Agreement No. CE 53/2008 (CE)

PLANNING AND ENGINEERING STUDY ON DEVELOPMENT OF LOK MA CHAU LOOP - INVESTIGATION

Environmental Impact Assessment Executive Summary

July 2013

CEDD 土木工程拓展署 Civil Engineering and Development Department

規劃署 Planning Department

ARUP

[Blank page]

Contents

圖表 1.1 Figure 1.1	研究範圍 Study Area
圖表 2.1a Figure 2.1a	發展大綱(整體)及各指定工程 Layout Plan (Overall) and Designated Projects
圖表 2.1b Figure 2.1b	修改後的初步發展大綱 Revised Preliminary Layout Plan
圖表 2.1c Figure 2.1c	工地外的工作區－濕地補償（漁塘或蘆葦塘） Off-site Works Area – Wetland Compensation (Fishpond/Reedbed)
圖表 2.1d Figure 2.1d	項目範圍及工作區 The Project and Temporary Works Area
附件 1-1 Appendix 1-1	初步發展大綱圖/建議發展大綱圖 PODP & RODP
附件 3-1 Appendix 3-1	布局方案 Development Options
附件 3-2a Appendix 3-2a	西面連接路方案 Road Alignment Option for Western Connection Road
附件 3-2b Appendix 3-2b	東面連接路方案 2 Road Alignment Option for Eastern Connection Road
附件 3-2c Appendix 3-2c	連接港鐵落馬洲站直接通道方案 Road Alignment Option for Direct Link to MTR LMC Station
附件 4-1 Appendix 4-1	影響概覽 Impact Summary

[Blank page]

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 Hong Kong Special Administrative Region (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 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 public engagement 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**).

The Project also comprises the developments and infrastructure within the LMC Loop and the supporting infrastructure in the adjacent area in Hong Kong outside the LMC Loop. The tentative construction of the Project was scheduled to commence in phases in late 2013 / early 2014 so as to make land progressively available for development from 2016 to 2018.

1.2 EIA Study Brief

The Project (Development of LMC Loop) 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.

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 also fall under various Schedule 2 DP categories:

- DP1: Ecological Area, which has a secondary function as a flood storage pond and the area is larger than 10 ha in size, under I.2 in Schedule 2 of Part 1;
- DP2: Western Connection Road (including LMC Road Connection to Fanling / San Tin Highway), which involves widening of existing roads partly in a conservation area, under Q.1 in Schedule 2 of Part 1;
- DP3: Direct Link to Mass Transit Railway (MTR) LMC Station, which includes a viaduct more than 100m in length between abutments and partly in a conservation area, under A.8 and Q.1 in Schedule 2 of Part 1;
- DP4: Drainage System under Internal Transport Networks, which discharge points are less than 300m from a conservation area, under I.1 in Schedule 2 of Part 1;
- DP5: Sewage Treatment Works, which has an installed capacity more than 5,000m3 per day, is located less than 200m from the planned educational institution and involves an activity for the reuse of treated sewage effluent, under F.2 and F.4 in Schedule 2 of Part 1;
- DP6: Eastern Connection Road, which is a new access road partly in a conservation area with an underpass section more than 100m and involve

diversion works which discharges into an area which is less than 300m from the conservation area, under A.9, I.1 and Q.1 in Schedule 2 of Part 1; and

- DP7: Flushing Water Service Reservoir, which involves an activity for the reuse of treated sewage effluent, under F.4 in Schedule 2 of Part 1.

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) but not under this study.

An application for an EIA Study Brief was made to the Environmental Protection Department (EPD) and the EIA Study Brief No. ESB-201/2008 for the Project had been issued under the Environmental Impact Assessment Ordinance (EIAO) before the start of the P&E Study. During the course of the Study, it was found needed 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. As such, a revised project profile (No. PP-455/2011) was submitted to EPD 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. The resulting Study Area comprising Area A, Area B and Added Area B is as shown in **Figure 1.1**.

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

(a) both land use developments / proposals and associated infrastructure that 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, etc) for supporting the development of the LMC Loop in Area B (including Added Area B) that have been considered and proposed under the Project.

2 Brief Description of the Project

2.1 General Description of the Project Environment

The LMC Loop is located near several major cross-boundary transport nodes including the Lok Ma Chau (LMC) Boundary Control Point (BCP), the 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 and Futian Commercial District Zone. During Shenzhen River training works, the LMC Loop was used as a dumping ground for sediments extracted from the older riverbed, some of which were contaminated.

Outside LMC Loop within Hong Kong side is currently a tranquil rural area which is characterised by essentially rural land uses including arable farming and fish ponds. 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. Furthermore, a large part of the Project lies within the Inner Deep Bay and Shenzhen River Important Bird Area.

A few village settlements, including LMC Tsuen, Pun Uk Tsuen, Chau Tau Tsuen, Ha Wan Fisherman San Tsuen, Shuen Yee San Tsuen and Ma Tso Lung Tsuen lie away from the Project and are mainly surrounded by arable lands and fish ponds.

The area around the San Tin Interchange has been occupied for uses closely related to the cross-boundary activities. These include open car parks and open storage compounds for the cross-boundary commuters and goods, as well as a public transport interchange for cross-boundary shuttle bus services. Further away from the highways, these areas are characterised by rural land uses with arable farming and land covered by trees.

The Project falls within the Deep Bay Water Control Zone according to the Water Pollution Control Ordinance. There is no public sewerage system in the vicinity of proposed development site except for the sewage treatment works within MTR LMC Station, which is designed for terminus use only. Existing domestic wastewater generated by villages nearby is likely discharged directly to nearby streams or collected by individual soak away and septic tanks systems.

2.2 General Description of the Project

The project is to develop the LMC Loop with higher education as the leading land use, complemented by high-tech R&D and C&C industries. According to the development parameters, the estimated total number of students and employees is approximately 53,000, based on a maximum total Gross Floor Area (GFA) of 1,200,000m^2 and an overall plot ratio of 1.37.

The Project comprises the development and infrastructure within LMC Loop (about 87.7ha) according to the Revised Preliminary Layout Plan (PLP) and associated supporting infrastructure / works within and outside the LMC Loop (**Figure 2.1a** to **2.1d**). The proposed key infrastructure include roads within the Loop, external connection roads such as Western Connection Road, Eastern Connection Road and the Direct Link to MTR LMC Station, sewage treatment works, flushing water service reservoir, district cooling systems (provisional),

fire station cum ambulance depot, electricity substations, drainage and sewage systems, water supply network and public utilities. Mitigation measures such as offsite compensation of wetland area and bioremediation works at Shenzhen River are also proposed along with this EIA Study.

Other project components that are related to the implementation of Development of LMC Loop but under separate EIA studies includes Kwu Tung North Fresh Water Service Reservoir and upgrading of Shek Wu Hui Sewage Treatment Works for off-site compensation to comply with the "No net increase in pollution load requirement in Deep Bay". The EIA of these project components were included in the NENT NDAs Study.

2.3 Need and Benefits of the Project

Need and Benefits of the Project

The Project is required to meet the future needs for the development of Hong Kong and Shenzhen and to consolidate the strategic position of the two cities in the region. The unique history and strategic location of the LMC Loop makes it the ideal project for Hong Kong and Shenzhen to showcase the cooperation of both cities in jointly developing this piece of land into a knowledge and technology exchange zone that meets the future development aspirations of the Hong Kong and Pearl River Delta.

With a view to developing a sustainable, environmentally-friendly, energy efficient and people-orientated community, the project vision is to develop the LMC Loop as a hub for cross boundary human resources development within a sustainable Knowledge and Technology Exchange Zone (KTEZ). This would provide impetus for human resources development in South China, enhance the competitiveness of the Pearl River Delta, and benefit the long-term economic growth of the two cities as well as the broader Pan River Delta region.

The Project also aligns with the Framework Agreement on Hong Kong/Guangdong Co-operation (the Framework Agreement) which was signed between the two governments in 2010. One of the major initiatives of the Framework Agreement is to promote collaborative development in Hong Kong and the PRD cities to form a world-class metropolitan region. To achieve this goal, Hong Kong and Guangdong have put forward a number of specific policies and measures. One of the key collaborative developments under the Framework Agreement is to develop the LMC Loop with higher education as the leading land use, complemented by high-tech R&D and C&C industries under the principle of "co-study, co-development and mutual benefit". Through closer co-operation, a world class metropolis comparable with Greater New York and Greater London would be developed as revealed in the second Hong Kong-Shenzhen Co-operation Forum in August 2007. It would facilitate skill and knowledge training, and as well as long term economic development and co-operation for the two cities.

The development proposal is estimated to provide a total of 29,000 job opportunities in the LMC Loop in operational phase. It is anticipated to generate economic activities to benefit the surrounding local population and local businesses. Apart from the job opportunities directly created in the LMC Loop, there will be positive indirect and induced impacts due to creation of additional job opportunities in the rest of the Hong Kong economy. These new job opportunities associated with the advent of new technology and supporting

commercial facilities in the LMC Loop and the rest of Hong Kong will have a positive impact on income and employment rate.

The high value-added higher education, high-tech R&D and C&C industries within the LMC Loop will also provide synergies with eco-tourism and commercial proposals in the neighbouring developments of the Closed Area and the NENT NDAs. It also provides opportunities for upgrading of skills, increased labour productivity and long term employment opportunities to local residents. Provision of an integrated infrastructure system in the area as a whole would enhance connectivity and mobility and would provide opportunity for the population.

A real opportunity to further the economic and social development of Hong Kong and Shenzhen would be provided. The project will promote Hong Kong as an education hub in Asia. The knowledge-rich and diversified atmosphere can facilitate high-tech research and application activities and in turn benefit the innovative economic activities which will enhance Hong Kong's long term competitiveness.

In environmental point of view, the project will provide opportunities to contribute to mitigation of odour impact from Shenzhen River near the LMC Loop and reduce risk due to land decontamination. Although there would also be environmental setbacks, these impacts have been assessed and measures to avoid, minimize and mitigate them have been proposed in this EIA.

Guidelines for 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 treated sewage effluent (TSE) recycling for flushing, irrigation and make-up water for district cooling system were formulated and recommended as 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. For the avoidance of doubt, the environmental impact associated with the proposed TSE reuse and DCS has been assessed in this EIA report.

The environmental benefits will be carbon reduction resulted from the implementation of the proposed green initiatives such as improving building energy efficiency, using energy-saving infrastructure and adopting renewable energy. However, the actual carbon savings achieved by those initiatives related to building energy efficiency and renewable energy are subject to the extent of application by the building developers / owners, as well as the environmental awareness and conscience of the future occupants.

3 Consideration of Alternatives

3.1 General

In conceiving alternative feasible options, key environmental issue such as ecological impact of the development and infrastructure needs carefully assessment in view of the presence of reed marsh, marsh, ponds and seasonal wetlands and the important ecological functional linkage provided by LMC Loop between Tsim Bei Tsui on the west side of Inner Deep Bay and Ng Tung River in the northeast. Other non-environmental factors such as planning parameters, transportation needs, engineering feasibility, site constraints, programme, safety, flexibility and maintenance requirements, land acquisition, interface with nearby projects and disruption to the community were also given due consideration in the formulation of outline development plan / layout plan and infrastructure.

In addition, several public consultation / engagement activities have been carried out before and during the P&E Study to collect views from the public on the development proposals. The pre-study public engagement exercise was conducted between June and July 2008 to collect public views and aspirations on the possible future land uses for the LMC Loop. Upon due consideration of the public views collected in 2008, the Hong Kong and Shenzhen governments agreed that the LMC Loop would be developed with higher education as the leading land use, complemented by high-tech R&D and C&C industries in order to meet the aspirations of the local community in respect of the LMC Loop development.

Stage 1 public engagement under the P&E Study was conducted in Hong Kong and Shenzhen between November 2010 and January 2011 to seek public views on the Preliminary Outline Development Plan (PODP) for the LMC Loop. Based on the public views on the PODP and infrastructure scheme, the draft Recommended Outline Development Plan (RODP) and infrastructure proposals were formulated and put forward to collect public views in the Stage 2 public engagement between May and July 2012.

A Preliminary Layout Plan was then developed taking into account the public views, planning and engineering considerations. The preferred development and infrastructure options are regarded as the most appropriate and balanced scheme, which can minimise the potential environmental impacts associated with the Project and achieve the development requirements.

3.2 Outline Development Plan and Layout Options

Feasible Layout Options

The three layout options, namely flexible, cluster and linear, had been investigated and formulated with regard to the overarching vision and guiding principles. They were conceptually different and aimed to provide different urban design solutions and possibilities to optimize land utilization by allowing a variation in development phasing, building footprints and floor space / land use allocation requirements. The key considerations in deriving the layout options include ecological functional linkage and landscape concerns. These layout options are presented in **Appendix 3-1**.

Option 1: The Flexible option (**Figure 1** of **Appendix 3-1**) is based on the idea of an extensive, dense and continuous series of buildings on a structured grid layout. This option accentuates the idea of the gradual transition of the urbanized context of Shenzhen and rural landscape of Hong Kong via the KTEZ through a series of linear development strips that are designed to accommodate the flexibility to extend by increments southeastwardly according to the actual land use demand. The development strips are permeated by a network of open spaces that serves as 'green connectors' amongst developments as well as between developments and the natural surroundings. As the development strips could be subdivided into development plots of different sizes, this allows a fine urban grain with human-scale environment to emerge. Spaces in between buildings and development plots could form part of the wider circulation network as well as provide pocket green spaces for leisure and passive uses. The central open space could serve as a multi-functional space where people can "go-to", "go-through", and "go-past".

Option 2: The Cluster option (**Figure 2** of **Appendix 3-1**) aims to create a series of predefined development clusters that accommodate high-density buildings with a compact building footprint based on an overall loosely structured urban layout. Each cluster could emerge with a distinctive identity, be independent from each other, and have the flexibility to accommodate different building forms and disposition to suit the needs of the end-users. This design flexibility allows a greater degree of autonomy for various users, whilst keeping the KTEZ as an intact community. The loose urban layout and the individual clusters facilitate the permeation of a non-uniform network of continuous and dynamic green open spaces. Swerving between development clusters, these green open spaces seamlessly sews together the different development parcels as well as integrating the surrounding natural environments with the KTEZ. These interesting green transitional spaces also form a part of the wider circulation network within the LMC Loop.

Option 3: The Linear option (**Figure 3** of **Appendix 3-1**) emerges from a compact linear building fabric that lines the northwestern edge along the Shenzhen River and southeastern edges of the site along the ecological area. The development alongside the edges forms a chain of buildings with continuous façade. To allow for some variation in building form and height profile, landmark buildings could be located in selected prominent places along each of the two development strips. Sandwiched between the two linear development strips is a belt of enclosed, continuous open space which serves as the key element that glues together different developments as well as provide spaces for social gathering, recreation, and leisure activities. This central open space functions as a key circulation feature and plays a major role in facilitating access to different buildings and uses within the site.

Option Evaluation

The formulation of a robust and flexible development option is the key driver for the LMC Loop development. In the formulation process, priority was accorded to layout options that take into account the LMC Loop's uniqueness as the "bridging" element between HK and SZ, embody the flexibility to cope with the changing planning circumstances, explore the development potentials of neighboring communities, support an integrated infrastructure system, and apply sensitive design to enhance environmental and ecological values.

With thorough analysis of the 3 options, the Flexible development (Option 1) was recommended. It performs more optimally in terms of urban arrangement, social, environmental, and economic aspects. The design approach integrates the surrounding ecology and natural setting. The hierarchy of green spaces serve multi-functions, including improvement of microclimate and air circulation, creation of visual corridors, and spaces for passive and active recreation.

Scale of Development

In terms of development density, 3 scenarios (total GFA of 1,200,000m^2, 1,500,000m^2, and 1,800,000m^2) have been assumed and studied. The purpose of these test case scenarios was to provide a starting point as well as a platform for discussion on the development intensity of the LMC Loop and to illustrate the responsiveness of the flexible layout to different development densities in the event of changing circumstances related to the number of population and land requirements. It is considered that the development intensity of 1,200,000m^2 GFA was appropriate to achieve a critical mass that would make the project attractive for development, while having due regard to minimizing ecological and environmental impacts of the area. Based on the principle of sustainable development, the Loop development aims to encompass nature conservation and development that balances environmental, social and economic concerns.

Building Height

Public opinion was one of the key considerations in designing the building heights. As compared with the PODP, the maximum building height has been reduced in the range of 3 to 5 storeys. The RODP has incorporated a more dynamic height profile with more variation in building heights to create a diverse skyline for the LMC Loop. Taller developments may be located at the western corner of the site in proximity to the western entrance of the LMC Loop to serve as a primary gateway for the site. Building heights along the Shenzhen River would be of lower rise and gradually rise towards the centre of the site and again gradually decrease towards the southern boundary of the site. Furthermore, the building height of the commercial sites near Hoo Hok Wai has been reduced to minimize the impacts of the proposed buildings on the birds' flight paths.

Development of Preferred Option

With general support from the public and the stakeholders on the main proposed land uses of higher education, high-tech R&D and C&C industries, the PODP has been refined to formulate the RODP. The following planning considerations were proposed for the RODP and Revised Preliminary Layout Plan:

Ecological Area at south of LMC Loop: With the major birds' flight paths located at the south of LMC Loop, the Ecological Area would be located at the south of LMC Loop to maintain the ecological linkage, mainly formed by the Meander the nearby fishponds at the south of the LMC Loop, with Hoo Hok Wai.

Plot Ratio and Height Profiles: Within the framework of 1.2 million m^2 GFA, the overall plot ratio will be 1.37. The building height profiles were formulated with the regard to the public comments and amenity/activity corridor. The low-rise building will be placed at the south and east of LMC Loop to minimize the impact to flight lines and Ecological Area (EA). Tallest building will be located at the western and central part of LMC Loop, where ecological sensitivity is

relatively less sensitive. The tallest buildings will be approximately 12 storeys from ground level (about 54 mPD).

Flushing Water Service Reservoir at Horn Hill: There is a need to maintain adequate head for flushing water supply. In order to save pumping energy for individual buildings, the flushing water service reservoir would be located at hill side. Thus, the flushing water service reservoir will be located at Horn Hill, which is the highest hill near LMC Loop.

Sewage Treatment Works at southeast corner of LMC Loop: Given the location of flushing water service reservoir at Horn Hill, the on-site sewage treatment works was sited as close as possible, i.e. southeast corner of LMC Loop. The buildings at the on-site sewage treatment works will be low-rise with minor human activities. Thus, it has benefits on minimizing ecological impacts when compared with the alternative site at other locations within LMC Loop.

Amenity/Activity Corridor in north-south direction at centre of LMC Loop: The location of amenity/activity corridor is designed to facilitate the activities of the future users within the Loop and to complement the long-term proposals in Shenzhen so that a visual and wind corridor links up Shenzhen with Hong Kong.

3.3 Feasible Alternative Infrastructure Options

In order to support the future development and population in LMC Loop, associated infrastructures will be required. Considerations in devising preferred options for Ecological Area (DP1), Western Connection Road (DP2), Direct Link to MTR LMC Station (DP3), Drainage System under Internal Transport Networks (DP4), Sewage Treatment Works (DP5), Eastern Connection Road (DP6) and Flushing Water Service Reservoir (DP7) are highlighted below.

3.3.1 Ecological Area (DP1)

A 12.8 ha Ecological Area (EA) will be established to compensate for the direct loss of reed marsh area within LMC Loop. Alternative sizes would be either fail to fulfil the compensation needs (if too small) or unable to achieve the development needs (if too large). In order to maximize the ecological value of the EA, it is located to include most bird flight paths and enhance linkages with the Meander and fishponds. Alternative locations and designs would reduce the function and values.

In addition, the EA will also serve a side function as a flood storage pond to temporarily retain part of the storm water from the LMC Loop before conveyed to Shenzhen River. As there is no excess runoff to the Meander, hydrological change will be negligible. The profile of EA has followed the recommendations of Drainage Impact Assessment Report.

3.3.2 Western Connection Road (DP2)

Provision of transportation infrastructure is required for accessing the LMC Loop. The main purpose of Western Connection Road (WCR) is to provide a direct linkage between LMC Loop with the external road and highway network at the southern end of the connection road, i.e. San Tin Highway and Castle Peak Road.

