

STUDY ON EXISTING PROFILE AND OPERATIONS OF BROWNFIELD SITES IN THE NEW TERRITORIES

- FEASIBILITY STUDY

Executive Summary

Final | November 2019

ARUP



規劃署
Planning Department

Planning Department

**Agreement No. CE40/2016 (TP)
Study on Existing Profile and
Operation of Brownfield Sites in
the New Territories – Feasibility
Study**

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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.

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*Notes: Numbers presented throughout the report might not add up precisely to
totals due to rounding.*

1 INTRODUCTION

1.1 General

1.1.1 Planning Department (PlanD) commissioned Ove Arup and Partners Hong Kong Limited (Arup) on 20 April 2017 to undertake the Study on Existing Profile and Operations of Brownfield Sites in the New Territories – Feasibility Study (the Study).

1.2 Background of Study

1.2.1 At present, there is a vast amount of agricultural land in the New Territories (NT), especially the north-eastern and north-western parts, mainly occupied by open storage yards, warehouses and other industrial/rural workshops, which can generally be referred to as brownfield sites. The operations on brownfield sites are generally low in land utilisation efficiency, and often lead to land use incompatibility as well as environmental and traffic issues. On the other hand, operations on brownfield sites play a role in supporting various economic activities in Hong Kong including construction, logistics, port back-up, waste recycling, vehicle repairing and related, rural industries, general warehouse and others.

1.2.2 It is considered necessary to capture a snapshot of comprehensive profile and spatial distribution of the brownfield sites in the NT as well as to understand the nature, site characteristics and operational details of the brownfield sites.

1.3 Main Objectives

1.3.1 The main objectives of this Study are:

- To formulate the definition and categorisation of brownfield sites;
- To capture a snapshot of comprehensive profile including the overall distribution, characteristics, and economic uses of brownfield sites in the NT by on-site field and questionnaire surveys;
- To understand details of operations and major industries involved in brownfield sites through interviews with key stakeholders; and
- To identify key issues pertinent to brownfield sites.

1.4 Study Area

1.4.1 The Study Area refers to the NT of the Hong Kong Special Administrative Region (**Figure 1.1** refers). The Metro Area including Hong Kong Island, Kowloon and Tsuen Wan/Kwai Tsing are excluded from the Study Area.

2 DEFINITION OF BROWNFIELD SITES

2.1 Definition of Brownfield Sites

- 2.1.1 In general, brownfield sites refer to agricultural land in the NT converted into various operations and uses, including open storage, warehouse, workshop, logistics and freight operation, container storage, vehicle parking, vehicle repair yard and vehicle body building yard. Against this background, and taking account of the findings of field and questionnaire surveys as well as stakeholder interviews, which will be reported in the next chapters, brownfield sites are defined as “**primarily agricultural land in the New Territories which has been formed and occupied by industrial, storage, logistics and parking uses.**” (棕地泛指新界一些遭平整的農耕土地，用作工業、貯物、物流、及泊車用途)¹

2.2 Categorisation of Brownfield Sites

- 2.2.1 For the purpose of this Study and based on the findings of the field and questionnaire surveys carried out under the Study, brownfield sites in active use (i.e. active brownfield sites) are categorized into 10 industries and details of which are elaborated as follows:

Active Brownfield Sites

- (a) **Construction Industry** covers mainly open storage and warehouse of construction materials and/or machinery, some of which are large and heavy that can only be stored in open-air and large sites. Workshops including concrete batching plants and asphalt batching plants as well as works areas and site offices are also included in this category.
- (b) **Logistics Industry** covers modern and general logistics operations. They are mainly in the form of logistics centres and container freight stations. Many of the operations involve the import and export trade, with some providing services related to international/regional distribution of goods, e-commerce, cold storage and other value-added services.
- (c) **Port Back-up (Container-related) Industry** covers storage of empty/laden containers, parking of container vehicles and repair of containers.
- (d) **Waste Recycling Industry** covers open storage/warehouse/workshop for collection, storage, dismantling, and/or processing of the recyclables such as paper, metal, plastic, waste electrical and electronic equipment etc.
- (e) **Vehicle Repairing and Related Industry** covers mainly vehicle repair yards for private and/or commercial vehicles. Vehicle body building yards for private and/or commercial vehicles, displaying and trading of new, second-hand, or other vehicles, as well as

¹ ‘Agricultural land’ in the definition refers to the land essentially used for agricultural purpose in the past as shown in satellite images taken in the 1960s, regardless of land lease status and zoning.

operations providing auto detailing and car beauty services are also covered in this industry.

- (f) **Vehicle Scrapping Industry** covers workshops for disassembly of vehicles and open storage/warehouse of scrapped vehicles and/or used vehicle parts.
- (g) **Rural Industries** cover a wide range of rural workshops², including food processing (e.g. noodles, dairies, soy sauce, bean curd, lard boiling, meat roasting etc), metalware processing, ice manufacturing, paper products processing, chemical processing, etc.
- (h) **Vehicle Parking** covers parking of private and/or commercial vehicles operating on a commercial basis, but excludes parking solely for container vehicles (which is categorized under port back-up (container-related) industry).
- (i) **General Warehouse / Storage** covers warehouse and open storage of vehicles or vehicle parts including new, second-hand, left-hand-drive and other vehicles, as well as warehouse and open storage of general goods that does not belong to the other industries mentioned in para. 2.2.1. It also covers warehouse and open storage sites on which the main items/materials involved cannot be clearly identified.
- (j) **General Workshops** cover workshops engaging in activities that do not belong to other industries mentioned in para. 2.2.1, such as repairing of machines and electrical appliances. It also covers workshops on which the main activities engaged cannot be clearly identified.

Inactive Brownfield Sites

- 2.2.2 Inactive brownfield sites refer to sites which were previously “agricultural land” and subsequently formed but found vacant or with vacant structures not in operation during the surveys³.

² According to the Definition of Terms used in statutory plans, rural workshops refer to low-rise building or temporary structures, used for industrial purpose and the operation of which is usually of a smaller scale and less sophisticated in nature. It includes informal industrial activities operated in workshop premises.

³ During the field survey, the field surveyor would preliminarily identify inactive brownfield site based on on-site observation and recorded details by taking site photos for further verification. The findings had been further verified by comparing such vacant /inactive brownfield status with historical aerial photos to confirm the identified inactive brownfield sites had previously been used for brownfield operation.

3 FINDINGS OF STAKEHOLDER INTERVIEWS

- 3.1.1 With a view to understanding the major industries involving in brownfield sites in detail, interviews with 19 stakeholder groups in construction, logistics, port back-up, waste recycling, vehicle repairing, and rural industries were conducted from July to November 2017.
- 3.1.2 The main considerations of various operations choosing brownfield sites were mainly low rent, operational requirements (e.g. heavy floor loading, high ceiling, large operation space), high operation efficiency, availability of supporting facilities such as parking and loading and unloading spaces, and locational factors.
- 3.1.3 In general, stakeholders expressed views that it would be feasible or partly feasible to relocate their operations from brownfield sites to specially designed multi-storey buildings (MSB) or industrial hubs. However, some brownfield operations involving heavy and bulky materials and/or machinery might only be accommodated at open-air sites. Some also had reservations on the benefits and effectiveness of MSB to accommodate container storage use, particularly in terms of floor height, loading capacity and operational difficulties.
- 3.1.4 The future rent and management issues of specially designed MSB or industrial hub were also raised by the stakeholders. Some opined that MSB would not be attractive if the rent was higher than what they paid at present. Some stakeholders opined that the management of MSBs should be government-led to ensure the admission criteria and facilities provided were suitable for their needs.

