

1 Introduction

1.1 Project Background

Before the training of Shenzhen River, the Lok Ma Chau Loop (LMC Loop) was within the administrative boundary of Shenzhen Municipal Government. It now lies within the administrative boundary of the Hong Kong Special Administrative Region (HKSAR).

In the Chief Executive's 2007 Policy Address, the development at LMC Loop is one of the ten major infrastructure projects for economic growth of the HKSAR. The HKSAR Government would work with the Shenzhen authorities to tap the land resources of the LMC Loop to meet future development needs and consolidate the strategic position of both cities in the Pan-Pearl River Delta region.

Subsequent to the signing of the "Co-operation Agreement on Recently Initiated Major Infrastructural Projects" at the Hong Kong-Shenzhen Co-operation Meeting on 18.12.2007, a "Hong Kong-Shenzhen Joint Task Force on Boundary District Development" (Joint Task Force), co-chaired by the Secretary for Development of the HKSAR Government and the Executive Vice Mayor of Shenzhen Municipal Government, was set up to coordinate and steer research and studies in relation to planning and development of land in the boundary district, including, inter alia, the LMC Loop.

At its first meeting on 10.3.2008, the Joint Task Force agreed that Hong Kong and Shenzhen would conduct a joint study on planning, environmental, and engineering feasibility for the development of the LMC Loop. Public engagement exercise on the possible future land uses of the LMC Loop was then carried out concurrently in Hong Kong and Shenzhen between June and July 2008. In the meanwhile, the Shenzhen Municipal Environmental Protection Bureau (SZMEPB) had appointed consultants to carry out terrestrial ecological investigation, marine/aquatic ecological baseline study and soil contamination testing works for the LMC Loop in 2008. Among the proposed land uses, higher education, research and development of new high technology and cultural and creative industries received wide support from both sides.

At the Hong Kong-Shenzhen Cooperation Meeting on 13.11.2008, a co-operation agreement was signed on the undertaking of a comprehensive study for the development of the LMC Loop. The meeting initially considered that higher education might be developed as the leading land use in the LMC Loop, complemented with some elements of high-tech research and development (R&D) facilities as well as cultural and creative (C&C) industries. This would provide impetus for human resources development in the South China region and enhance the competitiveness of the Pearl River Delta (PRD), as well as benefit the long-term economic development of the two cities. In 2009, the "Planning and Engineering Study on the Development of Lok Ma Chau Loop – Investigation" (P&E Study) was jointly commissioned by the Hong Kong Planning Department (PlanD) and Civil Engineering and Development Department (CEDD) with participation from Shenzhen. The findings of the baseline survey by SZMEPB were provided for reference under the P&E Study. In parallel, a separate study for

the adjoining area on Shenzhen side was commissioned by the Shenzhen government with participation from Hong Kong.

Stage 1 Public Engagement (PE) was conducted in Hong Kong and Shenzhen between November 2010 and January 2011 to seek public views on the Preliminary Outline Development Plan (PODP)(**Appendix 1-1**) for the LMC Loop. Based on the public views on the PODP and engineering assessment, the draft Recommended Outline Development Plan (RODP)(**Appendix 1-1**) was formulated and put forward to collect public views in the Stage 2 PE between May and July 2012. A Preliminary Layout Plan was then developed taking into account the public views, planning and engineering considerations (Details are discussed in **Section 2**).

1.2 The Assignment

On 26 May 2009, PlanD in association with CEDD commissioned Ove Arup & Partners Hong Kong Limited (Arup) as the Consultant for the P&E Study.

The P&E Study commenced on 1 June 2009 to carry out planning, environmental, and engineering feasibility studies and associated site investigation works with a view to formulating land use and development proposals for the LMC Loop, confirming the feasibility of implementing the land use and development proposals, carrying out preliminary engineering design and formulating the implementation strategies and programme for delivering the development of LMC Loop and associated supporting infrastructure in the adjacent area (i.e. Area B). The P&E Study also includes reviewing the land uses alongside the supporting infrastructure to be proposed in the areas adjoining the Loop in Hong Kong. In view of the public views received during Stage 1 PE, a separate land use review is carried out to explore the development opportunities in Area B and its surrounding area. Further separate studies may be required to ascertain the feasibility of the proposed land uses if they are to be taken forward as a result of this review.