The current Ha Wan Tsuen Road and LMC Road could not meet the future traffic need generated by the LMC Loop development. Thus, new road or improvement of existing road will be required. Five options (Options W1, W2, W3, W4 and W5 in **Appendix 3-2a**) have been investigated and major considerations for selecting the preferred option are highlighted as follows:

- The alignment should be selected to utilise existing roads (improvement works) as far as possible to minimise the impact associated with construction and operation of the new road.
- The alignment should be determined to minimise the impacts on ponds and avoid disturbance to undistributed large ponds to minimise ecological impacts.
- The road alignment should be away from the existing Boundary Patrol Road adjacent to Shenzehn River for security consideration.
- Utilization of the existing Lung Hau Road is not preferable as it is the sole emergency vehicular access (EVA) for the MTR LMC Station / Lok Ma Chau Spurline Boundary Control Point. The increased traffic flow from LMC Loop might affect the operation of the EVA in case of any incidents.
- Upgrading works of the existing Border Road should be minimised as such works might include more extensive slope stabilisation works due to limited flatlands and more disturbance to the adjacent ponds.
- The alignment should be designed to minimise landscape and visual impact and avoid affecting potential old and valuable trees.

The road options involved the possible utilisation of the existing LMC Road, and either of existing Lung Hau Road, Ha Wan Tsuen Road or Border Road. Option W3, comprising widening of the existing Ha Wan Tsuen Road and LMC Road with a bridge across the Meander, is recommended for the WCR. It provides the most direct and convenient route to the LMC Loop, has relatively low impact on environment, and involves less construction issues. Unlike some of the other options, this scheme need not utilize the existing Border Road and minimise the extent of the works. Furthermore, as this scheme does not directly pass through the existing villages, resumption of private land could be minimized. Noting the presence of potential old and valuable trees along the eastern edge of Ha Wan Tsuen Road, the road will be widened towards the western side, thereby requiring encroachment upon the adjacent fish ponds. Nevertheless, this option is recommended taken into account the overall environmental, safety and security considerations.

The LMC Road Connection to Fanling / San Tin Highway is a direct and simple route to serve the future traffic requirement. Minimum footprint and construction extent was designed. Alternative alignments, such as further east or west would lead to longer span and over design.

As a result, the WCR is designed as a two-lane single carriageway by widening the existing Ha Wan Tsuen Road and Lok Ma Chau Road (about1.3 km long) and constructing a slip road connecting to San Tin Interchange (about 480m long) in form of viaduct.

3.3.3 Direct Link to Lok Ma Chau Station (DP3)

The purpose of Direct Link to Lok Ma Chau Station is to transport local Loop users to existing MTR networks and the cross-boundary Loop users to LMC Spurline Boundary Control Point. In considering the limited space for deep tunnel landing and large construction footprint due to cut-and-cover activities for shallow tunnel, tunnel is not proposed. While utilizing existing Border Road (from LMC Loop to LMC Station) may be an alternative, it is considered not an option on security considerations (**Appendix 3-2c**). Therefore, viaduct is proposed and the spans between piers are 30m to 60m. Due to security reason, cycle track and pedestrian path is not proposed. The alignment of the Direct Link options have been designed to follow the existing railway reserve of the LMC Spur Line as far as possible to minimise the ecological impact to the existing fish ponds and to keep away from the existing New Boundary Patrol Road to reduce the security impact.

Instead of at-graded road, viaduct could minimise the permanent encroachment to wetlands. In order to avoid reedbed loss within LMC Station, all the piers will be constructed on bunds between reedbeds. However, there will be temporary reedbed loss during construction phase for the purpose of site requirements. The maximum affected area is 320m^2, compared to the entire reedbed area of 4.76 ha. Although a longer span with suspension bridge might be an option to avoid reedbed loss, it requires high bridge tower with solid foundations which would induce impact to bird flight lines.

Various transportation mechanisms to achieve an Environmental Friendly Transport System (EFTS) have been considered. In view of the relative short distance between the LMC Loop and MTR LMC Station, various forms of the Direct Link: Footbridge cum Travellator Option, Non Road-Based EFTS Linkage Option in the form of an Automatic People Mover system and Road-Based EFTS Linkage Option in the form of bus rapid transit system (BRT) using electric, supercapacitor or hybrid vehicles (**Appendix 3-2c**) had been considered.

Financial and economic appraisals for the above mentioned options suggested that the Footbridge cum Travellator Option and Non Road-Based EFTS Linkage Option are not financially viable without government support. From environmental point of view, the locations of Direct Link will lie on a major flight path across the Meander. The Road-Based EFTS Linkage Option will connect to the proposed WCR without additional structures above the Meander. Nevertheless, due to the design limitation of travellator and APM, viaducts crossing the Meander are unavoidable and thus induce additional ecological impact. Having considered the cost-benefit and possible ecological impact to major flight paths, Road-Based EFTS Linkage Option is selected and the alignment has been further refined in order to minimise the encroachment extent upon the compensation reedbeds for waste water polishing.

The about 770m long Direct Link is designed in the form of road-based two-lane single viaduct, with elevation up to 17.6 mPD.

3.3.4 Drainage System under Internal Transport Networks (DP4)

According to the preliminary design, the drainage network will include 900mm to 2250mm drainage pipes, 3000x2500mm and 3500x2750mm box culverts. The alignment of the drainage system generally follows the internal transport network in order to minimize construction extents and to facilitate future maintenance. The design of internal transport networks together with the associated utilities such as electricity cables, as well as drainage, sewerage and water supply networks is in response to the selected options of development layouts and external connections. In consideration of the relatively small scale of overall development area, a simple road circulation system has been proposed for the internal transport network.

The existing drainage catchment within LMC Loop diverts runoff to Shenzhen River via the Meander (with about 30% to 50% runoff) or directly to Shenzhen River. In the drainage network design, the same strategy is adopted, i.e. excess runoff will be partially diverted to Shenzhen River and Ecological Area (instead of Meander to avoid the discharge to Meander) respectively. The runoff discharged to the Ecological Area will then be conveyed and discharged at the Shenzhen River. The alternative arrangement of diverting all flow to one side of the LMC Loop is not recommended since it will involve larger extent of site formation to maintain the topography which in turn lengthens the construction period.

3.3.5 Sewage Treatment Works (DP5)

An on-site sewage treatment works will be provided on the east side of the LMC Loop for treatment of sewage arising from the development of LMC Loop. The Treated Sewage Effluent (TSE) could be reused fro non-potable use. This will not only reduce water consumptions but will also minimise the amount of effluent discharge. In order to comply with the requirement of "No net increase in pollution load requirement in Deep Bay" policy, two compensation options have been considered:

- **On-site compensation:** Water from Shenzhen River would be diverted and mixed with the sewage treatment work (STW) effluent before being treated by biological filters, which will be installed inside the proposed onsite STW. The additional biological filters will reduce the pollutants in the diverted Shenzhen River water, therefore, compensating for the residual load generated from the development area.

  It is noted that the majority of existing pollution loadings to Shenzhen River is from Shenzhen side. With the loading from Shenzhen side expected to continuously reduce in the coming future, this may result in a changing compensation requirement and lead to design / operation complications for a dedicated on-site STW facility. Therefore, this option is not recommended.

- **On-site STW cum Off-site compensation in Yuen Long Sewage Treatment Works (YLSTW) or Shek Wu Hui Sewage Treatment Works (SWHSTW):** While on-site compensation is not feasible in engineering consideration, provision of on-site STW cum off-site compensation by upgrading of Yuen Long Sewage Treatment Works (YLSTW) or Shek Wu Hui Sewage Treatment Works (SWHSTW) is considered. As the effluent from

the YLSTW/SWHSTW is discharged to the Deep Bay catchment area, the upgraded YLSTW/SWHSTW can be designed to compensate for the residual loads from the LMC Loop development area.

On the other hand, on-site STW cum off-site compensation is more adaptable to the changing compensation requirement and thus this option is recommended. SWHSTW, which can be upgraded and is currently under planning for expansion to cater for the future increased flow from the NDAs, will provide the off-site compensation for the residual loads from LMC Loop as there is currently no plan to upgrade YLSTW. Therefore, with consideration of works minimization (i.e. site footprints, programme, cost, etc), upgrading the existing SWHSTW for DP5's compliance with the "No net increase in pollution load requirement in Deep Bay" policy was recommended.

In addition, the at-graded layout of STW was selected due to cost-benefit consideration, reduced waste generation and reduced energy consumptions compared with underground options. To reduce environmental impacts, screw pumps will not be used to minimise visual impact. The design capacity of the proposed STW within LMC Loop will be 18,000m^3/day. Membrane Bio-Reactor (MBR) is recommended due to its compact size and efficiency compared to other conventional sewage treatment system.

3.3.6 Eastern Connection Road (DP6)

The LMC Loop will be commissioned in stages, whereby the traffic flows during the interim stage would not warrant the need for the construction of a new road at the eastern side. However, it is anticipated that the western connection alone will not be able to handle the traffic generated by the LMC Loop during full operation stage. The possibility of providing an alternative access to the Kwu Tung North New Development Area (KTN NDA) and also downtown to Sheung Shui direction from the west had been previously considered, but the capacities of WCR will be overloaded due to lack of feasible alternative routes in the west and the fact that placing both external access points in the west would not resolve the emergency vehicle access route issue for the LMC Loop development, therefore it has been recommended to design the road configuration to the eastern side of the LMC Loop and linking it with the future KTN NDA.

Nine alignment options (Options E1, E2, E3, E4, E5, E6, E7, E8 and E9 in **Appendix 3-2b**) have been investigated for the Eastern Connection Road (ECR) and the considerations in devising the preferred option are summarised as follows:

- Ecological impact including effect on birds' flight line should be considered. Viaduct across the Meander where major birds' flight corridor located should be avoided.
- Fragmentation should be minimised (if not avoidable). The form of the proposed infrastructural link (e.g. at grade road, viaduct, depressed road, underpass, etc.) should be carefully considered and adequate animal passages should be incorporated in the design.
- Ponds at Hoo Hok Wai show strong ecological linkages to the extensive fish pond area elsewhere in the Deep Bay area, especially for wetland birds, and

large waterbird species in particular. Disturbance to the ponds at Hoo Hok Wai should be avoided and minimised.

- The design should take into account road and fire safety issues.
- The design of ECR should enhance connectivity to nearby area and be connected to local roads so that nearby villages could access to the proposed Kwu Tung North New Development Area via ECR. This request has been raised during the public engagement exercise.
- The scale of the proposed connection road should be duly restricted to avoid it outweighing the scope of the LMC Loop development.
- The scheme should not pose major planning and engineering constraints on the development of the LMC Loop such as occupying unreasonable large portion of the scarce land in LMC Loop.
- Disturbance to nearby community should be minimised.

Amongst the alignment options, Options E6 (tunnel-based) will induce lesser wetland loss and lesser disturbance to surroundings than those of other options. However, Option E6 may impose planning and engineering constraints since it will take a longer length to rise to the site formation level within the LMC Loop. In addition, this option does not allow connection to the villages at Ma Tso Lung, thereby not benefiting improvement of the accessibility to these villages.

The alignments of Option E1 and E2, which strikes a careful balance by having the least overall environmental impact, requirement for land resumption, and associated cost of construction, were further investigated and refined in order to combine the environmental benefits of Option E6 and planning/operation advantage of Options E1 and E2. Three additional options, Options E7 to E9 were proposed.

While the deep tunnel options have the key advantage of generating minimal ecological impact to the existing fish ponds and the Meander, they also carry many significant drawbacks such as the land consumption in LMC Loop and safety issues. Option E9 is intended to minimise the ecological disruptions by designing the carriageway at below-ground level, while eliminating the constraints arising from deep tunnel configurations. This option similarly adopts the Option E1 alignment, but instead of having a deep tunnel crossing through the fish ponds and Meander, the road passes through the fish pond as a depressed road and crosses the Meander and Ecological Area as a shallow underpass. As the underpass section is only 200m long, it avoids the need for a full tunnel design and could also maintain a 2-way single carriageway configuration, unlike the possibility to over-design a deep tunnel as in Options E7 and E8. Furthermore, as the road level of the underpass level is only -9mPD, the need for a long approach ramp will be eliminated, thus allowing a better interface with the internal road network and public transport services. The use of depressed road will cause some ecological disturbance. During the operational phase, such disturbance could be greatly reduced by the use of low level shrubs and trees on both sides to serve as visual barrier to the depressed road. Furthermore, animal overpass above the depressed road would be provided to maintain connectivity for terrestrial mammals.

After careful balancing the various important considerations and views from the public, Option E9 (shallow underpass cum depressed road) has been selected as the preferred option due to the following key advantages over the other alternatives:

- Use of underpass to cross underneath the meander avoids permanent operational phase impacts, in particular relating to disturbance to Eurasian Otter and the bird flight line corridor;
- The combined use of shallow underpass and depressed road under the fish ponds and Meander is a significant advantage over the open access road option, and minimizes any ecological impact in the operational phase to the maximum practical extent;
- Potential visual impact of the depressed road could be effectively mitigated by providing shrubs and trees on both sides. Short length of the shallow underpass eliminates the need for a full tunnel design. The option results in an energy-saving design since no mechanical ventilation and smoke extraction system are required for the underpass. This means also significantly lower maintenance costs and resources (e.g. energy consumption), keeps the scale of road infrastructures more compatible with the overall scale of development, maintains a highly integrated road system, and is a significant advantage over the deep tunnel option;
- The scheme allow the adoption of a compact design, i.e. 2-way single carriageway configuration, whereas deep tunnel options requires an overdesign with dual 2-lane and double tube for safety reason;
- By virtue of much shorter approach ramp, shallow underpass option allows a higher flexibility for arrangement of public transport services for the Loop and the associated parking control strategy without causing major detours for Loop users, and does not undermine the effectiveness and attractiveness of the eastern connection road; and
- Minimal impact to the land use planning of the LMC Loop.

The design of the proposed ECR is in the form of two-lane single carriage linking from LMC Loop to NENT NDAs via Ma Tso Lung. It involves widening part of existing Border Road and new road near Ma Tso Lung as well as construction of at-grade carriageway, depressed road/underpass crossing the Meander and fishponds and minor viaducts across streams. The totally length of the ECR is about 2.2km comprising 610m depressed road, 200m underpass, 50m viaduct, and 1,350m at-grade road.

3.3.7 Flushing Water Service Reservoir (DP7)

The Treated Sewage Effluent (TSE) is proposed to be reused in the long-term for non-potable uses such as toilet flushing, landscape irrigation and make-up water for district cooling system (DCS), if proceeded.

TSE from the STW will be diverted to a flushing water service reservoir and supplied to the development for non-potable use. The locations of flushing water

service reservoir should be erected in hinterland and close to the STW such that adequate hydraulic head is maintained and energy consumption for pumping the TSE to the service reservoir can be saved when compared with the on-site options. In addition, in order to minimize workfront areas as well as the associated direct and indirect environmental impacts, the pipeworks associated with the flushing water service reservoir will mainly align with the ECR. Due to limited choice of hinterland available, a single option is proposed.

The footprint of Flushing Water Service Reservoir is about 1,350m^2. The estimated amount of TSE to be reused within LMC Loop development is 10,460 m^3/day. The treatment of TSE up to the proposed reuse quality will be located within the on-site STW, including the chlorine contact tank, chemical storage, TSE storage and distribution pumps connecting to the service reservoir and supply pipe network. The water quality for TSE reuse for various non-potable reuses are formulated with reference to the prevailing water supply guidelines or on-going TSE reuse projects for the intended non-potable water uses, balancing with practicality and anticipated end-user satisfaction.

4 Summary of Main Findings of the Assessment

4.1 General

The EIA Study was conducted in accordance with EIA Study Brief No. ESB-238/2011, following the guidelines on assessment methodologies in the Technical Memorandum on Environmental Impact Assessment (EIAO-TM). Cumulative impacts with other concurrent projects have been taken into account in the assessment.

This Executive Summary highlights the key identified impacts and proposed mitigation measures. A table of Impact Summary in accordance with Clause 3.4.18 in EIA Study Brief is presented in **Appendix 4-1**. The key findings of the EIA study are summarised below:-

4.2 Air Quality

4.2.1 Construction Phase

Potential dust impact would be generated from the site formation and clearance, ground excavation, construction of associated facilities, wind erosions during the construction phase.

A total of 64 representative air sensitive receivers have been identified within 500m from the Project boundary including the proposed development, buildings alongside the associated infrastructures, etc. Quantitative fugitive dust assessments have been conducted, taking into account the cumulative impact caused by the nearby concurrent projects. Effective dust control following the requirements given in the Air Pollution Control (Construction Dust) Regulation and in accordance with the EM&A programme during construction are recommended.

Under the unmitigated scenario, the predicted cumulative 1-hour, 24-hour and annual Total Suspended Particulate (TSP) at ASRs are summarized in **Table 4.1** below. Assessment results suggested that watering at site once per hour during working hours (9:00a.m. - 5:00p.m.) would be required to control the fugitive dust impact to the acceptable levels. The mitigated 1-hour, 24-hour and annual TSP at ASRs are summarized in **Table 4.1** below.

Table 4.1 Summary of Predicted Construction Dust Level (in µg/m^3)

	1-hr TSP	24-hr TSP	Annual TSP
Background	73.1	73.1	73.1
Concentrations at ASR (Unmitigated)	386.9 – 13,982.1	97.8 – 2,211.1	73.2 – 87.3
Concentrations at ASR (Mitigated)	81.3 – 489.6	73.8 – 168.3	73.1 – 74.6
Criteria	500	260	80

Note: Minimum value for mitigated scenario were extracted from dust model files.

4.2.2 Operational Phase

During operational phase, vehicular emissions from the associated road traffic as well as odour emissions from the on-site sewerage treatment works have been investigated through quantitative air quality assessment. The assessment has been conducted in accordance with the requirements of Annexes 4 and 12 of the TM-EIAO as well as the requirements set out under Clause 3.4.3 of the EIA Study Brief. A total of 64 representative air sensitive receivers have been identified within 500m from the Project boundary, with 33 existing ASRs and 31 planned ASRs including the proposed development, buildings alongside the associated infrastructures, etc.

The vehicular emission from the road networks has been estimated by using a finer model EmFAC - HK (ver. 2.1), whilst CALINE4 and ISCST3 models have been used to simulate the local dispersion. The predicted results indicate that the cumulative air quality impacts caused by all neighboring pollution sources due to the vehicular emission are all within acceptable levels of Hong Kong Air Quality Objectives (HKAQO).

The vehicular emission from the underpass connecting Loop internal road and Eastern Connection Road has been estimated by using ISCST3 model in accordance with the Permanent International Association of Road Congress Report (PIARC, 1991).

The predicted nitrogen dioxide (NO_2) and Respirable Suspended Particulate (RSP) at ASRs are summarized in **Table 4.2** below.

Table 4.2 Summary of Predicted Air Quality due to Vehicular Emission (in µg/m^3)

	1-hr NO2	24-hr NO2	Annual NO2	24-hr RSP	Annual RSP
Background	48.5	48.5	48.5	50.5	50.5
Concentration at ASR	56 - 183	50 - 68	49 - 57	51 - 54	50 - 52
Criteria	300	150	80	180	55

There would be odour nuisance likely arise from Shenzhen River, proposed LMC Sewage Treatment Works (LMC STWs) and Binhe Sewage Treatment Work. 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, residual impact of odour at the ASRs within the LMC Loop area were predicted. Continual improvement measures by the Shenzhen Municipal Government (SZMG) allow reduction in odour emission from estuaries and sewage discharge points. With the 12th 5-year plan targeting 95% centralised sewage collection and treatment, 92% was adopted in this assessment as a conservative assumption. If SZMG could achieve 92% or above centralised sewage collection and treatment, the odour level within Loop development could comply with 5 OU criterion over the long term.

In order to achieve 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 dosage and frequency of injection will also be established. If

the removal efficiency of bioremediation is lower than 98%, chemical dosage and frequency for bioremediation works will be increased to attain the removal target. The predicted odour levels are summarised in **Table 4.3**.

Table 4.3 Summary of Predicted Odour Level (in OU)

	Odour Level at ASRs
Project Contribution (on-site STW)	< 0.109
Unmitigated – Cumulative	47.2 to 153.5 (exceedance percentage <20.2% by time)
Mitigated (Short Term) – Cumulative	10.8 to 14.5 (exceedance percentage <3.0% by time)
Mitigated (Long Term) – Cumulative	3.5 to 4.7
Criteria	5

In addition, if buildings with central air conditioning in the development would be equipped with odour removal system capable of 95% removal efficiency as an interim contingency measure depending on the prevailing circumstances at the time, the residual odour impact would be reduced and the odour criterion inside all internal spaces as a fall back arrangement. With the continual improvement in Shenzhen River by the SZMG, odour level could comply with 5 OU criterion over the long term.

4.3 Noise

4.3.1 Construction Phase

Construction noise assessment has been conducted. A total of 18 representative noise sensitive receivers (NSRs) have been identified within 300m from the Project boundary. Results indicate that the noise impacts on all of the NSRs under unmitigated scenario would range from 63dB(A) to 90dB(A). 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, all NSRs would comply with the stipulated noise criterion with the noise impacts in a range from 54dB(A) to 75dB(A).

