North East New Territories

New Development Areas

Project Profile

(prepared in accordance with
the Environmental Impact Assessment Ordinance (Cap. 499))

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Civil Engineering and Development Department

Project Profile

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1. BASIC INFORMATION

1.1 *Project Title*

1.1.1 North East New Territories New Development Areas

1.2 *Purpose and Nature of Project*

1.2.1 The Project was formerly studied under "Planning and Development Study on North East New Territories" (the NENT Study). The NENT Study was an integrated planning and engineering study to identify new development areas (NDAs) in North East New Territories (NENT) to meeting long term housing demand and to accommodate additional population and create associated jobs. The NENT Study was completed in 2003 and identified 3 NDAs, namely Kwu Tung North (KTN), Fanling North (FLN), and Ping Che/Ta Kwu Ling (PC/TKL). KTN NDA and FLN NDA were proposed to accommodate the additional population and employment opportunities. Various land uses including residential, government, institution or community, education, recreation, business, park, promenade, open spaces, green belt, etc. were proposed. PC/TKL NDA was proposed partly as a possible reception site for the existing open storage and rural industrial land uses displaced by the KTN and FLN NDAs and partly to meet the territorial demand. Engineering infrastructure works including roads, drainage, sewerage, utilities, etc. were also proposed to support the NDAs.

1.2.2 The NDA proposals were subsequently shelved in 2003 in the light of a slower population growth. Under the study of Hong Kong 2030 : Planning, Vision and Strategy (the HK2030 Study) completed by Planning Department in 2007, the NDAs identified in the NENT Study were revisited and recommended for implementation. As a result, a comprehensive planning and engineering review study on the NDAs (the Review Study) will be conducted.

1.2.3 The Review Study is to review the findings and recommendations of the NENT Study to confirm the feasibility of implementing the NDAs in the NENT to meet long-term housing, social, economic and environmental needs, and to prepare recommended outline development plans (RODP) and preliminary engineering design for the development. The scope of the Review Study will include a planning and engineering review study and an environmental impact assessment (EIA) which is the subject EIA of this Project Profile.

1.2.4 The Project comprises the KTN, FLN and PC/TKL NDAs and the associated engineering infrastructure works to service the NDAs. They are hereinafter collectively named as North East New Territories New Development Areas (NENT NDAs).

1.3 *Name of Project Proponent*

1.3.1 New Territories North and West Development Office (NTN&WDO), Civil Engineering and Development Department (CEDD), the Government of Hong Kong Special Administration Region.

1.4 *Location and Scale of Project and History of Site*

1.4.1 The location of the Project is shown in *Drawing No. NTNZ 1539*. Subject to the findings of the Review Study, the NENT NDAs are planned to accommodate approximately 180,000 populations with a total project area of more than 800 ha. The individual NDAs are described below :-

(i) ***Kwu Tung North NDA***

The KTN NDA is located to the west of Sheung Shui and is bounded by the Kowloon-Canton Railway Corporation (KCRC) East Rail to the east, Castle Peak Road – Kwu Tung Section and Fanling Highway – Kwu Tung Section to the south, Pak Shek Au and Tit Hang Villages to the west, and Closed Area Boundary to the north. Topographical features in the area include Tai Shek Mo (Crest Hill) to the north and Sheung Yue River (River Beas) to the southeast, which flows from the upland areas in the south and joins Ng Tung River (River Indus) to the north. On both sides of the Sheung Yue River there are a number of fishponds with flat land used for agriculture. *Drawing No. NTNZ 1540* shows the NDA location and its local context. The NDA site area is about 490 ha.

The site is rural in character and comprises village and industrial land uses intermixed with active and inactive agricultural activities. The majority of the developed areas include open storage and informal industrial uses (vehicle repair and breaking areas, construction material storage sites, etc.) with domestic structures. The eastern portion contains a majority of cultivated fields, fallow agricultural land, fishponds and stream courses, along the Sheung Yue River. The recognized villages of Ho Sheung Heung and Yin Kong and a vast tract of agricultural wetland area commonly known as Long Valley are included within the boundary of the NDA.

The KTN NDA comprises residential development with associated employment and community facilities. Subject to the findings of the Review Study, it is planned to accommodate a total population of about 102,000 and to create about 16,000 jobs upon full development.

(ii) ***Fanling North NDA***

The FLN NDA is situated to the north east of the existing Fanling and Sheung Shui New Town and is bounded by the retrained Ng Tung River (River Indus) to the north, Sha Tau Kok Road to the east, existing development of Fanling and Sheung Shui New Town to the south and the KCRC East Rail to the west. The NDA site mostly comprises a long area of agricultural/flat land. *Drawing No. NTNZ 1541* shows the NDA location and its local context. The NDA site area is about 190 ha.

The existing land uses are primarily agriculture intermixed with domestic structures. The majority of the site is designated as "Green Belt" with small areas of residential, open space and "G/IC" land uses. The Ng Tung River is the main topographical feature in the area. There are no large-scaled existing developments in the vicinity except that the existing Sheung Shui and Fanling New Town borders the southern portion of the site and the Sheung Shui Slaughter House and Shek Wu Hui Sewage Treatment Works (STW) are located to the west.

The FLN NDA comprises residential development with associated employment and community facilities. Subject to the findings of the Review Study, it is planned to accommodate a total population of about 83,000 and to create about 2,500 jobs upon full development.

(iii) ***Ping Che/Ta kwu Ling NDA***

The PC/TKL NDA is situated to the north of Sha Tau Kok Road – Ma Mei Ha Section and is bounded by Pak Hok Shan and Tai Hom Uk to the east, Tsung Shan and Hung Lung Hang to the west. *Drawing No. NTNZ 1542* shows the NDA location and its local context. The NDA site area is about 150 ha.

The area is rural in character and comprises mostly agriculture, open storage and informal industries with scattered villages. No large-scale development have been identified in the vicinity. Most of the cultivated land occupies the northern part of

the area and extensive open storage and industrial activities are found in the southwestern part. In particular, areas along Ping Che Road include open storage of construction materials/vehicle repair and breaking areas, lorry/container vehicle parks and workshops.

Subject to the findings of the Review Study, the PC/TKL NDA comprises mainly rural industrial uses and open storage areas providing a total of approximately 2,500 job opportunities upon full development. This NDA provides a "reception area" for the open storage and rural industries that are affected by the development clearance for the KTN and FLN NDAs. This NDA will also provide land to meet the territorial demand for open storage and rural industrial uses.

1.5 *Number and Types of Designated Projects to be Covered by the Project Profile*

1.5.1 The Project includes a planning and engineering feasibility study (i.e. the Review Study) of the NENT NDAs accommodating approximately 180,000 population with a study area covering more than 800 ha. Therefore, the Review Study falls within Item 1 under Schedule 3 of the Environmental Impact Assessment Ordinance (EIAO), i.e. "Engineering feasibility study of urban development projects with a study area covering more than 20ha or involving a total population of more than 100,000". The Review Study is a Designated Project requiring an EIA report.

1.5.2 The Project also involves various Schedule 2 Designated Projects under the EIAO that may be identified in the course of the Review Study. The following elements of the Project, which are identified as Schedule 2 Designated Projects are also included in this Project Profile :-

(i) Fanling Bypass (Primary Distributor) with total length of about 9.5km [under Schedule 2, Part I, A.1]

(ii) District Distributors in KTN and FLN NDAs including the realigned Castle Peak Road [under Schedule 2, Part I, A.1]

(iii) Public dumping areas of not less than 2 ha in size [under Schedule 2, Part I, C.11]

(iv) Extension and upgrading of Shek Wu Hui Sewage Treatment Works (STW) [under Schedule 2, Part I, F.2]

(v) Construction of various Sewage Pumping Stations with capacity of more than 2000m^3/d. [under Schedule 2, Part I, F.3]

(vi) Upgrading of existing Sewage Pumping Stations with capacity of more than 2000m^3/d. [under Schedule 2, Part I, F.3]

1.6 *Name and Telephone Number of Contact Person*

All queries regarding the Project can be addressed to :

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2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 *Project Implementation*

2.1.1 The Project Proponent, NTN&WDO of CEDD, will be responsible for implementing the proposed works, together with all the environmental mitigation measures, the environmental monitoring and audit requirements as specified in the approved Environmental Impact Assessment (EIA) Report of this Project.

Specialist Environmental Consultants will be employed by CEDD through the main Consultants of the Review Study and responsible for undertaking the EIA study according to the Study Brief to be issued by the Director of Environmental Protection and to respond on behalf of the Project Proponent on issues related to the EIA.

The construction works of the proposed land formation and engineering infrastructure to serve the NDAs will be carried out in phases by CEDD's appointed contractors under various works contracts.

2.2 *Project Time Table*

2.2.1 The Review Study including the EIA study is anticipated to commence in mid 2008 for completion within a study period of 30 months, subject to extension of time due to possible delays. Detailed design and associated statutory procedures of the Project will follow. The construction works of the Project will commence around 2014. Outline implementation programme will be formulated under the Review Study.

2.3 *Interactions with Other Projects*

2.3.1 The project will likely interface with the following major projects in the North District :-

(i) Planning Study on Liantang/Heung Yuen Wai Cross-boundary Control Point and its Associated Connecting Roads in Hong Kong – Feasibility Study

(ii) Land use Planning for the Closed Area

(iii) Cycle Tracks connecting North West New Territories with North East New Territories

(iv) Retrofitting of Noise Barriers on Fanling Highway

(v) Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

(vi) Stormwater Drainage Master Plan Study in the Northern New Territories

(vii) Development of a Poultry Slaughtering and Processing Plant at a site in Sheung Shui

3. POSSIBLE IMPACTS ON THE ENVIRONMENT

3.1 *Air Quality*

Construction Impacts

3.1.1 Dust from construction works is expected to be the major source of impact during construction phase of NDA development. Dust generating construction activities include site clearance, demolition, material handling, stone crushing, concrete batching, site formation, infrastructure construction and vehicle movement on unpaved haul roads.

Operational Impacts

3.1.2 The major air pollution sources during the operation of the NDAs include : vehicle exhaust emissions from the existing and future road networks and underpasses; industrial emissions from the surrounding existing industrial premises; air quality inside the underpasses; odour emissions from the Shek Wu Hui STW Extension, the existing and proposed Sheung Shui slaughter houses and the existing and proposed sewage pumping stations; and other air emissions from material recovery & recycle facilities (MRRF), public transport terminus (PTTs) / public transport interchanges (PTIs), refuse collection points (RCP) and carparks.

