

## **Purpose**

The purpose of this Technical Report is to provide a broad assessment of technical, environmental and air ventilation on the Preliminary Outline Development Plan (PODP) and the associated basic infrastructure to the developments of the Lok Ma Chau (LMC) Loop and confirm their technical feasibility.

## **Broad Technical Assessments**

### **Socio-economic Impact Assessment**

Higher education as a leading use in the Loop would produce spill over effects on the levels of technology and human capital in Hong Kong. Research and Development (R&D) is an important and vital input into the production process and R&D expenditure contributes substantially to growth of outputs. The associated conferences held in the Loop as well as activities of the cultural and creative industries will also bring about economic activities.

It is estimated that the development of the Loop will provide about 29,000 job opportunities. Apart from the job opportunities directly created in the Loop, the indirect and induced impacts will also create additional job opportunities in the rest of the Hong Kong economy.

Improvement works on the LMC Road including the cycle track would potentially provide better accessibility and mobility to the existing residents in LMC Tsuen, Chau Tau Tsuen, Pun Uk Tsuen, Ha Wan Tsuen and Ha Wan Fisherman San Tsuen. With the development of the Loop, areas along LMC Road would have scope to provide rural commercial uses such as retail, restaurants or hostel facilities etc., which would bring about economic benefit to the nearby villages. The addition of an Eastern Connection Road linking the Loop and the future Kwu Tung North New Development Area (KTN NDA) would also improve connectivity and the Loop users could make use of the supporting facilities provided in KTN NDA.

### **Land Requirement Study**

Development of the LMC Loop requires various infrastructural supports, in particular, a network of access roads. The land requirement of various road options for the Eastern and Western Connection Roads were examined based on the following basic principles:

- Minimum land take
- Minimum social disturbance
- Minimum cost on resumption / clearance

In respect of the Eastern Connection Road, several options were assessed to determine the alignment which minimized disturbance to sensitive sites.

### **Transport and Traffic Assessment**

#### *Road Options*

A broad assessment of the traffic impact generated by the Loop development had been carried out, which revealed that apart from the Western Connection Road, an additional road linkage at the eastern side of the Loop will be required to handle the traffic generated, possibly by making use of an interconnection with the proposed road network of the KTN NDA. Based on the broad assessments, the Western Connection Road may utilise Ha Wan Tsuen Road and LMC Road while the options of the Eastern Connection Road will need further investigation in the next stage of the Study.

### *Pedestrian and Cycling Provisions*

The general transport strategy for the Loop is to provide a user friendly and convenient circulation network. The pedestrian provisions and walking environment in the Loop, such as adequate footpath widths and pedestrian crossings, would be designed to encourage walking.

Within the Loop, an extensive bicycle network will be provided to cover all major activity nodes of the Loop, and all facilities would be designed to be accessible by bicycles as far as possible.

### *External Access*

Direct transport linkage between MTR LMC Spur Line (LMCSL) Station and the Loop were investigated. An initial idea is to construct a non-road based Environmental Friendly Transport Mode (EFTM), possibly in the form of (1) a spur line extension or automatic people mover (APM) connecting the MTR LMCSL station with the western part of the Loop for the use of cross-boundary Loop users, or (2) direct footbridge connecting to the Loop. The provision of a separate road system for road-based public transport is also a possible option. Alternatively, public EFTM service such as electric bus could be provided to cater for travel between the Loop and the existing LMC Boundary Control Point (BCP) / Huanggan Port as well as railway stations. The details of connections would be investigated at later stage.

### *Cross Boundary Movement*

The main cross-boundary movements between the Loop and SZ are anticipated to utilise the MTR LMCSL Station, which currently has direct and convenient pedestrian connection with the Futiankouan Station on the SZ side. As a long-term proposal, a possible linkage across SZ River is proposed at the northern end to link up the Loop and Area C in SZ.

### **Drainage Impact Assessment**

The proposed development site had been taken into consideration under the Drainage Master Plan Study in Northern New Territories to assess the hydraulic performance of the drainage system. Based on the hydraulic performance, it was concluded that SZ River would have adequate capacity to convey the additional discharge as a result of development of the Loop.

The Old SZ River Meander does not have flood protection under existing condition. In order to minimise any adverse impact to the Old SZ River Meander, the runoff from the development site will need to be controlled. More detailed assessment will be carried in the Drainage Impact Assessment.

### **Sewerage Impact Assessment**

After reviewing the existing and planned sewerage infrastructures along with the proposed developments, several options for the collection, treatment and disposal of sewage flows from the proposed developments within the Study Area were investigated. A possible option is to treat the sewage flow locally by using an on-site STW and enhancing the effluent standard at the existing Shek Wu Hui STW / Yuen Long STW so as to meet the requirement of 'No Net Increase in Pollution Load to Deep Bay.

### **Water Supply and Utilities Impact Assessments**

Based on the broad assessment, there are two options to provide fresh water supply to the proposed development site. Under option 1, the supply can be provided from the existing 300DN and 150DN watermains sourced from Ngau Tam Mei Fresh Water Service Reservoir (FWSR) along LMC Road providing water supply to the LMC Terminus. Under Option 2, a new watermain can be laid from a newly proposed FWSR in KTN. Both options would be analysed as part of Water Supply Impact Assessment to identify the preferred option based upon an updated development schedule for the NDAs and the Loop development.

The flushing water demand for proposed development can be met by either fresh water or treated effluent. Different sources and options would be analysed as part of Water Supply Impact Assessment to identify the preferred option to provide the flushing water supplying to the Loop.

Broad assessments on other utilities required for the Loop development were undertaken, which included power supply, telecommunication and broadband cables, wireless communication facilities, cable TV services and gas supply.

