

Civil Engineering and Development
Department

Agreement No. CE27/2015(CE)
Technical Study on Reclamation at
Lung Kwu Tan - Feasibility Study
Final Executive Summary

246382/REP/025/01

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 246382

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1 Introduction

1.1 Background

1.1.1 On 30 October 2015, Civil Engineering and Development Department (CEDD) of the Government of the Hong Kong Special Administrative Region commissioned Ove Arup and Partners Hong Kong Limited (Arup) to provide consultancy services for Agreement No. CE 27/2015 (CE) “Technical Study on Reclamation at Lung Kwu Tan – Feasibility Study” (the Study).

1.2 The Study

1.2.1 In 2011, CEDD had commissioned Arup under Agreement No. CE9/2011(CE) “Increasing Land Supply by Reclamation and Rock Cavern Development cum Public Engagement” Feasibility Study (the Land Supply Study) to identify suitable locations for reclamation outside Victoria Harbour and rock cavern development. Lung Kwu Tan (LKT), with a possible reclamation area of 200 to 300 hectares, was identified as one of the potential near-shore reclamation sites for further consideration.

1.2.2 LKT is located at the western side of Tuen Mun (Refer to **Figure 1.1**). Its relatively large reclamation area is conducive to comprehensive planning for mixed and balanced land uses, creating jobs and supporting the development of Tuen Mun New Town and Hong Kong.



Figure 1.1 Location of Lung Kwu Tan

1.2.3 The public opinions received during the Stage 2 Public Engagement (PE2) of the Land Supply Study suggested that LKT reclamation site could be specifically considered for land reserve, residential

development, utilities uses including solid waste handling and recycling facilities and power supply facilities, recreational or leisure facilities, public parks, industrial, and tourism related facilities such as hotels. Impact on marine ecology, including possible encroachment on habitat of Chinese White Dolphin (CWD), ecological conservation, transportation, cost effectiveness and the need to expedite land supply were major concerns as regards the LKT reclamation.

- 1.2.4 In addition, the reclamation and the subsequent development at LKT are subject to various constraints including the development constraints imposed by the nearby existing industrial facilities / installations and village-type development, the identified CWD habitat just outside the site, and the capacity of existing road network in view of the many developments in Tuen Mun.
- 1.2.5 In view of the various constraints at LKT which may limit the development potential of LKT reclamation, this Study was commissioned to assess the feasible reclamation extent at LKT and to ascertain key constraints and possible options on future land use before proceeding with more detailed studies including planning and engineering study and statutory environmental impact assessment (EIA).
- 1.2.6 The findings of the Study will be further investigated, elaborated and supplemented in the proposed detailed planning and engineering study for the reclamation proposal in the next stage in order to meet the requirement stipulated in the relevant planning and environmental protection ordinances (e.g. Town Planning Ordinance, Foreshore and Sea-bed (Reclamations) Ordinance, Environmental Impact Assessment Ordinance (EIAO), etc.) to proceed with the requisite statutory procedures required for a reclamation project.

1.3 Main Objectives of the Study

- 1.3.1 The overall objectives of the Study are to ascertain the engineering feasibility of reclamation at LKT and to provide insight on the possible land use options for LKT reclamation in consideration of many development constraints and interfacing projects before taking forward the reclamation proposal to detailed studies including planning and engineering study and statutory EIA.
- 1.3.2 The main objectives of the Study are:-
- (a) To determine the feasible extent of reclamation;
 - (b) To assess the preliminary engineering feasibility for reclamation;
and
 - (c) To identify the key constraints and possible options on future land use.

1.4 Scope of “Executive Summary”

- 1.4.1 The Executive Summary provides a brief summary on the findings of the Study based on various assessments, and highlights the key issues and mitigation measures considered in the assessment. Based on the findings of the Study, potential development theme for LKT reclamation and the key constraints on land use are suggested for future consideration.

1.5 Structure of the Report

- 1.5.1 The Report is structured as follows:-
- (a) Section 1 introduces the Study;
 - (b) Section 2 describes the Study Area and its surrounding;
 - (c) Section 3 presents the land use assumptions adopted in the Study for assessment;
 - (d) Section 4 presents the results of the engineering and environmental assessments; and
 - (e) Section 5 advises the potential development theme of Lung Kwu Tan reclamation and the key constraints on land use for future consideration.

1.6 Nomenclature and Abbreviation

- 1.6.1 **Table 1.1** lists out the abbreviated titles of government departments mentioned in this Report.

Table 1.1 Abbreviations of Government Departments

Abbreviation	Full title
CEDD	Civil Engineering and Development Department
DSD	Drainage Services Department
EPD	Environmental Protection Department
WSD	Water Supplies Department

- 1.6.2 **Table 1.2** lists out the meaning of abbreviation for expressions adopted in this Report.

Table 1.2 Abbreviations for Expressions Adopted in this Report

Abbreviation	Full meaning
BPPS	Black Point Power Station
C&DMHF	Construction and Demolition Materials Handling Facilities
CPPS	Castle Peak Power Station
CWD	Chinese White Dolphin
EIA	Environmental Impact Assessment

Abbreviation	Full meaning
EIAO	Environmental Impact Assessment Ordinance, Cap 499
GI	Ground Investigation
HK 2030+	The study of “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030”
LKST	Lung Kwu Sheung Tan
LKT	Lung Kwu Tan
MAI	Marine Archaeological Investigation
MTIA	Marine Traffic Impact Assessment
NDA	New Development Area
NSR	Noise Sensitive Receiver
NWNT	North West New Territories
PD	Principal Datum
PE2	Stage 2 Public Engagement conducted under Agreement No. CE 9/2011(CE) “Increasing Land Supply by Reclamation and Rock Cavern Development cum Public Engagement – Feasibility Study” (the Land Supply Study)
RTT	River Trade Terminal
SAI	Site of Archaeological Interest
SS	Suspended Sediments (or Solids)
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
TTIA	Traffic and Transport Impact Assessment
WENT	West New Territories Landfill
WTW	Water Treatment Works

2 Site Description

2.1 North West New Territories

2.1.1 North West New Territories (NWNT) is geographically located near the boundary of Hong Kong and Mainland, and it has an extensive low-lying area. With the provision of major transportation linkage of Deep Bay Link and Tuen Mun-Chek Lap Kok Link, and the proposed Tuen Mun Western Bypass and Route 11, the connectivity of Hong Kong West internally including NWNT and Lantau as well as externally with the Pearl River Delta can be greatly enhanced. **Figure 2.1** shows the area around Tuen Mun West in NWNT. Coupled with a number of major development projects under planning in NWNT and various development initiatives in North Lantau, Hong Kong West will be the growth pole for both housing and strategic economic infrastructure in the future.



Figure 2.1 Tuen Mun West Area in North West New Territories

2.1.2 The imbalance in spatial distribution of population and jobs in the territory has long been identified, as the employment opportunities are centralised at the existing urban areas whilst there is vast amount of population at Tuen Mun, Yuen Long and Tin Shui Wai. According to the study “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030” (HK 2030+), despite a sizeable proportion of Hong Kong’s population (about 41%) lived in the non-Metro Area¹ in 2014, only about 24% of the job opportunities were provided in the same area. Such unbalanced distribution has resulted in congestion of key commuting corridors, more and longer home-to-work journeys, hence more carbon emission, less family / leisure time, lower productivity, etc.

¹ Tsuen Wan and Kwai Tsing are regarded as Metro Area in the analysis.

Addressing this imbalance will be one of the key tasks in HK 2030+. It is suggested in HK 2030+ to create strategic economic nodes outside Metro Area to bring about high-impact solutions. With the New Development Areas (NDAs), some of the future employment can decentralise to NWNT to strive towards the above goal.

2.1.3 The study “2014 Area Assessments on Industrial Land in the Territory” suggested that there would be an increasing demand forecast in industrial floor space in 2018 and 2023 at a territorial level, taking into account the arising needs for general logistics and warehousing, and the limited existing industrial stock to meet such demand.

2.1.4 Major studies for developments in NWNT, including Hung Shui Kiu NDA, housing sites in Yuen Long South and Tuen Mun Areas 40 and 46 development, are being carried out under separate consultancy studies to explore new employment opportunities and address long-term housing demand.

