**ENVIRONMENTAL IMPACT ASSESSMENT ORDINANCE (CAP 499) S.5(1)(a)**

**PROJECT PROFILE FOR SHEUNG SHUI TO LOK MA CHAU SPUR LINE**

## A. BASIC INFORMATION

### a. Project Title:

Sheung Shui to Lok Ma Chau Spur Line.

### b. Purpose and Nature of the Project:

To extend the KCR East Rail network from Sheung Shui to the 2nd rail cross-boundary point at Lok Ma Chau in order to relieve the severe overcrowding being experienced at the Lo Wu boundary crossing.

### c. Name of Project Proponent

Kowloon-Canton Railway Corporation (KCRC).

### d. Location and Scale of Project and History of the Site

*Location*

From north of Sheung Shui station the existing East Rail tracks will be relocated and the existing water mains on the west side of East Rail diverted, in order to provide sufficient space to allow the Spur Line to be built in a tunnel. The tunnel will turn westwards and pass underneath Long Valley. The first part of the tunnel will be built immediately along side the relocated East Rail tracks using the cut and cover technique. The cut and cover tunnel will descend and turn to the west to a point just east of the River Sutlej where the tunnel is deep enough to allow a reception shaft to be built to receive an Earth Pressure Balanced-Tunnel Boring Machine (EPB-TBM).

A tunnel will be bored using an EPB-TBM with the machine travelling west to east from the location of the EPB-TBM launching shaft at Chau Tau towards the reception pit just east of the River Sutlej. A further section of cut and cover tunnel will be used to ascend to ground level in a westerly direction from the EPB-TBM launching pit and terminate in an abutment.

The underground shell for the future Kwu Tung station will be built using diaphragm walls and an open excavation. The station is located approximately half way along the bored tunnel section. Two shafts for firemen's emergency access are located between the station and the tunnel portals. A ventilation building will also be constructed above each tunnel portal.

The Spur Line will turn northwards from the tunnel abutment on viaduct running parallel to San Sham Road and after passing through Ha Wan Tsuen, will pass over San Sham Road and over the proposed San Tin drainage channel, to the location of Lok Ma Chau station. An associated access road will be constructed, which runs from Lok Ma Chau Road to the proposed Lok Ma Chau station, customs and immigration building.

The Lok Ma Chau station, customs and immigration building has a plan area of approximately 25,000 m², a height of 34 m, and will incorporate an island platform. The major part of this building comprises cross boundary customs and immigration processing facilities to handle the predicted maximum two-way flow of approximately 35,000 passengers per hour. A double-decked footbridge will be constructed to provide a direct link for in-bound and out-bound passengers between the Hong Kong and Chinese customs and immigration facilities and with the proposed Huanggang Metro station on the Shenzhen side of the boundary.

The twin bored tunnel section from its connection to East Rail to Chau Tau will be constructed using the earth pressure balanced tunnel boring technique.

The viaduct will be of the pre-cast post-tensioned, concrete box girder type, between 5m and 16m above general ground level and will be built using launching gantries to place viaduct segments, followed by parapet installation from the viaduct deck.

*Scale of the Project*

The works will involve major engineering and will include the construction of a new railway from just north of Sheung Shui station to a new station, customs and immigration building to be built at Lok Ma Chau.

The proposed 7.4 km long, double-tracked Spur Line will be built using a combination of bored and cut-and-cover tunnels, and viaduct. The railway is designed for passenger traffic only, and will redirect half of the existing East Rail train services, which presently terminate at Lo Wu to Lok Ma Chau.

Lok Ma Chau station will be designed to allow expansion in the future as patronage increases. Enabling works for a possible Kwu Tung station will be installed to ensure a station can be built to serve the future Kwu Tung New Development Area. Figure 1 shows the alignment and location of the proposed Spur Line.

*History of the Site*

The Sheung Shui end of the alignment will occupy the existing East Rail reserve and the area presently occupied by water supply pipelines. The central section of the alignment will pass beneath areas of land that are either under active agricultural use (Long Valley) or have been converted for light industrial activity including construction material/equipment storage (Kwu Tung). Historically the Lok Ma Chau station site and the land under the viaduct section between Lok Ma Chau and Chau Tau have been used as commercial fishponds since being reclaimed by the local population from the marsh that once occupied the historical shoreline. Some of this former fishpond area has been used to build the major roads leading to the Lok Ma Chau road boundary crossing and for container storage activities.

