

Technical Study on Partial Development of Fanling Golf Course Site - Feasibility Study Project Profile

{prepared in accordance with the Environmental Impact Assessment Ordinance
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Civil Engineering and Development Department

Project Profile

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DRAWING LIST

Drawing No.

CDNNORZ0010 Partial Development of Fanling Golf Course Site – General Layout Plan

1. BASIC INFORMATION

1.1 Project Title

1.1.1 Technical Study on Partial Development of Fanling Golf Course Site - Feasibility Study

1.2 Purpose and Nature of Project

1.2.1 The 2013 Policy Address states that the feasibility of taking forward the further development of the New Territories North (NTN) needs to be studied with a view to developing a modern new town there of a similar scale as the Fanling/Sheung Shui New Town.

1.2.2 Accordingly, PlanD and CEDD of the Government of the HKSAR commissioned Ove Arup & Partners Hong Kong Limited in early 2014 to undertake the Agreement No. CE42/2013 Preliminary Feasibility Study on Developing the New Territories North (the NTN Study). The NTN Study has also explored the potential of developing the Fanling Golf Course (FGC) site. The full development option and partial development option of FGC site have been examined.

1.2.3 The FGC site was one of the land supply options under the 5-month public engagement launched by the Task Force on Land Supply starting from April 2018. In December 2018, the Task Force recommended the Government to accord priority to studying and resuming the 32 ha of land of the FGC to the east of Fan Kam Road under the partial option. The 32 ha of land east of Fan Kam Road of the FGC will be developed for the purpose of housing development (with emphasis on public housing)(referred hereafter as partial development of the FGC site), and CEDD will accordingly commence a detailed technical study to ascertain the number of housing units to be provided.

1.2.4 The technical study shall also determine the scope of the Infrastructure Works required for housing development; assess various impacts due to the provision of these infrastructures and housing development; and recommend the mitigation measures to keep the potential impacts within the acceptable level of the current standard/regulation. The technical study shall take into account the cumulative demand/impact of other adjoining existing, planned, committed and possible developments to establish the recommended Infrastructure Works and the required mitigation measures.

1.3 Name of Project Proponent

1.3.1 The Project Proponent is North Development Office (NDO), Civil Engineering and Development Department (CEDD) of the Government of the HKSAR.

1.4 Location and Scale of Project and History of Site

- 1.4.1 The location of the Project is shown in Drawing No. CDNNORZ0010.
- 1.4.2 The FGC site is located to the southwest of Sheung Shui town centre, and the closest point of the FGC site is within 800m from Sheung Shui Railway Station. The golf course is composed of three distinct 18-hole courses (the Old, New and Eden Courses, built in 1911, 1931 and 1970 respectively) set within about 170 ha of land.
- 1.4.3 The FGC site is currently not covered by any statutory Outline Zoning Plan. To the north, west, south and southeast of the FGC site are mainly rural areas under “Village Type Development”, “Green Belt”, “Agriculture”, “Recreation”, “Government, Institution or Community”, “Residential (Group C)” zones and “Comprehensive Development Area” zones for low-rise development (Lin Tong Mei Tsoi Yuen). To the northeast and further north across Fanling Highway, it is the Fanling/Sheung Shui New Town, of which land use zones with higher development intensity are found, such as the “Residential (Group A)” zone with a plot ratio of 5 to 7.
- 1.4.4 Under the option of partial development, a part of the FGC site to the east of Fan Kam Road of about 32 ha (which is identified as the potential development area, or PDA) will be released for comprehensive planning and development. The majority of the PDA is within the Old Course, with relatively thick tree clusters arranged linearly around individual fairways. Mature trees are also found along both sides of Fan Kam Road, the major access road to the FGC site. An open-air car parking lot for the golf club is located at the northern part of the PDA. Individual ancestral graves are scattered within the PDA while a large hilly site to the south of the golf course is demarcated as burial grounds.
- 1.4.5 Within the PDA, housing development (with emphasis on public housing) together with supporting infrastructure, government, institution or community facilities and open space will be proposed while some areas will be preserved as green belt.
- 1.4.6 The works for the Project include site formation works and the associated infrastructure works, which would include the necessary slope works, road works, sewerage works, sewage pumping station, sewage treatment works, drainage works, waterworks, utility works, etc. within or outside the assessment area for serving the proposed residential development. The scope and details of the associated infrastructure works would be identified and confirmed in the technical study.
- 1.4.7 This Project Profile is prepared for application to the Director of Environmental Protection for an Environmental Impact Assessment (EIA) Study Brief for the Project.

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

1.5.1 The proposed development at the PDA has an area of about 32 ha, with a preliminary estimated total population of about 13,000 (with possible adjustment subject to the review results in the technical study). It falls within Item 1 under Schedule 3 of the Environmental Impact Assessment Ordinance (EIAO), i.e. "Engineering feasibility study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100,000" and is therefore a Designated Project requiring an EIA report.

1.5.2 Schedule 2 Designated Projects under the EIAO may be identified in the course of the technical study. In particular, the following elements may be proposed under the technical study for the residential development. They are Designated Projects under Schedule 2 of the EIAO and are thus included in this Project Profile :-

- (i) Construction of sewage treatment works with an installed capacity of more than 5,000m³/day and a boundary of which is less than 200m from the nearest boundary of an existing or planned residential area. [under Schedule 2, Part I, F.2]
- (ii) Construction of a sewage pumping station with an installed capacity of more than 2,000m³/day and a boundary of which is less than 150m from the nearest boundary of an existing or planned residential area. [under Schedule 2, Part I, F.3]
- (iii) An activity for the reuse of treated effluent from a treatment plant. [under Schedule 2, Part I, F.4]

1.6 Name and Telephone Number of Contact Person

1.6.1 All queries regarding the Project can be addressed to:

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2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Implementation

- 2.1.1 The Project Proponent, NDO of CEDD, subject to the final recommendation of the technical study, will be responsible for implementing the proposed works, together with all the environmental mitigation measures, the environmental monitoring and audit requirements as specified in the EIA Report of this Project to be prepared under the EIA study.
- 2.1.2 The Consultants of the technical study are responsible for undertaking the EIA study according to the Study Brief to be issued by the Director of Environmental Protection and responding on behalf of the Project Proponent on issues related to the EIA.
- 2.1.3 The construction works of the proposed site formation and infrastructure works to serve the development will be carried out by the contractors to be appointed under works contracts.