3.2 *Noise*

Construction Impacts

3.2.1 Noise impacts during the construction phase may result from various phases of construction activities, neighbouring concurrent construction works, the use of powered mechanical equipment, construction plant, traffic along site access roads, blasting works, piling, etc.

Powered mechanical equipment employed from the construction of the proposed developments will be the primary source of noise impact affecting the surrounding noise sensitive receivers (NSRs). Due to the nature of the construction work for activities such as road construction and drainage works, it is envisaged that the noise criteria are likely to be exceeded only when the construction work is carried out adjacent to the NSRs, which is anticipated to be in a relatively short time period.

Operational Impacts

3.2.2 There are two main operational noise sources namely (i) road traffic noise, and (ii) fixed plant noise. The potential impacts from sources of road traffic noise include the traffic noise form existing roads including major roads like Fanling Highway and Tolo Highway, and the traffic noise form new roads and railway system. The potential impacts from the fixed plant noise sources include police firing range, sewage pumping stations and treatment facilities, driving school, fire station, electricity substations and other open storage and industrial land uses.

3.3 *Water Quality*

Construction Impacts

3.3.1 Potential impacts to surface water quality due to land based construction activities would primarily occur due to surface run-off and wastewater generation form within the construction sites, including sewage effluent from the workforce. It is likely that excavation of soft sediments form fishpond areas designated for development will be required. The

potential impact to nearby surface water associated with construction works in the pond areas will need to be assessed.

Operational Impacts

3.3.2 The developments of the NDAs will result in increases in sewage effluent discharges and in changes to the hydrological regime of the drainage basins. The following aspects have to be considered in the operational impact assessment:

(i) the potential impacts to inland and marine water quality of the sewage and industrial effluents generated by the developments and the works associated with the sewerage system, including the Shek Wu Hui STW, sewer mains and pumping stations;

(ii) the potential for increased risks of flooding resulting from hydrological changes due to the proposed developments; and

(iii) the potential for impacts to inland and marine water quality due to discharges from the stormwater system.

3.3.3 Water bodies including Shek Sheung River, Sheung Yue River, Ng Tung River, Ping Yuen River and Shenzhen River may be affected.

3.4 *Solid Waste*

Construction Phase

3.4.1 Solid wastes are mainly generated from a wide range of construction activities such as site formation, construction of roads and drains, and construction of the proposed development and infrastructure. The wastes arising from construction will largely consist of excavated and demolished C&D materials during earthworks and demolition works, chemical waste, and general refuse. The quantities of wastes to be generated during construction of the proposed NDAs are largely depended on the programmes of various works packages and also require off-site disposal.

Operational Phase

3.4.2 The operation of the proposed NDA developments and associated infrastructure will generate a significant amount of municipal solid waste. The storage and handling of this waste have the potential to cause adverse environment impact.

3.5 *Landfill Gas*

3.5.1 Two landfills are located near the proposed NDA development; those being NENT Landfill (near PC/TKL NDA) and Ma Tso Lung Landfill (near KTN NDA). The PC/TKL NDA lies approximately 400m away from the consultation zone of the NENT Landfill. The proposed open storage uses in the area are usually not considered sensitive to the impacts from landfill gas.

The Ma Tso Lung Landfill (MTLL) is situated in the vicinity of the KTN NDA. The development in KTN NDA will be situated outside the no-build zone of the MTLL, which extends 10m outside the waste boundary. However, a portion of the development falls within the 250m Consultation Zone. Therefore, a qualitative assessment of landfill gas hazard on these sensitive receivers will be necessary.

3.6 *Ecology*

3.6.1 The ecological resources recorded within the Study Area include forest, agricultural land (active/inactive and wet/dry), freshwater ponds, marsh, watercourse, shrubland-grassland mosaic, orchard, wasteland and developed area, where agricultural habitats are the most dominant among others in terms of area coverage.

3.6.2 The potential terrestrial ecological impact arising from the development of the proposed NDAs and construction of Fanling Bypass will be associated with :-

Construction Phase

(i) Direct habitat loss and habitat fragmentation resulting from land take for development;
(ii) Direct loss of inactive/less mobile/habitat-specific wildlife nesting/inhabiting the affected area;
(iii) Direct loss and impacts to watercourses as a result of construction discharge;
(iv) Impacts to wildlife as a result of isolation and fragmentation of ecological habitat; and
(v) Impacts to the surrounding habitat and associated wildlife due to physical disturbance of this habitat, increased human activity, inappropriate storage or dumping of construction material, or hill fire.

Operation Phase

(vi) Impacts to the surrounding habitat and associated wildlife due to increased human activities/disturbance associated with the operation of the proposed development.

3.7 *Potential Hazard*

3.7.1 There is one existing potentially hazardous site, Sheung Shui Water Treatment Work (SSWTW), which may pose an environmental constraint and risks to the proposed NDA developments. A hazard assessment for Sheung Shui WTW is required to demonstrate that the risks posed by the SSWTW to the proposed development complies with the requirements of the Risk Guidelines in Annex 4 of the EIAO-TM.

3.8 *Cultural Heritage*

3.8.1 Potential impacts on identified cultural heritage resources within the NDAs and associated infrastructures may arise from the following :

(i) Landtake for both temporary and permanent facilities which may result in damage to, or loss of, archaeological remains and deposits, culturally significant features and changes to the physical coherence of historic landscape; and

(ii) Severance and Islanding may result from permanent landtake required for the NDAs and associated infrastructures construction; areas of historic and cultural interest may be severed, thereby altering or destroying their integrity.

(iii) Construction works may result in damage to or loss of buried archaeological sites by:

- Disturbance through excavation at or near an archaeological site, topsoil stripping and the passage of heavy machinery on exposed and buried deposits;
- Change in the watertable due to construction and development activities;
- The burial of sites resulting in limitation on accessibility for future archaeological investigations (including surface survey and remote sensing techniques) and obscuring visible surface evidence;

- Ground compaction due to construction activities or the weight of permanent filled materials may cause damage or distortion to buried archaeological remains, especially in soft alluvial deposits.
- indirect impacts such as visual, vibration and noise intrusion on the setting and amenity of historic and cultural resources (e.g. grave sites and monuments and culturally or historically significant landscape features).

3.9 *Land Contamination*

3.9.1 A number of land uses with the potential to give rise to land contamination concerns have been identified within the boundaries of the NDAs. These include numerous small-scale vehicle maintenance and repair yards, metal scrap yards, storage yards, and uncontrolled dumping sites. Many of these properties are currently listed among the Lands Department's database of 'Blackspots'.

3.9.2 The contaminated land impacts are likely to be related to the following : health risks to site workers; disposal of contaminated soils, where encountered; and potential health risks to future users of the sites. The land contamination issue and its impact within the NDAs will be identified and assessed.

3.10 *Landscape and Visual*

3.10.1 Visual impacts are likely to result from the induction of a new urban area which would significantly change the existing visual system.

The proposed NDAs will prioritise, where possible, low quality landscape and excluded areas of high quality, natural or semi-natural landscape features. However the proposals will significantly and permanently change the existing landscape character of the area as a whole. This area will be transformed from a largely rural landscape to a high-rise urban environment in the case of Kwu Tung North and Fanling North, and into large scale open storage or industrial area with the PC/TKL NDA. In many locations these proposals will also change the relationship between the valley landscape and the uplands. This relationship will be changed on a fundamental level by the high-rise residential and commercial towers. These factors will inevitably result in significant and adverse residual landscape impacts for the existing uplands, which bound the development sites.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

Surrounding Environment including Existing and Planned Sensitive Receivers

4.1 *Air Quality*

4.1.1 The KTN, FLN and PC/TKL NDAs are situated within rural, village, agriculture and mixed industrial developments. Local emissions from roads and industrial areas are the major source affecting the air quality. These 3 NDAs are also located very near to the Mainland and the existing air quality in the Study Area is periodically affected by the industrial emissions from the Mainland. There is currently no fixed air quality monitoring station (AQMS) operated by EPD within the Project Area. The nearest EPD's AQMS is located in Yuen Long.

4.1.2 Subject to updating by the EIA study, the representative air sensitive receivers (ASR) within 500m of the development limits for KTN, FLN and PC/TKL NDAs have been identified and shown in *Table 4.1*. These include domestic premises, clinics, nurseries, temporary housing accommodation, schools, educational institutions, offices, factories, shops, shopping centre, places of public worship, libraries, sports stadium, home for the aged and active recreational activity areas.

4.2 *Noise*

4.2.1 Kwu Tung North NDA

The Kwu Tung North area is typically rural in character, mainly with scattered residential developments. The existing residential developments are predominantly low-rise consisting of local villages such as Pak Shek Au, Tong Kok, and Fung Kong Tsuen. Industrial premises/factories are also scattered in the area however most of them will be removed due to the proposed development. The background noise environment is generally tranquil except for areas located along major roads, in particularly the Fanling Highway. Subject to updating by the EIA study, the representative existing Noise Sensitive Receivers (NSRs) are listed in *Table 4.2a*.

4.2.2 Fanling North NDA

The proposed developments in FLN NDA are located in the interface of rural and urban developments. Area to the north of FLN NDA is generally rural in character with scattered villages such as Hung Kiu San Tsuen and Wah Shan Tsuen while area to the south of FLN NDA is urban in nature with mainly residential developments, including low-rise, medium-rise and high-rise. The low-rise residential developments include the villages at Sheung Shui Wai (Man Kok Village, Wai Loi Tsuen and Ha Pak Tsuen), Shek Wu San Tsuen and Ting Ping Shan Tsuen. The medium-rise and high-rise residential developments comprise Woodland Crest, Wing Fuk Centre, Wing Fai Centre and Belair Monte. Furthermore, there are scattered open storage and industrial uses around the NDA.

The background noise environment in FLN NDA is generally dominated by road traffic noise from Man Kam To Road, Jockey Club Road, Tin Ping Road, Ma Sik Road and Sha Tau Kok Road. In addition, commercial activities at the open storage and industrial sites also contribute to the background noise. Subject to updating by the EIA study, the representative existing NSRs are listed in *Table 4.2b*.

4.2.3 Fanling Bypass Southern Connection (FLBP-SC)

The existing developments along the proposed alignment of FLBP-SC (see *Drawing No. NTNZ 1543*) include both industrial and residential uses. The On Lok Tsuen industrial area located to the west of the FLBP-SC comprises mainly of warehouses, industrial buildings

and concrete batching plant. Isolated village houses of about 2 to 3-storey and cluster of village houses of Kau Lung Hang Lo Wai, Kau Lung Hang San Wai, Kiu Tau, Nam Wa Po and Wo Hop Shek San Tsuen are all located along either side of the FLBP-SC alignment. The major noise source in this area is traffic noise form major road such as Fanling Highway and railway noise from the KCR. Subject to updating by the EIA study, the representative existing NSRs are listed in *Table 4.2c*.

