

2 Project Description

2.1 General Description of the Project

The Project comprises the development of KTN NDA and FLN NDA and associated infrastructure such as road works, sewage treatment works, drainage channel, wholesale market, etc. Taking into account the public comments received during the public engagement exercises and findings of technical assessments, a set of revised RODPs has been formulated and preferred options of traffic and transport, basic infrastructure and utilities provisions are also proposed. The Project scope is summarised in this Chapter.

2.2 Need for the Project

2.2.1 Project Inception

In light of the population growth and the long-term demand for housing and employment, the HK2030 Study, completed in 2007, had recommended proceeding with the development of the NDAs. The NDAs would provide a mix of housing types as well as basic infrastructure and community facilities. KTN and FLN NDAs among other development proposals were proposed to develop at priority mainly for the following reasons:

- KTN and FLN NDAs have been studied in detail in the past and the public were consulted on the preliminary proposals;
- KTN and FLN NDAs are served by rail and would be highly accessible through the development of new rail stations;
- KTN and FLN NDAs are contiguous to existing developed areas, namely Fanling/Sheung Shui New Town, such that it would be more cost effective in the provision of infrastructure. Some of the existing government, institution or community facilities could also be shared between the developed areas and the NDAs. NDAs could provide additional employment opportunities for new town dwellers.

The development of NDAs was announced by the Chief Executive in 2007-2008 Policy Address as one of the ten major infrastructure projects for economic growth. According to the policy address, the NDAs were to ease pressure on developed areas and to meet the demand for land arising from population growth. The size of the NDAs would be smaller, less than one fourth of that of the existing new towns such as Tuen Mun and Sha Tin. The NDAs would provide land for various uses such as housing, employment, high value-added and non-polluting industries. Through comprehensive planning, the NDAs would provide quality living space and convenience to both residents and the public. In this connection, the Government commissioned the Project to formulate updated development proposals for the NENT NDAs with a view to

reviewing and updating the findings and recommendations of the NENT Study and to formulating a revised proposal and implementation strategy for the NDAs.

Despite the population growth in the latest population projection is slower than that adopted by HK2030 Study, there will still be an increase of about 1.4 million people in the coming 30 years. Due to the decrease in household size, the increase in the number of households is even more substantial. Development of NDAs has a long lead time of at least 10 years, involving such tasks as planning review, environmental impact assessment, statutory planning, land resumption/clearance/rehousing, engineering works and building construction. It is necessary to plan and to develop additional land now to meet the long-term housing, economic and social development needs of Hong Kong.

2.2.2 Project Aspirations

Owing to changing planning circumstances and rising public aspirations, the HK2030 Study revisited the NENT Study and recommended that changes are necessary. The HK2030 Study recommends that the NDAs should be developed as a “3-in-1 Scheme” for multiple purposes, including the provision of land for housing, education and community facilities, improvement of the degraded rural environment, better protection of resources of high conservation value, timely development of land for tertiary education, special industries, provision of employment, etc. Particularly, the NDAs can be an important source of housing land to address part of the anticipated shortfall in the medium to longer term (i.e. towards the latter part of the 2010s and thereafter). In 2008, the CEDD and PlanD jointly commissioned NENT NDAs Planning and Engineering Study - Investigation to formulate updated development proposals for NENT NDAs. After undertaking a 3-stage public engagement programme and planning and technical assessments, it is recommended to proceed with KTN and FLN NDAs at this juncture, and PC/TKL NDA is to put aside and re-planned.

2.2.3 Predicted Future Environment without Project

2.2.3.1 Existing Conditions

KTN NDA

The area covered by KTN NDA is around 450 ha and is bound by: the Closed Area Boundary to the north; Shek Sheung River to the east; Fanling Highway and Castle Peak Road to the south; and Pak Shek Au and Tit Hang villages to the west. The landscape character of the area can be broadly described as a low value, rural lowland area predominantly used for low value open storage and industrial uses, surrounded by higher value, natural landscape features, villages and agricultural land.

This NDA is fairly enclosed by prominent green hill ranges in close proximity on three sides: the ridges of Tai Shek Mo to the north; Lok Ma

Chau range to the west (Western ranges); and Ki Lun Shan and Ki Lun Shan Au to the south. The lower lying Ma Tso Lung valley runs between Lok Ma Chau range and Tai Shek Mo while between Lok Ma Chau range and Ki Lun Shan there is lower land containing Pak Shek Au village and the Fanling Highway. To the east of the NDA, the land is generally flatter and more open until past the urban area of Sheung Shui, where the hill ranges including Cham Shan and Wa Shan are visible. Fung Kong Shan is also a prominent hill in the middle of this NDA, increasing the general green aspect of the area. Hill slopes are undisturbed and mainly vegetated by grass and scrub vegetation with trees found principally in the foothills and major valleys.

The central southern and south-eastern parts of this NDA are generally flat with the central southern part being more developed and the south-eastern part made up of the predominantly agricultural Long Valley. The Long Valley is a significant rural feature of this area with high landscape and ecological value, made up of a mix of active and inactive agricultural land, some ponds, small areas of marsh and mitigation wetlands with limited built structures. The central southern part of the NDA is more developed, made up of mixed land uses such as small residential developments, scattered villages, agricultural lands, rural areas and rural industries including vehicle repair, construction material storage and container storage. Villages, such as Yin Kong and Ho Sheung Heung, are generally made up of traditional houses with no high rise structures, complementing the rural surroundings. Rivers and streams are also important features of this NDA. The Sheung Yue River is a channelised river that runs in a southwest to northeast direction along the western side of the Long Valley until it joins the Shek Sheung River, another channelised river but far wider, and this river binds the NDA.

FLN NDA

The area covered by FLN NDA is around 164 ha and is bound by Fu Tei Au Road to the north, the hill ranges of Cheung Po Tau, Cham Shan, Wa Shan and Ma Tau Leng to the north-east, Ma Wat River to the east, Sha Tau Kok Road and Ma Sik Road to the south, and Tin Ping Road, Jockey Club Road and Po Wan Road to the south-west with a very small section of the MTRC East Rail line binding it to the west.

The NDA area is bisected by the Ng Tung River, which flows along the base of the foothills of the defining hill ranges and is a key characteristic of the FLN NDA area. The area is generally of medium landscape value with high value upland areas of Cham Shan and Wa Shan defining one side of the river valley as a green backdrop into which San Wai/Tai Ling Firing Range integrates well. The urban area of Fanling/ Sheung Shui New Town, with a number of high rise structures and new developments, defines the other side of the river and the low-lying river flood plains in between are predominantly of a rural nature, with small scale agricultural plots (both active and abandoned) and some scattered residential structures and open storage sites. Sheung Shui Slaughter House and SWHSTW are located to the southwest of this NDA, and Sheung Shui

Water Treatment Works (SSWTW) is located immediately to the northwest. Sheung Shui Heung lies to the southwest of the NDA while villages of Wa Shan, Siu Hang Tsuen and Siu Hang San Tsuen lie to the north of the river and are set against the hillside backdrop.

2.2.3.2 Predicted Future Conditions Without Project

In most habitats, conditions are expected to remain largely unchanged or for current trends to continue in the absence of the Project.

In the Long Valley and Ho Sheung Heung Priority Site, a nature conservation Management Agreement (MA) is currently in place in parts of the area. Currently the area covered by MA agreements is approximately 15ha, of which 12ha is in Long Valley and 3ha is in Ho Sheung Heung *fung shui* wood. The current MA commenced in March 2012 is scheduled to be completed in February 2015, but for purposes of this assessment, it is assumed that similar MAs (or a similar successor conservation mechanism) will continue beyond this date and the area covered by the MA will remain broadly similar or may slowly increase as more farmers participate. It is also assumed that adaptive management will result in a gradual increase in the ecological value of the managed areas with the passage of time.

In lowland habitats in the Study Area, the area of agricultural land and lowland grassland is predicted to decrease except in the Priority Site, as developed areas increase incrementally. Farming is unlikely to become sufficiently attractive economically so as to result in large areas which have not been farmed in the recent past being returned to agricultural use; however the recent increase in interest in organic and ‘hobby’ farming may result in some recently abandoned areas of agricultural land being re-used for this purpose.

Some upland habitats are predicted to increase in ecological value gradually as shrubland, plantation and secondary woodland habitats mature. This natural process of habitat maturation may, however, be checked in some areas by the extension of developed areas and disturbance, especially that caused by hill fires.

Very few natural streams remain in the Study Area; however those that do still remain are predicted to retain or possibly increase their ecological value as riparian habitats improve.

Changes in wildlife numbers and diversity are particularly hard to predict and external factors, such as climate change, may have long-term and often unpredictable consequences. However, if recent trends continue, wetland fauna and fauna of semi-natural dryland habitats are likely to become increasingly concentrated in areas where wildlife conservation is a management objective. Meanwhile, woodland fauna diversity and numbers may continue to increase, albeit slowly, as habitats mature and are colonised.

Invasion of natural and semi-natural habitats by exotic flora and fauna, and ecological impacts from pests and diseases as a direct and indirect

consequence of anthropogenic activity, are increasing globally; both independently from, and in conjunction with, climate change. As with those in Hong Kong as a whole, habitats and species in the Study Area are likely to be adversely impacted by these increases.

The Study Area is of limited importance for fish production, but a fish fry culture farm is of significance in Hong Kong as much of the fish reared in fishpond culture fisheries passes through this farm. In the absence of the Project, this farm is predicted to continue operations, subject to the economic and other decisions of the operator.

The site environment is likely to remain status quo if undisturbed. But given the need of NENT NDAs is to accommodate the envisaged population growth, if the project does not proceed, it would lead to more land intake for smaller development areas spreading throughout the New Territories. Hence, this would not be efficient in terms of use of land resources, planning and infrastructure provision, hence likely generating localised uncontrolled impact on the environment.

2.2.4 Project Visions

The NDAs development is one of the ten major infrastructure projects promulgated in the 2007-08 Policy Address. It is of territorial significance as the development is a main source of land supply for our long-term housing, employment and other needs. The project visions include:

To promote economic development, the NDAs would provide development space to support different strategic land uses, including the industries where Hong Kong enjoys clear advantages.

To promote a sustainable living environment, land has also been reserved in the revised RODPs for the implementation of green initiatives such as District Cooling System (DCS), and the reuse of treated sewage effluent with a view to creating a green living environment and reducing carbon emission.

The main objective of the Project is to provide land for residential and economic development to support predicted population and employment requirements in order to meet Hong Kong's growing population and employment needs. Since resuming in 2008, the Project has been at the forefront of various major studies on new development areas in terms of progress. According to the current programme, the first housing development (which will be public housing) in the NDAs is expected to complete in 2023, taking into account the time required for the relevant statutory and land resumption procedures and infrastructure and construction works. The NENT NDAs will be a main source of new housing in Hong Kong in future. If the NDAs proposal is withdrawn, the housing supply for the whole community, including public and private housing, will be seriously affected.

The NDAs development would shift some of the population from the dense urban areas to the New Territories so as to achieve a more balanced territorial development pattern and an overall less congested

environment. This is important for the core urban areas which are already characterised by excessively high development densities.

In addition, given the need to accommodate the envisaged population growth, the absence of a comprehensively planned high density new town type development would lead to more land intake for smaller development areas spreading throughout the New Territories. The latter arrangement would not be efficient in terms of use of land resources, planning and infrastructure provision, hence likely generating more impact on the environment.

Together with the NDAs development, there will be an opportunity to improve the local traffic network, upgrade the rural environment, revive the local economy and provide employment.

2.3 Revised Recommended Outline Development Plan

2.3.1 Development Opportunities and Constraints

The opportunities and constraints on the NDAs are summarised below:

KTN NDA

Development Opportunities

- Strategically located near the Lok Ma Chau and Lok Ma Chau Spur Line Boundary Control Points (BCPs), the KTN NDA could capitalise on the increasing economic interactions between Hong Kong and the Mainland.
- There is potential for integrated planning of the NDA with the Lok Ma Chau Loop (LMC Loop) which is planned for higher education as the leading use, complemented by high-tech Research & Development (R&D) and cultural and creative industries as well as the Closed Area to be released which has been planned as a “belt of conservation, cultural heritage and sustainable uses between Hong Kong and Shenzhen”.
- The proposed Kwu Tung Railway Station on the Lok Ma Chau Spurline provides a significant opportunity to integrate environmentally friendly transport system with the overall land use framework. Such coordination will help maximise the use of public transport and minimise road traffic, thus reducing carbon emission.
- Fanling Highway to the south of the KTN NDA connects the NDA to the other areas in the North District and the New Territories.
- KTN NDA can be seen as an extension to the existing Fanling/Sheung Shui New Town, though separated by the Long Valley. Future residents of the NDA will have quite easy access to existing shops, services, G/IC facilities at Fanling and Sheung Shui by provision of public transport and connected road network. At the

same time, existing residents in Fanling/Sheung Shui will be able to make use of new facilities within the NDA, which is quite near to them.

- There are a number of natural features within and in the surrounding areas of the NDA that could be utilised to create a quality living environment.
- The eastern part of the NDA is Long Valley, which is recognised by its high ecological value and forming part of the Long Valley and Ho Shueng Heung priority sites identified for enhanced conservation under the New Nature Conservation Policy. Proper planning and land use zoning could help enhance the ecological and conservation value of Long Valley and develop an integrated green network within the NDA.
- Sheung Yue River provides an opportunity for passive recreation along the riverside promenade. However, as it is of high ecological value due to its importance for foraging egrets, mitigation measures will be required to ensure that disturbance to these water birds is minimised by provision of appropriate screen planting and of building setback along the river promenade.
- Mountainous areas to the north, including Fung Kong Shan and Tai Shek Mo, create a green backdrop to the NDA and act as a focus for major view corridors across the NDA.
- KTN NDA is rich in cultural and heritage resources, some of which could be incorporated in the planning of the NDA. These heritage resources include the *fung shui* woodland adjacent to Ho Sheung Heung, Hau Ku Shek Ancestral Hall in Ho Sheung Heung (a declared monument), and a number of graded buildings (including the Earth God Shrine of Kam Tsin, Hung Shing Temple and Pai Fung Temple, Sin Wai Nunnery, Yeung Yuen, Yan Wah Lo as well as Enchi Lodge). Proper planning and land use zoning could help incorporate these valuable resources into the NDA development for the benefits of future residents, workers and visitors.

Development Constraints

The NDA is surrounded by hilly terrain and steep slopes to its north and west. There are also a number of permitted burial grounds on these hilly slopes. The NDA development should avoid encroaching on these areas.

- With regard to infrastructure, the SSWTW, which is a potentially hazardous installation (PHI), lies to the northwest just outside the NDA boundary, but its 1km Consultation Zone covers the eastern portion of the NDA.
- The northern part of the NDA is traversed by the 400kV overhead power lines, supplying Hong Kong with electricity from Daya Bay nuclear power station in Shenzhen. The presence of the power lines has created a significant constraint to land use planning.

- The existing Dongjiang water mains along the western part of the NDA also present a major constraint to development. No building should be built within the Dongjiang water mains reserve.
- Fanling Highway to the south of the KTN NDA is the major noise/ air pollutant source to the NDA. Sufficient setback with landscape plantings from the major road should be allowed in order to minimise noise/ air quality impacts on future residents. If possible, non-noise sensitive developments would be proposed adjacent to the Highway to protect residential developments further north from adverse noise/ air impact. Otherwise, adequate noise barriers with landscape mitigation measures have to be provided.
- The northwestern part of the NDA would become the gateway of the proposed Eastern Approach Road to the LMC Loop. The traffic and highway design of the NDA needs to take the future traffic growth from the LMC Loop into consideration. Any environmental impact on the NDA developments caused by the traffic of LMC Loop should be minimised.
- The railway alignment and implementation programme of the Northern Link is currently under review in the "Review of Second Railway Development Study (RDS-2U)" undertaken by the Railway Development Office (RDO), Highways Department. In accordance with the Working Paper on the Northern Link circulated by RDO, it is noted that there are two preferred alignments for Northern Link to be proceeded to further study. In the first alignment option, the Northern Link connects to Chau Tau Station and Lok Ma Chau Station, and has no encroachment upon KTN NDA. In the second alignment option, the Northern Link will run alongside the East Rail Spurline in KTN NDA in the form of underground tunnel and ends at a single platform in Kwu Tung station. RDS-2U is on-going and the preferred alignment option is not confirmed at this moment. Hence, in formulating KTN RODP, flexibility has been allowed for a potential Northern Link alignment beside the existing East Rail.
- The existing helicopter pad at Lo Wu Firing Range in the northern part of the NDA imposes another significant constraint. Developments of adjacent sites are subject to the building height restrictions as stipulated in the Helicopter Landing Site Specification Guidelines of Government Flying Service (GFS). Developments adjacent to the Lo Wu Firing Range will also be affected by helicopter noise from the helicopter pad and noise from the shooting range.
- There are two indigenous villages, namely Ho Sheung Heung and Yin Kong within the NDA. Development of these long established indigenous villages should be avoided.
- Long Valley is a major ecological resource as well as visual relief of the NDA. Developments in its proximity should not adversely affect

the ecological value of Long Valley. Proper land use zoning and development controls are required to protect its ecological value.

- In addition to Long Valley, avoidance of other ecological resources including Sheung Yue River, Ma Tso Lung stream, Ho Sheung Heung Egretty together with their associated flight-lines, ecologically sensitive parts of the Long Valley and Ho Sheung Heung Priority Site, *fung shui* woods, secondary woodlands and any other habitats identified of high ecological significance under the study would also be considered.

FLN NDA

Development Opportunities

- The infrastructure and transport facilities in the rural area of Fanling are insufficient in meeting the needs of the current residents. Upon implementation of the NDA development, not only the open storage and industrial uses will be replaced by a quality living environment, but also more community and transport facilities will be provided to serve the residents living in FLN NDA and its vicinity.
- The development potential of the area has been optimised to cater for future population growth and aspirations for a quality living environment. The natural features, i.e. Ng Tung River and the hill slopes beyond FLN NDA, provide opportunities for planning and designing of a NDA based on the “riverside” theme with natural backdrop. Connectivity within the NDA will also be enhanced via a continuous riverside promenade alongside Ng Tung River with connections to the residential areas and open spaces within the NDA. Meanwhile, the mountainous areas to the north, including Fu Tei Au, Cham Shan, Wa Shan, Ma Tau Leng, create a visual backdrop to the NDA and provide a focus for major view corridors from the NDA.
- FLN NDA also enjoys a strategic location abutting the existing Fanling/Sheung Shui New Town. Future residents of the NDA will have convenient access to existing shops, services, G/IC facilities as well as the railway stations at Fanling and Sheung Shui by provision of public transport and well-connected road network. At the same time, existing residents in Fanling/Sheung Shui New Town will be able to make use of new public facilities and infrastructure within the NDA.
- Whilst there is no recognised village within the NDA, several recognised villages, namely Sheung Shui Wa Shan, Siu Hang San Tsuen, Sheung Shui Heung and Lung Yeuk Tau are in close proximity to the NDA. Development in close vicinity to these recognised villages should help enhance the overall amenity instead of imposing adverse impact on the villages. In planning the major road along Ng Tung River, every effort has been made to minimise adverse impacts on villages, landscape, ecology, environment, graves and cultural heritage resources as far as possible.

- There are a number of graded buildings, historic buildings and/or structures, and sites of archaeological interest in or adjacent to FLN NDA. Where possible, the graded building within the NDA (i.e. Man Ming Temple in Fu Tei Au) will be preserved to enrich the cultural value of the development.

Development Constraints

- Many slopes adjacent to the NDA boundary comprise burial grounds with significance. These form a natural constraint in delineating the boundary of the NDA.
- With regard to infrastructure, the SSWTW, which is a potentially hazardous installation (PHI), lies just outside of and to the northwest of the NDA boundary, but its 1km Consultation Zone covers the western portion of the NDA.
- Furthermore, the existing 400kV overhead power line and an existing 2000mm diameter Dongjiang water mains running east-west near Fu Tei Au limit the types of structures that can be built thereon.
- Sha Tau Kok Road and Po Shek Wu Road are currently busy road corridors. Several key junctions like Po Shek Wu Interchange are near its capacity limit. New highway infrastructure is essential to sustain further growth in Fanling North. In addition, it is preferable to minimise vehicular traffic routing through Fanling/Sheung Shui community to minimise traffic and environmental impacts to the existing new town, which, is also one of the key opinions received during the public engagement.
- The NDA is currently a low-lying plain beside Ng Tung River and subject to flooding risk. The site formation and drainage should be designed to minimise the flooding risk to the planned development and the nearby existing settlements.
- Avoidance of ecological resources including flight-lines of Ho Sheung Heung Egret, Ng Tung River, mitigation meanders, Siu Hang San Tsuen stream, secondary woodlands and any other habitats identified of high ecological significance under the study would also be considered.