Hung Shui Kiu New Development Area

2.1.5 Hung Shui Kiu NDA is one of the areas under planning for short-to-long term land supply. As a regional economic and civic hub for the NWNT, it will be the next-generation new town of Hong Kong complementing the new towns of Tin Shui Wai, Yuen Long and Tuen Mun for provision of housing, employment opportunities and civic facilities. With a total population of about 218, 000, Hung Shui Kiu NDA will provide about 61,000 new flats and 150,000 new job opportunities.

2.1.6 It has been discussed to turn the existing land inefficient uses which are largely accommodated in the open area and occupying sizable land, such as container storage, construction material/ machinery storage, car repair workshops, recycling yards, rural workshops, and other brownfield operations to other more beneficial uses. From development perspective, decanting brownfield operations to make way for development through comprehensive planning and infrastructure upgrading is important as a major future source of land supply and to enhance the utilisation of limited land resource. However, the need for certain brownfield operations cannot be ignored. Some services are part and parcel of certain sectors of Hong Kong’s overall economy, and should be provided locally. More importantly, brownfield operations offer local business and job opportunities for certain small and medium enterprises (i.e. SMEs) and low-skilled labour. In this regard, the Government will take Hung Shui Kiu NDA as a pilot area for examining the feasibility of accommodating brownfield operations that are still needed in Hong Kong in a more land efficient manner. Feasibility studies on technical aspects, operation model and business viability of the proposed multi-storey buildings for brownfield operations already commenced.

Tuen Mun Areas 40 and 46

- 2.1.7 Tuen Mun Areas 40 and 46 will connect with the Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities and North Lantau via Tuen Mun – Chek Lap Kok Link, and will also link up with the proposed Tuen Mun Western Bypass to other parts of the NWNT. The enhanced accessibility of Tuen Mun Areas 40 and 46 will provide opportunities for optimising development potential. Four parcels of land are identified as Potential Development Areas, which cover a total area of about 50 hectares.
- 2.1.8 There is vision to transform Tuen Mun Areas 40 and 46 into a major economic activity area in the NWNT, capturing the geographical advantage, enhanced accessibility and opportunity of bridgehead economy brought by new road infrastructure and development projects. To capture the geographical advantage, the areas are proposed to be developed as a modern logistics/green industry hub to address the demand in Hong Kong and to create job opportunities for the Tuen Mun District and the Territory.

2.2 Tuen Mun West

- 2.2.1 The industrial sector plays an important role in supporting the Tuen Mun New Town with two major industrial clusters in Tuen Mun: one is at the core of the New Town designated for light industry such as food manufacturing, and the other one is located to the west of Butterfly Bay (i.e. to the southeast of LKT) used by special industries such as steel manufacturing and material recycling. There are also some logistic firms in the southeast of LKT, taking the location advantage near the River Trade Terminal (RTT).
- 2.2.2 Being remote and separated from the major developments and population centre, groups of special facilities and industrial operations are gathered at the further west of Tuen Mun near LKT. These facilities include:
- (a) To the north of LKT near Tsang Tsui: West New Territories (WENT) landfill and its proposed extension, T. Park (or previously known as Sludge Treatment Facilities), proposed columbarium at Tsang Tsui, Black Point Power Station (BPPS), and
 - (b) To the southeast of LKT near Tuen Mun Area 40: Castle Peak Power Station (CPPS), Green Island Cement Plant, Shui Wing Steel Mill, Eco-Park, proposed development in Tuen Mun Areas 38 & 49 and 40 & 46, RTT, aviation fuel depot and cargo working area in Tuen Mun Area 16.

2.3 Lung Kwu Tan Study Area

- 2.3.1 The Study Area mainly covers the sea area outside the shore of LKT, namely the bay outside Lung Kwu Sheung Tan (LKST) in the north and LKT in the south separated by a headland (Refer to **Figure 2.2**). To the east of the Study Area lies the vast hilly terrain of Castle Peak Ridge,

which is used by the People's Liberation Army for regular military practices, of restricted access.

- 2.3.2 The area is accessible by Lung Kwu Tan Road, a north-south single 2-way carriageway, which links to Nim Wan Road in the north and Lung Mun Road in the south connecting to Tuen Mun Town Centre. Lung Mun Road is the only external access linking up the LKT area to Tuen Mun New Town and thus the rest of the territory. The LKT area is separated from the major developments and population centre in Tuen Mun not only geographically by the Castle Peak Ridge but also physically by the limited transport infrastructure.
- 2.3.3 The shore stretches from Lan Kok Tsui in the north to the material handling berth of CPPS in the south. The total length of shoreline is about 5.3 km including 4.3 km natural shoreline and 1.0 km artificial shoreline. Two coastal and alluvial plains occur around the shoreline, and the shorelines within the bays are mostly narrow sandy beaches. On the seaward side of the beaches is generally shallow water. The seabed level within the embayment where reclamation is being considered ranges from approximately 0.2m to 5m below Principal Datum throughout most of its area, with a general trend of increasing depth towards the sea.



Figure 2.2 View of Lung Kwu Tan and Lung Kwu Sheung Tan from Headland

- 2.3.4 The shallow water embayment offers opportunity for near-shore reclamation. In fact, outside the bays is the heavily trafficked navigation channel – Urmston Road. Within the bays, there is a submarine effluent outfall extending from the northern part of LKST to Urmston Road, and berthing facilities near CPPS. These features help define the potential reclamation extent.
- 2.3.5 The LKT area and its surroundings have a wide variety of natural landscapes of environmental significance / ecological value. Lung Kwu Tan Valley Site of Special Scientific Interest (SSSI) is located approximately 400m from the reclamation area, in-between are roads, villages, field and woodland. This SSSI is widely recognised as one of the most important butterfly habitats in Hong Kong with a high diversity of butterfly species recorded.
- 2.3.6 The reclamation area is also close to Sha Chau and Lung Kwu Chau Marine Park. It is located about 2km from the reclamation area, and is known to be the major feeding area for CWD. A CWD Lookout is stationed at the headland between LKT and LKST. Other well-known

tourist spots include the Tin Hau Temple, Emperor's Cave (皇帝巖) and Lau Ancestral Hall.

Lung Kwu Sheung Tan

- 2.3.7 LKST is predominantly occupied by individual industrial installations such as open storages with temporary structures, light industrial areas, workshops and recycling operations. These industrial establishments are mostly composed of low-rise 1-2 storey warehouse-type buildings, forming the light industry cluster to the north of the Study Area. The groups of structures within separate private lots are spatially distinct from neighbouring lots and do not give the impression of an organised development.



Figure 2.3 Industrial Operations at Lung Kwu Sheung Tan

Lung Kwu Tan

- 2.3.8 LKT is the main population centre of the area. According to the 2016 Population Census, there was a population of 1,892 people residing in the area and concentrated at LKT Village. LKT Village is a pre-1898 recognised village and is the only residential settlement within the Study Area. It comprises five geographic places, namely Lung Tsai, Sha Po Kong, Tuk Mei Chung, Nam Long and Pak Long, adjoining Lung Kwu Tan Road as shown in **Figure 2.4**. The Grade 3 Historic Building, Lau Ancestral Hall, is located at Tuk Mei Chung.



Figure 2.4 Location of Lung Kwu Tan Village

- 2.3.9 There are numerous private lots within LKT Village and some of them are with building status which includes building licences/ New Grant/ Old Schedule house lots. In addition to private lots with building status, there are private agricultural lots, structures for agricultural purposes covered by letter of approval, and tolerated structures covered by surveyed number at LKT.



Figure 2.5 Lung Kwu Tan Village

- 2.3.10 Similar to the indigenous villages throughout Hong Kong, the village-type development in LKT Village is mostly composed of clusters of three-storey village houses along informally organised rural roads with limited overall planning.
- 2.3.11 Indigenous villagers in the New Territories are entitled to burial rights in permitted burial grounds, which usually are located in the same village settlements, in the vicinity or on Government land. There are four main burial grounds in LKT area and a number of individual burial urns or graves scattered around the community.

- 2.3.12 Three of the permitted burial grounds are situated around foothills (one is next to Lung Tsai, and the other two are near Pak Long) and one is located at upper hills right next to the existing CWD lookout point. They are part of the LKT community and as observed on-site, they are all maintained in good condition.



