

18 Conclusion

18.1 Overview

This EIA Report has provided an assessment of the potential environmental impacts associated with all stages throughout implementation and the cumulative effects due to interfacing planned, committed and existing projects in the vicinity of the Project. Impact avoidance and minimization approaches have been proposed and mitigation measures have been recommended to alleviate the predicted environmental impact to the maximum practicable extent.

18.2 Green Initiatives

To promote low carbon and green community, a number of green initiatives such as the environmentally friendly transport system, district cooling system and on-site sewage treatment works with effluent recycling for flushing, irrigation and make-up water for DCS were formulated as recommended technical guidelines for future developers' considerations. The implementation of these green initiatives will be subject to separate EIA studies (if identified as DPs) and engineering findings during detailed design stage.

18.3 Air Quality Impact

18.3.1 Construction Phase

Results of the hourly, daily and annual average TSP concentrations are all in compliance with the AQO criteria with the implementation of water suppression measures. In addition, procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation should be incorporated by the Contractor. With these measures, it is concluded that there will be no adverse residual air quality impact during construction phase.

18.3.2 Operational Phase

On-site STW will be equipped with odour removal system with 95% odour removal efficiency as a mitigation measure and adverse odour impact due to the project are not anticipated.

With the implementation of bioremediation along the section of Shenzhen River approximately 1.9km downstream of, 1km upstream of and 1.3km along the Loop development (i.e. approximately 4.2 km in total) at 98% odour removal efficiency, short-medium term residual impact of odour at the ASRs within the LMC Loop area were predicted. As a short-term enhancement and contingency measure for reduction of indoor odour level before the completion of mitigation measures on Shenzhen River, the developers could consider to install odour removal system (i.e. activated carbon filter or selective catalytic filter etc.) capable of 95% removal efficiency in buildings with central air conditioning in the development. If the odour removal system were in place, the odour criterion would be met

inside all internal spaces. In the long term, with continuous improvement of Shenzhen River, the odour criterion will be achieved.

In order to assure the 98% odour removal efficiency along the section of Shenzhen River approximately 1.9km downstream of, 1km upstream of and 1.3km along the Loop development (i.e. approximately 4.2 km in total), the relationship between AVS reduction percentage and odour removal efficiency will be established by in-situ testing during the detailed design stage. At the same time, the optimum chemical dosage and injection frequency for the bioremediation work will also be established. If the removal efficiency of bioremediation is lower than 98%, chemical dosage and frequency during bioremediation works will be increased to restore the difference.

18.4 Noise Impact

18.4.1 Construction Phase

Construction noise assessment has been conducted. Results indicate that the noise impacts on all of the NSRs after the implementation of good site practices, temporary noise barriers and use of site hoarding, quiet plants and practical mitigation measures including the setting of the concrete lorry mixer at around 25m away from the existing NSRs along Ha Wan Tsuen Road and Lok Ma Chau Road and planned NSRs at eco-lodge along Border Road. By implementing the aforesaid feasible mitigation measure, typical NSRs including HWTR-6, HWTR-11 and EL-P3 would be within the stipulated noise criterion.

Construction access road traffic noise assessment on the access route along LMC Road and Ha Wan Tsuen Road for advance works at Year 2016 and along Sai Kwo Road, Lok Ma Chau Road and Ha Wan Tsuen Road for site formation at Year 2020 has been conducted. With the implementation of temporary noise barrier, most NSRs along Lok Ma Chau Road, Sai Kwo Road and Ha Wan Tsuen Road would be within their respective noise criteria and where exceedances were predicted, those contribution due to access road is less than 1dB(A) (i.e. 0.0dB(A)) and within the noise criterion of 70 dB(A). Hence the traffic noise impact from the construction access vehicle is insignificant.

18.4.2 Operational Phase

In operational phase, road traffic noise impacts which are based on the worst case scenario of the traffic impact assessment have been investigated. Traffic noise impact on the most of the noise sensitive receivers outside the LMC Loop will be mitigated by 0.8m to 5m reflective noise barriers to within their respective noise criteria and where exceedances are predicted, those contribution due to project road is less than 1dB(A) (i.e. 0.0dB(A) to 0.2dB(A)) and within the noise criterion of 70 dB(A). Hence road traffic noise impact from the project road is insignificant. In addition, provision of central air conditioning for the first layer of noise sensitive receivers facing Road M1 has been allowed to mitigate the noise impact from road traffic noise. Fixed noise source sound power level limits are specified for sewage treatment works and DCS (provisional) with necessary noise control measures to satisfy the noise criterion.

