

20 February 2023
Discussion Paper

Kau Yi Chau Artificial Islands

PURPOSE

This paper serves to brief Members of the Islands District Council on the preliminary proposals for four aspects of the Kau Yi Chau Artificial Islands (KYCAI), including reclamation extent, broad land use, strategic transport infrastructure and possible financing options under the Study on the Artificial Islands in the Central Waters (the Study).

BACKGROUND

2. According to the Conceptual Spatial Framework under the final recommendations of “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030” (Hong Kong 2030+) promulgated in 2021, the development of the KYCAI, which is at a strategic position within the expanded Harbour Metropolis, can provide about 1 000 hectares (ha) of land for meeting part of the medium to long-term land requirement of Hong Kong. It is further elaborated in the 2022 Policy Address that the KYCAI will expand the scope and capacity of Hong Kong’s development and enhance Hong Kong’s competitiveness as a financial, commercial and trade centre. It also includes part of the land of the KYCAI (about 300 out of the 1 000 ha) as one of the supply sources of the 3 280 ha of developable land in the entire territory in the coming 10 years.

3. The Study commissioned by the Civil Engineering and Development Department and the Planning Department in June 2021 mainly comprises a planning and engineering study on the KYCAI and a technical feasibility study on strategic road and rail connecting the artificial islands. The Study is targeted for completion by end 2024.

STRATEGIC POSITIONING AND PLANNING OBJECTIVES

4. The KYCAI will provide land to develop a core area of a new generation with a view to increasing public and private housing supply, while at the same time further enhancing Hong Kong's economic competitiveness through the development of a third Central Business District (CBD3). Besides, the proposed strategic transport infrastructure for supporting the artificial islands will significantly enhance the connection between the Harbour Metropolis and the Northern Metropolis, reinforce Lantau's edge as "Double Gateway" to the world and other Greater Bay Area (GBA) cities, and further refine Hong Kong's overall transportation network. Situated not far from the existing urban area¹, the KYCAI can offer decanting spaces to support the chain flows arising from the redevelopment of old urban districts of Hong Kong Island and Kowloon.

5. The development of the KYCAI will be based on the following three major planning objectives:

- (a) **Prosperous and diverse** (繁榮多元) – to enhance Hong Kong's international competitiveness and regional significance by developing CBD3 on the KYCAI to enhance Hong Kong's position as an international financial centre, playing the role as an international trade centre and strengthening the edge in legal services. Land will also be reserved outside the CBD for other economic activities to prepare for long-term diversified economic development and provide quality employment opportunities for young people;
- (b) **Green and liveable** (綠色宜居) – to create sustainable, accessible and people-oriented communities, adopt the planning concept of 15-minute neighbourhood and encourage residents to travel by healthy modes such as walking or cycling. Besides, with reference to the recommendations of Hong Kong 2030+, living space will be enhanced with the introduction of more forward-looking parameters in land planning, including assuming an increase in the average flat size of public and private housing by a range of 10% to 20% and raising the ratios of land for open space and land for community facilities to population to no less than 3.5 square metres (m²) per person respectively; and

¹ The KYCAI will be strategically located in the middle of the Hong Kong Island, Kowloon and Lantau Island, which is only around 4 kilometres (km) from Hong Kong Island West and around 15km from the Hong Kong International Airport.

- (c) **Forward-looking and innovative** (前瞻創新) – to comprehensively implement a smart, green and resilient (SGR) city strategy with a view to reducing daily energy demand and carbon emissions by formulating measures in three aspects, including planning and urban design, infrastructure system and smart mobility, to make the artificial islands an exemplar of urban innovation which embraces global and regional changes.

6. In order to achieve the above planning objectives, our proposals at this stage will cover the following six highlights:

- (a) adopt a “three-island” design to match the surrounding environment;
- (b) achieve the target of carbon neutrality through SGR city strategy;
- (c) connect the world and GBA and develop key routes for opening up Hong Kong’s strategic transportation network;
- (d) adopt a 15-minute neighbourhood concept for a liveable community;
- (e) create a work-live-play CBD; and
- (f) invite professional institutes to set up a platform to develop the detailed design of the artificial islands, realising community participation in planning this core area of the new generation.

Reclamation Extent

7. We preliminarily propose 1 000 ha of KYCAI which comprises three islands (namely Island A – about 380 ha, Island B – about 380 ha and Island C – about 240 ha), which forms a Y-shape channel separating the islands. The layout plan of the proposed artificial islands is provided in **Enclosure 1**. In formulating the proposed “Three-island configuration”, factors including ecology, water quality, engineering feasibility, marine traffic and port operation have been fully considered.