Figure 2.6 Clusters of Graves within Study Area

Opportunities provided by Lung Kwu Tan Reclamation

- 2.3.13 Knowing the drastic planning change in the NWNT, LKT reclamation could play a part in the strategic planning of the whole region, complementary to other developments in the NWNT. For instance, the new space formed by LKT reclamation could provide decanting sites for any resumption / relocation of brownfield operations at the NDAs, and other redevelopment proposals in Tuen Mun.
- 2.3.14 Due consideration should be given to the unique characteristic of Tuen Mun West and LKT area, i.e. the existing industrial setting and the remoteness, when formulating the development plan for LKT reclamation. The vast area of new land and the long seafront that can be provided by the reclamation proposal make it a valuable land resource for certain types of land use.

3 Land Use Assumptions

3.1 Guiding Principles for the “Preliminary Land Use Themes”

- 3.1.1 Considering the opportunities and constraints for the reclamation proposal, the possible land uses and combination were set out in the form of “preliminary land use themes” for assessment in the Study. A set of guiding principles, described below, were established to direct the formulation of the preliminary land use themes to assist the assessments and, after completion of the technical and environmental assessments, to evaluate the relative performance of the preliminary land use themes. At the end, potential development theme(s) for LKT reclamation would be identified with due consideration given to the vision of this reclamation project as well as the site constraints.

Enhance Land Supply to meet Territorial Needs

- 3.1.2 The sizeable reclamation at LKT would provide ample opportunities to increase and expedite land supply as the fundamental solution to meet various land demands of Hong Kong and to complement with other developments in Tuen Mun West. The opportunities provided by its location advantages and the marine access of LKT should be captured to meet the regional and territorial needs and provide new employment opportunities.

Meet Local Needs

- 3.1.3 Being a small and remote village cluster, LKT community has limited economic opportunities with its local business mostly taking place in mini-stores run by home-makers in daytime. There is no clinic, public library, post office and market in LKT; the residents have to travel about 15 minutes driving distance to Butterfly Estate in Tuen Mun South for these community facilities and there is only one bus line running in-between. Currently, there is no suitable government land in the LKT area to meet the shortfall of community facilities.
- 3.1.4 With the proposal of reclamation development, there are opportunities to improve the livelihood of the locals in three aspects: provision of more local business opportunities, provision of various new facilities, and improvement on the accessibility of LKT area with new public transport services.

Compatibility with Nearby Village and Industries

- 3.1.5 The existing land uses in LKST and LKT, which fall within the northern and southern portions of the Study Area respectively, are distinct: industrial in the north and village housing in the south. The new developments on the reclamation will adjoin these existing land uses, and should preferably be compatible with these existing usage.

- 3.1.6 The northern portion of the Study Area comprises mainly light industrial operations. Non-residential developments could be considered.
- 3.1.7 In contrast, the southern portion of the Study Area is generally residential in nature with village-type development just next to the coast near the reclamation area. Buildings in lower development density could be compatible with the existing villages.

Minimise Impacts on Existing Road Network and Provision of New Transport Infrastructure

- 3.1.8 Development inevitably involves movements of goods and people in one or more mode(s) of transport. The LKT area is linked to the Tuen Mun New Town by Lung Mun Road and the rest of the territory by Wong Chu Road and Tuen Mun Road. These three key roads form an important east-west spine for road traffic associated with the new development on the reclamation at LKT. These key roads are serving road traffic in Tuen Mun and the NWNT, and these key roads have only limited traffic flow capacity to spare for the new development.
- 3.1.9 The planning of the proposed development on LKT reclamation should therefore consider the need to minimise impact on these key roads. It would be more desirable to have land uses at LKT reclamation that can capitalise the spare capacity of the existing transport infrastructure in the reverse direction of peak hour flow, or else substantial input would be required for the strategic transport infrastructure.

Respect the Environment and Minimise Impacts

- 3.1.10 Besides human needs, reclamation works and the associated developments must respect the nature and environment, including terrestrial and marine ecology. This principle is evolved around the overarching strategic goal of sustainable development.
- 3.1.11 It is of particular importance for LKT reclamation development, given the natural resources of environmental significance / ecological value present in the surroundings. The developments at LKT should pay due respect to these ecological assets and facilitate their conservation.
- 3.1.12 For the goodness of the society, impacts on the environment given rise by any kind of development have to be minimised, confined and mitigated as much as possible. These include the pollution that would affect humans, such as noise and deterioration of air quality and water quality, and disturbance to the terrestrial and marine lives. Apart from minimising the impact, opportunities should be explored to provide some form of ecological enhancement to restore the damaged habitat.

Adopt a Flexible Design and Adaptable Implementation Programme

- 3.1.13 Possibility to undertake the whole development in phases should be explored for earlier commissioning to meet the urgent need of land. It would be desirable if some part(s) of new development can be commissioned before the completion of supporting infrastructures such as water supply and sewage treatment. The land use planning should therefore take into account the possible phasing and the construction time required for the land formation and the provision of associated infrastructures.
- 3.1.14 The existing road connection to Tuen Mun is at the south of LKT. As such, it would be more desirable to reclaim the southern portion and construct the new connecting road to Lung Mun Road first to minimise traffic impact on the Lung Kwu Tan Road.
- 3.1.15 Land resumption should be avoided as far as possible. Apart from the concerns over the impact on the villagers, it would induce uncertainty to the implementation programme of the development because the required process may be lengthy.

3.2 Potential Land Uses Included for Assessment

- 3.2.1 In order to meet the objectives of the Study, preliminary land use themes were formulated to facilitate the assessments required by this Study. They were adopted as the development assumptions to identify possible worst-case scenarios for technical and environmental assessments in order to assess the development opportunities and constraints of the LKT reclamation development. These themes were set out solely for the purposes of preliminary assessments required in this Study and do not represent the actual proposals. The actual development proposal for the reclamation will be developed in the future detailed studies and assessments, including the statutory EIA, with the involvement of the public.
- 3.2.2 Major land use types considered include residential and industrial uses, whilst commercial areas for office space, local retail outlets, etc. were only considered alongside with the residential / industrial development to support the future development.
- Residential uses – With the opportunities presented in the reclamation proposal to help address the major territorial needs including housing demands, utilising suitable parts of the reclamation area for housing development should be considered. In fact, under the public engagement activities done under the Land Supply Study, residential development was suggested as a potential land use by the public. A range of housing including private and subsidised housing could be considered to provide a suitable housing mix. The scale and density of the future housing developments should consider the low density village-type housing in the surrounding areas to ensure a compatible development scale.

- Industrial uses – The success of Hong Kong’s future development hinges on securing the necessary land resources to improve productivity and remain competitive in the Pearl River Delta region. Strong demand has been noted in the territory for industrial estates and science parks within which Hong Kong’s manufacturing as well as research and development sectors can blossom. In addition, there is a growing demand in the territory for the industrial operations with special requirements (i.e. modern logistics and warehousing, green industries and industrial parks proposed in the studies for Hung Shui Kiu NDA and Tuen Mun Areas 40 and 46). Some of them may require marine access. LKT reclamation, if pursued, would offer the opportunity to provide new, dedicated and modern industrial accommodation to cater for the new industrial processes requiring higher standard of accommodation to meet the territorial demand.

3.2.3 Some territorial facilities and installations which have played important roles in supporting Hong Kong’s growth and prosperity were also considered. The remote location and neighbouring industrial setting of LKT provide this reclamation site with a strong potential as solution space for such uses to serve the territory’s growth. Special uses such as Construction and Demolition Materials Handling Facilities (C&DMHF), which are set up for production of recyclable materials and/or public fill for reclamation and should be equipped with barging point(s) at seafront for material loading/unloading, were considered in the Study for assessment purpose. Placing these facilities in relative isolation from major population centres is one of the options from strategic town planning perspective.

