33/F, Revenue Tower, 5 Gloucester Road, Wan Chai, Hong Kong
香港灣仔告士打道 5 號稅務大樓 33 樓

ACE-EIA Paper 6/2013
For advice on 19 August 2013

Environmental Impact Assessment Ordinance (Cap. 499)
Environmental Impact Assessment Report
Development of Lok Ma Chau Loop

PURPOSE

This paper presents the key findings and recommendations of the Environmental Impact Assessment (EIA) report for the Development of Lok Ma Chau (LMC) Loop (hereafter known as "the Project") submitted under section 6(2) of the Environmental Impact Assessment Ordinance (EIAO) (Application No. EIA-212/2013). The Civil Engineering and Development Department (CEDD) (the applicant), and their consultants will present the EIA report at the meeting of EIA Subcommittee, if necessary.

ADVICE SOUGHT

2. Members' views are sought on the findings and recommendations of the EIA report. The Director of Environmental Protection (DEP) will take into account comments from the public and the Advisory Council on the Environment (ACE) in deciding whether or not to approve the EIA report under section 8(3) of the EIAO.

BACKGROUND

3. Before the training of Shenzhen River, the LMC Loop was within the administrative boundary of Shenzhen Municipal Government. The area of the LMC Loop was used as a disposal site for the sediment generated from the river

training works. It now lies within the administrative boundary of the Hong Kong Special Administrative Region (HKSAR). In view of the unique history of the LMC Loop which was within the Shenzhen's jurisdiction before 1997, Hong Kong and Shenzhen governments have agreed to jointly develop the site for mutual benefits of the two cities.

4. In the Chief Executive's 2007-08 Policy Address, the development at the LMC Loop is one of the ten major infrastructure projects for economic growth of the HKSAR. The HKSAR Government would work with the Shenzhen authorities to tap the land resources of the LMC Loop to meet future development needs and consolidate the strategic position of both cities in the Pan-Pearl River Delta (Pan-PRD) region.

5. In 2008, the Hong Kong and Shenzhen governments signed a Co-operation Agreement on the undertaking of a comprehensive study for the development of the LMC Loop. "The Planning and Engineering Study on Development of LMC Loop" (the Study) was jointly commissioned by the two governments in June 2009. It was 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. Public engagement exercises have been conducted before and at different stages of the Study to collect views from the public on the development positioning, possible future land uses and proposed development proposals of the LMC Loop.

6. The applicant has submitted the EIA report for the Project and DEP, in conjunction with the relevant authorities, considers that the EIA report meets the requirements of the EIA Study Brief and the Technical Memorandum on EIA Process (TM).

NEED FOR THE PROJECT

7. The applicant has advised that 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 Pan-PRD region. The unique history and strategic location of the LMC Loop can provide development space to strengthen co-operation between Hong Kong and Shenzhen to jointly develop the LMC Loop as a hub for cross-boundary human resources development within a Knowledge and

Technology Exchange Zone under the principle of sustainable development. Leveraging on its strategic location to both cities, the Project will provide impetus for human resources development in South China, enhance the competitiveness of Hong Kong and the Pan-PRD region, and benefit the long-term economic growth of the two cities.

ENVIRONMENTAL BENEFITS

8. The EIA report stated that the major environmental benefits with the Project in place include:

- Undertaking bio-remediation for a part of Shenzhen River in collaboration with the Shenzhen authorities to reduce the existing odour source from Shenzhen River and the odour exposure to nearby villages.
- Remediating contaminated land within the LMC Loop.
- Pioneering cooperation between Shenzhen and Hong Kong at a readily available site at the boundary for which alternative sites serving the same purpose may require more construction works, and hence more significant induced carbon emissions.

9. The applicant has also advised that the Project also offers opportunities to promote low carbon and green community such as the reuse of treated sewage effluent (e.g. for toilet flushing), low emission transport system (e.g. electric shuttle bus), low carbon built form and design (e.g. proper building orientation, energy efficiency lighting system, with green roof), etc.