8. The proposed configuration can keep the artificial islands away from coral communities with ecological value along the coastlines of Kau Yi Chau, Siu Kau Yi Chau, Sunshine Island and Peng Chau. The Y-shape channel will effectively cope with the impact of reclamation on water quality and ecology by maintaining sufficient water flow velocity in the waters nearby. The design of the water channels is aligned with the prevailing wind direction to reduce the urban heat island effect. Besides, in order to enhance construction efficiency and cost effectiveness, we propose carrying

out reclamation in shallower waters². The proposed reclamation extent has also minimised impacts on the existing fairways and anchorage areas. We also plan to use the water channel as an ecological refinement measure to promote biodiversity through such as deploying artificial reefs at seabed and building eco-shoreline in the intertidal zone. The coastline design will echo the surrounding islands, increase waterfront open space, and promote water sports. It also provides diversified activity venues and optimises living space.

9. For the geographical location of the KYCAI, we have considered the risk of flooding and overtopping waves and will adopt a progressive adaptive approach by formulating a preliminary plan that can tackle coastal hazards, including setting a suitable site formation level for the artificial islands, designing adaptive and resilient coastal protection measures and planning a buffer zone between shoreline and development area, etc.

10. We are conducting an Environmental Impact Assessment (EIA) study for the KYCAI development. The preliminary findings (**Enclosure 2**) show that the proposed reclamation works would not cause insurmountable impacts on ecology and fisheries. We will in the planning of the islands consider adding cultural tourism of outlying islands such as fisherman's wharf to provide upgrading and transformation opportunities for the local fisheries industry. The Government will also review the system of granting the ex-gratia allowances for fishermen affected by marine works projects in Hong Kong waters.

Broad Land Use

Broad Land Use Concepts

11. Based on the aforementioned three major planning objectives of “prosperous and diverse”, “green and liveable” and “forward-looking and innovative”, a Broad Land Use Concept for the KYCAI has been formulated by adopting the major planning concepts below (**Enclosures 3 and 4**):

- (a) **A “work-live-play” CBD3 (Enclosure 5)** – taking the geographical edge of situating closer to the Hong Kong Island, a CBD3 of 100 ha (including commercial, residential, culture and recreation, open space and mobility-

² The water depth of east of Kau Yi Chau has relatively deeper water depth (about 12 to 15 metres) and the three islands are located at the shallower waters at the north, west and south of Kau Yi Chau (average water depth of about 8 metres).

related use) will be located in the eastern part of Island A for providing about 4 million m² of commercial gross floor area (GFA) to create a CBD for the new era and Hong Kong's future economic engine matching the national policy of promoting Hong Kong as an international finance and trade centre as well as a node for legal services. With reference to the overseas experience in planning new or transforming existing CBDs in advanced cities in recent years and considering the aspiration of the new generation of young people for work-life balance, the planning of the artificial islands will adopt an innovative planning concept different from that for traditional CBDs by using urban design and place-making approach to create a quality work-live-play environment for living and working. Apart from providing commercial spaces and convenient transportation network, land will be reserved for housing, culture, creative arts, fashion and entertainment, popular city sports and facilities related to daily living, as well as a large amount of quality public spaces. The diversified activities and the planning of mixed uses will inject liveliness in the business district and make it another unique and attractive tourist destination for Hong Kong.

- (b) **Seven liveable living communities planned with 15-minute neighbourhood concept (Enclosure 6)** – these liveable living communities will be connected by a green mass transit system and separated by blue-green corridors with green waterfront promenade along the shorelines. Based on the concept of 15-minute neighbourhood, each community will be around 80-100 ha and has a green mass transit station at the centre, with the public transport stations, daily shopping and dining facilities, basic community facilities, open spaces, etc. reasonably distributed within the community. At the same time, comprehensive pedestrian and cycling networks will be planned to allow residents to travel by healthy modes such as walking or cycling within 15 minutes from their homes to different destinations to obtain various necessities. In addition, land will be reserved in each community for large-scale community and recreational facilities and/or economic use(s) with a view to diversifying the employment opportunities and increasing the local employment rate within the community. Overall, there will be about 1 million m² commercial GFA in the seven communities outside the CBD.