4 PROFILE OF BROWNFIELD SITES IN THE NEW TERRITORIES⁴

4.1 Survey Methodology

- 4.1.1 The field and questionnaire surveys for the Study were conducted from August 2017 to October 2018.
- 4.1.2 Based on desktop study of Digital Orthophoto (i.e. DOP5000) of 2015, about 1,300 hectares (ha) of brownfield sites in active use were initially identified at the beginning of the Study in 2017, which served as the initial baseline profile for the Study. Subsequently, with reference to the latest helicopter aerial photos, satellite images and unmanned aerial vehicle (UAV) photos taken in 2017/2018, other relevant planning data and survey maps provided by Survey and Mapping Office of Lands Department, land which were likely brownfield sites including but not limited to the estimated 1,300 ha were identified for on-site field and questionnaire surveys to confirm their status and usage.
- 4.1.3 During the field survey, field surveyors were required to record a list of information of the visited sites and operations, including their uses and characteristics, as well as to take site photos. The area of each brownfield site was determined based on its boundary identified in the latest orthophotos, taking into account the findings and observations during the on-site survey.
- 4.1.4 For sites identified with operation, questionnaire surveys were conducted to collect information related to the operational characteristics and requirements, equipment/facilities installed for the operation, locational factors/preferences, business nature and linkage, history of the operation, technical requirements and future business plan of the operation.
- 4.1.5 For sites that were observed to be vacant or not having any operation (e.g. residential use), only the status and/or use(s) of the sites were recorded.
- 4.1.6 The survey successfully interviewed 3,420 active brownfield sites, among 7,373 active brownfield sites identified that are with operation. The response rate of the questionnaire survey is 46%.

4.2 Spatial Distribution of Brownfield Sites

Brownfield Sites

- 4.2.1 The survey finds a total of 7,373 active brownfield sites (area of about 1,414 ha) in the NT⁵. Please refer to **Figure 4.1** for the spatial distribution of active brownfield sites.

⁴ Notes: Numbers presented throughout the report might not add up precisely to totals due to rounding.

⁵ The survey also finds a total of 996 inactive brownfield sites (area of about 165 ha) in the NT.

4.2.2 The number and area of active brownfield sites by sub-regions are shown in **Table 4.2.1**. About 70% of active brownfield sites (5,295 sites) are located in NWNT (75.0% in terms of area; i.e. 1,060.46 ha), followed by NENT (23.0% in terms of area; i.e. 325.72 ha), SENT (1.4% in terms of area; i.e. 20.29 ha) and SWNT (0.6% in terms of area; i.e. 7.37 ha).

4.2.3 **Table 4.2.1 Number and Area of Active Brownfield Site**

Sub-Regions	Number of Active Brownfield Sites		Area of Active Brownfield Sites	
	Number	%	Area (ha)	%
SENT	156	2.1%	20.29	1.4%
SWNT	58	0.8%	7.37	0.6%
NENT	1,864	25.3%	325.72	23.0%
NWNT	5,295	71.8%	1,060.46	75.0%
Total of Sites	7,373	100.0%	1,413.84	100.0%

Distribution of Active Brownfield Sites within New Development Areas (NDAs)/Potential Development Areas (PDAs)⁶

4.2.4 Among 1,414 ha of active brownfield sites, about 615 ha (43%) fall within the boundaries of NDAs/PDAs⁷ (**Table 4.2.2**). **Figure 4.2** shows the overall distribution of brownfield sites including the boundaries of NDAs/PDAs.

Table 4.2.2 Brownfield Sites Falling within the Boundaries of NDAs/PDAs

NDAs/PDAs	Area of Active Brownfield Sites (ha)	Area of Inactive Brownfield Sites (ha)	Area of Brownfield Sites (ha)
<i>Hung Shui Kiu/ Ha Tsuen (HSK/HA) NDA</i>	240.46	5.84	246.30
<i>Yuen Long South (YLS) Development</i>	90.25	3.65	93.90
<i>Kwu Tung North (KTN) and Fanling North (FLN) NDAs</i>	66.14	4.21	70.35
<i>New Territories North (NTN)⁸</i>	217.92	24.60	242.52
Total	614.77	38.30	653.07

⁶ In this report, “NDAs/PDAs” statistics also include Yuen Long South Development, which is positioned as an extension of Yuen Long New Town.

⁷ As identified by PlanD, among the active and inactive brownfield sites outside NDAs/PDAs, 76 ha are within conservation related zones (please refer to para. 5.1.8), about 120 ha are covered by government projects under active planning, and about 30 ha are already under known development projects initiated by private parties or landowners.

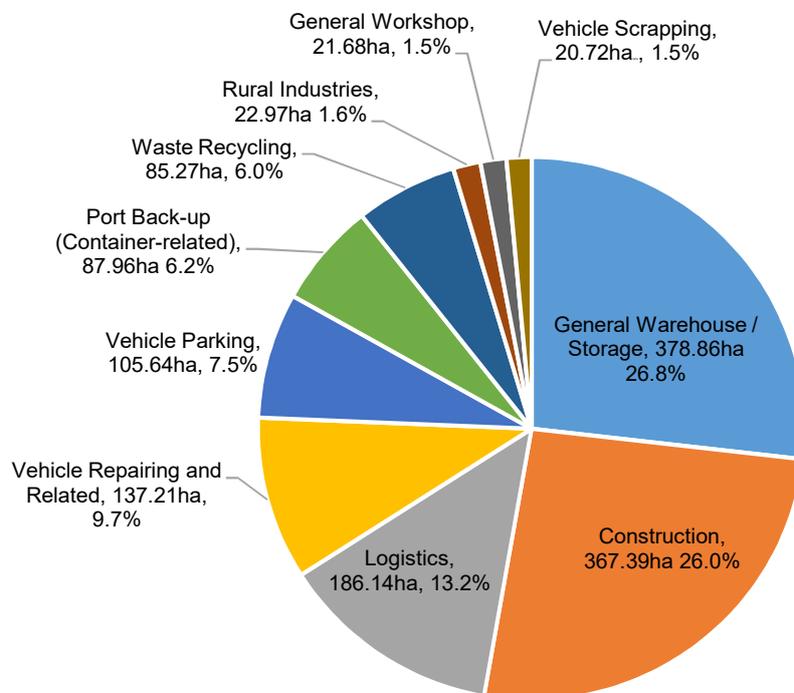
⁸ According to the “Preliminary Feasibility Study on Developing the New Territories North” (the NTN Study), potential developments areas in NTN include San Tin/Lok Ma Chau Development Node, Man Kam To Logistics Corridor and NTN New Town.

4.3 Industries on Brownfield Sites

Distribution of Brownfield Sites by Industry

4.3.1 The overall distribution of brownfield sites by industry is shown in **Table 4.3.1**. Among 1,414 ha of active brownfield sites, in terms of area, the major industries are general warehouse / storage (27% / 379 ha), followed by construction (26% / 367 ha), and logistics (13% / 186 ha) (**Chart 4.1**). The three industries occupy about 66% of active brownfield site area.

Chart 4.1 Distribution of Active Brownfield Sites by Industry (ha)



Average Site Size of Active Brownfield Sites

4.3.2 The average site size of active brownfield sites is also shown in **Table 4.3.1**. The overall average site size of active brownfield site is about 1,918 square metres (sq m). Active brownfield sites in port back-up (container-related) industry has the largest average size of about 5,787 sq m, whereas general workshops has the smallest average size, which is about 1,232 sq m.