18.5 Water Quality Impact

With full implementation of the mitigation measures such as good site practices, storm water pollution control plan, proper construction method, etc, no adverse impact is anticipated. No residual impact and cumulative impact is anticipated during both the construction and operational phase of the Project. In order to ensure effectiveness of the implemented mitigation, regular water quality monitoring in the meander are recommended during the construction phase.

18.6 Sewerage and Sewage Treatment Implications

Under the present condition, there is no public sewerage system in the vicinity of proposed development site. The proposed LMC Loop development will generate additional sewage flows and loads which cannot be handled by the existing YLSTW or SWHSTW. In order to meet the prevailing water quality policies of “No net increase in pollution load”, treatment facility will be required for the generated sewage from LMC Loop development.

On-site STW and off-site load compensation at SWHSTW is recommended. In addition, MBR is recommended as the sewage treatment process to be adopted in the on-site STW, which requires smaller footprint and generates effluent quality readily for TSE reuse purpose. In order to meet “No net increase in pollution load” in Deep Bay upgrading of SWHSTW is recommended to compensate for the residual loads and the proposal is recommended to be taken into consideration in the ongoing Study for expansion/upgrading of SWHSTW.

18.7 Waste Management Implications

18.7.1 Construction Phase

Potential waste management implications from the generation of waste during the construction phase have been evaluated. Measures, including the opportunity for on-site sorting, reusing excavated fill materials etc., are devised in the construction methodology to minimise the surplus materials disposal. Recommendations have been made for implementation by the Contractor during the construction phase to minimise waste generation and off-site disposal. The disposal quantities for C&D materials and their disposal methods have also been assessed.

It is estimated that total 1,391,900m³ of inert materials would be generated from the Project. 976,700m³ of the generated inert materials would be reused on-site and the remaining would be disposed of in Public Fill Reception Facilities.

On the other hand, total 271,500m³ non-inert materials would also be generated. 247,500m³ of the generated non-inert material (i.e. non-inert swamp deposit) would be reused on-site and in the concurrent projects such as NENT NDA, and the remaining would be disposed of in landfill.

Besides, total 64,000m³ of sediment would be generated during the construction of Eastern and Western connection roads. All sediment would be reused on-site and in the concurrent projects such as NENT NDA.

18.7.2 Operational Phase

The types of waste that would be generated during the operational phase have been assessed. Recommendations have been made to ensure proper treatment and disposal of these wastes. It is estimated that LMC Loop at full operation stage would recycle 14,396 tonnes per annum (tpa) out of 24,954tpa of municipal solid waste (MSW), leaving 10,558tpa of MSW that would need disposal to landfill.

18.8 Land Contamination Impact

The land contamination assessment has examined the potential contaminative landuses within the project area and their potential impacts to future use. The assessment involved site appraisal, site investigation, assessment of contamination extent and where necessary formulation of remedial actions.

5 zones within LMC Loop were identified as contaminated by metal Arsenic. The volume of contaminated soil is tentatively estimated as 57,444m³.

Remediation by Solidification/Stabilization is recommended. Mitigation measures are proposed during excavation for remediation of the contaminated soil in order to safeguard the general environmental, health and safety on site during the construction phase.

In addition, re-appraisal on the LMC Loop and the entire contamination assessment area for the associated infrastructure in the adjacent areas in Hong Kong outside Lok Ma Chau Loop would be required to ensure any potential contamination activities from land use changes after the approval of this land contamination assessment study, subject to a proper updating review prior to commencement of the construction works. Where re-appraisal or re-assessment is required, the project proponent would prepare and submit the Supplementary Contamination Assessment Plan (CAP) to EPD prior to the commencement of SI works. Following on from the submission of CAP and completion of SI, the project proponent would prepare a Contamination Assessment Report (CAR), a Remediation Action Plan (RAP) and a Remediation Report (RR) and submit to EPD for agreement prior to commencement of the works on the development.

18.9 Hazard to Life

The project will not involve the use or storage of explosives during the construction phase. Therefore, hazard to life due to use and storage of explosives would not be an issue.

18.10 Impacts on Sites of Cultural Heritage

The desktop review and field surveys of cultural heritage (archaeological heritage, built heritage and declared monument) within the 300m assessment area from the Project suggests that impacts from the Project are negligible.

The only potential impacts from the Project are the indirect visual impact on the built heritage near LMC Loop and Western Connection Road from its surrounding development but it can be mitigated by providing plant screening.