2.2 Project Time Table

- 2.2.1 The technical study including the EIA study is targeted to commence in Q3 2019 for completion in Q3 2021. Outline implementation programme for the development will be formulated under the Study.

2.3 Interactions with Other Projects

- 2.3.1 Potential projects that would interface with the partial development of the FGC site have been identified and are listed below. Implementation of some of these projects has yet to be approved. This list should be re-visited during the EIA study to ensure all the latest projects that might have interface with the proposed development in the FGC site are taken into account.
- (a) Site Formation and Infrastructure works for Housing Developments in North District;
 - (b) Development of Kwu Tung North and Fanling North New Development Areas (including Fanling Bypass Eastern Section and other associated works);
 - (c) Liantang/Heung Yuen Wai Boundary Control Point and Associated works;
 - (d) Proposed developments in the New Territories North;
 - (e) Drainage Improvements at North District;
 - (f) Shek Wu Hui Sewage Treatment Works – Further Expansion;

- (g) Water Supply to New Housing Developments in Sheung Shui and Fanling;
- (h) Fanling Highway Widening Contract;
- (i) Hong Kong 2030+ : Towards a Planning Vision and Strategy Transcending 2030;
- (j) Railway Development Strategy 2014 and other railway proposals
- (k) Po Shek Wu Road Interchange improvement;
- (l) Provision of Barrier-free Access Facilities for Highway Structures;
- (m) Queen's Hill Development;
- (n) The Police Facilities in Kong Nga Po;
- (o) The Establishment of an Agricultural Park in Kwu Tung South;
- (p) Comprehensive Development Area in Kwu Tung South;
- (q) Private housing development at Oi Yuen on Castle Peak Road – Kwu Tung;
- (r) Extension of North District Hospital;
- (s) The Site Formation and Associated Infrastructure Works for Proposed Development of Columbarium, Crematorium and Related Facilities at Sandy Ridge Cemetery – Design and Construction;
- (t) The Expansion of Wo Hop Shek Crematorium – Site Utilization for Capital Works Projects; and
- (u) Any planned/committed developments projects in Fanling/Sheung Shui area under the Policy Address 2013-2018, including the proposed public housing developments at Areas 4, 17, 27, 30, 35, 36, 48 and 49 and Po Shek Wu Road, the proposed subsidized housing development at Jockey Club Road (Area 11) and HKHS mixed housing development at Pak Wo Road, the proposed redevelopment of Junior Police Officers Married Quarters at Fan garden and the private housing development at Pak Wo Road.

2.3.2 The EIAs for the above projects, if required, will be conducted by their respective proponents. The Project EIA will consider the environmental effects of these projects (i.e. cumulative effect) on the partial development of the FGC site.

3. POSSIBLE IMPACTS ON THE ENVIRONMENT

3.1 Outline

3.1.1 All the environmental impacts as listed in Annex 1 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO - TM) have been reviewed. The following environmental impacts, which may arise during the construction, operation of the Project are described in the coming sections of this chapter.

- dust (e.g. fugitive dust)
- odour (e.g. municipal waste)
- noisy operations (e.g. fixed noise source)
- night-time operations (e.g. fixed noise source)
- traffic generation (e.g. induced traffic)
- liquid effluents, discharges (e.g. sewage)
- generation of waste or by-products (e.g. construction waste)
- storage, use, handling, transport, or disposal of dangerous goods, hazardous materials or wastes (e.g. diesel fuel)
- disposal of spoil material, including potentially contaminated material
- disruption of water movement or bottom sediment (e.g. watercourses)
- visual appearance
- ecological impacts

3.2 Air Quality

Construction Impacts

3.2.1 Construction works include site clearance, site formation, the infrastructure provision and any other infrastructure activities. Air quality impacts may arise from fugitive dust emissions generated from excavation, material handling, truck movement, rock crushing and screening, drilling and other construction activities.

Operational Impacts

3.2.2 The major permanent sources of air pollutants are the vehicular emissions from traffic on major roads and the internal roads of the PDA and the Fan Kam Road adjacent to the site. Odour from the proposed sewage treatment works, sewage pumping station, refuse collection points as well as the drainage channels and nullahs are other potential sources of air pollution.

3.3 Noise

Construction Impacts

3.3.1 During the construction phase, construction noise will be generated by various

construction activities such as operation of construction plant and use of powered mechanical equipment (PME) in excavation, concreting, compaction works and material handling activities. The extent and significance of construction noise impacts would depend on the scale of construction activities, number of PME in operation, duration of construction activities, number of construction vehicle movements, etc.

Operational Impacts

- 3.3.2 The traffic flow in major existing roads in the vicinity of the site include the San Tin Highway, Fanling Highway, Tolo Highway, Heung Yuen Wai Highway, Sha Tau Kok Road, Castle Peak Road, Po Shek Wu Road, Man Kam To Road, Fan Kam Road and the critical road links within the Area of Influence under the TIA, will be increased to cater for the increasing population. The future noise environment will be primarily affected by road traffic noise and fixed noise sources such as the proposed sewage pumping station and either the existing or relocated Fanling Raw Water Pumping Station.

3.4 Water Quality

Construction Impacts

- 3.4.1 The partial development of FGC site will involve various construction activities undertaken at various time durations. The activities, which will have likely impact on water quality, include site formation, sediment removal, concrete washings, construction of pilings, construction and upgrading of road network, site workshop or depot and sewage effluent from the workforce. The adverse impacts may comprise additional runoff, increase of suspended solids, pH value and turbidity levels, spillage of waste oils and generation of additional sewage and wastewater. The potential impacts on the nearby surface water associated with construction works will need to be addressed.