2.3.2 Planning Principles

KTN NDA

The planning principles for KTN NDA are as follows:

Promoting a Sustainable Living Environment through Transit-Oriented Development : The proposed Kwu Tung Railway Station on the Lok Ma Chau Spurline provides a significant opportunity to promote rail-based transit-oriented development (TOD). Majority of the NDA's developments and population would be located within 500m of the proposed Railway Station. In tandem with the principle of TOD, job-creating uses such as retail, commercial and office uses are planned

within this catchment area. The intention is to concentrate population and jobs within walking distance of the Station in order to minimise the need for commuting, and thus promote energy efficiency and minimise carbon emissions.

Walking and cycling will also be promoted within the NDA by providing an extensive pedestrian and cycling network connecting the proposed Railway Station with residential areas, major retail and recreational facilities, activity nodes and open spaces. Kwu Tung Railway Station will become the focal point of the cycle tracks and pedestrian walkways. The cycle tracks and pedestrian walkways are designed in a radial pattern from the Station along the landscaped areas to provide a pleasant cycling and walking environment.

Reserving Land to Support Economic Growth of Hong Kong : Taking advantage of its proximity to a number of boundary crossing facilities and Fanling Highway, land is reserved in the southern part of the NDA for the development of industries which Hong Kong enjoys clear advantages. Land intended for development of hotel and conference facilities to support the advantageous industries is also reserved in this area. The proposed commercial, research & development area would form a major gateway at the south-eastern part of NDA. It would not only provide land to support the economic growth of Hong Kong, but also create job opportunities to people living in the NDAs and the Fanling/Sheung Shui New Town.

Integration with Fanling/Sheung Shui New Town : Being located near the Fanling/Sheung Shui New Town, KTN NDA would be an extension of it to form Fanling/Sheung Shui/Kwu Tung North New Town. The new town and NDA residents would have an opportunity to share both existing and planned employment, commercial and community facilities. Opportunity has been taken to provide additional G/IC facilities and open spaces in the NDA to serve the larger community.

Balanced Community : Due consideration has been given to achieve a balanced housing mix in order to create a socially integrated community. A range of housing types are proposed to cater different housing needs and to achieve a more balanced community profile. In addition, an adequate provision of G/IC and open space sites is planned to ensure that the future community has convenient access to proper supporting services.

Timely Provision of Sufficient Government, Institution and Community Facilities : Timely provision of adequate supporting facilities is critical to ensure an appropriate standard of living. Many of the existing Government, Institution and Community (G/IC) facilities within the NDA will be retained. In addition, sufficient land has been reserved for a comprehensive range of G/IC uses in order to accommodate the social and community needs of the future population. The provision of G/IC facilities within the NDA is based on framework set out in the Hong Kong Planning Standards and Guidelines (HKPSG). It is also essential

that the location for the G/IC facilities are chosen in accordance with the nature of services offered, the target users and visitors and the frequency of the target users requiring the services. In formulating the implementation programme of the NDA, particular attention has been paid to ensure timely provision of various G/IC facilities in tandem with the population intake of the NDA.

Layout Design Respecting the Surrounding Environment and Ecology : To respect the rural character in the surrounding areas, a stepped building height profile is adopted in designing the NDA. The high density developments would be concentrated around the proposed Kwu Tung Railway Station. The building density and height drop gradually towards the periphery of the NDA to ensure a better integration between the NDA developments and the adjacent rural setting.

Due consideration is also given to preserve the habitat of Long Valley. The urban type development particularly those of high intensity should be located away from Long Valley, where ecologically-important habitats are present. In addition, proper land use zonings would be designated for Long Valley and its surrounding areas to protect the area.

Ecological resources including Sheung Yue River, Ma Tso Lung Stream, flight-lines of Ho Sheung Heung Egret, wetlands and woodlands in Long Valley and Ho Sheung Heung Priority Site, *fung shui* woods, secondary woodlands and any other habitats identified of high ecological significance have also been considered in formulating the revised RODP to avoid and minimise the impact.

Minimising Impacts on Existing Communities : Attempts have been made to minimise disturbance to the existing community and to avoid displacement of long-established indigenous villagers. Two burial grounds are located respectively at the hillslopes immediately west of Ho Sheung Heung and near Tit Hang on the northern and western fringes of the NDA. No development should encroach upon these areas. Developments in close vicinity to these indigenous villages aim to enhance the overall amenity of the area.

To help preserve the existing community network and to meet the rehousing needs of the eligible clearerees, opportunity has been taken to identify an appropriate local rehousing site in the NDA to re-house clearerees eligible for public rental housing.

Retention of Cultural Heritage Resources : The declared monument and graded historic buildings would be considered and incorporated in the NDA development.

Incorporation of Key Natural and Landscape Features into NDA Development : A key planning principle is to preserve and enhance the significant landscape character areas and landscape resources in the NDA. Due respect has been paid to the existing landscape features such as *fung shui* woodlands. Development/encroachment within *fung shui* Woodlands should be avoided. The existing *fung shui* Woodland adjacent

to Ho Sheung Heung would be integrated into the land use framework through the designation of “Green Belt” zoning. The Old Valuable Trees within the NDA boundary are proposed to be retained.

Existing trees within the proposed open space would be retained as far as possible to avoid the loss of landscape resources.

Creating a Comprehensive Green Network : The Town Park stretching the “Green Belt” zone in Pak Shek Au in the west to the Long Valley Nature Park provides spaces for recreational and social activities. A north-south open space corridor would be provided to link up Kwu Tung South with Fung Kong Shan Park. The corridor would be landscaped and form part of the comprehensive green network. This corridor also provides direct visual linkage from the southern part of the NDA to the hilly backdrop to the north and gives people a sense of space upon arrival. This green network serves as a physical linkage between major residential areas and major activity nodes such as Kwu Tung Railway Station, Town Park, Long Valley Nature Park and Fung Kong Shan Park.

Minimising Adverse Environmental Impact on the NDA : The principle of minimising environmental impacts through layout design has been pursued by placing the district distributor road on the periphery of the NDA. It could minimise the potential impacts of noise and air pollution caused by traffic and help provide a pleasant and traffic-free walking environment within the NDA. Amenity areas are also carefully planned to provide buffers between major roads and proposed developments to mitigate potential environmental impacts.

Enhancing Air Ventilation : In the KTN NDA, the land use and building layout would be sensibly devised to create breezeways and localised air paths between building blocks to maintain good air penetration from the prevailing winds from northeast/east. These wind corridors could enhance the overall ventilation performance of the NDA and the downwind areas.

Incorporation of Green Features : To minimise adverse impacts on the environment, reduce the use of natural resources, and achieve the target of low carbon emission, various green features have been proposed.

A District Cooling System (DCS) for non-domestic developments is proposed within the NDA to achieve energy efficiency and reduce greenhouse gas emission and to support low carbon economy. Meanwhile, green building measures including green roof, vertical greening and passive building design, etc. would also play a major role in enhancing energy and carbon reduction. Energy efficient systems/equipment, renewable energy, water saving fixtures and green construction materials are also proposed to further enhance the overall sustainability.

Different Environmental Friendly Transport Modes (EFTM) have been studied to improve the roadside environment. Sufficient buffer and flexibility for subsequent implementation of road-based EFTM has been

allowed. The roadside amenity is wide enough to accommodate different types of charging station and can be linked to the power supply system.

Besides, the reuse of TSE brings multiple benefits such as reducing treated effluent discharge in the receiving water body, conserving fresh water resources and enhancing water use efficiency. Reuse of TSE for non-potable purposes including toilet flushing, landscape irrigation and make-up water for district cooling system will be incorporated.

FLN NDA

Integration with Fanling/Sheung Shui New Town : Being located right next to the Fanling/Sheung Shui New Town, FLN NDA would be an extension of it to form Fanling/Sheung Shui/Kwu Tung North New Town. The existing and future residents would have an opportunity to share both existing and the planned community facilities. Opportunity has been taken to provide additional G/IC facilities and open space to serve the community.

Concentration of Population around Major Transport and Activity Nodes : The intention is to provide mainly residential developments with supporting commercial and G/IC facilities that are compatible with the surrounding land uses within an easily accessible environment. In order to enable a sustainable and quality living environment, FLN residents can walk easily to most commercial, leisure, G/IC, transport and other supporting facilities. It should be noted that a walkable distance refers to approximately 500m, which is also equivalent to a 10-15 minute stroll.

Balanced Community : Furthermore, due consideration has been given to strike a more balanced housing mix in order to create a socially integrated community. A range of housing types and mixes is proposed to cater to different segments of the community and to achieve a more balanced community profile. In addition, an adequate provision of G/IC and Open Space sites is planned to ensure that the future community has convenient access to proper supporting services.

Compatibility with the Environmental and Development Characters in the Surrounding : A stepped building height profile is adopted in FLN NDA in order to respect the existing local context and developments. Buildings with the highest density will be concentrated within the two core areas on the southern bank of Ng Tung River. The intensity and building height drops gradually towards Ng Tung River.

In view of the potential hazard within the Consultation Zone of the SSWTW, residential developments will not be planned within the 1km Consultation Zone. The amount of residential developments and working opportunities in the NDA are carefully controlled according to the risk thresholds.

Furthermore, to allow prevailing wind to pass through the NDA, all breezeways are oriented in a northeast–southwest direction to allow prevailing wind to pass through the NDA. Secondary breezeways are also provided running through the development, creating permeability

across the residential neighbourhoods to the Ng Tung River and Central Park. The Park at the centre of the NDA provides a large-scale visual and physical break between the two residential neighbourhoods, and is the key view corridor/breezeway within the NDA. The layout of the NDA therefore is designed to allow wind to penetrate into the existing Fanling/Sheung Shui New Town.

Comprehensive Open Space System to Create a Green Neighbourhood : In order to enhance the living environment in the NDA, an open space system is embedded into the NDA to provide a continuous green network across the neighbourhood. This linear open space system would allow for both the pedestrian and cyclists access which links up the existing Fanling/Sheung Shui New Town and the NDA, in order to facilitate the public to enjoy the scenic views along the river. As a riverside community, the riverfront promenade along Ng Tung River forms an important element to the open space system in FLN NDA which aims to improve the environment along the River for leisure and recreational use.

Preservation of Cultural Heritage Resources : Man Ming Temple (a Grade 3 historic building) will be preserved and located within an open space for public use.

Minimising Adverse Impact of the Fanling Bypass : FLN NDA occupies the flat land between the existing new town the surrounding hill slopes and village developments. The outer limit to the new town is clearly delineated by the retrained Ng Tung River and the proposed major road. In planning the major road along Ng Tung River, every effort has been made to minimise adverse impacts on villages, landscape, ecology, environment, graves and cultural heritage resources. The road is located on the northern side of the retrained river away from the NDA so as not to prejudice pedestrian access to the river as well as to provide a larger buffer distance for the NDA development. Open space has been planned along the river to provide a major public area for recreation and leisure.

Timely Provision of Sufficient G/IC Facilities : Provision of G/IC facilities within the NDA is based on the framework set out in the HKPSG. A wide range of G/IC facilities, including schools, nursery classes and kindergartens, clinic/ health centre and indoor recreation centre etc. will be provided. It is also essential that the location for the G/IC facilities are chosen in accordance with the nature of services offered, the target users and visitors and the frequency of the target users requiring the services. In formulating the implementation programme of the NDA, particular attention has been paid to ensure timely provision of various G/IC facilities in tandem with the population intake of the NDA.

Incorporation of Green Features : To minimise adverse impacts on the environment, reduce the use of natural resources, and achieve the target of low carbon emission, various green building features have been proposed. Passive measures including green roof, vertical greening and

passive building design, etc. would play a major role in enhancing energy and carbon reduction of the NDA. Meanwhile, energy efficient systems/equipments, renewable energy, water saving fixtures and green construction materials are also proposed to further enhance the overall sustainability.

To improve the roadside environment, different EFTM have been studied. The revised RODP has made sufficient buffer and flexibility for subsequent implementation of road-based EFTM. The roadside amenity is wide enough to accommodate different types of charging station and can be linked to the power supply system. Also, a site close to the electricity substations is reserved to provide a parking and operation area for EFTM vehicles.

Besides, the reuse of TSE brings multiple benefits such as reducing treated effluent discharge in the receiving waterbody, conserving fresh water resources and enhancing water use efficiency. Reuse of TSE for non-potable purposes including toilet flushing, landscape irrigation and make-up water for district cooling system would be incorporated.

2.3.3 Public Opinions

To foster community support and general consensus to the key issues and study proposals, a 3-stage public engagement exercise was conducted to enable more structured public engagement activities in the development of NDAs.

2.3.3.1 Stage 1 Public Engagement (PE1)

Public consultation has been carried out as part of the Stage 1 design phase to engage key stakeholders (public, relevant organisations, district councils and local rural committees) in discussions on key issues relating to the development of the NDAs. PE1 commenced on 14 November 2008 and lasted for about three months. To facilitate more focus discussions, the key issues/concerns were categorised into focus topics. Topical Notes for each of the topics were prepared. A community workshop was held on 20 December 2008. A website was also set up (www.nentnda.gov.hk) to disseminate information. The key environmental related comments received from the public during the PE1 are summarised in **Table 2.1**.

Table 2.1 - Key comments related to environment received during PE1

Key Issue	Public Comment	Action/ Response
Strategic Roles of NDAs	Development of the NDAs shall co-ordinate with the needs of the Pearl River Delta and integration with Shenzhen, the Lok Ma Chau Loop and the Closed Area in the long term. Key strategic uses of the NDAs should	<ul style="list-style-type: none"> • Development proposals will respect the existing environment and ecology. • Encroachment upon ecologically important areas will be avoided. • To facilitate the strategic roles of the NDAs, themes will be developed for each NDA in line with surrounding environs.

Key Issue	Public Comment	Action/ Response
	consider residential, commercial, economic activities, educational, medical, tourism and leisure.	
People - orientated Communities	To ensure a harmonious community, there should be a balanced mix of public and private housing. High density development might no longer be appropriate for the NDAs.	<ul style="list-style-type: none"> • Appropriate residential population size to be determined and provision of balance housing mix. • Provision of recreational and social facilities and balanced employment mix.
Sustainable Living Environment	To create a sustainable living environment, the development of the NDAs should preserve important ecological, natural landscape and historical and cultural resources of the area.	<ul style="list-style-type: none"> • Sustainable urban design including integration of natural features and local cultural resources, enabling a green and healthy lifestyle and sustainable urban form. • Enhanced microclimatic conditions through urban ventilation, streetscape design and landscaping. • Emphasis on ecological and heritage conservation. • Development of sustainable transport modes through emphasis on rail based development and environmentally friendly transport mode, pedestrian and cycling systems and open space networks. • Explore various green initiatives such as renewable energy use, effluent reuse and a district cooling system.

2.3.3.2 Stage 2 Public Engagement (PE2)

PE2 aimed at collecting public views on PODPs for NDAs commenced in November 2009 and completed in January 2010. A series of community engagement activities were undertaken for different stakeholders including Legislative Council Panel on Development, Town Planning Board, Advisory Council on the Environment, local residents, rural committees, district council, HYK and professional institutes.

A community workshop was held in December 2009 and other two consultation sessions with local villagers of Kwu Tung North and Fanling North were conducted to gauge the public views.

Both supporting and objecting views to the NDA projects were received. Major environmental related comments are summarised in **Table 2.2**.

Table 2.2 - Key Comments related to environment received during PE2

Key Issues	Public Comment	Action/ Response
Development Intensity	The public has proposed to increase the development intensity of some developments so as to provide more housing to meet the demand	The plot ratios of R2 and R3 sites in KTN and FLN increased from 3 to 3.5 and from 1 to 2 respectively.
Public Rental Housing	Objections to some of proposed public rental housing (PRH) sites are received in the eastern side of FLN NDA at Ma Shi Po as it is close to some nearby existing private housing developments.	The proposed PRH sites swapped with other proposed private residential sites to enhance spaciousness.
Long Valley Proposal	The proposed “Other Specified Uses (Comprehensive Development & Nature Conservation Enhancement Area)” zone for Long Valley was not supported by both the villagers and the green groups as it may fail to safeguard conservation of the ecological value of the area and on the other hand, freeze landowners’ development right.	To designate the core area of Long Valley as a Nature Park to enhance and conserve the existing ecological environment. The two areas in the south and north of the Nature Park retained as “Agriculture” zones to continue the existing agricultural activities.
SWHSTW - Further Expansion	The local residents, especially the Sheung Shui Heung villagers have expressed very strong objections to the proposed sewage treatment work extension in the green belt area north of Sheung Shui Heung. The local residents are concerned on the environmental and health impact of the sewage treatment work, and its constraint to future village expansion into the green belt area.	To reduce the SWHSTW extension area to the area immediately north of the existing STW by in-situ upgrading the existing STW. The green belt area north of Sheung Shui Heung remains its current zoning on the existing OZP.

2.3.3.3 Stage 3 Public Engagement (PE3)

In the light of various views collected from PE1 and PE2, the RODPs were formulated, outlining specific land use proposals. PE3 was carried out between mid June and end September 2012 to gauge public views on the RODPs.

During the PE3 exercise, 35 briefings and meetings with relevant bodies were held. They mainly included the Legislative Council Panel on Development, Town Planning Board, HYK, North District Council and relevant Rural Committees, Advisory Council on the Environment, Housing Authority, Land Development Advisory Committee, professional bodies, local concern groups and other stakeholders such as green groups. PE3 was also publicised through various channels including newspaper advertisements and delivering letters and posters to relevant parties. Roving exhibitions were held at the North District, Sha Tin and North Point Government Offices. The background information, consultation documents, video and executive summary of technical documents were uploaded onto the Study website for public viewing. Two public meetings in Kwu Tung North and Sheung Shui were held on 29 July and 22 September 2012, attended by over 600 and over 5,000 people respectively. Two special meetings of the Legislative Council Panel on Development to meet with deputations for views on the Project were held on 8 and 15 December 2012. Over 250 representatives from different professional institutes, green groups, local concern groups and organizations as well as individuals attended the meetings. As at December 2012, over 12,000 written submissions were received.

Both supporting and objecting views to the NDA projects were received. Major environmental related comments and issues of public concern are extracted and presented in **Table 2.3**.