Construction access road traffic noise assessment on the access route along LMC Road and Ha Wan Tsuen Road for advance works (Assessment Year: 2016) and along Sai Kwo Road, Lok Ma Chau Road and Ha Wan Tsuen Road for site formation (Assessment Year: 2020) has been conducted. A total of 55 representative noise sensitive receivers have been identified within 300m from the Project boundary. Results indicate that the noise impacts on all of the NSRs under unmitigated scenario would range from 43dB(A) to 75dB(A) in Year 2016 and 50dB(A) to 76dB(A) in Year 2020 respectively. With the provision 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 with the noise impacts in a range from 43dB(A) to 75dB(A) in Year 2016 and 50dB(A) to 75dB(A) in Year 2020 respectively. Exceedance was predicted at NSR TWOR-1 but the contribution due to the 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.

4.3.2 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. A total of 144 representative noise sensitive receivers have been identified within 300m from the Project boundary. Results indicate that the noise impacts on all of the NSRs under unmitigated scenario would range from 38dB(A) to 77dB(A). Traffic noise impact on the sensitive receivers outside the LMC Loop will be mitigated by 0.8m to 5m reflective noise barriers and controlled in a range from 37dB(A) to 76dB(A). Exceedance was observed at NSRs KTN-50, KTN-51, TWOR-1 and CTT-P3 in which their 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. 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.

4.4 Water Quality

The potential water quality impacts arising from the construction and operation of the Loop have been assessed in accordance with the requirements of Annexes 6 and 14 of the TM-EIAO as well as the requirements set out under Clause 3.4.6 of the EIA Study Brief.

Water sensitive receivers (WSRs) have been identified for the LMC Loop, including Shenzhen River, LMC meander, San Tin wetlands, Hoo Hok Wai and Ma Tso Lung Nullah.

During construction phase, potential water quality impacts would arise from construction runoff, groundwater from contaminated area, swage from workforce, riverbanks formation for ecological area, construction of bridge crossing under WCR, underpass / depressed road works and direct link to LMC Station as well as the bio-remediation of Shenzhen River. Control measures such as silt traps and oil interceptors will be implemented on site to control the potential surface runoff. Good site practice as stipulated in the Practice for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94) should be followed. Cofferdam/diaphragm wall will be employed to prevent disturbance to waterbodies during the construction of bridge pier and cut-and-cover underpass. Regular water quality monitoring in the meander has been recommended.

During operational phase, the major water pollution source would be the sewerage and sewage implication from the proposed sewerage treatment works for LMC Loop. The “No net increase in pollution load requirement in Deep Bay” will be fulfilled by loading compensation of Deep Bay catchment through upgrading Shek Wu Hui STW to advanced treatment level. Control measures like silt traps and oil interceptors will be implemented to control the potential surface runoff during operational phase as well.

With full implementation of the mitigation measures, no adverse residual and cumulative impacts are anticipated during both the construction and operational phase of the Project.

4.5 Sewerage and Sewage Treatment

The potential sewerage and sewage treatment implementations, which may arise from the Project has been assessed in accordance with the requirements of Annexes 14 of the TM-EIAO and EPD Report No. EPD/TP 1/05 Guidelines for Estimating Sewage Flows (GESF) for Sewerage Infrastructure Planning Version 1.0 as well as the requirements set out in Clause 3.4.5 and 3.4.7 of the EIA Study Brief.

Under current condition, there is no public sewerage system in the vicinity of proposed development site. The proposed LMC Loop development will generate additional sewage flows of about 15,000m^3/day which cannot be handled by the existing Yuen Long Sewage Treatments Works (YLSTW) or Shek Wu Hui Sewage Treatment Works (SWHSTW). In order to comply with "no net increase in pollution load requirement in Deep Bay", construction of a new onsite STW such as membrane bioreactor treatment process within the LMC Loop and upgrading of SWHSTW under separate projects are proposed. The design treatment capacity of the onsite STW is 18,000m^3/day. The reuse of treated sewage effluent, if proceeded, will be used for non-potable uses such as flushing water, irrigation of the landscaping areas and make-up water for the provisional district cooling system. With the proposed sewerage treatment facilities and upgrading works, it can be concluded that there will be no adverse sewerage and sewage treatment implications due to the Project.

4.6 Waste Management

4.6.1 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 to be disposed. Recommendations have been made for implementation by the Contractor during the construction period 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 1,391,900m^3 of inert materials would be generated from the Project. 976,700m^3 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 271,500m^3 non-inert materials would also be generated. 247,500m^3 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 64,000m^3 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.

4.6.2 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.

4.7 Land Contamination

Land contamination assessment has been carried out, which includes review of historic information and aerial photos, site appraisal, and site investigation for soil and groundwater sampling and testing in LMC Loop etc. Contamination Assessment Plan (CAP), Contamination Assessment Report (CAR) and Remediation Action Plan (RAP) for the LMC Loop have been submitted and agreed by EPD.

5 zones within LMC Loop were identified as contaminated by the metal Arsenic. The volume of contaminated soil is tentatively estimated as 57,444m^3.

Remediation by Solidification/Stabilization is recommended. Mitigation measures are proposed during excavation and remediation of the contaminated soil in order to safeguard the general environment, 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 outside LMC 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 PP would prepare and submit the Supplementary CAP to EPD prior to the commencement of SI works. Following on from the submission of CAP and completion of SI, the PP would prepare a CAR, a RAP and a Remediation Report (RR) and submit to EPD for agreement prior to commencement of the works for the development.

4.8 Hazard to Life

According to Clause 3.4.10 of the Study Brief, a hazard-to-life assessment has to be conducted if there is use of explosives for the construction activities and the storage or blasting location is in close proximity to populated areas and/or Potentially Hazardous Installation (PHI) sites.

As the development is outside the consultation zone of the nearest PHI and explosive are not required during construction, it is concluded that quantitative hazard assessment is not required.

4.9 Cultural Heritage

The potential cultural heritage impacts arising from the construction and operation of the Loop have been assessed in accordance with the requirements of Annexes 10 and 19 of the TM-EIAO as well as the requirements set out under Clause 3.4.11 of the EIA Study Brief.

In accordance with the archaeological survey findings at LMC Loop, Ma Tso Lung, the areas along Border Road, Ma Tso Lung Road and Ho Sheung Heung Road as well as the proposed alignments of Western Connection Road (including the connection to San Tin Highway), there was no sign of archaeological potential in the surveyed area. The overall archaeological impact on LMC Loop and the associated infrastructures outside LMC Loop arising from the Project is considered to be negligible.

Desktop review and field survey has been conducted for historic buildings and direct impacts are not expected. There will be minor visual impact from its surrounding development but it can be mitigated by providing plant screening.

4.10 Landscape and Visual

Within the Study Area, there are 17 out of total 57 key landscape resources (LRs) such as marshes, mixed woodlands, fishponds and natural river/stream and 4 out of 9 key landscape character areas (LCAs) such as rural lowland and hillside landscape areas of high importance. A total of 28 visual sensitive receivers (VSRs) were selected for the visual assessment, of which there are 7 VSRs considered to have high sensitivity to visual impacts from the implementation of DPs, including villagers living adjacent to the DPs.

4.10.1 Landscape Impact

The main potential impacts on existing landscape resources are the loss of existing trees and landscape resources due to the site formation works, drainage system and internal road network, sewage treatment plant on the LMC Loop; road modification and widening along Ha Wan Tsuen Road and LMC Road for the WCR including a slip road from LMC Road to San Tin Highway, road modification of existing Boundary Patrol Road at Ma Tso Lung and a new road section connecting to Planned KTN NDA for the ERC, construction of noise mitigation, a viaduct link to MTR LMC Station, and Flushing Water Service Reservoir at Ping Hang.

A broad brush tree group survey found approximately 6,600 trees within or located very close to the proposed works areas of the Project, including approximately 2,500 trees located on the LMC Loop (Over 90% are *Leucaena leucocephala*) and 4,160 trees within the works areas of road and utilities works proposed outside the LMC Loop. All weedy trees, *Leucaena leucocephala*, found on site shall be removed following good horticultural practices. Of these, it is estimated that approximately 30% including the mature specimen can be retained or transplanted. A large number of the trees that need to be felled are of non-native roadside trees having lower individual ecological and amenity value as well as fast growing undesirable species colonised the abandoned sites. Compensatory planting utilising both ornamental and native species will be implemented as mitigation measures and it is expected that the loss of trees will be compensated in terms of both quantity and quality with a replanting ratio not less than 1:1.

To minimise the potential impacts, a number of mitigation measures have been recommended during the construction phase including preservation of existing trees where possible, limited works areas and coordination with concurrent projects, reinstatement and creation of reedbed/fishpond/marsh, replanting of disturbed vegetation at the earliest possible stage, and transplanting of existing

trees where practicable. During the operation phase, measures to mitigate the permanent landscape impacts include compensatory planting with provision of large ornamental trees for roadside, amenity and woodland planting utilised a combination of native, ornamental and broadleaf species. With full establishment of the mitigation measures and maturity of the landscape planting, most of the landscape impacts will be alleviated to a slight adverse to negligible level and the entire LMC development will fit into existing rural lowland and riverside landscape context.

4.10.2 Visual Impact

The proposed institutional development associated with infrastructure and utilities facilities on the LMC Loop, WCR road works and noise barriers along Ha Wan Tsuen Road and LMC Road and the Direct Link to MTR LMC Station would have significant impact on VSRs located at LMC Cross-boundary Infrastructure Facilities, Ha Wan Tsuen and LMC Tsuen under the unmitigated scenario, due to their close proximity to the works. With full establishment of visual mitigation measures and maturity of the landscape planting including limited works areas, responsive design of institutional development, road alignment and viaduct, noise barrier structures, the use of vertical greening measures where possible on built structures and the restoration of the disturbed areas with roadside and amenity planting, most of the visual impact on the above VSRs will be alleviated to a moderate to slight level.

Other VSRs, such as villagers at San Tin, Ma Tso Lung and alongside of existing Boundary Patrol Road connecting LMC and Ma Tso Lung and vehicle travellers and pedestrians along Ha Wan Tsuen Road, LMC Road, existing and planned Boundary Patrol Road, Fanling and San Tin Highways, may experience moderate to slight visual impacts due to the change in visual context and loss of existing landscape features as a result of the development in the LMC Loop and/or associated road and utilities works outside the LMC Loop, the WCR, ECR and Flushing Water Service Reservoir under the unmitigated scenario. With full establishment of visual mitigation measures and maturity of the landscape planting including limited works areas, responsive design of institutional development and engineering structures including road alignment, viaduct, slip road and noise barrier structures, the use of vertical greening measures where possible on built structures and the restoration of the disturbed areas with roadside and amenity planting, most of the visual impact on the above VSRs will be alleviated to a negligible level.

With the implementation of the above mitigation measures, the visual impacts of the proposed works for the entire LMC Loop would be acceptable.

4.11 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 around construction areas, designed along infrastructural connections to allow or deter animal passage as required.
- Implement standard measures to minimise magnitude of construction run-off and spillage events.
- No dry season construction works associated with ECR outside current boundary fence and stabilisation of banks of LMC Meander.
- 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 stabilisation of banks of LMC Meander over period of 2 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.

On the basis of these impacts of Low severity, the Project is considered acceptable in terms of ecological impact.

4.12 Fisheries Impact Assessment

The fisheries impact assessment has been conducted in accordance with the requirement of Annexes 9 and 17 of the TM-EIAO as well as the requirements set out under Clause 3.4.14 of the EIA Study Brief. Desktop survey and site visits have been undertaken to investigate baseline information on actual fisheries status at fish ponds in the vicinity of the Project. There are no capture fisheries known within the fisheries assessment area, and no assessment of impact is carried out.

The temporary and permanent loss of active, inactive and abandoned ponds is as **Table 4.4**:

Table 4.4 Direct loss of fish ponds arising from the Project.

Development aspect	**Temporary Loss**			**Permanent Loss**		
	Active	**Inactive**	**Abandoned**	**Active**	**Inactive**	**Abandoned**
WCR/LMC DC	2.51-	1.10-	-	2.01	0.31	0.82
ECR	3.32-	-	-	2.10		-
WMA Area 2	-			7.16	1.29	-
WMA Area 4*	-			3.32*	-	-
WMA Area 7	-					3.08
WMA Area 9	-			1.34		5.48
Total	5.83	1.10	-	12.61	1.60	9.38

* potential alternative to use of Area 9, not included in total sum.

WCR/ECR = Western/Eastern Connection Road; WMA = wetland mitigation area

Permanent loss of a small area of active, inactive and abandoned ponds is considered to be a minor impact, in view of the small contribution to the total fish pond area in Hong Kong. It is considered that no mitigation is required for this loss.

Secondary fisheries impacts on pond potentially comprise water quality issues arising from sewage and runoff, blockage of access in either construction or operation phase, and bund stability or water seepage issues.

In general, with the current alignment selected for external connections, and good site practices implemented to minimize dust, water quality and waste impacts, no unacceptable direct and indirect impacts on fisheries from the construction activities and operation of the proposed development and infrastructure are anticipated.

4.13 Landfill Gas Hazard

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

4.14 Food Safety Implication

Potential food safety implications on fish ponds in association with excavation works were evaluated taking into account available baseline reference for ecotoxicity of pond fishes, contaminated dust migration to fish pond during excavation and ingestion of contaminated dust by pond fishes.

Estimated contaminated concentrations in fish attributed to the Project are insignificant compared with the Food Safety Standards under Hong Kong Regulations, and thus potential food safety implications are not anticipated.

4.15 Environmental Monitoring and Audit

An environmental monitoring and audit (EM&A) programme will be implemented throughout the entire construction period to regularly monitor the environmental impacts on the neighbouring sensitive receivers. Any action required during the operational phase has also been recommended for implementation.

The EM&A programme would include site inspection / audit and monitoring for construction dust, odour, construction airborne noise, operation airborne noise, water quality and updating changes as necessary. Details of the recommended mitigation measures, monitoring procedures and locations are presented in a standalone EM&A Manual.

5 Conclusion

An EIA Report has been prepared to fulfil the requirements as specified in the EIA Study Brief No ESB-238/2011 and the TM-EIAO. All the latest design information has been incorporated into the EIA process. The aspects that have been considered in this EIA Report include:

- Option evaluation;
- Description of construction and operational activities;
- Air Quality;
- Noise;
- Water quality;
- Sewerage and sewage implications;
- Waste management;
- Land contamination;
- Hazard to life;
- Cultural heritage;
- Landscape and visual;
- Ecology;
- Fisheries;
- Landfill gas hazard;
- Food safety; and
- EM&A requirements

Overall, the EIA Report has predicted that the Project would be environmentally acceptable and individual impacts are avoided or minimized with the implementation of the proposed infrastructure design and mitigation measures for construction and operational phases. An environmental monitoring and audit programme has been recommended to check the effectiveness of recommended mitigation measures.

圖表
Figures

新田分區計劃大綱(S/YL-ST/8) /
馬草壟及蠔殼圍發展審批地區圖(DPA/NE-MTL/2)
San Tin Outline Zoning Plan (S/YL-ST/8) /
Ma Tso Lung and Hoo Hok Wai Development
Permission Area Plan (DPA/NE-MTL/2)

AGR	農業 Agriculture
CA	自然保育區 Conservation Area
G/IC	政府, 機構或社區 Government/ Institution/ Community
GB	綠化地帶 Green Belt
OU	其他指定用途 Other Specified Used
OS	露天儲物 Open Storage
R(D)	住宅(丁類) Residential (D)
U	未決定用途 Undetermined
V	鄉村式發展 Village Type Development
MRDJ	道路 Road

* 註: 於已獲核准的馬草壟及蠔殼圍發展審批地區圖 (圖則編號: DPA/NE-MTL/2) 中列為 "未指定用途"
Note: "Unspecified Use" area on approved Ma Tso Lung and Hoo Hok Wai DPA Plan (No. DPA/NE-MTL/2)

Unspecified Use*

區內交通網內的排水管網
Drainge System under Internal Transport Network (DP4)

污水處理廠
Sewage Treatment Works (DP5)

東面連接路
Eastern Connection Road (DP6)

連接至古洞北新發展區
To Kwu Tung North NDA

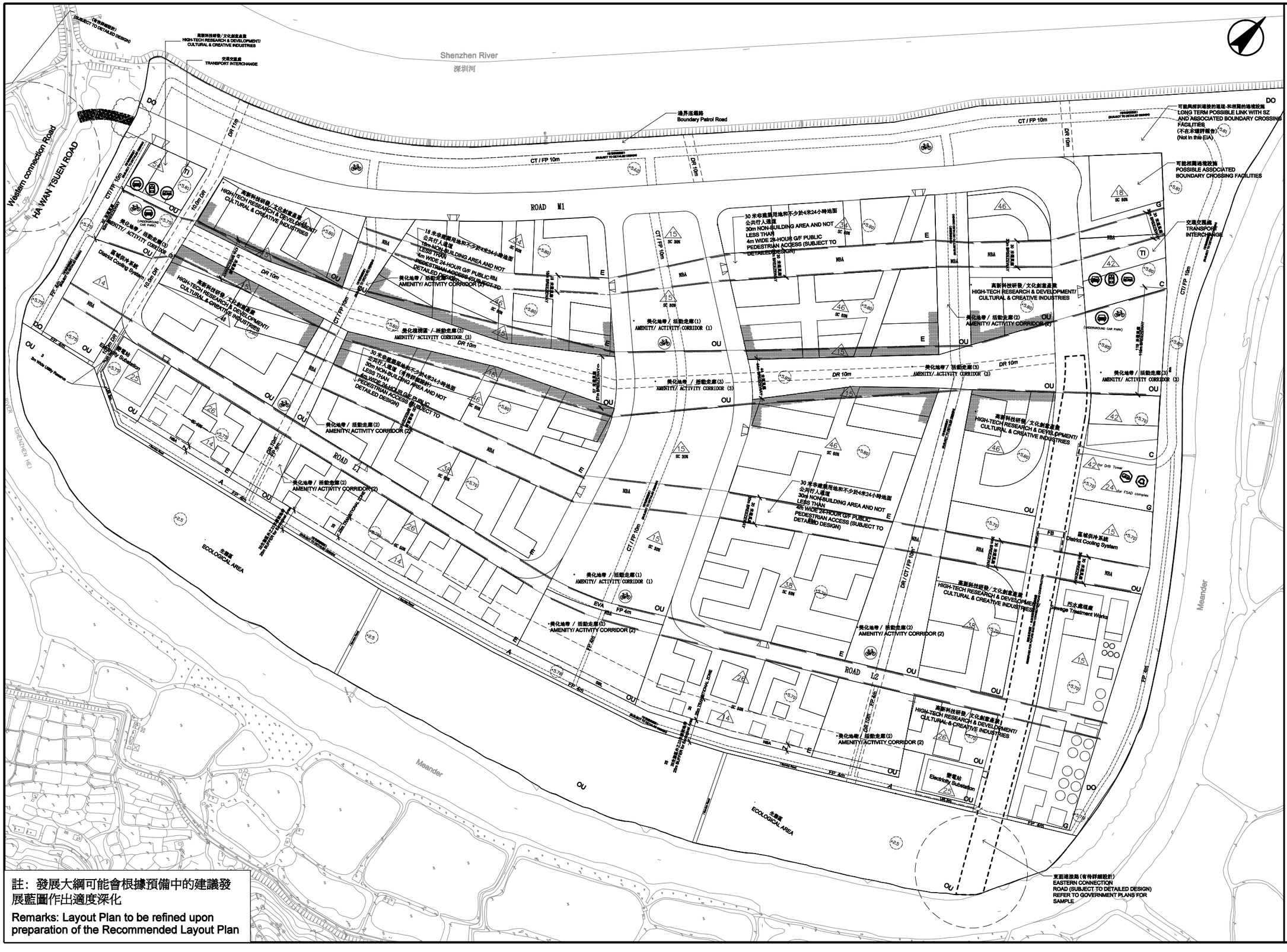
生態區
Ecological Area (DP1)

沖廁用水配水庫
Flushing Water Service Reservoir (DP7)

CA 落馬洲鐵路站連接通道
Direct Link to Lok Ma Chau Station (DP3)

西面連接路
(包括落馬洲與新田公路連接道路)
Western Connection Road
(Including Lok Ma Chau / San Tin Highway Connection)
(DP2)

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合 約 編 號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 - 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 發展大綱(整體)及各指定工程 Layout Plan(Overall) and Designated Projects	圖則編號 Figure No. 2.1a 圖則 Scale 1:20000 ON A3 修訂編號 Rev. -



註：發展大綱可能會根據預備中的建議發展藍圖作出適度深化

Remarks: Layout Plan to be refined upon preparation of the Recommended Layout Plan