Operational Impacts

- 3.4.2 Potential water pollution sources during operational phase will include sewage generated by residents, visitors and workers, as well as other activities within the area, such as commercial activities, etc. in the potential development. The additional sewage flow arising from the PDA may be conveyed and discharged to the existing Shek Wu Hui Sewage Treatment Works (SWH STW). It may cause adverse impact on existing sewerage system conveying sewage flows from Fanling and Sheung Shui to SWH STW and upgrading works will likely be required. An alternative option is to provide on-site self-contained Sewage Treatment Works (STW) with tertiary level treatment, the treated sewage effluent could either be reused entirely for toilet flushing and irrigation at PDA and FGC or be discharged to the existing drainage system. “No Net Increase in Pollution Loads Requirement in Deep Bay” will be incorporated into the design by considering cumulative sewerage catchment in the vicinity.

- 3.4.3 For the on-site STW option, provision of co-digestion system with pre-treated organic waste from internal and external sources should be explored if sludge digestion is employed.

3.5 Waste Management

Construction Phase

- 3.5.1 The construction activities of the proposed development would generate a variety of wastes including construction and demolition (C&D) materials and chemical waste. The wastes arising from construction will largely consist of excavated and demolished C&D materials during earthworks and demolition works, chemical waste, and general refuse. The quantities of wastes to be generated during construction of the proposed development will largely depend on the programme of various works packages and also require off-site disposal.

Operational Phase

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

3.6 Ecology

- 3.6.1 There are various habitats within the PDA including plantation, golf-course grassland, secondary woodland, watercourse and ponds. Apart from the lawn and bunkers within the PDA, long strips of plantation and secondary woodland of considerable sizes with mature trees have certain ecological values by providing quite diverse terrestrial habitat for fauna utilization, particularly mammals. Water bodies, mainly semi-natural watercourses and ponds, were also found to support faunal species of conservation importance.
- 3.6.2 A considerable number of seedlings and tree specimens of the protected species *Aquilaria sinensis* (protected under Cap. 586) are present in widespread parts of the PDA, and a comparatively large tree group with a mixture of this species and other native tree species is present at the southern tip of the PDA, near Tai Lung Experimental Farm. *Aristolochia tagala* (also known as Indian Birthwort) had been recorded along the western boundary of the PDA and south of the PDA near entrance of Tai Lung Experimental Farm. Also, *Glyptostrobus pensilis* (also known as Chinese swamp cypress) had been recorded at the woodland at the south of the subject site.
- 3.6.3 There are several small watercourses scattered through the PDA, most of which have been modified into ditches or concrete-lined channels. However, one of these to the west of Tai Lung Experimental Farm retains a relatively high degree of naturalness. A high abundance of the globally threatened freshwater crab *Somanniathelphusa zanklon*, and

the freshwater fish of conservation significance Small Snakehead *Channa asiatica* were recorded in this watercourse. Considerable numbers of *Aquilaria sinensis* seedlings were recorded along the riparian corridor.

- 3.6.4 Other species of ecological significance recorded in the FGC included terrestrial mammals (Masked Palm Civet, Small Indian Civet, Red Muntjac, Leopard Cat, etc.), bat (Short-nosed Fruit Bat, Intermediate Horseshoe Bat, Himalayan Leaf-nosed Bat, Chinese Noctule, Japanese Pipistrelle, Lesser Bamboo Bat, Lesser Yellow Bat, etc.), avifauna (Eastern Cattle Egret, Brown Fish Owl, etc.), herpetofauna (Reeves' Turtle, Chinese Water Snake, etc.), butterfly (Common Rose, Common Birdwing, etc.) and moth (*Spiralisigna gloriae*, *Fustius sterling*, etc.).

Construction Phase

- 3.6.5 During construction phase, potential ecological impacts will possible include:

- (i) Habitat loss and habitat fragmentation resulting from land take for development;
- (ii) Direct loss and impacts to watercourses and ponds;
- (iii) Impacts to wildlife as a result of isolation and fragmentation of ecological habitat; and
- (iv) Impacts to the surrounding habitat and associated wildlife due to physical disturbance of this habitat, increased human activity, inappropriate storage or dumping of construction material.

Operational Phase

- 3.6.6 The proposed development may cause impact to important habitat and ecology resources. Impacts to the surrounding habitat and associated wildlife due to increased human activities/disturbance associated with the operation of the proposed development are expected.

- 3.6.7 The cumulative impacts during the construction phase / operation phase arising from other interfacing projects will be considered and assessed in the Project EIA.

3.7 Cultural Heritage

- 3.7.1 There are three graded historic buildings within the FGC and two of them are located nearby the PDA. Built Heritage Impact Assessment should be conducted for any development or infrastructure projects proposed within 200m of built heritage resources.

- 3.7.2 According to the information provided by the Hong Kong Golf Club, individual ancestral graves (around 18 nos.) are scattered within the PDA. A large hilly site to the south of the golf course is demarcated as burial grounds.

- 3.7.3 The Po Leng Site of Archaeological Interest (AM99-1488) is located about 650m from the PDA. Field investigations yielded a few Tang/Song dynasty ceramic sherds from the site in 1999. Cultural remains of Ming and Qing periods were also found in 2002.
- 3.7.4 At Ping Kong village located about 230m from the PDA lies an area of archaeological interest. Ming/Qing dynasty pottery Blue and White sherds and red clothed and greyish tiles were noted in the fields located at the rear of the village. Historical villages with archaeological potential can be found in the wider vicinity at Tong Kung Leng and Lin Tong Mei.
- 3.7.5 Potential impacts on identified cultural heritage resources within the PDA and associated infrastructure and impacts on identified sites of archaeological interest may arise from the construction works in damage to or loss of buried archaeological sites by:
- (i) Disturbance through excavation at or near an archaeological site, topsoil stripping and the passage of heavy machinery on exposed and buried deposits;
 - (ii) Change in the water table due to construction and development activities;
 - (iii) The burial of sites resulting in limitation on accessibility for future archaeological investigations (including surface survey and remote sensing techniques) and obscuring visible surface evidence;
 - (iv) Ground compaction due to construction activities or the weight of permanent filled materials may cause damage or distortion to buried archaeological remains, especially in soft alluvial deposits; and
 - (v) Indirect impacts such as visual, vibration, settlement, titling and noise intrusion on the setting and amenity of historic and cultural resources.
- 3.7.6 An archaeological survey will be conducted to identify the potential archaeological sites and graded buildings within and in vicinity to the PDA. Both built heritage impact assessment and archaeological impact assessment will be carried out in a cultural heritage impact assessment to be conducted under the EIA study.

