facilities, planting species, landscaping details, management of spaces, 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 may use the nearby woodland for roosting and nesting. Also, the open space is designed for community gathering and leisure in order to enhance cohesion in Ta Kwu Ling area.

13.2.3 Due to the existing site constraints, maintenance works for specific locations of the existing watercourses of TKL04 and TKL05 is not easy to be carried out and so efficiency of flood case handling is relatively low. Upon implementation of the DIWTKL, a proper access can be provided to facilities the maintenance works. On the other hand, environmental materials for constructing maintenance access will be further explored in detailed design stage in order to maximize the ecological value of the proposed watercourses design.

13.2.4 To implement the key concept of Blue-Green Infrastructure by revitalising water bodies by incorporating green and ecoconservation elements into channel and river training works, ideas include planting in river channels and along riverbanks, engineering natural stream settings, preserving river ecosystems, enhancing various wildlife growth and introducing landscape designs, which promote greening, biodiversity and environmental beautification while maintaining the

drainage capacity. 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.

- 13.2.5 The increased flood protection standard provided by DIWTKL would facilitate the concept of “blue-green infrastructure” via drainage improvement works and subsequently retain the ecological connectivity among area in adjacent to Ping Yuen River under normal operations.
- 13.2.6 Vegetation and landscaping elements would be introduced to enhance the watercourses’ biodiversity and social connectivity for the drainage improvement works within TKL.
- 13.2.7 In additions, 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. The applicability and extent of solar energy will be evaluated during the detailed design stage.
- 13.2.8 The current ability of flood discharge of the existing watercourses is far to meet the latest standards for drainage & flood control performance and this situation would even get worse under the climate change parameters, e.g. wave run-ups and safety margin requirements under DSD’s Stormwater Drainage Manual. Hence, upgrading works at the existing watercourses of TKL04 and TKL05 is necessary to ensure adequate protection against extreme weather.

Avoidance / Minimization of Construction Disturbance on Ping Che Egretty

- 13.2.9 Ping Che Egretty is about 200m to the east of the Proposed Works Limit. As a precautionary measure, monthly egretty count during the breeding season within construction phase should be conduct at Ping Che Egretty by qualified ecologist to monitor for any abnormal changes in nesting ardeids due to indirect impacts from the construction activities.

13.3 Environmental-Friendly Design Recommended

- 13.3.1 The alignment of the proposed drainage channels will follow the original watercourses’ alignment as much as practicable to reduce encroaching into surroundings natural environment.
- 13.3.2 The Project will provide the opportunity to incorporate sustainable design and green features in the proposed drainage channels such as natural riverbed, biodiversity planting scheme, photovoltaic systems, woodland, wetland, etc.
- 13.3.3 After implementation of DIWTKL, the hydraulic performance of the proposed drainage channels is enhanced. This provides an opportunity to revitalise the existing

- watercourses which aims to promote water-friendliness, ecological enhancements, biodiversity and beautification. At most of the sections, scope of improvement works will include, provision of natural substrates riverbed, planting and provision of designated viewing points.
- 13.3.4 A holistic approach will be adopted to achieve the synergy in the planning of beautification works and ecological enhancement measures, as well as developing a water-friendly culture in the TKL area. The overall design will be further developed from on-going stakeholder engagement, co-creation workshops and detailed design.
- 13.3.5 Through reforming the alignment of the drainage channel, some area between the proposed drainage channels and the existing watercourses will be created. Once the improvement works is completed, it is anticipated that the isolated portion of existing watercourses will no longer have water supply in normal flow and so it is better for reformation instead of retention. In this point of view, those recreational areas are proposed to be developed in three main directions of woodland, wetland and community space.
- 13.3.6 In the wetland approach, artificial ponds will be constructed with building up a natural habitat. Meanwhile, an independent flow diversion system will be set up and constructed at the upstream of water sources to control the water supply to the destined ponds. Apart from environmental value, the ponds can also serve as an auxiliary water supply for the adjacent farms. Details of setting will be further explored in detail design stage.
- 13.3.7 In the woodland approach, native species trees and the transplanted trees will be planted to create ecological linkage with nearby habitats. The woodland can also provide extra foraging area for fauna especially birds which used to roost and nest in vicinity woodland.
- 13.3.8 In the community space approach, the community space will serve as a rural hub for the local residents in the neighbourhood. Display board and showcase may be installed to promote the ecological value and signature of TKL. Different kinds of leisure facilities may also be constructed for amenity and amusing.
- 13.3.9 In consideration of technically feasibility, natural substrates will be adopted to form the riverbed to promote benthic re-colonization. Also, micro-habitat diversity can be enhanced in the river by adding deflectors and instream refugia. Riffle- pool sequence will be developed to create stream's hydrological flow structure alternates from areas of relatively shallow to deeper water in order to recreate the natural habitat.
- 13.3.10 Offsite precast structures / modular integrated construction will be considered for the retaining structure as far as practicable to minimize environmental nuisance to nearby sensitive receivers during construction.