Legend

- LMC Loop Boundary 落馬洲河套地區
- Zoning Boundary 用途地帶界線
- TI Transport Interchange 公共運輸交匯處
- CFB Fire Station Cum Ambulance Depot 消防局暨救護站
- Bicycle Parking Station 單車停放處
- ESS Electricity Substation 電力支站
- DCS District Cooling System 區域供冷系統處
- BCF Boundary Crossing Facilities 過境設施
- Elevated Road 高架道路
- Breezeway 通風廊
- NBA Non-building Area 非建築用地
- Area Designated for "Shop and Services" and "Eating Place" Uses Only 只限於指定為「商店及服務行業」和「食肆」用途的地區
- DR Drainage Reserve 排水專用範圍
- EVA Emergency Vehicular Access 緊急車輛通道
- SC Site Coverage 上蓋面積
- UR Utility Reserve 公用設施區
- 47 Maximum Building Height (in mPD) 最高建築物高度 (在主水平基準上若干米)
- +8.0 Proposed Level (mPD) 建議的地盤平整水平 (在主水平基準上若干米)
- FB Footbridge 行人天橋
- FP Footpath 行人路
- CT Cycle Track 單車徑
- Ingress/ Egress 車輛進出口
- Zebra Crossing 斑馬線
- A AMENITY 美化市容
- DO DISTRICT OPEN SPACE 地區休憩用地
- OU OTHER SPECIFIED USES 其他指定用途
- E EDUCATION 教育
- G GOVERNMENT 政府
- C COMMERCIAL 商業

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署 PLANNING DEPARTMENT

ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

研究項目 Job Title

合 約 編 號 Agreement No. CE 53/2008 (CE)

落馬洲河套地區發展規劃及工程研究 - 勘查研究

Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title

修改後的初步發展大綱

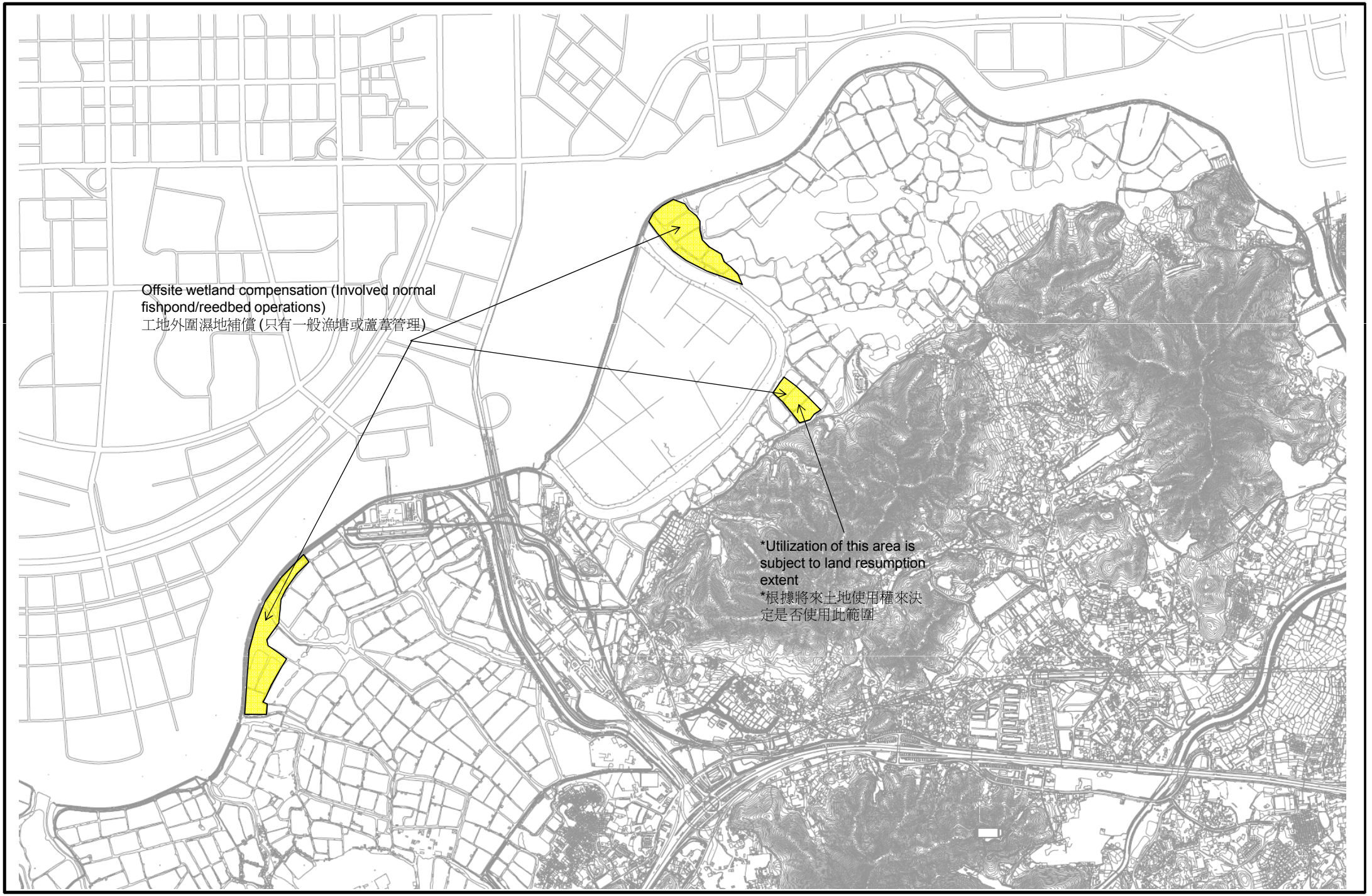
Revised Preliminary Layout Plan

圖則編號 Figure No.

2.1b

圖則 Scale 1:4000 ON A3

修訂編號 Rev. -



土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
規劃署 PLANNING DEPARTMENT
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合約編號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
工地外的工作區 – 濕地補償 (漁塘或蘆葦塘)
Off-site Works Area – Wetland Compensation (Fishpond/Reedbed)

圖則編號 Figure No.
2.1c

圖則 Scale
NTS

修訂編號 Rev.

連接至古洞北新發展區
To Kwu Tung North NDA

只有碎石清理
Rocks Clearance only

漁塘大部分地區沒有工程
No Construction Works in
Most Area of Fishpond

重設路標
Road Marking only

圖例
LEGEND

工作區
Works Area

項目範圍
The Project

落馬洲河套地區
LMC Loop

西面連接路
(包括落馬洲與新田公路連接道路)
Western Connection Road
(Including Lok Ma Chau / San Tin Highway Connection)

東面連接路
Eastern Connection Road

落馬洲鐵路站連接通道
Direct Link to Lok Ma Chau Station

沖廁用水配水庫
Flushing Water Service Reservoir

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
項目範圍及工作區
The Project and Temporary Works Area

圖則編號 Figure No.
2.1d

圖則 Scale
1:20000 ON A3

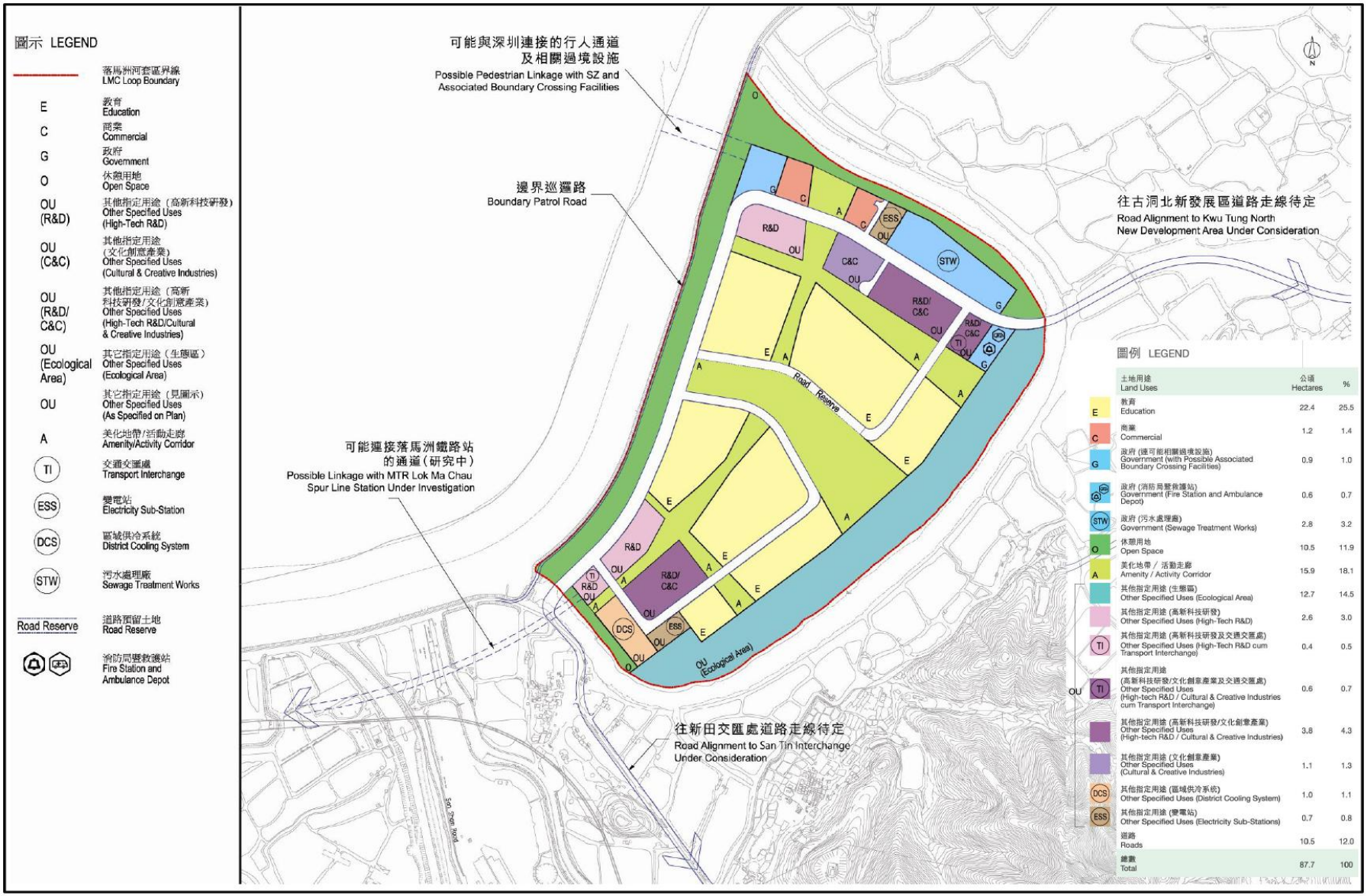
修訂編號
Rev. -

附件 1-1
Appendix 1-1

初步發展大綱圖/建議發展大綱圖

PODP & RODP

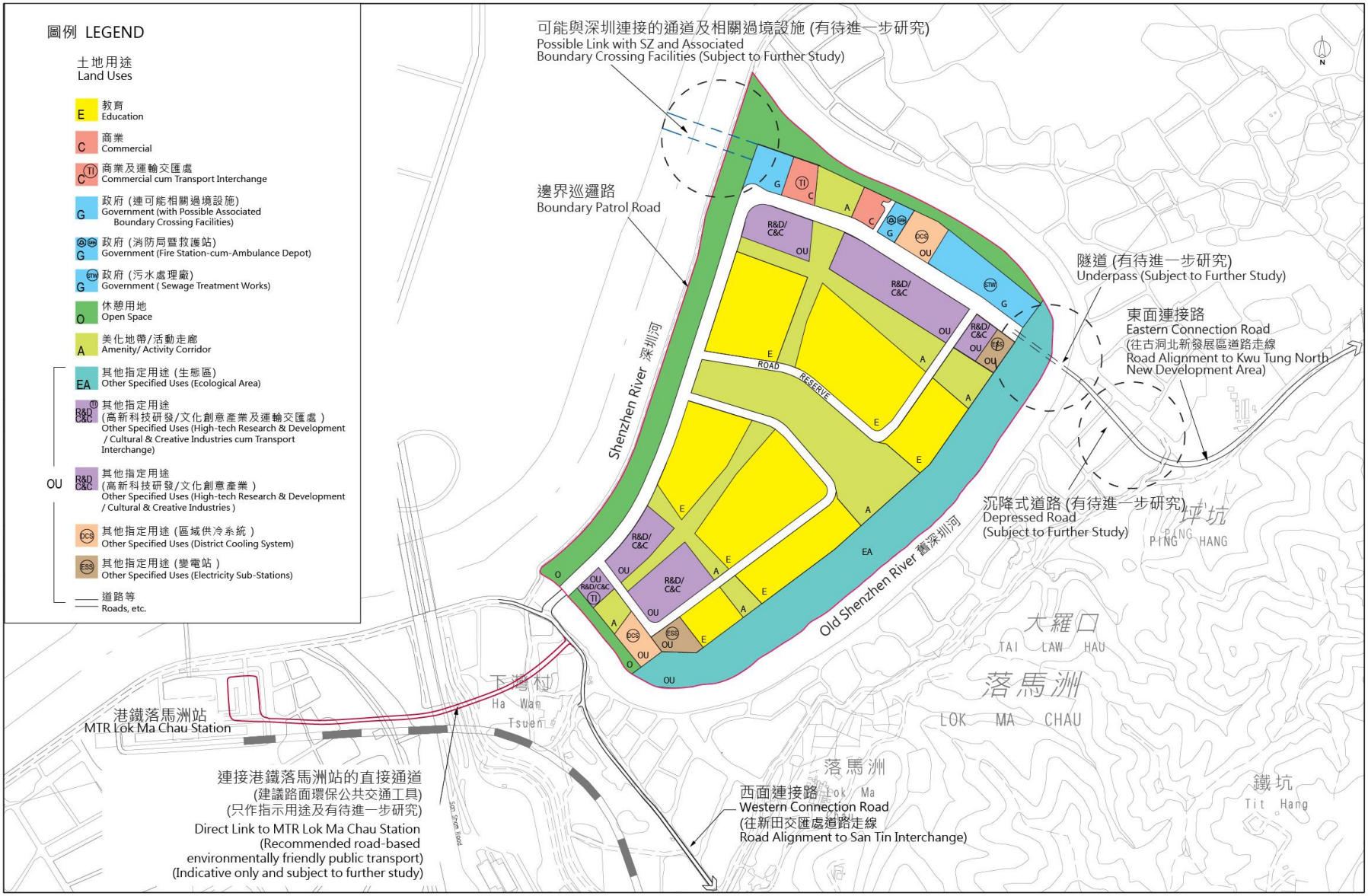
Preliminary Outline Development Plan (PODP)



Stage 1 Public Engagement (proposed at end 2010 to early 2011)

ARUP

Recommended Outline Development Plan (RODP)



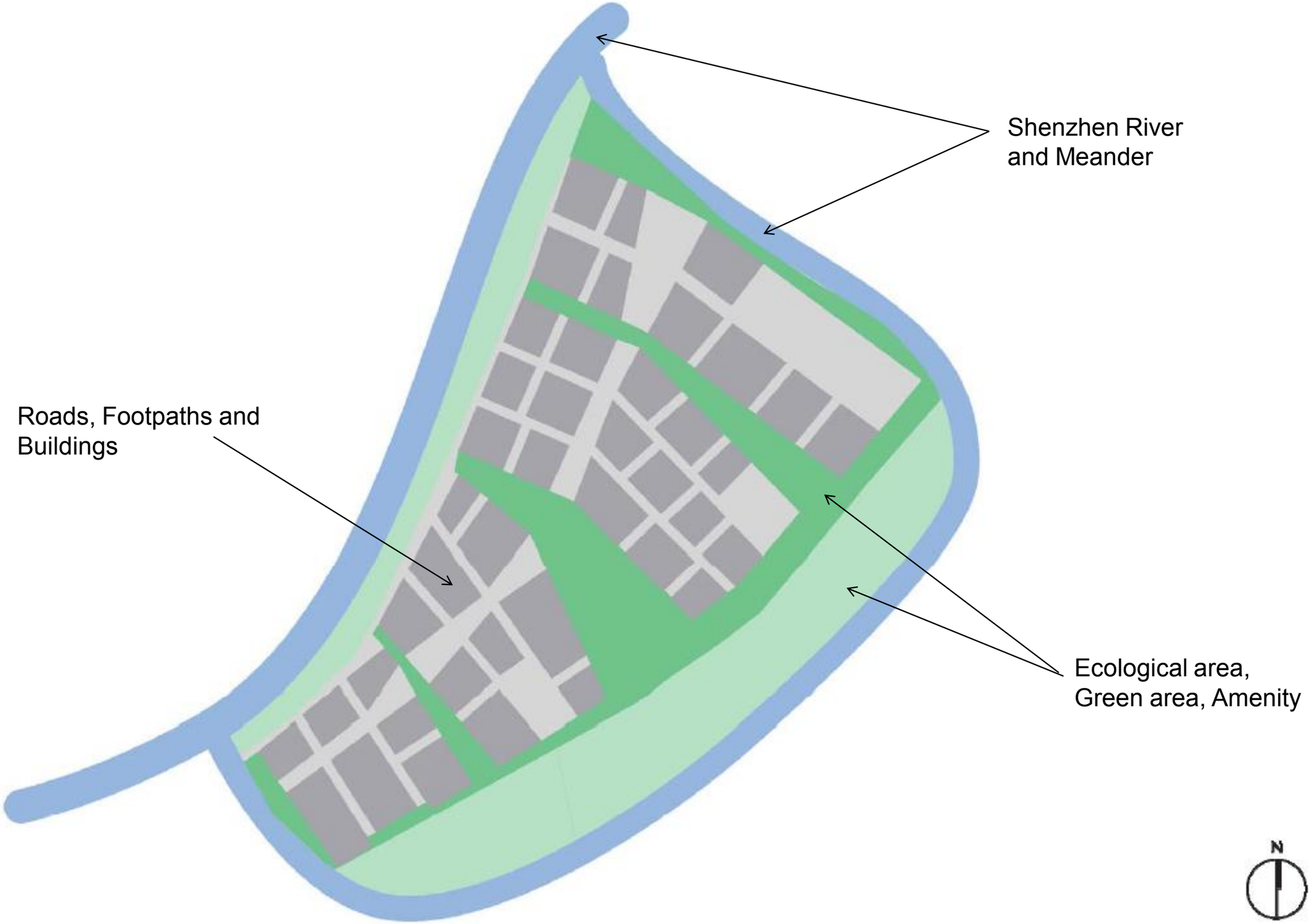
Stage 2 Public Engagement with refinements (proposed at mid 2012)