3.8 Land Contamination

- 3.8.1 The golf course could be a contaminated land as the sources of contamination mainly come from the use of turf grass chemicals (i.e. fertilizers and pesticides, including fungicides, herbicides and insecticides).
- 3.8.2 Chemicals (e.g. heavy metals, Arsenic (As), Antimony (Sb), Lead (Pb)) could possibly present in soil in the PDA arising from anthropogenic input and natural occurrence.

- 3.8.3 The actual land contamination impact on the concerned area can only be determined and verified by means of Site Investigation (SI) to be conducted at the detailed design study.

Construction Phase

- 3.8.4 The construction activities of the proposed development would involve excavation of contaminated soil during earthworks and subsequent disposal where encountered. The storage and handling of this waste may have the potential to cause environment impact and potential health risks to site workers.

Operational Phase

- 3.8.5 The contaminated land impacts may induce potential health risks to future users of the sites. The land contamination issue and its impact within the site will be identified and assessed.

3.9 Landscape and Visual

- 3.9.1 The cluster of trees in the PDA, which are landscape, fairway and woodland with many trees considered as potential Old and Valuable Trees (OVTs), symbolizes the long history of FGC development since year 1911. The vegetation of the project area is of typical secondary forest in the northern New Territories.
- 3.9.2 Potential OVTs (including trees with a DBH over 1000mm) and protected species in Hong Kong in accordance with the “Rare and Precious Plants of Hong Kong” possess significant amenity value. The survival rate of potential OVTs after transplanting is low due to their maturity.
- 3.9.3 The partial buried and partial exposed Dongjiang water mains along the Fan Kam Road may need to be realigned under the development, and lead to change of vegetation including additional tree felling or transplanted, or change the outlook of the features like slope cutting. No new plants can be grown above the water mains under any new works.
- 3.9.4 Due to permanent loss of the partial FGC site and fundamental change in visual character in the area, it is considered that the development will generate substantial landscape and visual impacts during both construction and operational phases before mitigation.
- 3.9.5 The expected sources of landscape and visual impacts arising from the potential development are as follows.

Construction Phase

- (i) Loss of landscape elements, e.g. trees, fishponds and natural topography;
- (ii) Loss of visual amenity through removal of landscape elements e.g. trees;

- (iii) Visual appearance of any temporary use prior to full development;
- (iv) Construction activities on newly formed areas and existing available land; and
- (v) Obstruction of, or intrusion into views by the development.

Operation Phase

- (i) Incompatibility with the surrounding landscape context, in particular the interfacing area of the proposed PDA and surrounding non-development area;
- (ii) Permanent loss of Landscape Resources (LRs)/ Landscape Character Areas (LCAs), such as loss of topography, vegetation, underground water table, agricultural land, recreational open space, green buffer, etc.;
- (iii) Residual impacts from loss of trees and vegetation during the construction phase would generate negative landscape and visual impacts in the short term until compensation planting has established and replaced these resources;
- (iv) Visual intrusion and obstruction created by the development;
- (v) Glare from direct or reflected sunlight or man-made light source from the development; and
- (vi) Visual quality of the new development.

3.10 Fisheries

- 3.10.1 Fish ponds are present within 500m area from the boundary of the PDA located southeast of Agriculture, Fisheries and Conservation Department (AFCD)'s Tai Lung Experimental Station. Any fish ponds/ fisheries resources/ fisheries activities at and in the vicinity of the PDA will be identified, and potential impacts to the fisheries will be assessed in a fisheries impact assessment (FIA) to be conducted under the EIA study.

4 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

4.1 Surrounding Environment including Existing and Planned Sensitive Receivers

- 4.1.1 All the existing and planned sensitive receivers and sensitive parts of the natural environment which might be affected by the Project as listed in Annex 1 of the EIAO-TM have been reviewed. The following sensitive receivers and sensitive parts of the surrounding environment which might be affected by the Project are identified below, subject to the EIA study:

Table 4.1

Sensitive Receivers	Land Use	Location relative to the PDA	Approximate Distance from the PDA (m)
Ching Ho Estate	High-density public housing	Northeast	160
Cheung Lung Wai Estate			50
Tai Ping Estate			350
On Po Tsuen	Low-density residential developments / Village	East	50
Ping Kong Village			150
Lin Tong Mei Tsoi Yuen		Southwest/ South	250
The Green			270
Tai Lung			500
Lin Tong Mei	210		
Tai Lung Experiment Station of the AFCD	Industry	East	170
Hong Kong Canine Working and Agility Club Limited (HKCWAC)		East	120
North District Hospital	Health care facilities	Northeast	100
Buddhist Li Chong Yuen Ming Nursing Home for The Elderly			340
Mother of Christ Church	Places of worship	Northeast	350
Ping Kong Tin Hau Temple		East	150
Tung Wah Group of Hospitals Ma Kam Chan Memorial Primary School	School	Northeast	100
HKCKLA Buddhist Wisdom Primary School			80
Elegantia College			100
Tsang Mui Millennium School			150
The Hong Kong Golf Club	Recreation	West	100
Watercourses	Watercourses	Within/in the vicinity of the area	Varies
Fishponds	Fishponds	Southeast of Tai Lung Experimental Station	300m
Planned/committed residential developments	Residential	Varies	Varies

4.2 Surrounding Environment that might affect the PDA

4.2.1 The existing and/ or relevant past land use(s) on the Project Site have been reviewed and are described in Section 1.4. The major elements of the surrounding environment and existing and/ or relevant past land use(s) which might affect the area in which the Project is proposed to be located as listed in Annex 1 of the EIAO-TM have also been reviewed. The elements considered relevant to the Project are listed below and will be further

considered in the EIA study:

- (i) The major existing roads in the vicinity of the PDA include the Fanling Highway, Fan Kam Road;
- (ii) Few existing brownfield sites located at the eastern side of the PDA;
- (iii) Existing canine boarding site at On Po Tsuen; and
- (iv) Existing Fanling Raw Water Pumping Station.