4 Engineering and Environmental Assessments

4.1 Assessment Assumptions

- 4.1.1 At this very preliminary stage of the project, the assessments were done based on various assumptions such as reclamation extent, construction methods and programme, and possible land uses and combination set out in the preliminary land use themes. The assumptions were established to facilitate the assessments under reasonably conservative and possible worst-case scenario, and do not represent the actual proposals. The actual proposal and details will be developed in detailed studies in the future, including the subsequent planning and engineering studies and statutory EIA, with the involvement of the public.
- 4.1.2 Possible interfacing projects were also identified, with reference to the best available information regarding the ongoing, committed, planned and proposed projects at the time of the assessment. The interfacing issues and the cumulative effects, in particular to the environmental and traffic conditions during operation, were identified and assessed in advance, with a view to identify the implication, if any, on the reclamation proposal due to other interfacing projects.
- 4.1.3 The aspects investigated and the key findings are summarised in this Section.

4.2 Potential Reclamation Extent

- 4.2.1 LKST and LKT together has an extensive coastal area with shallow seabed level. Reclamation is technically feasible, and the potential reclamation area is approximately 220 to 250 hectare on plan as shown in **Figure 4.1**. It stretches about 3 km in the north-south direction and 700m to 1 km in the east-west direction between the existing shore and the new reclamation edge. With such a sizeable reclaimed area, there are countless potential for development.

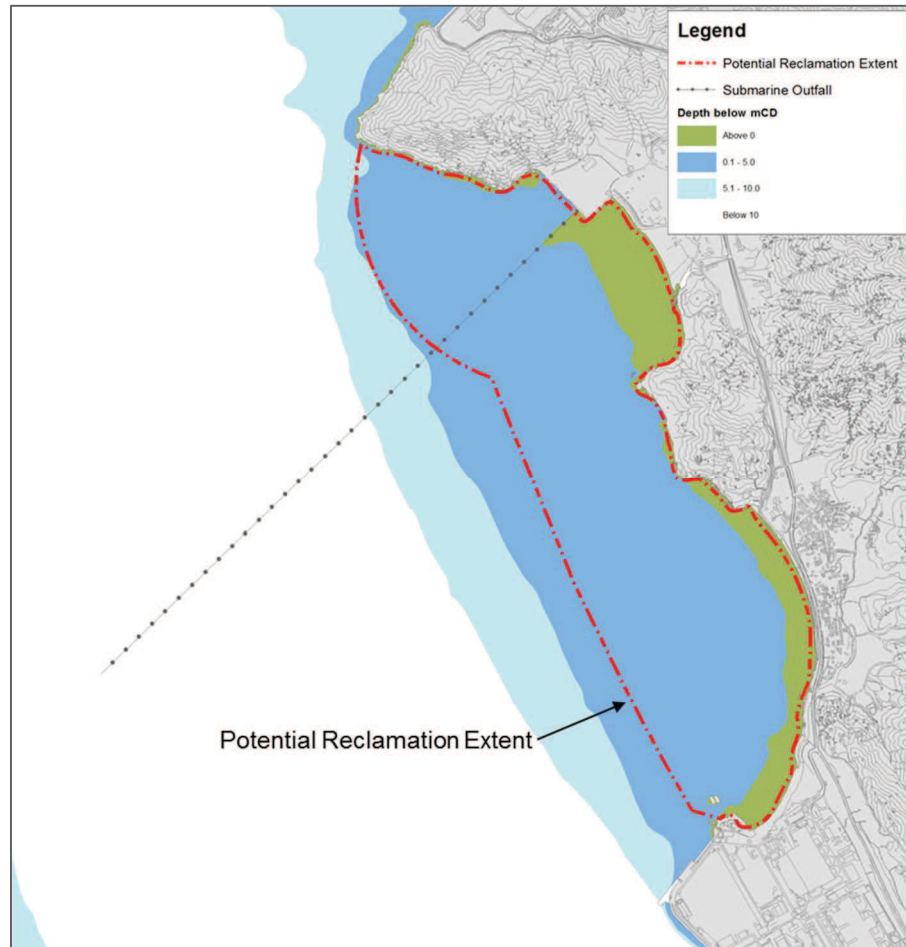


Figure 4.1 Potential Reclamation Extent

- 4.2.2 The potential reclamation extent was assessed in consideration of hydrodynamic, existing marine traffic pattern in Urmston Road and the sightings of CWD. It is limited within the embayment of shallow water to avoid changing the hydrodynamic regime within the nearby water bodies, to avoid encroaching upon the key navigation channel and the key CWD habitat just outside the bay. This extent is preliminary only and subject to review when the future land uses on the reclamation area, in particular along the shore, are determined and when detailed studies and investigation including EIA are undertaken.
- 4.2.3 Industrial uses might need marine transportation and loading or unloading of goods at the berths on the waterfront. Straight reclamation edge was initially proposed in the southern portion of the site that could allow marine access and berthing of vessels along the seaward edge. Vertical seawall would be required where berthing facilities are proposed. To provide sufficient space between the existing marine traffic using Urmston Road and the vessels berthing at the reclamation edge, the straight reclamation edge is set back by 100m from the line joining the Black Point headland in the north and the existing berth at the CPPS in the south. Dredging might be required to provide adequate water depth for vessel berthing and manoeuvring along the reclamation edge.

- 4.2.4 An existing effluent outfall, maintained by the Drainage Services Department (DSD), was identified within the potential reclamation area at the northern portion. This outfall connects to the North West New Territories Sewage Tunnel to convey and discharge the treated effluent from San Wai Sewage Treatment Works (STW) at Urmston Road, serving the catchments of Yuen Long peripheral area, North Tuen Mun and the Tuen Mun-Yuen Long Corridor, Tin Shui Wai and Au Tau/Long Ping.
- 4.2.5 Considering the importance of the existing submarine outfall to its catchments and the significant challenges in re-provisioning of this outfall at the heavily trafficked Urmston Road, the existing outfall should be retained and kept intact. Reclaiming over the outfall is not recommended as this would load the outfall and its surrounding soil that they were not originally designed for. Due to the no-dredging requirement near the outfall, on-shore berthing is not allowed in the northern portion of the reclamation site in the preliminary layout.

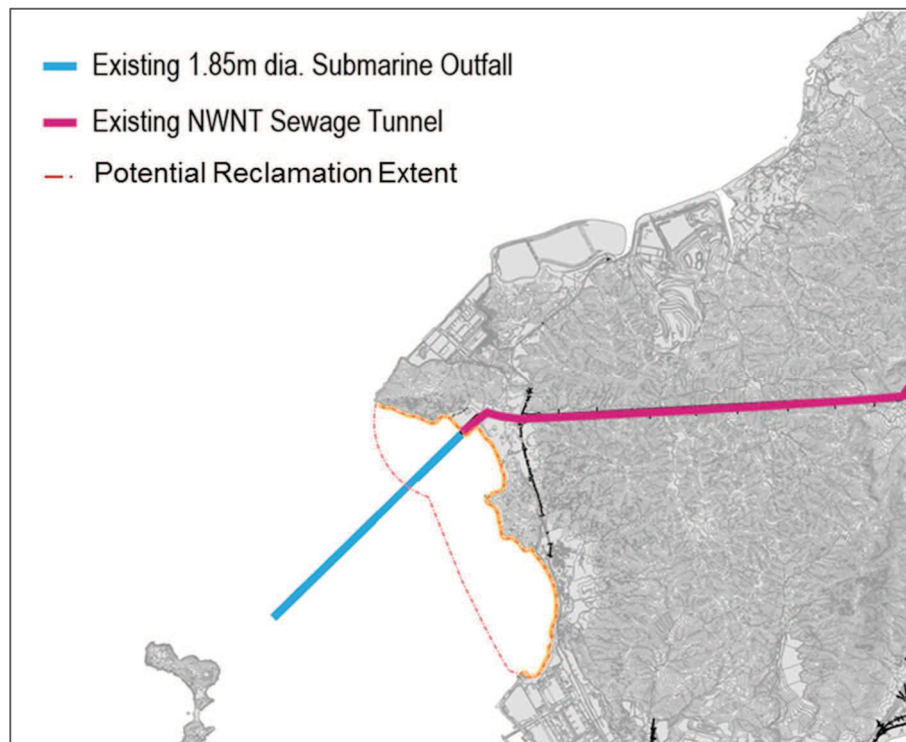


Figure 4.2 Layout of Existing Submarine Outfall

- 4.2.6 Desktop study and review of existing ground investigation (GI) records were undertaken as part of this Study. Additional project-specific marine GI works were carried out in the Study Area to supplement the available data and to verify the geological profiles.
- 4.2.7 Marine clay was found to vary from 5.5 m to 12.5 m in thickness and is possibly over-consolidated. Alluvium was found to be highly variable in composition, comprising predominantly clay and sand, with the sandy strata often being very gravelly. Completely to highly decomposed granite was reasonably well-graded and comprised typically silty gravelly-sand. Although the presence of marine deposits

presents more challenges in terms of consolidation and settlement control, it is considered feasible to overcome these through the application of suitable ground treatment methods.