1.3 The Study Area

As a result of the training of the Shenzhen River, which serves as the administrative boundary between Hong Kong and Shenzhen, an area of about 87.7 ha, previously lying to the north of the river course, is now situated to the south of the re-aligned river. The area, commonly known as the LMC Loop, was used as a disposal site for mud extracted from the river training work, some of which were contaminated. The LMC Loop is located near several major cross-boundary transport nodes including the Lok Ma Chau (LMC) Boundary Control Point (BCP), the Mass Transit Railway (MTR) LMC Station of the LMC Spur Line and the San Tin Interchange. To the north across the Shenzhen River is the Huanggang Port in Shenzhen. To the southwest is the Mai Po Nature Reserve and to the northeast is Hoo Hok Wai, comprising mainly fish ponds with high ecological value.

The Study Area comprises Area A, Area B and Added Area B as shown in **Figure 1.1**. Area A is the LMC Loop site in which the buildings, landscape, infrastructures and internal roads will be located. Supporting infrastructures and external transport connections are planned in Area B. Linkage of the external transport connections to the nearby regional primary road network is located in

the Added Area B. It should be noted that no new land uses / development would be proposed in Area B and Added Area B under the Project.

In accordance with the Project Proponent's clarification ref: NTNTPF2/6/44(E) dated 12 September 2012, the project scope shall comprise of:

- (a) Both land use developments / proposals and associated infrastructure are considered and proposed in LMC Loop (Area A), for preparation of the Recommended Outline Development Plan (RODP); and
- (b) Only associated infrastructure (e.g. roads, service reservoir, water mains, drainages, utilities, etc) for supporting the development of the LMC Loop in Area B (including Added Area B) have been considered and proposed under the Project

The adjoining area in Shenzhen (i.e. Area C in **Figure 1.1**) will mainly retain the present land uses and facilities but will reserve space and provide facilities for complementary development with Area A in the future. In the long term, the conceptual plan of Area C will be implemented to promote cooperation between Hong Kong and Shenzhen. A separate study for the adjoining area in Shenzhen (i.e. Area C in **Figure 1.1**) was commissioned by the Shenzhen side in June 2009, which was conducted in parallel with the LMC Loop Study.

The Development of the LMC Loop comprises the buildings, landscaping and supporting infrastructure within the site. Externally, the essential infrastructures comprise the proposed connection roads connected to the entrance points at the western and eastern parts of the LMC Loop, the Direct Link to MTR LMC Station and the flushing water service reservoir. Their associated environmental impacts within the study area are assessed in this EIA report.

1.4 EIA Study Brief

In accordance with the requirements of Section 5(1) of the Environmental Impact Assessment Ordinance (EIAO), a project profile (No. PP-376/2008) of the project title "Development of Lok Ma Chau Loop", was submitted to the Director of Environmental Protection (the "DEP") for the application of an Environmental Impact Assessment (EIA) Study Brief on 30 December 2008. Pursuant to Section 5(7)(a) of the EIAO, the DEP issued a Study Brief (No: ESB-201/2008 dated 23 January 2009) for the EIA study.

Subsequently, a revised project profile (No. PP-455/2011) was submitted to DEP on 3 November 2011 and a new Study Brief (No. ESB-238/2011) under section 5(1)(a) of the EIAO was issued on 12 December 2011 to adjust the Study Area due to the need to accommodate the alignment of the proposed transport infrastructure falling outside the original Study Area in EIA Study Brief ESB-201/2008 during the course of the Study.

This EIA Report is to address the environmental impacts due to the works and land uses proposed under the P&E Study in accordance with the latest EIA Study Brief (No. ESB-238/2011).

1.5 Designated Project

The LMC Loop Development is a designated project (DP) under Item 1 Schedule 3 of EIAO - Engineering feasibility study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100,000.

The Project will include land use planning and development in LMC Loop (Area A) and the associated infrastructures external in the adjacent areas in Hong Kong (within Area B and Added Area B). Individual project components were identified in light of the need for various stages in the implementation programme (see **Section 2.5.3**).

In addition, the following project components associated with the LMC Loop Development fall under various Schedule 2 DP categories as summarized in **Table 1.1**.