4.3 Air Quality

4.3.1 The study area for air quality impact assessment is defined as within 500m from the boundary of the PDA. These include domestic premises, clinics, schools, educational institutions, offices, factories, places of public worship, home for the aged and active recreational activity areas as listed in **Table 4.1**. The abovementioned potential air sensitive receivers (ASRs) are not exhaustive and indicative only, more potential air sensitive receivers will be identified in the EIA report. Potential air sensitive uses within the PDA will be identified based on the proposed land use under the technical study.

4.3.2 The southern portion of the PDA would be developed with low-rise residential and leisure use that the incoming wind would be easily skim through and serve the Sheung Shui and Fanling Town under S/SSW wind.

4.3.3 The high-density residential development at the northeastern part of the PDA would potentially shield the developed town at the leeward side under SW/WSW wind direction.

4.3.4 The major permanent sources of air pollutants are the vehicular emissions from traffic on major roads and the air pollutants emitted from the vicinity of the industrial stationary sources. Chimney emissions associated with nearby industrial premises and North District Hospital are the stationary air pollutant sources.

4.4 Noise

4.4.1 The existing noise environment within the PDA is dominated by the traffic on the existing major roads in the vicinity of the PDA include the Fanling Highway and Fan Kam Road, which is trunk road and rural road respectively

4.4.2 Isolated industrial operations in the brownfield sites scattered in the proximity of the PDA development and the pumping operation in the Fanling Raw Water Pumping Station also considered as a fixed noise source.

4.4.3 The PDA is located outside the Noise Exposure Forecast 25 (NEF 25) Contour of the Hong Kong International Airport (HKIA) under the Three-Runway System (3RS)

operations, however the PDA is close to a new departure flight path to be in use under the 3RS operations in future.

4.4.4 The PDA is located at more than 600 m away from the Fanling Lodge Helipads and 6 km away from the Shek Kong Airfield.

4.4.5 The noise impacts from the operation of the 3RS, the Shek Kong Airfield and the Fanling Lodge Helipads shall be assessed in the EIA stage with more operation details provided.

4.4.6 The study area for noise impact assessment is defined as within 300m from the boundary of the PDA. These include domestic premises, clinics, schools, educational institutions, offices, factories, places of public worship, home for the aged and active recreational activity areas as listed in **Table 4.1**. The abovementioned potential noise sensitive receivers (NSRs) are not exhaustive and indicative only, more potential air sensitive receivers will be identified in the EIA report. Potential noise sensitive uses within the PDA will be identified based on the proposed land use under the technical study.

4.5 Water Quality

4.5.1 The PDA falls within the sewerage catchment of the SWH STW. After treatment at the STW, the treated effluent is discharged into Ng Tung River and eventually to Deep Bay through existing sewerage system. Sewage flows from FGC are currently managed on site and there is no public sewerage system within the PDA. According to the findings in the NTN Study, the existing and planned sewerage capacities in the North District, including planned expansion of the SWH STW, have no surplus capacity of catering for the FGC development.

4.5.2 The water quality sensitive receivers (WSRs) for the PDA include rivers, channelized nullahs, canals, wetlands, and other water courses. Existing WSRs are identified within the 500m assessment boundary of the PDA as tabulated below. The list of WSRs are not exhaustive and additional WSRs identified during the course of the study should be included.

Description of Existing WSRs	Status	Approximate Distance from PDA (m)
Fanling Stream	Watercourse of ecological importance	350
Sheung Yue River (River Beas)	Channelized nullah	550
Rivers near Fu Hei Garden	Channelized nullah	200
Fish Ponds	Active fish ponds	300

4.6 Waste Management

4.6.1 The existing solid waste arising from the FGC and vicinity area include domestic waste from village houses, agricultural waste, commercial/industrial waste generated from open storage and informal industrial uses

4.7 Ecology

4.7.1 Highly anthropogenic developed areas, mainly as villages, low-rise residential areas and open space, are the major habitat adjacent to the PDA. Habitats in the adjacent areas of the PDA considered of potential ecological concern include three fung shui woodlands (Kam Tsin, Hang Tau and Lin Tong Mei), various seminatural or channelised watercourses (mainly near Ping Kong), secondary woodlands of considerable sizes in Tai Lung, Ying Pun and Tsiu Keng, and extensive agricultural land in Tsiu Keng, Ha Kung Tei, Ping Kong and Po Leng.

4.7.2 There are several fragmented ponds in the FGC and are highly disturbed by various anthropogenic facts such as regular turf and horticultural management. However, a number of species of conservation importance, including the endemic freshwater crab *Somanniathelphusa zanklon*, the globally threatened Reeves' Turtle (EN (IUCN 2014) and Chinese Bullfrog (PGC Fellowes *et al.* 2002) were found in the ponds.

4.8 Cultural Heritage

4.8.1 The golf course itself is not recognized as a historical resource but there are three graded historic buildings are located within the FGC:

- Half-way House, the Hong Kong Golf Club FGC (Grade 3)
- Fanling Lodge, Kwu Tung, Sheung Shui (Grade 1)
- Clubhouse, The Hong Kong Golf Club FGC, Fan Kam Road, Fanling (Grade 2)

4.8.2 According to the information provided by the Hong Kong Golf Club, there are currently 69 Chinese graves and 80 urns in the FGC. These graves are scattered on the FGC. Surrounding villagers are allowed to access to the graves at all times in the year to worship their ancestors.