**e. Number and Types of Designated Projects**

The proposed project is a single project comprising a railway and its associated stations as defined under Schedule 2, Part I, Category A.2 of the Environmental Impact Assessment Ordinance.

**f. Name and Telephone Number of Contact Person**

## B. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

**a. Planning and Implementation**

The whole project will be planned and implemented by KCRC in-house departments together with external consultants and contractors. Contractors will undertake construction, under the construction management control of KCRC.

**b. Project Programme**

Construction work is planned to commence on the Spur Line in the fourth quarter 2002, and take approximately four and a half years and before the Spur Line is completed for passenger operations.

**c. Project Interfaces**

As the Spur Line will be constructed in tunnel and on viaducts from Sheung Shui to Lok Ma Chau, the Spur Line will not have a significant effect on any existing or planned projects or the existing drainage regime in the area. Potential projects interfacing with the Spur Line are tabulated as follows:-

| **PAP / Project / Contract No.** | | **Tentative Start Date** | **Tentative Completion** |
|---|---|---|---|
| | ***Major Flood Control Projects*** | | |
| 73CD | Eastern Main Drainage Channels for San Tin | end 2002 | end 2005 |
| 90CD | Shenzhen River Regulation Project Stage 3 | mid 2001 | late 2004 |
| | ***Trunk Sewerage*** | | |
| - | Trunk Sewer Network for NWNT<br>Ngau Tam Mei / San Tin Trunk Sewer | - | 2007 |
| | ***Highways Project*** | | |
| 6712TH/B | New Road from Man Kam To Road to NT Circular Road and Boundary Crossing Facilities Expansion | early 2003 | mid 2006 |

## C. POSSIBLE IMPACT ON THE ENVIRONMENT

### a. Outline of Process Involved

*General*

Provisionally, three temporary works areas have been earmarked at Lok Ma Chau, Kwu Tung (Dills Corner Camp) & environs and on the site of the former Sheung Shui Temporary Housing Area.

*Proposed Road Access and Road Works*

The proposed Lok Ma Chau Station is within the Frontier Closed Area Boundary. An Emergency Vehicle Access (EVA) to the station will be built from the Boundary Road, along the east side of Ha Wan Channel to Lok Ma Chau Road. The existing Lok Ma Chau road will be upgraded.

### b. Potential Environmental Impacts: Construction Phase

*Air Quality*

Dust may be generated from excavation, cutting, filling, stockpiling and construction vehicle movements associated with the construction of the Spur Line. Potential air quality impacts may arise from the operation of construction plant and vehicles. The removal of unsuitable materials from watercourses and fishponds may also lead to odour impacts.

*Noise and Vibration*

Noise from construction activities may affect dwellings in Sheung Shui, Kwu Tung, Chau Tau, and Lok Ma Chau. These include, amongst others, the use of heavy cranes, or contiguous bored piling and hydro-cyclones to clean up spoil and re-cycle bentonite in the construction of diaphragm walls associated with the cut-and-cover tunnel section of the Spur Line. It is also expected that relocation of the existing East Rail tracks will also require construction works to be carried out during the nighttime in order not to interfere with the normal operations of the existing East Rail.

For the tunnel section of the alignment, potential vibration arising from the 24-hour tunnel boring operations in the weathered rock phase over 24 hour working may disturb local residents.

*Hydrology*

The tunnel boring operations may lead to potential loss of groundwater. Interference with the aquifer has the potential to impair local irrigation practices that rely on groundwater rather than surface sources.

Potential settlement along the tunnel alignment may also change surface hydrology, particularly with respect to gravity irrigation channels, which are fed from the Beas River inflatable weir.

*Water Quality*

Effluents generated from dewatering associated with piling activities are likely to contain suspended solids and will require treatment before disposal or discharge. Tunnel boring and spoil dewatering operations will generate process water that requires treatment. Effluents loaded with sediments may also arise during the draining and filling of fishponds for the construction of Lok Ma Chau station and the viaduct.

Other potential sources of water pollution include sewage generated by the construction workforce, as well as oily runoff from vehicles and storage areas.