- 13.3.11 The Project will aim to minimize the generation of and maximize the reuse of surplus inert construction and demolition (C&D) materials, as far as practicable.
- 13.3.12 The Project will promote water-friendly culture by the provision of additional amenities, e.g. lookout platform, seating, etc. and blue-green infrastructural elements along the proposed drainage channels.

13.4 Environmentally Sensitive Areas Protected

- 13.4.1 With the consideration of various alternative design and construction methods, the Project has avoided or minimised the following environmental problems:
 - Avoidance of encroachment into recognized sites of conservation importance;
 - Avoidance of loss of trees and retaining trees as many as practicable
 - Minimisation of disturbance of ecological habitats
 - Minimisation of the number of environmental sensitive receivers to be affected

13.5 Key Environmental Problems Avoided and Compensation Areas Included

- 13.5.1 All recognized sites of conservation importance have been identified and avoided during the planning and design of the Project. No works will encroach into any recognized sites of conservation importance or important habitats.
- 13.5.2 To minimize noise disturbance to ardeids breeding season of Egret, i.e. March to August, noisy construction activities such as demolition and excavation works will avoid the above period.
- 13.5.3 *Sections 13.3* and *13.4* have summarized the key approaches adopted in the current proposal to avoid, minimize and mitigate environmental impacts. Some of these approaches have contributed to avoid a number of environmental problems and to protect a number of environmental sensitive areas. *Table 13.1* presents the key environmental problems that have been avoided and any sensitive areas protected by these approaches.

Table 13. 1 Summary of Key Environmental Problems Avoided and Sensitive Areas Protected

Design Approach	Environmental Problems Avoided and Sensitive Areas Protected
Avoid excavation works in the existing watercourses during March to August	<ul style="list-style-type: none"> • Adverse impacts on water quality would be avoided

Design Approach	Environmental Problems Avoided and Sensitive Areas Protected
Avoid noisy construction works during ardeids breeding season of Egret	<ul style="list-style-type: none"> Adverse impacts on ecology would be avoided
Adopt environmentally friendly construction methods, e.g. offsite precast structures / modular integrated construction	<ul style="list-style-type: none"> Adverse impacts on air quality, noise, water quality, waste and ecology would be avoided
Implementation of environmental monitoring and auditing system during construction phase	<ul style="list-style-type: none"> Ensure that all the recommended mitigation measures are properly implemented

13.6 Environmental Benefits of Environmental Protection Measures Recommended

13.6.1 Mitigation measures have been recommended to further reduce the environmental impacts during the construction and operational phases of the Project. Key recommended mitigation measures and associated benefits are summarized in *Table 13.2* below.

Table 13. 2 Key Recommended Mitigation Measures and Associated Environmental Benefits

EIA Aspects	Key Recommended Mitigation Measures	Associated Environmental Benefits
Air Quality	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> Implement relevant dust control measures stipulated in the <i>Air Pollution Control (Construction Dust) Regulation</i>, and good site practices. Regular maintenance of construction equipment deployed on-site should be conducted to prevent black smoke emission. Connect construction plant and equipment to mains electricity supply and avoid use of diesel generators and diesel-powered equipment as far as practicable to minimize the emission impact from these machineries on nearby residents. Proper storage, handling, transporting and timely disposal of odorous excavated materials. Maintain site cleanliness and tidiness of construction site and control on NRMMS. <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> No mitigation measures would be required. 	<ul style="list-style-type: none"> Protect air sensitive receivers by reducing construction dust emission and odour nuisance
Noise	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> Good site practices; 	<ul style="list-style-type: none"> Protect noise sensitive