DESCRIPTION OF THE PROJECT

10. The Project comprises the development of the LMC Loop with an area of about 87.7 ha, supporting infrastructure/works within and outside the LMC Loop and the other associated works. The LMC Loop will be developed with higher education as the leading land use, complemented by high-tech R&D, as well as C&C industries. **Figure 1** illustrates the proposed general layout of the Project. **Figure 2** shows the Recommended Outline Development Plan of the LMC Loop.

11. As the Study involves a study area greater than 20 ha, it constitutes a

Schedule 3 (Item 1[1]) Designated Project under the EIAO. The following individual Schedule 2 Designated Projects (DPs) are also covered in the EIA report:

(i) Ecological Area - it is about 12.8 ha in size, mainly for ecological mitigation and reed marsh compensation and also serves as a flood storage pond (i.e. Item I.2 [2] of Part I of Schedule 2 of the EIAO);

(ii) Western Connection Road (including Lok Ma Chau Road Connection to Fanling/San Tin Highway) - it is a 2-lane single carriageway, consisting of about 1.3km long main road and 480m long slip road. Part of its alignment, haul roads and temporary works area will be within "Conversation Area", (i.e. Item Q.1 [3] of Part I of Schedule 2 of the EIAO);

(iii) Direct Link to MTR LMC Station - it is a 2-lane road-based viaduct of about 770m in length. Part of its alignment, haul roads and temporary works area will be within "Conversation Area" (i.e. Items A.8 [4] and Q.1 of Part I of Schedule 2 of the EIAO);

(iv) Drainage System under Internal Transport Networks - its discharge point is less than 300m from the "Conversation Area" (i.e. Item I.1 [5] of Part I of Schedule 2 of the EIAO);

(v) Sewage Treatment Works - its design capacity is about 18,000m^3/day with location at about 180m from the planned education institution and including facilities for reuse of treated sewage effluent (i.e. Items F.2[6] and F.4 [7] of Part I of Schedule 2 of the EIAO);

(vi) Eastern Connection Road - it is a 2-lane single carriageway, consisting of about 610m long depressed road, 200m long underpass, 50m long viaduct and 1,350m long at-grade road. Part of its alignment, haul roads and

---

1 Item 1 of Schedule 3 – "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".

2 Item I.2 of Part I of Schedule 2 – "A flood storage pond more than 10 ha in size".

3 Item Q.1 of Part I of Schedule 2 – "All projects including new access roads, railways, sewers, sewage treatment facilities, earthworks, dredging works and other building works partly or wholly in a conservation area".

4 Item A.8 of Part I of Schedule 2 – "A road or railway bridge more than 100 m in length between abutments".

5 Item I.1 of Part I of Schedule 2 – "A drainage channel or river training and diversion works which discharges or discharge into an area which is less than 300m from the nearest boundary of an existing or planned conservation area".

6 Item F.2 of Part I of Schedule 2 – "Sewage treatment works - with an installed capacity of more than 5,000m^3 per day and a boundary of which is less than 200m from the nearest boundary of an existing or planned educational institution".

7 Item F.4 of Part I of Schedule 2 – "An activity for the reuse of treated sewage effluent from a treatment plant".

temporary works area will be within "Conversation Area" (i.e. Items A.9 [8], I.1 and Q.1 of Part I of Schedule 2 of the EIAO);

(vii) Flushing Water Service Reservoir - it is for the reuse of treated sewage effluent (i.e. Item F.4 of Part I of Schedule 2 of the EIAO).

CONSIDERATION OF ALTERNATIVE OPTIONS

12. The EIA report has considered various alternative options for the development of LMC Loop, including the land uses, general layout, scale of development, building height, road alignments, designs, construction methods, sequence of works, etc. to avoid and minimise environmental impacts. The environmental benefits and dis-benefits of the options have been evaluated. The recommended options of various Project items have taken into account environmental considerations, site constraints, comments received from the public and Government departments, including those received during the public engagement exercises of the Project. The key considerations and outcomes are highlighted below.