Table 4.3.1 Number and Area of Brownfield Sites by Industry

Type of Industry	Sub-Region				Overall				Average Site Size (sq m)
	SENT	SWNT	NENT	NWNT	Area of Sites (ha)	%	No. of Sites ⁹	%	
	Area of Sites (ha)								
General Warehouse / Storage	1.95	1.04	106.23	269.64	378.86	26.8%	2,718	36.9%	1,393.89
Construction	10.04	4.12	102.91	250.32	367.39	26.0%	1,558	21.1%	2,358.09
Logistics	0.39	0.19	20.10	165.46	186.14	13.2%	560	7.6%	3,323.93
Vehicle Repairing and Related	3.21	1.89	23.17	108.94	137.21	9.7%	1,102	14.9%	1,245.01
Vehicle Parking	1.85	0.11	12.90	90.78	105.64	7.5%	435	5.9%	2,428.51
Port Back-up (Container-related)	0	0	19.39	68.57	87.96	6.2%	152	2.1%	5,786.84
Waste Recycling	0.35	0	29.06	55.86	85.27	6.0%	441	6.0%	1,933.56
Rural Industries	0.40	0.02	8.06	14.49	22.97	1.6%	104	1.4%	2,208.65
General Workshops	2.10	0	3.83	15.75	21.68	1.5%	176	2.4%	1,231.82
Vehicle Scrapping	0	0	0.07	20.65	20.72	1.5%	127	1.7%	1,631.50
Total Active Brownfield Sites	20.29	7.37	325.72	1,060.46	1,413.84	100%	7,373	100%	1917.59
Inactive Brownfield Sites	4.13	2.3	49.84	108.81	165.08	-	996	-	1,657.53
Total	24.42	9.67	375.56	1,169.27	1,578.92	-	8,369	-	1,886.63

Note: Information based on Question A2 of the questionnaire survey and field observation

4.4 Employment

4.4.1 Projected by extrapolation based on the questionnaire returns, active brownfield sites in the NT generate about 52,110 jobs in total. General warehouse/storage industry contributes 31% (16,360 jobs), followed by construction industry (25% / 13,140 jobs), logistics industry (15% / 7,820 jobs) and vehicle repairing and related industry (9% / 4,450 jobs).

4.5 Tenure Status and Monthly Rent

4.5.1 According to the survey findings, 74% of all the respondents to the questionnaire survey indicated that their sites were under tenancy.

⁹ The “sites” were counted by the consultant with reference to the physical features on site (e.g. fencing and road) observed in brownfields captured during on-site visit and also the responses or information collected during interviews with brownfield operators.

4.5.2 Overall, the median and average rents of brownfield sites are \$3.0/ square feet¹⁰ (sq ft) and \$3.9/ sq ft respectively. A diverse median rent ranging from \$2.3/sq ft paid by vehicle scrapping industry to \$4.3/sq ft paid by general workshop; and average rent ranging from \$2.3/sq ft paid by rural industries to \$4.7/sq ft paid by logistics and port back-up (container-related) industry were observed.

4.6 Land Status

4.6.1 Among the 1,414 ha of active brownfield sites, the majority (1,180 ha / 83%) is on private land and the remaining (234 ha / 17%) is on government land. Breaking down by number of sites, out of the total 7,373 active brownfield sites, 350 sites (5%) involve government land only (i.e. 51 ha in terms of area), 1,760 sites (24%) involve private land only (i.e. 219 ha in terms of area), and 5,263 sites (71%) involve both private land and government land (i.e. 961 ha of private land and 183 ha of government land in terms of area).

4.7 Land Use Zonings

4.7.1 Among the 1,414 ha of active brownfield sites, 321 ha (23%) fall under industrial and storage related use zones under statutory town plans, and 579 ha (41%) fall under development zones. Conservation related zones account for 69 ha (5%). (Table 4.7.1).

Table 4.7.1 Zoning of Active Brownfield Sites

Zoning Group	Area (ha)	%
Industrial and Storage Related Use Zone (including “Open Storage”, “Industrial (Group D)”, “Other Specified Uses” annotated “Port Back-up”, “Industrial”, “Other Specified Uses” annotated “Logistics Facility”, “Other Specified Uses” annotated “Port Back-up, Storage and Workshop Uses”)	321.23	22.7%
Development Zone (including “Residential (Group A)”, “Residential (Group B)”, “Residential (Group C)”, “Residential (Group D)”, “Residential (Group E)”, “Commercial”, “Commercial/Residential”, “Comprehensive Development Area”, “Village Type Development”, “Other Specified Uses” annotated “Rural Use”, “Government, Institution or Community”, “Open Space”, “Recreation”, etc.)	578.60	40.9%
Conservation Related Zone (including “Conservation Area”, “Coastal Protection Area”, “Other Specified Uses” annotated “Nature Park”, “Other Specified Uses” annotated “Comprehensive Development and Wetland Enhancement Area”, “Other Specified Uses” annotated “Comprehensive Development to include Wetland Restoration Area”)	68.66	4.9%
Green Belt Zone	106.08	7.5%
Agriculture Zone	152.80	10.8%
Others (including “Undetermined”, and other zones)	142.15	10.1%

¹⁰ One square metre equals 10.76 square feet.

Zoning Group	Area (ha)	%
Outside Coverage of Statutory Plans	44.32	3.1%
Total	1413.84	100.0%

4.8 Starting Year of Operations

- 4.8.1 Among 3,420 respondents to the questionnaire survey, 1,267 respondents (37%) indicated that they started their operations at the current brownfield site in “2009 or before”, followed by “2015 or after” (672 respondents / 20%) and “2010 – 2014” (573 respondents / 17%). 908 respondents (26%) refused to answer the question or were not sure about the answer.
- 4.8.2 For individual industry, comparatively higher percentage of respondents in logistics industry (36% / 150 respondents) indicated their starting year as “2015 or after”, and comparatively higher percentage of respondents in rural industries (73% / 43 respondents) indicated their starting year as “2009 or before”.

4.9 Operational and Locational Requirements

Reasons of Choosing the Current Site for Operation

- 4.9.1 According to the questionnaire survey, among 3,420 respondents, “Site Meeting Operational Requirement” (60%) and “Affordable Rent” (34%) were the two most selected reasons considered by the respondents as the reason(s) of choosing the current site for operation.

Requirement for Operating at Open-air Site

- 4.9.2 Among the 3,420 respondents to the questionnaire survey, about 43% indicated the need to operate at open-air site. Construction (57%), logistics (50%), port back-up (container-related) (57%), waste recycling (55%) industries had comparatively higher percentages of respondents within its industry indicating the need to operate at open-air site than other industries. General workshop (23%), general warehouse/storage (23%), vehicle parking (23%) industries had comparatively lower percentages of respondents indicating the need to operate at open-air site.

4.10 Views on Operating at Other Types of Location

Suitability of Relocating to General Industrial Buildings/ Industrial Estate/ Industrial Hub/ Specially Designed MSB

- 4.10.1 Among the 3,420 respondents to the questionnaire survey, only 376 respondents (i.e. 11%) indicated that it was suitable for their operation to relocate to other locations including general industrial buildings, industrial estate, industrial hub and/or specially designed MSB (with large operational space and specially designed ramp allowing large trucks/vehicles to access various floors direct).

- 4.10.2 Among the 376 respondents who considered their operation suitable to relocate to other locations, most respondents (228 / 61%) chose “Industrial Hub” as suitable (or as one of the suitable locations) for their operation, followed by “Industrial Estate” (196 / 52%), “General Industrial Building” (178 / 47%) and “Specially Designed MSB” (100 / 27%).
- 4.10.3 Notwithstanding the above, participants of the stakeholder interviews generally considered that it would be feasible or partly feasible to relocate their operations from brownfield sites to specially MSB or industrial hub, provided that the design of which was able to suit for their operational requirements.

