

**Agreement No. CE 54/2015 (EP)  
Lei Yue Mun Waterfront  
Enhancement Project –  
Environmental and Traffic Impact  
Assessment Studies -  
Investigation**

**Environmental Impact Assessment  
Executive Summary**

(Final)

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FIGURE 2.1 PROJECT LOCATION PLAN

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Appendix 2.1 Possible Locations of Proposed Landing Facility

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# 1 Introduction

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## 1.1 Background

1.1.1.1 Since 2000, the Tourism Commission (TC) has been implementing the Tourism District Enhancement Programme to enrich Hong Kong's appeal to visitors. Lei Yue Mun (LYM), being one of the most popular tourist attractions in Hong Kong for its pleasant seaside ambience and excellent seafood, had been identified to accord priority for improvement under the Programme. The TC completed several initial minor improvements along the LYM waterfront in 2003 and planned to further improve the facilities along the LYM waterfront area. The Lei Yue Man Waterfront Enhancement Project (the Project) consists of two components:

- a) Construction of a Public Landing Facility and Improvement Works to Existing Lookout Points and Viewing Platform; and
- b) Development of a Waterfront Promenade and Related Improvement Works.

1.1.1.2 As the Project will involve dredging operation less than 500m from the nearest boundary of an existing coastal protection area, it has been identified as a designated project according to Item C.12 (a) (vii) in Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO):

*"A dredging operation exceeding 500,000m<sup>3</sup> or a dredging operation which is less than 500m from the nearest boundary of an existing or planned coastal protection area".*

1.1.1.3 A project profile (No. PP-525/2015) was submitted to the Environmental Protection Department (EPD) on 23 June 2015 and an Environmental Impact Assessment (EIA) Study Brief (No. ESB-287/2015) for the Project was issued by EPD on 30 July 2015.

1.1.1.4 AECOM Asia Company Limited (AECOM) was commissioned by Civil Engineering and Development Department (CEDD) to undertake the EIA study for the Project under Agreement No. CE 54/2015 (EP) Lei Yue Mun Waterfront Enhancement Project – Environmental and Traffic Impact Assessment Studies – Investigation.

## 1.2 Purpose of this Executive Summary

1.2.1.1 This Executive Summary (ES) summarizes the key findings, recommendations and conclusions of the EIA Report for the Project. The ES contains the following information:

- Section 2 presents the purpose and nature of the Project, consideration of alternative options and construction methods for the Project;
- Section 3 presents the key findings of the environmental impact assessment;
- Section 4 describes the proposed environmental monitoring and audit for the Project; and
- Section 5 presents the conclusions.

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## 2 Project Description

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### 2.1 Purpose and Scope of Project

2.1.1.1 The Project aims primarily at providing more convenient access and better supporting facilities for tourists visiting LYM with a view to enriching their experience.

2.1.1.2 The Project comprises the following works elements:

Construction of a Public Landing Facility and Improvement Works to Existing Lookout Points and Viewing Platform (by CEDD)

- Construction of a promenade with a public landing facility (i.e. landing steps) capable of accommodating vessels with lengths up to 30m and draughts of about 3m;
- Construction of a breakwater;
- Dredging of seabed to provide sufficient water depth for navigation of vessels; and
- Improvement works for five existing lookout points and an existing viewing platform to improve their structural capacity.

Development of a Waterfront Promenade and Related Improvement Works (by Architectural Services Department (ArchSD))

- Construction of a carp-shaped platform and a pavilion with children's play area;
- Beautification works for the promenade, five lookout points and an existing viewing platform to improve their visual appearance; and
- Streetscape improvement works.

2.1.1.3 The location, site boundary and general layout of the Project are shown in **Figure 2.1**.

### 2.2 The Need and Benefits of the Project

2.2.1.1 The Project has been initiated by the TC to serve the purpose of enhancing LYM's attractiveness for tourism. Unanimous support has been obtained from Kwun Tong District Council (KTDC) and the local community of LYM, including local residents and business operators, who have been pressing for the early implementation of the Project over the past few years.

2.2.1.2 The Project would not only enhance LYM's attractiveness for tourism but also improve the general environment for the local residents. The provision of a waterfront promenade, carp-shaped platform and pavilion together with improvement of the existing lookout points and viewing platform would provide excellent vantage points for visitors/ local residents appreciating the harbour view within a leisurely environment. The landscaping and greening works which include planting of trees, shrubs, ground covers and climbers at the lookout points and viewing platforms, along the streets and around the pavilion, would create a pleasant environment and further enhance the landscape and visual quality of the LYM waterfront area. The living environment of the local community would also be improved with the provision of additional open space incorporating landscape features and leisure facilities for their enjoyment.