*Waste*

Construction waste products, particularly those from re-cycling of bentonite used for diaphragm wall construction, may be generated. It is envisaged that a total of 1,000,000 $m^3$ of spoil will need to be disposed of from tunnelling operations and the Kwu Tung station excavation. A limited quantity of contaminated soil from previous container storage or vehicle repair sites will require disposal at suitable sites. Construction and demolition materials will either be reused on site, or disposed of at a public filling area in accordance with the approved Waste Management Plan and as agreed with the Civil Engineering Department.

*Hazards*

There are no potentially hazardous installations, registered dangerous goods storage areas or landfills along the alignment of the Spur Line and therefore no hazards are foreseen.

*Visual Impacts*

Adverse visual impacts may result from the construction of the station and viaduct if unmitigated.

*Ecology*

There will be a permanent loss of fishponds at Lok Ma Chau station and the associated viaduct section but there will no loss of habitat for the tunnel section. Construction impacts on most habitats, with the exception of Lok Ma Chau station will be temporary. Amphibians, reptiles, birds and mammals may be disturbed by construction noise.

*Historical and Cultural Impacts*

There are no major items of cultural heritage value that will be directly or indirectly affected by the Spur Line.

*Land Contamination*

Some areas of potentially contaminated land (container storage/vehicle repair) may occur on the alignment of the track.

**c. Potential Environmental Impacts: Operational Phase**

*Air Quality*

The trains to be operated on the Spur Line will be electrically powered so there will be no dust and gaseous emissions. Tunnel ventilation and smoke extraction facilities should be carefully positioned to avoid potential air quality impacts. It is envisaged that some vehicular emissions may arise from station feeder roads.

When considerations are made in the broader context of air quality impacts associated with cross-border traffic, the operation of the Spur Line will bring positive impacts or benefits in that the emission-free train trips will replace a substantial number of cross-border passenger trips made by means of road transport.

*Noise and Vibration*

Operational rail noise will give rise to potential impacts on dwellings adjacent to the viaduct. Early morning (before 07:00 hours) and night-time (after 23:00 hours) train movements may present a potential issue. In a quiet rural environment, the passage of trains in the tunnel has the potential to cause ground-borne noise and vibration.

Apart from rail noise, limited road traffic noise restricted to areas immediately around Lok Ma Chau station and its access road may also arise.

*Hydrology*

A localised lowering of the water table may result if the tunnel is not completely watertight. There may also be a possible permanent alteration in seasonal groundwater movements owing to the presence of a tunnel in the weathered rock phase, particularly with the potential to affect the rate of replenishment to the farmer's irrigation wells.

*Water Quality*

Limited quantities of oils and lubricants will be used on the trains and may be deposited on the tracks by passing trains. As a result, the runoff from tracks may contain oil and grease as well as suspended solids. Water quality impacts may arise if oil, grease and suspended solids are not intercepted prior to discharge of track runoff. In addition, wastewater containing cleaning agents, discharge from air-conditioning systems and sewage generated at Lok Ma Chau station may also contribute to water quality impacts.

*Waste*

Municipal waste, including litter, foodstuffs, plastics, wood, office waste and cleaning materials, will be generated at Lok Ma Chau station and on trains.

*Hazards*

There is no hazard associated with the operation of the Spur Line. Fire precautions will be built into the design of the railway and Lok Ma Chau station.

*Visual Impacts*

Visual impacts will arise from the structures associated with the Chau Tau cut and cover tunnel box to the abutment; two ventilation buildings; two Emergency Access Points; the ventilation shaft/maintenance access for the future Kwu Tung station; and the viaduct and station at Lok Ma Chau.

*Ecology*

The potential impacts will be similar to those identified for the construction phase in terms of noise and disturbance from trains and loss of habitat at Lok Ma Chau station. The severity of impacts will be dependent on type of habitat and species present.

*Historical and Cultural Impacts*

The operation of the Spur Line will not affect any major items of cultural heritage value.

*Land Contamination*

The Spur Line will not give rise to any land contamination issue during its operation.

## D. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

### a. Existing and planned sensitive receivers and sensitive parts of the natural environment

*Residential developments and other air and noise sensitive receivers*

All potential sensitive receivers have been identified in Sheung Shui, Chau Tau and Lok Ma Chau. Both construction and operational noise could potentially impact sensitive receivers adjacent to the above ground railway. Dust has the potential to impact vegetation as well as sensitive receivers along the section of the alignment west of Chau Tau.