Factors Encouraging Relocation of Operation to General Industrial Building/ Industrial Estate/ Industrial Hub/ Specially Designed MSBs

- 4.10.4 When asked about what factor(s) that could encourage operators to relocate to designated locations or buildings including general industrial building/ industrial estate/ industrial hub/ specially designed MSBs, among the 3,420 respondents, 34% or 1,169 of respondents selected “Subsidy on Rent” as the encouraging factor(s), followed by “Sufficient Floor Space for Operation and Storage” (26% / 899) and “Subsidy to Add Equipment” (14% / 494).

Possibility to Operate Outside Hong Kong

- 4.10.5 Only 3% or 93 of the respondents stated that it was possible for their operation to operate outside Hong Kong. Among all industries, port back-up (container-related) industry has the highest percentage of respondents (10%) within its industry considering it possible for their operation to operate outside Hong Kong.

Arrangement In Case of Removal/ Relocation

- 4.10.6 Among the 3,420 of respondents, 63% / 2,160 of the respondents indicated that they would find another suitable site to continue their operation if they were required to move or relocate. 10% / 338 of the respondents indicated that they would terminate the business. There are comparatively higher percentages of respondents in rural industries (22% or 13 out of 59 respondents) and vehicle repairing and related industry (20% or 149 out of 741 respondents) indicating that they would terminate the business if they were required to move or relocate as compared to other industries.
- 4.10.7 Among the 2,160 of respondents indicating they would continue operating at another suitable site, a majority of respondents (97% / 2,096) indicated that they would find a site similar to where they are currently located.

5 KEY ISSUES PERTINENT TO BROWNFIELD SITES

5.1 Key Issues Relating to Impacts from Existing Brownfield Sites

Potential Environmental Impacts from Brownfield Sites in Different Industries

- 5.1.1 As observed during the on-site surveys of the brownfield sites, active brownfield sites in different industries would generate different degrees of potential environmental impacts on the surrounding sensitive receivers depending on the nature of activities involved. Residential use is the main sensitive use susceptible to the adverse environmental impacts including noise, dust, odour, visual and land/water contamination from brownfield sites.
- 5.1.2 Based on the field survey findings and the qualitative assessments, it is identified that active brownfield sites in the industries of waste recycling, vehicle repairing and related, vehicle scrapping, rural industries, general workshops, port back-up (container-related), logistics and construction generate “Higher” potential environmental impact in terms of noise, dust, odour, visual and land/water contamination; while vehicle parking and general warehouse/storage generate “Lower” potential environmental impact.
- 5.1.3 Based on the degree of potential environmental impacts of active brownfield sites in different industries and the concentration level of residential area adjacent to the active brownfield sites, large, moderate and small scales of environmental impacts from brownfield sites on adjacent residential areas have been identified. There are about 244 ha of active brownfield sites with large scale of impacts, 737 ha of active brownfield sites with moderate scale of impacts, and 433 ha of active brownfield sites with small scale of impacts¹¹.
- 5.1.4 Active brownfield sites generating large scale of environmental impacts are concentrated around HSK/HT NDA, KTN NDA, YLS Development, the potential development areas identified under the NTN Study including NTN New Town and San Tin/Lok Ma Chau Development Node; as well as Pat Heung, Shek Kong, Kam Tin, Lam Tei, Ping Shan, Kwu Tung South, Ngau Tam Mei and Tai Sang Wai.
- 5.1.5 The above analysis is a broadbrush assessment on the scale of potential environmental impacts from brownfield sites on adjacent residential areas which takes into account only the nature of brownfield operations in different industries and the concentration level of residential area adjacent to the brownfield sites. Actual environmental impacts from individual brownfield sites are subject to various site-specific factors. Detailed environmental assessment is required for future projects on specific brownfield sites.

¹¹ The analysis does not cover the 165 ha inactive brownfield sites, since those sites do not involve any operation at the time of survey and thus the scale of environmental impacts on adjacent residential use cannot be determined.

Ecological Impacts from Active Brownfield Sites in Conservation Related Zones

- 5.1.6 Operations on active brownfield sites may also create adverse ecological impacts on the adjacent areas of conservation interest such as fishponds and wetlands.
- 5.1.7 To identify brownfield sites within areas of conservation interest, reference has been made to the land use zonings with a strong bearing on nature conservation including “Conservation Area” (“CA”), “Coastal Protection Area” (“CPA”), “Country Park” (“CP”), “Site of Special Scientific Interest” (“SSSI”), “Other Specified Uses” annotated “Comprehensive Development and Wetland Enhancement Area” (“OU(CDWEA)”), “Other Specified Uses” annotated “Comprehensive Development to include Wetland Restoration Area” (“OU(CDWRA)”), and “Other Specified Uses” annotated “Nature Park” (“OU(Nature Park)”).
- 5.1.8 About 69 ha of active brownfield sites (excluding 7 ha of inactive brownfield sites) are located within the above conservation related zones. About 45% (31 ha) of the active brownfield sites are at Pok Wai/Tai Sang Wai and 27% (18 ha) are at San Tin. The remaining are mainly within “CPA” and “CA” zones scattered at Pui O, Lau Fau Shan and Pak Nai.
- 5.1.9 The active brownfield sites at Pok Wai/Tai Sang Wai (31ha) and San Tin (18ha) account for 72% of brownfield sites within conservation related zones. These 49 ha of brownfield sites are primarily outside the “Wetland Conservation Area” but largely fall within the “Wetland Buffer Area”¹² and in close proximity to wetlands and fishponds.

Traffic Impacts from Active Brownfield Sites in Different Industries

- 5.1.10 Active brownfield sites in the logistics, port back-up (container-related) and vehicle parking industries create relatively more traffic impacts as compared to other industries, mainly due to high traffic flows into/ out of the sites. Brownfield sites in the logistics and port back-up (container-related) industries mainly cluster around (i) San Tin / Lok Ma Chau Development Node, (ii) HSK/HT NDA, (iii) Sha Po Tsuen/Ngau Tam Mei and (iv) KTN/FLN NDA, while brownfield sites in vehicle parking industry scatter at different parts of the NT.

5.2 Key Issues Encountered in Displacement of Brownfield Sites

Socio-economic Needs and Importance of Industries Occupying Brownfield Sites

- 5.2.1 Active brownfield sites in NT with a total area of 1,414 ha provide a significant source of industrial land in Hong Kong. Many industries have certain need for brownfield sites. Brownfield operations are also

¹² Wetland Buffer Area is intended to protect the ecological integrity of the fish ponds and wetland within the Wetland Conservation Area and prevent development that would have a negative off-site disturbance impact on the ecological value of fish ponds.

servicing various industries including construction, logistics, waste recycling, vehicle repairing and related, and port back-up (container-related) industries. According to stakeholder interviews, some operations must be retained in Hong Kong for efficient operation of those industries. Brownfield operations also provide a considerable number of jobs, especially low-skilled jobs and serve as an integral part of the local economy.

- 5.2.2 According to stakeholder interviews, many workers at the brownfield operations reside in the nearby new towns and rural areas and work on full-time or part-time basis (e.g. logistics operations in HSK employ residents from the nearby Tin Shui Wai new town). Relocation/closure of brownfield operations would affect the employment in some of the new towns and rural areas quite significantly.
- 5.2.3 In view of their economic contributions, should the brownfield operations in these industries be displaced for alternative uses on the sites such as urban-type developments, appropriate measures may be needed to deal with the displaced operations. The Government should also thoroughly assess the long-term development and operational needs of individual industries with a view to estimating their respective land requirements and to examining options in providing additional spaces for their operations.

