

**Executive Summary**

(Ref. 113-03)



Agreement No. CE 2/2011 (CE)

# Hung Shui Kiu New Development Area Planning and Engineering Study – Investigation







土木工程拓展署

**New Territories North and West Development Office  
Civil Engineering and Development Department**

Agreement No. CE 2/2011 (CE)

## **Hung Shui Kiu New Development Area Planning and Engineering Study - Investigation**

### **Environmental Impact Assessment Report**

#### **Executive Summary**

**(Ref. 113-03)**

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**AECOM ASIA COMPANY LIMITED**

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## 1 INTRODUCTION

- 1.1.1 The Hung Shui Kiu (HSK) New Development Area (NDA) was formerly studied under the "Planning and Development Study on North West New Territories" (the NWNT Study) from 1997 to 2003. The NWNT Study identified HSK as a suitable NDA to cater for the long-term development need in Hong Kong with an area of 450 hectares (ha). Various land uses including residential, government, institution or community, education, recreation, business use, open spaces, port back-up, green belt, etc. were proposed. However, the proposal was subsequently shelved in 2003 in light of an anticipated slower population growth at that time.
- 1.1.2 Afterwards, the "Hong Kong 2030: Planning Vision and Strategy" (the HK2030 Study) completed by the Planning Department (PlanD) in 2007 revisited the need for NDAs in the New Territories and recommended proceeding with the NDA developments to address the long-term housing demand and provide employment opportunities. The Chief Executive announced in his 2007-08 Policy Address the planning for the NDAs in HSK as one of the ten major infrastructure projects for economic growth.
- 1.1.3 Having regard to the changes in planning circumstances and public aspiration since the completion of the NWNT Study, a comprehensive planning and engineering study on the HSK NDA was commissioned in 2011. The HSK NDA Planning and Engineering Study (the "Study") is to revisit the findings and recommendations of the NWNT Study, to take into account changes in the latest circumstances and public aspiration so as to confirm the feasibility of the proposed developments to meet long-term housing, social, and economic needs, and to prepare a Recommended Outline Development Plan (RODP) and preliminary engineering design for the development. The Study started with the assessment of a tentative HSK NDA of 790 ha and the NDA was subsequently refined to 714 ha taking into account the public views gathered and the results of the planning and technical assessments during the course of the Study.
- 1.1.4 A three-stage community engagement to foster consensus building was adopted for this Study. The Stage 1 Community Engagement (First Round) was carried out in November 2010 by the Civil Engineering and Development Department (CEDD) and PlanD before the commencement of the Study. In December 2011, the Stage 1 Community Engagement – Second Round was formally launched. The main purpose of the Stage 1 Community Engagement was to engage the community at the beginning of the Study process to discuss the key issues and help building the community vision for the HSK NDA. This would facilitate the preparation of development concepts for further discussion in the community. Based on the public comments received during the Stage 1 Community Engagement, the Preliminary Outline Development Plan (PODP) was formulated and put forward for public comment during the Stage 2 Community Engagement commenced in July 2013. The HSK NDA proposals were further refined with reference to the public views gathered from the Stage 2 Community Engagement and translated into the RODP. Subsequently, the Stage 3 Community Engagement was carried out from June 2015 to September 2015, to gauge public views on the RODP. A series of community engagement activities were undertaken including briefing sessions with the Panel on Development of Legislative Council, Town Planning Board, Hong Kong Housing Authority, Advisory Council on the Environment, Yuen Long and Tuen Mun District Councils, Heung Yee Kuk, Ping Shan, Ha Tsuen and Tuen Mun Rural Committees, professional bodies, green groups, affected villagers, local concern groups, port back-up and open storage operators, Hong Kong Logistic Council, Hong Kong Council for Testing and Certification, local industry operators, etc.
- 1.1.5 After careful and comprehensive consideration of comments received during the Stage 3 Community Engagement and taking into account all relevant considerations including the findings of various technical assessments, appropriate amendments to the land uses have been made to the RODP, which were reflected on the Revised RODP adopted for this environmental impact assessment (EIA).

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## **2 PROJECT DESCRIPTION**

### **2.1 Need of Project**

- 2.1.1 The HK2030 Study completely in 2007 suggested proceeding with the development of various NDAs (including HSK NDA) to address the long-term housing demand and provide employment opportunities. The NDAs shall provide a mixture of public and private housing land, and possibly higher education and high value-added/clean special industrial processes. The HSK NDA would also offer an alternative choice of living, through the development of lower-density buildings in a quality living environment, with convenient access to mass transportation and community facilities. In addition, by shifting some of the population from the dense urban areas to the New Territories, a more balanced territorial development pattern and a less congested environment could be achieved, which is particularly needed in those urban areas characterised by extremely high development densities.
- 2.1.2 The development at HSK NDA (herein referred to as the “Project”) will help to create new developable land for the provision of approximately 61,000 new flats (about half for public housing) thereby contributing toward Hong Kong’s housing supply targets. In doing so it will help facilitate the achievement of the Government’s multi-pronged strategy to increase much needed land supply, particularly in the medium and long term. To achieve the vision of building a sustainable, people-oriented and balanced living and working community for Hong Kong, the Project also aims to increase land supply for economic use by providing employment for 150,000. This would help to address the over concentration of commercial activities and employment opportunities in the main urban areas, boost the vibrancy of local communities, meet the short fall of jobs in Tin Shui Wai (TSW), as well as ease congestion at the commuting corridors between the New Territories and the urban areas.
- 2.1.3 The strategic location of the Project, close to the Tuen Mun, TSW and Yuen Long New Towns, Qianhai in Shenzhen, and connected by a number of existing and planned strategic transport links to other parts of the Territory, the Hong Kong International Airport and Shenzhen, is fundamental to its development as a regional centre and strategic employment hub.
- 2.1.4 Development of brownfield sites has also been highlighted as an opportunity for increasing land supply in Hong Kong. Therefore, the Government will actively explore the feasibility of accommodating some of the affected brownfield in multi-storey buildings.

### **2.2 Appreciation of Existing Environment**

- 2.2.1 The Project is located in the northwestern part of the New Territories, midway between the Tuen Mun and TSW New Towns (refer to **Figure 1.1** for location plan). The existing population of the Project area is approximately 42,000 (including committed developments). The area has a mixed urban-rural character. Land in the north is predominantly occupied by brownfield operations (mainly port back-up / open storage) uses with some village developments, whereas land in the south is mainly occupied by low-density residential and village developments with some scattered brownfield operations (mainly open storage, warehouse and workshop uses). These are described further below.

### **Northern Project Area**

- 2.2.2 The northern extent of the Project is bounded by Lau Fau Shan Road and hillslopes along Deep Bay Road. The Lau Fau Shan area is located in the northern Project area and is physically characterised by a series of knolls, uplands and hills. The uplands benefit from a moderate intensity of tree cover. Low lying areas are more sparsely vegetated and are occupied by clusters of New Territories Exempted Houses, informal basic housing, and a cluster of modern low rise developments. Lau Fau Shan has long been the local centre for oyster farming and fishing activities and the centre is well known for its seafood market and restaurant trade. Great variety of cultural/historical and natural scenic spots could also be found in the Lau Fau Shan area.
- 2.2.3 Areas within the northern part of the Project area have been cleared for brownfield operations. These operations permeate a significant proportion of the northern and central parts of the Project area (approximately 200 ha of land within the NDA were being used for brownfield operations at the time of writing), creating severe planning blight. Container storage and the storage of plant and vehicles are the principal uses. Container storage tends to fall into two categories: short- to medium-term container storage where containers are moved on and off site on a regular basis and long-term storage where containers are rarely moved off site. The latter condition is readily perceptible in relation to a number of sites. It is notable that containers are stored to six or more boxes high.
- 2.2.4 The northern and central parts of the Project area are also occupied by a number of traditional villages such as Fung Kong Tsuen, Ha Tsuen Shi, Sik Kong Wai, San Wai and Tung Tau Tsuen. The scale and intensity is consistent with village type development throughout the NWNT. There is particular cultural heritage value identified within these traditional villages. Many elements of vernacular Chinese rural housing of the Qing dynasties are preserved in the area.



**Large areas occupied by brownfield operations**



**Built heritage within villages**

### **Southern Project Area**

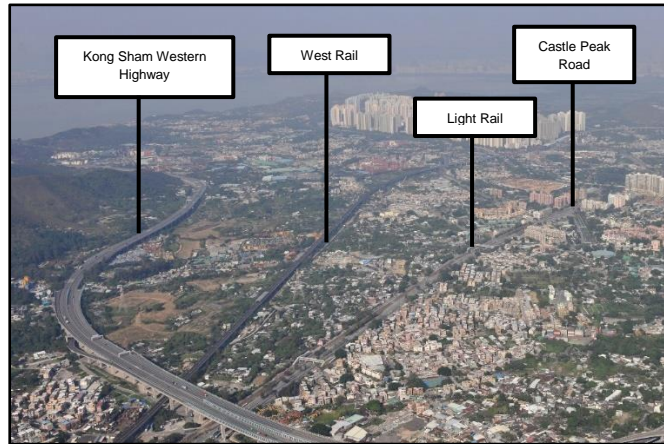
- 2.2.5 The southern part of the Project area is significantly dissected by existing road and rail infrastructure. This has a significant impact on the morphology of this area and in combination with other transport routes effectively subdivides the area into definable parts.
- 2.2.6 The southern part of the Project area and particularly those located to the north of Castle Peak Road are currently committed to developments and land uses of various scales and character. Domestic structures, non-domestic structures and brownfield sites mainly open storage, warehouse and workshops are particularly prevalent within the southwestern parts of the Project area. The domestic structures in these areas are widely dispersed and some of them are impoverished temporary structures, intermingled with many non-domestic temporary structures. Some domestic structures are also converted from abandoned farm structures. The southeastern part of the Project area contrasts significantly with the preceding areas where a series of contemporary developments have



been introduced to the area. This area includes a range of residential developments with various densities. These are generally low to medium-rise modern developments formed on lots of various scales. Individual developments have been realised incrementally over time as developers have assembled land of sufficient scale to enable development.



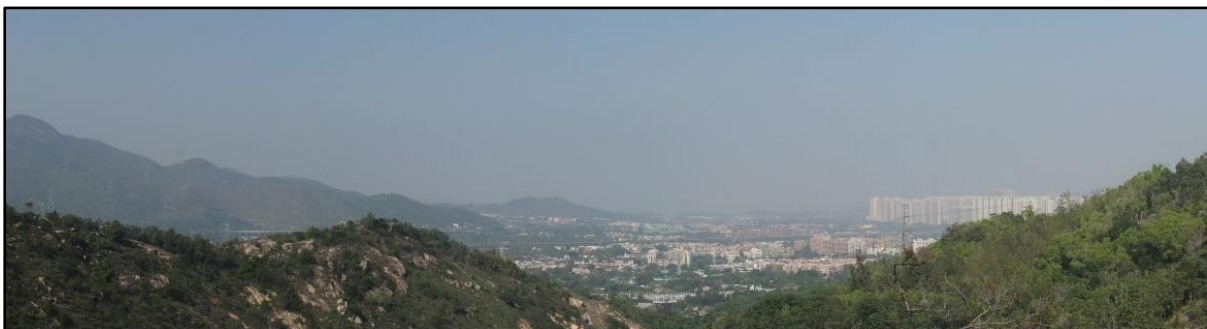
Open storage near villages



Area subdivided by Kong Sham Western Highway, West Rail, Light Rail and Castle Peak Road

### Western Project Area

- 2.2.7 Land at the western Project area is formed of rolling uplands and lowlands linked to Castle Peak and its associated hillsides. Intermittent developments including rural industrial uses and infrastructure facilities are located to the west of Kong Sham Western Highway (KSWH). A large area of hillslope is designated as “Conservation Area” (“CA”) on the extant Outline Zoning Plans (OZPs), which comprises mainly shrubland and grassland, as well as some natural watercourses and small patches of village/orchard and plantation. The physical terrain restricts development in this area.
- 2.2.8 A mosaic of brownfield sites (e.g. recycling yards), vegetated knolls (with graves) and a small amount of agricultural land is located east of the KSWH. The effect of the brownfield sites on the environment is evident through disturbance to a local egretty near San Sang San Tsuen and direct discharge of effluent into local channels/watercourses.