- 4.2.8 Non-dredged seawall schemes are preferred due to its less potential impact to water quality. However, the thick in-situ sediments are not strong and stiff enough to support the seawall above and the reclaimed land behind the seawall. From preliminary stability analysis, deep cement mixing is found technically feasible in this site to enhance the strength and stiffness of these materials to support the seawall.
- 4.2.9 The actual ground treatment types and seawall scheme are subject to review taking account of possible cost, programme constraints, availability of plant, land uses requirements, etc. This will be reviewed in the detailed studies and the detailed design stage.

4.3 Marine Traffic

- 4.3.1 The potential reclamation area is located near the heavily trafficked navigation channel – Urmston Road. Although the reclamation will not encroach upon this key navigation channel or occupy the water space frequently used by vessels, there are concerns that the smaller vessels may choose to navigate away from the new reclamation edge and move into the deep water channel. Also, if the C&DMHF is to be set up at LKT reclamation, it would involve a considerable volume of marine traffic for transportation of materials to and from the facility. The risk of collision might increase.
- 4.3.2 A preliminary marine traffic impact assessment (MTIA) was carried out based on the estimated future marine traffic pattern and the broadbrush estimate of additional vessel movements associated with the daily operation of the assumed special uses. The result shows that average individual risk in the waters around the site was considered to be either negligible or as low as reasonably practicable. In the next detailed study stage when the future land uses on the reclamation area and the associated marine traffic pattern are more certain, a comprehensive MTIA will need to be carried out and risk control options should be developed to minimise the impacts. Possible interface issues with other projects in the vicinity and the cumulative marine traffic impact would also be studied in the MTIA.

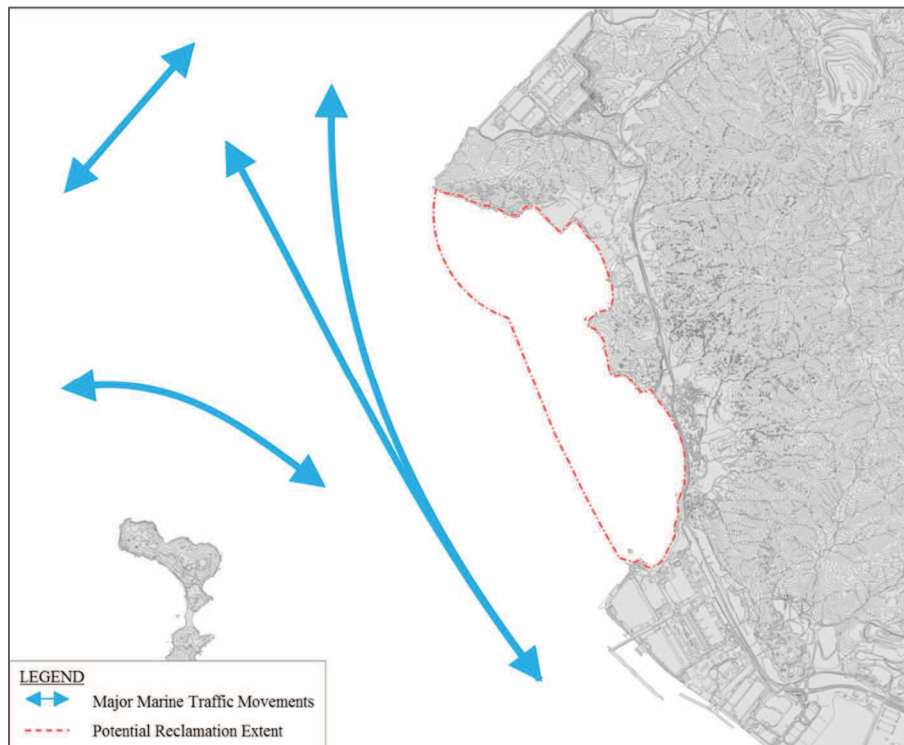


Figure 4.3 Key Marine Traffic Movements

- 4.3.3 Marine Department's radar station, Black Point Radar Station, is located at the peak of Black Point overseeing the marine traffic at Urmston Road. The buildings on the reclamation area should adopt stepped height profile towards the sea and the structures along seafront should be carefully designed to avoid blocking the radar coverage at Urmston Road to ensure marine safety.

4.4 Traffic and Transport

- 4.4.1 The new development at LKT reclamation would likely generate or attract traffic that use the key roads. A preliminary traffic and transport impact assessment (TTIA) was undertaken to assess the future traffic condition, if LKT reclamation development is pursued, within and around the Study Area.
- 4.4.2 The development proposal in Tuen Mun Areas 38 and 49, Tuen Mun Areas 40 and 46, and Tuen Mun Town Centre for industrial, logistic or residential development would generate additional road traffic on existing roads such as Lung Mun Road, Lung Fu Road, Wong Chu Road and Tuen Mun Road. As a result, this would have direct interface with the LKT development on traffic and transport aspects. On the other hand, the proposed Tuen Mun Western Bypass and Route 11 should be able to improve the overall traffic condition of Tuen Mun district.
- 4.4.3 The preliminary TTIA showed that, being the only external access linking up the LKT area to Tuen Mun New Town, Lung Mun Road

would likely have congestion problem with LKT reclamation development. Widening of Lung Mun Road and upgrading of Siu Lang Shui Road to provide a bypass route bypassing the critical junction along Lung Mun Road are therefore proposed based on the preliminary analyses in this Study. The proposed improvement scheme should be reviewed and adjusted in the detailed studies, taking into account the actual traffic demand of the proposed development and the detailed investigation of the local traffic arrangement during construction stage.

4.4.4 There would be congestion problem at Wong Chu Road and the slip road connecting northbound traffic at Tuen Mun Road to westbound traffic at Wong Chu Road. Due to the dense existing development on both sides of Wong Chu Road, there is no room available for road improvement works. Building a new slip road connecting Tuen Mun Road and Hoi Wing Road to provide an alternative route to Tuen Mun West is a possible measure to mitigate this congestion problem.

4.4.5 However, based on the preliminary assessment done for different preliminary land use themes, it was revealed that residential development would generate much higher traffic flow than the industrial uses, and aggravate the traffic condition in the already critical traffic flow direction even if only part of the reclamation is reserved for the purpose. The new slip road off Tuen Mun Road to Hoi Wing Road would not be enough to alleviate the congestion problem at Wong Chu Road. A new strategic road between Tuen Mun West and Tuen Mun Road bypassing the Wong Chu Road was considered necessary. Also, if extensive residential development was proposed, alternative access other than Lung Mun Road should be proposed to cater for emergency situations during which the Lung Mun Road was blocked / closed. Therefore, significant input on new transport infrastructure is anticipated if LKT reclamation goes for residential development.

4.4.6 In short, industrial and special uses that generate lower traffic flow in critical direction during peak hours than residential development are preferable at LKT reclamation. In particular, uses that can optimise the marine access provided at reclamation site, which in turn further reduce the traffic flow, should be given priority to effectively utilise the vast new land while minimising the burden on the key roads.

4.5 Environmental Assessments

4.5.1 In this Study, various environmental and ecological aspects were preliminarily investigated based on the assumed potential reclamation extent and land uses. The review was undertaken to identify the key issues and constraints in environmental and ecological aspects for consideration in the future planning of the reclamation development. It should not be regarded in any form or depth to form part of the statutory EIA for Designated Project or Preliminary Environmental Review (PER) for Non-Designated Project.

- 4.5.2 Environmental concerns as related to reclamation works mainly include potential impact on water quality, fisheries resources and marine ecology, in particular CWD for works in the western waters of Hong Kong. The potential impacts were preliminarily assessed in the Study with possible mitigation options suggested. The possible impact on area of significant ecological value such as marine park and SSSI were evaluated. As for the future development, the possible impact on air quality, noise, landscape and visual and cultural heritage which may impose constraints on future land uses were identified for future consideration.