4.8.3 The Po Leng Site of Archaeological Interest (AM99-1488), as mentioned in Paragraph 3.7.3, is located approximately 600m from the PDA.

4.8.4 An archaeological survey will be conducted to identify the potential archaeological sites and graded buildings within and in vicinity to the PDA.

4.9 Land Contamination

4.9.1 The present land uses that give rise to potential concern for land contamination mainly come from the use of turf grass chemicals (i.e. fertilizers and pesticides, including fungicides, herbicides and insecticides).

4.9.2 Based upon the remote and undeveloped location of the PDA, the number of sensitive receivers likely to be impacted by the identified contamination concerns is expected to be limited to, current land users and future site workers employed during the construction phase of the project.

4.10 Landscape and Visual

4.10.1 The composition of landscape elements within the project area mainly consists of grassland, woodland, plantation and watercourses.

4.10.2 A total of 13 nos. of LRs could be identified in the PDA and adjoining areas (within 500m assessment area in the PDA), among which high sensitivity are listed as follows:

- Agricultural Land
- Pond
- Natural Stream
- Fung Shui Woods
- Secondary Woodland
- Golf Course in FGC

4.10.3 A total of 8 nos. of LCAs could be identified in the PDA and adjoining areas (within 500m assessment area in the PDA), and classified into different major categories as follows:

- Settled Valley Landscape
- Upland and Hillside Landscape
- Rural Inland Plain Landscape
- Golf Course Landscape
- Miscellaneous Rural Fringe Landscape
- Institutional Landscape
- Transportation Corridor Landscape
- Residential Urban Landscape

4.10.4 The PDA is located on predominantly level terrain surrounded by a mountainous backdrop and surrounded by upland hillsides and the development pattern within the

local landscape is a mixture of low rise villages, open storage, industrial and commercial uses. The PDA is bordered by peak and ridgelines of mountains which form a continuous and large scale backdrop beyond the boundaries.

- 4.10.5 The scale of the development is of such a nature that it will alter the existing landscape character of the PDA as a whole. Visual sensitive receivers will be identified for environmental impact assessment during the EIA study.

4.11 Fisheries

- 4.11.1 There are fish ponds within 500m area from the boundary of the PDA in Tai Lung Hang Village.

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

5.1 General

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

- 5.1.2 The measures to minimise environmental impacts as listed in Annex 1 of the EIAO-TM have been reviewed. Subject to the findings of the EIA study, the following mitigation measures will be incorporated in the design for the construction and operation of the Project, where appropriate. The mitigation measures to be considered will include but will not be limited to the measures described in the following sections.

- pollution control technology
- source control
- waste management systems and practices
- potential for waste and wastewater minimization
- acoustic barriers and insulation
- buffer zones and landscaping
- different siting of activities
- site layout and building design
- retention of natural environmental features
- control of construction work practices
- application of the Deep Bay Guidelines for dredging, reclamation & drainage

works where applicable

- application of Chapters 9 and 10 of the Hong Kong Planning Standards & Guidelines (version available at the time the Ordinance comes into force) where applicable

5.2 Air Quality

Construction Phase

5.2.1 In order to prevent adverse impacts on air quality, the control measures stipulated in the Air Pollution Control (Construction Dust) Regulations should be implemented wherever applicable, to avoid or minimize air quality impacts on existing and planned ASRs. Mitigation measures, including but not limited to the following, will be put in place.

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

Operational Phase

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

- (i) Emissions from Chimneys
 - Provide adequate buffer distances between the existing or planned chimneys and the proposed development sites to protect the proposed development from emission of existing or planned chimneys.
- (ii) Odour Impact from the proposed sewage treatment works, sewage pumping stations and sewerage system
 - Design should be in accordance with DSD's Standard Design on Sewage Pumping Station, with all pumps located underground and enclosed within a structure/building;
 - Deodorization system should be installed and good housekeeping practice

would be adopted; and

- Prevention of septicity in sewerage network to reduce odour nuisance to public
- (iii) Impact from vehicle emissions
- Identify opportunities for greening the road transport, including promoting use of electric vehicles; and
 - Provide adequate buffer distances between the roads and the ASRs.

5.3 Noise

Construction Phase

5.3.1 In order to mitigate adverse noise impacts, the following general mitigation measures should be considered.

- Use of quiet plant to reduce noise generated;
- Provide movable and temporary barriers to screen NSRs from particular items of plant or noisy operations;
- Provide noise screening structures or purpose-built noise barriers along the site boundary to provide additional protection to NSRs nearby; and
- Good site practices will be implemented as effective noise mitigation measures. These will include, but not limited to, locating noisy equipment and activities as far from NSRs as practical, scheduling noisy activities to minimise exposure of nearby NSRs to high levels of construction noise, proper maintenance of construction plant and devising methods of working to minimise noise impacts on the surrounding environment.

Operational Phase

5.3.2 For road traffic noise, a number of noise mitigation designs, including traffic management measures, environmentally friendly layout design, the consideration of the application of low noise surfacing material and where necessary, noise barriers, should be incorporated in the layout plan of the PDA.

5.3.3 Retrofitting of existing roadside noise barrier or low noise surfacing material in some heavily trafficked roads such as Fanling Highway and Fan Kam Road would be possible at-source mitigation measures and shall be explored in the detailed design stage.

5.3.4 Should residual impacts be identified at the existing NSRs where the use of direct mitigation measures on the roads has been exhausted, these NSRs would then be eligible for indirect technical remedies.

5.3.5 Environmentally friendly layout designs may include locating buildings to avoid

exposure to traffic noise, providing comprehensive pedestrian and cycle track network throughout the development to minimize the generation of road traffic. Other designs may include the use of non-noise sensitive structures such as podium to shield traffic noise, single aspect design and adequate setback distance away from noisy roads.