ARUP

附件 3-1
Appendix 3-1

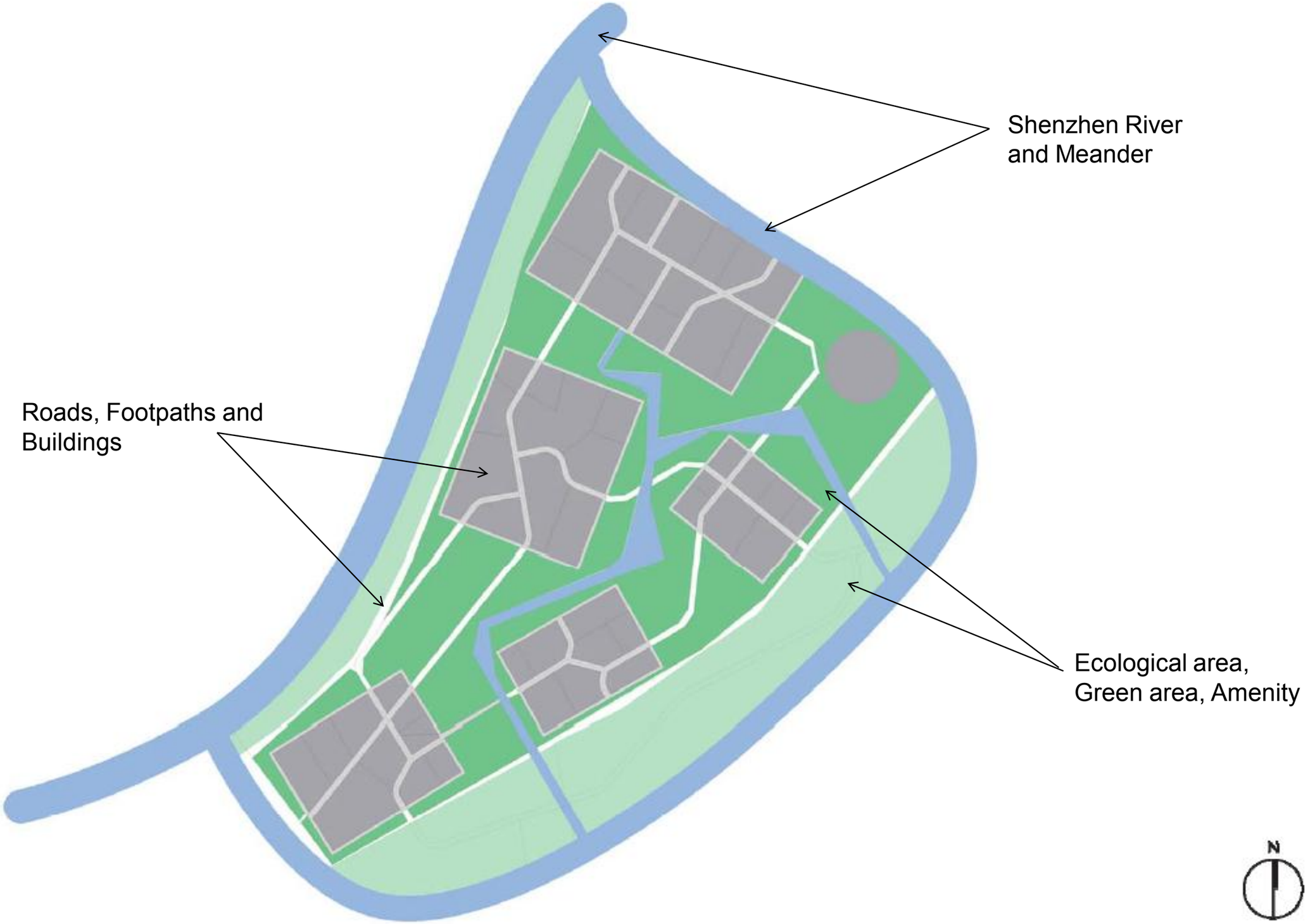
布局方案

Development Options



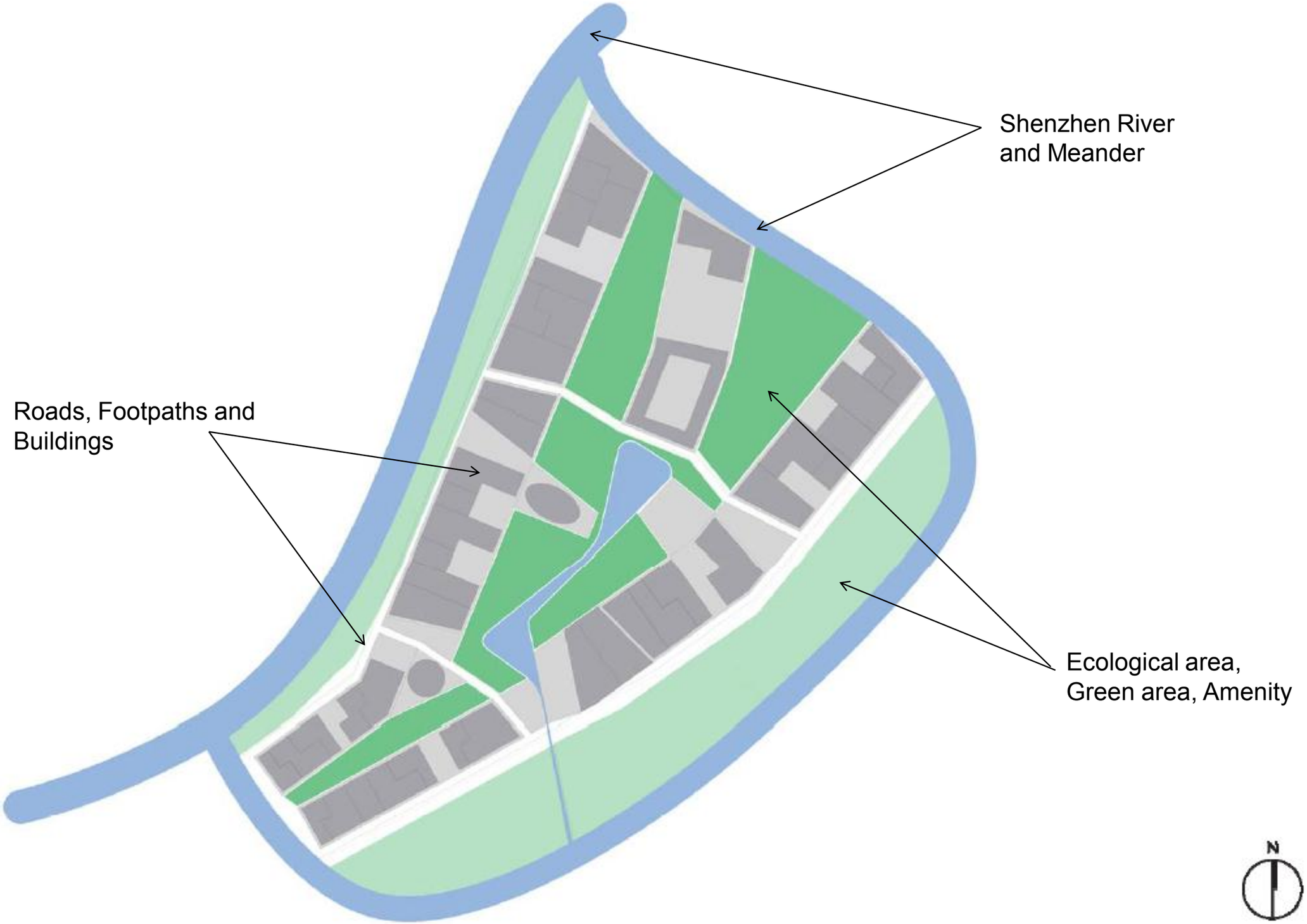
土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合約編號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 - 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 佈局方案一：靈活 **Layout Option 1: Flexible**

圖則編號 Figure No.	1
圖則 Scale	修訂編號 Rev.



土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合約編號 Agreement No. CE 53/2006 (CE) 落馬洲河套地區發展規劃及工程研究 - 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 佈局方案二：群組 **Layout Option 2: Cluster**

圖則編號 Figure No.	**2**
圖則 Scale	修訂編號 Rev.



土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合約編號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 - 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 佈局方案三：線狀 **Layout Option 3: Linear**	圖則編號 Figure No. 3 圖則 Scale / 修訂編號 Rev.

附件 3-2a
Appendix 3-2a

西面連接路方案

Road Alignment Option for Western Connection Road

N

禁區檢查站位置
CHECK POINT LOCATION

建議與新邊界巡邏路平行之
新支路(7.3米行車道及單車徑)
NEW ACCESS ROAD TO RUN
PARALLEL TO EXISTING NEW
BOUNDARY PATROL ROAD
(7.3m C/W & CYCLE TRACK)

建議新公共單車徑
PROPOSED NEW
CYCLE TRACK
FOR PUBLIC

新邊界巡邏路
New Boundary Patrol Road

利用邊境禁區規劃研究
建議之掉頭設施
MAKE USE OF TURN-AROUND
FACILITIES PROPOSED IN
FRONTIER CLOSED AREA STUDY

落馬洲站
LOK MA CHAU
STATION

插圖 INSET A
SCALE 1:2000

SAN SHAM ROAD
新錦路

落馬洲
LOK MA CHAU

下灣村路
Ha Wan Tsuen Road

落馬洲檢查站
LOK MA CHAU
CONTROL POINT

現有龍口路
(8.0米行車道及單車徑)
EXISTING LUNG HAU ROAD
(8.0m C/W & CYCLE TRACK)

龍口路
Lung Hau Road

邊境路
Border Road

龍口路
Lung Hau Road

現有落馬洲路
(10.3米行車道及單車徑)
EXISTING LOK MA CHAU ROAD
(10.3m C/W & CYCLE TRACK)

現有龍口路
(7.3米行車道及單車徑)
EXISTING LUNG HAU ROAD
(7.3m C/W & CYCLE TRACK)

落馬洲路
Lok Ma Chau Road

潘屋村
Pun Uk Tsuen

大概行車道伸延長度
APPROXIMATE LENGTH OF CARRIAGEWAY EXTENSION

地面
AT-GRADE : 300m
高架路
VIADUCT : 60m
總長度
TOTAL : 360m

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02(Lok Ma Chau Loop)\Drawing\20100531(REPORT C to T)\209840_FIG_1.dgn

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on
Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
西面接駁道路方案一
Western Approach Road Option 1 - New Road Parallel to New Boundary Patrol Road

圖則編號 Figure No.
1

圖例 Scale
1:5000 ON A3

修訂編號 Rev.
-

N

建議新公共單車徑
PROPOSED NEW CYCLE TRACK FOR PUBLIC

新邊界巡邏路
New Boundary Patrol Road

利用現有碼頭
MAKE USE EXISTING PIER

道路走線依從現有小徑
ROAD ALIGNMENT TO FOLLOW EXISTING TRACKS (7.3m C/W & CYCLE TRACK)

利用邊境禁區規劃研究建議之掉頭設施
MAKE USE OF TURN-AROUND FACILITIES PROPOSED IN FRONTIER CLOSED AREA STUDY

落馬洲站
LOK MA CHAU STATION

落馬洲
LOK MA CHAU

下灣村路
Ha Wan Tsuen Road

落馬洲檢查站
LOK MA CHAU CONTROL POINT

現有龍口路
(8.0米行車道及單車徑)
EXISTING LUNG HAU ROAD (8.0m C/W & CYCLE TRACK)

龍口路
Lung Hau Road

邊境路
Border Road

龍口路
Lung Hau Road

現有龙口路
(7.3米行车道及单车径)
EXISTING LUNG HAU ROAD (7.3m C/W & CYCLE TRACK)

現有落馬洲路
(10.3米行車道及單車徑)
EXISTING LOK MA CHAU ROAD (10.3m C/W & CYCLE TRACK)

落馬洲路
Lok Ma Chau Road

潘屋村
Pun Uk Tsuen

大概行車道伸延長度
APPROXIMATE LENGTH OF CARRIAGEWAY EXTENSION

地面
AT-GRADE : 300m
高架路
VIADUCT : 50m
總長度
TOTAL : 350m

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02(Lok Ma Chau Loop)\Drawing\20100531(REPORT C to T)\209840_FIG_2.dgn

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
規劃署 PLANNING DEPARTMENT
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合約編號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
西面接駁道路方案二
Western Approach Road Option 2 - Utilize Turn-Around Facilities at Lung Hau Road

圖則編號 Figure No. 2
圖例 Scale 1:5000 ON A3
修訂編號 Rev. -

N

建議新公共單車徑
PROPOSED NEW CYCLE TRACK FOR PUBLIC

新邊界巡邏路
New Boundary Patrol Road

落馬洲站
LOK MA CHAU STATION

落馬洲檢查站
LOK MA CHAU CONTROL POINT

下灣村路
Ha Wan Tsuen Road

擴寬現有夏灣村路
WIDEN EXISTING HA WAN TSUEN ROAD (7.3m C/W & CYCLE TRACK)

落馬洲
LOK MA CHAU

邊境路
Border Road

龍口路
Lung Hau Road

現有落馬洲路
(10.3米行車道及單車徑)
EXISTING LOK MA CHAU ROAD (10.3m C/W & CYCLE TRACK)

落馬洲路
Lok Ma Chau Road

潘屋村
Pun Uk Tsuen

大概行車道伸延長度
APPROXIMATE LENGTH OF CARRIAGEWAY EXTENSION

地面
AT-GRADE : 40m
高架路
VIADUCT : 60m
總長度
TOTAL : 100m

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531 (REPORT C to T)\209840_FIG_3.dgn

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
規劃署 PLANNING DEPARTMENT
奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合約編號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
西面接駁道路方案三
Western Approach Road Option 3 - Utilize Existing Ha Wan Tsuen Road

圖則編號 Figure No. 3
圖例 Scale 1:5000 ON A3
修訂編號 Rev. -

N

建議新公共單車徑
PROPOSED NEW CYCLE TRACK FOR PUBLIC

建議河套區專用新單車徑
PROPOSED NEW CYCLE TRACK FOR LOOP USERS

新邊界巡邏路
New Boundary Patrol Road

落馬洲站
LOK MA CHAU STATION

落馬洲
LOK MA CHAU

下灣村路
Ha Wan Tsuen Road

擴寬現有邊境路
(7.3米行車道及單車徑)
WIDEN EXISTING BORDER ROAD
(7.3m C/W & CYCLE TRACK)

落馬洲檢查站
LOK MA CHAU CONTROL POINT

邊境路
Border Road

龍口路
Lung Hau Road

現有落馬洲路
(10.3米行車道及單車徑)
EXISTING LOK MA CHAU ROAD
(10.3m C/W & CYCLE TRACK)

落馬洲路
Lok Ma Chau Road

潘屋村
Pun Uk Tsuen

大概行車道伸延長度
APPROXIMATE LENGTH OF CARRIAGEWAY EXTENSION

地面
AT-GRADE : 600m
高架路
VIADUCT : 70m
總長度
TOTAL : 670m

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531\(REPORT C to T)\209840_FIG_4.dgn

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 – 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
西面接駁道路方案四
Western Approach Road Option 4 - New Linkage from Border Road

圖則編號 Figure No.
4

圖例 Scale
1:5000 ON A3

修訂編號 Rev.
-

N

建議新公共單車徑
PROPOSED NEW CYCLE TRACK FOR PUBLIC

建議河套區專用新單車徑
PROPOSED NEW CYCLE TRACK FOR LOOP USERS

新邊界巡邏路
New Boundary Patrol Road

落馬洲站
LOK MA CHAU STATION

落馬洲
LOK MA CHAU

擬議的新通路
(7.3米行車道及單車徑)
PROPOSED NEW ACCESS ROAD (7.3m C/W & CYCLE TRACK)

下灣村路
Ha Wan Tsuen Road

擴寬現有邊境路
(7.3米行車道及單車徑)
WIDEN EXISTING BORDER ROAD (7.3m C/W & CYCLE TRACK)

落馬洲檢查站
LOK MA CHAU CONTROL POINT

邊境路
Border Road

龍口路
Lung Hau Road

現有落馬洲路
(10.3米行車道及單車徑)
EXISTING LOK MA CHAU ROAD (10.3m C/W & CYCLE TRACK)

落馬洲路
Lok Ma Chau Road

潘屋村
Pun Uk Tsuen

大概行車道伸延長度
APPROXIMATE LENGTH OF CARRIAGEWAY EXTENSION

地面
AT-GRADE : 550m
高架路
VIADUCT : 60m
總長度
TOTAL : 610m

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531\(REPORT C to T)\209840_FIG_5.dgn

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
規劃署 PLANNING DEPARTMENT
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合約編號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 – 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
西面接駁道路方案五
Western Approach Road Option 5 - Utilize Shorter Section of Border Road

圖則編號 Figure No. 5
圖例 Scale 1:5000 ON A3
修訂編號 Rev. -

附件 3-2b
Appendix 3-2b

東面連接路方案

Road Alignment Option for Eastern Connection Road

N

+6

落馬洲河套區
LMC Loop

+6

+15

+10

+8

+8

+12

+20

蠔殼圍
Hoo Hok Wai

牛角山
Horn Hill

香港警務處
落馬洲分區
落馬洲行動基地
Lok Ma Chau
Operation Base
Lmc Division
Hong Kong
Police Force

鱷鑊坑
Tse Koo Hang

馬草壘
Ma Tso Lung

馬草壘信義新村
Ma Tso Lung
Shun Yee San Tsuen

馬草壘新村
Ma Tso Lung
San Tsuen

舊深圳河
Old Shenzhen River

坪坑
Ping Hang

香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range

鳳崗山
Fung Kong Shan

古洞(北)
Kwu Tung (North)

大概行車道長度
APPROXIMATE CARRIAGEWAY LENGTH

地面
AT-GRADE ： 2.3km
高架路
VIADUCT ： 0.4km
總長度
TOTAL ： 2.7km

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531 (REPORT C to T)\209840_FIG_7.dgn

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合 約 編 號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 － 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 東面接駁道路方案 E1 Eastern Approach Road Option E1 - New At-Grade Road and Improvement of Border Road	圖則編號 Figure No. 7 圖例 Scale 1:5000 ON A3 修訂編號 Rev. 1

N

落馬洲河套區
LMC Loop

蜂殼圍
Hoo Hok Wai

牛角山
Horn Hill

香港警務處
落馬洲分區
落馬洲行動基地
Lok Ma Chau
Operation Base
Lmc Division
Hong Kong
Police Force

Old Shenzhen River 舊深圳河

坪坑
Ping Hang

鱷魚坑
Tse Koo Hang

馬草壟
Ma Tso Lung

馬草壟信義新村
Ma Tso Lung
Shun Yee San Tsuen

馬草壟新村
Ma Tso Lung
San Tsuen

香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range

鳳崗山
Fung Kong Shan

古洞(北)
Kwu Tung (North)

+6 +6 +8 +8 +12 +20

大概行車道長度
APPROXIMATE CARRIAGEWAY LENGTH

地面
AT-GRADE : 2.1km
高架路
VIADUCT : 0.3km
總長度
TOTAL : 2.4km

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531 (REPORT C to T)\209840_FIG_8.dgn

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
東面接駁道路方案 E2
Eastern Approach Road Option E2 - New At-Grade Road in Ma Tso Lung and Hoo Hok Wai

圖則編號 Figure No.
8

圖例 Scale
1:5000 ON A3

修訂編號 Rev.
1

N

落馬洲河套區
LMC Loop

+6

+6

+10

+15

+8

+20

+24

+20

+18

蠔殼圍
Hoo Hok Wai

牛角山
Horn Hill

香港警務處
落馬洲分區
落馬洲行動基地
Lok Ma Chau
Operation Base
Lmc Division
Hong Kong
Police Force

Old Shenzhen River 舊深圳河

坪坑
Ping Hang

鱷魚坑
Tse Koo Hang

馬草壟
Ma Tso Lung

馬草壟信義新村
Ma Tso Lung
Shun Yee San Tsuen

馬草壟新村
Ma Tso Lung
San Tsuen

香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range

鳳崗山
Fung Kong Shan

古洞(北)
Kwu Tung (North)

大概行車道長度
APPROXIMATE CARRIAGEWAY LENGTH

地面
AT-GRADE ： 2.5km
高架路
VIADUCT ： 0.6km
總長度
TOTAL ： 3.1km

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531 (REPORT C to T)\209840_FIG_9.dgn

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 － 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
東面接駁道路方案 E3
Eastern Approach Road Option E3 - Improvement of Existing Track and Border Road

圖則編號 Figure No.
9

圖例 Scale
1:5000 ON A3

修訂編號 Rev.
1

N

+6

落馬洲河套區
LMC Loop

+28

+26

+20

蠔殼圍
Hoo Hok Wai

牛角山
Horn Hill

香港警務處
落馬洲分區
落馬洲行動基地
Lok Ma Chau
Operation Base
Lmc Division
Hong Kong
Police Force

坪坑
Ping Hang

Old Shenzhen River 舊深圳河

鹹浦坑
Tse Koo Hang

馬草壟
Ma Tso Lung

馬草壟信義新村
Ma Tso Lung
Shun Yee San Tsuen

馬草壟新村
Ma Tso Lung
San Tsuen

香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range

鳳崗山
Fung Kong Shan

古洞(北)
Kwu Tung (North)

大概行車道長度
APPROXIMATE CARRIAGEWAY LENGTH

高架路
VIADUCT : 0.9km
隧道
TUNNEL : 0.9km
總長度
TOTAL : 1.8km

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531 (REPORT C to T)\209840_FIG_10.dgn

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
東面接駁道路方案 E4
Eastern Approach Road Option E4 - Tunnel Through Hill of Ma Tso Lung

圖則編號 Figure No.
10

圖例 Scale
1:5000 ON A3

修訂編號 Rev.
1

N

落馬洲河套區
LMC Loop

+6

+6

+10

+15

+16

+18

+8

+12

+20

蠔殼圍
Hoo Hok Wai

牛角山
Horn Hill

香港警務處
落馬洲分區
落馬洲行動基地
Lok Ma Chau
Operation Base
Lmc Division
Hong Kong
Police Force

蕉徑坑
Tse Koo Hang

馬草壟
Ma Tso Lung

馬草壟信義新村
Ma Tso Lung
Shun Yee San Tsuen

馬草壟新村
Ma Tso Lung
San Tsuen

香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range

鳳崗山
Fung Kong Shan

古洞(北)
Kwu Tung (North)

坪坑
Ping Hang

舊深圳河
Old Shenzhen River

大概行車道長度
APPROXIMATE CARRIAGEWAY LENGTH

地面
AT-GRADE : 1.6km
高架路
VIADUCT : 0.9km
隧道
TUNNEL : 0.1km
總長度
TOTAL : 2.6km

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531 (REPORT C to T)\209840_FIG_11.dgn