Avoidance and Minimisation

13. The applicant has advised that avoidance and minimisation of environmental impacts have been the key considerations, among others, throughout the entire Project development and design. Some of the key approaches which have been adopted in the Project by the applicant to avoid and minimise the environmental impacts are summarised as follows:

(i) To preserve the nearby existing major birds' flight-line corridor to the south of the LMC Loop, an Ecological Area comprising almost 15% of the total area of the LMC Loop has been proposed alongside the old Shenzhen River meander. Furthermore, to minimise the impact on the birds' flight-line corridor and the proposed Ecological Area, the development intensity near the Ecological Area has been reduced allowing only low-rise buildings at the south and east of the LMC Loop.

(ii) To minimise the habitat loss and disturbance to large trees, the Western Connection Road is recommended to follow the existing alignment of Ha Wan Tsuen Road and Lok Ma Chau Road.

[8] Item A.9 of Part I of Schedule 2 – "A road fully enclosed by decking above and by structure on the sides for more than 100m".

(iii) To avoid the permanent operational phase impacts, in particular disturbance to Eurasian Otter and major birds' flight-line corridor, the Eastern Connection Road incorporates the combined use of shallow underpass and depressed road design under the old Shenzhen River meander and fish ponds. A deep tunnel design is not preferred by the applicant due to: (a) the need for higher energy consuming mechanical ventilation and smoke extraction system for full tunnel design; (b) the long approach ramp required resulting in significant land area being sterilised in the LMC Loop; and (c) site constraints; etc.

(iv) To avoid/minimise the impacts on the nearby large ponds, wetland, reedbeds and major birds' flight-line corridor, the design and alignment of the Direct Link, connecting to the proposed elevated new public transport interchange at the MTR Lok Ma Chau Station, have been adjusted to: (a) avoid the large ponds in the area; (b) follow mainly the existing railway of LMC Spur Line; and (c) place the piers on the bunds of the reedbeds.

(v) To avoid/minimise the disturbance to wildlife, noise impact and potential hazards, construction methods such as percussive piling, blasting and use of explosives are not recommended. Besides, it is recommended to implement the habitat compensation and the establishment of the proposed Ecological Area in the initial stage of the Project in phasing the sequence of works.

SPECIFIC ENVIRONMENTAL ASPECTS TO HIGHLIGHT

Ecological Impact

14. While the area to the north of the LMC Loop across Shenzhen River (i.e. the Shenzhen City) is largely developed, the Project site is located at/close to ecological sensitive areas. They include reed marsh in the LMC Loop and the old Shenzhen River meander, Hoo Hok Wai and Deep Bay area, etc. within Hong Kong. The presence of conservation important species have been recorded in some areas, e.g. Eurasian Otters, Three-banded Box Terrapin, waterbirds and their major flight-line corridor between Mai Po and Hoo Hok Wai.

15. In addition to those major approaches and alternatives to avoid and minimise environmental impacts as mentioned in paragraph 13 above, the applicant also proposes the following key ecological measures:

(i) creating and establishing 12.78 ha. Ecological Area containing reed marsh and marsh habitat prior to total clearance of reed marsh in the Loop;

(ii) providing permanent compensatory off-site wetland areas totalling a minimum of 11.72 ha in advance of any wetland loss;

(iii) providing construction stage temporary compensatory off-site wetland areas ranging from 4.11 to 6.36 ha;

(iv) providing 1.3 ha woodland compensation area by planting trees and shrubs near Horn Hill;

(v) stipulating a buffer zone of 50m width near the Ecological Area, with low development intensity and building height and appropriate screen-planting of taller and denser trees around individual buildings;

(vi) creating a 23m minimum width vegetated setback at the edges of the Loop along the south-western and north-eastern sections of the meander;