Water Quality

- 4.5.3 The potential reclamation site is located within the North Western Water Control Zone and adjacent to the boundary of the Deep Bay Water Control Zone. The potential reclamation site is about 2 km from Sha Chau and Lung Kwu Chau Marine Park and is close to the spawning ground for commercial fisheries resources in the northern Lantau.
- 4.5.4 Preliminary water quality assessment for both construction and operation phases were carried out. It was anticipated that no significant change in the hydrodynamic regime within the north-western waters would be induced from the potential reclamation in the embayed areas of LKT and LKST. Based on the modelling result for operation phase worst case scenario, i.e. highest sewage generation amongst the preliminary land use themes assuming for secondary instead of tertiary treatment, there would be no significant change in the contaminant levels at the nearby water bodies. With proper system to collect and treat the sewage generated by the development, adverse water quality impact during operation phase is not anticipated.
- 4.5.5 The major impact during the construction phase would be the release of suspended sediments (or solids) (SS) due to the marine construction works. Construction phase water quality modelling was performed for the worst case scenario which assumed, on top of filling activities for reclamation, additional construction works such as 1) dredging works for berths at the reclamation edge and 2) dredging works for the re-provisioning of the existing submarine sewage outfall (hypothetical assumption only) were implemented simultaneously. The quantitative assessment showed that, with the implementation of environmentally friendly construction method and mitigation measures such as non-dredged seawall, leading seawall and slit curtain, SS release due to the project alone would not result in change in water quality at the concerned Water Control Zones.
- 4.5.6 Based on the above, adverse water quality impact is not anticipated at the nearby water bodies including the Sha Chau and Lung Kwu Chau Marine Park and the spawning ground for commercial fisheries resources during the construction and operation phases. The impact on

fisheries resources and marine ecology due to the water quality change is expected to be insignificant.

Fisheries Resources

- 4.5.7 A preliminary fisheries survey was carried out in both dry and wet seasons within the embayment. Production of adult fish fisheries resources was surveyed to be low. It was also recorded that majority of juvenile fish species were of low to moderate catch value.



Figure 4.4 Major Species Recorded in the Adult Fish Survey

- 4.5.8 Most of fishing activities recorded during the surveys were gillnetting and handlining. No large fishing vessel was recorded within the potential reclamation area. Commercial fishing activities observed were of small scale only, which may be due to the shallow water depth (less than 5 m) limiting large vessels to operate there. Impact from marine vessel traffic generated during construction and operation phases on fishing operation is expected not to be significant.
- 4.5.9 In summary, the permanent loss of fishing ground from the potential reclamation would have minor to moderate impact on fisheries resources.

Marine Ecology

- 4.5.10 LKT reclamation will cause direct loss of coastal water habitat, intertidal habitat and stream outlet. Based on information obtained from literature reviews and site surveys done in the Land Supply Study, no species of conservation importance were found at the said habitat. Nonetheless, to mitigate the impact of habitat loss for other marine organisms such as fishes, mitigation or enhancement measures such as eco-shoreline could be added to support marine lives.
- 4.5.11 Eco-shoreline can be implemented at the sheltered area of the reclamation edge to enhance the ecological condition around the reclamation site. It provides a sheltered habitat and a higher diversity of plant species for juvenile terrestrial and marine organisms. It can also serve as access to the sea side and provide food sources for wildlife. This will help establish food chain to enhance the ecological equilibrium locally.
- 4.5.12 The drainage system, in the form of either open channel or multi-cell box culvert, will be constructed on the reclamation area (see **Section 4.6**) to receive surface runoff from the development and the mountains in the east of the potential reclamation, via the existing stream outlets. From ecology perspective, open channels are preferred. Being protected

from the rough sea condition and under the hydrological influence of both freshwater and seawater, there is an opportunity to establish mangrove communities inside open channels and apply the eco-shoreline concept to build the channel walls. These green channels, with suitable vegetation or eco-friendly features at the base and along the walls, can optimise the opportunity for ecological enhancement. Designed at suitable locations, green channels, as illustrated in Figure 4.5, can preserve the existing natural shoreline as well.

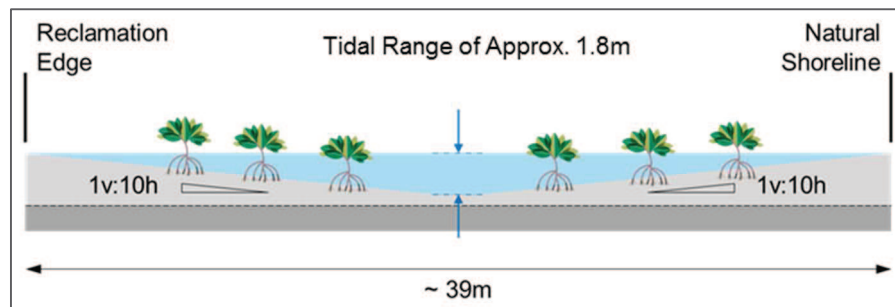


Figure 4.5 Green Channel

Chinese White Dolphin

- 4.5.13 In this Study, a 12-month near-shore dolphin survey involving theodolite tracking and underwater passive acoustic monitoring was carried out. CWDs were observed mostly at the Urmston Road and the Sha Chau and Lung Kwu Chau Marine Park. The potential reclamation extent is proposed to avoid encroaching upon the critically important CWD habitat.
- 4.5.14 Given the LKT reclamation is at a reasonable distance from the marine park, the direct impact on the marine park is expected to be insignificant.
- 4.5.15 The major impacts on CWDs from the LKT reclamation could be the likely disturbance to CWD's use of the historical habitat at Sha Chau and Lung Kwu Chau Marine Park and Urmston Road areas, primarily during the construction phase. Stringent protection and mitigation measures would need to be developed to avoid and/or minimise the possible impacts on CWD. The frequency and routes of construction vessels will need to be prudently planned to avoid / minimise usage of the CWD hotspots in or around the Urmston Road to avoid physical impacts to the CWD due to the works.
- 4.5.16 The fisheries production within the LKT reclamation area appears to be low, as indicated by the fisheries survey, and therefore the impact on prey resources of CWD is not expected to be significant

Lung Kwu Tan Valley Site of Special Scientific Interest

- 4.5.17 Lung Kwu Tan Valley SSSI is located approximately 400m from the southern portion of the potential reclamation area. The SSSI is about 6.72 hectares in size and covers a valley with natural woodland, hill slopes and streams flowing into the LKT area. The site is widely

recognised as one of the most important butterfly habitats in Hong Kong with a high diversity of butterfly species recorded.



Figure 4.6 Location of Lung Kwu Tan Valley SSSI and Fung Shui Woods

- 4.5.18 The development confined to the reclamation area should not have any significant effect to the SSSI as it is far away from the SSSI. However, outside the reclamation area, it may be of ecological interest to preserve the existing villages, as any transformation there will inevitably affect the SSSI and the Fung Shui Woods due to their close vicinity. Disturbance (e.g. dust and noise) generated during construction phase might affect the SSSI and the Fung Shui Woods and the utilisation of these areas by wildlife.
- 4.5.19 It is of scientific interest that butterflies growth could be affected by the presence of artificial lights. It is recommended that the development in the southern portion of the reclamation site should not have strong flood light. Territorial facilities which may be lit up in the evenings should avoid sitting at the southern portion of the reclamation close to the SSSI. Rather, they can sit at the northern portion of the reclamation, where the facilities would be over 1 km away from the SSSI, and the potential impact to the wildlife is expected to be low.

Air Quality

- 4.5.20 With the heavy industrial setting around LKT, the relatively high emission from the fixed plant sources, in particular from CPPS and BPPS, may be a concern.
- 4.5.21 Previous assessment has identified a small area of air quality exceedance zone in the southern portion of the potential reclamation area. The exceedance is mainly due to the emissions from the chimneys of the neighbouring CPPS. Air sensitive uses are therefore not recommended to be placed at this air quality exceedance zone. Such restriction does not exist in the northern portion of the potential reclamation area due to the shielding effect from Black Point headland.
- 4.5.22 There are village houses located next to Lung Kwu Tan Road. To avoid the air quality impact on these houses, the traffic to the new development on the reclamation area should be directed to the reclamation site as far as possible without recourse to Lung Kwu Tan Road.