Table 2.3 – Major Public Comments received during PE3

Key Issues	Public Comment	Action/ Response
The NDAs Proposal	<p>Support the NDAs proposal as the development of the NDAs could cater for various needs arising from the increasing population and social and economic developments in Hong Kong.</p> <p>Against the NDAs proposal in part or in whole. Some public are of the views that the proposed NDAs development is planning to integrate the NENT NDAs with Shenzhen into a boundary zone; the NDAs are planned by or for the Mainland/ “serve the rich</p>	<p>NDAs development, like other successful new towns, is the most efficient way to supply land for meeting housing needs. In view of population growth, increase in households and public aspirations, we believe that NDAs remain to be a major component in the overall strategy to provide housing land for Hong Kong in the medium- to long-term. The KTN and FLN NDAs would be the extension of Fanling/ Sheung Shui New Town to form the Fanling/ Sheung Shui/ Kwu Tung North New Town.</p>

Key Issues	Public Comment	Action/ Response
	<p>Mainlanders”.</p> <p>Some people are of the view that there is no imminent need for the NDAs due to slower population growth as well as there is actually a large quantity of vacant land in the developed areas of Hong Kong, which can be used for residential development.</p>	
<p>Development Intensity</p>	<p>The development intensity of the NDAs should be increased to address the housing shortfall.</p> <p>The proportion of public housing development is too low, the supply of small- and medium-sized flats insufficient, and that too much land has been planned for the low density residential developments (especially at PC/TKL NDA), which may not help address Hong Kong’s housing problem.</p>	<p>Given the pressing need for more housing land, the development density of the KTN and FLN NDAs has been increased taking into account the infrastructural capabilities, design flexibility and environmental acceptability.</p>
<p>Public-Private Housing Ratio</p>	<p>Suggest earmarking more land for Public Rental Housing (PRH) to increase the supply of PRH flats and introducing new Home Ownership Scheme (HOS) sites.</p>	<p>To accelerate the provision of PRH flats and HOS flats, the housing mix of the KTN and FLN NDAs has been reviewed to increase the proportion of public and subsidised housing without compromising the provision of a harmonious community. There will be approximately 60% of housing units for PRH/HOS.</p>
<p>Proposed “Nature Park” and “Agriculture” Zones for Long Valley</p>	<p>Support the proposed “Long Valley Nature Park” (“LVNP”) in the KTN NDA. However, some green groups point out that the Long Valley and Ho Sheung Heung Priority Site for Enhanced Conservation under the ‘New Nature Conservation Policy’ (NNCP) covers a much larger area than the LVNP and some areas in the</p>	<p>In response to the concern, it is recommended that a stringent approach in considering planning applications will be specified in the Explanatory Statement of the respective Layout Plan to strengthen the planning control over this zone. As for the proposed ecological compensation area, we believe that centralising all the compensatory wetland in one location will bring more ecological benefits than having small-scaled</p>

Key Issues	Public Comment	Action/ Response
	<p>western part of the priority site have been designated for residential and “Other Specified Uses (Commercial, Research and Development)” (“OU(CRD)”) uses under the RODP. They consider that the proposed 16-storey landmark building in the “CRD” site to the southwest of the LVNP would have negative impacts on the biodiversity of Long Valley. They also indicate that the area to the north of the LVNP is of a high ecological value and in the flight-path of egrets breeding and roosting at the Ho Sheung Heung egretty to the further north and they are concerned that the proposed “Agriculture” (“AGR”) zone for this area does not provide adequate protection to this ecologically sensitive area and therefore they suggest including this part of Long Valley into the LVNP. Some of them also query whether it is appropriate to use the LVNP for wetland compensation and the effectiveness of wetland enhancement in the area which already has a high ecological value.</p>	<p>and scattered compensations in the affected wetlands. The proposed LVNP can ensure continuous conservation of the existing wetland in-situ. Despite the recognition of the high ecological value of Long Valley wetland, there is still room for enhancing its ecological value. The original plan for the site adjacent to the Long Valley has been revised from 16-storey buildings to buildings of 10 storeys high as well as providing a building setback of 30 metres wide at the northeastern edge of the site and with trees planted, so as to be compatible with the environment of the LVNP. The future management and operation plans of LVNP are important components.</p>
<p>Loss of Agricultural Land and Assistance to Displaced Farmers</p>	<p>There are comments that the NDA development would uproot the existing agricultural activities and adversely affect the livelihood of the existing farmers. Some also suggest reserving land for community/hobby farming for the future and existing residents.</p>	<p>Other than the 37 ha designated for the LVNP, a total of 57 ha of land have been retained for agriculture use in KTN and FLN NDAs. About 28 ha of active agricultural land in KTN and FLN NDAs will be affected by the development proposals. Land suitable for agricultural rehabilitation / resite within and in the vicinity of the NDAs could be identified for the affected farmers who wish to continue farming.</p>
<p>Implementation</p>	<p>There are views against the</p>	<p>The implementation issue is</p>

Key Issues	Public Comment	Action/ Response
Approach	<p>Conventional New Town Approach (CNTA) for implementation of the NDAs proposal, contending that the private sector has assembled land within the NDAs with a legitimate expectation that the Government would process land exchange applications in accordance with the prevailing land policy. Many landowners and commenters also raise strong objections to land resumption by the Government as the landowners would be deprived of the opportunities to participate in the NDAs development. They allege that the CNTA will likely be subject to legal challenge if the Government sells the land resumed for private development. In implementing the NDAs proposal, the Government has been urged to allow land exchange and/or issue land exchange entitlements to the affected landowners other than compensation.</p> <p>However, some other landowners welcome the proposal to resume their land for NDAs development and some tenants on private land also prefer clearance by the Government rather than by private developers, in view of Government's established compensation and rehousing arrangements for land resumption and clearance, and in anticipation of an enhanced package to be offered.</p>	being deliberated by concerned bureaux/ departments.

Key Issues	Public Comment	Action/ Response
<p>Impacts on Existing Residents and Compensation and Rehousing/Re-provisioning</p>	<p>Many of the affected local residents object to the NDAs project as they consider that the Administration has not proposed a compensation and rehousing/reprovisioning package acceptable to them. Some strongly demand “no removal and no clearance”, requesting that the current living style of the squatters and farmers who have been living in the areas for a long time be retained. Some affected people have expressed that if development has to proceed, local rehousing with different types of housing should be provided, with exemption from the Comprehensive Means Test which is currently required by the Housing Authority. Some have stated that the compensation and rehousing package should be similar to those offered under the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link and the Liantang/Heung Yuen Wai Boundary Control Point projects. Some also request for additional local rehousing sites in FLN and PC/TKL NDAs for the affected local residents from these two NDAs. At the same time, however, some squatter residents raise concern about the delayed implementation of the NDA proposal, as they are worried that there will be no proper rehousing arrangements should the landowners take back their land.</p>	<p>It is recommended that a public housing site for each of KTN and FLN NDA will be reserved to provide units for local rehousing. Public housing units within the FL/SS new town and elsewhere could also serve the rehousing purpose. A set of reasonable compensation and rehousing arrangement is being deliberated by concerned bureaux/ departments to ensure a smooth land clearance and implementation of NDAs.</p>

Key Issues	Public Comment	Action/ Response
<p>Major Specific Comments on Individual RODPs</p>	<p>Strong objections have been raised to the proposed potential activity centres and sports ground/sports complex in the northwestern part of KTN NDA by villagers from Ma Tso Lung South Village as these proposed facilities will encroach upon their village houses.</p> <p>Development proposals recommending changes in the layout of the KTN NDA to allow developer's private residential development at the south of KTN NDA.</p> <p>Strong objections have been raised to the proposed police training facilities by villagers from Fu Tei Au Tsuen as these facilities will encroach upon their village houses and may have adverse ecological impacts on the nearby "Conservation Area" ("CA") designated for relocating the Man Kam To Road egretry.</p> <p>Objections have been raised to the zoning boundary of a residential site to the north of Ng Tung River by villagers from Sheung Shui Wa Shan as it will encroach upon some of their village houses and existing graves.</p> <p>Proposal to locate the proposed Town Park near Lung Yeuk Tau was received.</p> <p>Strong objection to the proposed SWHSTW extension and request for relocating the existing SWH STW have been received as these facilities are too close to the existing settlement of Sheung Shui Heung.</p>	<p>After examining the planning merits of these proposed amendments, some of them have been incorporated into the revised RODPs.</p>

Key Issues	Public Comment	Action/ Response
	<p>Strong objection to the proposed elevated slip road at Po Shek Wu Road has been raised by villagers of Tai Tau Leng Village and Tsung Pak Long Village on grounds of <i>fung shui</i> and environmental nuisance.</p> <p>Objections to the alignment of the proposed Fanling Bypass have been raised by villagers of Sheung Shui Wa Shan, Shek Wu San Tsuen North and Shung Him Tong.</p>	

2.3.4 Major Amendments of RODPs to address Public Comments

Subsequent to the PE3 on the RODPs, the following major amendments have been incorporated into the revised RODPs. The following sections, outline the major amendments of the RODPs with regard to the development intensity, public-private housing ratio and several specific comments on RODPs such as relocation of the proposed sports complex and outdoor recreational centre in KTN NDA and relocation of the proposed police training facilities in FLN NDA.

Development Intensity: After balancing different factors such as efficient use of infrastructure, scarce land resources, the need for more housing units, and growing public aspirations for a quality living environment, it is proposed to increase the development intensity of the NDAs through a number of measures. Most of the low density sites (i.e. “Residential Group 3” (“R3”) sites) are upzoned to medium density sites (i.e. “Residential Group 2” (“R2”) sites) and the maximum plot ratio of some of the high density residential sites in KTN and FLN NDAs has been increased from 5 to 6 on the revised RODPs.

Public-Private Housing Mix: To increase the Public Rental Housing (PRH) supply, some sites originally planned for private developments have been rezoned for PRH development, and or Home Ownership Scheme (HOS) development. For the KTN and FLN NDAs, the public housing ratio has increased from 49% under the RODPs to 60% under the revised RODPs.

Local Rehousing: In order to ensure that the eligible affected residents in FLN NDA can also have access to local rehousing near their original communities, a “PRH/HOS” site (Site D2-9) is designated in the eastern part of the FLN NDA for local rehousing, in addition to the rehousing site in KTN NDA.

Relocation of Sports Ground and Recreational Facilities: To minimise impacts on Ma Tso Lung South Village, the proposed sports ground/ sports complex is relocated to the northwestern part of the KTN NDA (Site F1-1) and the potential activity centres are relocated to Sites D1-12 and D1-13 to the north of Fung Kong Shan.

Relocation of Police Facilities: In response to local objections to the police facilities in the FLN NDA, the Police Driving and Traffic Training Complex and Weapons Training Division are shifted eastward to Site A1-8 and Site A1-11 respectively to minimise encroachment upon the village houses in Fu Tei Au Tsuen and to allow a buffer (zoned as “Agriculture”) between the “Conservation Area” and the police facilities. The Urban Tactical Training Complex will be relocated outside the NDA.

Boundary of the NDAs: Some local residents worried that they would be affected by the proposed development and/ or proposed road improvement works of the NDAs. Hence, they suggested that it is necessary to reconsider and revise the boundaries of NDAs, particularly, the boundary of the FLN NDA near the existing village of Wa Shan Tsuen. Thus, a small portion of the FLN NDA at Site B1-7 is excised from the FLN NDA.

2.3.5 Key Planning Parameters

Taking into account the received public comments during PE3 and with careful and comprehensive consideration, the RODPs have been further refined. **Table 2.4** summarises the major planning parameters of the revised RODP. The revised RODPs of KTN NDA and FLN NDA are shown in **Figure 2.1 & 2.2** with detailed development parameters shown in **Appendix 2.1**.

Table 2.4 - Major planning parameters of the Revised RODPs

	KTN NDA	FLN NDA	Total
Development Theme	Mixed Development Node	Riverside Community	-
Major Land Uses	Residential; Commercial, Research & Development; Long Valley Nature Park; Agriculture Uses; Recreational Facilities	Residential; Government Facilities	-
Total Area	450 ha	164 ha	614 ha
New Population^(a)	101,600	73,300	174,900
New Flats	35,400	25,300	60,700
New PRH Flats (% Total)	17,700 (49.9%)	14,000 (55.3%)	31,700 (52.2%)
New HOS Flats (% Total)	2,700 (7.7%)	2,200 (8.8%)	4,900 (8.1%)
New Private Flats^(b) (% Total)	15,000 (42.4%)	9,100 (35.9%)	24,100 (39.7%)
Plot Ratio	3.5 – 6	2 – 6	-
Maximum	35 storeys	35 storeys	-

	KTN NDA	FLN NDA	Total
Building Height			

Note

- (a) Excluding those resided in the indigenous villages, affected village houses/building lots under the village removal term (VRT), and existing/committed developments. If these people are included, the total population of the two NDAs would be 179,000 (105,500 in KTN and 73,500 in FLN).
- (b) Excluding the two “R4” sites.

2.3.6 Guidelines for Green Initiatives

In order to formulate a comprehensive plan for developing a sustainable, environmentally friendly, energy efficient and people oriented community in the NDA, the green initiatives, such as low emission transport system, renewable energy, built form and design, in relation to various themes for the developments and infrastructure of the NDAs have been proposed. These proposed green initiatives will be technical guidelines for future developers’ considerations and the implementation of green initiatives will be subject to separate EIA studies (if identified as DPs) and engineering findings during detail design stage.

Green initiatives for different themes including urban design and planning, green infrastructure, transport and logistics, energy, water, waste and materials that would be applicable at both district and building level are listed in the **Table 2.5** below.

Table 2.5 - Green initiatives in district and building levels

Themes	Green Initiatives
District Level	
Urban Design and Planning	Reserving breezeways /air paths, aligning streets with prevailing wind directions and providing extensive tree planting to minimise changes in micro-climate.
	Creating an attractive and connected public space network.
	Improving street design and layout
Green Infrastructure	Designation of the Long Valley Nature Park
	Integrating green space / natural feature into urban areas.
	Protecting established wildlife habitats
Transport and Logistics	Implementation of MTR Kwu Tung Station
	Promotion of walking and cycling.
Energy	Adopting district cooling system (Fresh Water Cooling Tower System using treated sewage effluent as Heat rejection) subject to further study.
	Selecting low carbon and renewable technologies.
	Improving building energy efficiency.
Water	Adopting water recycling strategies - Treated Sewage Effluent (TSE).
	Designing for sustainable water use.
	Integrating sustainable drainage systems into planning and design.

Themes		Green Initiatives	
Waste		Formulating waste reduction strategies.	
		Devising waste collection strategies.	
		Exploring community waste management.	
Materials		Selecting materials with lowest environmental impacts.	
		Selecting materials from local/regional sources.	
		Selecting materials from sustainable sources.	
		Selecting materials with high recycled content.	
Building Level			
Renewable Energy		Solar Thermal Panel	
		Photovoltaics (PV).	
Building Energy Efficiency	Passive Design	Proper building orientation.	
		Minimizing the overshadowing of buildings and maximising natural lighting	
		Green Roof Vertical Greening	
		High performance facade. Vertical Shading.	
		High thermal insulation performance glass. Use of automated blinds.	
		Optimal window to wall ratio.	
		Thermal mass.	
		Improved air-tightness.	
	Active Design	Energy Efficient Lighting System. High efficiency lighting fixtures. Lighting control.	
		Energy efficient ventilation system. Hybrid ventilation. Demand control ventilation.	
		Energy efficient air-conditioning system. Heat recovery. Free cooling. Equipment with Variable Speed Drives (VSDs).	
		High efficiency lifts and escalators. Variable voltage variable frequency (VVVF) drives. Group selective collective control.	
		Behavioural Change	Higher indoor set-point temperature.
			High efficiency electrical appliances.
	Water Efficient Fixtures		Low volume/ dual flush water closets.
			Low flow urinal with sensor control.
		Automatic control of taps and toilet flushing faucets with infrared sensors.	
		Water Efficient Irrigation System.	

Themes	Green Initiatives
Waste Reduction (Operational Phase)	Recycling Bins System (for paper, metals, plastics, fluorescent lamps, glass, toner cartridges, rechargeable battery, scrap electrical and electronic appliances, etc.).

The greatest environmental benefits will come from the carbon reduction by improvement of Building Energy Efficiency, followed by Energy Infrastructure (District Cooling System) and Renewable Energy (Solar Hot Water System and Photovoltaic). The actual carbon savings achievement by those initiatives related to Building Energy Efficiency and Renewable Energy are subject to the extent of application by the building developers / owners, as well as the environmental awareness of the future occupants.

2.3.7 Outline Development Plan Options

In the outset, the drawing up of the PODP avoided and minimised direct encroachment upon ecologically sensitive areas, including the Long Valley (predominant part), major rivers (including Ng Tung River, Shek Sheung River and Sheung Yue River), natural streamcourses (including Ma Tso Lung Stream upper and middle section) and hilly slopes, from proposed urban type development as far as practicable. Other ecologically less sensitive areas, including existing rural developed areas, agricultural land and the areas on the two sides of the major rivers, were included in the proposed development areas, as the NDAs developments are to optimise on the transport and infrastructure provision and to provide land to meet medium and long term needs for housing and economic development, in accordance with the strategic planning intentions stated in HK2030 Planning Vision and Strategy (HK2030). HK2030 (para. 13.4.44 and 45) states that “to ensure a more balanced development pattern and provide a choice of living other than the high-density urban mode, it is recommended that low to medium-density nodal clusters should be developed in the New Territories around rail stations. This proposal could also help to optimise use of rail and other infrastructure, provide housing land (for public and private housing), upgrade the rural environment, revive the rural economy, create boundary/gateway towns, and introduce employment. New development areas should be comprehensively planned for a mixture of land uses, emphasizing both the creation of a quality living/working space as well as resident/user convenience. Such development opportunities have been identified in previous planning studies including the Territorial Development Strategy Review and the consequential planning and engineering studies for North East New Territories and North West New Territories.”

Any ecological impacts, which are not expected to be significant, on the proposed development areas, would be reduced and mitigated with appropriate measures. The PODP was prepared in accordance with a comprehensive planning and urban design framework, with a set of well-

defined planning principles, one of which was to devising layout respecting ecology and environment. Suitable zonings (e.g. open space along the major rivers) and mitigation measures were proposed and the residual ecological impacts, if any, were environmentally acceptable.

The PODPs for NDAs proposed in the early stage of this Study is evolved to the Revised RODP presented in this EIA taking into consideration of the public opinions in the stages of public engagement as mentioned in Section 2.3.3 as well as the findings of this Study. Major differences between PODPs and RODPs are presented in the following sections.

2.3.7.1 Development Intensity and Public-Private Housing Ratio

PODP

In the early stage of this Study, the public was expecting a medium to low density development with appropriate development intensity that would not affect the beautiful natural scenery. In view of the above, special consideration was given to emphasis on the strategic role that the NDAs could provide a quality living environment.

Revised RODP

In response to public requests in increasing the development intensity of some developments and to provide more housing land in Stage 2 and 3 Public Engagement, it is proposed that to increase the plot ratio as well as the number of flat of the residential sites. Taking into account the increasing in demand for the public housing, the proportion of public and subsidised housing are increased without compromising the building of a harmonious community.

The revised RODP may cause an increase in air quality and noise impact on the resident. Mitigation measures are required to reduce the impact.

2.3.7.2 Long Valley Proposal

PODP

The area of Long Valley in the both side of Sheung Yue River was proposed to as Comprehensive Development and Nature Conservation Enhancement Area” (“CDNCEA”). The planning intention of OU(CDNCEA) was to conserve and enhance the ecological value and functions of this zone, including wetlands, fish ponds and wet agricultural land. Within the area designated as ‘Core Area of Long valley’ development would not be permitted except that required for purposes of nature conservation. Within the remainder of the zone the intention was to conserve and enhance the existing fish ponds and/or the remaining wetland. Development may be permitted on application to the Town Planning Board. A plot ratio of 0.2 is suggested over the whole zone to provide adequate financial incentive.

Revised RODP

Some comments relating to the proposed “Comprehensive Development and Nature Conservation Enhancement Area” (“CDNCEA”) zone for Long Valley on the KTN PODP were received in the Public Engagements.

The proposed “CDNCEA” zone for Long Valley was not supported by either the villagers or Green Groups as they considered that it may fail to safeguard conservation of the ecological value of the area and on the other hand, may freeze landowners’ development rights.

Whilst current agricultural practices in Long Valley are largely beneficial to wildlife (especially where Management Agreements under the NNCP are in place), there is a consensus amongst stakeholders that the agricultural zoning does not provide a sustainable means for long term protection and management.

Long Valley contains a habitat type (mainly wet agriculture) which is important for a number of wetland species but not covered in any protected areas in Hong Kong currently. In order to provide a better conservation to the important wetland habitat, and to encourage active management of these habitats for the benefit of wildlife, and to mitigate the loss of wetland under the NDA project, the core area with significant ecological value in Long Valley is proposed to zone “Other Specified Uses (Nature Park)” (OU(NP)) and implemented as a Nature Park. This zone would include the important areas of wet agriculture, mitigation wetlands, marsh and shallow ponds, as well as areas currently managed by Hong Kong Bird Watching Society (HKBWS) and the Conservancy Association (CA) under a management agreement under the New Nature Conservation Policy. Human activities and visitation within this zone would be controlled.

The introduction of “OU(NP)” in Long Valley would bring a number of benefits for the natural environment and the public. It would not only ensure conservation of the important wetland habitats, but also complement the existing protected wetlands at Hong Kong Wetland Park and Mai Po Nature Reserve in protecting a range of wetland habitats in Hong Kong with proper land use planning.