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署
PLANNING DEPARTMENT

ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
東面接駁道路方案 E5
Eastern Approach Road Option E5 - New At-Grade Road with Short Tunnel

圖則編號 Figure No.
11

圖例 Scale
1:5000 ON A3

修訂編號 Rev.
1

N

落馬洲河套區
LMC Loop

-15

-10

+26

蠔殼圍
Hoo Hok Wai

牛角山
Horn Hill

香港警務處
落馬洲分區
落馬洲行動基地
Lok Ma Chau
Operation Base
Lmc Division
Hong Kong
Police Force

Old Shenzhen River 舊深圳河

坪坑
Ping Hang

鱷魚坑
Tse Koo Hang

馬草壟
Ma Tso Lung

馬草壟信義新村
Ma Tso Lung
Shun Yee San Tsuen

馬草壟新村
Ma Tso Lung
San Tsuen

香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range

鳳崗山
Fung Kong Shan

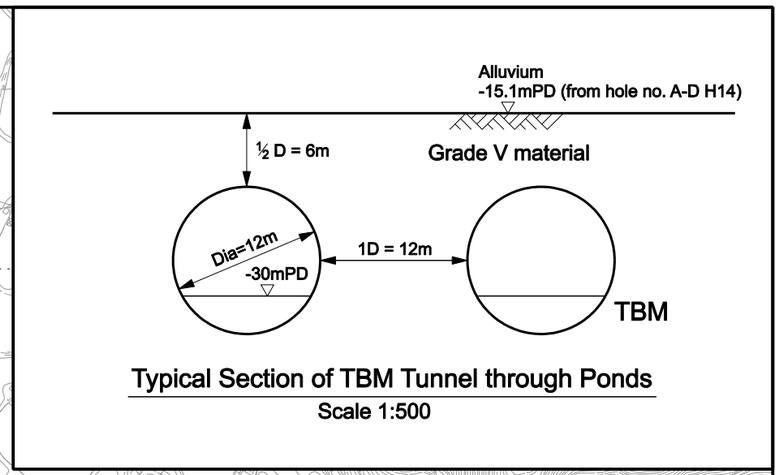
古洞(北)
Kwu Tung (North)

大概行車道長度
APPROXIMATE CARRIAGEWAY LENGTH

高架路
VIADUCT : 0.4km
隧道
TUNNEL : 1.5km
總長度
TOTAL : 1.9km

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20100531 (REPORT C to T)\209840_FIG_12.dgn

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合 約 編 號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 - 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 東面接駁道路方案 E6 Eastern Approach Road Option E6 - Tunnel Into Development	圖則編號 Figure No. 12 圖例 Scale 1:5000 ON A3 修訂編號 Rev. 1



Typical Section of TBM Tunnel through Ponds

Scale 1:500

826000 E

827000 E

843000 N

842000 N

N

Cut-and-Cover Tunnel in Area A (915m)

Gradient = 6.0%

+6.0

-30.0

TBM tunnel at pond area (~520m)

-30.0

TBM Tunnel at hill area (~860m) (Subject to GI)

Gradient = 6.0%

+18.0

落馬洲河套區
LMC Loop

Old Shenzhen River

舊深圳河

蠔殼圍
Hoo Hok Wai

牛角山
Horn Hill

坪坑
Ping Hang

鐵鑊坑
Tse Koo Hang

馬草壘信義新村
Ma Tso Lung Shun Yee San Tsuen

馬草壘
Ma Tso Lung

馬草壘新村
Ma Tso Lung San Tsuen

香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range

鳳崗山
Fung Kong Shan

古洞(北)
Kwu Tung (North)

Affect NENT NDA RODP

Ha Wan Tsuen Road

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20110729 (Report_S to T)\209840_FIG_4-3-2.dgn

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合 約 編 號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 – 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 東面接駁道路方案 E7 Eastern Approach Road Option E7	圖則編號 Figure No. 4.3.2 圖例 Scale 1:8000 ON A3 修訂編號 Rev. -

826000 E
827000 E
828000 E
843000 N
842000 N
N
-9.0
-30.0
Gradient = 5%
TBM tunnel at pond area (500m)
TMB tunnel at Horn Hill (240m)
-30.0
-30.0
Cut-and-cover Tunnel / TBM tunnel (470m) (Subject to GI)
Gradient = 6.5%
+0.8
Depressed Road (130m)
+8.0
At-grade carriageway (500m)
+8.0
+12.0
落馬洲河套區
LMC Loop
Old Shenzhen River
舊深圳河
蠔殼圍
Hoo Hok Wai
牛角山
Horn Hill
錯鑊坑
Tse Koo Hang
馬草壟
Ma Tso Lung
坪坑
Ping Hang
馬草壟信義新村
Ma Tso Lung Shun Yee San Tsuen
馬草壟新村
Ma Tso Lung San Tsuen
香港警察-羅湖練靶場
Hong Kong Police-Lo Wu Range
鳳崗山
Fung Kong Shan
古洞(北)
Kwu Tung (North)

Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20110729 (Report_S to T)\209840_FIG_4-3-3.dgn

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
規劃署 PLANNING DEPARTMENT
奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

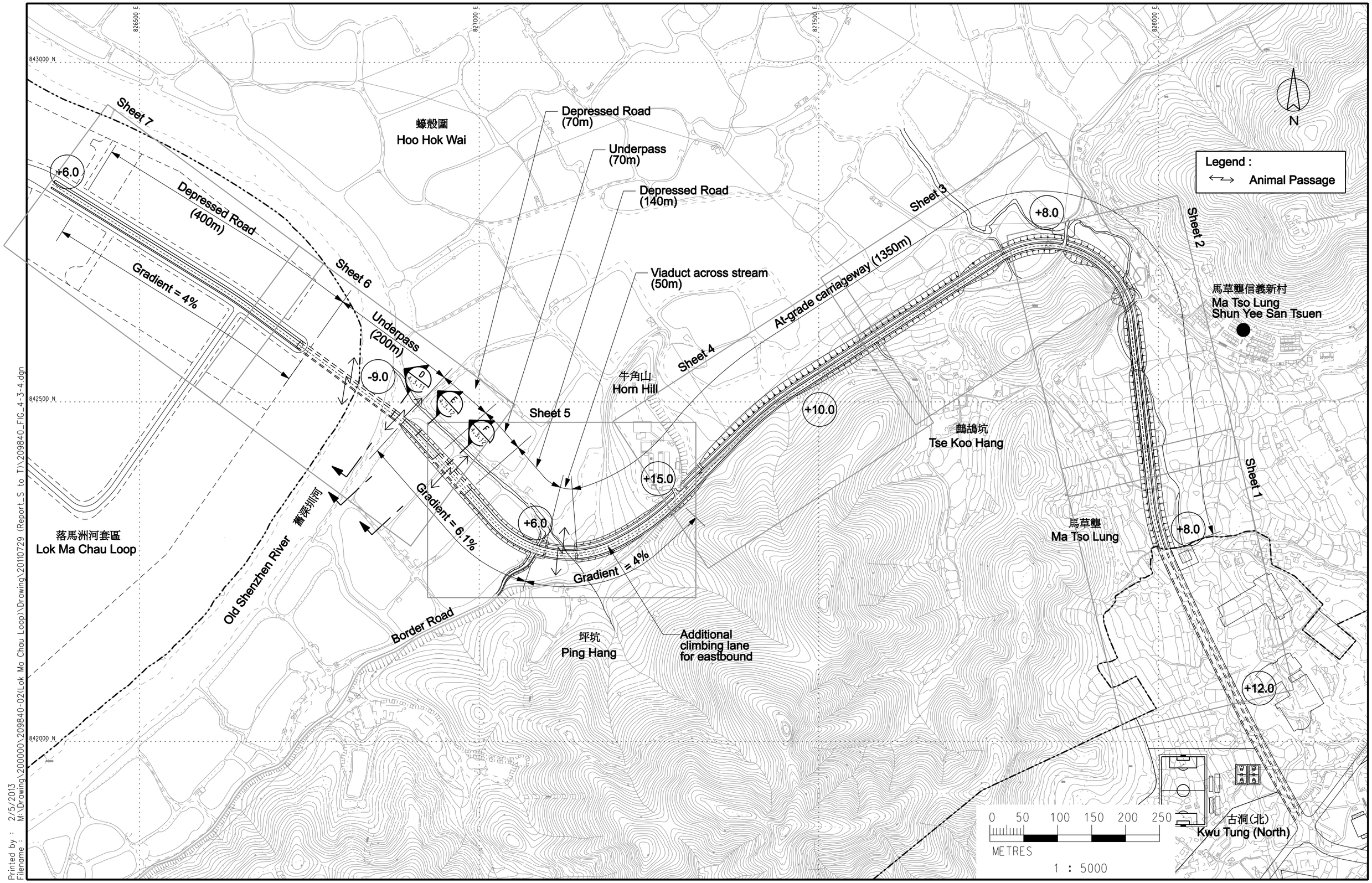
研究項目 Job Title
合 約 編 號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 – 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
東面接駁道路方案 E8
Eastern Approach Road Option E8

圖則編號 Figure No.
4.3.3

圖例 Scale
1:8000 ON A3

修訂編號 Rev.
-



Printed by : 2/5/2013
Filename : M:\Drawing\200000\209840-02\Lok Ma Chau Loop\Drawing\20110729 (Report_S to T)\209840_FIG_4-3-4.dgn

土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合 約 編 號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 – 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 東面接駁道路方案 E9 Eastern Connection Road Option E9	圖則編號 Figure No. 4.3.4 圖例 Scale 1:5000 ON A3 修訂編號 Rev. -

附件 3-2c
Appendix 3-2c

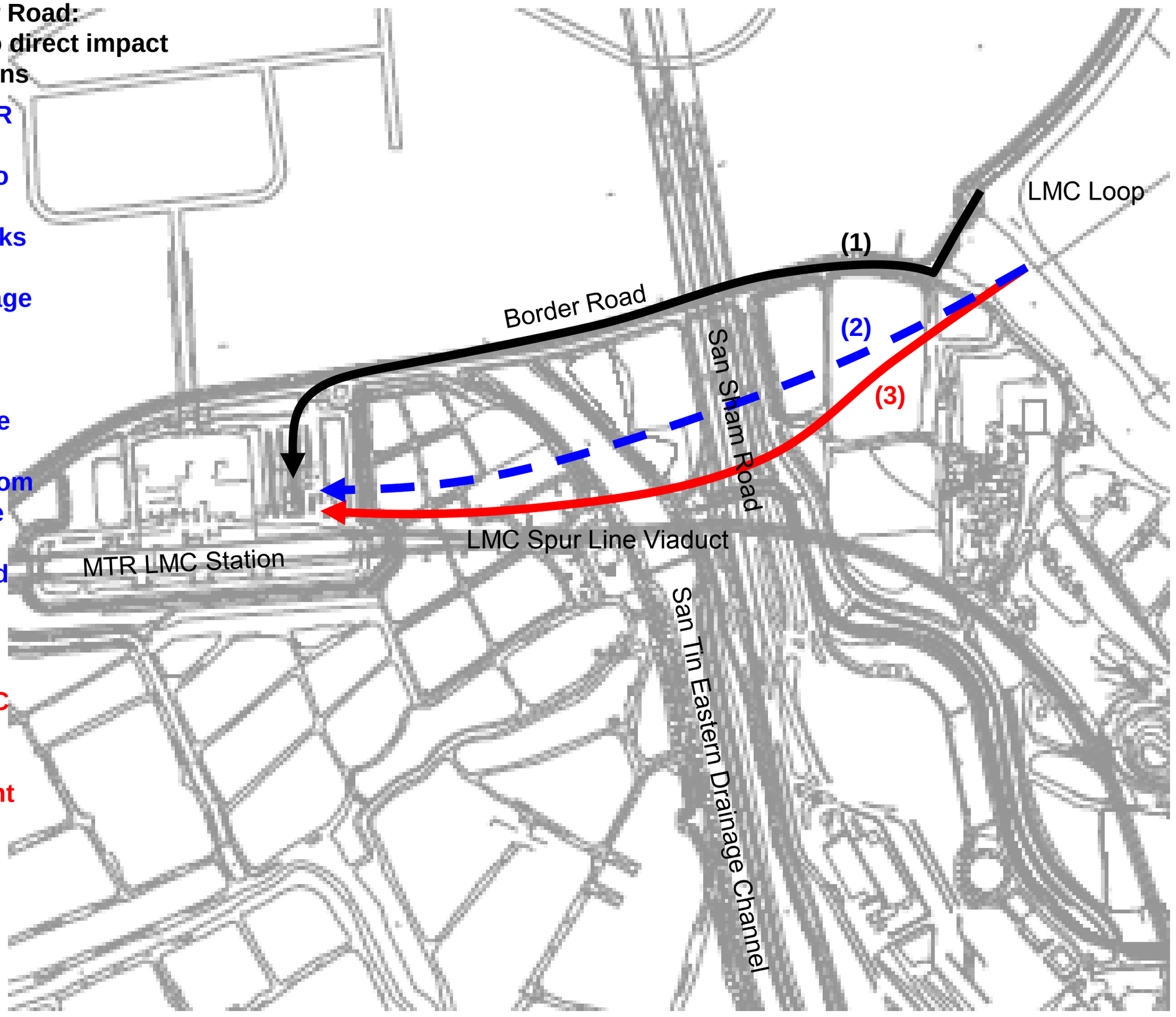
連接港鐵落馬洲站直接通道方案

Road Alignment Option for Direct Link to MTR LMC Station

(1) At-grade alignment along Border Road:
- **Avoid encroaching wetlands → No direct impact**
- **Not selected due to security reasons**

(2) Tunneling from LMC Loop to MTR LMC Station:
- **Avoid encroaching wetlands → No permanent direct impact**
- **Require lots of cut-and-cover works which will induce higher construction impact and the sewage polishing wetlands will be highly affected**
- **Open-cut across San Tin Eastern Drainage Channel affects drainage flow during construction stage**
- **Too steep gradient for climbing from beneath San Tin Eastern Drainage Channel to Elevated PTI**
- **Open-cut beneath San Sham Road requires underpinning of bridge foundation**
- **Not considered as feasible option**

(3) Viaduct alignment align with LMC Spur Line Viaduct:
- **Direct impact to wetlands**
- **Lesser disturbance impact to flight paths**
- **Preferred alignment**

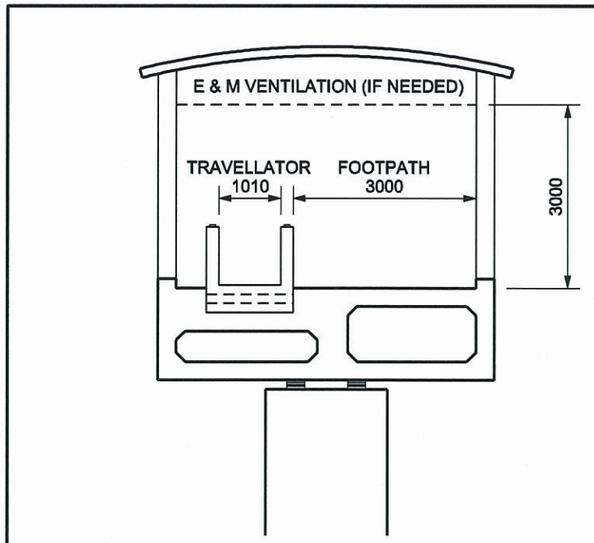


土木工程拓展署 CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
規劃署 PLANNING DEPARTMENT
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

研究項目 Job Title
合約編號 Agreement No. CE 53/2008 (CE)
落馬洲河套地區發展規劃及工程研究 - 勘查研究
Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation

圖則項目 Title
Alignment Option for Direct Link to MTR LMC Station

圖則編號 Figure No. 1
圖則 Scale NTS
修訂編號 Rev.

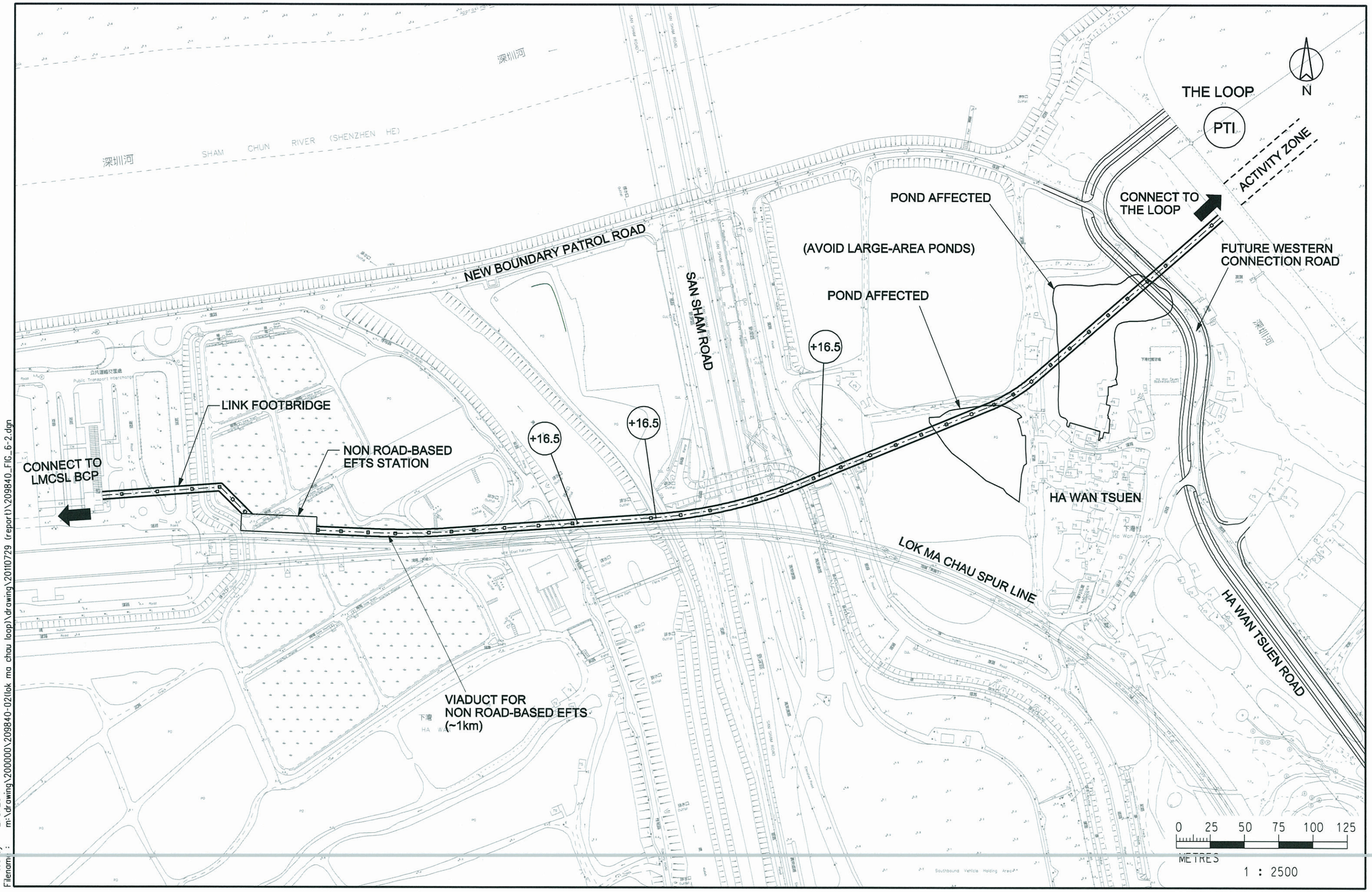


FOOTBRIDGE WITH TRAVELLATOR
SCALE 1:100

深圳河
SAN SHAM ROAD
NEW BOUNDARY PATROL ROAD
SAN SHAM ROAD
THE LOOP
N
PTI
ACTIVITY ZONE
CONNECT TO THE LOOP
POND AFFECTED
+14.0
(AVOID LARGE-AREA PONDS)
FUTURE WESTERN CONNECTION ROAD
POND AFFECTED
+12.0
+14.0
POSSIBLE EXIT TO HA WAN TSUEN
HA WAN TSUEN
+15.0
+15.0
+16.5
+16.5
+16.5
ENCLOSED PORTION FOR SECURITY
CONNECT TO LMCSL BCP
ENCLOSED PORTION FOR SECURITY
ENCLOSED PORTION FOR SECURITY
LOK MA CHAU SPUR LINE
HA WAN TSUEN ROAD
FOOTBRIDGE (~1km)
HA WAN
0 25 50 75 100 125
METRES
1 : 2500