### **Site Formation Assessment**

Broad assessment based on the maximum water levels under the Review of Drainage Master Plans in Yuen Long and North District Feasibility Study for SZ River suggests setting the future proposed site formation at minimum levels between +5.8mPD to +5.9mPD would be adequate in terms of coping with the risk of flooding based on the maximum water levels from the Estuary Study for SZ River. The precise level would be confirmed in the Drainage Impact Assessment.

Preliminary site formation design would be carried out, which would include soil decontamination as advance works and the associated works like advance haul routes to the Loop to facilitate soil decontamination works at an early stage.

### **Geotechnical Assessment and Site Investigation**

The proposed ground investigation works for Area A were completed in March 2010.

According to the preliminary ground investigation results, the geotechnical condition in the Loop would not affect the development feasibility and potential. Deep foundations would be required for high rise structures. Shallow foundations might be sufficient for low rise buildings with the application of ground treatment of the soft materials where present. In view of the high ground water level, uplifting forces would need to be considered.

All the options for the Eastern and Western Connection Road will require some extent of slope works and possibly natural terrain hazard mitigation works. These are not expected to pose major constraints to the construction of the road but would need to be confirmed with the proposed site investigation.

### **Qualitative Air Ventilation Assessment – Expert Evaluation**

The wind data from MM5 provided by the Planning Department and from Hong Kong Observatory – Wetland park station were applied to investigate the prevailing wind direction for both non-summer and summer condition. It was found that the non-summer prevailing wind is NE while SW for the summer condition.

The Study Area is dominated by low rise clusters and farmland which are non-sensitive area in terms of air ventilation. The Loop contains high density areas on the west side of the development and within the building group in the centre part of the development. Those areas have the highest stagnant potential within the whole development. In order to prevent those areas becoming less ventilated, a number of recommendations have been made and incorporated in the PODP.

### **Broad Environmental Assessments**

A broad environmental assessment on the proposed developments in Area A and Area B and the associated infrastructure provisions has been conducted. Further assessment will be carried out at later stage to determine the impacts.

#### *Air Quality*

A new STW is proposed to be constructed in the LMC Loop to treat the sewage locally and to discharge into nearby water bodies in SZ River. There would be planned sensitive receivers in the Loop

development. Where the STW will be located underground or its odour sources can be fully enclosed, the need for a buffer distance may not be absolutely necessary subject to detailed impact assessment to be carried out at a later stage. In addition, as buildings in the Loop will be centrally air conditioned, the inclusion of activated carbon filters in the fresh air inlets of the mechanical ventilation and air conditioning (MVAC) system can also serve to mitigate odour impact to the internal areas of the buildings. Further assessment will be carried out at later stage to determine the above impacts.

#### *Noise*

Noise measurements were conducted at selected locations of representative land use during daytime, evening, and night-time. The existing noise sources within 300m from the Study Area and locations of the noise measurement are reported. Additional noise measurements will be conducted at Ha Wan Tsuen, LMC San Tsuen, Border Road and the Loop. Available information from SZ would be reviewed to assess potential cumulative noise quality impact.

#### *Water Quality*

Environmental site investigation (SI) and laboratory testing works were carried out in Area A. The findings revealed that groundwater was not contaminated.

#### *Sewage Treatment*

Based on broad assessment, several options are being considered for the collection, treatment and disposal of sewage from the development site after considering the requirement of 'No Net Increase in Pollution Load to Deep Bay'. Further investigation would be conducted in the next stage.

#### *Ecology*

Development of Area A would affect some reedbed habitat of moderate to high ecological value. Based on the TM-EIAO, this requires mitigation in the form of compensatory habitat provision equal in function to that which currently exists. In the Ecological Area, a reedbed will be provided to compensate for the affected reed marsh in Area A and Area B. This mitigation measure will need to be managed for ecological enhancement.

Development of Area A has potential impacts on the bird's flight lines through the area. Provision of infrastructural links may also have impact on the bird's flight line corridor, as well as ground linkages for small mammals through the area.

Mitigation for any such impacts would be required, and this may consist of a set-back from main flight line routes, building height restriction and visual or noise barriers.

#### *Others*

Site investigation was carried out for assessing the level and extent of potential contamination in Area A. Test results indicate that elevated level of metal "arsenic" was detected at a few locations and further investigation of the contamination extent would be carried out.

Landscape character and visual amenity of the Loop change due to the implementation of the proposed development may have visual impact to adjacent areas which will be assessed in the next stage.

#### *Proposed Western Connection Road*

There are potential adverse ecological impacts on the ecological corridor during construction phase. This proposed road alignment minimises impacts on the ecological corridor and cumulative impacts during operation phase.

The road widening proposal of LMC Road and Ha Wan Tsuen Road may affect the roadside landscapes character including the loss of mature trees and potential old and valuable trees as well as visually sensitive receivers.

### *Proposed Eastern Connection Road*

Habitats of higher ecological value potentially affected by the proposed road alignments are located in the east, and include fish ponds (especially those near Ngau Kok Shan), streams at Ma Tso Lung and shrubland/woodland habitats in the Ma Tso Lung area. Mitigation is required for potential direct and indirect impacts on the bird's flight line corridor and fish pond loss, as well as the direct or indirect impacts on the riparian corridor and marsh at Ma Tso Lung. Where the road connection passes through areas sensitive to bird's flight lines and fish ponds, such road sections may be covered and embanked to maintain a natural appearance.

### **Way Forward**

Based on the findings of various broad assessments, it can be concluded that the developments and infrastructures proposed under the PODP are feasible. After consulting the public on the development options and PODP in the Stage 1 Public Engagement, more detailed technical assessments will be conducted in the next stage of the Study.