The Site Requirements/Preference for Industries and Implications on Brownfield Sites

- 5.2.4 According to the stakeholder interviews and questionnaire survey results, brownfield sites being affordable and open-air are important for particular industries such as construction, port back-up (container-related), and, to some extent, logistics and waste recycling.
- 5.2.5 For construction industry, storage of bulky construction machinery or materials with heavy floor loading and high clearance requirements would need to operate at open-air sites. The brownfield sites contribute to ensuring easy accessibility to bulky machinery and materials for efficient construction operations.
- 5.2.6 Container storage yards require high clearance and heavy floor loading as containers need to be stacked up for storage for more efficient operation and land usage.
- 5.2.7 The logistics operations usually require fast processing of goods and large storage space as well as frequent traffic of container vehicles/trucks and loading/unloading of goods at the site. Spacious and horizontal working spaces with convenient loading/unloading and parking are required. Therefore, while there are many examples of high-rise logistics facilities, open-air sites are preferred by the logistics industry for more efficient operation.
- 5.2.8 Some waste recycling operations involving heavy materials (e.g. ferrous metal) also require heavy floor loading. Some require ground floor space for installing conveyor belts which need to be sunken into the ground. The open-air brownfield sites could meet such requirements, although it is still possible for them to be accommodated indoors.

- 5.2.9 According to the questionnaire findings, most of the above-mentioned operations chose to operate on brownfield site as it could meet their operating requirements.

Considerations in Relocation of Brownfield Sites

- 5.2.10 As expressed by the stakeholders, those operations involving bulky/heavy materials or machinery may not be suitable to be accommodated in MSBs, such as brownfield sites for storage of heavy and bulky construction machinery in construction industry, storage of heavy and bulky recyclables in waste recycling industry, container storage in port back-up (container-related) industry, etc. Moreover, there are also other concerns for accommodating brownfield operations in MSBs or industrial hubs. The concerns include affordable rent, operational efficiency, sufficient space for operation and storage, as revealed from stakeholder interviews and questionnaire survey. Apart from MSBs, a certain amount of open-air sites may still be needed for displaced brownfield operations which cannot be accommodated in MSB.
- 5.2.11 As some operations in brownfield sites are creating adverse impacts to the surrounding, when relocating them to alternative locations (e.g. MSBs, open-air sites), the recipient sites should be prudently identified to avoid land use incompatibility. Moreover, those MSBs and/or open-air sites should be carefully designed and implemented to reduce/mitigate the adverse impact.

5.3 Key Issue Relating to Development Potential of Brownfield Sites

- 5.3.1 In considering whether brownfield sites can be redeveloped for other purposes (e.g. housing development), it is necessary to comprehensively examine a full range of technical considerations, including the overall development strategy, transport accessibility, infrastructure provision, land use compatibility and environmental implication. As a result, we cannot assume that brownfield sites even those initially identified as having development potential, could all be used for housing or other types of development.
- 5.3.2 Notwithstanding the difficulties and challenges encountered, some brownfield sites which are large in size and located nearer to existing new towns and major highways possess greater potential for further development.

Scattered Distribution of Brownfield Sites in the NT

- 5.3.3 Some brownfield sites in the NT, especially those outside NDAs/PDAs, are scattered in different areas (e.g. Shek Kong, Pat Heung, San Tin, Lung Kwu Tan etc.), varying in size and are of irregular shape. Brownfield sites with more sizeable area (say, 2 ha or more) may have higher potential for comprehensive development, which should be taken into account when assessing the preliminary development potential of brownfield sites.

Traffic Infrastructure Provision, Proximity to Existing New Town and Other Considerations

- 5.3.4 Some brownfield sites in the NT, especially outside NDAs/PDAs, are at quite remote locations, and lack convenient access to highways. Some brownfield sites are distant from the existing new towns where facilities including community, medical, and educational facilities are available.
- 5.3.5 Proximity to strategic highways and existing new towns should be taken into account when assessing the preliminary development potential of brownfield sites.
- 5.3.6 Some brownfield sites are located in ecologically sensitive areas and not suitable for development. These may be considered for restoration and conservation.

6 CLASSIFICATION OF POSSIBLE DEVELOPMENT POTENTIAL OF BROWNFIELD SITES

6.1 Classification of Possible Development Potential

6.1.1 Although the focus of the Study is on establishing a comprehensive profile and spatial distribution of brownfield sites in the NT, some initial work has been done to classify the possible development potential of brownfield sites (both active and inactive brownfield sites) to assist future work on examining alternative uses for the sites. The classification is a desktop exercise purely based on simple quantifiable criteria on distance and size, without carrying out any assessment on feasibility of individual sites for development. The following criteria have been taken into consideration in the classification process:-

- (a) **Strategic Location:** it refers to the straightline distance of brownfield sites to existing new towns¹³, which will provide common facilities/services including retail shops/restaurants, educational, community, commercial and medical facilities, and public transport services. The availability of and accessibility to nearby facilities are essential to actualize the development potential of brownfield sites, and important for achieving a reasonable quality of life for future residents.
- (b) **Transport Considerations:** it refers to the straightline distance¹⁴ of brownfield sites to the existing highways¹⁵. The transport accessibility is essential to actualize the development potential of brownfield sites, as it will facilitate future residents to travel to a wider area for a diverse range of employment, social and recreation facilities.
- (c) **Size of Brownfield Clusters:** brownfield sites locating close to one another are referred to as a brownfield cluster. There would be a

¹³ The distance measures from the edge of the brownfield sites to the boundaries of the existing new towns. The delineation of the existing new towns is adopted from the boundaries developed by the Civil Engineering and Development Department and Planning Department for new town development purposes.

¹⁴ The classification is only based on straightline distance to existing highways without taking into account the actual access to those highways and their capacity.

¹⁵ The distance measures from the edge of the brownfield sites to the centerline of the existing highways. 'Existing highways' refer to existing trunk roads and expressways. According to para. 3.2.1 in Chapter 8 of the Hong Kong Planning Standards and Guidelines, 'trunk roads' are for longer-distance traffic movements between main centres of population and activities. While 'expressways' (i.e. connecting the main centres of population and activities) would perform similar functions to 'trunk roads', they would be designed to a higher standard, and are designated under the Road Traffic Ordinance. Besides, according to Chapter 5 of the Road Users' Code prepared by Transport Department, trunk roads are busy roads which link important towns and districts, and some trunk roads are designated as expressways.

higher opportunity to develop a brownfield cluster of larger size¹⁶ for alternative uses through comprehensive development.

6.1.2 **Figure 6.1** refers to the possible development potential of brownfield sites in the NT. Table below shows the locations and area of brownfield sites with High, Medium and Low Possible development potential¹⁷ respectively based on the classification results.

Table 6.1.1 Classification of Possible Development Potential of Brownfield Sites

Possible Development Potential	Main Locations	Area of Brownfield Sites	
		Active and Inactive Brownfield Sites ¹⁸	Excluding Brownfield Sites Already Covered By Development Projects
High	<ul style="list-style-type: none"> ● Parts of HSK/HT NDA, KTN and FLN NDAs and YLS Development ● Sha Po Tsuen, Shap Pat Heung, Ping Shan, Lam Tei, Wang Chau, Tai Hang etc. 	455 ha	160 ha
Medium	<ul style="list-style-type: none"> ● San Tin/Lok Ma Chau Development Node, Man Kam To Logistics Corridor and NTN New Town ● Parts of HSK/HT NDA, KTN and FLN NDAs and YLS Development ● Ngau Tam Mei, Lau Fau Shan, Southern Part of Lung Kwu Tan etc. 	765 ha	290 ha
Low	<ul style="list-style-type: none"> ● Shek Kong, Pat Heung, Northern Part of Lung Kwu Tan, Sha Tau Kok etc. 	283 ha	250 ha
Total		1 503 ha	700 ha

6.1.3 Table below shows the breakdown of brownfield sites with high/medium possible development potential by zoning group on statutory town plans respectively based on the classification results.

¹⁶ With reference to the average site area of potential public housing developments identified by the Government, brownfield clusters with an area of 2 ha or more can be classified as having higher development potential.