4.2.4 Ping Che/Ta Kwu Ling NDA

The area is sparsely populated and is generally rural in nature. Village type houses and industrial premises are located along Ping Che Road. Other facilities such as the Pig Farm of the Agriculture, Fisheries and Conservation Department (AFCD) and Tin Hau Temple are also located in the area. Currently, this NDA mainly embraces zones of village, agriculture, open storage and industrial uses.

The dominant noise sources in the area are road traffic noise from Ping Che Road, inactive open storage and industrial sites. However traffic flows on this road is currently light. Subject to updating by the EIA study, the representative existing NSRs are listed in *Table 4.2d*.

4.3 *Water Quality*

4.3.1 Kwu Tung North NDA

The proposed development site at Kwu Tung falls within the catchment of Sheung Yue River. The site is comprised mostly agricultural farmlands and scattered villages with open space. The Dills Corner Camp is towards the southwest of the site. Small production plants and industries are located to the east of the Camp. There are also a police firing range and a sport village towards the north-west of the site. At Ho Sheung Heung, to the northeast of the site, there is an area of wet agricultural land near the confluence of Sheung Yue River and Shek Sheung River.

Small sewer systems may have been provided for the Dills Corner Camp, the sport village and local industries. However, it is expected that much of the existing on-site treatment facilities are old, inefficient, and are too small to serve the proposed residential development at Kwu Tung. The Kwu Tung area is currently not served by a trunk sewage system. However, the area is proposed to be served in the future by the Western Trunk Sewer (WTS) following recommendations in the North District Sewerage Master Plan (SMP).

There are two EPD river water quality sampling stations near the proposed development at Kwu Tung. The Sheung Yue River water quality at both sampling stations was found to be in the Water Quality Index (WQI) category of 'fair' which was unchanged from 2000.

4.3.2 Fanling North NDA

The proposed development site at FLN NDA falls within the catchment of Ng Tung River. The proposed development is close to the existing new town development at Sheung Shui and Fanling and includes the area immediately south of Ng Tung River. The site is mostly agricultural farmlands and ponds, with scattered temporary structures that have no proper sewer systems.

The existing sewerage system in the northern part of the Study Area was assessed as part of the North District Sewerage Master Plan. The existing sewerage system in Sheung Shui consists of approximately 40 km of sewers and 1500 manholes, four pumping stations and a sewage treatment works (STW) at Shek Wu Hui.

There are two EPD river water quality sampling stations near the proposed development site at FLN NDA. The river water quality at both sampling stations was in the category of 'fair' which was unchanged from 2000.

4.3.3 Ping Che/Ta Kwu Ling NDA

The Project also includes three open storage/rural industrial areas at Ping Che which fall within the catchment of Ping Yuen River and are comprised of open storage with scattered villages, temporary structures and warehouses. These open storage areas are converted from large numbers of agricultural lands and fish ponds. There are also local villages, industries and residential development near the Ping Che/Ta Kwu Ling development areas.

Currently the PC/TKL area is not served by a sewerage system. However, the North East New Territories (NENT) Village Sewerage Improvement Phase 1 has been completed, comprising a sewerage system with pumping stations along Ping Che Road.

There are two EPD river water quality sampling stations near the development areas at PC/TKL NDA. The river water quality at the station near Shenzhen River was in the WQI category of 'bad', while WQI for the other station close to the NDA was in the category of 'fair'.

4.3.4 Fanling Bypass (FLBP)

The majority of the route for the FLBP mainly falls within the KTN and FLN NDAs. The description of the current water quality for these NDAs, in sections 4.3.1 and 4.3.2 above, are thus suitable for this part of the route for the Fanling Bypass. After the FLN NDA the bypass turns south to run along the Ma Wat River before rejoining the Fanling Highway at Nam Wa Po. There is, however, no water quality monitoring data with which to characterise the existing water quality within the Ma Wat River. In the rivers in the project area (Ng Tung River, Ping Yuen River, and Sheung Yue River) the water quality is generally better in the upstream areas and it may thus be inferred that, as the Ma Wat River is in an upstream area of the river systems considered in this Study, the water quality may be better than around the KTN and FLN NDAs.

4.3.5 Identification of Sensitive Receivers

The proposed development sites are located close to a number of fish ponds, water courses and wet agricultural lands. The Water Sensitive Receivers (WSRs) that may be affected by the construction and operation of the proposed development include :

Kwu Tung North NDA

- fish ponds and wet agricultural land at Ho Sheung Heung;
- Main Drainage Channel (MDC) meanders;
- the Sheung Yue River and local tributaries; and
- Ponds and wet agricultural land to the north of the NDA, adjacent to the Shenzhen River.

Fanling North NDA

- farmlands at the north of Fanling and Sheung Shui;
- ponds and farmlands at the north-east of Sheung Shui'
- MDC meanders;
- the Ng Tung River and local tributaries;
- fish ponds next to the Ng Tung River; and
- Ng Tung River flood pumping station.

Ping Che/Ta Kwu Ling NDA

- the Ping Yuen River and local streams and tributaries;
- Ping Yuen River flood pumping station; and
- Fish ponds

Fanling Bypass

The majority of the water quality sensitive receivers are the same as those for the KTN and FLN NDAs. Additional sensitive receivers for the southern section include the following :

- the Ma Wat River and local streams and tributaries;
- water intake at Tau Pass Culvert; and
- wet agricultural land.

Long Valley

The Long Valley has been identified as an area of high ecological value, which may be impacted by developments at the KTN NDA, FLN NDA and FLBP. The Long Valley area contains the following water quality sensitive receivers.

- Wet agricultural land;
- MDC meanders;
- Marshland; and
- Ponds

Deep Bay Catchment

The catchments of Sheung Yue River, Ng Tung River and Ping Yuen River form the eastern part of the Deep Bay catchment. The EPD's "Deep Bay Zero Discharge policy" proposes no net increase of pollutant loadings into Deep Bay WCZ to protect the environmental resources of the Deep Bay catchment and the downstream water quality in Deep Bay.

4.4 *Solid Waste*

4.4.1 The existing solid waste arising from the area within the proposed NDAs include domestic waste from village houses, agricultural waste, commercial/industrial waste generated from open storage and informal industrial uses; and chemical waste from vehicle breaking and repair operations. The majority of these wastes are generated from the Kwu Tung and Ping Che areas. Waste generated from Fanling North area are mainly agricultural related and are expected to be re-used on site. The contribution of waste generated from these areas in the NENT catchment is considered small.

4.5 *Landfill Gas*

4.5.1 As mentioned in section 3.5.1 above, two landfills are located near the proposed NDA development; those being NENT Landfill (near PC/TKL NDA) and Ma Tso Lung Landfill (in KTN NDA).

4.6 *Ecology*

4.6.1 Subject to updating by the EIA study, the ecological sensitive areas (with moderate to high and high ecological value) and species are summarized as below :

Ecological Sensitive Receivers for NDAs (including FLBP)

NDAs	Ecological Sensitive Receivers
KTN	Marsh;
	Fish ponds and undisturbed lowland secondary forest (LSF) near Ho Sheung Heung;
	Rare/protected plant Ailanthus *Ailanthus fordii* and Pavetta *Pavetta hongkongensis* found in undisturbed LSF near Ho Sheung Heung;
	Main Drainage Channel for Fanling, Sheung Shui and Hinterlands (MDC) meanders;
	Ho Sheung Heung Egretry;
	Roosting site of Short-nosed Fruit Bat;
	The protected mammal species Javan Mongoose and other mammals;
	Species of Conservation Concern (SCC) birds, uncommon butterflies
Long Valley	Agricultural land;
	Marsh;
	MDC meanders;
	Pond;
	The protected mammal species Javan Mongoose and other mammals;
	The uncommon Chinese Bullfrog and Narrow-mouthed Frog; SCC birds
FLN	Fish ponds next to Ng Tung River;
	Marsh;
	MDC meanders;
	The uncommon Chinese Bullfrog and Narrow-mouthed Frog, uncommon butterflies and SCC birds
PC/TKL	Fish pond;
	The uncommon Chinese Bullfrog and Narrow-mouthed Frog, uncommon butterflies and SCC birds

4.7 *Potential Hazard*

4.7.1 Certain proposed developments in NDAs fall within the '1km' Consultation Zone of Sheung Shui Water Treatment Works which is classified as a Potentially Hazardous Installation due to the use of liquid chlorine in 1 tonne drums.

4.8 *Cultural Heritage*

Subject to updating by the EIA study, the following historical buildings and features were identified.

4.8.1 Kwu Tung North NDA

One declared monument, one Grade 1, one Grade 2 and one Grade 3 historical buildings are recorded by the AMO. They are presented in *Table 4.8a.*

Apart from the monuments and administratively concerned graded buildings as identified above, 3 old villages, 3 colonial style buildings, 9 Chinese traditional buildings, 1 temple, 5 earth shrines, 1 landscape feature, 62 graves and 16 Kam Taps that are of potential heritage interest were identified.

4.8.2 Fanling North NDA

FLN NDA is mostly located at the lowland floodplain along Ng Tung River, mainly occupied by agricultural fields. The area is dominated by the Liu clan but no pre-1950 villages are located within the Study Area. Therefore, there are little heritage features located within the FLN NDA. Most of the features identified are graves or kam taps.

No declared/deemed monument is identified within the FLN NDA. However, one Grade 2 building, the Man Ming Temple is identified in FLN NDA and shown in *Table 4.8b*.

Two tablets and 7 grave sites are identified within the FLN NDA.

Apart from the above sites, there are 21 graves and 9 Kam Taps identified along and near the FLBP within the FLN NDA.

4.8.3 Fanling Bypass Southern Connection (FLBP-SC)

The FLBP continues outside the FLN NDA from Sha Tau Kok Road running southward to join the existing Fanling Highway. No standing heritage sites along the this section of FLBP were identified. However, a Lung Yeuk Tau Heritage trail, 4 declared monuments, 1 Grade 1 buildings, 3 Grade 2 buildings, 1 Grade 3 Building and 7 known historical buildings are located near the FLBP-SC. These sites are listed in *Table 4.8c.* In addition, 1 historical building, 2 landscape features, 3 shrines and 2 graves, which are of heritage interest, near FLPB-SC have been identified.