(vii) stabilising banks of the old Shenzhen River meander including re-vegetation after completion;

(viii) installing 3m-high olive green fence around construction areas and along infrastructural connections to allow or deter animal passage as required;

(ix) implementing standard measures to minimise magnitude of construction runoff and avoid/minimise the potential impact of spillage events, if any;

(x) carrying out outside dry-season where practicable, construction works associated with the Western Connection Road along Ha Wan Tsuen Road, Eastern Connection Road outside current boundary fence, site formation in the Ecological Area and stabilisation of banks of the old Shenzhen River meander, to minimise disturbances to migratory birds/water birds;

(xi) using mechanised equipment only during the period 9am to 5pm;

(xii) prohibiting use of direct lighting on the old Shenzhen River meander and minimal night-time lighting for roads and buildings;

(xiii) providing barrier fence along at-grade road, wildlife underpasses and one 70m-wide overpass as part of the Eastern Connection Road;

(xiv) phasing work on Eastern Connection Road to avoid concurrent works in sections of critical ecological value;

(xv) using viaducts to cross streams at Ping Hang and Ma Tso Lung area;

(xvi) using opaque noise barriers along roads and appropriate glass and façade treatment for building in the Loop to minimise the mortality of fast-moving wildlife (e.g. birds); and

(xvii) conducting pre-construction search for any otter holts/dens and herpetofaunal species of conservation concern in construction sites, with

remedial measures such as setting of no works area around otter holts/ den and translocation of important species identified, if any.

The EIA concluded that the residual impacts after implementation of mitigation measures are all assessed as of low severity and the Project is considered acceptable in terms of ecological impact.

Air Quality Impact

16. During the operational phase, vehicular emissions within the LMC Loop should not be a major concern. Two transport interchanges would be provided at both sides of the LMC Loop and close to the external connection roads to reduce internal transport within the LMC Loop. Besides, green transport modes, such as electrical shuttle buses, cycling and walking would be promoted within the LMC Loop.

17. The odour problem mainly due to the existing Shenzhen River could be a concern in the initial operational phase. The key mitigation measure by the Project is the implementation of bio-remediation along 4.2 km of Shenzhen River next to the LMC Loop achieving 98% odour removal efficiency. As a result, the odour level would be reduced from 153.5 odour units (ou) in the worst case situation to 14.5 ou.

18. For the predicted residual odour impact of 14.5 ou after the bio-remediation works by the applicant, the EIA report concluded that the frequency of exceedance ranges from 1.0% to 3.1% in a year. It is anticipated that under the worst case scenario with low tides and high ambient temperature (i.e. mainly daytime during summer season) where most of the people would stay in air-conditioning buildings within the LMC Loop and the students would be on summer holiday. Hence, the duration of exceedances would be short. Besides, there would actually be a great improvement of odour levels in the LMC Loop area after the proposed bio-remediation works by the applicant. Environmental monitoring and audit (EM&A) programme with measurements and odour patrols is recommended to monitor the odour situation, and repeat the bio-remediation works if necessary. The applicant also proposes that, if circumstances so warrant it, all buildings with central air conditioning in the development could be equipped with odour removal system as an interim enhancement and contingency measures. Thus, the EIA considered that odour impact would be acceptable. Furthermore, with the

on-going improvement measures by the Shenzhen Municipal Government for improving water quality and reducing odour emission from tributaries of Shenzhen River, the EIA assessed that odour level would be further reduced to 4.7 ou. Therefore, compliance with the 5 ou criterion is expectedly to be achieved in long term.

19. For the operational vehicular emissions along connection roads, it could be a concern since some existing air sensitive receivers are close to the connection roads. The key concerned air quality parameters would be nitrogen dioxide (NO_2) and respirable suspended particulates (RSP). The predicted worst cases of 1-hour NO_2 and Annual NO_2 would be 183μg/m^3 (criterion: 300μg/m^3) and 57μg/m^3 (criterion: 80μg/m^3) respectively (with a NO_2 background of 48.5μg/m^3). The contributions due to the Project alone would be small. All cumulative air quality impacts due to vehicular emissions are all within the prevailing Air Quality Objectives (AQOs).