¹⁷ Brownfield sites within “OU(CDWRA)”, “OU(CDWEA)”, “CA”, “CPA” and “OU (Nature Park)” zones (as mentioned in para. 5.2.17 above), which are intended for nature conservation under the zonings, are not included in the classification of indicative development potential of brownfield sites.

¹⁸ Brownfield sites already covered by development projects include those brownfield sites within NDAs/PDAs (653 ha), covered by government projects under active planning (about 120 ha), and covered by known development projects initiated by private parties or landowners (about 30 ha).

Table 6.2.1 Breakdown of Brownfield Sites with High/Medium Possible Development Potential by Zoning Group on Statutory Town Plans

Zoning Group	Possible Development Potential					
	High		Medium		Total	
	Area (ha) (about)	%	Area (ha) (about)	%	Area (ha) (about)	%
Industrial Storage Related Uses	25	16%	27	9%	52	12%
Development Zones (Residential Zones)	34	21%	58	20%	92	20%
Development Zones (Others)	68	43%	82	28%	150	33%
Green Belt Zone	16	10%	51	18%	67	15%
Agriculture	10	6%	65	22%	75	17%
Others	6	4%	5	2%	11	2%
Outside coverage of statutory plans	1	Less than 1%	2	Less than 1%	3	Less than 1%
Total	160	100%	290	100%	450	100%

6.1.4 The above classification of development potential of brownfield sites is only for indicative purpose as it has been purely based on a desktop exercise having regard to simple quantifiable criteria including straightline distance to existing new towns, straightline distance to existing highways and size of brownfield clusters. The findings of this Study could only provide a snapshot of the brownfield sites (including both active and inactive brownfield sites), the uses of which are subject to constant change. The development potential of the brownfield sites therefore needs to be further examined in detail. Other factors including development strategy, land use compatibility, land status, environment, ecology, transport accessibility and other infrastructures provision etc. should be taken into account for a more comprehensive analysis in assessing the development potential of brownfield sites.

7 INTERNATIONAL EXPERIENCE

- 7.1.1 While the definition and character of brownfield sites may vary in different geographical, economic, environmental and legislation conditions of different regimes, tackling brownfield sites in general generates certain direct and indirect benefits, for instance optimising the utilisation of existing land resources, and eliminating environmental degradation. Tackling brownfield, however, also faces challenges of ownership issues and remediation costs.
- 7.1.2 This Study had reviewed a number of cases in Singapore, the United States and the United Kingdom. It indicated three possible approaches and their mechanisms and relevant considerations in tackling brownfield sites, including:-
- (i) intensification and consolidation into MSBs or industrial hubs;
 - (ii) redevelopment or regeneration for residential or commercial uses; and
 - (iii) rehabilitation for greening, conservation or recreation purposes.
- 7.1.3 The international experiences provide insights in terms of reserving land for industrial hubs, residential, commercial or conservation uses upon the regeneration of brownfield sites, as well as identifying an appropriate implementation approach (e.g. implementation by the public sector, the private sector, or through public-private partnership). It should be noted that the definition of ‘brownfield’ and its operations varies across jurisdictions and are highly related to the historical, social, economic and environmental contexts of the sites. The overseas examples could only serve as a general reference for tackling the issue of brownfield operations in Hong Kong.

8 CONCLUSION

Key Findings

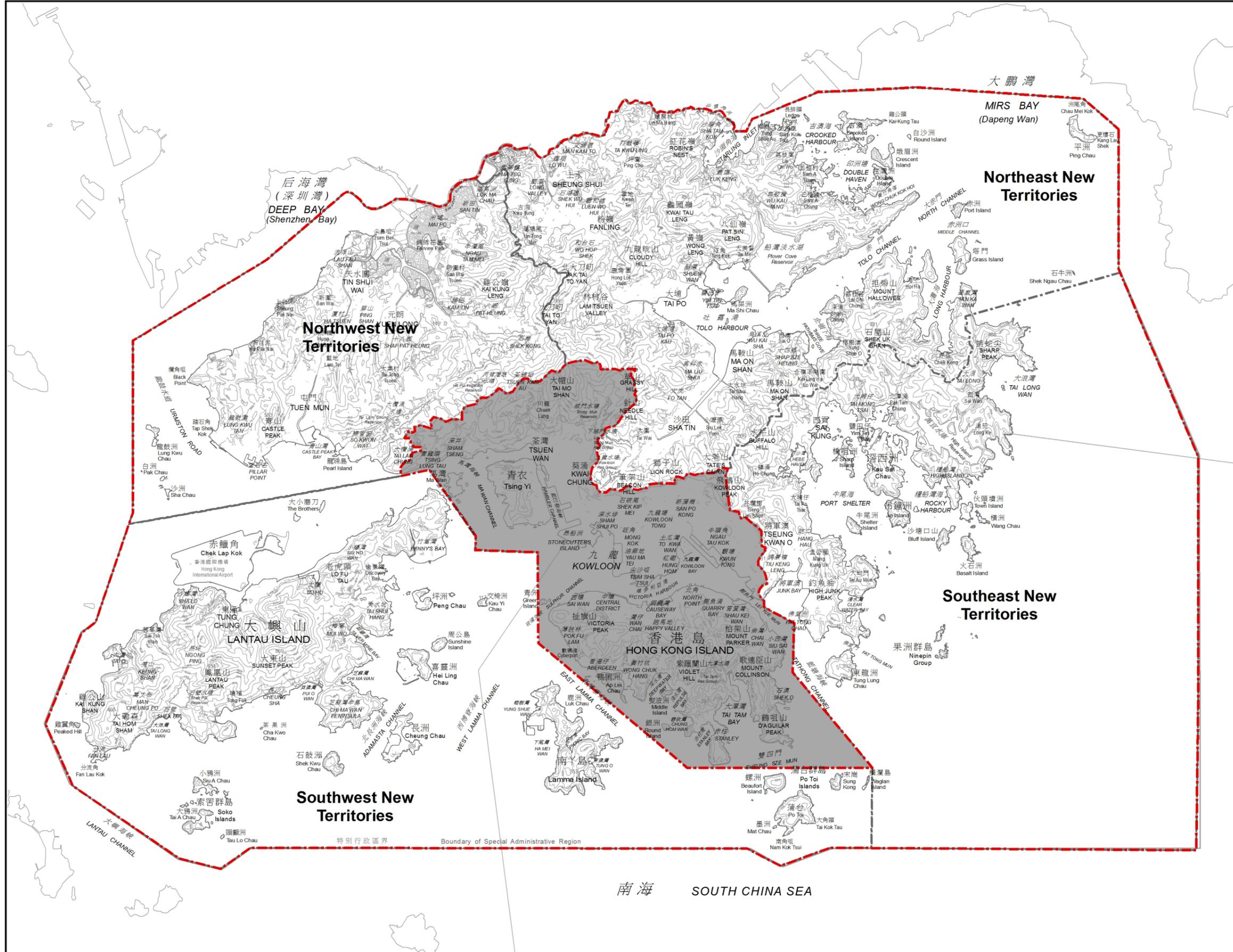
- Brownfield sites are defined as “primarily agricultural land in the NT which has been formed and occupied by industrial, storage, logistics and parking uses” (棕地泛指新界一些遭平整的農耕土地，用作工業、貯物、物流、及泊車用途)
- According to the survey findings, there are 7,373 active brownfield sites (area of about 1,414 ha) in the NT.
- In terms of area, about 75% of active brownfield sites are clustered in NWNT (i.e. about 1,060 ha), followed by NENT (23%; i.e. about 326 ha), SENT (1.4%; i.e. about 20 ha) and SWNT (0.6%; i.e. about 8 ha).
- The most common industries (in terms of area) are general warehouse / storage (26.8% / 379 ha), followed by construction (26.0% / 367 ha), logistics (13.2% / 186 ha) and vehicle repairing and related (9.7% / 137 ha).
- It is estimated that about 52,110 jobs are provided on active brownfield sites.
- The median and average rents of brownfield sites are \$3.0/sq ft and \$3.9/sq ft respectively.
- A vast majority of active brownfield land (over 80%) is under private ownership.