The remaining portion of the Long Valley area will predominantly remain as “Agriculture” zone where agricultural activities and practice can continue. It will provide adequate planning control under the Town Planning Ordinance (TPO) against unauthorised activities in the remaining portion of the Long Valley area. More stringent and proper administrative planning control will also be included in the layout plan prepared by the Planning Department.

2.3.7.3 Development along Northern Bank of Sheung Yue River

PODP

The developments proposed along the southern portion of Sheung Yue River were contiguous to existing developed areas and near the

proposed Kwu Tung railway station; accordingly it would be more cost effective in the provision of infrastructure which may be shared between the NDA and existing communities. In addition, the proposed developments could provide additional employment opportunities for new town dwellers and existing local residents.

Only low density and low rise developments were proposed and the developments avoided direct encroachment upon the flight-line between the Ho Sheung Heung egret and the Sheung Yue River and Long Valley, hence minimising fragmentation impacts on breeding ardeids.

Revised RODP

In order to further reduce the potential ecological impact, different height bands are designated within the “OU(C,R&D)” zone along Sheung Yue River to establish a stepped building height profile increasing from the riverside of Sheung Yue River towards Fanling Highway and the NDA Town Centre. In particular, developments fronting the riverside are subject to a maximum building height of 7 storeys while those at the rear are subject to a maximum building height of 10 storeys.

Being located in close proximity to the proposed Long Valley Nature Park, careful consideration should be given to the building disposition and façade treatment to ensure there will not be any possible adverse impact to the nearby nature reserve.

2.3.7.4 SWHSTW Extension

PODP

Both the area to the north of the existing SWHSTW and the open storage area to the west of the existing Man Kam To Road were reserved for the further expansion of SWHSTW.

Revised RODP

Local residents expressed their concern on the environmental and odour impact caused by the STW Extension. Therefore the area for the further expansion of SWHSTW is minimised and only a portion of land to the north of the existing SWHSTW (Site A2-3) is proposed for the extension. This arrangement would reduce the odour impact and have environmental benefit to adjacent sensitive receivers.

2.3.7.5 Impacts on Existing Residents

PODP

The developable areas of NDAs encroach upon some of the existing villages.

Revised RODP

Some local residents worried that they would be affected by the proposed development and/ or proposed road improvement works of the NDAs. Hence, the developable areas of NDAs are fine tuned to minimise the

encroachment on the villages, including Ma Tso Lung Tsuen in KTN, Fu Tei Au Tsuen and Sheung Shui Wa Shan in FLN.

2.4 Key Infrastructure

In order to support the future development and population inside the NDAs, associated infrastructure will be required. Some of the key infrastructure elements are also the Schedule 2 Designated Projects, which include the following:

KTN NDA

- San Tin Highway / Fanling Highway Kwu Tung Section Widening (between San Tin Interchange and Po Shek Wu Interchange) (Major Improvement) (DP1)
- Castle Peak Road Diversion (Major Improvement) (DP2)
- KTN NDA Road P1 and P2 (New Road) and associated new Kwu Tung Interchange (New Road) and Pak Shek Au Interchange Improvement (Major Improvement) (DP 3)
- KTN NDA Road D1 to D5 (New Road) (DP 4)
- New SPSs in KTN NDA (DP5)
- Proposed railway station and associated facilities in KTN NDA (To be conducted under separate study) (DP6)
- Utilization of TSE from SWHSTW (DP 7)

FLN NDA

- Utilization of TSE from SWHSTW (DP 7)
- Po Shek Wu Interchange Improvement (Major Improvement) (DP 8)
- Fanling Bypass Western Section (New Road) (DP 9)
- Fanling Bypass Eastern Section (New Road) (DP10)
- Shek Wu Hui Sewage Treatment Works - Further Expansion at FLN NDA (DP 11)
- Reprovision of temporary wholesale market in FLN NDA (DP12)
- New SPSs in FLN NDA (DP13)

2.4.1 Consideration of Feasible Alternative Infrastructure Options

2.4.1.1 San Tin Highway / Fanling Highway Kwu Tung Section Widening (between San Tin Interchange and Po Shek Wu Interchange) (Major Improvement) (DP1) and Castle Peak Road Diversion (Major Improvement) (DP2)

The existing San Tin Highway/ Fanling Highway between San Tin Interchange and Po Shek Wu Interchange is anticipated to reach its design capacity by 2029. In order to sustain the future traffic growth from

the development in Northern New Territories, it is proposed to widen the concerned portion from dual 3-lane to dual 4-lane configuration. The adjacent Castle Peak Road should also be diverted due to the widening of San Ting Highway/ Fanling Highway.

Site Constraints

The space on the southern side of this section of expressway is limited by some existing developments. Therefore along the section next to Europa Garden, asymmetrical widening approach will be adopted to avoid the building lots, i.e. widening towards the northern side of the expressway and shifting of central reserve is required.

There are many underground utilities along the existing Castle Peak Road (CPR), including the western trunk sewer, a 132kV power cable and a section of medium pressure gas main. Local diversion will be required if these utilities fall inside the expressway limit after widening. There is also a 600mm diameter high pressure gas main runs along Fanling Highway. According to the information provided by the Hong Kong & China Gas Company (HKGC), the subject section of pipe mostly runs along the Kwu Tung Road (KTR) in Kwu Tung South, which is outside the proposed widening works area. Further investigation and coordination with HKGC would be carried out on the locally affected section. Diversion of this high pressure gas main would be avoided or minimised as far as possible since it would be time consuming.

The space on the northern side is the proposed Kwu Tung North NDA and there is more flexibility on the widened Fanling Highway and the diverted Castle Peak Road alignment, subject to the planning and land use impact.

The proposed widening works will also inevitably involve modification or reconstruction works to the structures supporting this expressway and the bridges across it. As an initial assessment, these are technically feasible.

There are existing and planned developments on both sides of the Fanling Highway. Noise mitigation measures, including amenity as buffer zone, noise barrier or enclosure and noise reducing road surfacing have been recommended to mitigate the noise impact and sufficient space has been allowed in the planning and highway design. The detail of the noise assessment is presented separately in Section 4 of this EIA report.

To balance different considerations between highway design, land use planning, historic building conservation and tree preservation, three widening schemes have been studied and are presented below:

Scheme 1

In this widening scheme, it is proposed to transplant the 5 nos. Old and Valuable Trees (OVTs). The Fanling Highway is widened to the northern side by about 14m. The central reserve of the Fanling Highway is relocated accordingly.

The CPR and the associated utilities is diverted northward beside the widened Fanling Highway. Near Yin Kong Village, the CPR runs below the proposed elevated Kwu Tung Interchange to avoid encroachment upon the Enchi Lodge and the Earth God Shrine which are graded historic buildings.

A district distributor road to KTN NDA branches off from the CPR near the existing Kwu Tung Rural Committee House, providing access to the town centre.

The supports of the existing vehicular bridge between CPR and KTR are encroached by the Fanling Highway widening.

The benefit and dis-benefit of Scheme 1 are listed below:

Benefits	Dis-benefits
<p>The most straightforward road widening scheme in term of highway alignment design.</p> <p>Minimal land requirement and hence allows more efficient planning of the KTN NDA.</p>	<p>The scheme involves the tree transplant of the 5 nos. OVTs. The survival rate after transplant is anticipated to be low. The loss of 5 nos. OVTs is undesirable in terms of conservation.</p> <p>The northern lanes are closer to the existing sensitive receivers to the southern area of Fanling highway. This will generate a relatively higher air quality and noise impact on these receivers if no mitigation measure is imposed.</p>

Scheme 2

In this widening scheme, it is proposed to maintain the 5 nos. OVTs at their current locations. The trees are retained by shifting the Tai Po direction carriageway further north so that the trees are kept within the future median barrier. Basically the original dual 3-lane width will become the Yuen Long bound dual 4-lane carriageway and the other 4 lanes shifted to the north side of the trees.

This arrangement will create a very wide central reserve along this section (maximum 27m wide and about 20,500 m² in area) and vast area of developable land (more than 1.5km long) in KTN NDA is taken off. This large central median area can be a landscaped area. Public access to this landscaped area between the expressways is not suggested. The diverted Castle Peak Road is aligned to avoid encroachment upon the graded historic buildings of Enchi Lodge and the Earth God Shrine.

The benefit and dis-benefit of Scheme 2 are listed below:

Benefits	Dis-benefits
<p>Preserving all the OVTs in the vicinity.</p> <p>Highway performance is standard, except with a wider central reserve.</p> <p>The graded historic buildings are</p>	<p>Largest land requirement and the separated divider area between split sections cannot be utilised except as amenity.</p>

<p>maintained in this scheme.</p> <p>The northern lanes are diverted northern and far away from the existing sensitive receivers to the southern area of Fanling highway. This will generate a relatively lower air quality and noise impact on these receivers.</p>	
--	--

Scheme 3

In this widening scheme, the idea of splitting the traffic lanes of the Tai Po bound carriageway to avoid the OVTs and graded historic buildings is explored. This arrangement takes up less land area from the KTN NDA. The central reserve is about 9,700 m² in area.

However splitting the carriageway into 2+2 will restrict the traffic movements and choice of routing on the expressway. For instance, the capacity for weaving traffic along this section (diverging from Pak Shek Au and merging to new KTN interchange) will be limited within the two nearside lanes only. The other two off side lanes will bypass the KTN interchange in this direction. Directional signs must be clear and well placed to avoid causing confusion to road users.

Moreover, the subject expressway section will require more land such that both the split-up carriageway sections can have hard shoulders.

The benefits and dis-benefits of Scheme 3 are listed below:

Benefit	Dis-benefit
<p>This scheme takes up less land area from the KTN NDA.</p> <p>Avoid the OVTs and the graded historic buildings.</p>	<p>Greatly reduce the performance and possibly safety of the expressway section.</p> <p>Two of the northern lanes are closer to the existing sensitive receivers to the southern area of Fanling highway. This will generate a relatively higher air quality and noise impact on these receivers if no mitigation measure is imposed.</p>

Options Evaluation

The selection of widening scheme is based on the historic building conservation and OVT preservation.

Scheme (1), in the worst case, will fell 5 nos. OVTs. Preliminarily the anticipated survival rate of the OVTs after the tree transplant is low. This is undesirable and not consistent with government's policy on tree preservation.

Schemes (3) is ruled out, because of their undesirable highway performance.

In the current context, widening scheme (2) is recommended. All the OVTs are preserved at the central reserve and the graded historic buildings of Enchi Lodge and the Earth God Shrine could be avoided.

2.4.1.2 KTN NDA Road P1 and P2 (New Road) and associated new Kwu Tung Interchange (New Road) and Pak Shek Au Interchange Improvement (Major Improvement) (DP 3)

P1 and P2 Road

The western primary distributor road (Road P1) will branch off from the supplementary interchange near Pak Shek Au. It will climb uphill to the north and cross over the existing underground LMC Spurline and the underground Dongjiang water mains. The alignment has been carefully selected to minimise the potential environmental impact and maximise the land area for housing development to the east, while respecting the recognised burial grounds to the west and avoiding impacts to the existing Dongjiang water mains. Given the constraints, alternative alignments are considered not feasible and only a single option is proposed. Key environmental performance of the P1 road is summarised below:

Aspect	Phase	Key Sensitive Receivers	Environmental Performance
Noise	Construction	Scattered village house in Chau Tau Tsuen.	With the use of noise barrier and enclosure on the Powered Mechanical Equipment, construction noise impact is not anticipated.
	Operational	Both existing and planned receivers adjacent to the roads.	With the use of noise barriers and enclosures, the traffic noise impact at the sensitive receivers will be acceptable.
Air Quality	Construction	Temporary structures and residential premises.	With watering on site once in hour, dust impact is not anticipated.
	Operational	Both existing and planned receivers adjacent to the roads.	Given the buffer distance between the road and receivers, air quality impact is not anticipated.

The primary distributor then ends at a signalised junction near the former Ma Tso Lung Landfill, where traffic will either continue into the NDA or to the LMC Loop.

The eastern dual 2-lane elevated primary distributor road (Road P2) branches off from the proposed Kwu Tung Interchange near Yin Kong, crossing Sheung Yue River and joins another proposed at-grade roundabout, which will become a major junction with the internal roads

south of the Kwu Tung Station. This will be a viaduct section. The road will then continue north, heading into the valley between Tai Shek Mo and Fung Kong Shan. To minimise air and noise impact to nearby sensitive receivers, pedestrian pathway is designed on the east to act as a buffer. The primary distributor ends at another at-grade roundabout, which will become a major junction with the internal roads north of the Kwu Tung Station (Road D3).

As stated in Section 2.3.2 that KTN is a rail-based transit-oriented development, most of population in KTN will reside near the railway station. This will encourage residents to use mass transport and reduce the demand for road traffic. A comprehensive pedestrian and cycling track networks connecting major activity nodes, recreational facilities, green spaces and railway station is planned. Therefore, it is considered that the Road P2 should be away from the major residential area to avoid affecting the pedestrian and cycling track connectivity in core centre of KTN and also the minimizing the air and noise impact to the residential area.

Besides the core of KTN, the Road P2 should also avoid encroaching upon the area with high ecological value including Long Valley and Ho Sheung Heung *fung shui* wood.

Taking into account the consideration of the location of the proposed Kwu Tung Interchange, as is described in this Section below, the planning concept for KTN, and the avoidance of the areas of high ecological value; the Road P2 has been designed with an alignment to the east of the core of KTN and to the west of Long Valley and Ho Shueng Heung *fung shui* wood.

Proposed Kwu Tung Interchange

A new grade-separated Interchange, namely Kwu Tung Interchange is proposed as the major access from the Fanling Highway to the KTN NDA. Along the Fanling Highway section to the south of the NDA, there are many constraints for a new interchange or highway improvement works. Immediately south of the Fanling Highway and on the west side of the Sheung Yue River, there are existing residential buildings (Europa Garden Phase 1 and Phase 2). Due to the limited space, it is not feasible to put the interchange along the section next to the development. From highway design point of view, the new interchange shall be located at minimum 1km distance from other major interchanges. To the west of Europa Garden, there are the existing Park Shek Au Interchange and San Tin Interchange. It is not desirable to add another interchange along the side of the expressway, as it will be too close to the existing ones. Moreover, the placement of merging and diverging slip roads will be extremely difficult as the minimum weaving length cannot be achieved by a simple grade-separated roundabout design. On the east of Sheung Yue River, there is the Long Valley, which is an ecological sensitive area. Since this is an extremely environmentally sensitive spot, the interchange

shall be planned such that no road is going through or in close proximity of Long Valley.

Having considered the constraints, alternative locations are considered not feasible and it is proposed to locate the major interchange at about 400m east of the Sheung Yue River, avoiding the Long Valley. It will be an elevated roundabout with slip roads connecting Fanling Highway in all direction movements. It is close to but does not affect the planned CDA zones on the two sides of the expressway. Buildings including the St. Paul's House of Prayer on the two sides of this expressway section will not be affected. It is also at around 200m distance from the recognised village, Yin Kong.

Proposed Pak Shek Au Interchange

A supplementary interchange is proposed for the KTN NDA for better accessibility and also to allow for better connection for future development in Lok Ma Chau Loop (LMC Loop). Since a new major interchange is proposed at the east of the NDA, the other interchange should simply be supporting on the other end of the NDA. Due to the constraints set by the existing slip roads, in particular the newly constructed diverging slip road at San Tin interchange for outbound cross-boundary traffic by-passing the roundabout, the opportunities goes to improvement works at the Pak Shek Au Interchange. Two schemes have been considered.

Scheme 1

In this scheme, an off line at-grade roundabout proposed to connect the Pak Shek Au Interchange will be maintained. Its connection with the service roads (CPR and KTR) will also remain. The slip road for traffic from Kwu Tung to Tai Po will be diverted to connect with the offline interchange, facilitating the additional slips for diverging traffic from Yuen Long. The Pak Shek Au Interchange will connect with the diverted CPR through an elevated single 2-lane carriageway above these slip roads, such that the through traffic on CPR can be maintained. For the slip road for NDA traffic to Yuen Long, the merging point needs to go further west to avoid weaving with the traffic using the San Tin Interchange. Alternatively this slip road can also be connected to KTR but this will hamper the function of its linkage towards Yuen Long. **Table 2.6** summarises the benefits and disbenefits of Scheme 1 for Pak Shek Au Interchange and San Tin Interchange.

Table 2.6 - benefits and disbenefits of Scheme 1 for Pak Shek Au Interchange and San Tin Interchange

Benefits	Disbenefits
Off line at-grade roundabout proposed to connect the Pak Shek Au Interchange will be maintained. Its connection with the service roads (CPR and KTR) will also remain	This will hamper the function of this linkage towards Yuen Long

The environmental performance of Scheme 1 is summarised below.

Aspect	Phase	Key Sensitive Receivers	Environmental Performance
Noise	Construction	Village house	With the use of noise barrier and enclosure on the PME, construction noise impact is not anticipated
	Operational	Both existing and planned receivers adjacent to the roads	With the use of noise barriers, the traffic noise impact at the sensitive receivers will be acceptable
Air Quality	Construction	Temporary structures and residential premises	With watering on site once in hour, dust impact is not anticipated.
	Operational	Both existing and planned receivers adjacent to the roads	Given the buffer distance between the road and receivers, air quality impact is not anticipated.

Scheme 2

Instead of merging at the location of the existing abutment of San Tin Interchange, the proposed on-slip road from Pak Shek Au Interchange to Yuen Long direction merges at the far side of Fanling Highway westbound. Solid-cum-broken line is proposed between the on-slip road from Pak Shek Au Interchange and the off-slip road to San Tin Interchange. The merging traffic from Pak Shek Au Interchange on the 4th lane is not allowed to cut to the 3rd lane, until after passing San Tin Interchange. The main traffic on the 3rd lane can cut to the 4th lane if desirable. With this arrangement, weaving between Pak Shek Au Interchange and San Tin Interchange is avoided. The solid-cum-broken line zone also provides a region for the merging traffic to accelerate to match with the traffic speed of main line traffic.

The key environmental benefit of this arrangement is that it does not involve demolition of the San Tin roundabout. Possible disturbance to the cross-boundary traffic is also avoided. The scheme also has higher cost-effectiveness as the length of viaduct and the land requirement area is much reduced. It also reduces the footprint spanning over the existing LMC Spurline.

The slight downside of this arrangement is that it will involve merging at the far side, at which slower vehicles may encounter difficulty in cutting back to slow lane. However, this situation is also commonly encountered in many trunk roads merging in Hong Kong and is practically acceptable. The relatively long junction separation between San Tin Interchange and the next junction (Fairview Park Roundabout) can ease the situation.

The road profile of the slip road is modified to suit the alternative scheme. Instead of spanning over the slip road in the form of viaduct, a 200m-long portion of Castle Peak Road will go beneath the slip roads in the form of underpass. The rearrangement of the on-slip road by NENT NDAs at San Tin Interchange opens up new opportunities of the San Tin Interchange Connection for LMC Loop. The environmental performance is similar to Scheme 1.

Scheme 2 provides more flexibility for the implementation timetables between LMC Loop and KTN / FLN NDAs. It allows the San Tin Interchange Connection for LMC Loop to be less dependent on the Pak Shek Au Interchange Improvement for KTN and FLN NDAs. It therefore provides much clearer demarcation of the construction works area and better independency of the implementation timetables. **Table 2.6a** summarises the benefits and disbenefits of Scheme 2 for Pak Shek Au Interchange and San Tin Interchange.

Table 2.6a - Benefits and Dis-benefits of Scheme 2 for Pak Shek Au Interchange and San Tin Interchange

Benefits	Dis-benefits
No need to temporarily demolish San Tin roundabout and hence less disturbance to cross-boundary traffic during construction	Fast-lane merging of on-slip road from Pak Shek Au Interchange
More clear construction demarcation between LMC Loop and KTN NDA	Entry arm to San Tin Roundabout to be refined with right-turning slip road from LMC Road
More programme-independency between LMC Loop and KTN NDA	
Avoid long span across LMC Spurline and box culvert	
Reduce detour, in particular the LMC Loop traffic to Yuen Long direction	
Less land requirement	
Less cost	

Option Evaluation

Based on above consideration, Scheme 2 is selected.