4.8.4 Ping Che/Ta Kwu Liing NDA

Neither declared/deemed monument nor graded buildings were identified within the PC/TKL NDA.

Only one Grade 2 building, the Hung Shing Temple of Hung Leng Tsuen is located near Ping Che Road (outside the PC/TKL/NDA).

Identified heritage interest sites in PC/TKL NDA includes 3 historical buildings, 4 temples, 2 shrines, 6 graves and 2 Kam Taps.

4.9 *Land Contamination*

4.9.1 The existing environment in the three NDAs is rural in character and comprises village and industrial land uses intermixed with active and inactive agricultural activities. The main expected contaminants from the land uses in the NDAs are from by-products from small industries, container storage yards, vehicle and equipment storage and vehicle repair workshops.

Based upon the generally remote and undeveloped locations that comprise the Study Area, the number of sensitive receivers likely to be impacted by the identified contamination concerns is expected to be limited to, current land users and future site workers employed during the construction phase of the project.

Land-based excavation and grading works will be required for the construction of the NDAs. These construction activities are for concern as there may be interphasing with potentially contaminated soil underlying the existing industrial uses, and hence the potential to impact sensitive receivers.

The present land uses that give rise to potential concern for land contamination include numerous small scale vehicle maintenance and repair yards, metal scrap yards, storage yards, and uncontrolled dumping sites. Many of these properties are currently listed among the *Lands Department Central Database of the Task Force (Blackspots) on Flytipping Control (March 1999)*.

4.10 *Landscape and Visual*

4.10.1 Kwu Tung North NDA

KTN is low quality rural / lowland area, surrounded by high quality, natural upland areas. The land uses are mixed and characterised by open storage, industrial, transport and residential uses. The lowland areas are characterised by open storage and industrial uses, the valley floor areas by traditional villages, major transport infrastructure and active or abandoned agricultural land and the natural upland areas are characterised by ridges with mixed grass, shrub and woodlands. The proposed KTN NDA is mainly on the low quality areas, while the high quality areas are preserved. However, the scale of the development is of such a nature that it will alter the existing landscape character of the area as a whole. This area will be transformed from a rural landscape to a high-rise urban environment. KTN NDA will alter the relationship of the valley with the upland ridges and have some significant adverse residual landscape impacts on the character of the upland areas. However, it should be noted that the impact on the character of Kwu Tung will be beneficial, since the low quality of the present landscape will be changed to a high quality, though the nature of the character will be completely different : high-rise urban.

4.10.2 Fanling North NDA

FLN area has generally a medium quality landscape character. Higher qualities are ascribed to the natural upland areas of Cham Shan and Wa Shan. Similar to the proposed location of KTN, the FLN NDA is generally proposed in areas with a lower quality character. The proposal will alter the landscape character from agriculture and village areas to be an urban area. Residual impacts after mitigation will be apparent on the Upper Ng Tung River Valley, on the relationship between the upland areas to the north and the valley landscape, on the residual valley areas and associated village settlements to the north and on the landscape setting of the existing Sheung Shui / Fanling urban areas.

4.10.3 Ping Che/Ta Kwu Ling NDA

The landscape character of the present PC / TKL area is defined as a broad valley area with upland areas and ridgelines, foothills and side valleys. The upland areas and higher foothills that are characterised by grass, shrub and woodland, generally have a high quality, while the lower foothills and lowland areas with mixed land uses in the valleys have a lower quality. The PC/TKL NDA proposal will primarily be located in lowland areas with low quality landscape used for open storage and agriculture, while grass, shrub and woodland areas are preserved. Impacts are expected due to the loss of existing agricultural areas to the east of Ta Kwu Ling, the formalisation of the existing disparate land uses in the Ping Che area, the change of landscape setting in existing villages and the altered relationship between the natural uplands and the valley floor. In general, after mitigation a wholesale alteration of the landscape is expected with both adverse and beneficial results.

5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS

5.1 *General*

5.1.1 The EIA study will investigate those environmental impacts and propose the appropriate mitigation measures with the explicit intention that all proposals would be environmentally acceptable and cost effective. The residual impacts, if any, would be confined within the allowable limit. Environmental monitoring and auditing of potential impacts that may arise from the works of the Project would be provided for the construction and operational phases. Subject to the findings of the EIA study, the following mitigation measures will be incorporated in the design and construction of the Project.

5.2 *Air quality*

Construction Phase

5.2.1 In order to prevent adverse impacts on air quality, the control measures stipulated in the Air Pollution Control (Construction Dust) Regulation should be implemented wherever applicable, to limit the dust emissions from the site. Mitigation measures, including but not limited to the following, will be put in place.

- Stockpiles of dusty material will not extend beyond site boundaries.
- In the process of material handling, any material which has the potential to create dust will be treated with water or sprayed with a wetting agent where practicable.
- Any vehicle with an open load compartment used for transferring dusty materials off-site will be properly fitted with side and tail boards and cover.
- Stockpiles of sand and aggregate will be enclosed on three sides and water sprays will be used to dampen stored materials and when receiving raw material.
- The site will be frequently cleaned and watered to minimise fugitive dust emissions.
- Motorised vehicles on site will be restricted to a maximum speed of 15km/hr and shall be confined to designated haul roads which will be surfaced with hardcore.

Operational Phase

5.2.2 The proposed mitigation measures to improve the air quality within the study area are to be considered as follows :-

(i) Vehicle Exhaust Emissions from Open Roads

- in order to further reduce the impacts from open roads, the use of railway and environmental friendly vehicles would be given higher priority to roads within NDAs;
- green spine will be proposed in KTN NDA which would be restricted to the pedestrian and environmentally friendly transports such as electric bus, trolley bus, fuel cell vehicles, EURO III diesel vehicles using ULSD and CRT, etc., and
- adequate buffer distance, tree planting and dense shrub plantation are recommended to separate the pedestrian and heavy trafficked road.

(ii) Impacts inside Underpasses

- the air quality inside underpasses would follow the air quality guideline stated in the Practice Note on Control of Air Pollution in Vehicle Tunnels.

(iii) Impacts from Chimney Exhaust Emissions

- licence would need to be applied prior to the commencement if the future industrial premise in PC/TKL NDA classified as Specified Process under the Air Pollution Control (Specified Process) Regulation; and
- should the installation/alternation/modification of chimney with the total fuel consumption rate exceed the criteria stated in the *Air Pollution Control (Furnaces, Ovens and Chimneys) (Installation and Alternation) Regulations* of the existing and future industrial premises in the PC/TKL NDA, approval from EPD would need to be sought before such installation/alternation/modification under the regulation.

(iv) Odour Impacts from Shek Wu Hui Sewage Treatment Works (STW)

Existing STW --

- covering the inlet works and sludge holding tanks; and
- addition of suitable amount of chemical or by other alternative measures such as oxygen or air injection to achieve the required 45% reduction of odour at the inlet works; or covering the primary sedimentation tanks.

Proposed STW Extension --

- covering the effluent channels of primary sedimentation tanks and sludge holding tanks; and
- addition of suitable amount of chemical or by other alternative measures such as oxygen or air injection to achieve the required 45% reduction of odour at the inlet works; or covering he primary sedimentation tanks.

(v) Impacts from Sewage Pumping Stations (SPS)

- odour suppression measures such as enclosing the wet well or screening room and providing scrubbing system or activated carbon filter would be considered in the design of the facilities and would be installed during the SPSs operation so as to minimize the odour nuisance to the adjacent ASRs;
- as some of the proposed/upgraded SPSs are classified as Schedule 2 Designated Projects under the EIAO, details of mitigation measures for the sewage pumping station would be proposed under separate cover to meet the requirements of the EIAO; and
- in general, for all SPSs, the design would follow the *Environmental Guidance Note for Sewage Pumping Station which is NOT a Designated Project.*

(vi) Impacts from Materials Recovery/Recycling Facility (MRRF)

- the sources of odour of dust would be located as far as possible away from the adjacent ASRs;
- all the sorting process or activities in MRRF would be enclosed; and
- odour scrubbing system would be installed to reduce the odour impact and the discharge of the system would be directed away from the air sensitive uses.

(vii) Impact from Public Transport Terminals/Interchanges (PTTs/PTIs)

- the design of the PTTs/PTIs would follow the design consideration recommended in the Control of Air Pollution in Semi-Confined Public Transport Interchanges (ProPECC PN 1/98);
- adequate ventilation and dilution of vehicle exhaust should be provided; and
- ventilation exhaust, if any, would be directed away from the nearest ASRs.

(viii) Impact from Refuse Collection Points (RCPs)

- odour removal system would be provided for the RCP to reduce odour nuisance in the vicinity; and
- the discharge of the odour removal system would be directed away form the ASRs to avoid the odour nuisance.

5.3 *Noise*

Construction Noise

5.3.1 In order to mitigate adverse noise impacts, the following general mitigation measures will be put in place.

- Plant operated on site should be well maintained and serviced regularly.
- Subject to such working constraints as power supply, safety and obstruction of proposed works,mobile plant will be sites as far away form the nearby NSRs as practicable.
- Noise activities will be planned and scheduled to be undertaken during appropriate time periods to minimise potential noise impacts at nearby NSRS. Noisy construction activities will be scheduled to take place at noise-tolerant time periods (e.g. lunch time).
- Materials stockpiles and other massive structures (such as temporary site offices) will be effectively utilised, where possible, to screen noise from construction activities.
- Noisy plant or processes will be replaced by quieter alternatives where possible. Silencers or mufflers on construction equipment should be utilise and be properly maintained during the construction works.
- Where necessary, temporary and movable noise barriers and enclosures will be employed to minimise noise impact to NSRs.

Operational Phase

5.3.2 For road traffic noise, the planning and design of the NDAs have to be maximised the separation distance between the sensitive land uses and major roads as far as practicable. Direct mitigation measures at source such as use of noise barrier/enclosure and open-textured (low noise) road surfacing on high speed road (i.e. speed limit above 50 kph) should be adopted wherever practicable. A combination of direct mitigation measures at source and at development sites would be investigated to alleviate the extent of road traffic noise impact.

5.3.3 Should residual impacts be identified at the existing NSRs where the use of direct mitigation measures on the roads has been exhausted, these NSRs would then be eligible for indirect technical remedies. For the planned educational institutions, the affected façade should be provided with noise insulation as a last resort to mitigate the impact.

5.3.4 For the potential impacts arising from the sources of fixed plant noise including police firing range, sewage pumping stations and treatment facilities, driving school, fire station, electricity substations and other open storage and industrial land uses, the following mitigation measures and appropriate building design should be adopted.