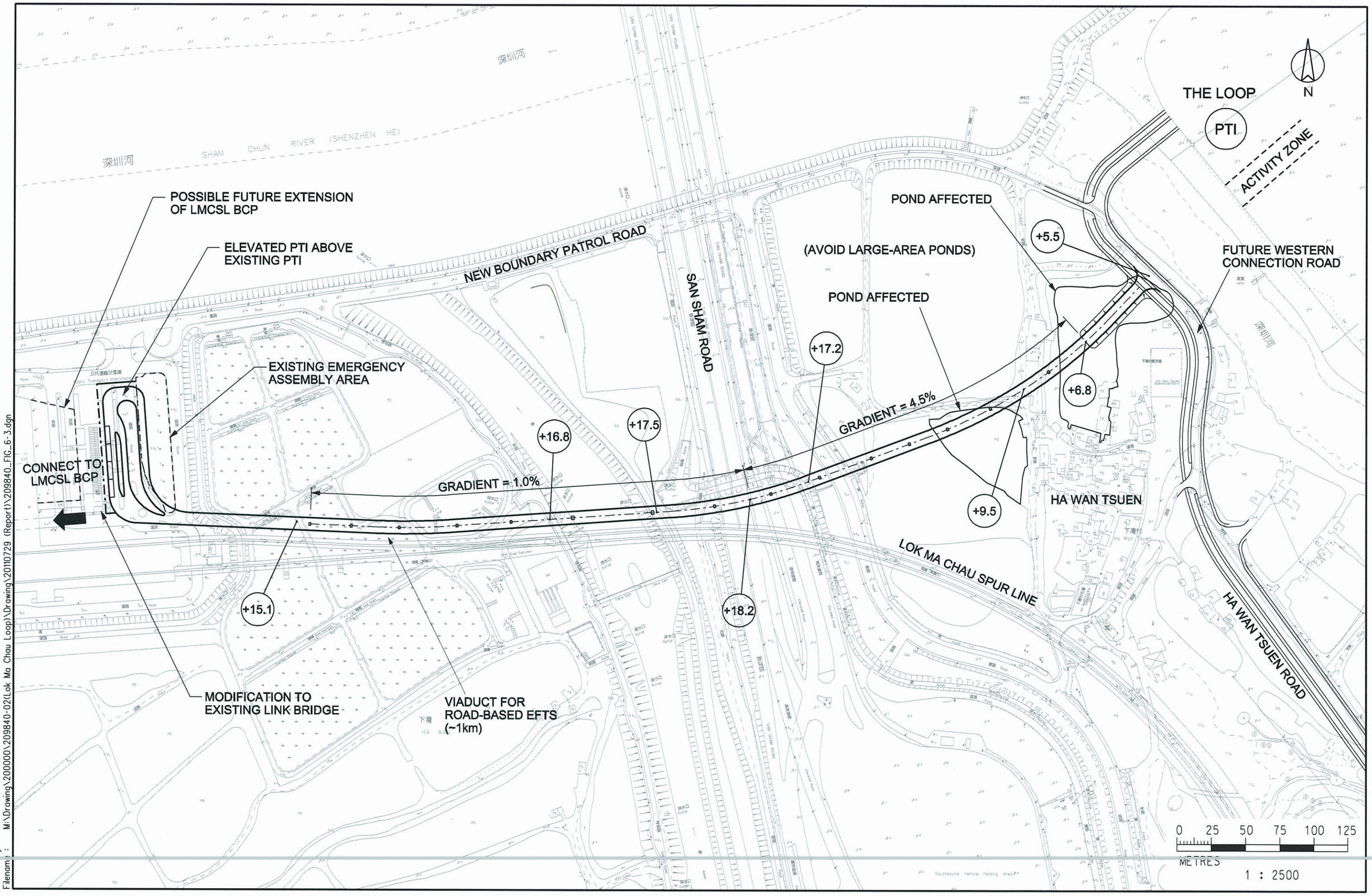
Printed by : 2/8/2011
Filename : m:\drawing\200000\209840-02\lok ma chau loop\drawing\20110729 (report)\209840_FIG_6-1.dgn

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT; 规划署 PLANNING DEPARTMENT	ARUP 奥雅纳工程顾问 Ove Arup & Partners Hong Kong Limited	研究项目 Job Title 合 约 编 号 Agreement No. CE 53/2008 (CE) 落马洲河套地区发展规划及工程研究 – 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	图则项目 Title DIRECT CONNECTION TO LMCSL STATION - FOOTBRIDGE CUM TRAVELLATOR OPTION	图则编号 Figure No. 6.1 图例 Scale 1:2500 ON A3 修订编号 Rev. -



Printed by : 2/8/2011
Filename : m:\drawing\200000\209840-02\lok ma chau loop\drawing\20110729 (report)\209840_FIG_6-2.dgn

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 规划署 PLANNING DEPARTMENT	ARUP 奥雅纳工程顾问 Ove Arup & Partners Hong Kong Limited	研究项目 Job Title 合 约 编 号 Agreement No. CE 53/2008 (CE) 落马洲河套地区发展规划及工程研究 – 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	图则项目 Title DIRECT CONNECTION TO LMCSL STATION - NON ROAD-BASED EFTS LINKAGE OPTION	图则编号 Figure No. 6.2 图例 Scale 1:2500 ON A3 / 修订编号 Rev. -



Printed by : 3/8/2011
Filename : M:\Drawing\200000\209840-02(Lok Ma Chau Loop)\Drawing\20110729 (Report)\209840_FIG_6-3.dgn

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 规划署 PLANNING DEPARTMENT	ARUP 奥雅纳工程顾问 Ove Arup & Partners Hong Kong Limited	研究项目 Job Title 合 约 编 号 Agreement No. CE 53/2008 (CE) 落马洲河套地区发展规划及工程研究 – 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	图则项目 Title DIRECT CONNECTION TO LMCSL STATION - ROAD-BASED EFTS LINKAGE OPTION	图则编号 Figure No. 6.3 图例 Scale 1:2500 ON A3 修订编号 Rev. -

圖例 :
LEGEND :

施工過程中受影響的漁塘
POND AFFECTED DURING CONSTRUCTION

施工過程中臨時受影響的蘆葦區域，將在完工後全數修復
REED BED TEMPORARILY AFFECTED DURING CONSTRUCTION ONLY AND TO BE REINSTATED AFTER CONSTRUCTION

地面道路
AT-GRADE ROAD

高架橋
ELEVATED VIADUCT

施工區界限
LIMIT OF WORKS AREA

高架公共運輸交匯處
ELEVATED PTI ABOVE EXISTING PTI

落馬洲邊界管制站
可擴建的區域
POSSIBLE FUTURE EXTENSION OF LMCSL BCP

現有緊急集合地點
EXISTING EMERGENCY ASSEMBLY AREA

連接落馬洲邊界管制站
CONNECT TO LMCSL BCP

面積約320平方米
AREA ≈ 320m²

擬接駁港鐵落馬洲站的行人天橋
PROPOSED FOOTBRIDGE FROM/TO MTR LOK MA CHAU STATION

連接現有的連接橋
CONNECTION TO EXISTING LINK BRIDGE

路面環保運輸系統的高架橋
VIADUCT FOR ROAD-BASED EFTS

避讓蓄水池
(AVOID STORAGE PONDS)

避讓較大的漁塘
(AVOID LARGE-AREA PONDS)

禁區內需考慮保安措施
SECURITY MEASURE THROUGH CLOSED AREA

將來的西邊連接路
FUTURE WESTERN CONNECTION ROAD

河套區
THE LOOP

下灣村
HA WAN TSUEN

新邊界巡邏路
NEW BOUNDARY PATROL ROAD

新深道
SAN SHAM ROAD

落馬洲支線
LOK MA CHAU SPUR LINE

新田東的主要排水管道
SAN TIN EASTERN MAIN DRAINAGE CHANNEL

209840/HY/301
209840/HY/302
209840/HY/303

REEDBED NO.1
REEDBED NO.2
REEDBED NO.3
REEDBED NO.4
REEDBED NO.5
REEDBED NO.6
REEDBED NO.7
REEDBED NO.8

+22.06
+15.15
+15.1
+16.5
+17.6
+18.2
+17.2
+5.5
+6.8

R 250
R 175
R 495.35

GRADIENT = 1%
GRADIENT = 4.5%

841800 N
841600 N
841200 N

825000 E
825200 E
825400 E
825600 E
825800 E

0 25 50 75 100 125
METRES

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT / 規劃署 PLANNING DEPARTMENT	ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited	研究項目 Job Title 合約編號 Agreement No. CE 53/2008 (CE) 落馬洲河套地區發展規劃及工程研究 - 勘查研究 Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	圖則項目 Title 落馬洲鐵路站連接通道總圖 Direct Link to Lok Ma Chau Station – General Layout – Key Plan	圖則編號 Figure No. 2.11a 圖則 Scale: AS SHOWN 修訂編號 Rev.

附件 4-1
Appendix 4-1

影響概覽

Impact Summary

Summary of Environmental Impacts Associated with the Project

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Air Quality Impact					
Construction Phase					
Existing, planned and committed sensitive developments mostly are residential with a few other types such as government/ institution/ community (GIC) and places of public worship 51 assessment points (refer to **Figures 3.2 - 3.2d**)	**Scenario 1** • 1-hour Average TSP Conc.: 2390.2 – 13982.1 µg/m^3 • 24-hour Average TSP Conc.: 180.0 – 1593.8 µg/m^3 • Annual Average TSP Conc.: 73.2 – 86.9 µg/m^3 **Scenario 2** • 1-hour Average TSP Conc.: 386.9 – 9254.8 µg/m^3 • 24-hour Average TSP Conc.: 97.8 – 2211.1 µg/m^3 • Annual Average TSP Conc.: 73.2 – 87.3 µg/m^3	• EIAO-TM and AQO • 1-hr Average TSP Conc: 500 µg/m^3 • 24-hr Average TSP Conc: 260 µg/m^3 • Annual Average TSP Conc: 80 µg/m^3	• Exceed EIAO-TM (1-hr) criterion by up to 13482.1 µg/m^3 • Exceed AQO (24-hr) criterion by up to 1951.1 µg/m^3 • Exceed AQO (Annual) criterion by up to 7.3 µg/m^3	• Watering once per hour on exposed worksites and haul road is proposed • Dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices would be carried out to further minimise construction dust impact.	**Scenario 1** The mitigated impact prediction results for 1-hr, 24-hr and Annual Average TSP Conc. are as follows. • 1-hour Average TSP Conc.: 130.8 – 489.6 µg/m^3 • 24-hour Average TSP Conc.: 76.0 – 168.3 µg/m^3 • Annual Average TSP Conc.: 73.1 – 74.4 µg/m^3 • No adverse residual 1-hr, 24-hr and annual dust impacts would be anticipated. **Scenario 2** The mitigated impact prediction results for 1-hr, 24-hr and

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
					Annual Average TSP Conc. are as follows. • 1-hour Average TSP Conc.: 81.3 – 444.0 µg/m^3 • 24-hour Average TSP Conc.: 73.8 – 149.4 µg/m^3 • Annual Average TSP Conc.: 73.1 – 74.6 µg/m^3 • No adverse residual 1-hr, 24-hr and annual dust impacts would be anticipated.
Operational Phase (Vehicular Emission)					
Existing, planned and committed sensitive developments mostly are residential with a few other types such as government/ institution/ community (GIC) and places of public worship 64 assessment points (refer to **Figures 3.2 -**	**<u>Year 2020</u>** • 1-hour Average NO_2 Conc.: 61-183 µg/m^3 • 24-hour Average NO_2 Conc.: 50– 68 µg/m^3 • Annual Average NO_2 Conc.: 49 – 57 µg/m^3 • 24-hour Average RSP Conc.: 51 – 54 µg/m^3 • Annual Average RSP Conc.:	• Environmental Impact Assessment Ordinance (EIAO) (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO), Annex 4 and Annex 12 • Air Pollution	• No exceedance was anticipated.	• No mitigation measure would be required.	• No adverse residual impact would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
3.2d)	51 – 52 µg/m^3 **Year 2027** • 1-hour Average NO_2 Conc.: 56 - 162 µg/m^3 • 24-hour Average NO_2 Conc.: 50 – 64 µg/m^3 • Annual Average NO_2 Conc.: 49 – 53 µg/m^3 • 24-hour Average RSP Conc.: 51 – 53 µg/m^3 • Annual Average RSP Conc.: 51 – 52 µg/m^3	Ordinance (APCO) (Cap 311); • 1-hr Average NO_2 Conc: 300 µg/m3 • 24-hr Average NO_2 Conc: 150 µg/m3 • Annual Average NO_2 Conc: 80 µg/m3 • 24-hr Average RSP Conc: 180 µg/m3 • Annual Average RSP Conc: 55 µg/m3			
Operational Phase (Odour Emission)					
Planned and committed sensitive developments mostly educational institutions within LMC Loop 22 assessment points (refer to **Figures 3.2b – 3.2c**)	**Unmitigated Case** • 5-seconds average: 47.2 ou – 153.5 ou	• Environmental Impact Assessment Ordinance (EIAO) (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO), Annex 4; • Meet 5 odour units based on an averaging time of 5 seconds for odour	• Exceed EIAO-TM (1-hr) criterion by up to 148.5 ou	• Bioremediation along certain extent of Shenzhen River • Odour removal system for on-site STP • Odour removal system at buildings with central air-conditioning system as interim contingency measure, if require.	**Short Term** • 5-seconds average: 10.8 ou – 14.5 ou • No adverse residual impact anticipated indoor if odour removal system is installed. • Residual impact would be anticipated outdoor. **Long Term**

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		prediction assessment.			• 5-seconds average: 3.5 ou – 4.7 ou • No adverse residual impact would be anticipated.
Noise					
Construction Phase (Construction Noise)					
Existing residential premises and worship in the vicinity Future residential premises within LMC Loop 19 assessment points (refer to **Figures 4.4-4.7**)	• Predicted construction noise levels would range from 63 to 90 dB(A)	• TM-EIAO Annex 5 for non-restricted hours for domestic premises: 75 dB(A), for educational institution is 70 dB(A) (65 dB(A) during examination period).	• Exceed the TM-EIAO noise criterion by up to 15 dB(A)	• Adoption of good site practices, use of quite plant and working methods, use of site hording as noise barrier at ground level of NSRs, use of temporary noise barrier from relatively static PMEs, scheduling of construction works outside school examination periods and critical area and alternative use of plant items and setting the concrete lorry mixer at around 20m away from the existing NSRs along Ha Wan Tsuen Road and Lok Ma Chau Road and planned NSRs at eco-lodge along Border Road to minimise construction noise impact	• The mitigated predicted construction noise levels for the Project alone would range from 54 to 75 dB(A) within the criterion • No adverse residual noise impact would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
• Construction Phase (Construction Traffic Noise)					
Existing residential premises and worship in the vicinity 55 assessment points (refer to **Figures 4.4-4.7**)	• Predicted construction traffic noise levels would range from 43 to 75 dB(A) in Year 2016 and 50 to 76 dB(A) in Year 2020	• Noise Control Ordinance (NCO) (Cap.400); • Environmental Impact Assessment Ordinance (EIAO) (Cap. 499); • Noise criterion for domestic premises is 70dB(A) and 65 dB(A) for places of worship	• Exceed TM-EIAO criterion by up to 5dB(A) for Year 2016 and 6 dB(A) for Year 2020	• Provision of temporary reflective noise barrier	• The predicted mitigated construction traffic noise would range from 43 to 75dB(A) in Year 2016 and 50 to 75 dB(A) in Year 2020 • The contribution due to the construction access road would be less than 1dB(A) for both Year 2016 and 2020 and the noise impact from construction access road is within the noise criteria of 70dB(A). Thus construction traffic noise is insignificant. • No adverse residual impacts would be anticipated.
Operational Phase (Traffic Noise)					
Existing residential premises and worship	Predicted noise levels would be in the range of 38to 77 dB(A)	• EIAO-TM Annex 5: ANL	• Exceed TM-EIAO criterion by up to	• Implementation of reflective noise barrier	• The predicted mitigated operational

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
in the vicinity Planned residential premises 144 assessment points (refer to **Figures 4.4-4.7**)			7dB(A)	• Provision of central air conditioning for the first layer of NSRs facing Road M1	traffic noise would range from 37 to 76dB(A) • The contribution due to the project road would be less than 1dB(A) and the noise impact from project road is within the noise criteria of 70dB(A). Thus operational traffic noise is insignificant. • No adverse residual impacts would be anticipated.
Operational Phase (Fixed Noise)					
Planned residential premises in LMC Loop	• Maximum sound power level was predicted to meet the relevant noise criteria	• EIAO-TM Annex 5: ANL-5dB(A)	• No exceedance was anticipated.	• Application of silencer installation at exhaust fan of sludge pumping station • Application of special acoustic enclosure at inlet pump of the influent pumping station, air blowers of the blower house, RAS pump of the RAS pumping station, thickened primary sludge	• No adverse residual impacts would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				pumps of the primary sludge thickeners, effluent pump of the effluent pumping station, thickened primary sludge pumps of the sludge pumping station, condensers and chillers	
Water Quality					
Construction Phase					
Shenzhen River (WSR1), LMC Meander (WSR2), San Tin Wetlands (Fish Ponds) (WSR3), Hoo Hok Wai (WSR4), Ma Tso Lung Nullah (WSR5) (refer to **Figure 5.2**)	• Potential deterioration in water quality	• TM-EIAO; • Water Pollution Control Ordinance (WPCO) (Cap. 358); • Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS); • Practice Note for Professional Persons (ProPECC) PN 1/94	• No exceedance was predicted.	• Appropriate mitigation measures has been proposed (see Section 5.7.1) to control the following: - Construction runoff - Groundwater from contaminated area - Sewage from workforce - Construction of bridge crossing - Construction of underpass/depressed road - Bio-remedation of Shenzhen River - Construction of	• No unacceptable water quantity impacts would be anticipated. • No adverse residual impact would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				viaduct across reedbed in LMC Station	
Operational Phase					
Shenzhen River (WSR1), LMC Meander (WSR2), San Tin Wetlands (Fish Ponds) (WSR3), Hoo Hok Wai (WSR4), Ma Tso Lung Nullah (WSR5) (refer to **Figure 5.2**)	Water quality would be deteriorated by: - Sewage and sewerage system - Discharge from District Cooling System - Runoff from internal and external connections - Drainage system	• Relevant standards/ criteria stipulated under the EIAO-TM, WPCO, TM-DDS and ProPECC 5/93	• No exceedance was predicted	• Appropriate and practicable mitigation measures have been proposed to control potential adverse water quality impact during operational phase (see Section 5.7.2)	• No unacceptable water quantity impacts would be anticipated. • No adverse residual impact would be anticipated.
<u>Sewerage and Sewage</u>					
Construction Phase					
Water quality, air and noise sensitive receivers at or near the Project Site	Additional sewage flows and loads will be generated which could not be handled by the existing YLSTW or SWHSTW	• No net increase in pollution load	• No exceedance was predicted.	• On-site STW and off-site load compensation at SWHSTW is recommended. • MBR is recommended as the sewage treatment process in the on-site STW.	• No adverse residual impacts would be anticipated.
<u>Waste</u>					

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Construction Phase					
Water quality, air and noise sensitive receivers at or near the Project Site, the waste transportation routes and the waste disposal site.	• Construction and demolition (C&D) materials would arise from site clearance waste excavated materials, construction of new buildings and structures, on-site sorting of C&D materials and imported fill materials • Contaminated soil in Area A (around 57,444m3), Area B and added Area B • Sediments from fishponds and meander (around 300m^3 for the construction of WCR and 63,700m^3 for the construction of ECR) • Chemical wastes • General Refuse (1600m^3, include Paper, Metals and Plastics) • Sewage from amenity facilities	• EIAO-TM Annex 7 and Annex 15 • Waste Disposal Ordinance (Cap. 354); • Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C); • Land (Miscellaneous Provisions) Ordinance (Cap. 28); • Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation; • Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N); and • Dumping at Sea Ordinance (Cap.	• Not applicable.	• Strict implementation of good site practice • Adoption of on-site sorting, reusing excavated fill materials etc. to minimize the surplus materials to be disposed. • Implementation of waste reduction measures • Implementation of measures to minimize the impact from storage, collection and transportation of waste	• No adverse residual impacts would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		466).			
Operational Phase					
Water quality, air and noise sensitive receivers at or near the Project Site, the waste transportation routes and the waste disposal site.	<u>Area A</u> • Municipal Solid Waste (Phase I: 34.2tpd and Phase II: 68.4tpd) • Chemical waste from laboratories, machinery maintenance and servicing in academic buildings and STW • Food waste (24.6tpd) • Sewage sludge (7.1 wet tonnes/day) <u>Area B</u> • Insignificant amount of general refuse would be generated in Area B during operational phase	• Waste Disposal Ordinance (Cap. 354); and • Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C).	• Not applicable.	• Implementation of a waste prevention programme as well as materials recovery and recycling programme • Employ reputable waste collector to remove general refuse • Employ licensed waste collector and trip-ticket system for the collection of chemical waste • Follow Code of Practice on the Packaging, Labelling and Storage of Chemical Waste in handling of chemical waste. • Food waste should be collected separately with using enclosed containers and treated by on-site composting in an enclosed area • Sewage sludge should be treated at the proposed STF at Nim Wan and transported by road in water tight containers or skips.	• No adverse residual impacts would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Land Contamination					
Construction Phase					
Potential land contamination sites within the Project Area	LMC Loop • 5 zones were identified as contaminated by metal Arsenic with volume of 57,444m^3 contaminated soil Contamination Assessment Area for the Associated Infrastructure outside LMC Loop • No potentially contaminated site was identified in the contamination assessment area for the associated infrastructure outside the LMC Loop and SI work was not required	• Section 3 (Potential Contaminated Land Issues) of Annex 19 "Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts" of the EIAO-TM. • Guidance Note for Contaminated Land Assessment and Remediation" • Practice Guide for Investigation and Remediation of Contaminated Land • Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management	• Not Applicable	LMC Loop • Remediation by solidification/stabilization is recommended. • Mitigation measures are proposed during excavation and remediation of the contaminated soil.	• No adverse residual impacts would be anticipated.
Operational Phase					
• Not Applicable					

