8. SUMMARY OF ENVIRONMENTAL OUTCOMES

8.1 Introduction

8.1.1 The major sensitive areas within the study area include residential buildings and institutional uses. With the implementation of the proposed mitigation measures, no insurmountable adverse environmental impacts would be expected at the air, noise, waste and water quality sensitive receivers during both construction and operation phases.

8.1.2 Benefits of Schemes H, I, J and Interim Q are stated above in **Sections 2.1.2 to 2.1.5**. In particular, the road improvement works along the Canton Road corridor will bring about the following benefits upon completion:

- Traffic flow capacity of Canton Road in both directions will be increased by about 20% for the signal junction of Canton Road / Austin Road / Austin Road West
- The overall traffic delay for signal junctions along the Canton Road corridor between Jordan Road and Austin Road will be reduced by about 15%
- Traffic queues will be able to disperse along Canton Road after each signal cycle instead of being queued up and blocking back traffic from upstream junctions.

  The above traffic benefits will lead to environmental benefits. Improvement in traffic will lead to reduction in vehicular emission, which will contribute to a better air quality in the region. In addition, a smoother traffic flow will reduce the noise generated from the vehicles.

8.1.3 Without the Project, the existing traffic congestion problems in the area at the existing major road corridors including Jordan Road , Ferry Street, Canton Road , Lin Cheung Road, Wui Cheung Road and Austin Road cannot be relieved. In addition, the condition will be worsen with the additional traffic arising from developments in the WKRD. Severe traffic congestion will lead to adverse air quality impact as the vehicles are in idling condition in traffic congestion. The noise would also be increased.

8.1.4 The project will relieve the traffic congestion in the WKRD area by providing new traffic lanes linking the existing roads and improving the existing road junctions that have severe traffic congestion during peak hours at present. It will reduce traffic congestion and therefore reduce deterioration of air quality and noise environment in the vicinity. The project would bring improvements in air quality and noise environment from existing road networks and the overall quality of the ambient environment, especially for the residential premises within and in the vicinity of the WKRD area. In this regard, it is anticipated that the future air and noise environment will be improved in the presence of the project.

8.2 Approaches Adopted to Minimize Environmental Impact

8.2.1 Avoidance of environmental impact has been one of the key considerations throughout the entire project development and design in which various environmentally friendly options and design were considered and incorporated. Given the highly urbanized nature of the areas in the vicinity, there are a large number of residential premises distributed within the study area. In this case, we shall formulate our design with the aim to achieve the following:

- Optimize the foundation works and minimize the excavation to avoid the

excessive production of excavated materials;

- Appropriate phasing of works to minimize the construction impact; and
- Maximize the reuse of material generated on site;
- Good site practice to minimize the waste production and water pollution due to the site surface run-off; and
- Provision of 410 compensatory trees to minimize the landscape and visual impact.

Schemes H and I will be constructed cast-in-situ, which is a more environmental friendly option than the pre-cast method in this Project. The cast-in-situ method will affect less traffic lanes during operation and will reduce the implementation programme from 3 years to 23 months (refer to **Section 2.2.2(c)** for the engineering reasons).

With less traffic lanes affected and shorter implementation programme, the environmental impacts on air, noise, water, waste, visual and landscape are all reduced.

8.2.2 The foundation types of all the viaducts will be pre-bored H-piles instead of large diameter bored piles. Less traffic lanes will need to be closed in temporary traffic arrangement due to the smaller piling machines. With reduced traffic impacts, there will be a reduction in air and noise impacts from vehicles in traffic jams.

8.2.3 In selecting temporary support structures for excavation, options with less waste impact such as pipe pile wall instead of diaphragm wall will be chosen, provided that such options are feasible and practicable.

8.2.4 The proposed works involve providing new traffic lanes to link up the existing roads and structures. Similar structural configurations and built-forms to the existing roads and structures will be adopted to blend in with the surroundings, so as to reduce the visual impacts. Landscape works will be proposed in planting areas and climbers will be proposed on concrete piers to reduce the landscape impacts.

8.3 Approaches Adopted to Mitigate Environmental Impacts

8.3.1 It can be seen that the road works has adopted the principle to avoid the environmental impacts. Where the impacts could not be avoided, efforts have been deployed to minimize the impacts as much as practicable. Notwithstanding this, the EIA has recommended a package of mitigation measures that would be required. The Environmental Mitigation Implementation Schedule as indicated in **Appendix 8.1** has clearly stated the details of such mitigation measures, the timeframe and the implementation agents.