- 5.3.6 For the fixed noise sources, mitigation measures such as provision of buffer distance, relocation of the sources, or environmentally friendly layout design should be incorporated in the layout plan for mitigating noise impacts from existing/planned fixed noise sources to nearby existing/planned NSRs. The details and extent of noise mitigation measures will be subject to the assessment results in the EIA study.

5.4 Water Quality

Construction Phase

- 5.4.1 In order to prevent adverse impacts on water quality, the following general mitigation measures should be implemented.

- Site run-off should be reduced and directed into temporary sand traps or other silt removal facilities before discharging into the outlets;
- Silt removal facilities should be maintained regularly;
- Open stockpiles of materials on site should be avoided or where unavoidable covered with tarpaulin or similar fabric during rainstorms;
- Silt curtains or sand bag barriers will be used to confine the disturbed area during sediment removal activities;
- Where possible, works entailing soil excavation will be minimized during the wet season;
- To minimize the impacts of concrete washings, infiltration/sedimentation pits will be used to settle out the washings before treatment/re-use/discharge. If necessary, treatment units with pH adjustment will be adopted;
- Oil interceptors will be provided and properly maintained for collecting spillage or leakages from site workshops. The waste oil removed will be collected by licensed collectors;
- Mobile toilets or other appropriate means will be provided to store sewage before disposal through licensed collection agent or discharging to main sewerage system; and
- For bore piling operations, the resulting suspension will be settled in sedimentation/infiltration pit until supernatant is clear and the bentonite solids will be disposed appropriately.

Operational Phase

- 5.4.2 The following general mitigation measures are to be considered in order to meet 'no net

increase in pollution loading' in Deep Bay:

- provision of blue-green drainage infrastructure which facilitates the infiltration of rainfall and the process of natural filtering to reduce the quantity and improve the quality of runoff;
- adopt on-site greywater recycling to reduce discharge of sewer;
- sewage collected from the on-site/surrounding STW will be treated to a standard suitable for recycle for non-potable use including flushing and irrigation;
- upgrading the sewerage system for discharge into SWH STW or providing other sewage treatment/disposal facilities to ensure that there is sufficient capacity to cater for increased sewage effluent flows from the developments; and
- provision of suitable measures to minimize the risk of emergency discharges of untreated sewage effluent and to ensure timely repair.

5.5 Waste Management

Construction Phase

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

5.5.2 Waste generated during the construction phases of the Project would be reduced and properly disposed of through proper waste management at the outset during the planning and design stages of a project and proper practices on site including:

- compilation of waste management plan;
- waste segregation and storage by category on site;
- avoidance/minimization;
- reuse and recycling of construction material;
- monitoring and record the proper disposal of waste generated; and
- for handling of dredged/excavated sediment, Environment, Transport and Works Bureau Technical Circular (Works) No. 34/2002 will be followed.

Operational Phase

5.5.3 During the operational phase, residential buildings, public areas and other facilities such as sewage treatment works will generate different kind of wastes such as general refuse, sewage sludge and chemical waste.

5.5.4 The waste management hierarchy of 'Reduce, Replace, Reuse and Recycle' shall be used

to evaluate the waste management options to allow maximum waste reduction.

5.5.5 The following mitigation measures should be considered:

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

5.6 Ecology

5.6.1 As a precautionary approach, in considering the layout of the PDA, where possible, should avoid all secondary woodland within the PDA. Conservation-related zoning(s) (such as Green Belt) can be used to avoid direct impacts from future development. Any unavoidable loss of woodland should be compensated by planting of native tree and shrub species in appropriate locations. Potential habitat loss of woodland inside the PDA should be avoided as far as practical so as to maintain its ecological function as a corridor and refuge for fauna using the course. Future development should be adjusted or carefully designed to integrate existing woodland groups with infrastructure and residential design in order to retain its current value. Loss of other important habitats should be avoided through proper zoning.

5.6.2 To retain semi-natural features in the watercourses and minimise the future potential impacts from the development footprint, a buffer on both sides of the semi-natural watercourse should be provided as appropriate.

5.6.3 The mitigation measures that to be implemented to minimize the impacts on air, noise and water qualities will also help to minimize impacts on ecological resources.

5.6.4 As regards habitat loss, the best mitigation is avoidance and will be used wherever possible. For loss which is considered unavoidable, compensation will be provided, with the following features:-

- a variety of habitat types;

- linkage with other wetland areas and other ecological resources; and
- an acceptable size for creation of habitats and to minimize disturbance to fauna utilizing the habitat.

5.6.5 In line with Government's enhanced policy to better protect all natural rivers and streams from the impacts of construction works, the following design approaches, in order of priority, will be adopted:

(a) Avoidance approach - to avoid direct impacts on natural rivers and streams.

(b) Minimization approach - to minimize impacts if avoidance is not possible.

(c) Compensation approach - to compensate for significant residual impacts/loss when there is no other alternative available.

5.6.6 The proposed projects will comply with the following guidelines to ensure that environmental concerns are taken into account in stream and rivers:

- Environment, Transport and Works Bureau Technical Circular (Works) No. 5/2005: Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works
- Building Department (BD) Practice Note for Authorized Persons and Registered Structural Engineers 295: Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works
- Drainage Services Department (DSD) Practice Note No. 1/2015: Guidelines on Environmental and Ecological Considerations for River Channel Design

5.7 Cultural Heritage

5.7.1 A cultural heritage impact assessment (CHIA) will be carried out under the EIA study. Impacts on cultural heritage sites will be avoided as far as practicable, by amending layout plan to allow preservation of the heritage resources in-situ. If unavoidable, mitigation measures to the direct impact and indirect impact on built heritage resources will be implemented. Besides, the CHIA will also review and identify the archaeological potential of the PDA, assess the archaeological impact of the proposed development and propose mitigation measures, if necessary

5.7.2 Mitigation measures, such as rescue excavation prior to the commencement of construction works, archaeological watching brief during construction, etc. would be proposed and implemented if necessary according to the result of the CHIA.