EIA Aspects	Key Recommended Mitigation Measures	Associated Environmental Benefits
	<ul style="list-style-type: none"> • Use of quiet PME; • Adoption of temporary noise barrier or noise enclosure; • Scheduling of PME / construction activities. <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> • No mitigation measures would be required. 	<p>receivers by reducing construction and operational noise impacts</p>
Water Quality	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> • Adopt good site practices. • Implementing proper site management measures to control site runoff and drainage following the guidelines provided in ProPECC PN 1/94. • Use of containment structures and diversion channels to facilitate a dry or at least confined excavation within the watercourses. • Proper treatment of wastewater before discharge in accordance with WPCO. • Proper storage, handling and disposal of chemicals. • Response procedures for accidental spillage or leakage of chemicals • Water quality monitoring during construction. <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> • Maintenance for removal of excessive silt, vegetation, debris and obstruction. 	<ul style="list-style-type: none"> • Protect the downstream water sensitive receivers
Waste Management	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> • Avoidance, minimization, recycling, treatment and safe disposal of waste. • Good waste management and control practices to avoid generation of excessive amount of waste. • C&D materials should be excavated, transported and disposed of in a manner to minimize adverse environmental impacts. • Proper storage, handling and disposal of chemical waste. • Proper storage, recycling and disposal of general refuse. <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> • The screenings, silt materials and debris collected during operation and maintenance should be properly packed and transported to the designated landfill for disposal as soon as possible. • All chemical waste should be properly stored, labelled and removed by licensed waste collectors in accordance with Waste Disposal (Chemical Waste) (General) Regulation. 	<ul style="list-style-type: none"> • Minimize waste generation • Ensure proper handling and disposal of C&D material • Ensure proper handling of general refuse & chemical waste
Land Contamination	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> • A review of Contamination Assessment Plan (CAP) should be conducted to confirm whether the proposed site 	<ul style="list-style-type: none"> • Ensure proper handling contaminated

EIA Aspects	Key Recommended Mitigation Measures	Associated Environmental Benefits
	<p>investigation (SI) works are still valid and provide fine adjustments of the sampling locations and number of boreholes for Areas A, B1 and B2 prior to commencement of site investigation (SI) works. Supplementary CAP(s) for the Project Area, to document the re-appraisal, review the proposed sampling location(s) and outline the proposed sampling arrangement as well as testing parameters, should be submitted to EPD for review and agreement.</p> <ul style="list-style-type: none"> • SI works should be carried out according to the supplementary CAP(s) endorsed by EPD. Contamination Assessment Report (CAR) should be prepared to present the findings of the SI works. • If contamination is confirmed, the CAR will be accompanied by a Remediation Action Plan (RAP) to provide details of the remedial actions for the identified contamination. The CAR and RAP will be submitted to EPD for agreement. • Remediation Report (RR) will be prepared and submitted to EPD for endorsement prior to commencement of any proposed construction works upon completion of remediation works, if necessary. <p><u>Operation Phase</u> No mitigation measures would be required.</p>	<p>soil</p>
Ecology	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> • Avoid impact to recognized sites of conservation importance. • Consideration of alternative construction method to minimize ecological impact. • Careful phasing of construction activities. • Adopt mitigation measures for air, noise and water impacts. • Carry out update vegetation and aquatic surveys. • Translocation and transplantation of species of conservation importance prior to commencement of construction works. • Provision of animal corridors. <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> • No mitigation measures would be required. 	<ul style="list-style-type: none"> • Avoid impact to recognized sites of conservation importance • Minimize ecological impact • Mitigate ecological impact • Ecological enhancement opportunity
Fisheries	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> • Implement water quality mitigation measures. <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> • No mitigation measures would be required. 	<ul style="list-style-type: none"> • Protect fisheries resources
Cultural Heritage	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> • Implement mitigation measures such as pre-construction baseline condition survey and baseline vibration monitoring and evaluate on the necessary construction monitoring and structural strengthening measures for AMO's consideration 	<ul style="list-style-type: none"> • Protect close proximity graded historic buildings, new items for Grading

EIA Aspects	Key Recommended Mitigation Measures	Associated Environmental Benefits
	and provision of proper access and space. <u>Operation Phase</u> <ul style="list-style-type: none"> • No mitigation measures would be required. 	Assessment and built heritage items during construction
Landscape and Visual	<u>Construction Phase</u> <ul style="list-style-type: none"> • Minimise disturbance by implementing good site practices. • Erection of decorative construction hoarding. • Control of night time lighting. • Tree preservation, tree transplantation and compensatory tree planting. • Buffer planting. • Enhance river meander <u>Operation Phase</u> <ul style="list-style-type: none"> • Enhanced design to river sides / bed, streetscape, river crossing. • Use of natural bedding substrate. • Use of gabion mattress at river bed. • Adopt lighter colours for the structures to reduce the visibility • Street lightings to minimize light spill and glare. • Implementation of plantation scheme. 	<ul style="list-style-type: none"> • Enhance the landscape quality and visual appearance of the project

END OF TEXT