Some of the key mitigation measures are discussed below.

8.4 Air Quality Impact

8.4.1 During the construction phase, the extents of temporary works areas that may generate fugitive dust have been reduced to minimize the dust impact as much as practicable. However, given the relatively short separation with some of the receivers in the urban context, dust suppression measures such as frequent watering would be implemented to minimize the potential construction dust impact and comply with the regulatory requirements.

8.4.2 In addition, other dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices would be in place to further

minimize the construction dust impact. Some examples of these good site practices include:

- Any excavated dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24hours of the excavation or unloading.
- Any dusty material remaining should be wetted with water and cleared from road surfaces.
- The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle.
- Where practicable, vehicle washing facilities should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.

8.4.3 Sensitivity test indicated that the year 2016 was the worst-case assessment year within 15 years of the commencement of the Project. The potential impacts arising from the background pollutant levels within and adjacent to the Project site, together with vehicle emissions from open road networks, portal emissions from the WHC, and the proposed underpasses/landscape decks of Road Work at West Kowloon have been assessed. Based on the modeling results, the vehicular emission will not exceed the air quality objectives at ASRs for all modeled parameters in the operational phase. No mitigation measure is required

8.5 Noise Impact

8.5.1 For the construction phase, the predicted unmitigated construction noise levels at most of the NSRs are found exceeding the daytime noise criteria. The main source of the noise is expected to be the use of plant equipment. The following mitigation measures are considered to reduce the noise impact:

- Conduct regular maintenance of plant equipment and throttle down unused equipment
- Locate and direct mobile noisy equipment away from NSRs
- Apply silencer or muffler on plant equipment
- Make good use of appropriate structures for noise screening
- Use Quality Powered Mechanical Equipment (QPME) which produces lower noise level
- Erect noise barriers of 3m height to shed large plant equipment
- Carry out regular inspection to audit the implementation of mitigation measures
- Carry out noise quality monitoring throughout the construction period.

8.5.2 However, after the implementation of the mitigation measures, the cumulative construction noise level at NSR YCS and LCMS would still exceed the noise criteria during examination period. However, the impacts are temporary and reversible. It is also possible to schedule noisy works outside the examination period for education

institutes. Construction noise monitoring will be carried out to assess noise impacts to these receivers, and telephone hotline will be provided to service complaint. Therefore the residual impact exceeding the construction noise criteria has been reduced to minimal.

8.5.3 For the operational phase, the traffic noise contributed from the proposed new roads is considered insignificant. No mitigation measure is required.

8.6 Water Quality Impact

8.6.1 Impact on water quality during the construction phase and operation phase are investigated and the respective mitigation measures are recommended. The key issue from the proposed works would be the potential release of sediment-laden water from surface works and open-cut excavation. To minimise the deterioration of water quality good site practices such as temporary drainage, dike or embankment for flood protection, efficient silt removal facilities, covering exposed areas with tarpaulin, vehicular washing facilities at construction site exits, oil interceptors etc would be implemented.

8.6.2 Furthermore the following mitigation measures should be implemented as far as practicable:

Construction Phase

- Re-circulate wastewater used in ground boring and drilling for site investigation after sedimentation. Wastewater should be discharged into storm drains via silt removal facilities for final disposal.
- A wheel washing bay should be provided at every exit for all vehicles and plants to be cleaned. Water from the facilities should have sand and silt removed before discharged into storm drains. Roads between the facilities and public roads should be paved with backfall to avoid run-off entering public road drains.
- Surface run-off should be discharged into storm drains via adequately designed sand and silt removal facilities. Perimeter channels at site boundaries should be provided to intercept storm runoff running across the site.
- Maintain minimum distances of 100m between the discharge points of the site effluent and the existing seawater intakes. No effluent will be discharged into typhoon shelter.
- Good site practices for rubbish and litter removal should be adopted to prevent rubbish and litter from spreading out from the site area. The site should be clean on a regular basis.
- Proper handling of chemical waste, including the use of suitable containers, labelling and safe storage for chemical waste containers
- Sufficient number of chemical toilets should be provided for workforce

Operation Phase

- The road drainage should be directed through silt traps in the gully inlets to remove silt and grit before entering the public storm water drainage system.

- The silt traps should be regularly cleaned and maintained in good working condition.