Vegetated hillslopes at back of the Project area



**Egretty disturbed by brownfield activities**



**Modified watercourse receiving effluent from adjacent properties**

### **Eastern Project Area**

- 2.2.9 The TSW Main Channel, which is a wide concrete-lined channel, forms the northeastern boundary of the Project. In the eastern Project area, Kiu Tau Wai industrial area is located to the south of the existing West Rail TSW Station (TSW Station) and TSW Light Rail Transit (LRT) Station. This area comprises of a number of low-rise industrial buildings which are mainly used for logistics, vehicle testing, warehouse and other general industrial uses.
- 2.2.10 A series of open areas located within and adjacent to Kiu Tau Wai and Hung Uk Tsuen have also been converted for the use of industries and open storage. The mix of land uses within the area has created industrial / residential interface issues.



**Rural Industry and Open storage near village areas**



**Concrete-lined banks of the TSW Main Channel**

### **Constraints and Opportunities for Project Development**

- 2.2.11 The Project commands a geographically favourable location which provides opportunities for the area to develop as the regional centre of the NWNT with new residential and economic developments. However, a number of existing infrastructure and social and environmental features also impose constraints to the Project development.

#### ***Development Opportunities***

- Highly Accessible
- 2.2.12 The Yuen Long Highway to the southeast and KSWH and Shenzhen Bay Bridge to the west connect the Project area to other parts of the Territory as well as Shenzhen through the strategic road network. The proposed strategic highway (Tuen Mun Western Bypass (TMWB)) which would connect the Project area to the Tuen Mun – Chek Lap Kok Link and the other proposed new strategic highway could further augment accessibility to and from the Project area.
- 2.2.13 The proposed HSK Station along the existing West Rail Line (HSK Station) and the existing TSW Station provide an opportunity to connect the Project area with Tuen Mun, TSW and Yuen Long New Towns and the urban area. These stations could also integrate the railway transport system in the overall land use framework. With the introduction of the environmentally friendly transport services (EFTS) in the Project and integration of land uses, the EFTS and railway stations could help maximise the use of public transport, thus minimising road traffic and reducing carbon emissions. The existing and planned railways and highway network is shown in **Figure 2.1**.
- Favourable Geographical Location
- 2.2.14 Being located close to the Tuen Mun, TSW and Yuen Long New Towns, Qianhai in Shenzhen, and connected by a number of existing and planned strategic transport links to other parts of the Territory, the Hong Kong International Airport and Shenzhen, there is potential for the Project to be developed as a regional centre and strategic employment hub. This geographically favourable location enables development of the area in promoting economic activities.
- Plentiful Natural and Landscape Features
- 2.2.15 A number of natural and landscape features within and surrounding the Project area could be utilised to create a quality living environment, such as uplands and lowlands, knolls, ridgeline/mountain backdrops of Yuen Tau Shan, woodlands, and San Sang San Tsuen egret and its associated flight path. Proper planning and land use zoning designation could help conserve the ecological value of these features and establish an integrated green network for the Project. Drainage channels running through the Project area offer good opportunities for creating distinct local character and providing passive recreational spaces along the riverside promenades.
- Rich Cultural Heritage
- 2.2.16 The Project and its surroundings boast significant cultural heritage resources such as a number of declared monuments, graded historic buildings, sites of archaeological interest and the Ping Shan Heritage Trail. Appropriate planning and proper land use zoning designation could help incorporate these valuable resources into the Project for the benefits of existing and future residents.

➤ Land Resource

- 2.2.17 At present, a large portion of land is being utilised for the purposes of brownfield operations. The vast extent of brownfield operations in the area has created environmental and interface problems. However, with the aspiration to turn such land for more optimal uses, it provides opportunities for supporting the future development of Hong Kong.

***Development Constraints***

➤ Infrastructure Constraints

- 2.2.18 A number of constraints posed by the existing infrastructure and environment require careful consideration in the planning of the Project:

- i) The West Rail Line (WRL) and LRT Line which traverse the Project area, fragment much of the land and are expected to pose constraints to the nearby developments in terms of access, and environmental and visual impacts.
- ii) The existing major distributors of KSWH, Castle Peak Road and Hung Tin Road will also likely generate environmental impacts to the nearby proposed developments within the Project area.
- iii) The Project area falls within the Deep Bay Water Control Zone (WCZ) and is subject to the requirement that no net increase in the pollution loading to the Deep Bay waters would result from any proposed new developments.

➤ Retention of the Traditional Villages and Permitted Burial Grounds

- 2.2.19 Retention of traditional villages (involving 19 recognised villages and 1 village re-site) within the Project area precludes a large quantity of land from being developed. Potential interface issues between the villages and the proposed developments will need to be addressed. Permitted burial grounds located at the hillslopes in the western and northwestern Project area, and isolated knolls near the recognised villages would generally be retained.

➤ Proliferation of Brownfield Operations

- 2.2.20 At present, a large portion of land is being utilised for the purposes of brownfield operations including open storage, port back-up, construction material/machinery storage, car repair workshops, recycling yards, and rural workshops, etc. There are concerns regarding the negative externalities generated from such uses including the encroachment on residential developments leading to adverse interface issues, environmental degradation, adverse visual impacts and possible land contamination issues. While recognising that there may be opportunities to accommodate some of these uses to multi-storey buildings, given this is likely to be an incremental process, concerns pertaining to the interface of new developments with the existing brownfield operations during the interim period, needs to be addressed.

➤ Preservation of Natural and Landscape Features

- 2.2.21 Whilst the natural and landscape features are regarded as opportunities and may add value to the Project, their existence; however, may preclude land from being developed. Due consideration should be paid to these resources within and in the vicinity of the Project area to avoid/minimise adverse effects on their ecological and aesthetic value.



➤ Flooding Risk

- 2.2.22 Areas adjoining TSW New Town along TSW Main Channel are located in the flood plain where flooding is evident. Site formation and the drainage system should be designed to minimise flooding risk to the planned developments and the nearby existing settlements.

## 2.3 General Description of the Project

- 2.3.1 The Project occupies an area of approximately 714 ha and is located in the northwestern part of the New Territories, midway between the Tuen Mun and TSW New Towns. Adhering to the planning principles for creating a sustainable, people-oriented and balanced living and working community, the Project will be the next generation New Town of Hong Kong providing a desirable place to live, work, learn and play for a total population of about 218,000. It will also offer development spaces for various commercial and special industrial uses and “Government, Institution and Community” (“G/IC”) facilities.
- 2.3.2 Being the Regional Economic and Civic Hub for the NWNT, the Project will create about 150,000 new employment opportunities, and a large amount of commercial facilities and supporting services for people living in the Project area, TSW, Tuen Mun and Yuen Long New Towns as well as the proposed Yuen Long South development project.
- 2.3.3 The Project mainly comprises the following elements:
- The provision of about 61,000 **new residential units** will house an estimated new population of about 176,000 persons. With the existing population and population from the planned/committed residential developments within the Project area, the overall population is projected to be around 218,000 persons upon full development.
  - **Commercial** sites for office, retail and hotel developments around the proposed HSK Station and existing TSW Station to reinforce their respective roles as “Regional Economic and Civic Hub” and “District Commercial Node”, as well as two commercial sites in the northern edge of the Project area to complement local economic activities in the Lau Fau Shan and the northern part of TSW New Town area.
  - **Enterprise and Technology Park** for accommodating a variety of innovation and technology uses, which may include research centre, testing & certification use, data centre, modern industries and other related businesses and non-polluting industrial uses.
  - **Logistics Facility** to facilitate accommodation of modern logistics buildings.
  - Multi-storey buildings on land reserved for **Port Back-Up, Storage and Workshop Uses** to accommodate some of the affected brownfield operations in a land-efficient manner.
  - **Industrial** land for general industrial uses.
  - A comprehensive **Open Space** network, including a continuous riverside promenade and a Regional Town Park in the centre of the Project area, that would optimise existing natural, cultural and landscape resources and provide recreational and leisure spaces.
  - A variety of “**G/IC**” **facilities** such as social welfare facilities, education facilities, etc. to support the existing neighbourhood and future population.



- A **New HSK Sewage Treatment Works (STW)** with a tertiary and secondary plus treatment process and an ultimate design capacity of approximately 85,500 m<sup>3</sup> per day.
- **Four new Sewage Pumping Stations (SPSs)** with a design capacity of 27,000 m<sup>3</sup> per day (SPS1), 39,500 m<sup>3</sup> per day (SPS2), 11,000 m<sup>3</sup> per day (SPS3), and 68,000 m<sup>3</sup> per day (SPS4).
- A **Fresh Water Service Reservoir (FWSR) and Flushing Water Service Reservoirs (FLWSR)**.
- A **Refuse Transfer Station (RTS)** to support the existing NWNT RTS and cope with the new population waste generation.
- **District Cooling System (DCS)** in the vicinity of the proposed HSK Station and the existing TSW Station – subject to further review.
- **Primary Distributor Road** (Dual 2 / Dual 3 Standard) – Road P1.
- **Eight District Distributor Roads** (Dual 2 / Dual 3 Standards).
- **Green Transit Corridor (GTC)** comprising EFTS, pedestrian walkways and cycle tracks, which would traverse the core of residential, commercial and other land reserves within the Project area – details subject to further review.
- **Comprehensive Pedestrian Walkway and Cycle Track Network** to promote walking and cycling within the Project area.

## 2.4 Revised Recommended Outline Development Plan

- 2.4.1 In the outset, the drawing up of the proposals on the Revised RODP has avoided and minimised direct encroachment upon ecologically sensitive areas (e.g. the egretty near San Sang San Tsuen) and hilly slopes as far as practicable. Integrated land use and transport planning approach (e.g. compact city design and sensible road arrangement) has also been adopted to minimise possible environmental impact. The Revised RODP was prepared in accordance with a comprehensive planning and urban design framework, with a set of well-defined planning principles including the objective to alleviate industrial / residential interface issues through land use planning. In balancing other factors, the proposed land uses have also been sited in such a way to avoid environmental impacts such as noise and air impacts, with introduction of appropriate mitigation measures such as setback and amenity strips.
- 2.4.2 The Revised RODP has been prepared by taking into account public views received in various rounds of Community Engagement exercises, as well as findings of technical assessments. **Table 2.1** summarises the major planning parameters of the Revised RODP.