20. For construction phase, with the implementation of dust control measures including those under the Air Pollution Control (Construction Dust) Regulation, the mitigated worst case dust levels of 1-hour total suspended particulates (TSP), 24-hour TSP and Annual TSP at air sensitive receivers are 490 μg/m^3 (criterion: 500 μg/m^3); 168 μg/m^3 (criterion: 260 μg/m^3) and 75 μg/m^3 (criterion: 80 μg/m^3) respectively. All of the results are within their respective criteria.

21. While the Legislative Council passed the Air Pollution Control (Amendment) Bill 2003 on 10 July 2013 to adopt the new AQOs with effect from 1 January 2014, for the purpose of assessing the air quality impacts under the EIAO, consideration of the assessment criteria would be based on the AQOs prevailing at the time of the decision.

Landscape and Visual Impact

22. The proposed LMC Loop development including buildings in the LMC Loop, roads (including elevated & bridge structures, noise barriers), flushing water service reservoir, etc. and the associated works will have potential landscape and visual impacts.

23. There are about 6 660 no. of trees within the Project area. Of these,

about 2 500 no. of trees located on the LMC Loop and about another 4 160 within the limit of work areas. No "Registered Old and Valuable Trees" or "Champion" Trees were found. Over 90% of the trees within the LMC Loop are aggressive weedy trees, *Leucaena leucocephala*, which shall be removed following good horticultural practice. About 2 638 no. of trees and 279 no. of trees will be retained and transplanted respectively. All of the trees to be felled are weedy trees or unavoidably in conflict with the construction works and not suitable for transplant. The loss of trees will be compensated in terms of both quantity and quality with a replanting ratio not less than 1:1.

24. With the implementation of mitigation measures including limited works area, preservation of existing trees and transplanting where possible, responsive design of infrastructure and utilities facilities, vertical greening measures and restoration of disturbed area with compensatory planting, the landscape and visual impacts of the Project would be reduced to acceptable level.

Noise Impact

25. Road traffic noise is a noise concern mainly because some of the existing noise sensitive receivers are close to the existing LMC Road and Ha Wan Tsuen Road, i.e. the proposed future Western Connection Road although it is only a 2-lane single carriageway.

26. For the construction access road traffic, with the provision of temporary noise barriers, the cumulative noise levels would be in a range from 66 to 75dB(A) under the worst case scenario.

27. For the operational road traffic, the cumulative traffic noise impacts at the existing and planned Noise sensitive receivers will be mitigated by 0.8m to 5m high noise barriers and be controlled to within a range from 63 to 76dB(A).

28. The several construction and operation road traffic noise exceedances are found along existing major roads (e.g. San Tin/Fanling Highways) which cause the major traffic noise. The EIA assessed that the noise due to construction traffic or operation traffic of the project roads alone would be within the noise criterion of 70 dB(A) and contribute much less than 1dB(A) (i.e. 0.0 to 0.2 dB(A)) to the overall noise level. Hence, the traffic noise impacts due to the Project are insignificant in the exceedances.

29. For general construction noise, with the use of quiet plants, temporary noise barriers or site hoarding to screen the noise sources, set-back of noisy equipment, as well as implementation of other practical mitigation measures and good site practice, the noise levels would range from 54dB(A) to 75dB(A) within the noise criterion of 75dB(A).

Water Quality and Sewerage Impact

30. The key potential water quality impact of the Project would be caused by the construction works at the old Shenzhen River meander and other water courses. The potential impact would be minimised by the project design and construction methods, e.g. by means of cofferdam, diaphragm wall, pre-casted bridge structures, etc. to separate and avoid the construction works from water courses. Besides, silt traps and oil interceptors would be installed at the proposed roads with regular cleansing to cater for the operational phase impact.