2.4.1.3 Utilization of Treated Sewage Effluent from SWHSTW (DP7)

The utilization of treated sewage effluent will have environmental benefits in reducing the sewage pollution loads into Deep Bay. The major facilities of the utilization of TSE including the treatment facilities for effluent reuse in SWHSTW, a flushing water service reservoir in KTN, and flushing water service reservoir in FLN and the associated pipeworks.

Treatment Facilities for Effluent Reuse

As the source of sewage effluent is from SWHSTW, the treatment facilities for effluent reuse are proposed in SWHSTW for maximizing the energy efficiency.

Flushing Water Service Reservoir in KTN

The flushing water service reservoir in KTN is proposed in KTN G1-4 to achieve the required water level and also avoidance of encroaching upon the permitted burial ground.

Flushing Water Service Reservoir in FLN

The flushing water service reservoir in FLN is proposed in FLN D4-1 to achieve the required water level and also avoidance of encroaching upon the permitted burial ground. In addition, the proposed site could be accessed via the existing access road of Tong Hang Fresh Water Service Reservoir. Therefore new site access to the proposed service reservoir is not required and the potential environmental impact induced by construction of new access road could be avoided.

2.4.1.4 Po Shek Wu Interchange Improvement (Major Improvement) (DP8)

In the previous NENT Study (Agreement No. CE64/96 Planning and Development Study on North East New Territories), Fanling Bypass starts from an interchange near Long Valley on the west, travelling north-eastwards between Ho Sheung Heung Village and Sheung Yue River. It then crosses Ng Tung River near Fu Tei Au and interchange with Man Kam To Road, which is the main access for cross-boundary traffic using Man Kam To Control Point. The most obvious change of the current proposal is that it does not include the section through the area of Ho Sheung Heung and Long Valley, and instead it links up with the proposed improvement at Po Shek Wu Interchange with Fanling Highway. This alternative routing is developed mainly to respect the constraints imposed by ecology in the areas of Long Valley and Ho Sheung Heung. The latest findings from the ecological surveys show that an elevated crossing over the Ng Tung River, near Ho Sheung Heung will cause impact to the bird flight-line. Other constraints of crossing over Ng Tung River include the existing MTRC East Rail, Dongjiang watermains, 400kV cable pylons, and Ng Tung River itself as a designated main drainage watercourse. Underground options of this road crossing have been explored and it is concluded in the Technical Assessment that the Fanling Bypass Section through Long Valley is ecologically infeasible. Hence traffic will rely on Po Shek Wu Road for access to the Fanling Highway. This raises the need for the Po Shek Wu Interchange Improvement to enhance its traffic capacity to sustain the traffic growth in North District.

Po Shek Wu Interchange is currently exceeding its junction capacity. In order to cater for the traffic flow from the FLN NDA, improvement work, including realignment of Po Shek Wu Road and the construction of an elevated southbound right-turning slip road to bypass the interchange, is

proposed. Five alternative schemes have been considered and details are summarised below.

Scheme 1

Scheme 1 is to shift and rearrange the existing Po Shek Wu Interchange. The existing interchange is a grade-separated interchange consisting slip roads and an at-grade roundabout directly underneath the expressway. It is proposed to replace this roundabout by a new roundabout at the junction of Po Shek Wu Road and Choi Yuen Road, which is around 300m north of the existing one.

Traffic to/from the expressway to Po Shek Wu Road will be diverted to a set of proposed slip roads near Tsung Pak Long. These slip roads will converge into viaducts going north-south direction and over an area between the two recognised villages: Tsung Pak Long and Tai Tau Leng. This area is a green belt zone. The lands are all private agricultural land.

From the preliminary alignment design the highest road level is +19mPD, that is about 15m above existing ground level. The viaducts land in front of the proposed at-grade roundabout at Choi Yuen Road.

Two flyovers are proposed for the main flow traffic along Po Shek Wu Road to bypass the roundabout, as it is anticipated that the main stream traffic may overload the roundabout capacity at peak hours. The flyover has avoided the encroachment into the proposed public rental housing site on Choi Yuen Road.

Scheme 2A

In this improvement scheme, a single-lane elevated slip road is proposed for the right turning traffic (Po Shek Wu Road southbound to Fanling Highway westbound) to bypass the existing Po Shek Wu Interchange. It hence reduces the conflicting traffic at the Po Shek Wu Interchange.

On the eastern side of the slip road, the existing cycle track, footpath and slope will be retained. There is no encroachment into the proposed public rental housing site during the construction or operational stage.

On the western side, the existing Po Shek Wu Road and footpath is shifted westward to provide space for the slip road. The Po Shek Wu Road / Choi Yuen Road junction would be modified to tie in with the shifted Po Shek Wu Road. The existing bridge across East Rail is a beam-slab structure and can be widened by stitching for accommodating the shifted road.

Beyond Po Shek Wu Road / Choi Yuen Road junction, the slip road is constrained by the Tai Tau Leng village at the west and Choi Po Court at the east. Large mature trees are also observed between Po Shek Wu Road and Choi Po Court. In order to minimise the impact on both sides, the slip road is proposed to go above the existing Po Shek Wu Road, at a level of +20mPD. The central reserve of Po Shek Wu Road will be widened to accommodate the column for the slip road.

The slip road will then span across the existing Po Shek Wu Interchange and Fanling Highway at a level of +25mPD, and then goes down to join the westbound traffic on Fanling Highway near Tsung Pak Long. A 3-level highway arrangement will be formed at Po Shek Wu Interchange.

Scheme 2B

This Improvement Scheme (2B) is a variation of the Improvement Scheme (2A). Similarly, a single-lane elevated slip road is proposed for the right turning traffic (Po Shek Wu Road southbound to Fanling Highway westbound) to bypass the existing Po Shek Wu Interchange. However instead of running on the corridor between Tai Tau Leng and Choi Po Court, this scheme explores the feasibility of a single-lane elevated slip road between Tai Tau Leng and Tsung Pak Long.

In this scheme (2B), the slip road alignment will have to encroach into the existing slope between Po Shek Wu Road and the proposed public rental housing site. It is infeasible to utilise the area of the existing Po Shek Wu southbound lane for the slip road climbing and shift the existing Po Shek Wu Road westward.

The slip road will climb up to sufficient headroom at about +19.1mPD to cross Po Shek Wu Road and the drainage channel near Tai Tau Leng. The “Village Type Development” zone of the two recognised villages, Tai Tau Leng & Tsung Pak Long, in the Outline Zoning Plan is avoided. The slip road will then turn left into the green belt zone between the villages. From the preliminary alignment design the highest road level is +16.1mPD, that is about 12m above the existing ground level.

The slip road will then span across the existing Fanling Highway at a level of +16mPD, and then turns right and goes down to join the westbound traffic on Fanling Highway near Tsung Pak Long.

The Improvement Scheme (2B) has a similar traffic arrangement to Improvement Scheme (2A), despite the proposed slip road is slightly longer in length. Hence its traffic capacity is anticipated to be similar to Improvement Scheme (2A).

Scheme 3

The scheme is a variation of scheme (1). In view of the strong objection from Tai Tau Leng and Tsung Pak Long villagers on any slip roads across the green belt area between the two villages, the scheme of slip road above the drainage channel between Long Valley and Tsung Pak Long has been explored.

In this scheme, the slip roads from the junction Po Shek Wu Road / Po Wan Road bypass the roundabout and then run above the existing Choi Yuen Road at a level of around +18.5mPD. Portal structure and sufficient headroom above Choi Yuen Road are allowed in this road section. Other traffic from / to the roundabout makes use of the Choi Yuen Road for access to the Fanling Highway. The Choi Yuen Road traffic climb up gradually from +11.0mPD to +18.5mPD and merge with

the bypass slip road near the Tsung Pak Long and Tai Tau Ling Floodwater Pumping Station, and vice versa in the other direction. Further south, the slip roads then run above the drainage channel between Long Valley and Tsung Pak Long and connect to the Fanling Highway.

Scheme 4

This option includes flyovers on both So Kwun Po and Po Shek Wu roundabouts for right turn traffic and rearrangement of slip roads and marking to avoid weaving traffic along the subject expressway section.

In this scheme, a 2-lane slip road is proposed to pick up traffic from Ma Sik Road. It will be elevated over Jockey Club Road, the edge of North District Park, San Wan Road and the East Rail, and then climb over the elevated roundabout of So Kwun Po Interchange at about +27mPD. An elevated structure over a strip of land on the edge of North District Park will definitely cause land issues and visual impacts.

The 2-lane slip road will join with the slip road for traffic leaving the roundabout to San Tin and continue elevated at a high level to go over the elevated Pak Wo Road. Traffic along this road will then bypass the Po Shek Wu Interchange and join Fanling Highway directly. Consideration has been made to fit this bypass to go underneath the existing bridge of Pak Wo Road to avoid a high rise viaduct along the expressway. However a 600mm diameter high pressure gas main is identified along the footpath next to the San Tin bound expressway. If the footpath is converted into highway, diversion of this main has to be done and it would be very time consuming.

Furthermore, there will be a flyover on Po Shek Wu roundabout for right turn traffic. The arrangement of the slip road will be similar to Improvement Scheme (2A).

Options Evaluation

Improvement Scheme (1) is a more comprehensive scheme in diverting traffic along Po Shek Wu Road and improving the weaving on Fanling Highway between Po Shek Wu Interchange and So Kwun Po Interchange. It would reduce the air and noise impact along Po Shek Wu Road near Choi Po Court, but slightly increase the impact to Tai Tau Leng and Tsung Pak Long. The scheme is considered to have more visual impact, planning impact and higher construction cost. It requires private land resumption on the green belt area between Tai Tau Leng and Tsung Pak Long. The Improvement Scheme (1) was presented to the public during the Stage Two Public Engagement. The villagers of Tai Tau Leng and Tsung Pak Long expressed very strong objection to the proposed slip roads between Tai Tau Leng and Tsung Pak Long. They raised concerns on the environmental impacts of the slip roads, including air, noise, visual and *fung shui* issues. There are also concerns on the possible constraints by the slip road on village expansion.

Improvement Scheme (2A) is sufficient in diverting traffic along Po Shek Wu Road from FLN NDA to Fanling Highway. Nevertheless, the improvement scheme does not provide solution for the existing short weaving distance problem between Po Shek Wu Interchange and So Kwun Po Interchange. The current air and noise impact along Po Shek Wu Road near Choi Po Court remains. But noise and visual impact to Choi Po Court can be carefully mitigated by appropriate environmental mitigation measures. The scheme is considered to have less visual impact, planning impact and land requirement as well as lower construction cost.

Improvement Scheme (2B) has similar traffic performance as Improvement Scheme (2A), but the triple reverse horizontal curve is unfavourable in term of traffic safety and comfort. The environmental, visual, planning and land requirement impact is in-between Improvement Schemes (1) and (2A). It has partially reduced the impact to Tai Tau Leng and Tsung Pak Long, but strong objection is still anticipated.

Improvement scheme (3) has several deficiencies compared to schemes (1), (2A) and (2B). The Po Shek Wu Interchange slip roads are now shifted to the west and become too close to the proposed Kwu Tung Interchange, of which the location is also heavily constrained. There is concern on insufficient weaving distance between the two interchanges. Thousands of young trees are present along the drainage channel between Tsung Pak Long and Long Valley and will be affected by the proposed slip roads. Tree transplant of these large numbers of trees are not environmentally desirable. There are scatters living along the channels and the air and noise impact to the nearby residents will not be welcome. In fact, the village representative of Tsung Pak Long has been briefly consulted on their opinions on improvement scheme (3). The village representative has indicated that they will object to improvement scheme (3), due to the same environmental concern as scheme (1). In view of the above considerations, improvement scheme (3) is ruled out for further assessment.

Improvement scheme (4) will involve extensive reconstruction works to the busy So Kwun Po Interchange, and cause traffic disruption. Moreover right-turn flyover on top of the existing elevated So Kwun Po Interchange will cause significant visual impacts to the surroundings. The existing high pressure gas main alongside the expressway is also a great constraint. The right-turning slip roads at the So Kwun Po Interchange will encroach upon the North District Park, which is one of the major open spaces in the North District. Leisure facilities and valuable mature trees in the park area will be affected. The air, noise and visual impact to the park will likely attract very strong objection from the general public. In view of the above considerations, the improvement scheme (4) is ruled out for further assessment.

The benefits and dis-benefits of the schemes are summarised below:

Scheme	Benefits	Dis-benefits
Scheme 1	<p>A more comprehensive scheme in diverting traffic along Po Shek Wu Road and improving the weaving on Fanling Highway between Po Shek Wu Interchange and So Kwun Po Interchange.</p> <p>Reduce traffic noise impact on Choi Po Court</p>	<p>Increase in the traffic noise impact on Tai Tau Leng and Tsung Pak Long if no mitigation measures</p> <p>More visual impact and planning impact and</p> <p>Higher construction cost</p> <p>Strong objection from public</p>
Scheme 2A	<p>Sufficient in diverting traffic along Po Shek Wu Road from FLN NDA to Fanling Highway.</p> <p>Less visual impact, planning impact, land requirement</p> <p>Lower construction cost.</p>	<p>The improvement scheme does not provide solution for the existing short weaving distance problem between Po Shek Wu Interchange and So Kwun Po Interchange.</p> <p>The current noise impact along Po Shek Wu Road near Choi Po Court remains if no mitigation measures.</p>
Scheme 2B	<p>Sufficient in diverting traffic along Po Shek Wu Road from FLN NDA to Fanling Highway.</p> <p>Reduce traffic noise impact on Choi Po Court</p>	<p>Triple reverse horizontal curve is unfavourable in term of traffic safety and comfort.</p> <p>Increase in the traffic noise impact on Tai Tau Leng and Tsung Pak Long if no mitigation measures</p> <p>More environmental, visual, planning and land requirement impact than Scheme 1</p> <p>Strong local objection is still anticipated.</p>
Scheme 3	<p>Avoid the strong objection from Tai Tau Leng and Tsung Pak Long villagers on any slip roads across the green belt area between the two villages.</p>	<p>Too close to the proposed Kwu Tung Interchange, of which the location is also heavily constrained.</p> <p>Insufficient weaving distance between the two interchanges.</p> <p>Thousands of young trees are present all along the drainage channel between Tsung Pak Long and Long Valley and will be affected.</p> <p>Increase in noise impact on the nearby residents in the NE of Tsung Pak Long if no mitigation.</p>

Scheme	Benefits	Dis-benefits
Scheme 4	Avoid weaving traffic along the So Kwun Po and Po Shek Wu Interchanges	<p>Involve extensive re-construction works to the busy So Kwun Po Interchange</p> <p>Right-turn flyover on top of the existing elevated So Kwu Po Interchange will cause significant visual impacts to the surroundings.</p> <p>The existing high pressure gas main along side of the expressway is also a great constraint.</p> <p>Leisure facilities and valuable mature trees in the North District Park will be affected.</p> <p>The current noise impact along Po Shek Wu Road near Choi Po Court remains without mitigation measures.</p>

In conclusion, improvement scheme (2A) is recommended. While the scheme (2A) has slightly less traffic capacity compared to Scheme (1), the model test has demonstrated its effectiveness in diverting the additional traffic from NDA. The existing short weaving between Po Shek Wu Interchange and So Kwun Po Interchange should be tolerated. In overall term, the Improvement Scheme (2A) is considered to have less environmental and land requirement impact on the existing residents. This also responds to the public concern on the environmental and land use impact of Po Shek Wu Interchange.

2.4.1.5 Fanling Bypass Western Section (DP9)

The proposed Fanling Bypass Western Section provides a linkage between the Man Kam To Road and the proposed Fanling Bypass Eastern Section. The planning intention is to arrange the bypass at the periphery of the NDA across Ng Tung River, such that through traffic will be diverted away from the town centre. This minimises the environmental impact of the traffic to the FLN NDA.

At its western end, the bypass connects to the existing Man Kam To Road, existing maintenance access of Ng Tung River and the access road to Sheung Shiu Wa Shan with a roundabout junction on the northern side of Ng Tung River. Site constraints such as Ng Tung River and Hung Kiu San Tsuen have been considered in designing the roundabout connections. Two locations of the roundabout of Man Kam To Road are proposed.

Location 1 – On the existing Man Kam To Road

The existing Man Kam To Road at the southern side of Ng Tung River remained unchanged and the roundabout is proposed on the existing Ma Kam To Road.

The Man Kam To Egretty at the east of the existing Man Tam To Road would be affected by the roundabout but its loss could be mitigated by provision of an alternative egretty location.

Location 2 – On the west of the existing Man Kam To Road

The roundabout is proposed at the west of the existing Man Kam To Road and north of Ng Tung River. The existing Man Kam To Road at the southern side of Ng Tung River should be shifted westward to connect the roundabout. The Police Driving and Traffic Training Complex (FLN A1-8) should also be shifted to the west in order to maintain the required site area.

The impact on the Man Kam To Egretty could be reduced in this scheme. However, additional land resumption is required due to the shifting of the existing Man Kam To Road and the proposed Police Driving and Traffic Training Complex shifting to the west. This would result in disrupting existing residents and not desirable.

Option Evaluation

In order to minimise the disruption to the existing community, Location 1, which is the only viable option, is adopted. The current design and mitigation measures proposed in the EIA will ensure that the residual environmental impact will be insignificant and acceptable.

2.4.1.6 Fanling Bypass Eastern Section (DP10)

The proposed Fanling Bypass Eastern Section provides a direct bypass linkage between FLN NDA & Sha Tau Kok Road (STKR) with the Fanling Highway Tai Po direction. Three alignment schemes are proposed.

Scheme 1 – Along the southern bank of Ng Tung River

Under the scheme, Fanling Bypass Eastern Section is proposed along the southern bank of Ng Tung River. The drainage impact and the environmental impact on the Ng Tung River itself would be minimised. In addition, the impact to Siu Hang San Tsuen Stream could also be avoided.

However, it would induce significant visual, noise and air impacts on the eastern side of FLN NDA, which is the core residential district of FLN NDA. The land along the southern bank of Ng Tung River is occupied by the proposed road and the development potential of FLN NDA would be reduced. Hence, the scheme is not acceptable.

Scheme 2 – Along the Ng Tung River

Fanling Bypass Eastern Section is proposed along the Ng Tung River in this scheme. Environmental impacts on the northern bank of Ng Tung River can be avoided. However, piers and the superstructure of the proposed Fanling Bypass Eastern Section along Ng Tung River would induce significant drainage and environmental impact on Ng Tung River, including ecological impact on a flight-line used by large waterbirds. The

visual, noise and air impact to the proposed housing development are also significant. Hence, the scheme is not acceptable.

Scheme 3 – Along the northern bank of Ng Tung River

Fanling Bypass Eastern Section is proposed along the northern bank of Ng Tung River in this scheme. The visual, air and noise impact to the proposed development along Ng Tung River would be minimised.

Fanling Bypass would cross Ng Tung River and some drainage impact and environmental impact on Ng Tung River are expected but it would be less than that in Scheme 2. A viaduct is proposed for crossing the Siu Hang San Tsuen stream to minimise the environmental impact on the stream.

The Benefits and Dis-benefits of the schemes are summarised below:

Scheme	Benefits	Dis-benefits
Scheme 1	Impact on Ng Tung River, Siu Hang San Tsuen stream is minimised.	Significantly visual, air, noise and planning impact on the proposed housing development in FLN NDA.
Scheme 2	Avoid environmental impacts on the northern bank of Ng Tung River.	Significant drainage and environmental impact on Ng Tung River and ecological impact on waterbirds using the river. Visual, air and noise impacts on the proposed development in the southern bank of FLN are also significant.
Scheme 3	Some drainage and environmental impacts on Ng Tung River but less than Scheme 2. Visual, air and noise impacts to the proposed development along Ng Tung River are minimised.	Encroachment on Siu Hang San Tsuen Stream.

Option Evaluation

Based on above consideration, Scheme 3 is selected. The current design and mitigation measures proposed in the EIA will ensure that the residual environmental impact will be insignificant and acceptable.

Fanling Bypass Eastern Section along Ma Wat River

In the previous study, the road was aligned on the eastern bank of Ma Wat River. However due to further development of village houses,

alignment on the west side to avoid clearance of small houses is proposed in this Study.

In order to minimise the visual impact to the adjacent proposed residential sites in the east of FLN, the section of the Fanling Bypass crossing Sha Tau Kok Road would be a depressed road. The depressed section would be in conflict with the existing temporary wholesale market and also the existing Ma Wat River. Therefore reprovision of the temporary wholesale market (DP12) and diversion of Ma Wat River is proposed.