2.2.1.3 Apart from the aforementioned benefits to be brought from the Project, the Project also helps expedite the implementation of a new sewerage system for the Lei Yue Mun area under the Lei Yue Mun Village Sewerage project undertaken by Drainage Services Department (DSD). The implementation of a new sewerage system for the Lei Yue Mun area is scheduled to be carried out concurrently with the Project to address the hygiene and sewerage treatment concerns in the area,

would bring improvements to the water quality and environmental hygiene conditions. Such improvement would be a vital element in enhancing tourist appeal and would not only benefit the business sector but also the residents. The Project together with DSD's sewerage project will help promote a sustainable tourism growth for LYM, in particular in strengthening its competitiveness among other seafood dining destinations over the territory and improving the overall water quality and environmental hygiene conditions with a view to benefiting the visitors and local residents there.

## 2.3 Consideration of Alternative Options

2.3.1.1 Various alternatives and options with respect to the location and design of the Project were considered in detail in the EIA study. Highlights of the considerations given to alternatives and options are presented in the following paragraphs.

2.3.1.2 Taking into account factors including site conditions, marine safety, environmental considerations, operational requirements and convenience of access for visitors, three possible locations, namely the existing berthing (Location 1) and village jetty (Location 2) outside the Sam Ka Tsuen Typhoon Shelter and the waterfront on the south coast of LYM (Location 3), were identified for the landing facility (see **Appendix 2.1**). Among these locations, Location 3 was selected as the preferred option for the landing facility for the following reasons:

- It is conveniently located within a reasonable walking distance to the seafood restaurants and other attractions in LYM, thereby meeting the primary objective of the Project;
- It is located further away from Sam Ka Tsuen Typhoon Shelter, thereby minimizing impacts on the operation of the typhoon shelter;
- It would involve a smaller extent of squatters clearance and is located further away from air and noise sensitive areas, thereby minimizing impacts on the local community and environment; and
- The potential impact on water quality and marine ecology arising from the small-scale marine works is anticipated to be minor. With implementation of recommended mitigation measures, adverse impact on water quality and marine ecology would not be anticipated.

2.3.1.3 Different design layouts for the public landing facility were considered to arrive at the optimum option such that environmental impacts would be minimized without compromising its operational requirements. The preferred design option was selected with the following advantages:

- The length of the breakwater was reduced as far as practicable to allow more room for smaller boats to sail within the nearshore waters without compromising suitable berthing conditions at the public landing facility;
- The extent of underwater rock excavation/dredging was reduced as far as practicable to minimize the amount of excavated materials, impact on marine ecological habitats and associated wildlife, noise impacts on the nearby noise sensitive receivers and potential resuspension of fine and possibly contaminated materials from the seabed; and
- To avoid the impact on coral colonies, the dredging volume has been minimized as far as practicable, which will only affect about 0.05ha of the subtidal hard substrate habitat. To mitigate the impact, coral translocation and other best practicable mitigation measures will be implemented. A coral mitigation plan will be prepared subject to comment by the Agriculture, Fisheries and Conservation Department (AFCD) prior to implementation of the proposal.

## 2.4 Construction Method

2.4.1.1 Construction of the promenade with public landing facility and the breakwater will mainly involve dredging of seabed, underwater rock excavation, construction of sloping seawall, pile construction and construction of deck structures. The improvement works for the existing lookout points and the existing viewing platform will involve demolition of existing structures, installation of new concrete structures and backfilling. To minimise the potential environmental impacts, the following construction methods and sequences have been considered and adopted for the Project as far as possible:

- Minimise active marine works area by phased construction and adopting piled deck structure for the public landing facility and breakwater to reduce the amount of dredging works;
- Utilise pre-cast elements for construction of the public landing facility and breakwater as far as practicable to minimise in-situ construction works so as to reduce the construction period and environmental impacts, such as waste generation, noise and dust impacts;
- Incorporate ecological features such as seawall enhanced with rough texture and irregular pattern into the design of vertical seawall as far as practicable to provide shades and refuge for organisms. A submission on the detailed design of the ecological features to be adopted will be prepared subject to comment by the AFCD prior to the installation of the ecological features;
- Install silt curtain and restrict dredging operation to a production rate of no more than 100m<sup>3</sup> per hour to minimise the potential water quality impact (e.g. prevent the dispersion of suspended sediments) arising from the dredging works; and
- Implement good site practice and appropriate environmental mitigation/control measures.

## 2.5 Project Programme

2.5.1.1 The Project construction works are anticipated to commence in the third quarter of 2019 and be completed by the first quarter of 2023.

## 2.6 Interactions with Other Projects

2.6.1.1 Based on the best available information at the time of conducting the EIA study, sewerage improvement works would be carried out in the vicinity of the Project (i.e. within 500m of the boundary of the Project) by DSD from the third quarter of 2018 to the first quarter of 2023, namely "Lei Yue Mun Village Sewerage". The works for the Project may therefore potentially interact with the concurrent sewerage improvement works. The synchronizing of these projects will minimise the duration of environmental nuisance to the nearby residents.