**Table 2.1 Land Use Budget of the Revised RODP**

<b>Land Use</b>	<b>Area (ha)</b>
<b>Residential</b>	80 (18%)
Residential and Commercial / Residential	80
<b>Economic</b>	105 (24%)
Commercial (Office, Hotel and Retail)	22
Logistics Facilities	37
Port Back Up, Storage and Workshop Uses	24
Enterprise and Technology Park	9
Industrial	13
<b>Public Facilities</b>	86(20%)
Government, Institution or Community (other than Education)	32
Education and Related Uses	28
Public Utilities (Petrol Filling Station, Bus Depot, Regional Plaza, Station, etc.)	26
<b>Open Space</b>	66(15%)
Regional Open Space	16
District Open Space	27
Local Open Space	23
<b>New Roads and Amenity</b>	104(23%)
New Roads	86
Amenity	18
<b>Total</b>	<b>441</b>
<b>Others</b>	
Existing Road and River Channel	70
Green Belt (Preserved Knolls & Hillslopes)	54
Retained Existing/ Committed Development (including villages)	149
<b>Grand Total</b>	<b>714</b>

## 2.5 Designated Projects

- 2.5.1 The Project is a Designated Project (DP) under Item 1 Schedule 3 of Environmental Impact Assessment Ordinance (EIAO) - 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, as it covers an area of 714 ha and will accommodate a total population of 218,000.
- 2.5.2 In addition, based on the Revised RODP, the Project would comprise the following DPs by virtue of items A.1, A.2, A.3, A.8, A.9, B.5, F.1, F.3(b), F.4, G.2 and Q.1 of Schedule 2 of the EIAO (**Table 2.2** and **Figure 2.2**).

**Table 2.2 Schedule 2 Designated Projects in the HSK NDA**

Designated Project Reference No.	Schedule 2 Designated Project		Work Component / Reference in Revised RODP
DP1 <sup>1</sup>	Part I, A.1	A road which is an expressway, trunk road, primary distributor road or district distributor road including new roads, and major extensions or improvements to existing road	Construction of new primary distributor road (Road P1)
DP2 <sup>1</sup>	Part I, A.1	A road which is an expressway, trunk road, primary distributor road or district distributor road including new roads, and major extensions or improvements to existing road	Construction of eight new distributor roads (Roads D1 to D8)
DP3 <sup>2</sup>	Part I, A.2	A railway and its associated stations	Construction of new West Rail HSK Station (Site 4-34)
DP4 (Potential DP) <sup>2</sup>	Part I, A.3	A tramway and its associated stations	Construction of EFTS – subject to further review
DP5 <sup>1</sup>	Part I, A.8	A road or railway bridge more than 100 m in length between abutments	Construction of slip roads between: Road D8 Junction and existing Castle Peak Road; Junction of D8/P1 and Junction of D7/P1; and KSWH connection to Road D3
DP6 <sup>1</sup>	Part I, A.9	A road fully enclosed by decking above and by structure on the sides for more than 100 m	Construction of partly depressed and partly decked-over roads located at Road D2, Road D4 and Road D6
DP7 (Potential DP) <sup>2</sup>	Part I, B.5	A container back-up area, container storage, container handling or container packing area (including a container vehicle parking area) more than 5 ha in size and within 300 m of an existing or planned receiver	Construction of a new container back-up and storage area (Sites 3-1, 3-4, 3-5, 3-13 and 3-14) – subject to further review
DP8 <sup>2</sup>	Part I, F.1	Sewage treatment works with an installed capacity of more than 15,000 m <sup>3</sup> per day	Construction of new HSK STW (Site 3-26 and part of existing SW STW)
DP9 <sup>1</sup>	Part I, F.3(b)	A sewage pumping station –	Construction of four new SPSSs (Sites 2-34, 3-41, 3-48 and 4-35)

Designated Project Reference No.	Schedule 2 Designated Project		Work Component / Reference in Revised RODP
		(b) with an installed capacity of more than 2,000 m <sup>3</sup> per day and a boundary of which is less than 150 m from an existing or planned receiver	
DP10 <sup>2</sup>	Part I, F.4	An activity for the reuse of treated sewage effluent from a treatment plant	Construction of flushing water service reservoirs for reuse of reclaimed water at Tan Kwai Tsuen and Fung Kong Tsuen (Sites 3-3 and Site 5-40)
DP11 <sup>2</sup>	Part I, G.2	A refuse transfer station	Construction of one RTS (Site 3-12)
DP12 <sup>1</sup>	Part 1, Q.1	All projects including new access roads, railways, sewers, sewage treatment facilities, earthworks, dredging works and other building works partly or wholly in an existing or gazetted proposed country park or special area, a conservation area, an existing or gazetted proposed marine park or marine reserve, a site of cultural heritage, and a site of special scientific interest.	Construction of Road P1 and a slip-road from KSWH to Road D3 partly located within the "CA" of Yuen Tau Shan

Note:

- 1 Subject to an Environmental Permit application under this EIA Study.
- 2 Subject to separate EIA Study, as required.

## 2.6 Project Benefits and Green Initiatives

### Green Initiatives

- 2.6.1 As a green city, the Project would adopt a sustainable and energy saving strategy in respect of town planning, urban design, transportation, and blue-green infrastructure, so as to achieve energy efficiency, carbon emission reduction and sustainable living, as far as practicable. A key aspect to achieving this is to minimise road transport-use and promote green mobility. Within the Project, major population, economic activities and community facilities have been concentrated within walking distance of mass transit and public transport nodes. Green mobility is promoted through the introduction of the GTC and a comprehensive cycle track and pedestrian walkway network.
- 2.6.2 The comprehensive pedestrian walkway and cycle track network could be supported by facilities such as underground cycle parking areas, bicycle rental system, cycle and footbridges, crossing facilities and rest areas to promote walkability and cycle friendliness.



**Conceptual diagram of GTC and environmentally-friendly modes of transport**

- 2.6.3 In addition to transport, a total water management concept and arrangement including sewerage, drainage and water resource infrastructure is proposed for integration into the Project. To promote sustainable use of water, opportunities for using reclaimed water and harvested rainwater for non-potable purposes such as toilet flushing and irrigation within the Project will be explored. Rainwater is proposed to be partly collected and reused as irrigation water. Also roadside bioretention swales are proposed to attenuate any surface run-off to the downstream areas. Blue-green infrastructure, such as a flood retention facility with possible underground storage tank, will be used to temporarily store any flood water collected at low-lying villages. The flood retention facilities' integrated design with the Open Space system would provide for opportunities for passive recreation activities and public enjoyment, as well as a potential microclimate cooling mechanism.





**Conceptual diagram of flood retention lake proposed in Regional Town Park and revitalised river channels**

- 2.6.4 It is also proposed to revitalise the river channel system by adopting a comprehensive regeneration design along the whole system. The ecology of the channel would be enhanced and the riverside promenade with pedestrian walkways and cycle tracks introduced. To inject vitality into the riverside, the promenade will be extended along the channels to link the Regional Town Park and Regional Plaza. The regenerated channels will be the major green spines, breezeways and view corridors and will enable better integration between different neighbourhoods and with the adjacent TSW New Town.
- 2.6.5 Other green initiatives, which are proposed include the provision of a Community Green Station for environmental education and collection of recyclables from the local community; and promotion of energy efficient buildings and installations. The use of a DCS for non-domestic developments, and the establishment of an information and communication technology (ICT) platform to coordinate different city functions for enhancing city management and convenience of residents and businesses would also be explored.
- 2.6.6 These proposed green initiatives will be implemented in future developments subject to further review.
- 2.6.7 The proposed green initiatives have been summarised in **Table 2.3**, under the following themes: Green Mobility, Total Water Management, Solid Waste Management, Sustainable Drainage System, and Green Energy Saving.

**Table 2.3 Proposed Green Initiatives**

Themes	Green Initiatives
Green Mobility	Create compact and walkable city by concentrating population, key economic activities and major community facilities within walking distance of mass transit and public transport nodes
	Create local communities with easily accessible daily necessities to promote walking
	Provide comprehensive, convenient and attractive cycle track and pedestrian walkway network with supporting facilities such as underground cycle parking areas, bicycle rental system, cycle and footbridges, crossing facilities and rest areas, etc. to promote walkability and cycle friendliness
	Provide GTC that connects the residential clusters with the logistics, enterprise and technology quarter, railway stations and key community facilities to minimise road traffic and carbon emissions
Total Water Management	Incorporate tertiary treatment at the proposed HSK STW allowing reclaimed water to be polished for reuse, thus minimising the need for long-distance effluent export
	Explore the use of biogas produced from sludge digestion for electricity generation
	Explore the use of reclaimed water for non-potable purposes such as toilet flushing and irrigation
	Provide bioretention swales along roadsides
Solid Waste Management	Co-locate Community Green Station with the refuse transfer station for environmental education purpose and convenient collection of recyclables from the local community, providing synergy to achieve better operational efficiency and environmental sustainability
	Explore adoption of automatic refuse collection system and organic waste treatment facilities
Sustainable Drainage System	Provide flood retention facilities as a regulating measure to the overall drainage system and as a microclimate cooling mechanism through integrated design with the open space system for public enjoyment
	Collect rainwater for non-potable purposes
	Revitalise the river channel system of Project area by replacing Tin Ying Road abutting the channel and adopting comprehensive regeneration design along the whole system. The ecological system in the channel will be enhanced and riverside promenade with pedestrian walkways and cycle tracks will be introduced
	Inject vitality to the riverside by extending the promenade all along the river channels linking with the Regional Town Park and Regional Plaza and creating corridors for activities
	Regenerate river channels as the major green spines, breezeways and view corridors and enable better integration between different neighbourhoods and with the adjacent TSW New Town
Green Energy Saving	Explore the use of DCS for non-domestic developments
	Encourage environmentally friendly building design and materials, and energy-saving installations
	Promote certification under BEAM Plus or other equivalent accreditations for all new buildings
	Establish ICT platform to coordinate different city functions to enhance city management and convenience of residents and business activities
	Explore development of community gardens in open space and amenity areas to promote green living

### **Benefits of the Project**

- 2.6.8 The Project aspires to turn the existing vast extent of brownfield sites including open storage, port back-up, construction material/machinery storage, car repair workshops, recycling yards, and rural workshops, etc. which have created considerable environmental, traffic, visual, and other nuisance, to more optimal uses and better land utilisation for future development of Hong Kong. The development of the Project could result in the following benefits and bring in environmental initiatives:

#### ***Direct Benefits***

- **Alleviate the current housing shortfall and meet the long-term housing needs of Hong Kong** – The Project will provide about 61,000 new flats (about half for public housing). This will provide a variety of housing types, responding to the needs of the community and therefore engendering a sense of belonging for people and enriching their quality of life. The proposed public/private housing mix in the Project will also help to redress the existing imbalance of public/private housing in the TSW New Town.
- **Create job opportunities** – Approximately 150,000 new job places would be generated upon full development of the Project, through a mix of commercial, business, industrial, community and government land uses. This would help to address the over concentration of commercial activities and employment opportunities in the main urban areas, boost the vibrancy of local communities, meet the short fall of jobs in TSW New Town, as well as ease congestion at the commuting corridors between the New Territories and the urban areas.
- **Sustain Economic Growth** – Concentrated development intensity of the commercial sites at the proposed HSK Station and the existing TSW Station reinforces their respective functions as “Regional Economic and Civic Hub” and “District Commercial Node”. The proposed commercial development around the two stations would help relieve the already congested town centres of nearby Yuen Long and Tuen Mun New Towns. In each individual residential neighbourhood, street shops and local retailing services will be provided to meet the residents’ daily necessities and enhance street vibrancy.
- **Provide Spaces for Special Industry** – The “Logistics, Enterprise and Technology Quarter” at the northwestern part of the Project area provides another major employment cluster. About 37 ha of land are reserved for high value-added modern logistics and about 9 ha are reserved for uses such as innovation and technology, testing and certification, data centre and other related business and non-polluting industrial activities. An approximately 13 ha industrial zone is also planned at the western fringe of the Project area near KSWH for general industrial uses.
- **Provide “G/IC” facilities** – The planning for the Project is people-oriented. The requirements of the surrounding areas including TSW have been taken into account in the provision of “G/IC” facilities. The Project has proposed a series of civic elements and a wide range of “G/IC” facilities including hospital, clinics, magistracy, community halls, performance venue, wet markets, youth centres, educational facilities, social welfare facilities, sports and recreation facilities, etc.