8.7 Waste Management

8.7.1 The amount of C&D material that would need to be transported off-site has been minimised as far as practicable in the design. The opportunity for re-using the C&D material has been fully considered and implemented where practicable. Good site practices have been recommended for chemical waste, general refuse and C&D materials. Disposal of any type of waste will follow the relevant ordinances. Shall all the recommended good practices and relevant ordinances be strictly followed, no adverse environmental impact are expected in the construction phase.

8.7.2 As mentioned in **Section 6.4.33**, testing will be carried out to verify sediment quantity and quality. All issues on management of dredged sediments will be resolved and all relevant arrangements will be endorsed by the relevant authorities including MFC and EPD before the commencement of any dredging works. Exact location of marine disposal of the sediment will be assigned by MFC.

8.8 Landscape and Visual Impact

8.8.1 In this assessment, 15 Landscape Recourses (LR), 11 Landscape Character Areas (LCA), and 31 Visual Sensitive Receivers (VSR) are identified in the assessed area. The magnitude of change, the sensitivity of change, and the degree of impact of landscape and visual impact for the LRs, LCAs, and the VSRs are assessed. Mitigation measures for landscape and visual impact are also recommended.

Impact on Existing Open Space

8.8.2 Impact on existing open space along Canton Road is primarily due to the loss of amenity planting areas and the change of traffic conditions along the works area. All the affected open space is located along West Kowloon Highway and Canton Road.

8.8.3 In the total of 556 surveyed trees in the assessed area, 33 trees are recommended to be transplanted and 310 trees are recommended to be felled due the construction and improvement works of roads and elevated roads. 213 trees will be retained.

8.8.4 Due to height profile and short distance to the works area, almost all VSRs will see the works in close proximity. However as the construction period is not long, the impact to these VSRs is determined to be acceptable.

8.8.5 During the construction stage, the following landscape and visual mitigation measures are recommended:

- Minimise the construction period as far as possible
- The works limit should be clearly defined to avoid further impact on adjacent offsite landscapes. Screens or hoardings around the site limit should be in visually unobtrusive colours to screen the proposed works.
- Protection of preserved trees identified in the tree survey under this Project based on the recommendation of detailed tree assessment report and the approval of Tree Removal Application under ETWB TCW No.3/2006 – Tree Preservation.

- Unavoidable trees affected by the works and considered for transplant where feasible in accordance with ETWB TCW No. 3/2006 – Tree Preservation, should be maintained until the establishment period.
- An aesthetically pleasing, integrated design in terms of form, textures, finishes and colours of proposed development components and associated structures should be compatible with the existing surroundings and be guided by schematic theme paving of the future West Kowloon Reclamation Development and the Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS). The mitigation measures are to adopt similar built-forms, configurations and aesthetic appearance as the nearby structures for the newly proposed viaducts. The structural form, landscaping, and aesthetic appearance of the highway structures of Scheme H(A), Scheme H(B), Scheme I, & Scheme J was approved by the ACABAS during the 352nd ACABAS meeting held on 21 May 2013.

8.8.6 During the operation stage, the following landscape and visual mitigation measure is recommended:

- Compensatory planting will be provided in accordance with ETWB TCW 3/2006 to minimise potential impact on the existing landscape resource of trees.
- Climbers for vertical greening will be provided at piers of elevated roads and shrub planting will be provided near amenity planting strips to soften the hard landscape.
- Adopt similar built-forms, configurations and aesthetic appearance as the nearby structures for the newly proposed viaducts so as to enhance compatibility with the existing surroundings.

Impact on Existing Trees

8.8.7 Based on the individual tree survey, there are 556 trees within the tree survey boundary. These trees are mainly located along roadsides. There are no rare species or endangered species found in the assessment area. The majority of the assessed trees have low to medium amenity value. It is anticipated that 310 would be felled and 33 would be transplanted due to the proposed works. 213 trees will be retained. To mitigate the impact of the removal of the trees, both on-site and off-site compensatory planting is proposed. The location of the planting area is indicated in **Figure 7.6a to 7.6e.** Approximately 410 heavy standard trees are proposed to be planted in the indicated areas. The number shall be subject to agreement with the Government during Tree Removal Application process under ETWB TCW No. 3/2006

8.8.8 With reference to ETWB TCW No. 29/2004, no registered Old and Valuable Tree was identified within the subject site boundary during the tree survey conducted in Aug 2012 and all surveyed trees are not considered as "potentially registered trees".