- 8.1.1 The Study has captured a snapshot of comprehensive profile and spatial distribution of brownfield sites in the NT, and details of the operations and major industries involved in brownfield sites.
- 8.1.2 Due to the transient nature of brownfield sites, the profile and spatial distribution of brownfield sites established under this Study could only provide a snapshot of brownfield sites based on the field and questionnaire surveys. While periodic update of the overall amount of brownfield land would be possible through desktop analysis of aerial photos, satellite images and other available information, comprehensive review of the data (including site profile and characteristics, etc.) can only be carried out through on-site surveys.
- 8.1.3 Brownfield sites are scattered in different areas, vary in size, are of irregular shape and lack convenient access to highway. In the absence of comprehensive planning of these land parcels, some brownfield sites in NT are underutilised with development potential. The Study has identified the key issues pertinent to brownfield operations in the NT with a broad analysis on the environmental, ecological and traffic problems caused by the brownfield sites. The Study has also classified the possible development potential of both active and inactive brownfield sites. In considering whether brownfield sites can be redeveloped for other purposes (e.g. housing development), further

comprehensive study taking into account a full range of considerations and technical assessments would need to be conducted.

- 8.1.4 In displacing brownfield sites for development, appropriate measures may be needed to deal with the existing operations on these brownfield sites considering the economic importance of the relevant industries occupying brownfield sites. The Government has to assess the long-term development and operational needs of individual industries with a view to estimating their respective land requirements and to examining options in providing spaces for their operations.

Figures



Legend

- Study Area Boundary
- Sub-regions in Study Area
- Metro Area



Consultant

ARUP

Contract No. and Title

Agreement No. CE 40/2016 (TP)
Study on Existing Profile and Operations of
Brownfield Sites in the New Territories –
Feasibility Study

Figure title

Study Area

Figure no.

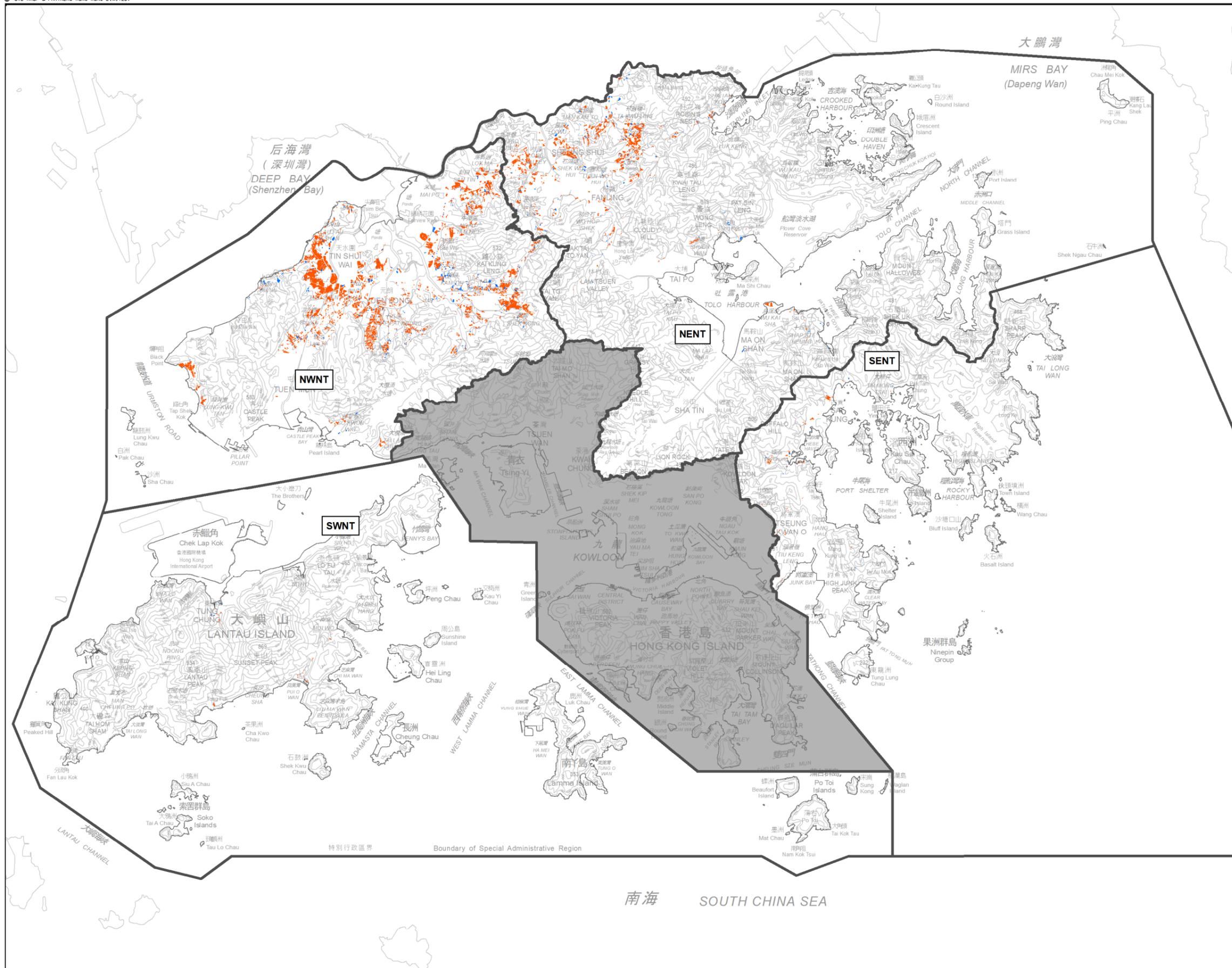
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Legend

- Sub-regions in Study Area
- Metro Area
- Active Brownfield Sites
- Inactive Brownfield Sites



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Study on Existing Profile and Operations of
Brownfield Sites in the New Territories –
Feasibility Study