### ***Environmental Initiatives***

- **Minimise Industrial / Residential Interface** – At present, the proliferation of brownfield operations in the Project area has created considerable environmental, traffic, visual, flooding and other problems. One of the objectives of developing the Project is to convert these brownfield sites to more optimal uses and improve the overall environment of the area. Approximately 24 ha of land at the northern fringe of the Project area is reserved for “Other Specified Uses” annotated “Port Back-up, Storage and Workshop Uses” (“OU(PBU+SWU)”). This area may accommodate some of the existing brownfield operations through the possible development of multi-storey buildings or other land efficient means. The provision of this dedicated area will help to alleviate existing industrial/residential interface issues resulting from existing brownfield operations. In addition, new roads will be provided to directly connect this area to KSWH thereby eliminating the current movement of heavy goods vehicles (HGV) through built-up areas including residential areas.
- **Create Compact and Walkable City** – For sustainable development of the Project, one of the key planning concepts is to minimise traffic generation. Major population, economic activities and community facilities will be concentrated within walking distance of mass transit and public transport nodes. Green mobility is promoted within the Project through the introduction of the GTC comprising the EFTS, cycle tracks and pedestrian walkways. This would allow the community to have better accessibility to the EFTS which would in turn help reducing road based traffic and hence their associated vehicular noise and emission.

A comprehensive and convenient pedestrian walkway and cycle track network is also planned throughout the Project area. Key destinations, such as proposed railway/EFTS stations and public transport nodes, riverside promenade and residential communities, would be linked up by pedestrian walkways, cycle tracks and open spaces. This would allow convenient and comfortable movement within the Project area and create local communities with easily accessible daily necessities to promote cycling and walking.



**Conceptual diagram of pedestrianised shopping street which connects to the proposed HSK Station**





Environmentally-friendly modes of transport

- **Introduce Integrated Green and Blue Network** – A comprehensive open space network has been planned through the Project area. Leisure and recreational spaces that optimise the existing natural, cultural and landscape resources are introduced to form an integrated green and blue network. In particular, the regenerated river channels and high quality riverside promenades would form the spine of the open spaces framework, and also operate as continuous pedestrian walkway to enhance connectivity of the entire Project area. It would link up several important open spaces and recreational spaces within the Project area, including the Regional Town Park at the centre of the Project area and the Regional Plaza in front of the proposed HSK Station.
- **Adopt Sensible Road Arrangement** – The re-arrangement of the road network within the Project area by replacement of Tin Ying Road and downgrading of Hung Tin Road will reduce the existing road traffic noise and minimise air pollutants generated from road traffic. The proposal for replacing Tin Ying Road also provides an opportunity to integrate a leisure riverside development along the river channel and facilitate better connectivity between TSW New Town and the Project area.



Conceptual diagram of revitalised river channel

- **Promote Green Initiatives** – The Project provides an opportunity to showcase a range of green initiatives adopted to create a green city. For sustainable development of the Project, one of the key planning concepts is to minimise traffic generation through transit-oriented development. Major population, economic activities and community facilities will be concentrated within walking distance of railway and public transport nodes. Green mobility is promoted within the Project area through the introduction of the GTC and a comprehensive cycle track and pedestrian walkway network. To promote sustainable use of water, using reclaimed water and harvested rainwater for non-potable purposes such as toilet flushing and irrigation within the Project area would be explored. Other green initiatives include



the provision of Community Green Station for environmental education and collection of recyclables from the local community; and promotion of energy efficient buildings and installations.

- Sustainable drainage systems or facilities have also been identified (e.g. rainwater harvesting, roadside bioretention swales, blue-green infrastructure, flood retention facilities). The implementation of these measures would reduce and attenuate stormwater flows, avoid/reduce flooding, improve water quality of river channels, and improve ecological value of channels.
- **Preserve and Promote Cultural Heritage Resources** – All Declared Monuments and Graded Historic Buildings are well preserved and kept intact. In addition, the Project provides an opportunity to promote the cultural heritage resources through the provision of a cultural heritage trail. This trail is proposed to begin at the existing TSW Station and proposed HSK Station permeates through the Project area along the existing “Open Space” and “Amenity” (“A”) zones to interlink the heritage features at Ha Tsuen. The trail provides a safe and efficient amenity for people to explore many of the culturally significant areas in the Project area and is also intended to help promote these features and draw people to the area.



Examples of built heritage within the Project area

- **Optimise Natural Resources** – The retention of the San Sang San Tsuen egret in “Green Belt” (“GB”) that is buffered by “Local Open Space” (“LO”), is an improvement upon its current condition in a highly disturbed open storage area, as it increases protection of the egret. The “LO” also provides an eco-corridor, covering the ardeid flight paths, and providing connectivity to foraging habitats to the east.
- Within the Project area, more than half of existing villages and brownfield sites, including the southwestern and northwestern Project areas are currently not covered by or properly connected to the existing sewerage system. New public sewers are proposed under this Project to collect sewage from most of these existing unsewered developments. This is likely to result in an improvement to the water quality of watercourses within the Project area.

## **2.7 Development Programme for the Project**

2.7.1 The Project would be commissioned in different stage with the first population intake in Year 2024. The major construction works are targeted to commence in Year 2019 and be completed by Year 2037/2038 for full population intake. The key site formation and infrastructure works in different stages are summarised below.

### **Advance Works**

2.7.2 The Advance Works are targeted to bring in early population and employment to the Project area within the capacity of existing strategic infrastructure. The required supporting infrastructure works are therefore minimal. Some industrial sites and a key access roads (Road P1), will be implemented under this development stage. The major site formation and infrastructure works in this development stage will include:

- Site formation works for “Residential” (“R”), “G/IC”, “Commercial” (“C”) and “Industrial” (“I”) sites.
- Two new SPSs (SPS1 and SPS2) (DP9) and associated rising mains.
- Primary Distributor Road P1 under KSWH and associated interchange/junction works connecting with KSWH, Castle Peak Road and other District Distributors (DP1).
- Slip Roads between Road D8 Junction and existing Castle Peak Road; Junction of D8/P1 and Junction of D7/P1 (DP5).
- Essential utilities for the future development of relevant sites in the Project, such as sewerage, watermains, power supply cables and electricity substation, etc.

### **Stage 1**

2.7.3 In Stage 1, three “OU(PBU+SWU)” sites in the northern part of the Project will be developed. The early completion could provide opportunity for accommodating some of the affected brownfield operations. The major site formation and infrastructure works in this development stage will include:

- Site formation works for the three “OU(PBU+SWU)” sites and two “R” sites.
- A section of District Distributor Road D1 (DP2) connecting the “OU(PBU+SWU)” sites to KSWH.
- Utilities laying works for the future development of relevant sites in the Project, such as sewerage, watermains, power supply cables, etc. along the proposed Road P1.

### **Stage 2**

2.7.4 In Stage 2, the development mainly focuses on areas surrounding the proposed HSK Station and the remaining “OU(PBU+SWU)” sites in the northern part of the Project area.

2.7.5 The major site formation and infrastructure works in this development stage will include:

- District Distributor Road D6, D7 and D8 (DP2 and DP6) and local roads, and associated pedestrian walkway and cycle tracks.
- District Distributor Road D1, a section of Road D3 (DP2) and local roads, and associated pedestrian walkway and cycle tracks.

- Site formation works for “R”, “C”, “G/IC” and open space sites in the southern Project area and associated section of the GTC.
- Site formation works for the remaining “OU(PBU+SWU)” sites and RTS in the northern Project area.
- Two new SPSs (SPS3 and SPS4) (DP9) and associated rising mains.
- New HSK STW Phase 1 (DP8).
- A FWSR and FLWSRs for reuse of reclaimed water (DP10) near Tan Kwai Tsuen and associated supply networks.
- DCS near proposed HSK Station (if implemented).
- Utilities for the future development of relevant sites in the Project, such as sewerage, watermains, power supply cables, electricity substations, etc.

### **Stage 3**

2.7.6 In Stage 3, the development would focus on special industrial sites, public housing sites in the northern Project area, and open space in the middle part of the Project area. Most of the existing brownfield operations are located in the areas under this development stage. The major site formation and infrastructure works in this development stage will include:

- District Distributor Road D4 and Ping Ha Road (Road D2) widening (DP2 and DP6) and local roads, and associated pedestrian walkways and cycle tracks.
- District Distributor Road D3 and D5 (DP2), and associated pedestrian walkways and cycle tracks.
- Slip roads connecting KSWH and Road D3 (DP5 and DP12).
- Site formation works for “R”, “C” and “G/IC” sites in the eastern and northern parts of the project area and associated section of GTC.
- Site formation works for “OU(Logistics Facilities)” and “OU(Enterprise and Technology Park)” sites in the western Project area and associated section of GTC.
- New HSK STW Phase 2 (DP8).
- A FLWSR for reuse of reclaimed water near Fung Kong Tsuen (DP10) and associated supply networks.
- Extension of FWSR near Fung Kong Tsuen and associated supply networks.
- Revitalisation of existing Tin Sam Channel and HSK Main Channel.
- Flood retention facilities and open spaces.
- Utilities for the future development of relevant sites in the Project, such as sewerage, watermains, power supply cables, etc.

#### **Stage 4**

2.7.7 In Stage 4, the remaining residential development along the TSW Main Channel and the low density residential development in Lau Fau Shan area will be completed. The major site formation and infrastructure works in this development stage will include:

- Local roads serving development sites, and associated pedestrian walkways and cycle tracks.
- Site formation works for “R”, “G/IC”, “C”, open spaces and riverside promenade sites in the eastern and northern Project areas and associated section of GTC.
- Revitalisation of TSW Main Channel.
- Flood retention facilities.
- DCS near existing TSW Station (if implemented).
- Construction of EFTS (DP4) (if implemented), and associated pedestrian walkway and cycle tracks within the GTC.
- Utilities for the future development of relevant sites in the Project, such as sewerage, watermains, power supply cables, etc.

#### **Existing Brownfield Interface with New Development**

2.7.8 The potential interface issues which could arise during the implementation stages have been assessed within individual chapters (e.g. air quality/construction dust, construction noise, and visual impacts on existing and planned sensitive receivers). Where required, mitigation measures have been recommended to avoid or minimise potential impacts. A review of existing land uses (with a particular focus on sites for open storage, port back-up, construction material/machinery storage, car repair workshops, recycling yards, and rural workshops, etc.) and the phasing plan was also undertaken to identify any locations where other impacts may arise (e.g. population intake at locations adjacent to existing brownfield operations). In most cases the population moves in after clearance of the surrounding brownfield sites. As a result any potential interface issues are minimised through the development phasing.