- (c) **Blue-green network for promoting healthy living and biodiversity (Enclosures 7 – 9)** – a comprehensive blue-green network will be planned on the artificial islands to provide a variety of recreational and sports opportunities for people living and working on the islands and create a diverse range of flora and fauna habitats to enhance biodiversity. The network comprises the blue-green corridors between living communities, over 20 km of accessible waterfront promenades to encourage water-friendly culture, eco-shorelines, and various local, district and regional open spaces. In addition, the waters surrounding the artificial islands (including the water channels between islands) are very suitable for marinas and a variety of water sports venues including those for hosting local/international competitions.
- (d) **Adopting smart, green and resilient city strategy** – the strategy will cover the following measures to ensure that the developments on the islands could, in the long term, adapt to climate change and facilitate Hong Kong to achieve the carbon neutrality target before 2050:

Sustainable planning and urban design: include 15-minute neighbourhoods as discussed in paragraph 11(b) above, “sponge city³”, building orientations according to prevailing wind directions, coastal design strategy adapting to climate change, green building, urban forestry, etc.;

SGR infrastructure system: include sustainable urban drainage system, district cooling system, desalination plant, advanced food waste / sewage sludge anaerobic co-digestion facilities, common utility tunnel, etc.; and

Smart mobility: include pedestrian and cycling networks, supporting facilities for electric vehicles and other new energy vehicles (such as hydrogen vehicles), etc., as well as measures to be recommended by the Transport Department under the “Traffic and Transport Strategy Study”.

³ “Sponge City” means that a city can function like a sponge that has great resilience. The stormwater could be absorbed, stored, infiltrated and cleaned during rainy days, and could be “released” and utilised as needed to enhance the ecological function and reduce flooding in the city.

Major Development Parameters

12. Taking into account the above planning objectives, various city development strategies, the capacity of connecting transport infrastructure for the artificial islands and a liveable population density, it is preliminarily proposed providing 190 000 – 210 000 residential flats on the KYCAI of 1 000 ha by adopting a public to private housing ratio of 70:30 in the planning study for accommodating a population of 500 000 – 550 000 and providing 270 000 employment opportunities (including about 200 000 in CBD3). The proposed maximum domestic plot ratios are 6.5 and 7.5 for living communities and CBD respectively, while the maximum non-domestic plot ratio for the artificial islands is 15.

Land Use Targets

13. Based on the above concept and development parameters, the land use targets for the KYCAI of 1 000 ha are broadly as follows:

- (a) **Residential use** (about 250 ha or 25%);
- (b) **Economic uses** (about 100 ha or 10%) – include (i) commercial uses in CBD3, and (ii) other economic uses (e.g. creative industries, private medical; private education, tourism, marina club and retail, dining and entertainment);
- (c) **Open Space** (about 200 ha or 20%);
- (d) **Government, Institution and Community (GIC) facilities and utility infrastructure** (about 200 ha or 20%) – apart from the usual population-based GIC facilities, they may include special facilities (e.g. cultural venues, sport facilities and venues for international competitions, public water sports centre, etc.). Utility infrastructure may cover sewage treatment works, desalination plant, refuse transfer station, advanced food waste treatment facilities, district cooling system and grey water⁴ treatment plant; and
- (e) **Mobility-related infrastructure** (about 250 ha or 25%) – include roads, railway-related facilities, pedestrian streets, cycle tracks, etc.

⁴ Greywater refers to the water collected from baths, wash basins, kitchen sinks and laundry machines, etc. The wastewater can be treated to be reclaimed water and reused for non-potable purposes such as toilet flushing and irrigation.

14. To realise community participation in planning the core area of a new generation, we will invite relevant professional institutes to set up a platform to present their proposals to the Government, including the major planning concepts explained under in paragraph 11 above and certain important planning issues, such as how to create an attractive quality public space, how to develop the artificial islands into a smart city of the new generation, how to optimise the use of multidimensional spaces, how to implement the concept of sustainable development and living diversity, etc.

Strategic Transport Infrastructure

15. The KYCAI provides a good opportunity for us to plan a network of strategic transport infrastructure (i.e. The Hong Kong Island West – Northeast Lantau Link and Hong Kong Island West – Hung Shui Kiu Rail Link) with a view to improving Hong Kong’s overall transportation network. The preliminary proposal of the strategic transport infrastructure can meet the traffic demands of the KYCAI development and greatly enhance the connectivity of Hong Kong’s transportation network. The alignments of the strategic transport infrastructure are preliminarily proposed to connect the existing and planned major roads and rails for facilitating linkage with Hong Kong International Airport, Zhuhai and Macau to the west, Qianhai, Shenzhen and Northern Metropolis to the north, West Kowloon to the east and Hong Kong Island West and Central to the south. The entire transportation network will extend in all directions.