18.11 Landscape and Visual Impacts

18.11.1 Landscape Impact

With the implementation of landscape mitigation measures following the completion of the works, including limited works areas, minimise disturbance to existing trees and other landscape resources, implementation of tree preservation, protection and compensatory planting proposals, reinstatement of disturbed fishpond and woodland, creation of woodland and wetland, application of roadside amenity planting, planting on the LMC Loop, green roof and green wall system and greening measures on retaining wall, slopes and built structures, the residual (mitigated) impacts during construction phase (Day 1) on the majority of the identified landscape resources and landscape character areas would be moderate to negligible and the residual (mitigated) impacts during operation phase (Yr 10) on the majority of the identified landscape resources and landscape character areas would be slight beneficial to negligible.

Construction Residual (Mitigated) Impact (Day 1)

- Slight to moderate adverse mitigated impact (Day1) on 19 out of 57 LRs identified within the Study Area.
- Negligible mitigated impact (Day1) on 38 LRs identified within the Study Area.
- Moderate adverse mitigated impact (Day1) on the character of LMC Loop Riverside Landscape.
- Slight adverse mitigated impacts (Day 1) on 6 out of 9 LCAs identified within the Study Area

Operation Residual (Mitigated) Impact (Yr 10)

- Slight Beneficial mitigated Impact (Yesr10) on LR Trees on the LMC Loop.
- Negligible mitigated impact (Year 10) on all remaining 56 LRs identified within the Study Area.
- Slight adverse mitigated impact (Year 10) on the character of LMC Loop Riverside Landscape.
- Negligible mitigated impacts (Year 10) on all remaining LCAs.

18.11.2 Visual Impact

With the implementation of visual mitigation measures following the completion of the works, including limited works areas, screening measures for temporary and permanent works, location of temporary and permanent works away from VSRs, minimise disturbance to existing visual context and landscape characters, implementation of planting proposals and screening buffer to proposed built structures, reinstatement of disturbed fishpond and woodland, creation of woodland and wetland, application of roadside amenity planting, planting on the LMC Loop, green roof and green wall system and greening measures on retaining wall, slopes and built structures to enhance visual amenity, the residual (mitigated) impacts during construction phase (Day 1) on the majority of the identified VSRs

would be moderate to negligible and the residual (mitigated) impacts during operation phase (Yr 10) on the majority of the identified VSRs would be slight to negligible.

Construction Residual Impact (Day 1)

- Moderate adverse mitigated impacts (Day 1) on 7 out of 28 VSRs identified within the visual envelope of proposed works who located in proximity to or have an overview to the proposed works.
- Slight adverse to negligible mitigated impacts (Day 1) on 17 out of 28 VSRs identified within the visual envelope of proposed works.

Operation Residual Impact (Yr 10)

- Slight adverse mitigated impacts (Year 10) on 7 out of 28 VSRs identified within the visual envelope of proposed works.

Negligible mitigated impacts (Year 10) on the remaining VSRs identified within the visual envelope of proposed works.

18.11.3 Tree Impact

There are approximately 6,660 existing trees on the LMC Loop and within the limit of works areas. According to the preliminary engineering layouts of proposed works contained in Chapter 2 of this EIA, some of existing trees are inevitable to be in conflict with the construction works, the proposed works require transplanting of approximately 279 trees and felling of approximately 4,022 trees.

New planting areas within the LMC Loop including tree planting in landscape buffer, open spaces and roadside planting areas will accommodate approximately 5,000 new trees.

New planting areas along the road alignment of WCR (DP2), ECR (DP6) and access road to Flushing Water Service Reservoir (DP7) will accommodate approximately 2,600 new trees.

500 whips will be planted on the newly formed and remnant sloping areas along the road alignment. Slopes have a gradient more than 30 degree will be hydroseeded.

Based on a preliminary estimation, the above planting proposal would achieve a replanting ratio of minimum 1:1 in terms of quantity and quality except for slope works according to ETWB TCW No. 3/2006. This tree replanting ratio would compensate the total girth and number of tree loss as well as the total number of tree loss on sloping area.

The above recommendation on existing trees is preliminary and subject to the detailed tree survey and tree felling application to be submitted for LandsD/Government approval at detailed design stage of the project in accordance with ETWB TWC No. 3/2006 Tree Preservation.

18.12 Ecological Impact

The ecological baseline study has identified a number of habitats and species of conservation significance potentially impacted by the Project. Foremost among these is reed marsh in LMC Loop, LMC Meander, Eurasian Otter, the flight line corridor in areas over and adjacent to LMC Loop and a stream network at Ma Tso Lung for which there is a record of Three-banded Box Terrapin.