2.6.1.2 The cumulative environmental impacts arising from this concurrent project during the construction and operation of the Project have been assessed in the EIA Report. To minimise the potential cumulative environmental impacts arising from these two projects, ArchSD/ CEDD will closely liaise with DSD on planning of the programme of various construction activities which include exploring the feasibility of entrusting the interfacing streetscape improvement works to DSD to avoid/ minimise repeated and concurrent construction works.

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# 3 Key Findings of the Environmental Impact Assessment

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## 3.1 Introduction

3.1.1.1 The EIA study has provided an assessment of the potential environmental impacts associated with the construction and operation of the Project based on the engineering design information available at this stage. The assessment has been conducted in accordance with the EIA Study Brief (No. ESB -287/2015) issued for the Project and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) and it covers the following aspects:

- Air quality impact;
- Noise impact;
- Water quality impact;
- Sewerage and sewage treatment implications;
- Waste management implications;
- Land contamination;
- Ecological impact (terrestrial and marine);
- Fisheries impact; and
- Landscape and visual impacts.

## 3.2 Air Quality Impact

### 3.2.1 *Key Assessment Scope and Key Criteria*

3.2.1.1 The air quality impact assessment was conducted in accordance with the requirements in Annexes 4 and 12 of the EIAO-TM and the requirements in Section 3.4.3 and Appendix A of the EIA Study Brief. In accordance with the EIA Study Brief, the study area is defined by a distance of 500m from the boundary of the Project site, with consideration to be extended to include major existing, planned and committed air pollutant emission sources that may have a bearing on the environmental acceptability of the Project.

### 3.2.2 *Construction Phase*

3.2.2.1 The Project would involve construction of a promenade with a public landing facility and a breakwater; structural improvement works for five existing lookout points and an existing viewing platform; construction of a carp-shaped platform and a pavilion with children play area; beautification works for the promenade, five existing lookout points and an existing viewing platform; and streetscape improvement works. Potential air quality impacts from the construction works of the Project would mainly arise from construction dust from demolishing of existing structures, excavation, concreting works and backfilling works. Considering these construction activities would be limited scale, localised and in phasing as well as the construction period would be short, significant dust emission is not anticipated and could be well controlled through the dust suppression measures as stipulated in the Air Pollution Control (Construction Dust) Regulation (Cap. 311R) of Air Pollution Control Ordinance (APCO) (Cap. 311) and good site practices. Cumulative dust impact contributed by this Project and the concurrent project, Lei Yue Mun Village Sewerage, is also not anticipated. With the implementation of sufficient dust suppression measures and good site practices (e.g. regular watering of exposed site surfaces and tarpaulin covering of all dusty vehicle loads transported to, from and between site locations, etc), adverse

construction dust impact due to the construction of the Project is not anticipated. Requirements of Air Pollution Control (Construction Dust) Regulation and EPD's Recommended Pollution Control Clauses for Construction Contracts are proposed to be incorporated into the future contract document.

3.2.2.2 Odour impact is not anticipated from the dredging activities in view of the low level of acid-volatile sulphide (AVS) (<reporting limit of 1.00 mg/kg) in the sediment. Therefore, adverse odour impact from dredged sediment is not anticipated. Nonetheless, the following good site practices are recommended to minimize the potential odour emission during dredging and transportation of dredged sediment:

- Loading of the dredged sediment to the barge should be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water;
- Any dredged sediment should be stored in enclosed tanks or properly covered as far as practicable to minimise its exposed area during its temporary storage and should be placed as far away from the identified air sensitive receivers (ASRs) as practically possible;
- Dredging rate should be controlled carefully;
- The dredged sediment is suggested to be delivered off-site for disposal every day as far as possible to avoid the dredged sediment for storage at the barge overnight;
- Dredged sediment placed on marine vessel for disposal should also be properly covered during transportation; and
- The dredging activities should be conducted during non-summer season as far as possible.

### **3.2.3 Operation Phase**

3.2.3.1 During operation phase, marine traffic would be induced from the Project. Considering that the induced marine traffic would be minor, adverse air quality impacts on the nearby ASRs is not expected. Nonetheless, potential cumulative air quality impacts due to the induced and other marine emission, industrial emission and vehicular emission within the study area during operation phase of the Project have been assessed. In accordance with the Air Quality Objectives (AQO), Nitrogen Dioxide (NO<sub>2</sub>), Sulphur Dioxide (SO<sub>2</sub>), Respirable Suspended Particulates (RSP) and Fine Suspended Particulates (FSP) are the key criteria pollutants for assessment of the air quality impact for this Project. The results indicated that the predicted cumulative air pollutants concentrations (hourly NO<sub>2</sub>, annual NO<sub>2</sub>, 10-min SO<sub>2</sub>, daily SO<sub>2</sub>, daily FSP, annual FSP, daily RSP and annual RSP) at all ASRs would comply with the AQO. No adverse air quality impact is anticipated and no mitigation measure is deemed necessary.