31. The proposed LMC Loop development will generate sewage. Coupled with upgrading the existing Shek Wu Hui Sewage Treatment Works, which is studied under the separate EIA of the North East New Territories New Development Areas (NENT NDAs), "No net increase in pollution load requirement in Deep Bay" will be fulfilled by the proposed on-site sewage treatment works with the maximum design capacity of 18,000 m^3/day (Dry Weather Flow). The reuse of treated sewage effluent will be considered by the future operators for non-potable uses, e.g. toilet flushing.

32. The EIA concluded that the water quality impact and sewerage impact would be acceptable with the implementation of the recommended mitigation measures.

Waste Management

33. The key waste issue is the waste generation during construction stage. Approximately 1.39Mm^3 inert materials will be generated. About 75% of them (i.e. 0.98Mm^3) would be reused on site. The remaining would be sent to public fill reception facilities.

34. Besides, about 271,500m^3 non-inert construction materials and 247,500m^3 of non-inert swamp deposit would be generated. They would be treated

and reused on-site and in the concurrent projects such as NENT NDAs project, as far as practicable; and the remaining will be disposed of at landfill. Moreover, approximately 64,000m^3 sediment would be generated. All of the sediment would be treated, if necessary, and reused on-site and in the concurrent projects such as NENT NDAs project.

Land Contamination

35. Previously, the LMC Loop was used for disposal of dredged contaminated and uncontaminated sediment from the Shenzhen River Regulation project. With reference to the prevailing land contamination standards, the EIA report determined that there are about 57,444m^3 of soil contaminated by the metal Arsenic within the LMC Loop. The EIA recommends treatment by solidification/ stabilisation method and the treated soil would be reused on site. Re-appraisal of land contamination will be carried out to ensure any potential contamination activities from land use changes after the approval of this land contamination assessment study.

Other Environmental Impacts

36. Other environmental impacts including hazard to life, cultural heritage, fisheries, landfill gas hazard and food safety implication [9] have also been addressed in the EIA report. With the implementation of recommended mitigation measures, the Project will comply with the relevant requirements under the TM.

ENVIRONMENTAL MONITORING AND AUDIT

37. The EIA report includes an EM&A Manual which recommends an EM&A programme during the construction and operational phases of the Project. Key recommended EM&A requirements cover ecology, odour, dust, noise and water quality.

---

[9] Food Safety Implication is included in the EIA Study Brief (No. ESB-238-2011) in response to the public comments received in Nov 2011 during the public inspection of the Project Profile for the Application of EIA Study Brief. The comments concerned on the potential food safety implication (possible toxication of fishes) caused by the Project.

PUBLIC CONSULTATION

38. The applicant has made the EIA report, EM&A Manual and Executive Summary available for public inspection under the EIAO from 5 July 2013 to 3 August 2013. During this inspection period, a total of 39 public comments were received by the Environmental Protection Department. The main concerns raised by the public will be summarised in a gist to be provided separately.

August 2013
Environmental Assessment Division
Environmental Protection Department

DP1
生態區
Ecological Area

DP2
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)