Construction and operation of development associated with the Project will result in a range of ecological impacts some of which, if unmitigated, are predicted to cause ecological impact of high significance. The key habitat losses and disturbance impacts are as follows:

Permanent Impacts

- Permanent loss of 10.96ha of reed marsh and 0.50ha of marsh in LMC Loop.
- Permanent loss of ecological function (arising from habitat loss and disturbance impacts) of 9.70ha of pond.
- Permanent loss of 2.33ha of marsh.
- Permanent loss of 0.19ha of seasonally wet grassland.
- Permanent loss of 1.26ha of woodland and shrubland.
- Permanent loss of 0.15ha of riparian vegetation along LMC Meander.
- Permanent loss of 80-160m² of LMC Meander river bed and water column.

Temporary Impacts on Functional Value of Habitats

- Temporary loss of functional value of 4.11ha to 6.36 ha of pond, duration depending on phase of project, but total period approx. 7 years.
- Temporary loss of 0.032 ha of disturbed reed marsh during construction of Direct Link.
- Temporary of effective loss of 1.10 ha of reed marsh in EA during construction of Eastern Connection Road, duration 18 months.
- Temporary loss of riparian vegetation along LMC Meander due to stabilisation works, duration up to 4 years though not concurrently.

Secondary Impacts

- Disturbance to LMC Meander.
- Fragmentation impacts on movements of large waterbirds, herpetofauna and mammals, including Eurasian Otter arising from infrastructural connections and disturbance from buildings.
- Disturbance impacts to Eurasian Otter, mainly due to construction-related activities.
- Potential run-off impacts on watercourses.
- Increased wildlife mortality due to noise barriers.

Key mitigation measures comprise the following:

- Creation of 12.78ha Ecological Area containing reed marsh and marsh habitat to compensate for habitat loss in LMC Loop, and a buffer area of 50m width.
- Use of underpass below LMC Meander and depressed road through fish ponds at HHW.
- Provision of permanent compensatory off-site wetland areas totalling a minimum of 11.72ha.
- Provision of temporary compensatory off-site wetland areas totalling a minimum of 6.36ha in construction phase.
- Implementation of lower building heights near to EA.
- Banks of LMC Meander to be stabilised and re-vegetated after completion.
- Site formation works in EA and bank stabilisation works alongside LMC Meander to be carried out in wet season.
- Installation of 3m-high olive green fence site hoarding around construction areas to reduce disturbance and allow or deter animal passage as required.
- Implement standard measures to minimise magnitude of construction run-off and spillage events.
- Use of mechanised equipment only during the period 9am to 5pm.
- No use of direct lighting on LMC Meander.
- Provision of wildlife underpasses and one 70m-wide overpass as part of Eastern Connection Road.
- Phasing of work on Eastern Connection Road to avoid concurrent working in sections of critical ecological value.
- Use of viaducts to cross streams.
- Where possible, wet season work only in critical areas of fish ponds.
- Use of opaque noise barriers along roads to minimise wildlife mortality.

Adverse residual impacts after implementation of mitigation measures are all assessed as of Low severity, and comprise the following:

- temporary loss for 2-3 years (depending on establishment period required) of 2.50ha of reed marsh to allow site formation of the Ecological Area..
- temporary loss for 18 months of riparian vegetation of LMC Meander due to construction of the Eastern Connection Road. Through design, the vegetation will be reprovided after construction.
- temporary loss of riparian vegetation due to raising of level of LMC Loop and stabilisation of banks of LMC Meander over period of 4 years;
- permanent loss of 0.15ha of riparian vegetation of LMC Meander and river bed under footprint of Western Connection Road.

- permanent loss of 80-160m² of LMC Meander river bed and water column;
- temporary loss of 1.26ha of woodland and shrubland due to construction of ECR. This will resolve itself in 20-30 years once the area of planted trees reaches maturity.

18.13 Fisheries Impact

Since the pond areas to be lost do not account for a significant proportion of the total fish pond area in Hong Kong, the fisheries impact is not considered to be significant. Indirect impacts arising from construction activities and operation of the proposed development would be properly mitigated through standard practices and thus no significant fisheries impact will appear. Overall, no unacceptable fisheries impact are predicted from this project.

18.14 Landfill Gas Hazard

Landfill gas hazard assessment is not required as the development is outside the 250m Consultation Zone of Ma Tso Lung Landfill (MTLL) and there is no impact on the restoration and aftercare facilities of MTLL.

18.15 Food Safety

Estimated contaminant concentrations in fish attributed to indirect impact is insignificant compared with the Food Safety Standards under Hong Kong Regulations, and thus potential food safety implications is not anticipated.

18.16 Environmental Monitoring and Audit

An Environmental Monitoring and Audit (EM&A) programme has been established and the scope of EM&A requirements has been detailed in the EM&A Manual.