3.2.3.2 No odour nuisance from the operation of the Project is anticipated as there is no odour emission source arising from the Project and no other odour emission source is found within the Project area from odour patrol. Similar to the capital dredging during construction phase, odour impact is not anticipated from the maintenance dredging. Nevertheless, good site practices should be adopted to minimize any potential odour emission during dredging and transportation of dredged sediment.

## **3.3 Noise Impact**

### **3.3.1 Key Assessment Scope and Key Criteria**

3.3.1.1 The noise impact assessment was conducted in accordance with the requirements set out under Annexes 5 and 13 of the EIAO-TM, and Section 3.4.4 and Appendix B of the EIA Study Brief. In accordance with the EIA Study Brief, the study area included areas within 300m from the boundary of the Project site. The study area shall be expanded to include noise sensitive receivers (NSRs) at distances over 300m from the Project boundary and associated works if those NSRs are also affected by the construction of the Project.

### **3.3.2 Construction Phase & Operation Phase**

- 3.3.2.1 Noise impacts would be resulted from the proposed construction activities with the use of powered mechanical equipment (PME). The assessment results indicated that the unmitigated noise levels at the representative NSRs would be 55 – 96 dB(A). With the implementation of all practicable noise mitigation measures, including the use of quiet PME and deployment of construction noise barriers and portable noise enclosure, the predicted noise levels at all the representative NSRs would comply with the EIAO-TM noise criteria. Hence, no unacceptable noise impact arising from the construction of the Project is anticipated. The mitigated cumulative construction noise impact would exceed the criteria at five representative NSRs (four existing residential uses and one existing performing arts centre cum educational institution). Notwithstanding this, the exceedance would mainly be caused by a concurrent project and transient in nature. The Contractor would liaise closely with the affected NSRs and notify them before commencing the construction activities of concern and should strive to complete the works in the shortest time possible. In addition, to minimise nuisance to nearby educational institution and seafood restaurants, noisy construction works would not be carried out during the examination period of the educational institution and the peak business hours of the restaurant. Hence, adverse residual construction noise impact is not anticipated.
- 3.3.2.2 The Project is not a noise pollution source and therefore noise impact arising from the project during operation phase is not anticipated.

## **3.4 Water Quality Impact**

### **3.4.1 Key Assessment Scope and Key Criteria**

- 3.4.1.1 The water quality impact assessment was conducted in accordance with the requirements in Annexes 6 and 14 of the EIAO-TM and the requirements in Section 3.4.5 and Appendix C of the EIA Study Brief. According to the EIA Study Brief, the study area for the water quality impact assessment included areas within 500 m from the boundary of the Project site and covered Victoria Harbour (Phase one) Water Control Zone (WCZ), Junk Bay WCZ and Eastern Buffer WCZ under the Water Pollution Control Ordinance (WPCO).

### **3.4.2 Construction Phase**

- 3.4.2.1 During construction phase, the key issues associated with the land-based construction activities would be the potential release of construction site run-off from surface work areas, wastewater from general construction activities, accidental spillage and sewage from construction workforce. Minimization of water quality deterioration could be achieved through implementing adequate mitigation measures such as minimising surface run-off and implementing measures to abate pollutants at source. Regular site inspections should be undertaken routinely to inspect the construction activities and work areas in order to ensure the recommended mitigation measures are properly implemented. No unacceptable residual water quality impact is therefore anticipated.
- 3.4.2.2 For marine construction activity, the key source of potential water quality impact is associated with dredging and filling activities, which have potential to release contaminants and increase suspended solid levels in marine water. The potential water quality impacts have been quantitatively assessed using the Delft3D Model, which has identified that the potential water quality impacts from suspended solids and sedimentation rate elevation as well as the contaminants release would be confined within 100m of the Project site. With the adoption of the recommended mitigation measures including use of closed grab dredger, restriction of dredging production rate (no more than 100m<sup>3</sup> per hour) and deployment of silt curtains, no unacceptable residual water quality impact would be resulted.

### **3.4.3 Operation Phase**

3.4.3.1 The key source of potential water quality impacts under the operation phase will be the change in hydrodynamic regime, sewage effluent from the increased touristic and commercial activities, surface run-off associated with the new paved areas and maintenance dredging. Since LYM waterfront was predicted to maintain its good flushing ability, no adverse water quality impact is thus attributed to the establishment of landing facility and breakwater. It is expected that water quality would be improved upon the completion of the concurrent project (i.e. Lei Yue Mun Village Sewerage). For the potential impacts of surface run-off, with proper implementation of the recommended mitigation measures such as proper drainage system design, provision of pollution control devices and adoption of good management practice, no unacceptable water quality impact is anticipated. During maintenance dredging, with proper implementation of the recommended mitigation measures including use of closed grab dredger, restriction of dredging production rate (no more than 100m<sup>3</sup> per hour) and deployment of silt curtains, no unacceptable water quality impact is anticipated.