- For the NSRs, proper arrangement of housing blocks and the use of special block design.
- For the noise sources, careful siting of noisy machinery within the site; by enclosing the noisy machinery within building structures; by use of acoustic louver, silencer for ventilating fan, acoustic door and absorptive wall lining; and any opening of the building to be located facing away from any NSRs.

5.4 *Water Quality*

Construction Phase

5.4.1 Construction phase mitigation measures include the use of sediment traps, wheel washing facilities for vehicles leaving the site, adequate maintenance of drainage systems to prevent flooding and overflow, sewage collection and treatment, and comprehensive waste management (collection, handling, transportation, disposal) procedures.

5.4.2 In order to prevent adverse impacts on water quality, the following general mitigation measures will be put in place.

- Surface run-off from the construction sites will be directed into storm drains via adequately designed wastewater treatment facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers will be provided on site to properly direct stormwater to such facilities.
- Silt removal facilities, channels and manholes will be maintained and the deposited silt and grit will be removed regularly, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.
- Open stockpiles of materials on site will be avoided or where unavoidable covered with tarpaulin or similar fabric during rainstorms. Measures will be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.
- Manholes (including any newly constructed ones) will always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system.
- Where possible, works entailing soil excavation will be minimised during the rainy season (April to September).
- Final earthworks surfaces will be well compacted and hydroseeding following completion to prevent erosion.
- All vehicles and plant will be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads.
- During construction works, proper toilets will be provided for the use of site staff. These will be provided by a licensed contractor, who will be responsible for appropriate disposal and maintenance of the effluent.
- All fuel tanks and chemical storage shall be sited on sealed areas and provided with locks. The storage areas shall be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled oil, fuel and chemicals form reaching the receiving waters. Drainage from oil filing points and any areas where fuels and lubricants are used will be connected to storm drains via a petrol interceptor.
- For excavation of sediment from fish ponds, it will be ensured that the bunds around the fish pond to be excavated are intact, sufficient to retain any disturbed sediments.

Operational Phase

5.4.3 The following general mitigation measures are to be considered:

- provision of sand/silt and oil/grease traps at suitable locations to prevent ingress of pollutants to the stormwater system, which would serve to reduce the loading from the storm drains to the inland waters of the Deep Bay Water Control Zone compared to the existing situation;

- construction of drainage works to prevent increased risk of flooding;
- upgrading the sewerage system to ensure that there is sufficient capacity to cater for increased sewage effluent flows from the developments;
- upgrading the level of treatment at the Shek Wu Hui STW to ensure that there is no net increase in pollutant loading to the receiving waters for the discharges;
- provision of suitable measures to minimise the risk of emergency discharges of untreated sewage effluent and to ensure timely repair; and
- provision of suitable measures to control the discharge of industrial effluents (either pre-treatment prior to discharge to sewer or transport to a suitable treatment facility.

5.5 *Solid Waste*

Construction Phase

5.5.1 Solid waste arising from construction will largely consist of spoil generated during earthworks, and general construction waste/surplus materials (such as C&D waste from demolition works, chemical waste and general refuse).

5.5.2 As the NDA developments would require the import of a large amount of fill material, the C&D waste will be stored separately and reused in the works.

5.5.3 The following measures will be implemented to reduce the quantities of C&D waste material that will require landfill disposal:

- Use waste haulier authorised or licensed to collect specific category of waste;
- Waste haulier should obtain the necessary registration and licences under the Waste Disposal Ordinance and the Waste Disposal (Chemical Waste) (General) Regulation from the Environmental Protection Department;
- Nomination of an approved person, such as site manager, to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility, of all waste generated at the site;
- Separation of chemical wastes for special handling and appropriate treatment at a licensed facility;
- A recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites);
- In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills, and control fly-tipping, a trip-ticket system shall be implemented by the Contractor, in accordance with the contract and the requirements of ETWB TC(W) No. 31/2004 "Trip Ticket System for Disposal of Construction and Demolition Material".
- A Waste Management Plan (WMP) shall be prepared and this WMP shall be submitted to the Engineer for approval. The WMP will be in accordance with ETWB TC(W) No. 19/2005 "Environmental Management on Construction Sites".
- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse of recycling of materials and their proper disposal.
- Any unused chemicals or those with remaining functional capacity shall be recycled;
- Use of reusable non-timber formwork to reduce the amount of C&D material; and
- Proper storage and site practices to minimise the potential for damage or contamination of construction materials.

Operational Phase

5.5.4 The following mitigation measures are to be considered:

- The containment, storage and delivery of the sewage sludge should be enclosed. Odour removal facilities should also be installed to minimise the potential air quality impacts to any sensitive receivers.
- General refuse should be collected from lidded bins and delivered to a central collection point and should be stored in enclosed containers to prevent odour, windblown litter, vermin, water pollution and visual impact.
- Removal of recyclables should be encouraged or formal systems organised, and may occur before or after the delivery of wastes to the central collection point. Collection bins for used aluminium cans, waste paper and glass bottles are recommended to be provided at strategic locations of the development site to encourage recycling by residents.

5.6 *Landfill Gas*

Construction Phase

5.6.1 Precautionary measures to be adopted by the contractors (for both site formation and infrastructure development) for the period of construction of infrastructure within the landfill consultation zone are outlined in EPD's Guidance Note.

Operational Phase

5.6.2 General precautionary measures, which mainly apply to developments fallen within the Landfill Consultation Zone and should be reviewed as part of the Qualitative Landfill Gas Hazard Assessment (QLFGHA) during the detailed design stage of the future development for consideration include the following :

Utility Companies

- All utility companies should be made aware of the location and features of the site by the developers of the sites within the Consultation Zone during the respective detailed design stage as part of the QLFGHA. The utilities companies should have a responsibility to train and ensure their staff to take appropriate precautions at all times when entering enclosed spaces or plant rooms.

Developers of Sites

- The developers will hold a special responsibility to ensure that the occupants of the building, its staff and maintenance workers are protected from landfill gas and that visitors to the site are also made aware as to the dangers and the precautions required to be taken.
- To ensure that strict procedures for maintaining control over all temporary and / or permanent works proposed at the sites are reviewed with regard to the landfill gas hazard. This needs to be accompanied by a comprehensive contingency plan in case of incidents, including liaison with EPD officers, Fire Services Department, Landfill Restoration Contractors and others, as necessary.
- All construction and maintenance (including utilities) personnel working at the site should be made aware of the hazards of landfill gas and its possible presence on site. This should be achieved through a combination of posting warning signs in prominent places and also by access to detailed information on landfill gas hazards and the designs and procedural means by which these hazards are being minimised on site;

- Entry to confined spaces such as refuse / store rooms, drainage manholes, etc. should be preceded by a period of "airing" the space by opening the door widely allowing fresh air to enter. Where appropriate, monitoring of gas should also precede entry.

5.7 *Ecology*

5.7.1 The mitigation measures that are to be implemented to minimise the impacts on air quality, noise and water quality will also help to minimise any impacts on ecology resource.

5.7.2 Generally, the impacts to the Long Valley will be mitigated by avoidance. If unavoidable, further measures to enhance habitats in the Long Valley in the Project will be examined under the EIA Study. It is an option that the loss of and affected high ecological habitats will be mitigated through habitat enhancement by converting relative lower quality habitats with high potential value (agricultural lands) to high quality freshwater wetland habitats (marsh) at Long Valley to create a large, ecological significant and well managed freshwater wetland compensating the direct loss of and other impacts on habitat of high ecological value and other key Species of Conservation Concern (SCC) habitat, as well as the affected wildlife, particularly SCC and uncommon frogs. The feasibility of habitat enhancement will be subject to review in the EIA study and planning stage.

5.7.3 Impact (i.e. noise disturbance) to wildlife due to the NDA development and Fanling Bypass (FLBP) would be mitigated by establishing vegetation buffer/screen around the proposed development sites and both sides of FLBP.

5.8 *Potential Hazard*

5.8.1 The following measures to reduce the risks to the proposed NDA developments from Sheung Shui Water Treatment Work (SSWTW) will be made:

- Arrangements should be put in place whereby WSD staff at Sheung Shui provide a direct warning (by telephone) to the Hong Kong Police Force to stop Eastbound and Westbound Traffic on Fanling Bypass so as to minimise the population exposed to a chlorine release.
- WSD and FSD will be responsible for on-site and off-site emergency procedures, respectively. Hence, WSD and FSD should update their emergency plans, as necessary, to take into account the NDA development, which fall within the Consultation Zone.
- Emergency plans to protect workers should a release of Chlorine occur at the WTW should be formulated by the Contractor for construction works in the vicinity of the WTW in consultation with FSD and WSD to ensure that communication and actions are efficient and effective should an incident occur.

5.9 *Cultural Heritage*

5.9.1 Impacts to cultural heritage site should be avoided as far as practicable. If unavoidable, mitigation measures to the direct impact on standing heritage resources will be implemented. They include the use of retaining walls to preserve the structural stability of some graves *in situ* and preserve the sites with cultural heritage interest by record (a full cartographic and photographic record before and during removal) before removal when preservation *in situ* is not possible.

5.9.2 Mitigation measures to avoid impact on archaeological deposits include rescue excavation prior to the commencement of construction work and archaeological monitoring during construction to preserve the deposits by record.

5.10 *Land Contamination*

5.10.1 The following mitigation measures will be implemented during the construction phase to minimise any potential exposure to contaminated soils or groundwater:

- The use of bulk earth-moving excavator equipment to minimise construction workers' potential contact with contaminated materials;
- Exposure to any contaminated materials be minimised by the wearing of appropriate clothing and personal protective equipment such as gloves (when interacting directly with contaminated material), preventing smoking and eating during such activities, and providing adequate hygiene and washing facilities;
- Vehicles containing any contaminated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet conditions.;
- Only licensed waste hauliers should be used to collect and transport any contaminated material to an appropriate disposal site and procedures should be developed to ensure that illegal disposal of wastes does not occur; and
- The necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the *Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)*, as required:

5.11 *Landscape and Visual*

Mitigation Measures to be Incorporated in the Design Layouts of the NDAs

5.11.1 The following measures will be adopted to minimise the landscape and visual impacts during the design stages.

- the urban design principles such as the density of the development and focusing the development around certain functions;
- controlling building height profiles;
- responsive building massing;
- controlling the walling effect;
- establishing visual and open space links; and
- landscape design principles.