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### 3 SUMMARY OF KEY FINDINGS IN EIA STUDY

#### 3.1 Approach to Environmental Impact Assessment

3.1.1 The EIA process provides a means of identifying, assessing and reporting the environmental impacts and benefits of the Project. It is an iterative process that has been undertaken in parallel with the development of the Revised RODP to identify the potential environmental effects of various design options, and develop alternatives as well as mitigation measures to be incorporated into the design, construction and operation of the Project. Public views obtained from the various community engagement exercises have been considered and incorporated into the EIA process, where appropriate. Mitigation measures have been proposed, where required, to avoid some potential environmental impacts, or to minimise impacts to acceptable levels. In addition, environmental benefits have been incorporated into the Project, where possible.

#### 3.2 Air Quality Impact

##### Construction Phase

3.2.1 Potential air quality impacts from the construction works of the Project would mainly be related to construction dust from excavation, materials handling, spoil removal and wind erosion. Quantitative fugitive dust assessments have been conducted, taking into account the cumulative impact caused by nearby concurrent sources within 500 m from the boundary of the Project area. With the implementation of mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation together with the recommended dust suppression measures including watering once per hour on active works areas, exposed areas and unpaved haul roads and other site management measures such as, good site practices, and environmental monitoring and audit (EM&A) programme, the predicted dust impact at air sensitive receivers (ASRs) in the vicinity of the work sites would comply with the hourly, daily and annual particulate criteria stipulated in the Air Quality Objectives (AQOs) and Technical Memorandum on EIA Process (EIAO-TM).

3.2.2 A summary of the predictions for representative air pollutants related to construction dust impact after the implementation of mitigation measures is presented below:

**Table 3.1 Summary of Construction Dust Impact after Implementation of Mitigation Measures**

Scenario	TSP Conc. ( $\mu\text{g}/\text{m}^3$ )	RSP Conc. ( $\mu\text{g}/\text{m}^3$ )		FSP Conc. ( $\mu\text{g}/\text{m}^3$ )		AQO / EIAO-TM Compliance
	Max. 1-hour (500)	10 <sup>th</sup> highest 24-hour (100)	Annual (50)	10 <sup>th</sup> highest 24-hour (75)	Annual (35)	
Year 2019 – 2030	169 – 488	91 – 100	41 – 45	69 – 75	29 – 31	Yes
Year 2031 – 2036	170 – 495	92 – 100	41 – 44	69 – 75	29 – 31	Yes

Note: Respective criterion is given in bracket.

3.2.3 The most affected ASRs would be those in the immediate vicinity of construction sites, for example, Oaklands Court, Tin Ha Road Playground, logistic facilities at Sites 3-6 and 3-8, and Site 4-20 due to Stage 2 Works Contract in Year 2019 – 2030 scenario, and Site 3-14 due to Stage 3 Works Contract in Year 2031 – 2036 scenario. In summary, no unacceptable air quality impact during construction phase is anticipated when the proposed mitigation measures are implemented.

### **Operation Phase**

- 3.2.4 Cumulative air quality impact arising from the vehicular emissions from the open roads including KSWH, Castle Peak Road and Yuen Long Highway, and chimney emissions within the assessment area, portal emission and emission from ventilation building of TMWB, has been assessed at the worst case years. The assessment results concluded that the predicted cumulative 1-hour and annual average NO<sub>2</sub>, daily and annual average respirable suspended particulates (RSP) / fine suspended particulates (FSP) concentrations at representative ASR would comply with the AQOs.
- 3.2.5 A summary of predictions for representative air pollutants during operation phase is presented below.

**Table 3.2 Summary of Air Quality Impact during Operation Phase**

Scenario	NO <sub>2</sub> Conc. (µg/m <sup>3</sup> )		SO <sub>2</sub> Conc. (µg/m <sup>3</sup> )		RSP Conc. (µg/m <sup>3</sup> )		FSP Conc. (µg/m <sup>3</sup> )		AQOs / EIAO-TM Compliance
	19 <sup>th</sup> highest 1-hour (200)	Annual (40)	4 <sup>th</sup> highest 10-min (500)	4 <sup>th</sup> highest 24-hour (125)	10 <sup>th</sup> highest 24-hour (100)	Annual (50)	10 <sup>th</sup> highest 24-hour (75)	Annual (35)	
Year 2024 – 2030	86 – 137	17 – 36	110 – 256	26 – 36	91 – 97	40 – 43	68 – 73	29 – 30	Yes
Year 2031 – 2039	87 – 145	17 – 36	110 – 256	26 – 36	91 – 98	40 – 43	69 – 73	29 – 31	Yes

Note: Respective criterion is given in bracket.

- 3.2.6 Higher annual NO<sub>2</sub> concentration would be predicted at the ASRs at Sites 3-43, 3-45, 3-50 and 3-51 which are within the industrial area located next to KSWH. The predicted hourly and annual average NO<sub>2</sub> concentrations at most of existing and planned ASRs would be in the range of 20 – 30 µg/m<sup>3</sup>. The predicted RSP/FSP concentrations at the ASRs would be dominantly contributed from background levels. For the existing and planned ASRs, the Project would contribute to less than 2 µg/m<sup>3</sup> in terms of annual RSP and 1 µg/m<sup>3</sup> in terms of annual FSP.
- 3.2.7 The potential odour impact from nearby existing chicken farm has been assessed. Exceedance of odour criterion would only be expected at a small portion of one planned site zoned “OU(PBU+SWU)”. It is proposed that these areas to be designed as non-air sensitive uses or with the fresh air intake located at higher levels. The cumulative odour impacts from upgraded San Wai STW, new HSK STW and planned RTS have also been assessed. No exceedance of the EIAO-TM odour criterion would be expected. No adverse odour impact from the operation of the four planned SPSs would be anticipated with the implementation of proposed mitigation measures including enclosing the wet wells and odourous facilities, provision of deodourising units for treatment of foul air before discharging.

### 3.3 Noise Impact

#### Construction Phase

- 3.3.1 Construction noise associated with the use of powered mechanical equipment (PME) for different stages of construction has been conducted. With the implementation of practical mitigation measures including good site management practices, use of movable noise barrier, use of “quiet” plant, proper workfront management, proper grouping of PME for some construction activities at critical work areas and provision of minimum separations from the affected educational institutions or avoidance of any noisy construction activities during the examination period, the maximum predicted construction noise impact would be 75 dB(A) for residential noise sensitive receivers (NSRs), 70 dB(A) for education institutions and 65 dB(A) for education institutions during examination period. Hence, no unacceptable impact arising from the construction of the Project would be anticipated.
- 3.3.2 For conducting construction works closed to education institution, it is recommended that the Contractor should liaise with the school representative(s) to obtain the examination schedule so as to avoid noisy construction activities during school examination period.
- 3.3.3 An EM&A programme is recommended to ensure the proper implementation of the proposed mitigation measures and take remedial measures when non-compliance is recorded. As the construction of the Project may involve different parties, it is proposed to set up a liaison group among relevant government departments, contractors of the works contracts, etc. during construction phase of the Project so as to ensure the proper implementation of the proposed noise mitigation measures.

#### Operation Phase

- 3.3.4 Operational road traffic noise impact on planned and existing noise sensitive uses within and in the vicinity of the Project area have been assessed. After considering the alternative land use arrangements, results indicate that the noise impacts can be further mitigated by a combination of noise mitigation measures including: 1) application of low noise road surfacing materials on some road sections; 2) noise barriers/cantilever noise barriers along some Project road sections; and 3) building set-back, orientation and special building design such as façade design as non-noise sensitive uses/blank façade, provision of acoustic windows for affected planned residential NSRs to ensure the noise levels at these NSRs would comply with the respective noise criteria. This mitigation will also ensure that the noise levels caused by Project roads are within the respective noise criteria. Provision of air conditioning and noise insulated windows for the affected planned educational institutes is proposed to alleviate the adverse traffic noise impact. A summary of the predicted road traffic noise levels is given below:

**Table 3.3 Summary of Mitigated Road Traffic Noise Levels**

Use	Predicted Mitigated Overall Noise Levels, L <sub>10(1hr)</sub> dB(A)	Criteria, L <sub>10(1hr)</sub> dB(A)
<b>HSK NDA</b>		
Residential	43 – 70	70
Educational Institutions	47 – 65	65

- 3.3.5 The re-arrangement of the road network by replacing Tin Ying Road and downgrading of Hung Tin Road will also reduce the existing road traffic noise impact to nearby noise sensitive receivers.

- 3.3.6 Fixed plant noise assessment has been conducted. Noise impact from planned fixed plant could be effectively mitigated by implementing noise control measure at source during the detailed design stage. With the adoption of the proposed maximum permissible sound power levels for the planned fixed plant, the impact noise levels at representative NSRs would comply with the relevant noise criteria. Therefore, adverse fixed noise sources impact to the NSRs is not anticipated.
- 3.3.7 Rail noise assessment has been conducted based on operational information from the railway operator. Results indicate that the noise impacts from WRL and LRT on NSRs would comply with the statutory requirement after incorporated mitigation measures such as screening by noise tolerant buildings, provision of architectural fins, non-sensitive use or fixed glazing and building layout setback.
- 3.3.8 EFTS is proposed to be introduced to operate within the Project area, which may be in the form of rail based or road based mode of transport. For conservative noise assessment, the rail based EFTS was assumed for rail noise impact assessment. Results indicate that the noise impacts on NSRs would comply with the statutory requirement after some track enhancement measures such as embedded rail, green track with vegetation, etc.
- 3.3.9 Considering the existing helipad near KSWH is for emergency use, there would be no routine flight expected. Helicopter noise assessment at the existing helipad during occasional take-off, overflight and approach has been conducted. Results indicate that the operation of the helipad would not pose environmental impact to the planned NSRs and the existing NSRs.
- 3.3.10 One of the objectives of developing the Project is to convert the existing brownfield sites to more optimal uses and improve the overall environment of the area. Approximately 24 ha of land at the northern fringe of the Project area is reserved as “OU(PBU+SWU)” sites. This area may accommodate some of the existing brownfield operations through the possible development of multi-storey buildings or other land efficient means. The provision of this dedicated area will help to alleviate existing industrial/residential interface issues resulting from existing brownfield operations. In addition, new roads will be provided to directly connect this area to KSWH thereby eliminating the current movement of HGV through built-up areas including residential areas.

### **3.4 Water Quality Impact**

#### **Construction Phase**

- 3.4.1 Water quality impacts from the construction works are associated with the general construction activities, construction site run-off, accidental spillage, and sewage effluent from construction workforce. The site practices as outlined in the ProPECCPN 1/94 “Construction Site Drainage” and the ETWB TC (W) No. 5/2005 “Protection of natural streams/rivers from adverse impacts arising from construction works” are recommended to minimise the potential water quality impacts from the construction activities. Proper site management and good site practices are also recommended to ensure that construction wastes and other construction-related materials would not enter the nearby watercourses. Sewage effluent arising from the construction workforce would be handled through provision of portable toilets. Water quality monitoring and regular site inspection will be implemented for the construction works to ensure that the recommended mitigation measures are properly implemented.
- 3.4.2 An Emergency Response Plan is recommended to minimise the potential water quality impact from construction site discharges under failure of treatment facilities during emergency situations or inclement weather.
- 3.4.3 With the implementation of the recommended mitigation measures, the construction works for the Project would not result in unacceptable impacts on water quality.