*Watercourses and nullahs*

Potential water sensitive receivers are located at both ends of the Spur Line. Water quality could potentially be impacted in the San Tin River and the River Sutlej, and fishponds in the Chau Tau and Lok Ma Chau areas could be impacted. Suspended solids levels may increase in these water bodies and could lead to increased sedimentation effects. The ultimate downstream receiving water body is Inner Deep Bay.

*Groundwater resources*

The groundwater in Long Valley is an important resource to the local farming community that any impact during the tunnelling operations that must be mitigated.

*Areas of ecological significance*

The location of Lok Ma Chau Station comprises fishponds and there are a number of fishponds along the viaduct alignment between Lok Ma Chau and Chau Tau that are of ecological value. This section of the railway lies within the Wetland Conservation Area and the Wetland Buffer Area associated with Mai Po Ramsar Site.

*Places of high visual value*

The only areas along the alignment that will be affected by visual impacts are those upon which the Lok Ma Chau station and the approach viaduct will be built.

*Sites of cultural heritage*

There are no sites of historical and cultural heritage in the vicinity of the alignment.

*Future Planned Sensitive Receivers*

There are no future planned sensitive receivers along the section of the above ground railway.

**b. Major elements of the surrounding environment and existing and/or past land uses on site, which might affect the area in which the project is located.**

Close to Lok Ma Chau are several container storage areas. Some of these land pockets may be contaminated. These past land-uses may present land contamination problems.

## E. ENVIRONMENTAL PROTECTION MEASURES

### a. Measures to minimise environmental impacts

The major environmental issues and potential mitigation measures are summarised in the following paragraphs:

*Construction Phase*

*Air Quality*

Dust suppression measures set out in the *Air Pollution Control (Construction Dust) Regulations* will be adopted. These include on-site vehicle speed restrictions and wheel washing facilities at all site access points, careful handling and the containment or damping of dusty materials, and frequent watering or covering of exposed areas of ground and prompt site restoration. These measures will be used as general practice to all construction sites to ensure that potential dust emissions are controlled and impacts upon sensitive receivers are minimised.

*Noise and Vibration*

General site practices including the location of noisy machinery away from sensitive receivers; the use of silencers, mufflers and acoustic shields on plant and equipment; regular maintenance of plant and equipment; and the reduction in number of machines used at any one time, will be adopted to control noise impacts.

With respect to the tunnelling operations, the EPB-TBM launching shaft will be fully covered if found to be necessary. The use of EPB-TBM has minimum vibration impact (less than 5mm ppv) as demonstrated on West Rail Contract DB-320.

*Hydrology*

Use of the EPB-TBM machine is expressly selected to avoid any draw-down of groundwater, and/or the need for compressed air working or grouting which might lead to the impairment of an aquifer. It has also been demonstrated on the West Rail DB-320 contract that the technology will generate minimal settlement at the surface.

A hydrological study will be undertaken to characterise the hydro-geological regime and a groundwater flow sensitivity analysis will be used to test that the tunnel placement and partial obstruction in the residual rock phase will not cause a permanent adverse impact to groundwater movement.

*Water Quality*

Water impact mitigation measures will include installation of appropriate drainage facilities to control site runoff, (silt and oil traps), proper management on-site to prevent debris and harmful materials from reaching drainage facilities of water bodies, provision of adequate toilet facilities and proper disposal of sewage by a recognised waste disposal company, and provision of a purpose-designed treatment plant to treat process water from the EPB-TBM prior to discharge.

*Waste*

Mitigation measures to control waste will include adoption of general good housekeeping practices, sorting and segregation of wastes for reuse and disposal, agreement with Civil Engineering Department on an allocation of space at a public filling area for the tunnel spoil and other excavated materials, and the designation of specific access routes for disposal vehicles.

*Hazards*

No mitigation is required as no impact is identified.

*Visual Impacts*

Solid site hoardings will be erected around construction sites before the commencement of works to reduce the potential visual impacts of the works. Upon the completion of construction, reinstatement of visually amenable features and re-vegetation will be implemented.