Table 1.1 Schedule 2 designated projects in LMC Loop development

Project Component	Brief Description	Schedule 2 DP Category		Reasons
Ecological Area (DP1) ^[3]	<ul style="list-style-type: none"> Site formation works 12.8 ha of Ecological Area for reed marsh compensation (Figure 2.2) A secondary function as a flood storage pond (Figure 2.3) 	I2	A flood storage pond more than 10 ha in size	The Ecological Area will have a secondary function as a flood storage pond and the area (total 12.8 ha) is larger than 10 ha in size.
Western Connection Road (including LMC Road Connection to Fanling / San Tin Highway) (DP2) ^[1]	<ul style="list-style-type: none"> Site formation works Linkage from LMC Loop to external road and highway network in San Tin Highway/Castle Peak Road (Figures 2.4a to 2.10) formed by widening of existing Ha Wan Tsuen Road and Lok Ma Chau Road (at-grade) plus a new slip road to San Tin Interchange 2-lane single carriageway About 1.3 km (main road) and 480m (slip roads) in length Other components under this DP: construction haul roads, utilities (water mains, drainage, electric cables, etc), noise barriers and cycle tracks 	Q1	All projects including new access roads, railways, sewers, sewage treatment facilities, earthworks, dredging works and other building works partly or wholly in an existing or gazette proposed country park or special area, a conservation area, an existing or gazette proposed marine park or marine reserve, a site of cultural heritage, and a site of special scientific interest.	The part of Western Connection Road (WCR) alignment, haul roads and the temporary works area will be within the “Conservation Area” under the Approved San Tin Outline Zoning Plan (OZP) No. S/YL-ST/8 to the west of LMC Loop.
Direct Link to MTR LMC Station (DP3) ^[2]	<ul style="list-style-type: none"> Site formation works Linkage from LMC Loop to the proposed PTI at MTR LMC Station (Figures 2.11a to 2.11e) Road-based 2-lane single viaduct Elevation: at grade in the junction at WCR and up to 17.6 mPD About 770m in length Other components under this DP: 	A8	A road or railway bridge more than 100m in length between abutments.	Direct Link to MTR LMC Station is in the form of viaduct and the length between abutments is about 500m.
		Q1	All projects including new access roads, railways, sewers, sewage treatment facilities, earthworks, dredging works and other building works partly or wholly in an	The part of the alignment of Direct Link to MTR LMC Station, haul roads and the temporary works area will be within the “Conservation Area”

Project Component	Brief Description	Schedule 2 DP Category	Reasons
	construction haul roads, utilities (water mains, drainage, electric cables, etc), noise barriers/parapets		existing or gazette proposed country park or special area, a conservation area, an existing or gazette proposed marine park or marine reserve, a site of cultural heritage, and a site of special scientific interest.
Drainage System under Internal Transport Networks (DP4) ^{[2][3]}	<ul style="list-style-type: none"> Site formation works Drainage system within LMC Loop (Figure 2.3) The drainage system under the internal transport network including Main Road M1, Road L1 and Road L2 (Figure 2.1b) Other components under this DP: utilities 	I1	A drainage channel or river training and diversion works which discharges or discharge into an area which is less than 300m from the nearest boundary of an existing or planned conservation area.
Sewage Treatment Works (STW) (DP5)	<ul style="list-style-type: none"> Footprint: 2.1 ha (Figures 2.1b, 2.26a, 2.26b and 2.26c) Average Dry Weather Flow: 18,000 m³/day Treatment level: tertiary Treatment method: Membrane bioreactor (Subject to detailed design) Components for TSE reuse: reclaimed water surge vessel compound, reclaimed water booster pump compound, reclaimed water chlorine contact tank 	F2	Sewage treatment works with an installed capacity of more than 5,000 m ³ /day and a boundary which is less than 200m from the nearest boundary of an existing or planned educational institution.
		F4	An activity for the reuse of treated sewage effluent from a treatment plant.
Eastern Connection Road (ECR)(DP6) ^[2]	<ul style="list-style-type: none"> Site formation works Linkage from LMC Loop to North East New Territories New Development Areas (NENT NDAs) via Ma Tso Lung (Figures 2.12 to 2.23f) Involve widening part of existing Border 	A9	A road fully enclosed by decking above and by structure on the sides for more than 100m.
		I1	A diversion works which discharges or discharge into an area which is less than 300m from the nearest boundary of an