Figure 4.7 Air Quality Exceedance Zone

Noise

Road Traffic Noise

- 4.5.23 The most important existing Noise Sensitive Receivers (NSRs) within the Study Area are the existing village houses located next to Lung Kwu Tan Road. As for the air quality, the traffic to the new development on the reclamation area should be directed to the reclamation site without recourse to Lung Kwu Tan Road to minimise road traffic noise.

Fixed Plant Source

- 4.5.24 Various existing fixed plant noise sources were considered in the assessment. They include BPPS, CPPS, open storage and industrial operation at LKST. As mitigation measures such as enough buffer distance are readily available, they should not affect the future land uses on the reclamation area.
- 4.5.25 To assess the potential noise impacts on the existing NSRs if a C&DMHF, which would operate in open-air site, is set up at LKT reclamation, quantitative assessment was conducted assuming that the facility was placed in the southern portion of the reclamation site in front of the existing villages. It was revealed that various mitigation measures such as using quiet plants in the C&DMHF, and allowing a buffer zone or building a terraced landscape feature between C&DMHF and the existing villages should be considered to mitigate the impact.

Helicopter Noise

- 4.5.26 CPPS, BPPS and Black Point Radar Station are equipped with helipad to meet operation needs. Helicopters will generate noise when flying through, approaching, taking-off from or hovering and idling above the helipads. Due to the close proximity to the reclamation site, the potential noise impact from the helicopters on future development was considered.
- 4.5.27 The buffer zones on the potential reclamation were determined based on the horizontal distance required for the helicopter to approach and depart from the helipads, or to hover and idle above the helipads. Development(s) of noise sensitive use would be subject to height restriction or should be avoided altogether within the buffer zones due to the possible exceedance of noise level.

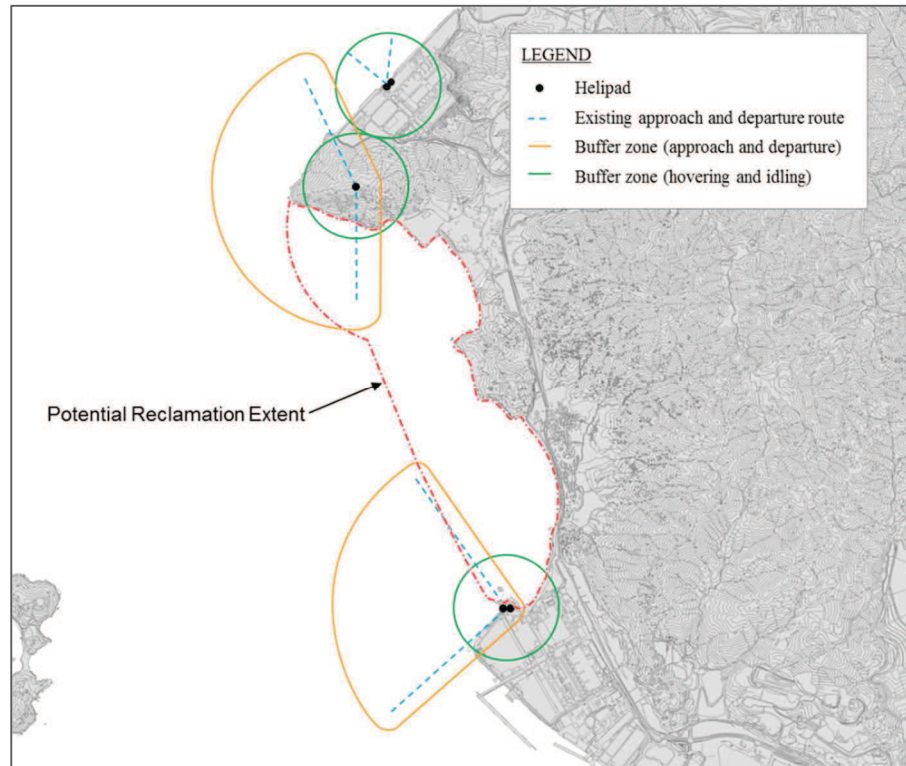


Figure 4.8 Helipads and Noise Buffer Zone

Landscape and Visual

Landscape Impact

4.5.28 Given its nature and scale, the reclamation proposal would inevitably involve permanent loss of water bodies and natural seafront environment in LKT area. The physical loss of those natural resources will lead to changes on the existing landscape character, changing from a rural coastal plain landscape setting to an urban landscape area.

4.5.29 Whilst the residual landscape impact on open seawater, inshore marine water, beaches and inshore water landscape cannot be fully mitigated, there are plenty of room to provide open space and green channels on the reclamation area, which may be considered beneficial to the local community.

Visual Impact

4.5.30 The existing visual character is dominated by the industrial facilities / operations. Thus, the visual quality of LKT area is considered of low value. Nonetheless, the new buildings on the reclamation area, depending on height and massing, may result in loss of sea view to some of the visual receivers, particularly in LKST and Sha Po Kong.

4.5.31 The building height of the future development should be limited to below the ridgeline of the surrounding hillslopes and key vantage points. Stepped building height profile descending from the hillslopes to the waterfront should be considered in response to the topographical setting. This would allow the future development to be better integrated with

the natural surrounding and the existing built-up environment, and would also help optimise the wind capturing capacity of the future development. Preliminary visual assessment was carried out, and the visual impact to the sensitive receivers is considered to be moderate after mitigation.

Cultural Heritage

Terrestrial Archaeology

- 4.5.32 The reclamation works would be carried out on the sea and thus is not expected to directly affect the identified heritage resources including the LKST Site of Archaeological Interest and LKT Site of Archaeological Interest.
- 4.5.33 However, both Sites of Archaeological Interest (SAI) may be affected by the associated work to occur on land to meet the infrastructure needs (road improvements, drainage works, utilities, etc.). The archaeological deposits may be directly and adversely affected by the excavation works. During the design stage, impacts to the SAI should be avoided or kept to a minimum.

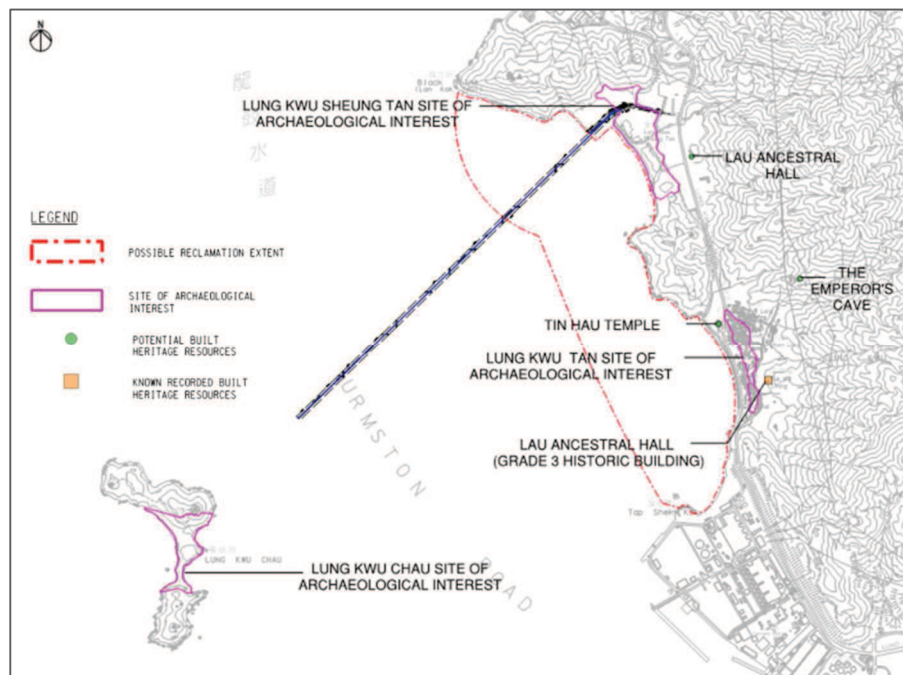


Figure 4.9 Locations of Cultural Heritage Resources

- 4.5.34 More specifically at this stage, transformation of existing land uses within the SAI (i.e. open storage or industrial workshop at LKST and villages at LKT) will adversely and directly affect the archaeological deposits during the construction phase unless alternative proposals are formulated in a way which could avoid subsurface works.