Figure title

Distribution of Brownfield Sites in the New Territories

Figure no.
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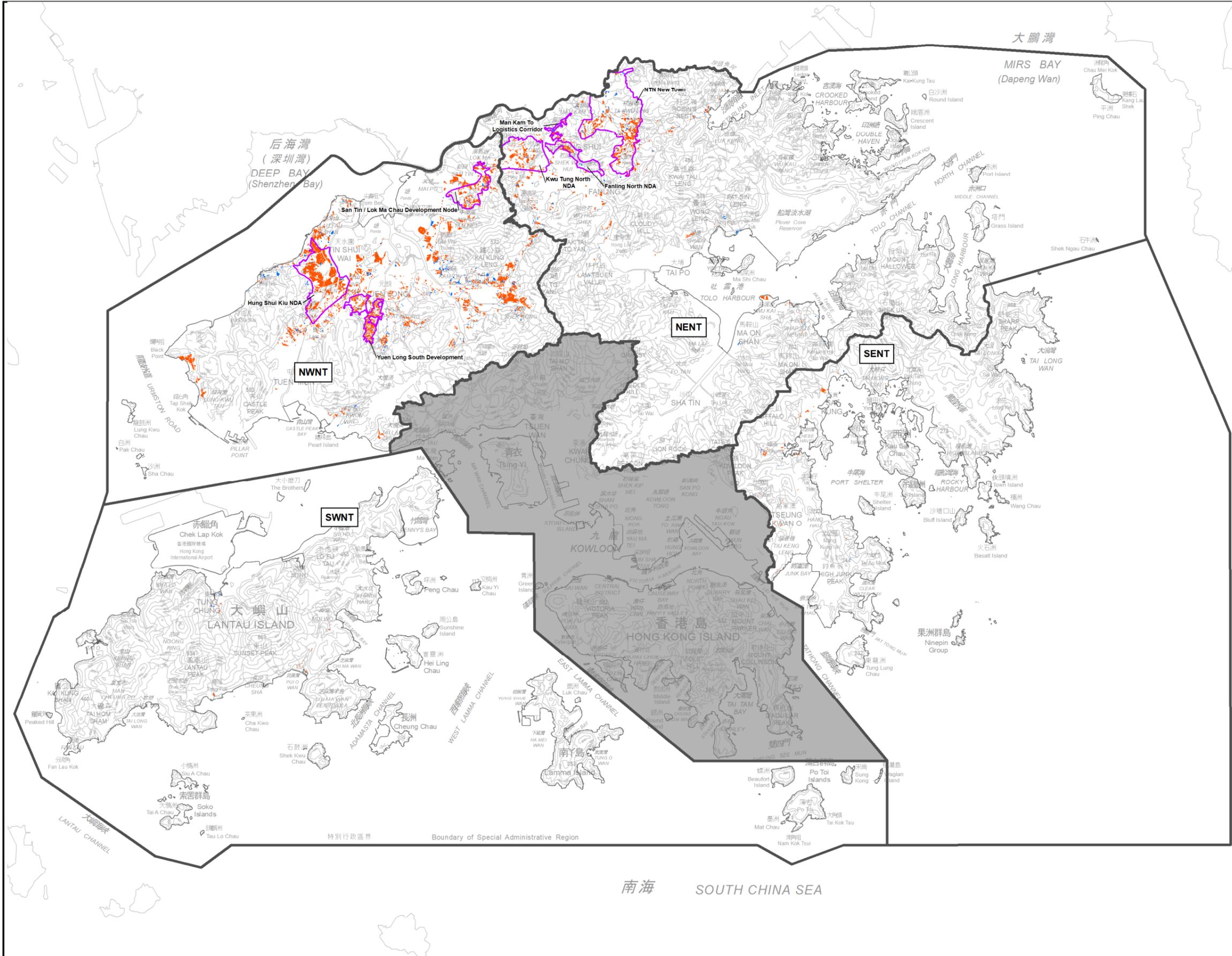
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Legend

- Sub-regions in Study Area
- Metro Area
- New Development Area (NDA)/Potential Development Area (PDA) Boundary
- Active Brownfield Sites
- Inactive Brownfield Sites



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Contract No. and Title

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 Study on Existing Profile and Operations of
 Brownfield Sites in the New Territories –
 Feasibility Study

Figure title

**Distribution of Brownfield Sites in the New Territories (Including
 Boundaries of New Development Areas/Potential Development Areas)**

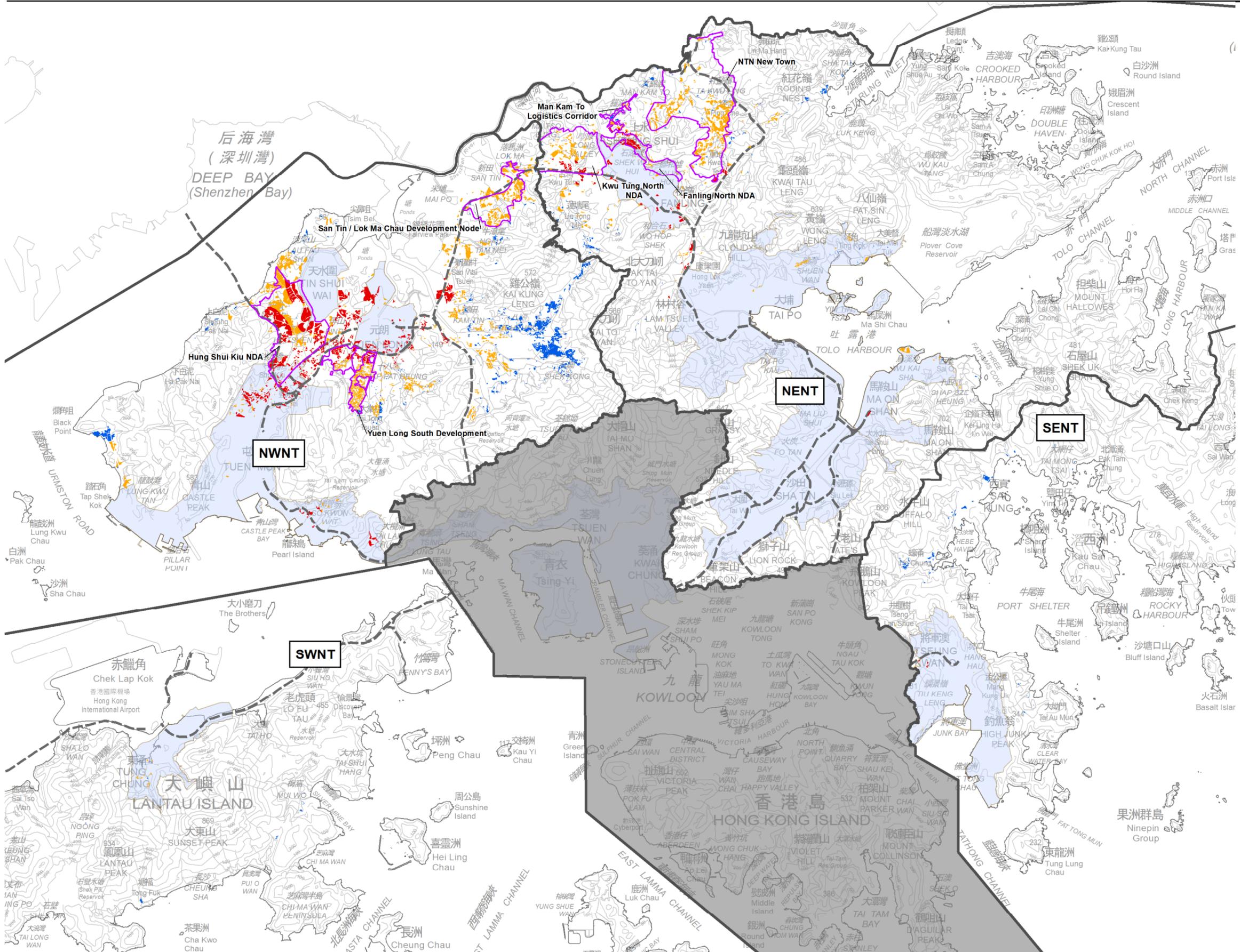
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Legend

- Sub-regions in Study
- Metro
- New Development Area (NDA)/Potential Development Area (PDA) Boundary
- Existing Highways
- Existing New Town

Possible Development Potential

- High
- Medium
- Low

Note:

- Brownfield sites falling within conservation related zones (as stated in para. 5.1.8 of the Executive Summary) are excluded from the classification.
- The classification of possible development potential of brownfield sites has not taken into account the planned uses for NDAs.



<p>Consultant</p> <h1 style="text-align: center;">ARUP</h1>	<p>Contract No. and Title</p> <p>Agreement No. CE 40/2016 (TP) Study on Existing Profile and Operations of Brownfield Sites in the New Territories – Feasibility Study</p>	<p>Figure title</p> <h2 style="text-align: center;">Classification of Possible Development Potential of Brownfield Sites in the New Territories</h2>	<p>Figure no.</p> <p>6.1</p>	<p>Rev.</p>	<p>COPYRIGHT RESERVED</p> <p>規劃署 Planning Department</p>																
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