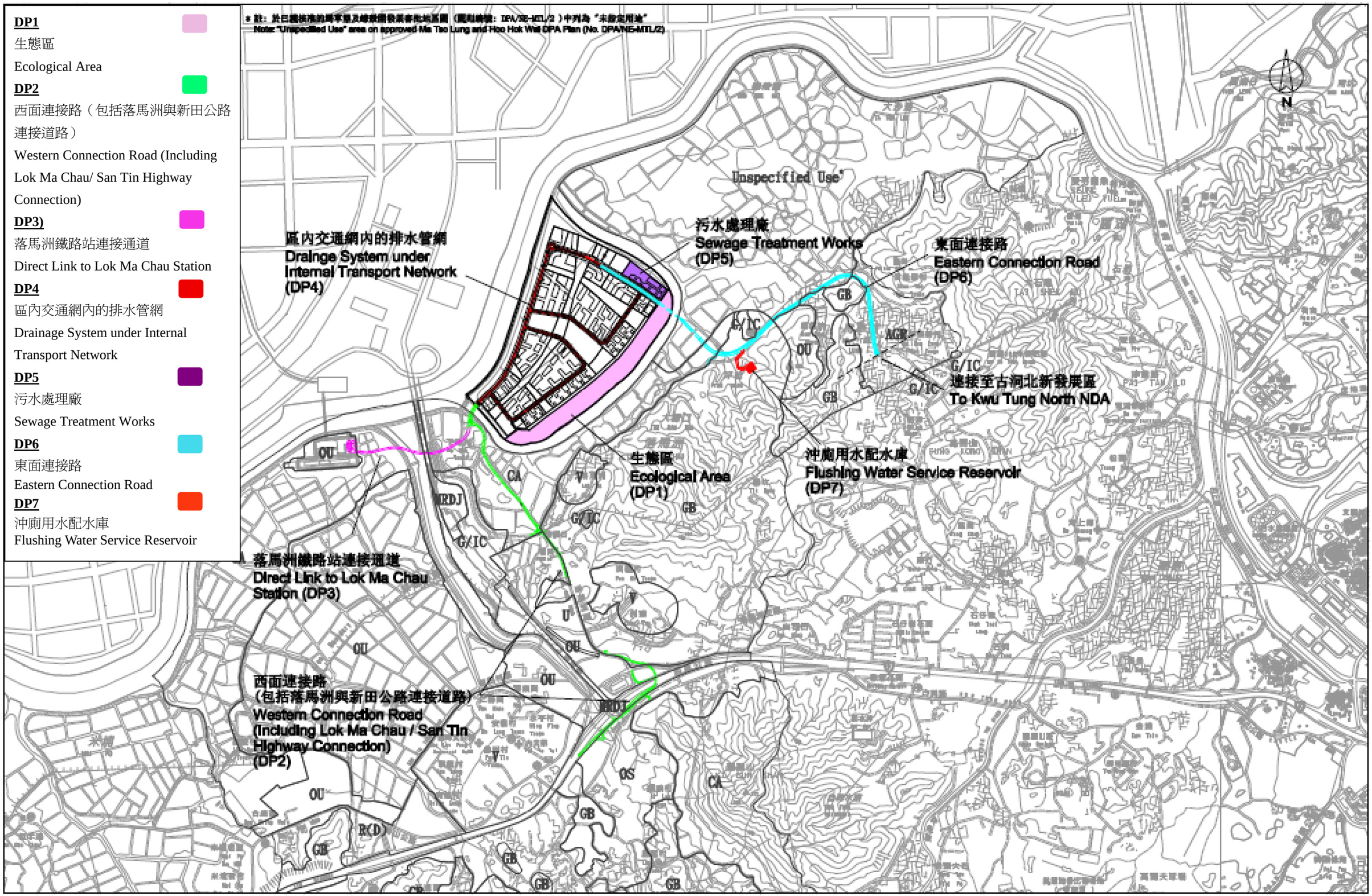
DP3)
落馬洲鐵路站連接通道
Direct Link to Lok Ma Chau Station