Project Component	Brief Description	Schedule 2 DP Category		Reasons
	<p>Road and new road near Ma Tso Lung</p> <ul style="list-style-type: none"> 2-lane single at-grade carriageway plus depressed road/underpass crossing the Meander and minor viaducts across streams About 610m (depressed road), 200m (underpass), 50m (viaduct), 1350m (at-grade road) in length Other components under this DP: construction haul roads, utilities (water mains, drainage, electric cables, etc), noise barriers and cycle tracks 		existing conservation area.	diverted runoff will be discharged to the Meander which is less than 300m from the nearest boundary of the “Conservation Area” under the Approved San Tin OZP No. S/YL-ST/8 at east of LMC Loop.
		Q1	All projects including new access roads, railways, sewers, sewage treatment facilities, earthworks, dredging works and other building works partly or wholly in an existing or gazette proposed country park or special area, a conservation area, an existing or gazette proposed marine park or marine reserve, a site of cultural heritage, and a site of special scientific interest.	The part of the alignment of ECR will be within the “Conservation Area” under the Approved San Tin OZP No. S/YL-ST/8 at east of LMC Loop.
Flushing Water Service Reservoir (DP7)	<ul style="list-style-type: none"> Include site formation works Footprint: 1350 m² (Figure 2.23a and 2.26c) Size: 3375 m³ Other components under this DP: 200m access road from ECR, the associated designated pipelines for treated sewage effluent reuse 	F4	An activity for the reuse of treated sewage effluent from a treatment plant	The flushing water service reservoir will retain the treated sewerage effluent for re-use.

Note:

[1] The road type of Western Connection Road is neither an expressway, trunk road, primary distributor nor district distributor and the bridge span crossing Meander is less than 100m (~65m only). It is therefore not a DP under S2 A1 and S2 A8 category respectively.

[2] The road type of Direct Link to MTR LMC Station, Internal Transport Network and Eastern Connection Road are neither an expressway, trunk road, primary distributor nor district distributor. They are therefore not a DP under S2 A1 category.

[3] The entire drainage system within LMC Loop (Area A) will involve two S2 DPs: (I) flood storage pond and (II) drainage discharges. As the works will be under different construction contracts and involve different operators, the flood storage pond has been included in the Ecological Area (DP1) and drainage discharges in the Drainage System under Internal Transport Networks (DP4) respectively.

[4] Two electricity substations below 400 kV are proposed within the LMC Loop but they are not identified as designated projects.

For the avoidance of doubt, the upgrading of Shek Wu Hui Sewage Treatment Works (SWHSTW) in connection with DP5's compliance with "No Net Increase in Pollution Load requirement in Deep Bay" policy is also a Designated Project under F.1 Schedule 2 of Part 1. The EIA for this DP will be conducted under the North East New Territories New Development Areas Planning and Engineering Study (NENT NDAs Study) (see Item 8 of **Section 2.8.1**).

1.6 Objectives of the EIA Report

This EIA report has incorporated the comments from various government departments and other concerned parties on the on-going P&E Study in addressing the environmental impacts of the existing, committed and planned developments in the vicinity. The report also compared the benefits and disbenefits of different development scenarios and options under various aspects including environmental consideration, with the aims to deriving the RODP that avoids adverse environmental impact to the maximum practical extent.

According to Section 1.8 of the EIA Study Brief, this EIA study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the developments proposed under the Project and related works that take place concurrently. This information will contribute to decisions by the Director of Environmental Protection on:

- (i) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project and associated works, and their related staged implementation;
- (ii) the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and
- (iii) the acceptability of residual impacts after the staged as well as the full implementation of the Project and the related proposed mitigation measures are implemented.

The objectives of the EIA study as per Section 2.1 of EIA Study Brief are as follows:-

- (i) to describe the Project together with the requirements for carrying out the Project;
- (ii) to identify and describe elements of the community and environment likely to be affected by the Project and/or likely to cause adverse impacts on the sensitive uses at the Project, including both the natural and man-made environment and associated environmental constraints;
- (iii) to provide information on the consideration of alternatives to avoid or minimize the potential adverse environmental impacts on the sensitive uses at the Project and adjacent areas that may be subject to (i) the adverse environmental impacts of the Project and/or (ii) the adverse impacts of the existing/committed/planned developments in the Project site and adjacent areas; to compare the environmental benefits and disbenefits of each of different options; to provide justifications and constraints for selecting the preferred option(s); and to describe the part environmental factors played in the selection;