## **3.5 Sewerage and Sewage Treatment Implications**

### **3.5.1 Key Assessment Scope and Key Criteria**

3.5.1.1 The assessment for sewerage and sewage treatment implications was conducted in accordance with Section 3.4.6 and Appendix D of the EIA Study Brief and the criteria and guidelines for evaluating and assessing impacts on the public sewerage, sewage treatment and disposal facilities as stated in Annex 14 of the EIAO-TM.

### **3.5.2 Construction Phase**

3.5.2.1 During the construction phase, impact on the existing sewerage system arising from the Project is not anticipated.

### **3.5.3 Operation Phase**

3.5.3.1 According to the latest construction programme, no programme gap is envisaged between this Project and the Lei Yue Mun Village Sewerage project to be undertaken by DSD. Hence, any sewerage plug-in and additional sewage arising from the increase in visitors will be discharged into the newly constructed sewerage system.

3.5.3.2 The existing Kwun Tong Preliminary Treatment Works has adequate treatment capacity to handle the sewage flow generated from the visitors in Lei Yue Mun after the completion of the waterfront enhancement works. Hence, no adverse sewage impact arising from the operation of the Project is anticipated.

## **3.6 Waste Management Implications**

### **3.6.1 Key Assessment Scope and Key Criteria**

3.6.1.1 The waste management implications assessment was conducted based on the criteria and guidelines in Annexes 7 and 15 of the EIAO-TM and Section 3.4.7 and Appendix E-1 of the EIA Study Brief.

### **3.6.2 Construction Phase**

- 3.6.2.1 During the construction phase, the major waste types generated from the Project include marine sediment, construction and demolition (C&D) materials, general refuse from workforce and chemical waste from the maintenance of construction plant and equipment.
- 3.6.2.2 The total volume of dredged sediment generated from the dredging works is estimated to be approximately 10,875 m<sup>3</sup>. Based on the results of the chemical and biological screening, approximately 9,740 m<sup>3</sup> of sediment is suitable for Type 1 – Open Sea Disposal and 1,135 m<sup>3</sup> of sediment requires Type 2 – Confined Marine Disposal with reference to ETWB TCW No. 34/2002. With the implementation of the recommended mitigation measures such as avoidance of stockpiling of contaminated sediments as far as possible, covering the dredged sediment on trucks or barges, equipping barge transporting sediments with tight fitting seals, and off-site disposal of dredged sediment in accordance with the requirements of ETWB TCW No. 34/2002, no adverse waste impacts would be expected from dredging, transportation and disposal of marine sediment.
- 3.6.2.3 The total quantity of C&D materials generated from the Project is estimated to be approximately 3,360 m<sup>3</sup>, of which approximately 2,890 m<sup>3</sup> would be inert materials and approximately 470 m<sup>3</sup> would be non-inert materials. It is also expected that chemical waste (a few hundred litres per month) and general refuse (approximately 52 kg per day) would be generated from the Project as well as floating refuse (approximately 2.7 m<sup>3</sup> per year) would be collected from the newly constructed seawall during the construction phase. These identified wastes would be properly handled, transported and disposed of using the recommended methods and in accordance with the relevant legislations and guidelines, and good site practices would be followed. Hence, adverse waste impacts would not be expected.

### **3.6.3 Operation Phase**

- 3.6.3.1 During operation phase, recreational activities from visitors would generate about 107 kg of general refuse per day. With the provision of sufficient quantity of recycling bins and general refuse bins and proper handling, no adverse waste impact would be expected.
- 3.6.3.2 Approximately 3,056 m<sup>3</sup> marine sediment would be dredged under maintenance dredging at about every 5 to 10 years. The maintenance dredging would require sediment sampling and testing in accordance with the requirements of ETWB TCW No. 34/2002 for proper disposal of the dredged sediment. With implementation of the recommended mitigation measures such as avoidance of stockpiling of contaminated sediments as far as possible, covering the dredged sediment on trucks or barges, equipping barge transporting sediments with tight fitting seals, and off-site disposal of dredged sediment in accordance with the requirements of ETWB TCW No. 34/2002, no adverse waste impact would be anticipated.

## **3.7 Land Contamination**

### **3.7.1 Key Assessment Scope and Key Criteria**

- 3.7.1.1 The land contamination assessment was conducted following the criteria and guidelines in sections 3.1 and 3.2 of Annex 19 of the EIAO-TM and the requirements in Section 3.4.8 and Appendix E-2 of the EIA Study Brief.

### **3.7.2 Construction and Operation Phases**

- 3.7.2.1 Based on the findings of site appraisal (i.e. desktop study and site inspection) within the site boundaries of construction works, no potentially contaminating activities were identified. Therefore, adverse land contamination impact arising from the Project would not be anticipated.