*Ecology*

Early enhancement of fishponds remote (500 m) from the Lok Ma Chau station footprint will be undertaken to mitigate for construction impacts.

*Historical and Cultural Impacts*

No mitigation is required as no impact is identified.

*Land Contamination*

Appropriate measures will be taken to remediate any contaminated land or to ensure disposal of contaminated materials to a suitable site. The adoption of safe site practices should prevent the exposure of workers to potential risks associated with contaminated materials.

*Environmental Monitoring and Audit*

An Environmental Monitoring and Audit (EM&A) programme will be identified for all environmental impacts. This will identify any problems as they arise and speed up their resolution.

*Operational Phase*

*Air Quality*

Electrically powered trains will be used to avoid air quality impacts.

*Noise and Vibration*

The Multi-plenum System will be implemented on the viaducts. Appropriate design of trackform, viaduct structure and noise barriers will be used to limit pass-by noise to levels below the Noise Control Ordinance (NCO) criteria. Appropriate limits will be placed on train frequency and speed during night-time operations to ensure that NCO requirements are met. Either Low Vibration Track or Floating Slab Track will be used, as appropriate, where required for mitigation of structure-/ground-borne noise arising from vibrations generated by trains passing by.

*Hydrology*

A totally water tight tunnel will be maintained to avoid lowering of water table.

*Water Quality*

Appropriately designed oil/grease interceptor for track and stations will be installed to ensure that discharges meet standards. Biological treatment plant and polishing facilities will be provided at Lok Ma Chau station to ensure sewage effluent meets Water Pollution Control Ordinance criteria and requirements under EPD's Zero Discharge Policy for the Deep Bay Water Control Zone.

*Waste*

Implementation of good housekeeping practices and observation of the requirements of the Waste Disposal Ordinance will prevent adverse impacts. Appropriate disposal routes will be determined for removal of all wastes.

*Hazards*

No mitigation is required as no impact is identified.

*Visual Impacts*

Landscaping and planting will be implemented to minimise visual impacts of Lok Ma Chau station building and viaducts.

*Ecology*

A total of 28.5 ha of existing fishponds at Lok Ma Chau will be enhanced and managed in perpetuity for conservation purposes.

*Historical and Cultural Impacts*

There will be no historical and cultural impacts during the operation of the Spur Line. No mitigation measures will be required.

*Land Contamination*

No land contamination issues are expected to arise during operation of the Spur Line. No mitigation measures will be required.

**b. Potential Severity, Distribution and Duration of Key Environmental Impacts**

There will be limited dust, noise, water quality, ecology, waste, landscape & visual impacts which will last for the construction period, tentatively from fourth quarter 2002 until civil engineering construction is substantially completed late 2005. Impacts will potentially affect receivers in the Sheung Shui, Chau Tau and Lok Ma Chau areas.

Air quality impacts would be most significant during earthworks and excavation activities. The locations of major excavations are remote from residential premises. Noise impacts will be most severe during excavation, piling and concreting. Again, there are very few residential premises close to the alignment where these activities will occur. Water quality impacts will be most noteworthy during excavation, drilling and piling. Ecological impacts are likely to peak during construction of the Lok Ma Chau station, from 2002 – 2005.