### **Operation Phase**

- 3.4.4 All sewage generated from the new developments will be discharged to the public sewerage system and diverted to the proposed new HSK STW. Part of treated sewage effluent will be reused as reclaimed water for toilet flushing in the Project while the rest of treated sewage effluent from the proposed new HSK STW will be pumped to the NWNT Effluent Tunnel for discharging to the Urmston Road Outfall for proper disposal at the North Western WCZ. Hence, no increase in the pollution loading to the Deep Bay waters would be induced by the Project. The Project would actually have water quality beneficial effect by providing new sewerage in the proposed development area which will replace the existing unsewered areas and thus reducing the pollution loading to Deep Bay.
- 3.4.5 In view of the potential adverse effect of emergency sewage bypass and sewage leakage on the water quality of the nearby watercourses, various precautionary measures are proposed to be incorporated in the design of the SPSs and rising mains to avoid emergency bypass and leakage of sewage to the maximum practicable extent. A contingency plan is also recommended to deal with the remote occurrence of emergency discharge. With the incorporation of the precautionary measures and contingency plan as recommended in this EIA, the possibility of emergency sewage bypass and sewage leakage would be remote and the potential water quality impacts in the unlikely event that an overflow/leakage does occur would be minimised.
- 3.4.6 Another source of potential impact during the operational phase will be the run-off or non-point source pollution from road surfaces and developed areas. Stormwater control measures including adequate stormwater drainage system with suitable pollutant removal devices, blue-green infrastructure and best stormwater management practices are recommended for the Project to minimise the non-point source pollution. With proper implementation of the recommended mitigation measures, it is anticipated that the water quality impacts associated with the non-point source discharge from road surfaces and developed areas would be minimised.

### **3.5 Sewerage and Sewage Treatment Implications**

- 3.5.1 The Project will generate additional sewage flow which will require additional sewerage infrastructures such as new HSK STW and SPSs. The new HSK STW is proposed with a tertiary treatment process, for reuse of reclaimed water and secondary plus treatment (with UV disinfection and 75% nitrogen removal) for disposal of effluent.
- 3.5.2 Reuse of reclaimed water is recommended for non-potable uses such as toilet flushing and irrigation. With reuse of reclaimed water, part of the treated sewage would be reused and the effluent discharge to North Western WCZ will also be minimised.
- 3.5.3 Within the proposed development area, most of the existing villages and brownfield sites, are currently not covered by or properly connected to the existing sewerage system. New public sewers are proposed under this Project to collect sewage in the proposed development area which will replace the existing unsewered areas. This is likely to result in an improvement to the water quality of watercourses within the Project area.
- 3.5.4 Based on the sewerage impact assessment, it can be concluded that the Project is sustainable from sewerage collection, treatment and disposal perspective.

### **3.6 Waste Management Implications**

- 3.6.1 The types of waste that would be generated during the construction and operation phases of the Project have been identified. The potential environmental impacts that may result from these waste materials have been assessed in accordance with the criteria and guidelines outlined in Annex 7 and Annex 15 of the EIAO-TM.

#### **Construction Phase**

- 3.6.2 The main waste types to be generated during the construction phase of the Project would include construction and demolition (C&D) materials, chemical waste, general refuse, excavated sediment and contaminated soil. It is estimated that there will be around 0.42 Mm<sup>3</sup> of non-inert C&D materials, 5.55 Mm<sup>3</sup> of inert C&D materials, a few cubic metres per month of chemical waste, around 1,950 kg per day of general refuse and some excavated sediment and contaminated soil to be generated during the construction phase of the Project. Reduction measures have been recommended to minimise the amount of materials generated by the Project by reusing C&D materials as far as practicable before off-site disposal.
- 3.6.3 The non-inert and inert C&D materials generated from the Project will be reused within the Project or other concurrent projects as much as possible. For instance, during site clearance and site formation works, it is assumed that most inert C&D materials will be suitable for reuse on-site as backfilling materials and only 5,047 m<sup>3</sup> of inert C&D materials will be transported to other concurrent projects for reuse. Temporary stockpiling areas are also identified to store the C&D materials to be reused under this Project. Provided that the waste is handled, transported and disposed of using approved methods, adverse environmental impacts would not be expected.

#### **Operation Phase**

- 3.6.4 The main waste types to be generated during the operation phase of the Project would include municipal solid waste, chemical waste and sewage sludge. It is estimated that there will be around 700 tonnes per day of municipal solid waste, a few cubic metres per month of chemical waste, around 16 m<sup>3</sup> per day of screenings and grits and around 50 m<sup>3</sup> per day of dewatered sludge to be generated during the operation phase of the Project. Three new refuse collection points and a new RTS have been included in the Revised RODP to handle the increased quantity of waste in the district. A Community Green Station is proposed to be co-located with the new RTS for environmental education purpose, convenient collection of recyclables from the local community, and to provide synergy to achieve better operational efficiency and environmental sustainability. Provided that the waste is handled, transported and disposed of using approved methods, adverse environmental impacts would not be expected.

### **3.7 Land Contamination Impact**

- 3.7.1 The land contamination assessment examined the potential contaminative land use within the assessment area and their potential impacts to future land use. The majority of the potentially contaminated sites could not be accessed to assess the site conditions by site walkover, at the time of reporting. For those sites that were accessible for site walkover, permission could not be obtained from the site operators to carry out the site investigation (SI) works. Due to this, the assessment on the potential land contamination was conducted based on the findings from desktop study, helicopter reconnaissance and site surveys.



- 3.7.2 A total of 480 potentially contaminated sites were identified, of which 253 potentially contaminated sites are currently used as open area storage, container storage and warehouse sites. Warehouse sites may not be contaminated if they are used to store general household goods (e.g. furniture and toys). Container storage and open area storage, on the other hand, typically comprise a large portion of area for goods / container storage with possibly smaller portion for potentially contaminating activities such as vehicle / equipment maintenance area and the associated chemical handling/storage. The contamination (if any) is therefore expected to be localised if the main types of goods stored on-site are not potential sources of contamination. In addition, the land uses of the remaining identified potentially contaminated sites are not large scale polluting installations / facilities, which further support that the contamination (if any) would be localised rather than widespread.
- 3.7.3 The chemicals of concern (COCs) identified with the potential to be present at the potentially contaminated sites include: metals, VOCs, SVOCs, PCRs and PCBs. These COCs are readily treatable using proven physical, chemical and biological remediation techniques; as demonstrated by the successful remediation of soil contaminated with the abovementioned COCs in other Hong Kong projects. By implementing the recommended further works, the actual contaminated site(s) within the assessment area would be located and any contaminated soil and groundwater would be identified and treated.
- 3.7.4 The implementation of the recommended further works under this Project would clean up any contaminated site(s) identified within the assessment area. The recommended further works would not only minimise the health risks to future occupants arising from the exposure of the contaminated soil and/or groundwater, it would also provide the opportunity to treat the contaminated soil / groundwater using proven remediation techniques for reuse as useful materials (such as backfilling materials); thereby minimising the amount of waste disposing into the already depleting landfills in Hong Kong and achieving a more sustainable development.
- 3.7.5 Furthermore, the Project would allow the conversion of any contaminated site(s) into land that is safe for more optimal development. This would assist in addressing Hong Kong's long-term housing demand and other land use needs.
- 3.7.6 Given the above, land contamination impacts are therefore considered not insurmountable.
- 3.7.7 As the identified potentially contaminated sites are still in operation and the development will only commence in stages from 2019 to 2037/38, and there may be change in land use prior to development within both the potentially contaminated and non-contaminated sites, it is recommended to conduct further works. This would include: site re-appraisal, SI works as well as submission of supplementary Contamination Assessment Plan(s) (CAP(s)), Contamination Assessment Report(s) (CAR(s)) and Remediation Action Plan(s) (RAP(s)) for the Environmental Protection Department's (EPD) approval after the sites are handed over to project proponent for development. If contaminated soil and/or groundwater were identified, remediation should be carried out according to EPD's approved RAP(s) and Remediation Report(s) (RR(s)) should be submitted to EPD for agreement after completion of the remediation works. No development works shall be commenced prior to EPD's agreement of the RR(s).

### **3.8 Ecological Impact**

- 3.8.1 Thirteen identified habitats, including developed area/wasteland, village/orchard, agricultural area (dry), agricultural area (wet), plantation, woodland, shrubland, grassland, marsh, fishpond and mitigation pond, stormwater drain/recreational pond, natural watercourse and modified watercourse, were located within the Project area where the development and associated construction works are proposed.

### **Areas Retained and/or Protected in the Development of the Revised RODP**

- 3.8.2 Avoidance measures were considered and incorporated during the early stages of the Project, to avoid direct impact to recognised sites of conservation importance / areas of higher ecological value including:
- Retention of most of the “GB” areas in the Revised RODP;
  - Avoidance of “Coastal Protection Area” (“CPA”) and the majority of “CA”;
  - Avoidance of the three identified egrettries: Ngau Hom Shek egrettry, Shenzhen Bay Bridge egrettry and San Sang San Tsuen egrettry and its associated flight lines;
  - Avoidance of a large area of shrubland/plantation/woodland (Crested Serpent Eagle territory) at Ngau Hom Shek (Site 3-2);
  - Retention of Tung Tau Tsuen woodland and one individual of plant species of conservation importance (Incense Tree) *in situ*;
  - Avoidance of Deep Bay Link (DBL) project mitigation ponds (wetland compensation area) near KSWH; and
  - Avoidance of natural watercourses, TSW Main Channel and its major tributary.

### **Potential Impacts and Mitigation Measures**

- 3.8.3 The Project will encroach upon approximately 441 ha of habitat area; however, over 98% of the existing habitats are of low ecological value. Only 0.1 ha of “CA” (which comprised roads and reinforced concrete flood storage pond) to the west of KSWH would be directly impacted. The direct impact is anticipated to be negligible.
- 3.8.4 Only two small areas of woodland located at Ngau Hom Shek (0.1 ha) and west of Fung Kong Tsuen (0.11 ha) would be lost. These woodlands were already subject to anthropogenic disturbance (e.g. roads and graves). Given the relatively small sizes, the impact is minor.
- 3.8.5 While San Sang San Tsuen egrettry would be retained under the “GB” zoning, construction activities adjacent to the egrettry would create disturbance impact. The impact would be mitigated by scheduling the construction works outside the breeding season of the ardeids (i.e. between March and August).
- 3.8.6 While the Project would not have direct impact on the DBL project mitigation ponds, the proposed slip roads between Road P1 and KSWH would be located adjacent to the two eastern ponds which could result in potential decreased use of these ponds by avifauna species (due to disturbance and potential barrier effect). To minimise the impacts an amenity strip is proposed adjacent to the eastern side of these ponds and additional buffer tree planting along the new Road P1 would provide screening.
- 3.8.7 Two footbridges and two cycle bridges are proposed across TSW Main Channel and construction activities (e.g. piling and excavation) may result in temporarily habitat loss and disturbance to avifauna (including overwintering waterbirds and nesting ardeids). Given the construction is temporary and small in scale, the loss of modified watercourse habitat would be also minor.
- 3.8.8 Indirect and secondary impacts during the construction phase would be construction disturbance, noise and vibration, dust, glare and site run-off. With implementation of good site practices (e.g. dust suppression measures, night-time lighting control, proper discharge system), no significant adverse ecological impact is anticipated.