The Hong Kong Island West – Northeast Lantau Link

16. The Hong Kong Island West – Northeast Lantau Link (HKIW– NEL Link) (**Enclosure 10**), comprising southern and northern sections, is about 13 km long in total. The HKIW– NEL Link will be the first major trunk road connecting Hong Kong Island and the Northwest New Territories without passing Kowloon and will improve Hong Kong’s overall transportation network.

17. The preliminary proposal for the southern section of the HKIW – NEL Link, as the fourth road harbour crossing, will be in the form of a sub-sea tunnel connecting the KYCAI with Route 4 on Hong Kong Island West. Drawing reference to overseas experience, it is proposed that the HKIW – NEL Link will land on Island C in view of avoiding the commercial land on Island A being occupied by the HKIW – NEL Link. To enhance the connectivity of the CBD, we also propose a slip road connecting the HKIW – NEL Link with the CBD on Island A.

18. The northern section of HKIW – NEL Link will connect KYCAI with the planned Route 11 and Tsing Yi – Lantau Link via viaducts and/or tunnels in the preliminary design. In addition, it is proposed constructing a road near Penny’s Bay for connection with the North Lantau Highway. This design is to cope with the actual site constraints and technical difficulty encountered if connecting the HKIW – NEL Link with the planned Route 11, Tsing Yi – Lantau Link and North Lantau Highway at a single interchange.

19. We propose commencing the reclamation works and the construction of the HKIW – NEL Link concurrently, and strive to complete the HKIW– NEL Link in 2033 so as to support the land formation works and to suit the target of having the first population intake in the same year.

Hong Kong Island West – Hung Shui Kiu Rail Link

20. With the development of Northern Metropolis proposed in the Policy Address in 2021, the Government is actively planning the Hong Kong – Shenzhen Western Rail Link, connecting Hung Shui Kiu and Qianhai, to facilitate connections between Hong Kong and Shenzhen and foster the integrated development among Hong Kong and the GBA cities with better interconnectivity.

21. Taking this opportunity, we propose extending the strategic railway to Hung Shui Kiu for connection with the planned Hong Kong – Shenzhen Western Rail Link (Hung Shui Kiu to Qianhai) so as to strengthen the connections among the KYCAI, the Northern Metropolis and the Hong Kong-Shenzhen Western Rail Link, thus effectively enhance the strategic position of the KYCAI and the connectivity of Hong Kong rail network.

Recommended Rail Alignment and Depots

22. The Hong Kong Island West – Hung Shui Kiu Rail Link (HKIW – HSK Rail Link) is about 30 km long (**Enclosure 11**) which comprises a station on Island A and Island C respectively. The HKIW – HSK Rail Link will pass through Hong Kong Island West, the KYCAI, Sunny Bay, Tuen Mun East and Hung Shui Kiu in the Northern Metropolis for connection with the planned Hong Kong – Shenzhen Western Rail Link (Hung Shui Kiu to Qianhai). In order to enhance the connectivity of Hong Kong rail network, we preliminarily propose several interchange stations along the rail link for passengers transferring to the Island Line via HKU Station, the Tung Chung Line via Sunny Bay Station and the Tuen Ma Line via Hung Shui Kiu Station.

We will also explore the feasibility of interchanging with the Island Line at Kennedy Town with a view to enhancing the railway network. Besides, we plan to locate a depot at the proposed reclamation site at Sunny Bay to facilitate daily operations and train deployment, and to allow flexible deployment of trains during emergencies.

Green Mass Transit System on the KYCAI

23. To cope with the planning needs and transport demand at the KYCAI, our preliminary proposal is to link up the three artificial islands by a green mass transit system. Land will be reserved for a depot at Island C. Passengers from this mass transit system can interchange with the HKIWK – HSK Rail Link at suitable location(s) on the islands. Each living community on the KYCAI will be supported by a new generation of transport interchange hub⁵ allowing a centralised connection with public transport with different transport modes to connect the living communities and provide effective patronage coverage on the KYCAI. We will review and formulate the transport mode, alignment and location of depot at the next stage of planning.