2.4.1.7 Shek Wu Hui Sewage Treatment Works – Further Expansion (DP11)

The existing SWHSTW is a secondary STW with design capacity of 93,000m³/day, serving the North District sewerage catchment (Sheung Shui and Fanling areas). In order to cope with the natural and planned population growths within the sewerage catchment, SWHSTW shall be further expanded.

Six extension schemes have been studied and are presented below:

Option A - South of Ng Tung River and adjacent to FLN B2-2

Option A area is generally flat with open area being used for agricultural and open storage in Sheung Shui North. No pond filling is required and ecological impact is low. It is close to the existing STW which would allow more efficient design and operation of the expansion/upgrade. However, the nearby residents have raised very strong objection to this option due to the potential odour, visual and health concern.

Option B - North of Ng Tung River at Fu Tei Au (FLN A1-3)

Option B is an area with great level difference at Fu Tei Au (from +6 to +21 mPD). There is an existing Grade 3 historic building of Man Ming Temple next to the site and part of the land is occupied by the Dongjiang water main reserve. It is necessary to fill some fish ponds of low ecological value. It is close to the existing STW which allow more efficient design and operation of the expansion/upgrade. However, the residents at Fu Tei Au have raised very strong objection to this option due to the land resumption of their land lots.

Option C - East of Ng Tung River at Sha Ling

Option C is an open area mostly appeared to be agricultural uses near Sha Ling. The site use will cause significant ecological impacts, as wetland bird species were recorded in the agricultural area during the ecological survey. In addition, the site is at long distance from the existing STW and the NDAs.

Option D - West of Ng Tung River near Lo Wu

Option D is an open area mostly appeared to be agricultural uses near Lo Wu. Preliminary ecological assessment has indicated that it is a “No-go” option ecologically as it would result in loss of Ho Sheung Heung Egret.

Similar to Option C, the site is at long distance from the existing STW and the NDAs.

Option E - Area between Ng Tung River and existing SWHSTW (FLN A2-3)

Option E is government land with temporary structures adjacent to the existing SWHSTW and ecological value of the site is low. It is adjacent to the existing STW which would allow more efficient design and operation of the expansion/upgrade. No private land lot is affected in this option.

Option F - Cavern within NDAs

Option F is expanding the STW in cavern within NDAs. However, the land within KTN NDA is considered to be of low suitability for large excavated underground cavern development due to the poor ground condition. In FLN NDA, most of the area suitable for cavern development is constrained by the alluvial flood plain. To the west of the FLN NDA are elevated hillsides that could be considered suitable for some cavern development but these are generally low-lying and may not have rockhead close to surface locally.

Options Evaluation

From the preliminary screening of the location options, Option A is ruled out due to its close proximity to the existing Sheung Shui Heung and the potential odour and visual impact as well as the strong public objection. Option D is ruled out due to its non-compensable ecological disturbance. Option F is ruled out due to its low feasibility in geotechnical/topographical aspect.

For hydraulic design, operation and maintenance, Option E is the most efficient as it is the closest site to the existing SWHSTW. It means the shortest pipe work and less pumping from sewage source to sewage treatment work extension would be required. It also allows possible share of some sewage treatment facilities and maintenance staff between the existing and the extended sewage treatment works. Option C is the lowest efficient as it is the most remote option to the existing SWHSTW compared to Option B and Option E.

The ecological values of the proposed sites for Option B and Option E are low as described above. The ecological impact of Option C is high as wet agricultural land and fishponds affected are of medium to high ecological value. Much habitat creation / enhancement for compensation is required.

For land resumption, the proposed site for Option E is in government land and land resumption is not required. Compared to Option B, more private land resumption for Option C is required and most are wet agricultural land and fishponds.

In conclusion, Option E is recommended as the most suitable site in terms of hydraulic design, operation and maintenance. The ecological impact of Option E is low and no land resumption is required.

Consideration of alternative sewage treatment technologies

In considering the upgrading of sewage treatment technologies, a number of options namely sequencing batch reactors (SBRs), biological aerated filters (BAFs) and membrane processes, among others, have been considered. Given the space constraint, tightened effluent discharge requirements to satisfy the “no net increase in pollution to Deep Bay” policy, and enhanced initiative for promoting TSE reuse, membrane processes namely membrane bioreactor (MBR) has been selected as the preferred sewage treatment technology for consideration in the further expansion and upgrading of SWHSTW.

2.4.1.8 Reprovision of temporary wholesale market in FLN NDA (DP12)

The existing temporary wholesale market in FLN would be affected by the construction of Fanling Bypass Eastern Section. The adjacent site is proposed for the reprovision to minimize the operation impact to the wholesale market. In addition, no private lot resumption is required for the reprovision. According to assessment, the environmental impact on the proposed location is acceptable.

2.4.1.9 New Sewage Pumping Stations (DP5 and DP13)

Six new SPS have been proposed to convey the sewage flow from the 2 NDAs to SWH STW for treatment and its disposal. The new SPSs will be located at the lower end of the gravity sewers network within the NDAs. To facilities the maintenance at the operation phase, the SPSs are proposed near existing / proposed road network. Besides, the SPSs locations are proposed to be as far away from residential / commercial development as practicable in order to reduces the odour and noise impact on the residents.

2.4.1.10 Road R1 (LMC Loop Eastern Connection Road) and Sports Ground in KTN

A sports ground with spectator capacity up to 10,000 people is required to serve the NDAs and Fanling/Sheung Shui New Town in accordance with Hong Kong Planning Standards and Guidelines (HKPSG). The original proposed location in the RODP is at and near Ma Tso Lung village. Given the relatively large area of the sports ground, it would have significant impact on existing residents. In order to minimise its impact on the community, re-designating the location of sports ground is needed. Taking into account the severe constraint imposed by Sheung Shui Water Treatment Works (SSWTW) in terms of potential hazard consideration, the sports ground cannot locate within 2 km radius of SSWTW. As such, the only suitable location in planning terms is at the northwest corner of KTN NDA. The available area at the location is limited by the burial ground to its west. The dimensions and area requirement of the sports ground also constrain its location, layout and areal extent. As such, the alignment of rural road R1, which connects KTN NDA and Lok Ma Chau Loop, to the east of sport ground is constrained and dictated by the location and area extent of the sports

ground. As a result, a section of Ma Tso Lung Stream lower section, which is of moderate ecological value, will unavoidably be affected. Various design options of rural R1 and relevant mitigation measures have been explored to minimise the ecological impact, if any, on the Ma Tso Lung Stream lower section. The current design and mitigation measures proposed in the EIA will ensure that the residual ecological impact will be insignificant and acceptable.

2.4.1.11 Footbridge over the Sheung Yue River adjacent to the Proposed Long Valley Nature Park Visitor Centre

A footbridge crossing the Sheung Yue River near the proposed Visitor Centre in KTN is proposed in order to connect the railway station and the existing resident near Yin Kong Village via the open space network in KTN. The location of the footbridge is governed by the open space arrangement. In addition, shifting the footbridge southwards would be in conflict with the existing access ramp of Sheung Yue River. Shifting the footbridge to the north would result in a detour for residents and would increase disturbance and fragmentation impacts on waterbirds foraging in the Sheung Yue River.

East of the bridge, the footpath will continue south along the east bank of the river, then east along the southern edge of Long Valley Nature Park. Screening of the footpath in order to avoid disturbance of fauna in the Nature Park will be designed and detailed in the Habitat Creation and Management Plan for the Nature Park.

In addition, visitors to the Nature Park (to which access will be managed) will enter by this route.

The current design and mitigation measures proposed in the EIA will ensure that the residual environmental impact will be insignificant and acceptable.

2.4.1.12 Footbridge over the Sheung Yue River adjacent to the Tidal Section of the Ng Tung River

A footbridge crossing the Sheung Yue River near the tidal section of the Ng Tung River is proposed for in order to connect the footpath, cycle track and utilities network between KTN and FLN. The south of the proposed crossing is constrained by the existing SWHSTW and the existing Sheung Shui Slaughter House and hence the footbridge cannot be shifted further south. In addition, shifting the footbridge to the south would increase disturbance and fragmentation impacts on fauna in Long Valley and waterbirds foraging in the Sheung Yue River.

2.4.2 Key Infrastructure Requirements for Development Plan - Schedule 2 Designated Projects

2.4.2.1 San Tin Highway and Fanling Highway Kwu Tung Section Widening (between San Tin Interchange and Po Shek Wu Interchange) (Major Improvement) (DP1)

In order to sustain the future traffic growth from the development in Northern New Territories, the San Tin Highway and Fanling Highway Kwu Tung Section is proposed to be widened from dual 3-lane to dual 4-lane configuration. The key characteristics of Fanling Highway are summarised as follows:

Road Type	Carriageway Type	Number of Carriageways	Carriageway Width (metre)	Design Speed (km/hr)	Speed Limit (km/hr)
Expressway	Dual 4-lane	2	14.6	≥100	100

The alignment of this scheme is shown in **Figure 2.3-2.7**. The details of the selected scheme are described in Section 2.4.1.1.

2.4.2.2 Castle Peak Road Diversion (Major Improvement) (DP2)

The proposed widening work of the San Tin Highway and Fanling Highway Kwu Tung Section would push the expressway limit further to the north. Consequently, the adjacent service road, CPR Kwu Tung Section, has to be diverted. The access from the CPR to Yin Kong Village will be maintained. The realigned CPR will join the Pak Shek Au Interchange at the western end and the original CPR near Yin Kong at the eastern end. The alignment has been carefully selected to maximise the land area for housing development, taking into account the development constraint.

This shifted section of CPR at the south of KTN NDA will function as a bypass road and provide the linkage between KTN NDA and Kwu Tung South, and will remain as a major utility corridor between San Tin and Sheung Shui. The key characteristics of the diverted CPR are summarised as follows:

Road Type	Carriageway Type	Number of Carriageways	Carriageway Width (metre)	Design Speed (km/hr)	Speed Limit (km/hr)
District Distributor	Single 2-lane	1	7.3	≥ 50	50

The alignment of this scheme is shown in **Figure 2.3, 2.4 and 2.6**.

2.4.2.3 KTN NDA Road P1 and P2 (New Road) and associated new Kwu Tung Interchange (New Road) and Pak Shek Au Interchange Improvement (Major Improvement) (DP 3)

At KTN NDA, two primary distributor (PD) roads are proposed. The eastern side PD is connected to Fanling Highway via a grade-separated interchange near Yin Kong while the western side PD will be connected to the Fanling Highway via a pair of slip roads near Pak Shek Au. These PD roads would be further connected to the LMC Loop through a periphery road network. The key characteristics of the two PD roads are summarised as follows:

Road Type	Carriageway Type	Number of Carriageways	Carriageway Width (metre)	Design Speed (km/hr)	Speed Limit (km/hr)
Primary Distributor	Dual 2-lane	2	6.75	≥ 50	50

A new grade-separated Interchange, namely Kwu Tung Interchange is proposed as the major access from the Fanling Highway to the KTN NDA. Moreover, a supplementary interchange, namely Pak Shek Au Interchange, is proposed for the KTN NDA for better accessibility and also to allow for better connection for future development in LMC Loop.

The alignment of this scheme is shown in **Figure 2.3-2.6**. The details of the selected scheme are described in Section 2.4.1.2.

2.4.2.4 KTN NDA Road D1 to D5 (New Road) (DP 4)

The distributor roads (Road D1 and D2) will provide direct connectivity between the diverted CPR and KTN NDA.

The northern distributor road (Road D3) will provide the east-west connectivity between the two primary distributor roads (P1 and P2).

Further north to the western primary distributor road, another district distributor road (Road D4) will gradually go downhill and passes under a 400kV power Over-head (Transmission) Lines (OHL). Sufficient clearance is provided. The road will join with the junction to the LMC Loop.

Further north to the eastern primary distributor road, a district distributor road (Road D5) will gradually goes uphill and passes under a 400kV power OHL. The road generally follows the existing level and sufficient clearance is provided. Then it turns to the west and goes round the northern side of Fung Kong Shan, forming another junction near the Lo Wu Firing Range. This junction connects with the possible road to the future developments in LMC Loop, and also acts as an entry point to the KTN NDA from the north.

The alignment of these schemes is shown in **Figure 2.3-2.5**. The key characteristics of the district distributors inside KTN NDA are summarised as follows:

Road Type	Carriageway Type	Number of Carriageways	Carriageway Width (metre)	Design Speed (km/hr)	Speed Limit (km/hr)
District Distributor	Single 2-lane	1	7.3	≥ 50	50

2.4.2.5 New sewage pumping stations (SPSs) in KTN NDA (DP5)

Gravity sewers will be provided within NDA. To prevent the gravity sewer from crossing underneath the river, two SPSs (with an installed capacity of more than 2,000 m³/day) are proposed to be constructed in KTN.

One of the proposed SPSs (capacity of about 100,000 m³/day) will be located at site D1-3 on the west bank of Sheung Yue River. Wet well/dry well type of SPS will be used and 3 duty pumps and 1 stand-by pump will be installed in the proposed SPS. A superstructure of about 5m in height will be constructed for the SPS. The proposed location also allows the sewage to be directly discharged into adjacent river without affecting the nearby residents in case of any emergency event. In order to minimise work front areas as well as the associated direct and indirect environmental impacts, the proposed twin 900mm diameter rising mains will be routed along the cycle track adjacent to the west bank of Sheung Yue River, crossing the Sheung Yue River on a pipe bridge and crossing underneath the railway track of MTRC, routing along the maintenance access track on the east bank of Ng Tung River, crossing the Ng Tung River on a pipe bridge and connecting to the inlet works of expanded / upgraded SWHSTWs.

Another new SPS with an installed capacity of about 8,000 m³/day is proposed at F1-2 of KTN NDA. Wet well/dry well type of SPS will be used and 1 duty pump and 1 stand-by pump will be installed in the proposed SPS. A superstructure of about 5m in height will be constructed for the SPS. In order to minimise the work front areas and the environmental impact, the proposed twin 250mm diameter rising mains will be routed along the proposed KTN NDA Road D5 and the downstream of the rising mains will be connected to the proposed gravity sewage system of KTN NDA near the proposed roundabout between KTN NDA Road D5 and P2.

Both SPSs would be surrounded by solid boundary walls with approximate height 3m.

The details of the proposed sewage pumping stations are shown in **Figure 2.10**.

2.4.2.6 Proposed railway station and associated facilities in KTN NDA (DP6)

An underground box structure was constructed for a future Kwu Tung Station as part of the Lok Ma Chau Spur Line project. One of the planning principles for Kwu Tung North area is to promote rail-based transport. The consultancy study for the Review and Update of the Railway Development Strategy 2000 (RDS-2U) undertaken by Highways Department is expected to be finished in 2013. The Government will consider the consultant's final recommendations to formulate the future railway development strategy in Hong Kong, including the Northern Link, and the timing for commencement of Kwu Tung Station. The construction of new station and the key infrastructure requirements will be investigated in separate studies at subsequent design stages.

The location of the proposed railway station is shown in **Figure 2.1**.

2.4.2.7 Utilization of Treated Sewage Effluent from SWHSTW (DP7)

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

Part of the TSE from the STW will be polished up to the required standards before diverted to a flushing water service reservoir and supplied to the development for non-potable uses. The locations of flushing water service reservoirs (one in KTN NDA and one in FLN NDA) are proposed to be located at about +70.00mPD, which could provide sufficient top water head for discharge. In order to minimise the environmental impact and work front areas, the distribution pipeline will align with the proposed road network.

The initial capacity of the TSE reuse system will be approximately 20,000m³/day serving the KTN and FLN NDAs, with the provision of expanding to 53,000m³/day covering both the KTN and FLN NDAs and the existing development in Sheung Shui and Fanling areas. The exact scale of the TSE reuse system is subject to further refinement during the detailed design stage of the Study. TSE supply from SWHSTW Phase 1 expansion is about 60,000m³/day, and it should be sufficient for the demand of KTN and FLN NDAs.

TSE is proposed for non-potable uses such as toilet flushing, landscape irrigation and make-up water for DCS. **Table 2.7** summarises the breakdown of reclaimed water demand in KTN and FLN NDA. **Table 2.8** provides the reuse water standard adopted for toilet flushing, landscape irrigation water reuse and make-up water for DCS.

To fulfil this stringent standard, additional treatment of the TSE via chlorination will be required. Chlorine Contact Tank (CCT) will be constructed for carrying chlorination and dechlorination processes. After polishing treatment, the reclaimed water produced from the TSE reuse

system will be conveyed to the distribution system by newly proposed pumping station. The distribution system consists of rising mains, a new reclaimed water service reservoir, and distribution system up to individual development sites.

The Flushing Water Service Reservoir in KTN would be in site G1-4. The size of the service reservoir structure is about 76m by 30m. Preliminary assessments suggest a cut slope formation of approximately 38m height with the proposed cut/fill slope angle not exceeding 40° based on the general safe angle of the cut slope. Further studies can be conducted to reduce the extent of site formation as far as possible during the detailed design stage after the further ground investigation has been conducted.

The Flushing Water Service Reservoir in FLN would be in site D1-4. The size of the service reservoir structure is about 75m by 26m. Preliminary assessments suggest a cut slope formation of approximately 62m height with the proposed cut/fill slope angle not exceeding 40° based on the general safe angle of the cut slope. Further studies can be conducted to reduce the extent of site formation as far as possible during the detailed design stage after the further ground investigation has been conducted.

The location of the TSE system is shown in **Figure 2.11, 2.11a, 2.11b and 2.11c.**

Table 2.7 - TMF/TSE demand in KTN and FLN NDAs

	KTN	FLN	2 NDAs
TMF/TSE demand (m ³ /day)	16,806	6,649	23,455

Table 2.8 - Reclaimed Water Quality Standard for KTN and FLN NDAs

Parameter	Unit	Reclaimed Water Quality Standard for KTN and FLN NDAs
E. coli	cfu/100mL	Not detectable
Total residual chlorine (TRC)	mg/L	≥ 1 (out of treatment system) ≥ 0.2 (at user end)
Dissolved oxygen (DO)	mg/L	≥ 2
Total suspended solids (TSS)	mg/L	≤ 5
Colour	unit	≤ 20
Turbidity	NTU	≤ 5
pH	mg/L	6 - 9
Threshold odour number (TON)	-	≤100
5-day Biochemical oxygen demand (BOD5)	mg/L	≤10

Parameter	Unit	Reclaimed Water Quality Standard for KTN and FLN NDAs
Ammoniacal nitrogen (NH ₃ -N)	mg/L as N	≤1
Synthetic detergents	mg/L	≤5

Note: Apart from TRC which has been specified, the water quality standards for all parameters shall be applied at the point-of-use of the system.

2.4.2.8 Po Shek Wu Interchange Improvement (Major Improvement) (DP8)

The Po Shek Wu Interchange is currently exceeding its junction capacity. In order to cater for the traffic flow from the FLN NDA, improvement work, including realignment of the Po Shek Wu Road and the construction of an elevated southbound right-turning slip road to bypass the interchange, is proposed.

The details of the selected scheme are described in Section 2.4.1.3 and shown in **Figure 2.7-2.9**.

2.4.2.9 Fanling Bypass Western Section (New Road) (DP 9)

The proposed Fanling Bypass Western Section provides a linkage between the Man Kam To Road and the proposed Fanling Bypass Eastern Section. The planning intention is to arrange the bypass at the periphery of the NDA at the north of the Ng Tung River, such that through traffic will be diverted away from the town centre to minimise the environmental impact of the traffic to the FLN NDA.

The proposed Fanling Bypass Western Section provides a linkage between the Man Kam To Road and the proposed Fanling Bypass Eastern Section. The key characteristics of the Fanling Bypass Western Section are summarised as follows:

Road Type	Carriageway Type	Number of Carriage ways	Carriageway Width (metre)	Design Speed (km/hr)	Speed Limit (km/hr)
District Distributor	Single 2 –lane	1	7.3	≥ 50	50

The alignment of this scheme is shown in **Figure 2.12**.