### **Enhancement Measures and Environmental Benefits**

3.8.9 The environmental benefits arising from Project include:

- Approximately 200 ha (45% of the proposed development area) is currently occupied by brownfield operations. This operation had created various environmental impacts, including: air quality/dust, noise, visual, water quality, and subsequently ecological impacts. Therefore, consolidation of the existing brownfield operations to multi-storey buildings will help to reduce the current impacts and improve habitat quality.
- The retention of the San Sang San Tsuen egret in “GB” that is buffered by “LO”, is an improvement upon its current condition in a highly disturbed open storage area.
- The implementation of sustainable drainage systems or facilities would reduce and attenuate stormwater flows, improve water quality of river channels, and improve ecological value of river channels.

3.8.10 Enhancement measures have also been considered to improve the overall habitat quality and bring environmental benefits to the Project, which include:

- Introduction of native plant species within the proposed development area and by incorporating habitat creation through the landscaping plan (e.g. planting of trees and bamboo at “LO” and “DO” zoning), particularly at areas connected to “GB” (i.e. natural habitats);
- Inclusion of suitable planting within the flood retention facilities to provide foraging and/or roosting/nesting habitats for wetland dependent species (e.g. ardeids);
- Incorporation of ecological enhancement into the design of the realigned Tin Sam Channel could improve the ecological value of the habitats during the operational phase; and
- Enhancement planting with native species at the proposed Fung Kong Tsuen FLWSR site would enhance the value of habitats present.

### **Conclusion**

3.8.11 The Revised RODP has generally avoided impacts to habitats and species through its layout and the retention of higher ecological value habitats (e.g. the egret, woodland). With the implementation of the recommended mitigation measures (e.g. measures to avoid/minimise impacts to San Sang San Tsuen egret, measures to reduce disturbance from construction activities, etc.), no unacceptable residual impacts including both direct and indirect residual impacts during construction and operational phases would be expected.

## **3.9 Fisheries Impact**

3.9.1 Existing fisheries resources within the assessment area include active fishponds (outside the Project boundary) and capture fisheries resources of North Western and Deep Bay WCZs. The value of capture fisheries in the North Western WCZ is low to moderate, while it is low in Deep Bay WCZ. An important nursery and spawning ground for commercial fisheries species has been identified within the North Western WCZ, but outside the Project area. No oyster culturing and intertidal fishing were recorded at the coastal area from Ngau Hom Sha to Lau Fau Shan.

- 3.9.2 Potential fisheries impacts arising from the Project have been assessed. No active fishponds are located within the Project boundary. Three inactive fishponds were recorded within the Project area and would be lost due to the Project. Therefore the impact to pond fish culture is considered negligible to low when taking into account the potential conversion of inactive fishponds back to active fishponds.
- 3.9.3 No unacceptable water quality impacts to the Deep Bay WCZ and North Western WCZ are anticipated from the Project with proper implementation of water quality mitigation measures. Therefore, monitoring of fisheries resources during the construction and operation phases would not be necessary.

### **3.10 Landscape and Visual Impact**

- 3.10.1 Given the generally rural nature of the Project area, development of the Project will likely bring about land use changes that will fundamentally change the visual and landscape character of the area. However such changes could be regarded as positive enhancement given the Project area is presently a large area of dilapidated and haphazard brownfield sites. The Project, though bringing changes to the existing environment, would intrinsically enhance the visual and landscape character of the area, ensure ample public benefit such as open space, and contribute to creating a vibrant, liveable and green new town.
- 3.10.2 Moreover, at the outset of drawing up the proposals on the Revised RDP, a planning and urban design framework has been formulated to minimise landscape and visual changes as far as possible. The Project has been carefully planned to achieve a distinct landscape and visual characteristic of a new town. A stepped building height and development intensity profile is adopted with the tallest and densest developments concentrated at the commercial nodes near the railway stations, and descending towards Lau Fau Shan and Deep Bay area which is more rural and low-rise in scale. Care has also been taken to establish a network of linked open spaces, accommodating a number of parks, green amenity strips, shopping streets and landscape/visual corridors, to create 'green' communities and partly compensate for any loss of landscape/visual resources due to the developments.
- 3.10.3 Despite cautionary design, it is inevitable that the Project at such large-scale would induce some potential landscape and visual impacts at the construction and operational phases (including site clearance and formation works, construction of new developments and roads, provisioning of utilities, realignment of roads, streams and watercourses, and the ultimate operation of the new developments). To evaluate the significance of such impacts, landscape and visual impact assessment for the Project was undertaken. Key findings are outlined below.

#### **Landscape Impacts**

- 3.10.4 A broad-brush tree survey has been carried out to determine, in broad terms, the potential impacts on existing trees. Within the assessment area, it is estimated that there are approximately 28,583 trees consisting of 200 species. Major tree species include *Ficus microcarpa*, *Macaranga tanarius* var. *tomentosa*, *Leucaena leucocephala*, *Dimocarpus longan*, *Ficus benjamina* and *Celtis sinensis*. The broad brush tree survey suggests that only about 45% of the trees are found within the Project area, and amongst them, about 50% would be preserved. While most of the trees surveyed belong to common tree species of variable quality, some rare tree species and other trees of relatively outstanding quality were found occasionally. One Old and Valuable Tree (OVT) was found in the assessment area but it is located outside the Project area. A total of 63 trees are potentially registerable as OVTs, while 28 additional trees identified as Important Trees (as per DEVB TCW No. 7/2015). A detailed Tree Removal Application process will be carried out at a later detailed design stage to finalise the tree treatment and allocate compensatory planting areas. Tree

compensation within the Project area will be provided at a 1:1 ratio. This means that for every tree that is removed, a new one will be planted. Furthermore, trees affected by DPs will be compensated within their respective DP areas.

- 3.10.5 Within the assessment area, 18 Landscape Resources (LRs) and six Landscape Character Areas (LCAs) are identified. Due to the nature of the Project, some LR and LCAs are inevitably affected. Based on the impact assessment findings, a number of mitigation measures have been proposed. These include tree protection and preservation, tree transplantation, compensatory planting, road greening, as well as integration of the abovementioned open space framework to mitigate the loss of major LR and reinstate streetscape areas to equal or better quality than currently existing. With the mitigation measures in place, the residual landscape impacts during the operational phase will consist largely of loss of vegetation and fragmentation of some LR only. The residual landscape impacts for some LR and LCAs cannot be completely mitigated, for example the loss of agricultural land, low-lying woodland and grassland. The loss of vegetation in other LR/LCAs, however, will only be temporary as it will be replaced by new and/or compensatory planting. The felling and compensation of trees will also occur in stages over the course of the construction of the Project rather than all at once. The concepts enshrined in the urban design framework create many opportunities to introduce new planting in areas of open space such as the Regional Town Park or along river channels. The reinstated vegetation is recommended to consist largely of native species so as to enhance the ecological integrity and biodiversity of the Project area. The provision of roadside “A” zones provides room for this type of planting.
- 3.10.6 The new developments and their site greening and amenity plantings, new high quality street trees and roadside vegetation along all district distributors and local roads, and the aforementioned trees and plantings within new open space sites and riverside promenade, will enhance the landscape quality of the area. Collectively, the new development will bring forth both impacts and new amenity that seeks to balance the new developments with ample greening and well-designed public space.
- 3.10.7 In particular, while disturbance during the construction phase would cause temporary impacts to the TSW Main Channel and Shek Po Channel, the LR for these watercourses would be enhanced during operational phase as implementation of the proposed open space framework would upgrade the quality of these resources. Other watercourses at Hang Hau Tsuen Nullah, Ping Ha Road Nullah, Tin Sam Channel, San Sang San Tsuen Channel, and Yick Yuen Tsuen/Tsing Chuen Wai Nullah would also be subject to permanent impacts due to partial coverage and subsequent loss of sections of the watercourse. However, the overall impact on these resources would be enhanced via new amenity and native plantings, enhanced nullah edges and recreation zones along the lengths of these nullahs.

### **Visual Impacts**

- 3.10.8 From a visual perspective, given the nature and scale of the proposed development with high-rise developments, the Project will likely to be altered significantly from the visual context of the area. A number of Visual Sensitive Receivers (VSRs), especially those located within and to the immediate surroundings of the Project area, are anticipated to experience substantial visual impacts:
- For Residential VSRs, the substantial visual impact after mitigation is largely due to the scale of the proposed development and proximity of the VSRs to the sources of impact. As a result, views are full and in some cases all-encompassing for those within the Project area.
  - In the case of Recreational VSRs, several are afforded prolonged and recurring views toward the Project, such as hikers along the Castle Peak Trails.



- For Travelling VSRs, substantial impacts arise for those VSRs travelling along roads that intersect or pass through the Project area such that their views will be significantly altered for long durations of their journey, causing a substantial magnitude of change. In the case of cyclists along roadways, their higher sensitivity due to a slower travel speed and heightened awareness of their surroundings results in pronounced and prolonged exposure to visual impacts.

3.10.9 Based on the impact assessment findings, a number of mitigation measures have been proposed. These include adopting alternative designs or revisions to the basic engineering and architectural designs to prevent and/or minimise adverse impacts; remedial measures such as colour and textural treatment of building features; and compensatory measures such as the implementation of landscape design elements (e.g. tree planting, creation of new open space, etc.) to compensate for unavoidable adverse impacts and to attempt to generate potentially beneficial long-term impacts.

3.10.10 Given the overall visual character in the Project area would be significantly changed by the Project, the recommended mitigation measures may not be enough to adequately compensate for such a substantial magnitude of change for these highly sensitive VSRs. However, the overall change that is to occur as a result of development of the Project will ultimately bring about positive enhancement. The transformation of the area from what is presently an area predominantly occupied by haphazard and dilapidated brownfield sites into a contemporary planned community with varying District Character Areas and applicable landscape treatments will result in strong visual interest and character and improved visual outlook for the majority of VSRs. Added to this, a number of breezeways and view corridors planned along riverside promenade and fung shui lanes, as well as a stepped building height strategy enshrined in the urban design framework will add visual interest to the development and provide it a contextual setting and connection to the broader Project area and TSW New Town. The urban design framework sets forth a number of planning and urban design concepts intended to influence the form, scale and overall visual character of the Project with the intention to develop a holistic and visually dynamic new town arising from what is presently a brownfield site.

#### **Overall Assessment**

3.10.11 The urban design framework is an intrinsic part of the Project that must be viewed in connection with proposed mitigation measures. While not all impacts can be fully reduced or eliminated through the implementation of mitigation measures due to the nature of the Project, the urban design framework goes further by specifically outlining and dedicating areas for open space, riverside promenade development, fung shui lanes and view corridors, and greenbelt areas that will result in the creation of new, positive LRs with positive visual outlooks for VSRs. The urban design framework also provides guidelines on building heights, massing and scale in order to address the visual change that will result from new buildings and provide contextual, sensitive treatment to the surrounding developments. The measures sought in the urban design framework work in unison with mitigation measures to ensure that a quality, green, and attractive new town replaces the existing mix of industrial storage yards that presently exist with the goal of realising a positive impact as a result of the new town development.

3.10.12 Overall, assuming full implementation of mitigation measures in combination with the key urban design and planning proposals outlined above, the residual landscape and visual impacts are perceived to be acceptable with mitigation measures as outlined in Annex 10 of the EIAO-TM, provided that appropriate mitigation measures are implemented during the construction and operational phases of the Project.