Possible Financing Options

Infrastructure investment to support sustainable development and long-term benefit

24. We conducted in March 2019 a financial analysis for the KYCAI reclamation and the associated infrastructures works (such as water supply, sewerage and drainage system) as well as strategic transport infrastructure. The result showed that the land sales revenue (about 974 billion to 1,143 billion according to the estimate of the Hong Kong Institute of Surveyors in February 2019) was higher than the construction cost (by making reference to construction cost of similar works, the ballpark construction cost estimate of the KYCAI reclamation and the associated infrastructure works together with the strategic transport infrastructure is in the order of \$500 billion (in September 2018 price)).

⁵ A transport interchange hub can provide interchange facilities for various public transports, and may also provide other facilities such as parking lots, bicycle parking spaces, shopping and dining facilities, etc.

25. In view of the recent adjustment on property market and land value and for the sake of prudence, we have carried out a sensitivity test based on the latest information and parameters as follows:

- In terms of land sale revenue, based on the transaction price of land and properties up to November 2022, and then introduce more conservative assumptions, the estimate of the land sales revenue from private residential and commercial sites on the KYCAI is about \$750 billion.
- In term of construction cost, if the \$500 billion previously calculated based on the September 2018 price is adjusted solely based on civil engineering related indexes, a rough estimate of the total construction cost of the project in the second quarter of 2022 will be about \$580 billion.
- In other words, with the consideration of the latest market condition together with conservative assumptions, the land sales revenue is still higher than the construction cost. In fact, apart from the land sales revenue, investment in infrastructure works can also drive economic growth. Upon full development of the KYCAI, the associated economic activities would generate around \$200 billion of value-added each year (in 2021 price), amounting to about 7% of the Gross Domestic Product (GDP). Furthermore, there will be social and economic value for supplying land for public housing and strategic transport infrastructure. In conclusion, implementation of the KYCAI development is still considered to have social and economic benefits.
- The KYCAI development will span 20 years from end 2025. Roughly speaking, the ballpark estimate on the average annual expenditure will be about \$30 billion assuming the construction volume is evenly spread over the years. The Government has stated earlier that the medium-term forecast of capital works expenditure will exceed \$100 billion per year. This expenditure (plus the cash flow of this project) amounts to about 4% of GDP. For reference, at the peak of the Hong Kong Airport Core Program in the 1990s, government spending on capital works accounted for about 6% of GDP.

- Since the entire development is a long-term investment with economic benefits, we consider it not necessary to rely solely on public expenditure to take forward the project. Apart from funding using Capital Works Reserve Fund, we have considered introducing one or more of the financing options, including bond issuance, Public-Private-Participation such as Build-Operate-Transfer Model to construct major road, Railway-plus-Property Model to construct railway, etc.) to make appropriate use of market forces.
- The project is still at the preliminary planning stage where the EIA, ground investigation etc. are in progress. After the overall design work is completed, we will have the basis to develop the phased implementation of works and provide a cost estimate with reference to a more detailed engineering design. We will further investigate the feasibility of these financing options in the Study (**Enclosure 12**).

WAY FORWARD

26. With the views gathered in the public engagement, we will further develop the preliminary proposals.

27. We aim to commence the statutory process of EIA in 2023. We will apply for funding to commence detailed design and ground investigation of the project in early 2024. After the completion of the statutory procedures under the Foreshore and Sea-bed (Reclamations) Ordinance in the second half of 2024 and the completion of the detailed design before mid-2025, we target to apply for funding for the reclamation works in the second half of 2025 and commence reclamation works at the end of the same year. Barring unforeseen circumstances, the first batch of residential development for population intake will be in 2033 at the earliest.

ADVICE SOUGHT

28. Members are invited to offer view on the reclamation extent, strategic transport infrastructure, broad land use and possible financing options formulated under the Study.

ATTACHMENTS

- Enclosure 1** Reclamation Extent
- Enclosure 2** Preliminary Findings on Ecological and Fishery Baseline Survey relating the reclamation works of KYCAI
- Enclosure 3** Broad Land Use Concept Plan
- Enclosure 4** Rendered Illustration of KYCAI
- Enclosure 5** Rendered Illustration of CBD3
- Enclosure 6** Rendered Illustration of Living Communities
- Enclosure 7** Rendered Illustration of Blue-green Corridor between Living Communities
- Enclosure 8** Rendered Illustration of Waterfront Promenade and Water Channel between Artificial Islands
- Enclosure 9** Rendered Illustration of Regional Park and Water Sports Facilities
- Enclosure 10** Alignment of HKIW – NEL Link
- Enclosure 11** Alignment of HKIW – HSK Rail Link
- Enclosure 12** Possible Financing Options

**Civil Engineering and Development Department
Planning Department
February 2023**