Construction Phase

5.11.2 The following general mitigation measures will be implemented to alleviate the impacts for the construction stage.

- Implementation of erosion control mechanisms to be constructed during constriction phase so that construction equipment, construction works and the landscape is protected if heavy rains occur.
- Measures should be taken to store and use construction equipment and building materials where they are not visually intrusive, to easily be washed away or where they produce less dust.

- Damaged vegetation and trees, not ear-marked for removal, should be rectified, repaired or replaced, using the same species, size and form, to the original condition prior to the commencement of works.
- Minimization of light pollution techniques to be implemented. This includes having more lights with focused beams rather than energy wasting, floodlighting which might impact on the nighttime character of the area.
- Hydro seeding of slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character.
- Haul roads should be rehabilitated at earliest opportunity to be compatible with their existing surrounding landscape or planned surrounding landscape.
- Protection and preservation of grassland mosaic. This will include screening off the grassland mosaic areas as no-go areas during the construction phase. These areas should also be off limits to workers during their rest periods.

Operational Phase

5.11.3 The following general mitigation measures are to be considered for the operation stage.

- All green belt areas to be preserved. Possible erosion, such as due to industrial activities within NDAs, should be compensated for by planting new trees and by establishing erosion control mechanisms.
- A variety of woodland, shrubland-grassland screening vegetation should be used to soften the form of the proposed earthworks and integrate any components of designated projects into the existing landscape context..
- Protection and preservation of grassland mosaic. This will include building fire-safety precautions around burial sites and also building in erosion control measures where necessary, such as where visitor traffic volume would cause problems.
- Establishment of vegetation on slopes helps to integrate the artificial slopes into a more natural landscape. Vegetation and trees on slopes are an erosion control mechanisms that should be implemented at the earliest opportunity.
- Establishment of trees as visual barrier is necessary at various locations. Evergreen trees and shrubs with a dense foliage should be used.
- To minimize the visual impact of noise barriers, they should have a non-reflective finish. They should also be tinted & shaped so as to blend into the surrounding landscape.
- Colour, texture and shape of retaining walls should blend in with the character of the surrounding landscape.
- The form of all highway-associated structures that have a similar engineering function should be compatible with each other to avoid visual clutter.
- The colour and finishing details of highway-associated structures should be compatible with the NDAs that they are associated with and also with their surrounding landscape.

5.11.4 The following site-specific mitigation measures will also be considered for the operation stage.

- Creation of Green Mantle to serve as a visual buffer to the NDA. The Green Mantle should also act as a visual link between the NDA and the wooded foothills of upland areas.
- Development of various parks to compensate for the loss of wetland and lowland secondary forests within the combined development areas.

6. USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1.1 There is no previously approved EIA report applicable to this Project.

Tables

Table 4.1 Representative Air Sensitive Receivers (ASRs)

ASRs	Locations
Kwu Tung North NDAs	
Existing ASRs	
KTN-1	De La Salle Secondary School (New Territories)
KTN-2	Kwu Tung Tin Su
KTN-3	Europa Garden
KTN-4	Pak Shek Au
KTN-5	Lo Wu Correctional Institution
KTN-6	Phoenix Garden
KTN-7	Ho Sheung Heung Village
KTN-8	Sin Wai Nunnery
KTN-9	Police Firing Range
Fanling North NDAs	
Existing ASRs	
FN-1	Village house of Wing Ning Wai
FN-2	Kan Lung Tsuen Village Expansion
FN-3	Village houses at Sheung Shui Wa Shan
FN-4	Hung Kiu San Tsuen
FN-5	Ancestor of Liu Temple (Tak Yeung Tong)
FN-6	Tsung Pak Long
FN-7	Sheung Shui Wai
FN-8	Man Kok Village
FN-9	Fung Kai Secondary School
FN-10	Woodland Crest
FN-11	Shek Wu San Tsuen
FN-12	Wing Fai Centre
Fanling Bypass Southern Connection	
Existing ASRs	
FS-1	Scattered village house east of Ma Wat River and west of Wing Ning Wai
FS-2	Chong Him School
FS-3	Village houses at Tong Hang
FS-4	Village houses at Kau Lung Han Lo Wai
FS-5	Village houses north of Nam Wa Po

Ping Che/Ta Kwu Ling NDAs	
Existing ASRs	
PC-1	Ha Shan Kai Wat
PC-2	Tai Po Tin Tsuen
PC-3	Village house at Wan Chuen Sin Koon
PC-4	Ta Kwu Leng Rural Committee Office
PC-5	Village houses south of Tong Fong
PC-6	Village house in front of Caritas
PC-7	Ping Yeung Tsuen
PC-8	Hung Shing Temple
PC-9	Ta Kwu Ling Rural Centre – Government Building
PC-10	Law Hong Temple
PC-11	Hung Leng Tsuen

Table 4.2a Existing Noise Sensitive Receivers (NSR) in Kwu Tung North (KTN)

NSR	Description	No. of Storey	Uses
KTN-1	De La Salle Secondary School (New Territories)	2	Educational
KTN-2	Ho Tung Primary School	1	Educational
KTN-3	Village houses of Ho Tung Garden	1-2	Residential
KTN-4	Kam Tsin Village	3	Residential
KTN-5	Tsung Shan Court	2	Residential
KTN-6	Kwu Tung Tin Su	2	Residential
KTN-7	Ho Tung Dispensary	1	Clinic
KTN-8	Village houses west of Ho Tung Dispensary	2	Residential
KTN-9	Europa Garden	2	Residential
KTN-10	Scattered village houses near Europa Garden	1-2	Residential
KTN-11	Chau Tau Tsuen	2	Residential
KTN-12	Pak Shek Au	2	Residential
KTN-13	Ma Tso Lung San Tsuen	2	Residential
KTN-14	Lung Kai Public School	1	Educational
KTN-15	Lo Wu Correctional Institution	3	Residential
KTN-16	Phoenix Garden	3	Residential
KTN-17	Ho Sheung Heung Village	3	Residential
KTN-18	Hung Shing Temple	1-2	Worship
KTN-19	Sin Wai Nunnery	2	Worship
KTN-20	Yin Kong Tsuen	3	Residential
KTN-21	Lung Mo Temple	1	Worship
KTN-22	Enchi Lodge	1-2	Residential

Table 4.2b Existing Noise Sensitive Receivers in Fanling North

NSR	Description	No. of Storey	Uses
FN-1	Wing Ning Wai	3	Residential
FN-2	San Uk Tsuen	3	Residential
FN-3	Lok Yee Nga Kui	3	Residential
FN-4	Kan Lung Tsuen	3	Residential
FN-5	Siu Hang Tsuen	3	Residential
FN-6	Siu Hang San Tsuen	3	Residential
FN-7	Wa Shan Public School	2	Educational
FN-8	Sheung Shui Wa Shan	2	Residential
FN-9	Hung Kiu San Tsuen	2	Residential
FN-10	Tin Hau Ancient Temple	2	Worship
FN-11	Ancestor of Liu Temple (Tak Yeung Tong)	1	Worship
FN-12	Fu Tei Au Tsuen	1	Residential
FN-13	Bok Man School in Tsung Pak Long	2	Educational
FN-14	Tsung Pak Long	3	Residential
FN-15	Wai Loi Tsuen	3	Residential
FN-16	Man Kok Village	3	Residential
FN-17	Ha Pak Tsuen	3	Residential
FN-18	Fung Kai 2nd Secondary School	2	Educational
FN-19	Tin Ping Shan Tsuen	2	Residential
FN-20	Woodland Crest	9	Residential
FN-21	On Kwok Villa	3	Residential
FN-22	Shek Wu Hui Government Public School	7	Educational
FN-23	Shek Wu San Tsuen	1 – 3	Residential
FN-24	Good View New Village	3	Residential
FN-25	Scattered village houses east of Good view New Village	1 – 2	Residential
FN-26	Government Quarters east of Ling Shan Tsuen	6	Residential
FN-27	Wing Fuk Centre	30	Residential
FN-28	Wing Fai Centre	35	Residential
FN-29	Belair Monte	31	Residential
FN-30	Regentville	30	Residential
FN-31	Tsui Lai Garden	20	Residential
FN-32	Tin Ping Estate	30	Residential

Table 4.2c Existing Noise Sensitive Receivers along Fanling Bypass Southern Connection (Section Outside the NDA boundary)

NSR	Description	No. of Storey	Uses
FS-1	Scattered village houses east of Ma Wat River and west of Wing Ning Wai	3	Residential
FS-2	Village houses in Wing Ning Wai	3	Residential
FS-3	Village houses in Ma Wat Wai	3	Residential
FS-4	Chong Him School	3	Educational
FS-5	Shung Him Tong Kindergarten	2	Educational
FS-6	Shung Him Tong Church	1	Worship
FS-7	Shung Him Tong Tsuen	3	Residential
FS-8	Tong Hang Village	3	Residential
FS-9	Village houses in Wong Kong Shan	2	Residential
FS-10	Scattered village houses along KCR and Fanling Highway	3	Residential
FS-11	Village houses in Kau Lung Hang Lo Wai	3	Residential
FS-12	Village houses in Kau Lung Hang San Wai	3	Residential
FS-13	Village houses to Nam Wa Po	3	Residential
FS-14	Dawning Views	31	Residential
FS-15	Wo Hop Shek San Tsuen	1 – 3	Residential
FS-16	Village houses east to Wo Hop Shek San Tsuen	2	Residential
FS-17	Village houses in Tai Wo	2	Residential

Table 4.2d Existing Noise Sensitive Receivers in Ping Che

NSR	Description	No. of Storey	Type
PC-1	Ha Shan Kai Wat	3	Residential
PC-2	Yuen Ha Tsuen	3	Residential
PC-3	Pig Farm Quarter	2	Residential
PC-4	Village house near Yuen Ha Tsuen	1 – 2	Residential
PC-5	Tai Po Tin Tsuen	3	Residential
PC-6	Wan Chuen Sin Koon	1	Worship
PC-7	Village house next to Wan Chuen Sin Koon	3	Residential
PC-8	Tai Po Tin Village	3	Residential
PC-9	Village house next to Ta Kwu Leng Rural Committee Office	3	Residential
PC-10	Hang King Terrace	3	Residential
PC-11	Lei Uk Tsuen	3	Residential
PC-12	Tong Fong	3	Residential
PC-13	Village house in front of Caritas	1	Residential
PC-14	Caritas Kindergarten	2	Educational
PC-15	Caritas Fung Wong Fung Ting Home (home for the aged) (1)	2	Residential
PC-16	Ping Yeung Tsuen	3	Residential
PC-17	Hung Shing Temple	1	Worship
PC-18	Village houses in Kat Tin Cheun	1 – 3	Residential
PC-19	Village house near Ping Che Tsuen	3	Residential
PC-20	Ping Che Tsuen	3	Residential
PC-21	Tin Hau Temple	1	Worship
PC-22	Ping Che New Village	3	Residential
PC-23	Po Tai Temple	1	Worship
PC-24	Cambridge Elderly Home	3	Residential
PC-25	Law Hong Temple	1	Worhsip
PC-26	The Baptist Convention of HK Baptist Assembly	1	Residential
PC-27	Regency Court	3	Residential
PC-28	Hung Leng Tsuen	3	Residential
PC-29	Hung Shing Temple	1	Worship

(1) The medical room in Caritas Fung Wong Fung Ting Home is located away from Ping Che Road and the flats facing Ping Che Road are primarily for residential uses.