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

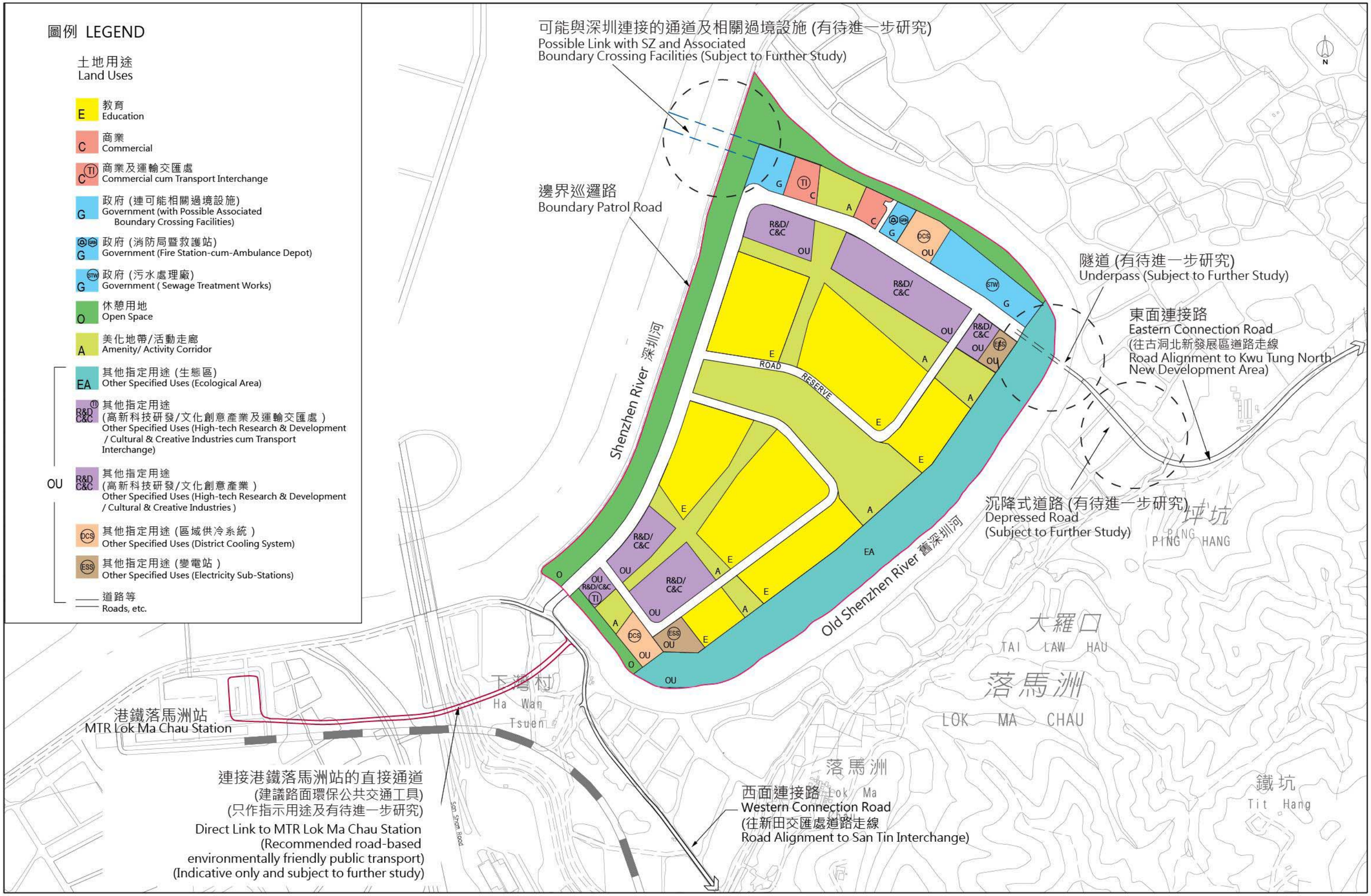
DP5
污水處理廠
Sewage Treatment Works

DP6
東面連接路
Eastern Connection Road

DP7
沖廁用水配水庫
Flushing Water Service Reservoir



Project Title: Development of Lok Ma Chau Loop	Application No.: EIA-212/2013
Figure 1: Project Layout Plan (based on Figure No. 2.1a of the EIA Report)	



Project Title: Development of Lok Ma Chau Loop	Application No.: EIA-212/2013
Figure 2: Recommended Outline Development Plan (RODP) (based on Appendix 1-1 of the EIA Report)	