- 5.7.3 Proper coordination with relevant stakeholders/authorities will be carried out to formulate and subsequent implementation mitigation measures for any affected graves and urns.

5.8 Land Contamination

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

- To adopt appropriate treatment method for remediation of the contaminated site;
- Exposure to any contaminated materials be minimised by the wearing of appropriate clothing and personal protective equipment such as gloves (when interacting directly with contaminated material);
- Contaminated materials should be removed with bulk earth movers to prevent human contact;
- Adequate washing facilities should be provided and smoking/eating should be prohibited in the area;
- Contaminated sediments which have been stockpiled or are being transported should be covered with tarpaulin;
- Leakage of pollutants or leaching from excavated soil should be prevented by storing on an impermeable surface;
- Only licensed waste haulers should be used to collect and transport any contaminated material to an appropriate disposal site and procedures should be developed to ensure that illegal disposal of wastes does not occur; and
- The necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 354), as required.

- 5.8.2 Mitigation measures will also be determined with reference to EPD's documents such as "Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management (December 2007)", "Guidance Notes for Contaminated Land Assessment and Remediation (August 2007)", and "Practice Guide for Investigation and Remediation of Contaminated Land (August 2011)".

5.9 Landscape and Visual

- 5.9.1 The existing mature tree clusters and valuable trees will be preserved as far as possible. Felling and transplanting registered OVTs are not allowed in accordance to the Environmental, Transport and Works Bureau Technical Circular (Works) No. 29/2004. As such they are recommended to be retained in-situ.

- 5.9.2 Tree preservation from feasibility, planning, design, construction to post-construction stages of a development and the procedures for control of tree felling, transplanting and

pruning should comply with Development Bureau Technical Circular (Works) No. 7/2015.

- 5.9.3 Mitigation works in development area during the construction stage rely heavily on the optimisation of the footprint of the works area, avoidance of significant topographical changes together with the retention, protection and compensatory planting of trees/vegetation.
- 5.9.4 The submission of landscape and visual impact assessment will make reference to EIAO's Guidance Note No. 8/2010 on "Preparation of Landscape and Visual Impact Assessment under EIAO".

Mitigation Measures to be Incorporated in the Design Stage of the PDA

- 5.9.5 The following measures will be adopted to minimize the landscape and visual impacts during the design stage.
- The urban design principles such as recommending appropriate scale of the development;
 - Controlling building height profiles and providing stepped building heights;
 - Responsive building massing;
 - Controlling the walling effect;
 - Preserving and establishing visual and open space links, including provision of view and breeze corridors;
 - Sustainable and quality landscape design principles and best practices; and
 - The design should take into account the location of the potential OVTs and associated clearance zones and avoid disturbance of the soil levels around these trees.

Construction Phase

- 5.9.6 The following general mitigation measures will be implemented to alleviate the impacts for the construction phase:
- Erosion control measures should be implemented for protection of construction works and the landscape if heavy rains occur;
 - Measures should be taken to store and use construction equipment and building materials where they are not visually intrusive, or easily washed away or where they produce less dust;
 - Damaged vegetation and trees, not earmarked for removal, should be rectified, repaired or replaced, using the same or complementary species, size and form, to the original condition as far as possible;
 - Minimization of light pollution techniques to be implemented. This includes having more lights with focused beams rather than energy wasting, floodlighting which might impact on the nighttime character of the area;

- Exposed slopes should be appropriately vegetated as soon as grading works are completed to prevent erosion and subsequent loss of landscape resources and character; and
- Haul roads should be revegetated at the earliest opportunity to be compatible with their existing surrounding landscape or planned surrounding landscape.

Operational Phase

5.9.7 The following general mitigation measures are to be considered for the operational phase.

- Trees should be planted as visual barriers where appropriate;
- Tree transplanting and compensatory planting will partially mitigate the impact on the existing tree/woodland;
- Roadside planting is proposed alongside all roads within the development. It will enhance local identity, if theme planting is used, and reduce visual impact through screening;
- Amenity strips will be provided to roads, wherever practicable, to mitigate their visual appearance;
- Adopt an earthy tone material for the pedestrian paths to avoid excessive contrast with the rural context and an aesthetic paving pattern is proposed to bring visual interests and coherence to the paths;
- Road structures, such as pedestrian bridges, will be designed to improve the visual appearance of the road corridor;
- The visual impact of noise barriers will be mitigated by appropriate detailed design, including use of transparent panels, provision of planting on and adjacent to the barriers, appropriate colour selection of panels and supporting structure as well as design of supporting structures to incorporate a high level of quality and aesthetics;
- The landscape treatment of road embankments and soil slopes will be provided to enhance their visual appearance;
- Landscape treatment will be provided to open drainage channels, where practicable, to enhance their visual appearance; and
- The visual impact of buildings will be mitigated by appropriate detailed design, including screen painting, facade treatment, colour scheme and texture of materials used.

5.10 Fisheries

5.10.1 Mitigation measures would be formulated and implemented if necessary according to the result of the FIA.

5.11 Further implications

Public consultation to date

- 5.11.1 After the 5-month public engagement starting from 26 April 2018, the Task Force on Land Supply (TFLS) submitted its report on the overall land supply strategy and land supply options to the Government in December 2018. On 20 February 2019, the Government announced that it accepted the TFLS's recommended land supply options including, among others, developing the 32 hectares of land of FGC (i.e. the PDA) to the east of Fan Kam Road.

Public interest and political sensitivity

- 5.11.2 The Government should, through detailed technical studies, carefully consider and balance the different views in the community on the possible uses of the land, the ecological, conservation and heritage value, and the leisure and recreational functions of the FGC site.

6. USE OF PREVIOUSLY APPROVED EIA REPORT

- 6.1.1 No previously approved EIA report covers the full extent of the study area of the proposed Project. However, reference would be made to the approved EIA report AEIAR-175/2013 — North East New Territories New Development Areas.
- 6.1.2 Reference will also be made to the NTN Study completed in 2017 and reference information provided by the Hong Kong Golf Club.

- END -