## **3.8 Ecological Impact (Terrestrial and Marine)**

### **3.8.1 Key Assessment Scope and Key Criteria**

3.8.1.1 The ecological impact assessment was conducted following the criteria and guidelines in Annexes 8 and 16 of the EIAO-TM and the requirements in Section 3.4.9 and Appendix F of the EIA Study Brief. Habitat evaluation and impact assessment followed the requirements stated in EIAO Guidance Notes 6/2010, 7/2010, 10/2010, 11/2010 and other relevant legislations and guidelines. According to the EIA Study Brief, the study area included areas within 500m from the boundary of the Project site and any other areas likely to be impacted by the Project.

### **3.8.2 Construction and Operation Phases**

3.8.2.1 Literature review and ecological field surveys have been conducted. Eight terrestrial habitats were identified within the study area including mixed woodland, plantation, shrubland, grassland, developed area, natural watercourse, intertidal habitat and drainage channel. Marine habitats within the study area include subtidal hard substrate and soft bottom habitats, and intertidal habitats (i.e. rocky shore, sandy shore and artificial seawall). The ecological values of the identified habitats are rated as low or low to moderate. No sites of conservation importance would be directly affected.

3.8.2.2 No plant species of conservation importance were recorded within the study area and no direct impact on terrestrial species of conservation importance would be anticipated. The proposed land-based works would only affect developed area near the seafront. The proposed marine-based works would directly affect marine habitats, including subtidal hard substrate habitats (0.05 ha), rocky shore (0.03 ha), sandy shore (0.02 ha) and artificial seawall (40 m); as well as causing temporary loss of subtidal soft bottom habitat (0.32 ha) and artificial seawall (85 m). All temporarily affected habitats would be reinstated. Given the small sizes and low ecological values of the affected habitats, the direct impacts to habitats are anticipated to be minor.

3.8.2.3 Direct impact to coral colonies of low abundance which are dominated by locally common octocoral species is anticipated. Translocation and/or other best practicable mitigation measures would be implemented to minimize the direct impact of affected coral colonies. A detailed Coral Mitigation Plan, including description of the methodology of coral translocation and/ or other best practicable mitigation measures identified with reference to recently approved EIA project, would be submitted to the AFCD for comment before commencement of project construction. Ecological features such as seawall enhanced with rough texture and irregular pattern would be incorporated into the design of vertical seawall as far as practicable to increase the surface complexity of the seawall to provide shades and refuge for organisms. A submission on the detailed design of the ecological features to be adopted will be prepared subject to comment by the AFCD prior to the installation of the ecological features. During operation phase, maintenance dredging would be required at about every 5 to 10 years to maintain sufficient water depth for safe navigation of vessels. During both capital and maintenance dredging operations, mitigation measures to control water quality impact are recommended (e.g. use of close grab dredger, restriction of dredging rate to no more than 100m<sup>3</sup> per hour and deployment of silt curtain) to confine the sediment plume within the proposed dredging area and to minimise indirect impact to the nearby intertidal and subtidal flora and fauna. With implementation of the recommended mitigation measures, the residual direct impact to coral is considered acceptable. During operation phase, it is recommended to carry out coral survey to review and update the conditions of corals in the dredging area and its vicinity prior to each maintenance dredging. Subject to the findings of the coral survey, the impact on corals due to maintenance dredging will be reviewed and mitigation measures will be proposed as necessary.

3.8.2.4 Construction site runoff, noise, deteriorated water quality and other disturbance impacts resulting from the proposed marine-based and land-based works would have potential indirect impact to the nearby natural habitats (e.g. intertidal and subtidal habitats, mixed woodland and shrubland, etc.), wildlife, as well as fauna species of conservation importance. With the proper implementation

of mitigation measures such as good site practice and water quality impact control measures, no adverse indirect ecological impact to nearby natural habitats, wildlife, and fauna species of conservation importance would be expected from the Project.

### **3.9 Fisheries Impact**

#### **3.9.1 Key Assessment Scope and Key Criteria**

3.9.1.1 The fisheries impact assessment was conducted following the criteria and guidelines in Annexes 9 and 17 of the EIAO-TM and the requirements in Section 3.4.10 and Appendix G of the EIA Study Brief. As per the EIA Study Brief, the study area for fisheries impact assessment included areas within 500m from the boundary of the Project and associated works.

#### **3.9.2 Construction and Operation Phase**

3.9.2.1 The potential fisheries impacts due to the construction and operation of the Project are considered minor in view of the small scale of the works. About 0.05 ha permanent loss and 0.6ha temporary loss of fishing ground would be resulted due to construction of the project. Indirect impact on fisheries due to elevation in suspended solids level, depletion of dissolved oxygen and release of contaminants would be temporary. With the implementation of the recommended mitigation measures such as adoption of silt curtain, reduced dredging rate, and use of closed grab dredger, adverse impact on water quality and fisheries is not anticipated.