- (iv) to identify and assess air quality impact, noise impact, water quality impact, waste management, land contamination, hazard to life, ecological impact, fisheries impact, landscape and visual impact, impacts on sites of cultural heritage, quantify emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;
- (v) to identify the negative impacts and propose measures to avoid or provision of mitigation measures to minimize pollution, environmental disturbance and nuisance during construction and operation of the Project;
- (vi) to investigate the feasibility, practicability, effectiveness and implications of the proposed impact avoidance and/or mitigation measures;
- (vii) to identify, predict and evaluate the residual environmental impacts (i.e. after practicable avoidance or mitigation measures) and the cumulative effects expected to arise during the construction and operation of the Project and associated works in relation to the sensitive receivers and potential affected uses;
- (viii) to identify, assess and specify methods, measures and standards to be included in the detailed design, construction and operation of the Project and associated works which are necessary to mitigate these environmental impacts and cumulative effects and reduce them to the acceptable levels;
- (ix) to investigate the extent of the secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as provision of any necessary modification;
- (x) to identify individual project(s) that fall under Schedule 2 of the EIAO; to ascertain whether the EIA study has adequately addressed the environmental impacts of those projects; and, where necessary, to identify the outstanding issues that need to be addressed in any further detailed EIA study;
- (xi) to investigate the extent of the secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as provision of any necessary modification; and
- (xii) to design and specify environmental monitoring and audit requirements to ensure effective implementation of the recommended environmental protection and pollution control measures.

The EIA study also demonstrates that criteria in the relevant sections of the Technical Memorandum on the EIA Process of the Environmental Impact Assessment Ordinance (TM-EIAO) are fully complied or the anticipated environmental impacts will be mitigated to acceptable levels.

According to Section 3.2.1 of the EIA Study Brief, information on the potential impacts on the environment within the HKSAR boundary arising from any associated works of the Project outside the HKSAR boundary, and in combination with those impacts arising from the Project, are provided to facilitate DEP's consideration on the overall acceptability of any adverse environmental

consequences that are likely to arise as a result of the Project. These information are provided in **Section 2.8.2** of this Report.

1.7 Structure of the Report

The structure of this Report is as follows:

<u>Section</u>	<u>Title</u>	<u>Aims</u>
1	Introduction	To provide project background, purpose and scope of the EIA study as well as to describe the EIA study area and the Schedule 2 Designated Projects.
2	Project Description	To describe the project inception, public aspirations, consideration of alternatives, green initiatives and project visions leading to the development of RODP and major activities in the project scope.
3	Air Quality Impact	To assess the potential air quality impact of the project and recommend mitigation measures.
4	Noise Impact	To assess the potential noise impact of the project and recommend mitigation measures.
5	Water Quality Impact	To assess the potential water quality impact of the project and recommend mitigation measures.
6	Sewerage and Sewage Treatment Implications	To assess the potential sewerage and sewage treatment implications of the project and recommend mitigation measures.
7	Waste Management Implications	To assess the potential waste management implications of the project and recommend mitigation measures.
8	Land Contamination Impacts	To assess the potential land contamination impacts of the project and recommend mitigation measures.
9	Hazard to Life	To assess the potential hazard to life impact of the project and recommend mitigation measures.
10	Impact on Sites of Cultural Heritage	To assess the potential cultural heritage impact of the project and recommend mitigation measures.
11	Landscape and Visual Impact	To assess the potential landscape and visual impact of the project and recommend mitigation measures.
12	Ecological Impact	To assess the potential ecological impact of the project and recommend mitigation

		measures.
13	Fisheries Impact	To assess the potential fisheries impact of the project and recommend mitigation measures.
14	Landfill Gas Hazard	To assess the potential landfill gas hazard of the project and recommend mitigation measures.
15	Food Safety Implication	To assess the potential food safety implication of the project and recommend mitigation measures.
16	Environmental Outcome	To summarise the assumptions and limitation of assessment methodologies as well as findings of environmental impacts, outcomes and mitigation measures adopted.
17	Environmental Monitoring & Audit	To summarise the requirement of Environmental Monitoring & Audit.
18	Conclusion	To draw conclusions from the assessment results of the EIA study.