2.4.2.10 Fanling Bypass Eastern Section (New Road) (DP 10)

The proposed Fanling Bypass Eastern Section provides a direct bypass linkage between FLN NDA and Sha Tau Kok Road (STKR) with the

Fanling Highway Tai Po direction. Generally the Fanling Bypass Eastern Section is wholly elevated, except an underpass portion near Lung Yeuk Tau. There are footbridges across Fanling Highway and at the Lung Yeuk Tau Interchange. As indicated in the traffic forecast, the Fanling Bypass can effectively divert traffic away from STKR Luen Wo Hui Section and Wo Hop Shek Interchange, and improve the traffic condition there. This responds to the Fanling residents' key concern during PE2 and PE3 that the additional NDA traffic will worsen the existing Fanling traffic condition.

For the elevated section to the west of Siu Hang San Tsuen, the road is aligned to compromise between the physical constraints set by the existing Ng Tung River on its south, and the steep gradient hillside on the north, while fulfilling all technical standard requirements.

The key characteristics of the Fanling Bypass Eastern Section are summarised as follows:

Road Type	Carriageway Type	Number of Carriageways	Carriageway Width (metre)	Design Speed (km/hr)	Speed Limit (km/hr)
Primary Distributor	dual 2-lane	2	7.3	≥80	80

The alignment of this scheme is shown in **Figure 2.13-2.17**.

2.4.2.11 Shek Wu Hui Sewage Treatment Works - Further Expansion at FLN NDA (DP11)

The existing SWHSTW is a secondary STW with design capacity of 93,000m³/day, serving the North District sewerage catchment (Sheung Shui and Fanling areas). In order to cope with the natural and planned population growths within the sewerage catchment, SWHSTW shall be further expanded by phases, namely Phases 1A, 1B and Phase 2, within the existing and adjacent extension sites. The treatment capacities SWHSTW after completion of Phases 1A and 1B would be increased to 133,000m³/day and 153,000m³/day respectively and reaching an ultimate capacity of 190,000m³/day after completion of Phase 2.

At the same time, the treatment level of SWHSTW should also be upgraded to tertiary level in order to meet the “no net increase in pollution loading to Deep Bay” requirement with reference to “Hong Kong 2030 Planning Vision and Strategy, Working Paper No. 30 Broadbrush Environmental Comparison of Development Options, Clause 14”.

The exact design details and sequence of the SWHSTW upgrading scheme are subject to refinement under separate study being conducted by DSD under Agreement No CE40/2012(DS). This is classified as a DP under EIAO Schedule 2, Part I, Item F2 (sewage treatment works with an installed capacity of more than 5000 m³ per day). The location of

SWHSTW – Further Expansion is shown in **Figure 2.11**. The height of the structures in SWHSTW would not exceed 20m.

The main treatment process components are listed below:

Sewage Treatment	Sludge Treatment
Inlet works	Primary Sludge Thickening
Preliminary Treatment	Waste Activated Sludge Thickening
Equalization	Sludge Digestion and Biogas Utilization
Primary Sedimentation	Sludge Dewatering
MBR Pre-treatment Screen	
Bioreactor and Membrane Filtration System	

2.4.2.12 Re-provision of temporary wholesale market in FLN NDA (DP12)

The North District Temporary Wholesale Market for Agricultural Products will be affected by the NDA development. In order not to affect the operation of the market, the re-provisioned wholesale market at site D1-6 of FLN NDA will be re-constructed by phases.

The re-provisioned wholesale market will have approximately 1,000 market stalls within a site area of around 1.3ha, which will be the same scale as the existing wholesale market. The wholesale market will provide around 1,000 employment. The re-provisioned wholesale market will provide parking spaces, trading area for stalls, offices, toilet and refuse collection point facilities. The final layout will be reshaped to be compatible with the road layout and minimise the environmental impact.

The details of the re-provisioned wholesale market is shown in **Figure 2.18-2.19**

2.4.2.13 New Sewage pumping stations (SPSs) in FLN NDA (DP13)

There will be four new SPSs with installed capacity of more than 2,000 m³ per day inside the FLN NDA (sites A1-6, B2-3, B1-4 and C2-3) to convey the sewage to the SWHSTW.

For the proposed SPS at site A1-6 of FLN NDA, the installed capacity of about 10,000 m³/day is proposed. Wet well/dry well type of SPS will be used and 1 duty pumps and 1 stand-by pump will be installed in the proposed SPS. The proposed location also allows that the sewage to be directly discharged into adjacent river without affecting the nearby residents in case of any emergency event. A superstructure of about 5m in height will be constructed for the SPS. The downstream of the proposed twin 300mm diameter rising mains will be connected to the proposed gravity sewage system at FLN NDA Road L6.

For the proposed SPS at site C2-3 of FLN NDA, the installed capacity of about 35,000 m³/day is proposed. Wet well/dry well type of SPS will be used and 3 duty pumps and 1 stand-by pump will be installed in the proposed SPS. The proposed location also allows that the sewage to be directly discharged into adjacent river without affecting the nearby residents in case of any emergency event. A superstructure of about 5m in height will be constructed for the SPS. The downstream of the proposed twin 250mm diameter rising mains will be connected to the proposed gravity sewage system at FLN NDA Road L4.

For the proposed SPS at site B1-4 of FLN NDA, the installed capacity of about 3,000 m³/day is proposed. Wet well/dry well type of SPS will be used and 1 duty pump and 1 stand-by pump will be installed in the proposed SPS. The proposed location also allows that the sewage to be directly discharged into adjacent river without affecting the nearby residents in case of any emergency event. A superstructure of about 5m in height will be constructed for the SPS. The proposed twin 150mm diameter rising mains will be routed over the Ng Tung River and the downstream of the rising mains will be connected to the proposed gravity sewage system at KTN NDA Road L6.

For the proposed SPS at site B2-3 of FLN NDA, the installed capacity of about 61,000 m³/day is proposed. Wet well/dry well type of SPS will be used and 3 duty pumps and 1 stand-by pump will be installed in the proposed SPS. A superstructure of about 5m in height will be constructed for the SPS. The proposed twin 750mm diameter rising mains will be routed along the existing Man Kam To Road, Po Wan Road and Chuk Wan Road to connect to SWHSTW Phase 2 expansion works.

The SPSs would be surrounded by solid boundary walls with approximate height 3m.

A trunk sewer is proposed along the proposed main road which will connect to SWHSTW Phase 2 expansion works. The routing is selected to minimise the work front areas as well as the associated direct and indirect environmental impacts.

The details of the proposed sewage pumping stations are shown in **Figure 2.10**.

2.5 Nature, Benefits and Scope of the Project

2.5.1 Nature of Project

There is a general shortage of land for housing including public/subsidised housing, for which the NDAs will be a major source of supply. The development of the NDAs can also provide opportunity for accommodating various economic uses to help meet Hong Kong's economic needs and generate employment opportunities for the NDAs residents. The development of the NDAs would be a major component, among others, in the overall strategy to provide housing land for Hong Kong in the medium to long term. The NENT NDAs Study has been

undertaken since 2008, and the planning is the most advanced of similar studies.

The KTN and FLN NDAs are also the latest endeavours to reinforce the existing new town framework of the Fanling/ Sheung Shui New Town to provide more comfortable living spaces for the people of Hong Kong. The NDAs will make good use of their close proximity to existing communities. They will buttress the pursuit of a greener living environment. Robust economic activities clusters will be established to provide a variety of jobs and help achieve a more balanced distribution of jobs across the territory. At the same time, the ecologically sensitive areas will be preserved and the farming community will be taken care of. A quality environment with integrated land uses, enhanced transportation, ample recreation spaces, and attractive urban design will facilitate the building of a harmonious community where people can live, work and play.

2.5.2 Benefits of Project

In formulating the proposed developments for the NDAs, consideration has been given to views and comments made by the local communities and the public, guiding principles and overall development strategies as well as planning and urban design framework. Reference has also been made to relevant and most current planning contexts and circumstances. Technical and environmental assessments on traffic, engineering, air quality, noise, water quality, sewerage, waste, land contamination, hazard to life, landfill gas hazard, cultural heritage, landscape and visual, ecological aspects, etc. have been conducted and mitigation measures were recommended. All these are considered with a view to creating housing supply and economic opportunities as well as reaching a careful balance among quality of life, environmental protection and sustainability. The benefits of the Project, including environmental benefits in the broad term, are broadly described below:

Serving a Wider Community

The KTN and FLN NDAs will be the extension of Fanling/ Sheung Shui New Town to form the Fanling/ Sheung Shui/ Kwu Tung North (FL/SS/KTN) New Town in the future. Some of the infrastructure facilities (such as sewage treatment works extension) and new community facilities (such as hospital and district police station) will serve a wide catchment covering the existing new town and the two NDAs. The two NDAs will provide a new hospital, polyclinic, standard swimming pool complex, district police station, new schools and employment clusters to serve the existing and new residents whilst the existing facilities of Fanling/ Sheung Shui New Town can afford services to the whole new town.

The NDAs development would plan for a balanced community to optimise use of scarce land resources to serve the mass housing need with different housing types. The urban design principle of planning for a more interesting townscape, more diversified neighbourhoods and better

air ventilation should also be duly considered. There will also be an integrated urban design framework for the whole new town, providing a good quality urban environment, optimising on the natural ridgelines and water courses to provide an interesting townscape, vibrant activity areas, connected open spaces and a green network for enjoyment.

Increasing Housing Supply and Employment Opportunities

The two NDAs will provide 60,700 new flats to accommodate an additional population of about 174,900 persons. About 35,400 new flats would be provided in KTN NDA to accommodate about 101,600 persons while 25,300 new flats would be provided in FLN NDA to accommodate 73,300 persons. The public to private housing ratio of the NDAs will be 60:40. 31,200 and 6,500 new jobs will be created in KTN and FLN NDAs respectively.

Pursuing a Greener Living Environment

In order to formulate a comprehensive plan for developing a sustainable, environmentally friendly, energy efficient and people oriented community in the NDA, the green initiatives, such as low emission transport system, renewable energy, built form and design, in relation to various themes for the developments and infrastructure of the NDAs have been proposed.

Through the proposed green initiatives, the greatest environmental benefits will come from the carbon reduction by improvement of Building Energy Efficiency, followed by Energy Infrastructure (District Cooling System) and Renewable Energy (Solar Hot Water System and Photovoltaic). The actual carbon savings achievement by those initiatives related to Building Energy Efficiency and Renewable Energy are subject to the extent of application by the building developers / owners, as well as the environmental awareness of the future occupants.

Designating Long Valley as Nature Park

Some 37 hectares of land in the core area of Long Valley generally of high ecological value are designated as a Nature Park to be implemented by the Government as part and parcel of the NDAs project. Long Valley is unique in Hong Kong ecologically. It is the only area in Hong Kong where a large area of continuous and contiguous wetland habitats, notably wet agricultural land, marsh, fishponds and shallow ponds, exist in a complex mosaic which, together with adjacent non-wetland habitats, provides suitable habitat for a large number of fauna species, in particular bird species of conservation significance which require freshwater wetland habitats.

Accordingly, designation and management of the area of Long Valley which is of the highest ecological value as a Nature Park, and thus both safeguarding this area in the long term and actively managing it to further enhance its ecological value is a major ecological benefit of the project at a Hong Kong level.

As the ecological value of this area is closely related to the existing wet farming practice, part of the Nature Park may allow such use based on guidelines and requirements to be prescribed by the Government. A detailed management plan will be derived under a separate study by CEDD with technical input from AFCD upon completion of the EIA study. All stakeholders (including Green Groups and farmers) will be engaged during this study process. The Nature Park intends to showcase the harmonious blending of farming activities with nature conservation. A visitor centre will be provided to demonstrate the ecological importance of Long Valley as an element of the project.

The “Agriculture” zoning of the land in the north of the Nature Park will be retained to allow continuation of the current use and it is anticipated that conservation Management Agreements, or a similar mechanism, will continue in this area. The “Agriculture” zoning of the area to the south of the Nature Park will also remain in place.

In addition to the ecological benefit described above, the designation of Long Valley Nature Park and the retention of the Agriculture zoning of the adjacent areas will function as a “green lung” contributing to a quality living environment for the KTN and FLN NDAs.

New Woodland Planting

While woodland habitat takes many years to become fully established, the creation of two large blocks of native woodland, covering a combined area of about 16ha in KTN will result in a significant long term environmental benefit as a consequence of the project. Ecologically, the area will benefit from the addition of a large area of habitat which is of significance to a number of woodland-dependent fauna species. Such species are currently present in relatively small numbers in comparison with many other areas in the New Territories, partly as a consequence of the scarcity of large blocks of woodland in the Study Area.

In addition, the human population of KTN will benefit from the creation of a more attractive landscape; there will also be an overall environmental benefit in respect to the carbon footprint of the Project Area, both directly through carbon sequestration, and indirectly due to a reduction in the area that is vulnerable to hill fires.

Improving Transport Network

The NENT NDAs Study has proposed a comprehensive transport network including:

External Transport Connection

- Construction of a railway station on Lok Ma Chau Spur Line within the KTN NDA,
- Provision of connecting roads to Lok Ma Chau Loop,

- Construction of the Fanling Bypass to connect the FLN NDA with Fanling Highway (Tai Po Section) to reduce the traffic impacts on the Fanling/ Sheung Shui New Town and
- Improvements of the existing road network that connections the NDAs.

Internal Road System and Public Transport Facilities

The use of environmentally friendly buses is recommended to provide feeder services within the NDAs and between the NDAs, the Fanling/ Sheung Shui New Town and the railway stations.

Cycle and Pedestrian

A comprehensive network of pedestrian walkways and cycle tracks is proposed to link the residential and commercial nodes with the proposed MTR station/public transport interchanges of the NDAs, Fanling/ Sheung Shui New Town and the North-East and North-West New Territories cycle tracks currently under construction.

The specific environmental benefits and dis-benefits of the NDAs development are broadly described below:

Environmental Benefits

- The project will improve the sewerage infrastructure and sewage treatment facilities of the areas, which would benefit both the existing and new population;
- The project will help improving the existing interface problems of residential/ open storage/ rural industrial uses;
- The project will provide the opportunity to clean-up existing contaminated land;
- The project will provide for long-term conservation for Long Valley;
- The Project makes use of existing land for building sustainable and green communities, rather than forming new land through reclamation works.

Environmental Dis-Benefits

- The existing rural environment and landscape character of the Project Area will be permanently altered. The changes from rural to urban character in the vicinity have been minimised wherever possible by a comprehensive landscape and urban design package;
- There is potential for adverse impacts to cultural heritage from the proposed development. A comprehensive survey has been undertaken for the Project Area to identify areas of high archaeological and heritage value resources, and these have been considered and incorporated in accordance with the TM- EIAO criteria;

- There is the potential for cumulative air and noise impacts arising from the Project. However, mitigation measures have been recommended to control the impacts to acceptable level;
- There is potential for adverse ecological impact arising from the development of the NDAs. Mitigation measures have been proposed to avoid, minimise or compensate for all significant impacts;
- The construction and operation of the proposed development will generate solid wastes. However, these solid wastes will firstly be reduced by recycling and reuse initiatives recommended in this EIA. The remaining solid wastes will thereafter be managed in an proper manner;
- Construction of the NDAs will introduce transient noise and air quality impacts to existing and future sensitive receivers. The construction programme, however, has aimed to reduce the scale, extent and severity of all such transient impacts to within statutory requirements.

Overall speaking, although the NDAs development would cause changes to the existing rural landscape and adverse impacts on the environment, these impacts have been properly considered and proper mitigation measures have been proposed to avoid possible disturbance to the community and environment as far as possible.

2.5.3 Works Contracts

The scope of the Project is summarised in **Table 2.10**. The development packages are shown in **Figure 2.20**.

Table 2.10 - Relationship among Development Phases, Development Packages and Works Contracts

Development Package	Works Contract
Advance Works Package – Advance Infrastructure and Development at KTN and FLN	WC03 – Roadworks, Associated Infrastructure and Open Spaces at KTN and FLN
	WC04 – Advance Site Formation and Engineering Infrastructure at KTN
	WC06 – Advance Site Formation and Engineering Infrastructure at FLN
	WC07 – Advance Fanling Bypass (Eastern Section) (Connection between Sha Tau Kok Road and Fanling Highway)
	WC07 – AFCD's Sites at FLN (Reprovisioning of North District Temporary Wholesale Market)
	WC08 – Phase 1B STW Extension at FLN

Development Package	Works Contract
	WC09 – Secondary Service Reservoir, Associated Trunk Mains and Distribution Mains at KTN
	WC19 – Site for Lots subject to VRT in FLN
	WC28 - Fanling Bypass (Eastern Section) (Connection between Sha Tau Kok Road and Wu Nga Lok Yeung)
	WC32 – Flushing Water Service Reservoir, Associated Trunk Mains and Distribution Mains at KTN
	WC33 - Stockpiling Area in KTN and FLN
Package 1 – First Stage of Infrastructure and Development at KTN and FLN	WC01 – Nature Park (Long Valley Core Area and Wetland Enhancement Works and Visitor Centre)
	WC18 – Site for Lots subject to VRT in KTN
	WC21 – HKPF's Sites at KTN (Reprovisioning of Fan Garden Junior Police Officer's Police Married Quarters as well as District Headquarter Associated Married Staff Quarters)
	WC21 – HKPF's Sites at FLN (Reprovisioning of Police Driving and Traffic Complex and Weapon Training Division)
	WC21 - Planting for Relocation of Man Kam To Egretty at FLN
Package 2 – Remaining Infrastructure and Development at KTN (South)	WC10 – Fanling Highway Widening, Kwu Tung Interchange and Pak Shek Au Interchange
	WC11 – Site Formation and Engineering Infrastructure at KTN (South)
	WC26 – Trunk Mains from Ngau Tam Mei Primary Fresh Water Service Reservoir to Existing and Proposed FWSR and Pumping Station
	WC31 - Plant for District Cooling System at KTN
Package 3 –	WC12 – Site Formation and Engineering

Development Package	Works Contract
Remaining Infrastructure and Development at KTN (North)	Infrastructure at KTN (North)
	WC21 – HKPF's Sites at KTN (District Headquarters and Divisional Police Station)
	WC29 - Reprovisioning Sites for Potential Activity Centre
Package 4 – Remaining Infrastructure and Development at FLN (East)	WC13 - Secondary Service Reservoir, Associated Trunk Mains and Distribution Mains at FLN
	WC14 – Fanling Bypass (Western Section) (Connection between Man Kam To Road and Sha Tau Kok Road) and Po Shek Wu Interchange Improvement
	WC15 – Remaining Site Formation and Engineering Infrastructure at FLN (East)
Package 5 – Remaining Infrastructure and Development at FLN (West)	WC08 – Phase 2 STW Extension at FLN
	WC22 – Remaining Site Formation and Engineering Infrastructure at FLN (West)

2.6 Construction Method

The preferred construction methods, sequence of works and staged implementation are presented in following sections:

2.6.1 Advance Works Package – Advance Infrastructure and Development at KTN and FLN

Site Formation

The site formation to be carried out in Advance Works Package mainly includes the southwest portion of KTN NDA, service reservoirs in KTN NDA, and the east portion of FLN NDA.

Surplus inert C&D material generated in the site formation would be either reused in the concurrent projects or stored in the stockpiling areas in KTN and FLN NDAs for the earth filling works in later stage.

Consolidation measures involve the installation of band-drains and surcharging would be adopted.

Treatment of Arsenic-Containing Soil in KTN

Approximately 1Mm³ of arsenic-containing soil is identified in the whole KTN NDA and treatment is required in accordance with the Land Contamination Assessment in Chapter 8. In-situ Solidification/Stabilization treatment will be adopted. The soil after treatment will be re-used as backfilling materials within the NDAs. The method of treatment is covered in Chapter 8 of this EIA report.

Road Works and Utilities

The proposed road works and utilities include road networks, drainage systems, sewerage networks, water supply networks and utility construction to support the development in the Advance Infrastructure and Development. The road infrastructure during the Advance Infrastructure and Development are listed below:

- Primary distributor P1 in KTN (DP3)
- District distributor D1, D3 & D4 in KTN (DP4)
- Local distributor L1 in KTN
- Fanling Bypass Eastern Section in FLN (DP10)
- Local distributor L1, L2 and L4 in FLN

Except the construction of viaduct and underpass of Fanling Bypass Eastern section, typical construction method at-grade road construction would be adopted. The works involve earthworks, utilities laying, laying of sub-base materials and laying of bituminous or concrete surfacing layers.