Table 4.8a Deemed and Graded Buildings in KTN NDA

Site No.	AMO Ref. (Status)	Site Name	Construction (Renovation) Year
HKT-1	AM 770115 (Declared Monument)	Hau Kui Shek Ancestral Hall	Constructed in 1762 (renovated in 1987)
HKT-2	- (Grade 1)	Earth god shrine of Kam Tsin Village	Built around 1788 in the Qing dynasty
HKT-3	AM 770116 (Grade 2)	Hung Shing Temple and Pai Fung Temple	Hung Shing Temple was made in 1700 and Pai Fung Temple was built in 1937. The two Temples were restored in the 1970s.
HKT-4	AM 950628 (Grade 3)	Sin Wai Nunnery	Built in 1919

Table 4.8b Deemed and Graded Buildings in FLN NDA

Site No.	AMO Ref. (Status)	Site Name	Construction (Renovation) Year
HFL-1	AM 950618 / 05804 (Grade 2)	Man Ming Temple	Built over 100 years ago

Table 4.8c List of Known Heritage Features of the Lung Yeuk Tau Heritage Trail near FLBP-SC

Site Code	AMO Ref. (Status)	Site Name	Construction (Renovation) Year
HFL-2	-	Siu Hang Tsuen	Qing dynasty to modern
HFL-3	AM 780197 (Declared)	Kun Lung Wai (San Wai), south of Ng Tung River	1744 to modern
HLF-4	AM 780195 (Grade 2)	Sin Sut Study Hall (Sin Shut Study Hall), 20 San Uk Tsuen, Lung Yuek Tau	1840 to modern
HFL-5	AM 790196	San Uk Tsuen, Lung Yeuk Tau	13th century to modern
HFL-6	AM 840339 (Grade 2)	Wing Ning Wai, Lung Yeuk Tau	Ming dynasty to modern
HLF-7	AM 840339	Wing Ning Tsuen, South of Wing Ning Wai	Qing dynasty to modern
HFL-8	AM 840340 (Grade 2)	Tung Kok Wai, Southeast of Wing Ning Tsuen	1363-1421 to modern
HFL-9	AM 950632 (Declared)	Tang Chung Ling Ancestral Hall, East of Lo Wai	16th century
HFL-10	AM 780185 (Declared)	Tin Hau Temple, Lung Yeuk Tau	Before early 16th century (1913, 1981)
HFL-11	AM 840342 (Declared)	Lo Wai, West of Tang Chung Ling Ancestral Hall	Late Yuan dynasty
HFL-12	AM 840341 (Declared)	Ma Wat Wai, Northwest to Lo Wai	1736-1795
HFL-13	AM 5681	Shek Lo, East of Shung Him Church	1925
HFL-14	AM 880394 (=AM 5682) (Grade 3)	Shung Him Church, at the spur of Lung Shan, 20 Shung Him Tong Village, Lung Yuek Tau	1926
HFL-15	AM 5680	Lok Yuen (Happy Garden), Shung Him Tong Tsuen, Lung Yeuk Tau	1900s
HFL-16	AM 5683	Kin Dak Mun, Shing Him Tong Tsuen, Lung Yeuk Tau	1910
HFL-17	AM 980940 (01-02)	Two stone tablets of Chung Hin Bridge, Lung Yeuk Tau	1937-38

Drawings

圖 例 LEGEND:

- **研究區界線** STUDY AREA BOUNDARY
- **擬議古洞北新發展區** PROPOSED KWU TUNG NORTH NDA
- **擬議粉嶺北新發展區** PROPOSED FANLING NORTH NDA
- **擬議坪輋 / 打鼓嶺新發展區** PROPOSED PING CHE / TA KWU LING NDA
- **擬建粉嶺繞道** PROPOSED FANLING BYPASS

深圳市 SHENZHEN SHI

羅湖 LUOHU

打鼓嶺 TA KWU LING

坪輋 Ping Che

古洞 KWU TUNG

上水 SHEUNG SHUI

粉嶺 FANLING

編號 no.	日期 date	內容摘要 description	核對 checked	核准 approved
修訂 REVISION				

圖則名稱 drawing title

新界東北新發展區檢討研究：研究區

REVIEW STUDIES ON NORTH EAST NEW TERRITORIES NEW DEVELOPMENT AREAS : STUDY AREA

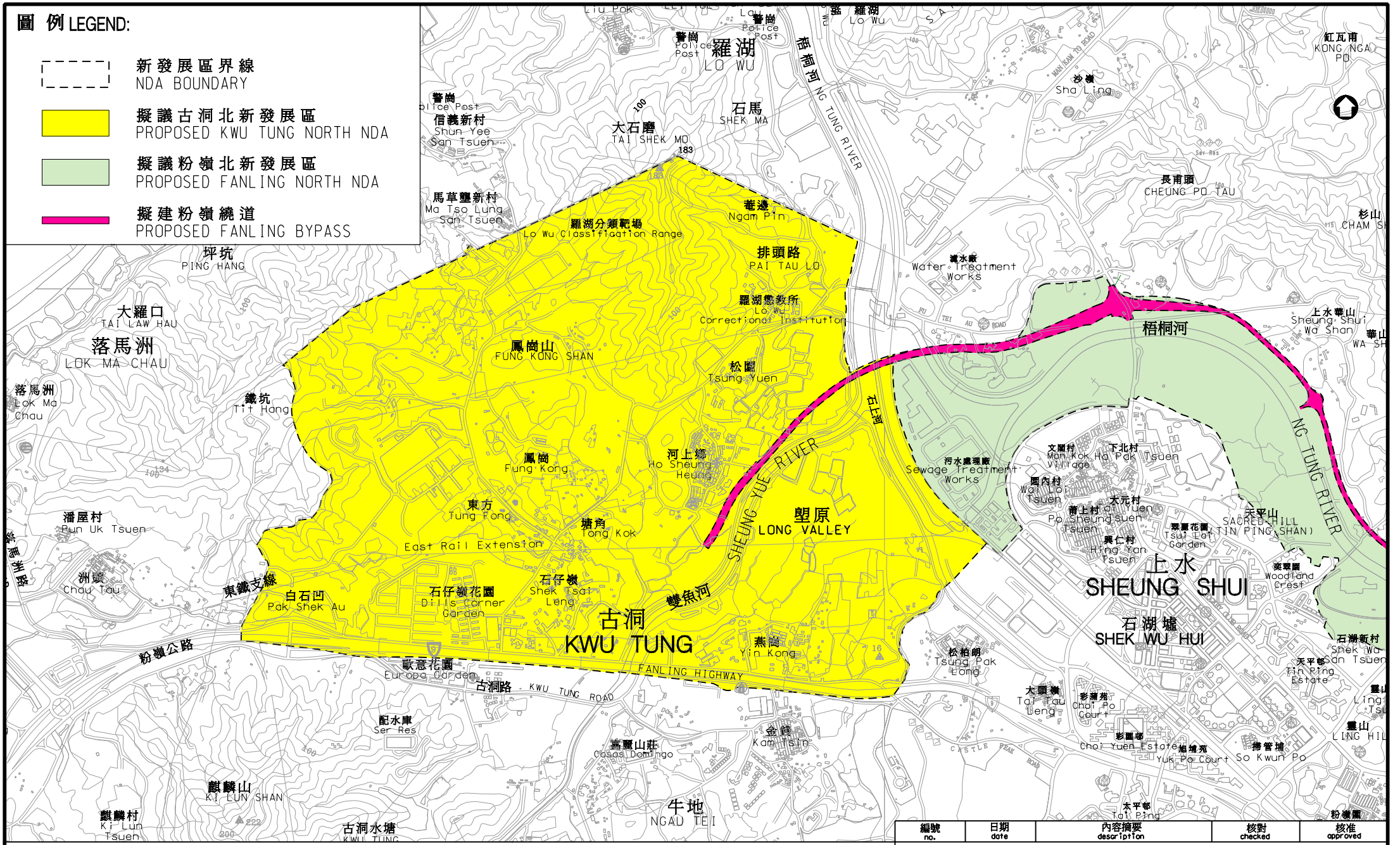
繪圖 drawn: K S LO	簽署 initial: SIGNED	日期 date: 31.10.2007	項目編號 item no.: 726CL
核對 checked: Y F TANG	簽署 initial: SIGNED	日期 date: 1.11.2007	比例 scale: 1 : 35 000
核准 approved: C S LIU	簽署 initial: SIGNED	日期 date: 1.11.2007	圖則編號 drawing no.: NTNZ 1539

辦事處 office

新界西及北拓展處
NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE

土木工程拓展署
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

(updated as at 1 Nov 07) L:/Cswp_drawing/726cl/Drawing/Ntnz1539.dgn A3 420MM X 297MM



編號 no.	日期 date	內容摘要 description	核對 checked	核准 approved

修訂 REVISION

圖則名稱 drawing title

新界東北新發展區檢討研究
REVIEW STUDIES ON NORTH EAST NEW TERRITORIES NEW DEVELOPMENT AREAS

擬議古洞北新發展區
PROPOSED KWU TUNG NORTH NDA

繪圖 drawn	K S LO	簽署 initial	SIGNED	日期 date	31.10.2007
核對 checked	Y F TANG	簽署 initial	SIGNED	日期 date	1.11.2007
核准 approved	C S LIU	簽署 initial	SIGNED	日期 date	1.11.2007