### **3.11 Impact on Cultural Heritage**

- 3.11.1 Based on desktop review and archaeological survey conducted between January and March 2015, a total of six Sites of Archaeological Interest (SAIs) were identified within the assessment area. However, only Tseung Kong Wai SAI (F1) and Tung Tau Tsuen SAI (F2) might be partially impacted by construction of the Project, but no insurmountable impact is anticipated. The archaeological impact arising from the construction works should be assessed when the detailed design of the works is available. Preservation in situ is the top priority to safeguard the archaeological remains in the impacted area by amending the layout plans of the construction works. However, if the works cannot avoid disturbance to the archaeological deposit, depending on degree of direct impact, the following mitigation measures should be considered, such as archaeological surveys, archaeological watching brief, preservation by records and relocation of archaeological remains. The scope and programme of the archaeological fieldwork would be agreed with AMO.
- 3.11.2 Separately, as archaeological fieldwork could not be conducted at some of the area, four Archaeological Potential Areas (APAs) were identified within the Project Area, which were subjected to uncertain archaeological potential. As such, further archaeological survey is required to be conducted at APA1 and APA2 to ascertain the extent of any archaeological remains within the APAs if any construction works will be carried out. Based on the findings of the survey, mitigation measures could be proposed, such as preservation in situ, preservation by records, or relocation of archaeological remains, in prior agreement with the AMO. Direct impact arising from the proposed development within APA3 should be avoided as far as possible. As the land use of APA4 remains “GB” and “V” type and no construction works will be conducted, no mitigation measure is required.
- 3.11.3 A total number of 21 traditional villages with archaeological potential were identified. As no development is proposed in the “V” zones, no impact is anticipated and hence no mitigation measure is required.
- 3.11.4 In terms of built heritage, two Declared Monuments, seven Graded Historic Buildings (including two Grade 2 Historic Buildings and five Grade 3 Historic buildings) are within the Project Area. The Project will not affect any Declared Monuments or Graded Historic Buildings. Moreover, 339 nil grade built heritage were identified within the Project Area. No direct impact to these nil grade built heritage is anticipated except 12 of them located in Yick Yuen Tsuen, Tin Sam San Tsuen and Tin Sam Tsuen which were assessed to contain no cultural significance. Preservation by record (including cartographic and photographic record) prior to the commencement of any construction works would be required for the impacted nil grade built heritage.
- 3.11.5 Moreover, the Project provides an opportunity to promote the cultural heritage resources within and surrounding the area through the provision of a cultural heritage trail. This trail is proposed to begin at the existing TSW Station and the proposed HSK Station and permeates through the Project area, along the existing “Open Space” and “A” zones. The trail provides a safe and efficient amenity for people to explore many of the culturally significant areas in the Project area and is also intended to help promote these features and draw people to the area. A Conservation Strategy in Ha Tsuen area is also recommended to maximise the public education, heritage and cultural tourism related opportunities in this area as heritage attractions. A Conservation Management Plan should be proposed to implement future maintenance and management of the cultural heritage.

### **3.12 Environmental Monitoring and Audit Requirements**

- 3.12.1 An EM&A programme will be implemented throughout the entire construction period to regularly monitor the environmental impacts on the neighbouring sensitive receivers. Any action required during the construction phase is also recommended for implementation. Some of the environmental aspects would extend the EM&A programme to the operational period to ensure no unexpected adverse environmental impacts resulting from the Project.
- 3.12.2 The EM&A programme would include site inspection / audit and monitoring for construction dust, construction airborne noise, operation airborne noise, water quality and updating changes as necessary. Details of the recommended mitigation measures, monitoring procedures and locations are presented in a standalone EM&A Manual.

## **4 SUMMARY OF ENVIRONMENTAL OUTCOMES**

- 4.1.1 The Project will be the next generation new town for Hong Kong. In addition, to providing housing and other land supply in Hong Kong, the Project will also serve as a “Regional Economic and Civic Hub” for the NWNT, given its strategic location in the NWNT and connection to TSW, Tuen Mun and Yuen Long New Towns. The Project aspires to turn the existing vast extent of brownfield sites including open storage, port back-up, construction material/machinery storage, car repair workshops, recycling yards, and rural workshops, etc. which have created considerable environmental, traffic, visual, and other problems, to more optimal uses and better land utilisation for future development of Hong Kong.
- 4.1.2 The EIA has provided an assessment of the potential environmental impacts associated with the construction and operation of the Project, based on the engineering design information available at this stage. This has also included specific assessment for the six Schedule 2 DPs subject to environmental permit application under this Study.
- 4.1.3 The assessment has been conducted, in accordance with the EIA Study Brief (No. ESB–291/2015) under the EIAO for the Project, covering the following environmental issues:
- Air Quality Impact
  - Noise Impact
  - Water Quality Impact
  - Sewerage and Sewage Treatment Implications
  - Waste Management Implications
  - Land Contamination Impact
  - Ecological Impact
  - Fisheries Impact
  - Landscape and Visual Impact
  - Impact on Cultural Heritage
- 4.1.4 The findings of this EIA Study have determined the likely nature and extent of environmental impacts predicted to arise from the construction and operation of the Project. During the EIA process, environmental control measures have been identified for incorporation into the planning and design of the Project, to achieve compliance with environmental legislation and standards during both the construction and operation phases.
- 4.1.5 Avoidance of environmental impacts has been one of the key considerations throughout the entire EIA Study. The key environmental problems that have been avoided and any sensitive areas protected in the Revised RODP are summarised below.

### **Protection of Sites of Conservation Importance**

- The majority of Sites of Conservation Importance (“CPA”, most of the “CA”) have been avoided. Where there is a slight encroachment into the “CA”, the preferred option has avoided impacts to semi-natural/natural habitats and graves.

### **Protection of San Sang San Tsuen Egretty**

- The Egretty is retained and protected in “GB” zone, which is an improvement upon its current condition in a highly disturbed storage area. The egretty is also protected from disturbance through the provision of “LO”, which provides a buffer to the south of the “GB”. The “LO” also provides an eco-corridor, covering the ardeid flight paths, and connecting the “GB” supporting the egretty to “GB” and foraging habitats to the east.

### **Preservation of Habitats with Ecological Value and Species of Conservation Importance**

- Most of the sites of conservation importance as well as habitats with high ecological value have been excluded from the Project area during the optioneering stages. In addition, the majority of “GB” is retained during the development to avoid the loss of natural habitats. This also includes avoidance of direct impacts to species of conservation importance.

### **Protection of Natural Watercourses in the Project Area**

- A natural watercourse is located in the “Industry” zone in the west of the Project area. To avoid direct loss of this watercourse, the Revised RODP has zoned the watercourse and the area south of it as “GB” thereby protecting it from development.

### **Protection of the Deep Bay Water Quality**

- There will be no increase in the pollution loading to the Deep Bay waters, as the sewage generated by the Project will be either reused as reclaimed water or properly disposed at North Western WCZ. In addition, providing new sewerage network in the Project which will replace the existing unsewered areas within the proposed development area, and will reduce the pollution loading to Deep Bay.
- The recommended preventative design measures of the four new SPSs would also protect the inland watercourses and Deep Bay waters downstream of the SPSs.

### **Preservation of Built Heritage**

- All of the Declared Monuments and Graded Historic Buildings have been preserved within the Revised RODP. A cultural heritage trail is also proposed under the Revised RODP to allow public to appreciate these precious heritage resources by walking.

4.1.6 Other than measures to avoid environmental impacts, efforts have also been exercised to minimise and compensate any unavoidable impacts. The need for any environmental designs required to mitigate the associated impacts have been identified and will be implemented as appropriate.

### **Minimising Water Quality Impacts**

- By reducing and attenuating stormwater flows through the adoption of sustainable drainage systems or facilities, flooding would be avoided/reduced, water quality of channels and subsequent ecological value of channels would be improved.



- By reducing the amount of effluent discharge from the new HSK STW via Urmston Road Submarine Outfall, with reusing part of the treated sewage effluent as reclaimed water, the pollution loading to the North Western WCZ would be minimised.

#### **Minimising Landscape and Visual Impacts**

- A comprehensive open space network is planned for the NDA to create a continuous riverside promenade, where additional open spaces are introduced on the Revised RODP with corresponding changes to the spatial layout of the developments along TSW Main Channel to further enhance air ventilation performance and visual porosity. The landscape and ecological value of the riverside promenade will be enhanced by planting vegetation of native species.
- Sufficient buffer has been introduced on the Revised RODP as "A" and Non-building Area (NBA) between the existing "V" zone and new developments. A 5 m NBA is also proposed along Road D2 for the private residential developments facing Lo Uk Tsuen, Ha Tsuen and San Uk Tsuen to increase the separation of buildings from the "V" zone.
- The proposed building height and development intensity profile for the Project area gives due regard to the physical form and setting of the existing and retained uses. This will allow better integration with the existing / retained areas and enhance the quality of the overall visual character of the Project area.

#### **Minimising Air Quality Impacts**

- The Revised RODP has concentrated the population, key economic activities and major community facilities within walking distance of mass transit and public transport nodes. Community neighbourhoods will also be created within easily accessible daily necessities to promote walking. With the above planning, road traffic and associated vehicular emissions will be minimised.
- The GTC encompassing EFTS, pedestrian walkways and cycle tracks, and a comprehensive pedestrian walkways and cycle tracks network will connect residential clusters with the "Logistics, Enterprise and Technology Quarter", railway stations and key community facilities to facilitate people movement between different activity nodes within the Project area and hence minimise road traffic and vehicular emissions.
- The re-arrangement of the road network by replacement of Tin Ying Road and downgrading of Hung Tin Road will minimise air pollutants generated from road traffic as well as reduce the existing road traffic noise.
- The Revised RODP layout also removes the existing interface problem between brownfield operations and the adjoining residential developments and will minimise movements of HGV traffic within the Project area by diverting the traffic to the new primary distributor underneath KSWH.

### **Minimising Noise Impacts**

- As stated above, the Project has been carefully planned to minimise road traffic and associated emissions, and noise by: promoting walking and cycling; providing GTC within the Project area; and locating “PBU+SWU” sites away from residential areas, as far as practicable. The GTC will also be separated from future roads to minimise traffic disturbance, and the depressed sections at road junctions will also shield some of the traffic noise. Noise impacts to a significant number of residents in TSW will also be ameliorated through replacement of Tin Ying Road. Non-noise sensitive uses and set-back from roads have also been proposed as far as practicable in order to avoid excessive noise barrier or sterilising too much land.
- NSRs are protected through various mitigation measures to comply with the statutory traffic noise limit. These include application of low noise road surfacing materials; noise barriers/cantilever noise barriers; and building set-back, orientation and special building design such as façade design, provision of architectural fins/acoustic windows for affected developments.
- The location of the planned logistics facilities buildings would help to screen the fixed plant noise from proposed “OU(PBU+SWU)” sites, thereby minimising impact on the existing village houses.

4.1.7 Overall, the EIA Study has predicted that the Project, with the implementation of the mitigation measures, would be environmentally acceptable with no adverse residual impacts on the population and environmentally sensitive resources. A number of enhancements (including enhancing ecological connectivity across the Revised RODP; provision of landscape planting in the “LO” zone adjacent to the egretty that could potentially be used by ardeids for nesting; wetland planting in the flood retention facilities in the Regional Town Park could provide additional resources for birds) and environmental benefits (including provision of dedicated “OU(PBU+SWU)” sites thereby reducing existing industrial / residential interface issues; rearrangement of the road network to reduce the existing traffic noise and minimise air pollutants generated from traffic; pollution loading to the Deep Bay waters will be reduced, as the existing unsewered areas within the proposed development area will be provided with new sewerage and no treated sewage effluent generated by the Project will be discharged to Deep Bay) within the proposed development area are also likely to result from the Project, which are illustrated in **Figure 4.1**.