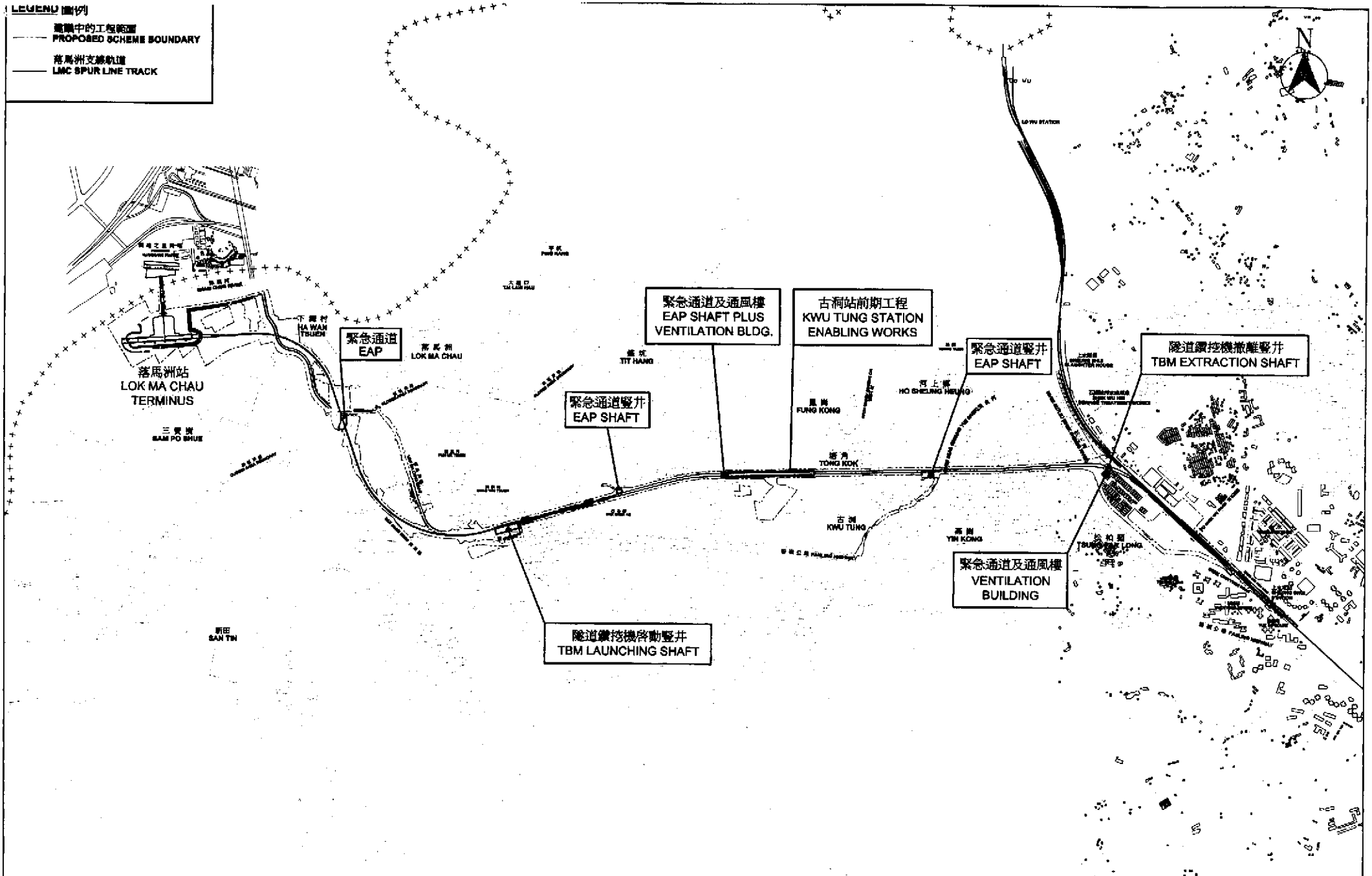
**c. Further Implications**

This project has been the subject of a previous EIA report that was exhibited to the public and received adverse comment because of the perceived impact of the proposed railway viaduct

on the avifauna of Long Valley. The current proposal seeks to address the public objections to the previous proposal by replacing the viaduct section across Long Valley with a tunnel. Mitigation for potential impacts on the ecology of Long Valley is not necessary, avoiding the need for compensating managed wetland areas at ground level.

## F. USE OF PREVIOUSLY APPROVED EIA REPORTS

No previously approved EIA report exists for the proposed project. The EIA for the San Tin Drainage Channel adjacent to the Lok Ma Chau Station area will be reviewed, particularly for ecology and water quality issues. Reference may also be made to the Shenzhen River Regulation Project Stages I, II, & III EIAs and the EIA for the Main Drainage Channels for Fanling, Sheung Shui and Hinterland.




圖一：上水至落馬洲支線
定線及位置

FIGURE 1 : SHEUNG SHUI TO LOK MA CHAU SPUR LINE
ALIGNMENT AND LOCATION

KCR 九廣鐵路
East Rail Extensions

JOB REF : J01-0113
DRAWING NO. : 0113X11A
ISSUE NO : 01
SCALE : 1 : 20000 (A3)
DATE : 17SEP2001
CADD FILENAME : 0113X11A.DWG
REVISION : A