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Hazard					
• Hazard assessment is not required as explosive would not be required during the construction and the development is outside the consultation zone of the nearest PHI					
Cultural Heritage					
Construction Phase					
Sites of archaeological interest	• None recorded presence of sites of archaeological interest to be confirmed during archaeological site survey and no impact is anticipated.	• Guidelines for Cultural Heritage Impact Assessment • EIAO-TM Annex 10 and Annex 19	• Not Applicable	• No mitigation measure would be required.	• No adverse residual impacts would be anticipated.
Built Heritages (refer to **Figures 10.3** to **10.9**)	• No impacts are anticipated from the construction on built heritage	• Guidelines for Cultural Heritage Impact Assessment • EIAO-TM Annex 10 and Annex 19	• Not Applicable	• No mitigation measure would be required.	• No adverse residual impacts would be anticipated.
Operational Phase					
Sites of Archaeological Interest	• None recorded presence of sites of archaeological interest to be confirmed during archaeological site survey and no impact is anticipated.	• Guidelines for Cultural Heritage Impact Assessment • EIAO-TM Annex 10 and Annex 19	• Not Applicable	• No mitigation measure would be required.	• No adverse residual impacts would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Built Heritages (refer to **Figures 10.3** to **10.9**)	• Indirect visual impact on the built heritages near LMC Loop and Western Connection Road from its surrounding development.	• Guidelines for Cultural Heritage Impact Assessment • EIAO-TM Annex 10 and Annex 19	• Not Applicable	• Provide plant screening	• No adverse residual impacts would be anticipated.
Landscape and Visual					
Construction Phase					
Existing Landscape Resources (LRs) and Landscape Character Area (LCAs) within the Study Area Visually Sensitive Receivers (VSRs) within the Study Area (refer to **Figures 11.4a** to **11.4s** for Impacts LRs; **Figures 11.5a** to **11.5e** Impacts for LCAs and **Figures 11.6.1** to **11.7a to 11.7g** for Visual Impacts)	***The LMC Loop Development under EIAO Schedule 3:*** • Significant adverse unmitigated impact on the LR - Marsh on the Loop. • Slight to moderate adverse unmitigated impacts on 33 out of 57 LRs identified within the Study Area. • Significant adverse unmitigated impact on the character of LMC Loop Riverside Landscape. • Moderate adverse unmitigated impacts on 6 out of 9 LCAs identified within the Study Area • Significant adverse unmitigated impacts on 7	• EIAO – TM, EIAO GN No.8/2010 and ETWB TC(W) No. 3/2006	• Not Applicable	• CP1- Preservation and Protection of Existing Trees • CP2 - Works Area and Temporary Works Areas, and Restoration of Temporary Works Area. • CP3 - Advance Implementation of Mitigation Planting • CP4- Transplantation of existing trees • CP5- Coordination with concurrent projects • CP6- Creation of Wetland and Landscape Buffer • CP7-Design of Retaining Wall and Slopes •	***The LMC Loop Development under EIAO Schedule 3:*** • 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

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	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 to Moderate adverse unmitigated impacts on 17 out of 28 VSRs identified within the visual envelope of proposed works. ***DPs under EIAO Schedule 2*** **DP1, DP4 and DP5 within the LMC Loop** • Slight to Significant adverse unmitigated impacts on LRs within the Study Area including grassland, trees and marsh on the LMC Loop and the river to the south of the Loop. • Significant adverse unmitigated impact on the character of LMC Loop Riverside Landscape. • Moderate to Significant adverse unmitigated impacts on 10 out of 28 VSRs				mitigated impacts (Day 1) on 6 out of 9 LCAs identified within the Study Area • 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. ***DPs under EIAO Schedule 2*** **DP1, DP4 and DP5 within the LMC Loop** • Slight to Significant adverse unmitigated impacts on LRs

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	identified within the visual envelope of proposed works. **Western Connection Road (including LMC Road/San Tin Highway Connection) (DP2)** • Slight to Moderate adverse unmitigated impacts on existing road, roadside trees and woodlands and village settlements, fishponds, open yard and developed areas, 18 out of 57 LRs identified within the Study Area. • Moderate adverse unmitigated impacts on 3 out of 9 LCAs identified within the Study Area • Slight to Significant adverse unmitigated impacts on 11 out of 28 VSRs identified within the visual envelope of proposed works. **Direct Link To MTR LMC Station (DP3)** • Slight to Moderate adverse				within the Study Area including grassland, trees and marsh on the LMC Loop and the river to the south of the Loop. • Significant adverse unmitigated impact on the character of LMC Loop Riverside Landscape. • Moderate to Significant adverse unmitigated impacts on 10 out of 28 VSRs identified within the visual envelope of proposed works. **Western Connection Road (including LMC Road/San Tin Highway Connection) (DP2)** • Slight adverse to Negligible adverse mitigated impacts (Day1) on 18 out of 57 LRs identified within the Study

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	unmitigated impacts on existing road, cross-boundary facilities, roadside trees, mitigated wetland and natural stream, open yard and developed areas, 10 out of 57 LRs identified within the Study Area. • Moderate adverse unmitigated impact on the character of LMC Cross-boundary Infrastructure and Facilities Landscape. • Slight to Significant adverse 7 out of 28 VSRs identified within the visual envelope of proposed works. **Eastern Connection Road (DP6)** • Slight to Moderate adverse unmitigated impacts on existing road, grassland, shrubland, woodlands, fishponds, agricultural fields and natural stream, 10 out of 57 LRs identified within the Study Area.				Area. • Slight adverse mitigated impacts (Day 1) on 3 out of 9 LCAs identified within the Study Area • Moderate adverse to Negligible mitigated impacts (Day 1) on 11 out of 28 VSRs identified within the visual envelope of proposed works. **Direct Link To MTR LMC Station (DP3)** • Slight adverse to negligible mitigated impacts (Day 1) on 10 out of 57 LRs identified within the Study Area. • Slight adverse mitigated impact (Day1) on the character of LMC Cross-boundary Infrastructure and Facilities Landscape.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	• Moderate adverse unmitigated impacts on 4 out of 9 LCAs identified within the Study Area. • Moderate adverse unmitigated impacts on 9 out of 28 VSRs identified within the visual envelope of proposed works. **Flushing Water Service Reservoir (DP7)** • Slight adverse unmitigated impacts on grassland of Horn Hill, LR identified within the Study Area. • Moderate adverse unmitigated impact on the character of LMC Hillside Landscape. • Moderate adverse unmitigated impacts on 4 out of 28 VSRs identified within the visual envelope of proposed works.				• Moderate adverse to negligible mitigated impacts (Day1) on 7 out of 28 VSRs identified within the visual envelope of proposed works. **Eastern Connection Road (DP6)** • Slight adverse to negligible mitigated impacts (Day1) on 10 out of 57 LRs identified within the Study Area. • Slight adverse mitigated impacts (Day1) on 4 out of 9 LCAs identified within the Study Area. • Slight adverse mitigated impacts (Day1) on 9 out of 28 VSRs identified within the visual envelope of proposed works.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	•				**Flushing Water Service Reservoir (DP7)** • Negligible mitigated impacts (Day 1) on grassland of Horn Hill, LR identified within the Study Area. • Slight adverse mitigated impact (Day1) on the character of LMC Hillside Landscape. • Slight adverse mitigated impacts (Day1) on 4 out of 28 VSRs identified within the visual envelope of proposed works.
Operational Phase					
Existing Landscape Resources (LRs) and Landscape Character Area (LCAs) within the Study Area Visually Sensitive	***The LMC Loop Development under EIAO Schedule 3:*** • Significant adverse unmitigated impact on the LR - Marsh on the Loop.	• EIAO – TM, EIAO GN No.8/2010 and ETWB TC(W) No. 3/2006	• Not Applicable	• OP1- Roadside and Amenity planting • OP2-Compensatory planting proposals • OP3- Responsive design of	Residual Impacts (Yr10) during operation period upon full establishment of LMMs. ***The LMC Loop***

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Receivers (VSRs) within the Study Area (refer to **Figures 11.4a** to **11.4s** for Impacts LRs; **Figures 11.5a** to **11.5e** Impacts for LCAs and **Figures 11.6.1** to **11.7a to 11.7g** for Visual Impacts)	• Slight to moderate adverse unmitigated impacts on 33 out of 57 LRs identified within the Study Area. • Significant adverse unmitigated impact on the character of LMC Loop Riverside Landscape. • Moderate adverse unmitigated impacts on 6 out of 9 LCAs identified within the Study Area • Significant adverse unmitigated impacts 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 to Moderate adverse unmitigated impacts on 17 out of 28 VSRs identified within the visual envelope of proposed works. ***DPs under EIAO Schedule 2*** **DP1, DP4 and DP5 within the**			buildings and structures • OP4- Design of noise mitigation structures • OP5- Design of engineering structures • OP6- Creation of Woodland • OP7-Reinstatement of Affected Fishponds • OP8-Appication of Terraced Podium Landscape, Vertical Greening and Green Roof •	***Development under EIAO Schedule 3:*** • 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. • Slight adverse mitigated impacts (Year 10) on 7 out of 28 VSRs identified within the visual envelope of proposed works. • Negligible mitigated

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	LMC Loop • Slight to Significant adverse unmitigated impacts on LRs within the Study Area including grassland, trees and marsh on the LMC Loop and the river to the south of the Loop. • Significant adverse unmitigated impact on the character of LMC Loop Riverside Landscape. • Moderate to Significant adverse unmitigated impacts on 10 out of 28 VSRs identified within the visual envelope of proposed works. **Western Connection Road (including LMC Road/San Tin Highway Connection) (DP2)** • Slight to Moderate adverse unmitigated impacts on existing road, roadside trees and woodlands and village settlements, fishponds, open yard and developed areas, 18				impacts (Year 10) on the remaining VSRs identified within the visual envelope of proposed works. ***DPs under EIAO Schedule 2*** **DP1, DP4 and DP5 within the LMC Loop** • Slight Beneficial mitigated Impact (Year 10) on LR Trees on the LMC Loop. • Negligible mitigated impact (Year 10) on all remaining LRs. • Slight adverse mitigated impact (Year 10) on the character of LMC Loop Riverside Landscape. • Negligible mitigated impacts (Year 10) on all remaining LCAs. • Slight adverse

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	out of 57 LRs identified within the Study Area. • Moderate adverse unmitigated impacts on 3 out of 9 LCAs identified within the Study Area • Slight to Significant adverse unmitigated impacts on 11 out of 28 VSRs identified within the visual envelope of proposed works. **Direct Link To MTR LMC Station (DP3)** • Slight to Moderate adverse unmitigated impacts on existing road, cross-boundary facilities, roadside trees, mitigated wetland and natural stream, open yard and developed areas, 10 out of 57 LRs identified within the Study Area. • Moderate adverse unmitigated impact on the character of LMC Cross-boundary Infrastructure and Facilities Landscape.				mitigated impacts (Year 10) on 3 out of 28 VSRs identified within the visual envelope of proposed works. • Negligible mitigated impacts (Year 10) on all remaining VSRs. **Western Connection Road (including LMC Road/San Tin Highway Connection) (DP2)** • Negligible mitigated impact (Year 10) on all remaining LRs. • Negligible mitigated impacts (Year 10) on all remaining LCAs. • Negligible mitigated impacts (Year 10) on 3 out of 28 VSRs identified within the visual envelope of proposed works. • Negligible mitigated impacts (Year 10) on

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	• Slight to Significant adverse 7 out of 28 VSRs identified within the visual envelope of proposed works. **<u>Eastern Connection Road (DP6)</u>** • Slight to Moderate adverse unmitigated impacts on existing road, grassland, shrubland, woodlands, fishponds, agricultural fields and natural stream, 10 out of 57 LRs identified within the Study Area. • Moderate adverse unmitigated impacts on 4 out of 9 LCAs identified within the Study Area. • Moderate adverse unmitigated impacts on 9 out of 28 VSRs identified within the visual envelope of proposed works. **<u>Flushing Water Service Reservoir (DP7)</u>** • Slight adverse unmitigated impacts on grassland of Horn				all remaining VSRs. **<u>Direct Link To MTR LMC Station (DP3)</u>** • Negligible mitigated impact (Year 10) on all remaining LRs. • Negligible mitigated impacts (Year 10) on all remaining LCAs. • Slight mitigated impacts (Year 10)) on 1 out of 28 VSRs identified within the visual envelope of proposed works. • Negligible mitigated impacts (Year 10) on all remaining VSRs. **<u>Eastern Connection Road (DP6)</u>** • Negligible mitigated impact (Year 10) on all remaining LRs. • Negligible mitigated impacts (Year 10) on all remaining LCAs. • Negligible mitigated

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	Hill, LR identified within the Study Area. • Moderate adverse unmitigated impact on the character of LMC Hillside Landscape. • Moderate adverse unmitigated impacts on 4 out of 28 VSRs identified within the visual envelope of proposed works.				impacts (Year 10) on all VSRs. **Flushing Water Service Reservoir (DP7)** • Negligible mitigated impact (Year 10) on all remaining LRs. • Negligible mitigated impacts (Year 10) on all remaining LCAs. • Negligible mitigated impacts (Year 10) on all VSRs.
Ecology					
Construction Phase					
Habitats, species, fragmentation (refer to **Figure 12.1** for habitat map)	Habitats • Loss of 10.96ha of reed marsh • Loss of 0.5ha of marsh • Disturbance to fish ponds • Construction run-off increasing suspended solids and pollutants in LMC Meander	• Forests and Countryside Ordinance • Wild Animals Protection Ordinance • Environmental Impact Assessment Ordinance • Protection of Endangered Species	• Not Applicable	• Specific mitigation measures are proposed during construction (see section 12.8)	• Disturbance effects on both the flight line corridor and LMC Meander and also on Eurasian Otter

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	• Pollutant run-off to downstream areas • Accidental spillage events • Disturbance to LMC Meander • Loss of pond habitat along Ha Wan Tsuen Rd. • Disturbance to pond habitat • Woodland loss along Ha Wan Tsuen Road • Run-off to LMC Meander and stream south of Lung Hau Road • Habitat loss and disturbance to marsh and reed marsh • Loss of secondary woodland • Direct impacts on LMC Meander • Direct impacts on Ping Hang Stream • Loss of riparian habitat of Ma Tso Lung Stream • Construction run-off <u>Species</u>	of Animals and Plants Ordinance			

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	• Mortality impacts on birds • Impacts on Eurasian otter • Impacts on other mammals • Impacts on Herpeto fauna, Odonata and Paradise Fish • Impacts on Rose Bitterling • Impacts on small snakehead and *Somanniathelphus zanklon* <u>Fragmentation</u> • Impacts on flight line corridor from LMC Loop development • Impacts on flight line corridor from WCR and ECR • Temporary disturbance impacts arising from strengthening of banks of Ecological Area				
Operational Phase					
Habitats, species, fragmentation (refer to **Figure 12.1** for habitat map)	<u>Habitats</u> • Loss of 10.92ha of reed marsh	• Forests and Countryside Ordinance • Wild Animals	• Not Applicable	• Specific mitigation measures are proposed during construction (see section 12.8)	• Disturbance effects on both the flight line corridor and LMC Meander and also on

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	• Loss of 0.5ha of marsh • Disturbance to fish ponds • Accidental spillage events • Loss of pond habitat along Ha Wan Tsuen Rd. • Disturbance to pond habitat • Woodland loss along Ha Wan Tsuen Road • Habitat loss and disturbance to marsh and reed marsh • Loss of secondary woodland • Direct impacts on LMC Meander • Direct impacts on Ping Hang Stream • Loss of riparian habitat of Ma Tso Lung Stream • Operational runoff <u>Species</u> • Mortality impacts on birds • Impacts on Eurasian otter • Impacts on other mammals • Impacts on Herpeto fauna,	Protection Ordinance • Environmental Impact Assessment Ordinance • Protection of Endangered Species of Animals and Plants Ordinance			Eurasian Otter

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	Odonata and Paradise Fish • Impacts on Rose Bitterling • Impacts on small snakehead and *Somanniathelphus zanklon* <u>Fragmentation</u> • Impacts on flight line corridor from LMC Loop development • Impacts on flight line corridor from ECR				
<u>Fishery</u>					
Construction Phase					
Fisheries	• Temporary loss: 2.51ha of active pond and 1.10ha of inactive pond. Permanent loss: 2.01ha of active pond and 0.31ha of inactive pond and 0.82 of abandoned pond due to construction of WCR and Direct Link to LMC Station • 3.32ha inactive pond would be temporarily lost and 2.10ha permanently lost due to the construction of ECR.	• EIAO – TM • Food Adulteration (Metallic Contamination) Regulations (CAP 132V)	• Not Applicable	• Illegal dumping of waste and excavated material will be properly managed (see Waste Section) • A layer of permanent sheet pile wall will be erected along the site boundary adjacent to fish ponds after commencement of site works. • Temporary traffic arrangements will be instigated to maintain or	• No adverse residual impact would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	• For Area 2 there will be permanent loss of 7.16ha of active ponds and1.29ha of inactive ponds. Permanent loss of 3.08ha of abandoned ponds (Area 7) and 1.34ha of active ponds and 5.48ha of abandoned pond (Area 9). Permanent loss of 3.32ha of active pond (Area 4) will occur should it be chosen. • Potential indirect impacts from discharge of sewage/wastewater, runoff • The loss of fisheries resources/production would not be significant • Very low to low impact on fishing activity Minor permanent impact on aquaculture activity EIAO – TM			provide alternative access to fish ponds • Standard mitigation measures to control site runoff and other pollutants caused by construction activities and good site practices will be implemented (details see Water Quality Section). Excavated material and other inert construction wastes produced will be transferred to proper recipients (i.e. landfill) (details see Waste Section). • The contractor should prepare the emergency contingency plan for actions to be taken if significant impacts on fish ponds occur.	
Operational Phase					
Fisheries	• Some ponds will be lost permanently. • Sewage and runoff from the proposed development could	• EIAO – TM • Food Adulteration (Metallic Contamination)	• Not Applicable	• Affected ponds will be reinstated as far as practicable after completion of construction works.	• No adverse residual impact would be anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	cause a deterioration of water quality and affect fish. • The development area and proposed alignments may generate surface runoff that would affect the water quality of the streams and ponds nearby. • There is a concern that existing paths to active fish ponds may be blocked (i.e. blocked by proposed connection roads) • Some ponds will be adjacent to future connection and thus bund stability and water seepage issues may also be concerns	Regulations (CAP 132V)		• Sewage from the proposed development will be dealt with via a sewerage system. • The contractor should prepare the emergency contingency plan for actions to be taken if significant impacts on fish ponds occur.	
Food Safety Implications					
Human	• Potential food safety implications is not anticipated	• Food Safety Standards under Hong Kong Regulations	• Not Applicable	• Good site practice should be adopted to minimize the release of TSP and the associated implications (details see Section 13.6.7). • The contractor should have effective communication with Food and Environmental Hygiene	• No potential safety implications are anticipated.

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/ Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/ Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				Department (FEHD) / Centre of Food Safety (CFS), on food surveillance and food incidents.	
Landfill Gas					
LFG hazard assessment is not required as the development is outside the 250m Consultation Zone of MTLL. There is no impact on the restoration and aftercare facilities of MTLL.					