### **3.10 Landscape and Visual Impacts**

#### **3.10.1 Key Assessment Scope and Key Criteria**

3.10.1.1 The landscape and visual impact assessment was conducted based on the criteria and guidelines in Annexes 10 and 18 of the EIAO-TM, the EIAO Guidance Note No. 8/2010 and Section 3.4.11 and Appendix H of the EIA Study Brief. According to the EIA Study Brief, the study area for the landscape impact assessment included areas within 500m from the boundary of the Project site, while the assessment area for the visual impact assessment shall be defined by the visual envelope of the Project.

#### **3.10.2 Construction Phase**

3.10.2.1 During the construction phase, the key sources of landscape and visual impacts would include construction of the public landing facility, dredging works, enhancement works of sitting out area and footpath and foundation work at lookout points. All existing trees within the proposed works boundary would be preserved as far as possible. The work areas for the Project are generally at ground level. The visual experience of the visual sensitive receivers (VSRs) would not be significantly changed. With the implementation of mitigation measures including preservation of existing trees, control of night-time lighting glare, erection of decorative screen hoarding, careful management of construction activities and facilities, provision of buffer zone (a minimum distance of about 10m) between the CPA and dredging works boundary, deployment of silt curtains and close supervision of dredging works, no unacceptable residual landscape and visual impacts from construction of the Project would be anticipated.

#### **3.10.3 Operation Phase**

3.10.3.1 During the operation phase, the aboveground/above-sea-level structures/hardscape features such as the pavilion, the breakwater and the promenade with public landing facility, and maintenance dredging works would be the key sources of landscape and visual impacts. Nevertheless, the height of all the proposed aboveground/above-sea-level structures/hardscape

features would not be prominent (not higher than 5m) and the maintenance dredging works would be limited scale and infrequent (interval of about every 5 to 10 years). With the recommended mitigation measures including provision of buffer zone between the CPA and dredging works boundary, deployment of silt curtains and close supervision of dredging works, adoption of aesthetic design for the aboveground/above-sea-level structures/hardscape features, provision of buffer and amenity planting to fit into the local landscape and visual context, and reinstatement of temporarily disturbed landscape areas, the overall landscape and visual impacts of the Project would be beneficial.

# 4 Environmental Monitoring and Audit

## 4.1 Introduction

4.1.1.1 Environmental Monitoring and Audit (EM&A) requirements for air quality, noise, water quality, sewerage and sewage treatment, waste management, land contamination, ecology, fisheries, and landscape and visual impacts were identified and recommended, which are detailed in the EM&A Manual and summarized in **Table 4.1** below. On-site monitoring and auditing is recommended to check against the implementation of recommended mitigation measures in the construction and operation phases.

**Table 4.1 Summary of EM&A Requirements**

Environmental Aspect	Environmental Monitoring and Audit	
	Construction Phase	Operation Phase
Air Quality	✓	X
Noise	✓	X
Water Quality	✓	✓ <sup>(1)</sup>
Sewerage and Sewage Treatment	X	X
Waste Management	✓	X
Land Contamination	X	X
Ecology	✓	✓ <sup>(1)</sup>
Fisheries	X	X
Landscape and Visual	✓	X

Note:

(1) EM&A to be conducted during maintenance dredging operation.

## 4.2 Air Quality Impact

4.2.1.1 With the implementation of dust suppression measures stipulated in Air Pollution Control (Construction Dust) Regulation, good site practice and proposed mitigation measures, no adverse dust and odour impact arisen from the construction works would be expected at the ASRs in the vicinity of the site. No air quality monitoring is therefore considered necessary. Weekly site audit is recommended to be conducted during construction phase in order to ensure the proposed mitigation measures are implemented in an appropriate manner and are effective.

4.2.1.2 Since no adverse air quality impact is anticipated during the operation phase of the Project, monitoring and audit is deemed unnecessary.

## 4.3 Noise Impact

4.3.1.1 Noise monitoring is recommended for the construction phase of the Project to ensure compliance with the daytime construction noise criterion. The implementation of the recommended mitigation measures for daytime construction activities should also be audited weekly as part of the EM&A programme. Construction noise levels will be measured in terms of the 30-minute A-weighted equivalent continuous sound pressure level (Leq) for the time period between 0700 and 1900hours before and during the construction period.

4.3.1.2 Baseline monitoring will be conducted to determine the existing noise level prior to commencement of construction works. Construction noise monitoring will be carried out weekly at representative noise monitoring stations (residential uses). Action Level or Limit Level for the monitoring is considered to be triggered in case of the receipt of a noise complaint or an exceedance of the noise criteria stipulated in the EIAO-TM. If noise exceedance is recorded,

additional noise monitoring will be conducted in accordance with the Event and Action Plan. The monitoring shall be considered complete if the exceedance has been rectified or proved to be from sources other than the Project construction works.