Built Heritage

- 4.5.35 The reclamation works and the subsequent development would not affect any built heritage directly. However, the only graded historic

building known in the Study Area - Lau Ancestral Hall in Tuk Mei Chung - may be affected by the large scale development within existing villages. It is recommended to retain the graded historic building onsite with sufficient buffer from the works.



Figure 4.10 Lau Ancestral Hall at Tuk Mei Chung

- 4.5.36 Mitigation measure may be required for the potential impact, such as degradation of its setting, to the Tin Hau Temple. As the connection to the sea is relevant for the temple dedicated to the goddess of the sea, open space and view corridor towards the sea should be allowed in front of the temple for inducing green and open environment and connecting the temple to the sea visually.



Figure 4.11 Tin Hau Temple

Marine Archaeology

- 4.5.37 The Marine Archaeological Review of marine archaeological potential within the Study Area was conducted based on historical evidence and review of previous Marine Archaeological Investigation (MAI) Studies.

No actual marine archaeological resources were identified within the potential reclamation area. However, the two previous MAI studies taken reference in the baseline review covered very small sections of the potential reclamation area. It is recommended that MAI will be carried out in the EIA under EIAO during the next stage of the project and will need to cover the whole reclamation area and the construction space.

4.6 Infrastructure Assessments

- 4.6.1 Needs for some key infrastructures, including drainage, sewerage and water supply, were broadly assessed in this Study to identify any constraints on the development or future land use planning.

Drainage

- 4.6.2 4 no. new drainage structures, in the form of either open channel or multi-cell box culvert, are recommended to collect the surface runoff from the reclamation and the existing hillside catchments via connecting to the four existing surface runoff discharge points along the shore.
- 4.6.3 Apart from acting as a storm drain, i.e. dimensioned to provide the necessary capacity to discharge the runoff collected, an open channel can be designed as a water feature to enhance the environment within the development site. In order to maximise the opportunities of developing mangrove communities on gentle sloping bed, the width of water space between the natural shoreline and the new reclamation edge would be roughly 40m. Compared with box culvert, open channel has down side as it would occupy surface land and have a much greater land requirement. Therefore, it should be considered and properly placed in consideration of spatial arrangement of various land uses.

Sewerage

- 4.6.4 The existing sewerage infrastructure in the vicinity of the potential reclamation at LKT includes Pillar Point STW and San Wan STW. As advised by EPD, both STWs have no spare capacity to take up the sewage flow from the new development at LKT reclamation. A new on-site STW is therefore required. The new STW should handle the sewage discharged from the existing villages as well to bring about environmental enhancement.
- 4.6.5 The footprint of the STW depends on the estimated sewage flows, which in turn relate to the land uses and the size of contributing population, and the treatment level. In order to achieve the objective of Total Water Management and to minimise the pollutant to water bodies, consideration should be given to re-use the effluent from STW for non-potable uses such as toilet flushing, irrigation and street washing.

- 4.6.6 The on-site STW requires an outlet at reclamation edge to discharge the treated effluent. Considering the marine traffic risk involved in carrying out the marine works for a new submarine outfall laid across the heavily trafficked Urmston Road, the feasibility of discharging the treated effluent near shore was investigated. The preliminary water quality model revealed that discharging at the seawall would not have any impact on the water sensitive receivers near the reclamation site if the effluent has gone through a treatment of secondary level or above.

Water Supply

- 4.6.7 Tuen Mun district is currently served by Tuen Mun Water Treatment Works (WTW) at Fu Tei in the north of Tuen Mun. As advised by Water Supplies Department (WSD), it would not have any spare capacity for the development on LKT reclamation. The capacity of the existing Tuen Mun WTW should be increased or a new WTW will be required to cope with the water demand arisen.
- 4.6.8 Tuen Mun WTW is identified as one of the government facilities that could be relocated to caverns under the Preliminary Land Use Study for Lam Tei Quarry and the Adjoining Areas. If pursued, the relocated WTW could be designed to cater for additional water demand of the LKT reclamation development. Alternatively, the capacity of the Tuen Mun WTW can be increased by expanding it in caverns near the existing WTW. Other waterworks required may include new fresh water primary service reservoir, fresh water service reservoirs, fresh water pumping station, trunk transfer and distribution mains.
- 4.6.9 For flushing water, both seawater and reclaimed water (if territory treatment is adopted in the new STW) are possible and available sources locally. Again, new service reservoirs, new pumping station and distribution mains will be required but the scale of works will be smaller as compared with freshwater supply.

5 Next Step

5.1 Potential Development Theme and Key Constraints on Land Uses for Future Consideration

- 5.1.1 The Study assesses that the potential reclamation area at LKT could be approximately 220 to 250 hectares. Having considered the opportunities, constraints and potential impacts, it was suggested that industrial-based development would be more suitable at LKT reclamation, when compared with residential uses, to fit in the existing industrial setting of Tuen Mun West and be more likely be synergic with the industrial developments including logistics, warehousing and green industry in Tuen Mun West and NWNT. These synergic developments also provide employment opportunities which would benefit the local and the region.
- 5.1.2 Territorial facilities such as C&DMHF and other special uses, which can optimise the marine access and in turn minimise the traffic flow added to the road networks in Tuen Mun district, could be considered at LKT reclamation. These facilities requiring marine access for transportation of materials and products can only be located near-shore such as reclamation. LKT reclamation, coupled with its ample size, would be one of the major sources for such land uses if they are in need. That said, these facilities should be placed on the northern portion of the reclamation site adjacent to LKST only, to promote compatibility with the existing villages at LKT and avoid disturbance to the butterfly species at Lung Kwu Tan Valley SSSI due to flood lighting in the evenings.
- 5.1.3 In contrast, if residential development is pursued even in part of the site, it would lead to increase in traffic in critical direction and hence severe traffic congestion. Significant input on new transport infrastructure would be required.
- 5.1.4 Sufficient buffer area, such as open space, should be provided between the existing villages and the new development. Open space and view corridor toward seaside should be allowed in front of the Tin Hau Temple for inducing green and open environment and connecting the temple to the sea visually. Opportunities should be explored to build green channel for ecological enhancement and beautification, while meeting the drainage need.
- 5.1.5 Other key constraints on future land use will include the air quality exceedance zone at the southern end of the potential reclamation area adjacent to the CPPS. The future land uses should avoid any air sensitive use within this exceedance zone.
- 5.1.6 The building height of the future development should be limited to below the ridgeline of the surrounding hillslopes and key vantage points, with due consideration of other restrictions in view of the potential

helicopter noise, operation of Black Point Radar Station and visual impact as well.

- 5.1.7 The locals could benefit from the new development by additional community facilities in the neighbourhood, and more choices of new public transport services. New roads provided on reclamation site could, depending on the management and operation requirement, provide an alternative route for refuse vehicles to reduce the nuisance from refuse vehicles on existing residents along Lung Kwu Tan Road.
- 5.1.8 Land resumption should be avoided as far as possible. Apart from the concerns over the impact on the villagers, it would induce uncertainty to the implementation programme of the development. Moreover, it may be of ecological interest to preserve the existing villages, as any transformation there will inevitably affect the Lung Kwu Tan Valley SSSI and the Fung Shui Woods due to their close vicinity. The subsurface works that may be required during construction will also adversely and directly affect the archaeological deposits of the LKT SAI underneath the villages.

5.2 Future Studies

- 5.2.1 To pursue the reclamation proposal further, more detailed investigation and assessments should be carried out to firm up the development proposal and land use planning, covering aspects such as marine traffic, land traffic and transport, drainage, sewage, etc. Statutory EIA should be carried out to ascertain the environmental acceptability of the development proposal and to explore further mitigation / enhancement measures.
- 5.2.2 Apart from the needs of the society, views of the local community are equally important in determining the development theme of the LKT reclamation. The locals and villages concerned should be engaged in the process of formulating the land use proposals during the detailed studies in the next stage.