Diversion of Ma Wat River

The construction of Ma Wat River diversion to suit the footprint of the Fanling Bypass will be carried out with proper site drainage provision

as per EPD's Practice Note ProPECC PN 1/94, as the first step without disturbance to the existing flow. Upon completion of the diversion channel and subsequent connection works at the junction between the existing and diverted channels will be scheduled to be carried out during dry season with provision of silt removal facilities. The flow will be diverted to the diversion channel after completion of connection work.

Viaduct and Underpass of Fanling Bypass

The substructures of the Fanling Bypass Viaduct will take the form of reinforced concrete (RC) columns & pilecaps founded on RC bored-piles.

It is envisaged that the superstructures of the Fanling Bypass Viaduct, for accommodating the dual-2 carriageway, will be constructed by one of the following methods:

Precast segmental method, with the bridge deck constructed as precast segments (each a few metres long) which are lifted into position and then stitched & prestressed together — This method was adopted extensively for numerous bridgework projects in Hong Kong in recent years (e.g. Shenzhen Bay Bridge, Deep Bay Link, Route 8);

In-situ balanced-cantilever method, with the bridge deck constructed as in-situ segments by a travelling formwork (each segment was concreted in-situ and then prestressed onto the preceding segment) – This method was adopted in some of the projects in Hong Kong (e.g. Castle Peak Road Improvement Siu Lam Viaduct, constructed during 2004 to 2006).

The foregoing methods do not differ significantly in terms of environmental impacts. The selection of method is, rather, driven by consideration on engineering constraints and the individual contractors' available equipment/resources in-hand.

It should be noted that although the precast segmental method does not require mega lifting equipment as that for the precast spans method, the length of spans that the precast segmental method can sustain is usually limited to about 80 m (due to limitation on the capacity of the launching girder for such a method). To avoid stretching to the limit, it is assumed that the length of spans for precast segmental method should be limited to 75 m. This was also the spans-length adopted for the typical spans of the Shenzhen Bay Bridge approach viaduct.

Cut-and-Cover method would be adopted for the underpass at Sha Tau Kok Interchange, which involving trench-excavation (i.e. open-cut) followed by in-situ construction of the tunnel structure in the trench, and then backfilling around the underpass structure.

Shek Wu Hui Sewage Treatment Works – Further Expansion

The existing SWHSTW would be further expanded from a secondary STW with design capacity of 93,000m³/day to a tertiary STW with design capacity of 190,000m³/day in phases.

The design capacity would be increased to 133,000 m³/day under the further expansion Phase 1A which involves both civil works and E&M works. Phase 1B would be commenced after the completion of Phase 1A and increase the design capacity to 153,000m³/day. The works of Phase 1B involves E&M works only. Lastly, further expansion Phase 2, involving both civil works and E&M works, would be carried out the increase the design capacity to 190,000m³/day.

The effluent discharge standard of the SWHSTW would be tightened throughout the phases of upgrading. The construction activities would include concrete foundation works, formworks, superstructures and the associated pipeworks.

Secondary Freshwater Service Reservoir and Flushing Water Service Reservoir (DP7)

Facilities for freshwater supply and reuse of TSE involve the service reservoirs and the associated pipeworks. The major construction works will include earthwork, concrete works for service reservoir structures and construction of maintenance roads. Both cut and fill slopes shall be formed for the formation of platform for the service reservoirs construction. Installation of soil nail would be carried out for slope stabilization.

Landscaping Works at Open Spaces, Amenity Areas and Slopes

Landscaping works at open space, amenity areas and slopes will be conducted after site formation works and slope works. As these will mainly involve planting and minor pedestrian facilities, environmental impact is not anticipated.

2.6.2 Package 1 – First Stage of Infrastructure and Development at KTN and FLN

Establishment of LVNP

Loss of some wetland habitats of ecological significance, are an unavoidable result of the Project, either as a consequence of direct habitat loss, increased predicted disturbance impacts or habitat fragmentation. Alternatives for compensation of such unavoidable loss that were considered included compensation as close to the original site as was feasible, compensation elsewhere in the NDAs and compensation outside the NDAs, both in and beyond the NDA Study Area. For all but the first of these alternatives, consideration was also given as to whether areas chosen for compensation should be aggregated or constructed and maintained as separate areas.

It was decided that *in situ* compensation was appropriate and feasible. Consolidating the wetland compensation area in the LVNP was chosen as the most practical alternative for implementation and can meet the mitigation requirements.

The area of Long Valley proposed to be zoned as LVNP has been assessed as of High to Very High ecological value; however, it has been demonstrated from monitoring of bird diversity and distribution undertaken under the previous and current Management Agreements (MAs) in Long Valley that management with nature conservation objectives has the potential to increase both numbers and diversity of fauna.

At the present time MAs in Long Valley are voluntary and do not cover the whole of Long Valley; the managed area within the boundary of the proposed 37ha LVNP is approximately 10ha. There is, therefore, considerable scope to increase the extent of the managed area, approximately 70% currently not being under conservation management.

In addition, however, studies undertaken by CA and HKBWS have shown that of the different cultivation treatments adopted, less intensively managed wet agricultural land and shallow ponds have higher species richness than other habitats. Survey findings have also shown that, at least in shallow pond habitat, the attractiveness of such habitat to birds begins to decline after about four years; thus rotation of habitats is an important ongoing element of conservation management.

Accordingly, long-term and strategic management (i.e. provision of specific wetland types, periodic habitat changes and adoption of crop rotation) will be required to maintain and enhance the wetland function. These management issues are discussed further in the Preliminary Management Plan for the LVNP (**Appendix 13.10**).

Besides the management of LVNP, improvement of water supply system and construction of visitor centre would be carried out.

Planting for Relocation of Man Kam To Egretty at FLN

Loss of the Man Kam To egretty site would be a significant adverse ecological impact. It is proposed that loss of the egretty should be mitigated by appropriate planting of trees and bamboo to provide compensatory habitat for breeding ardeids, with the intention that this could provide an alternative nesting site for birds from the Man Kam To Road egretty.

A suitable location for reprovision of an egretty site has been identified in area A1-7 in FLN NDA. This area contains a former meander that was isolated from the Ng Tung River during channelization of the river. The meander is currently maintained by AFCD as mitigation for the ecological impacts of river channelization. The area is proposed to be zoned as

Conservation Area (CA) under in the revised RODP. Both of the adjacent areas (A1-3 and A1-9) are zoned for Agriculture in the revised RODP.

Reprovision of potential nesting locations should follow overseas practice for the creation of artificial nesting sites (for example Hafner 2000, White et al. 2008). The provision of suitable nesting locations should be relatively easy to achieve through planting appropriate species of trees and, especially, bamboo (*Bambusa eutuldoides*) which is particularly favoured by breeding ardeids. Once the trees and bamboos have reached a suitable size for breeding egrets, measures to attract breeding ardeids should be implemented, including placing decoys (models) in potential breeding sites and use of recordings of breeding ardeids to create an attraction to the site.

In addition, accidental or deliberate disturbance by people should be minimised by giving consideration to surrounding the site with water (it is currently surrounded by water on three sides) and fencing the site.

Site Formation

Site formation for the site in KTN and 2 sites in FLN for HKPF would be carried out in Package 1. Surplus inert C&D material generated in the site formation would be either reused in the concurrent projects or stored in the stockpiling areas in KTN and FLN NDAs for the earth filling works in later stage. Consolidation measures involve the installation of band-drains and surcharging would be adopted.

2.6.3 Package 2 & 3 – Remaining Infrastructure and Development at KTN

Site Formation

Site formation of the remaining developable area would be carried out in Package 2 & 3. The surplus inert C&D material generated in the previous packages would be reused for the earth filling works in Package 2 & 3.

Fill would be imported to the Site to fill the area to the site formation level. Appropriate sources of fill material would be identified in consultation with the Public Fill Committee and Environmental Protection Department.

Treatment of Arsenic-Containing Soil in KTN

Method of the treatment of arsenic-containing soil in Package 2 & 3 would be similar to the treatment method described in Advance Works Package.

Road Works and Utilities

Remaining road works and utilities will be constructed in Package 2 & 3. Except the construction of viaduct of Kwu Tung Interchange and Pak Shek Au Interchange, typical construction method for earthwork, utilities laying and paving will be adopted.

The construction of diversion channel will be carried out with proper site drainage provision as per EPD's Practice Note ProPECC PN 1/94, as the first step without disturbance to the existing flow. Upon completion of the diversion channel, temporary flow diversion and subsequent connection work at the junction between the existing and diverted channels will be scheduled to carry out during dry season with proper provision of silt removal facilities. The temporarily diverted flow will be discharged to the diversion channel until completion of connection work.

Fanling Highway Widening, Kwu Tung Interchange and Pak Shek Au Interchange

The substructures of the viaduct of Kwu Tung Interchange and Pak Shek Au Interchange will take the form of RC columns & pilecaps founded on RC bored-piles.

It is anticipated that the superstructures of the viaduct of Kwu Tung Interchange and Pak Shek Au Interchange will be constructed by cast in-situ deck method, which is a conventional method for construction of short span bridges and bridges with small turning radius.

Landscaping Works at Open Spaces and Amenity Areas

The method of carrying out landscaping works in Package 2 & 3 would be similar to the method described in Advance Works Package

Plant for District Cooling System at KTN

Construction activities for provisional DCS would include concrete foundation works, formworks, superstructures and the associated pipeworks.

2.6.4 Package 4 & 5 – Remaining Infrastructure and Development at FLN

Site Formation

Site formation of the remaining developable area would be carried out in Package 4 & 5. The surplus inert C&D material generated in the previous packages would be reused for the earth filling works in Package 4 & 5.

Fill would be imported to the Site to fill the area to the site formation level. Appropriate sources of fill material would be identified in consultation with the Public Fill Committee and Environmental Protection Department.

Road Works and Utilities

Remaining road works and utilities will be constructed in Package 4 & 5. Except the construction of viaduct of Fanling Bypass Western Section, typical construction method for earthwork, utilities laying and paving will be adopted.

Viaduct of Fanling Bypass Western Section

The construction method of both substructures and superstructures of viaduct of Fanling Bypass Western Section would be similar to the method of Fanling Highway Widening, Kwu Tung Interchange and Pak Shek Au Interchange abovementioned.

Shek Wu Hui Sewage Treatment Works – Further Expansion

The upgrading works of SWHSTW to be carried out in Package 5 would be similar to that in Advance Works Package.

Secondary Freshwater Service Reservoir and Flushing Water Service Reservoir (DP7)

The facilities and method of construction of the service reservoirs to be constructed in Package 4 would be similar to one in KTN in Advance Works Package.

Landscaping Works at Open Spaces and Amenity Areas

The method of carrying out landscaping works in Package 4 & 5 would be similar to the method described in Advance Works Package.

2.7 Implementation Programme

It is anticipated that the NDAs will be commissioned in phases. The construction major work is targeted to commence in Year 2017 and are summarised in **Table 2.11** below. The construction programme is shown in **Appendix 2.2**.

Table 2.11 - Construction Programme

Description	Work Period ¹	Description of Work
Infrastructure and development of Advance Works at KTN and FLN	2017 - 2024	<ul style="list-style-type: none"> • Site formation and infrastructure • Fanling Bypass (Eastern Section) • Management of Stockpiling material
First stage of infrastructure and development at KTN and FLN	2018 - 2021	<ul style="list-style-type: none"> • Site formation and infrastructure • Ecological compensation works • Sewerage and water supply networks • School, hospital, HKPF facilities and housing site • Fanling Bypass (Eastern Section) • STW Extension Phase 1B at FLN • Village resite in KTN and FLN • Secondary service reservoir • Trunk mains and distribution mains
Infrastructure and development at KTN (South)	2018 - 2029	<ul style="list-style-type: none"> • Site formation and infrastructure • Fanling Highway Widening • Kwu Tung Interchange • Pak Shek Au Interchange
Infrastructure and development at KTN (North)	2020 - 2028	<ul style="list-style-type: none"> • Site formation and infrastructure

Description	Work Period ¹	Description of Work
Remaining Infrastructure and development at FLN (East)	2021 – 2029	<ul style="list-style-type: none"> • Site formation and infrastructure • Secondary service reservoir • Trunk mains and distribution mains • Fanling Bypass (Western Section) • Po Shek Wu Interchange Improvement
Remaining Infrastructure and development at FLN (West)	2022 - 2028	<ul style="list-style-type: none"> • Site formation and infrastructure • STW Extension Phase 2

Note:

Works period of site formation for lots subject to village removal term (VRT) is not included.

2.8 Concurrent Project

The potential concurrent projects are identified in Table 2.12. Four projects may have potential cumulative impacts. Their impacts have been assessed in the individual sections of this EIA study. Locations of the concurrent projects are shown in **Figure 2.21 and 2.22**.

Table 2.12 - Evaluation of cumulative impacts due to concurrent projects in HKSAR

Concurrent Projects		Evaluation
1	Agreement No. CE42/2006(TP) Planning Study on Liantang/Heung Yuen Wai Cross-boundary Control Point and its Associated Connecting Roads in Hong Kong – Feasibility Study	A new Boundary Control Point (BCP) is proposed to be constructed at Heung Yuen Wai. The associated connecting road is within 500m study boundary of Fanling Bypass. Cumulative impact has been assessed for both construction and operational phases.
2	Agreement No. CE60/2005 (TP) Land Use Planning for the Closed Area – Feasibility Study (FCA)	The study is a strategic land use planning for the opening of Regulation of Shenzhen River Stage III. The new Closed Area boundary is put in place in late 2011 / early 2012. Since this project is in a strategic level, there is no major implementation programme for the associated infrastructure. Cumulative construction environmental impacts from this Project are therefore not considered. For the operational impact, the change in traffic due to the implication of land use planning for the closed area is taken into account.
3	Agreement No. CE22/2006(HY) Cycle	This project aims to provide an extension to the proposed cycle track network in the New Territories

Concurrent Projects		Evaluation
	Tracks Connecting North West New Territories with North East New Territories – Investigation, Design and Construction	and associated supporting and recreational facilities; comprising 3 major sections and 3 minor sections. According to the website of CEDD, the cycle track section from Sheung Shui to Ma On Shan has been under construction. And that from Sheung Shui to Tuen Mun will be under tender soon. However, this is considered far away from site and cumulative impacts from this Project are therefore not considered.
4	Agreement No. CE53/2008(CE) Planning and Engineering Study on Development of Lok Ma Chau Loop - Investigation	The Development of the LMC Loop comprises the buildings, landscape and supporting infrastructure within and adjacent to the site. The eastern connection road lies within the study area of KTN NDA. Since the construction programme is likely to be concurrently with the LMC Loop, cumulative impact has been assessed for both construction and operational phases.
5	Construction of a Secondary Boundary Fence and new sections of Primary Boundary Fence and Boundary Patrol Road	The existing boundary fence from Mai Po to Lin Ma Hang will be reproduced or a secondary boundary fence will be erected under this project. The whole construction is expected to commence in 2011-2012 for completion in 2015-2016. Since this project will be completed prior to the commencement of NDA construction, cumulative environmental impact is not anticipated.
6	The proposed Northern Link of the railway	The railway alignment and implementation programme of the Northern Link is currently under review in the "Review of Second Railway Development Study (RDS-2U)" undertaken by the Railway Development Office (RDO), Highway Department. In accordance with the Working Paper on the Northern Link circulated by RDO, it is noted that there are two preferred alignments for Northern Link to be proceeded to further study. Since this project is still in planning stage and there is no implementation programme yet, cumulative impacts from this Project are therefore not considered.
8	Agreement No. CE 20/2004(EP) North East New Territories (NENT) Landfill Extension – Feasibility Study	A Strategic Plan under this Study was developed for the landfill extensions and new sites for the disposal of solid wastes in the next 50 years. The proposed extension is southeast adjacent to the existing NENT Landfill and is outside the 500m study boundary of PC/TKL NDA which is subject to replanning in later stage. Thus, cumulative environmental impact is not anticipated.

Concurrent Projects		Evaluation
9	Development of a Poultry Slaughtering and Processing Plant in Sheung Shui	According to the Government Press Release on 1 st June 2010, the development of a poultry slaughtering centre would be shelved. Cumulative impacts from this Project are therefore not considered.
10	Drainage Master Plan Review for Yuen Long and North Districts	In view of changes in land uses and new developments planned within the northern area, this project has conducted numerical models for evaluating the hydraulic performance of the major rivers/channels. Further drainage improvement works for major rivers, upstream channels and the local flooding spots would be proposed by this project. The proposal is expected to be finalised in late 2010. Since the proposals of drainage works has not yet been finalised, cumulative impacts from this Project are therefore not considered.
11	Widening of Tolo Highway/ Fanling Highway between Island House Interchange and Fanling (Stage 2)	The project comprises (1) widening of a section of Fanling Highway of approximately 3 kilometers (km) long between Tai Hang and Wo Hop Shek Interchange from dual three-lane to dual four-lane carriageway; and (2) widening of the southbound slip road at Wo Hop Shek Interchange. The tentative completion date of the project is from Yr 2015 to Yr 2018 but is still under review by HyD. Cumulative impacts from this Project have been assessed for both construction and operational phases.
12	Construction of cycle tracks and the associated supporting facilities from Sha Po Tsuen to Shek Sheung River	This Project (the EIAO DP portion) is for the Priority Phase of the proposed Cycle Track Network recommended in the FS. According to the discussion with CEDD, the construction period is Yr 2014 – 2017. Cumulative impacts from this Project are thus considered.
13.	Planning and Engineering Study for Kwu Tung South - Feasibility Study	This project is under review and planning. No detailed information was available and thus not taken into account.
14.	Site formation and associated infrastructural works for development of columbarium, crematorium and related facilities at Sandy Ridge Cemetery	This Project comprises mainly the site formation of about 10 hectares of land and provision of associated infrastructural works, including roads, viaducts, tunnel, pedestrian walkway between Lo Wu MTR Station and the proposed columbarium facilities, drainage and sewerage works, waterworks and other utility services. The site formation and associated infrastructural works will include designated projects under

Concurrent Projects		Evaluation
		<p>Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499), such as road bridges and widening of a district distributor road, etc. which require environmental permits prior to construction and operation. An EIA will be conducted to address the environmental impact and mitigation measures will be proposed if necessary.</p> <p>The site formation works will be carried out by phases for completion in 2022.</p> <p>The location is far away from the sensitive uses from NDA sites (>500m) and thus not taken into account in this EIA.</p>
15.	Regulation of Shenzhen River Stage IV	This project forms a part of Drainage Master Plan Study in Northern New Territories. The location of this project is about 5km away which is far away from site. The environmental impact including water quality would be mitigated to acceptable levels. Thus, cumulative environmental impact is not anticipated.
16.	Development of Organic Waste Treatment Facilities, Phase 2	This Project comprises mainly the construction and operation of Organic Waste Treatment Facilities, Phase 2 in Sha Ling. The project would be completed by 2016. The proposed location is more than 500m from the boundary of the FLN NDA. Moreover, the environmental impact including air quality would be mitigated to acceptable levels. Thus, cumulative environmental impact is not anticipated.
17.	Provision of Cremators at Wo Hop Shek Crematorium	This Project comprises mainly the demolition works in Phases I and II and the provision of seven cremators in Phase I as well as the additional two cremators under the future expansion phase. The construction works would be completed by 2014 before the commencement of NDAs project. The environmental impact in operation stage would be mitigated to acceptable levels. Since the proposed location is within 500m from the proposed NDA associated road network, the cumulative operational environmental impact has been considered.
18.	EIA study for SCL (HUH – ADM)	The proposed Access Road at Lo Wu is an extension of the existing Drainage Services Department (DSD)'s maintenance access road adjacent to the Sheung Shui Treatment Works for

	Concurrent Projects	Evaluation
		connecting to the existing Lo Wu Marshalling Yard which is currently serving the East Rail Line. Works activities for the proposed access road extension would only involve minor construction works such as site clearance, road formation and concrete road slab laying, lasting for a short duration of about one month. The likely environmental impacts associated with the proposed works would mainly relate to the construction impacts. Considering that the proposed works would be minor in nature, limited scale (less than 20m) and short-term (last for about one month), significant cumulative environmental impacts arising from its construction is not anticipated.