#### **4.4 Water Quality Impact**

4.4.1.1 Water quality monitoring and audit is considered necessary to ensure that the recommended mitigation measures are implemented properly throughout the construction phase and during maintenance dredging in operation phase. Weekly site audit is recommended to be conducted during construction phase in order to ensure the proposed mitigation measures are implemented in an appropriate manner and are effective. Marine water quality monitoring is recommended during both capital and maintenance dredging works of the Project. Monitoring parameters will include dissolved oxygen (DO), turbidity and suspended solids (SS). Baseline monitoring for marine water quality will be carried out 3 days per week for 4 weeks prior to the commencement of marine works of the Project. Impact monitoring will be undertaken 3 days per week during the capital and maintenance dredging works of the Project.

#### **4.5 Sewerage and Sewage Treatment Implications**

4.5.1.1 Since adverse sewerage impact from the Project would not be anticipated, no monitoring or audit is considered necessary.

#### **4.6 Waste Management Implications**

4.6.1.1 The contractor will formulate waste management measures on waste minimization, storage, handling and disposal in a Waste Management Plan as part of Environmental Management Plan in accordance with the Environment, Transport and Works Bureau Technical Circular (Works) No. 19/2005. Weekly site audit should be carried out to check the implementation status of the recommended waste management measures throughout construction period.

4.6.1.2 During the operational phase of the Project, with proper implementation of the proposed mitigation measures, adverse waste impact arising from the Project is not expected. No monitoring or audit is required.

#### **4.7 Land Contamination**

4.7.1.1 No land contamination impact would be anticipated from the Project, therefore, no monitoring or audit is required.

#### **4.8 Ecological Impact (Terrestrial and Marine)**

4.8.1.1 Implementation of the recommended mitigation measures will be audited monthly throughout the construction phase.

4.8.1.2 Prior to the marine-based construction works, a detailed coral mapping is recommended to identify the exact number of coral colonies (both movable and non-movable) within the affected area. Surveys of finding a suitable recipient site are also recommended. The coral mitigation is recommended to be undertaken during the winter season (November-March) in order to avoid disturbance to the spawning period (i.e. July to October) of the affected coral colonies. A detailed Coral Mitigation Plan, including description of methodology for coral translocation (e.g. pre-translocation survey, identification / proposal of coral recipient site) and/or other best practicable mitigation measures, and post-mitigation monitoring programme, should be prepared with reference to recently approved EIA and submit to the AFCD for comment before commencement of the project construction. All the coral mitigation exercises should be conducted by experienced marine ecologist(s) with at least 5 years relevant experience prior to commencement of coral

mitigation. During operation phase, it is recommended to carry out coral survey to review and update the conditions of corals in the dredging area and its vicinity prior to each maintenance dredging. Subject to the findings of the coral survey, the impact on corals due to maintenance dredging will be reviewed and mitigation measures will be proposed as necessary.

## **4.9 Fisheries Impact**

4.9.1.1 Since no unacceptable fisheries impact would be anticipated during the construction and operation phases of the Project, no specific monitoring or audit for fisheries is considered necessary.

## **4.10 Landscape and Visual Impacts**

4.10.1.1 The design, implementation and maintenance of the proposed landscape and visual mitigation measures should be checked to ensure that they are incorporated in the detailed design. Implementation of the applicable recommended mitigation measures should be checked at least once every two weeks through the site audit programme during the construction phase. No specific monitoring or audit for landscape and visual is considered necessary during operation phase.

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## 5 Conclusion

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- 5.1.1.1 The Lei Yue Mun Waterfront Enhancement Project, which includes construction of a public landing facility and improvement works to existing lookout points and viewing platform, as well as development of a waterfront promenade and related improvement works, aims primarily at providing more convenient access and better supporting facilities for tourists visiting LYM with a view to enriching their experience. The Project would not only enhance LYM's attractiveness for tourism but also improve the general environment for the local residents.
- 5.1.1.2 The EIA Report provides information on the nature and extent of the potential environmental impacts including air quality, noise, water quality, sewerage and sewage treatment, waste management, land contamination, ecology, fisheries, landscape and visual, that may arise during the construction and operation of Lei Yue Mun Waterfront Enhancement Project. Mitigation measures have been proposed, where necessary and appropriate, to ensure full compliance with environmental legislation and standards.
- 5.1.1.3 The EIA Report has concluded that the Project would be environmentally acceptable with no unacceptable residual impacts on the nearby environmental sensitive receivers with the implementation of the proposed mitigation measures during its construction and operation. The schedule of mitigation measures recommended to be implemented has been provided in the EIA Report and an EM&A programme has been recommended to check the proper implementation of these measures and monitor environmental compliance of the Project.

## About AECOM

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