項目編號 Item no. 726CL

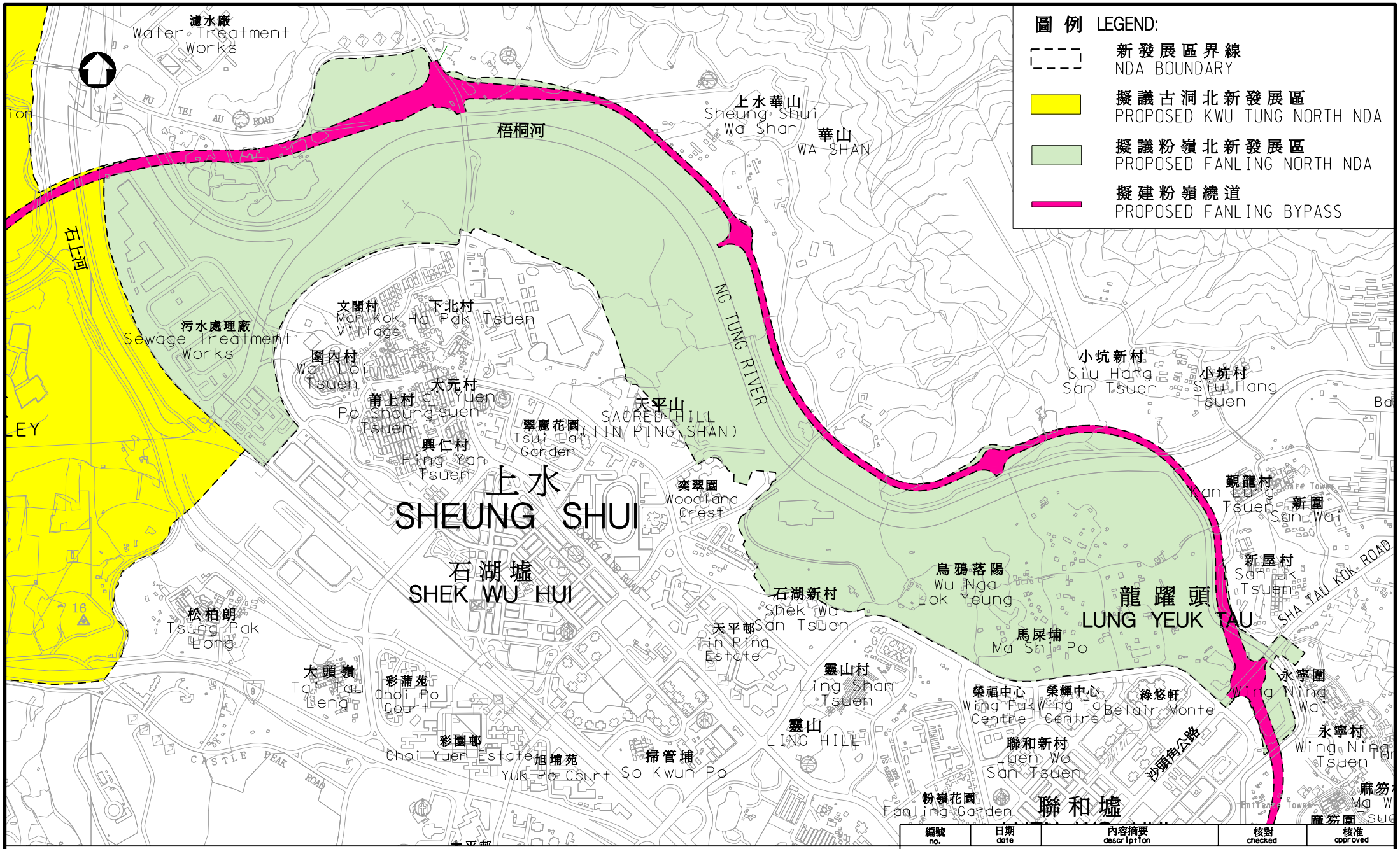
比例 scale 1:15 000

圖則編號 drawing no. NTNZ 1540

辦事處 office
新界西及北拓展處
NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE

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

(Updated as at 1 Nov 2007) L:\CSWP-Drawing\726CL\DRAWING\Ntnz1540.DGN A3 420MM X 297MM



編號 no.	日期 date	內容摘要 description	核對 checked	核准 approved

修訂 REVISION

圖則名稱 drawing title

新界東北新發展區檢討研究
REVIEW STUDIES ON NORTH EAST NEW TERRITORIES NEW DEVELOPMENT AREAS

擬議粉嶺北新發展區
PROPOSED FANLING NORTH NDA

繪圖 drawn	K S LO	簽署 initial	SIGNED
		日期 date	31.10.2007
核對 checked	Y F TANG	簽署 initial	SIGNED
		日期 date	1.11.2007
核准 approved	C S LIU	簽署 initial	SIGNED
		日期 date	1.11.2007

項目編號 Item no. 726CL

比例 scale 1:10 0000

圖則編號 drawing no. NTNZ 1541

辦事處 office
新界西及北拓展處
NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE

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

(Updated as at 1 Nov 2007) L:\CSWP-Drawing\726CL\DRAWING\Ntnz1541.dgn A3 420MM X 297MM

圖例 LEGEND:

- 新發展區界線 NDA BOUNDARY
- 擬議坪輋 / 打鼓嶺新發展區 PROPOSED PING CHE / TA KWU LING NDA

編號 no.	日期 date	內容摘要 description	核對 checked	核准 approved

修訂 REVISION

圖則名稱 drawing title

新界東北新發展區檢討研究
REVIEW STUDIES ON NORTH EAST NEW TERRITORIES NEW DEVELOPMENT AREAS

擬議坪輋 / 打鼓嶺新發展區
PROPOSED PING CHE / TA KWU LING NDA

繪圖 drawn	簽署 initial	日期 date	項目編號 item no.	辦事處 office
K S LO	SIGNED	31.10.2007	726CL	新界西及北拓展處 NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE
核對 checked	簽署 initial	日期 date	比例 scale	
Y F TANG	SIGNED	1.11.2007	1:10 000	
核准 approved	簽署 initial	日期 date	圖則編號 drawing no.	
C S LIU	SIGNED	1.11.2007	NTNZ 1542	土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

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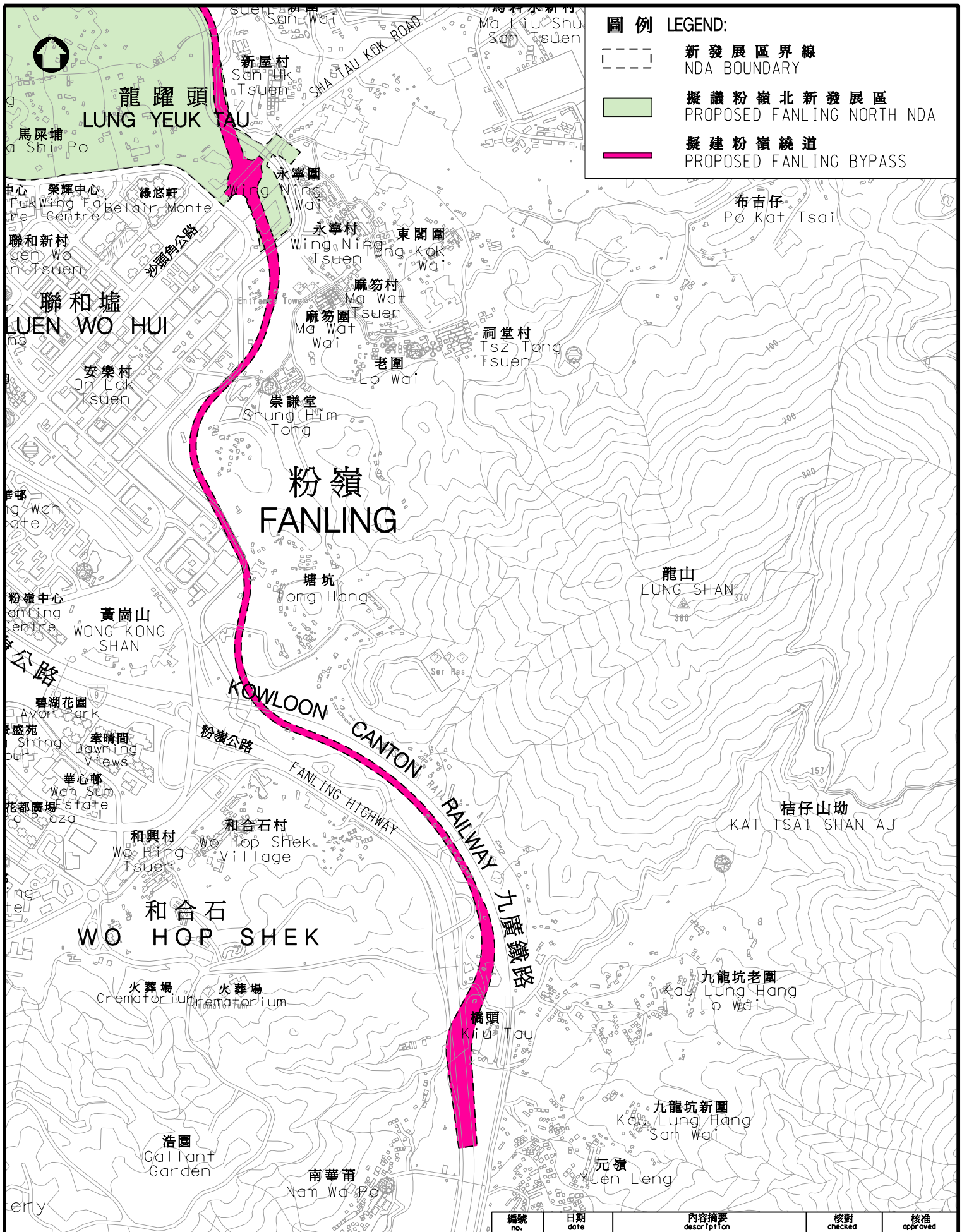

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修訂 REVISION

圖則名稱 drawing title

新界東北新發展區檢討研究
REVIEW STUDIES ON NORTH EAST NEW TERRITORIES NEW DEVELOPMENT AREAS

擬建粉嶺繞道南段
PROPOSED FANLING BYPASS - SOUTHERN CONNECTION

繪圖 drawn	簽署 initial	日期 date	項目編號 item no.	辦事處 office	
K S LO	SIGNED	31.10.2007	726CL	新界西及北拓展處 NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE	
核對 checked	簽署 initial	日期 date	比例 scale		
Y F TANG	SIGNED	1.11.2007	1:10 000		
核准 approved	簽署 initial	日期 date	圖則編號 drawing no.	土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	
C S LIU	SIGNED	1.11.2007	NTNZ 1543		

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