

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

For discussion
on 16 September 2010

Exterior Design of Tunnel Buildings of the Central - Wan Chai Bypass and Island Eastern Corridor Link (the “CWB”)

Purpose

This paper aims to seek Members' views on the exterior design of the tunnel buildings to be constructed under the CWB project, including three ventilation buildings, the east vent shaft and the administration building.

Background

2. Under the steer of the Sub-committee on Wan Chai Development Phase II (WDII) Review (the Sub-committee) of the then Harbourfront Enhancement Committee (the HEC), the public was extensively engaged from May 2005 to June 2007 through various public engagement activities to solicit their views on the enhancement of the harbourfront of Hong Kong Island. The views expressed by the Sub-committee and the public had been fully considered and incorporated as appropriate in drawing up the relevant zoning plans¹, in which the alignment of CWB and the locations of tunnel buildings are covered.

3. In taking forward the CWB project, the air quality, noise, visual and other environmental aspects of the CWB (including all tunnel buildings) have also been fully assessed in accordance with the Environmental Impact Assessment (EIA) Ordinance. To alleviate the environmental impact due to the CWB project, we will implement mitigation measures set out in the EIA report as approved by the Environmental Protection Department (EPD). Assessment results indicate that with the implementation of the relevant measures, the environmental impact due to the CWB project (including the tunnel buildings) would be acceptable. The size and bulk of the ventilation buildings have also been kept to a minimum by locating many of the equipment underground.

¹ Including the Recommended Outline Development Plan for WDII and the proposed amendments to the draft Wan Chai North Outline Zoning Plan and the draft North Point Outline Zoning Plan.

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

4. The road scheme of the CWB project was gazetted under the Road (Works, Use and Compensation) Ordinance (Cap. 370) in July 2007. The locations, site area and maximum height of the tunnel buildings were covered in the gazetted plans. After going through extensive consultation (including the relevant District Councils (DCs), the former HEC, professional bodies and local representatives, etc.) and relevant statutory processes, the proposed road scheme was authorized by the Chief Executive in Council in May 2009. Funding for the implementation of the project was approved by the Finance Committee of the Legislative Council on 3 July 2009 and the construction works of the project commenced in late 2009 for completion in 2017.

Ventilation Buildings and Administration Building

5. The ventilation buildings for the CWB will accommodate the essential facilities for tunnel operation, including tunnel ventilation system and fire safety system. Air inside the tunnel will be collected and treated in the ventilation buildings before discharge². The administration building will accommodate the computer system for the control of the whole tunnel operation, and also serve as the office for tunnel staff and depot area for the daily operation of the CWB tunnel. The locations of the three ventilation buildings, east vent shaft and administration building are shown in **Annex 1**.

6. The tunnel buildings should be located at sites with sufficient area to accommodate the essential facilities and to meet operation needs. Particularly in the case of ventilation buildings, to achieve safe and effective operation of the CWB tunnel, they should be located as close to the tunnel as possible. Other considerations – including land use, environmental impact, minimum disruption to the public during construction and physical constraints, etc. – have also been taken into account in the site selection. The key considerations for the selection of the locations of the tunnel buildings are set out in **Annex 2**.

Exterior Designs of Tunnel Buildings

7. We have engaged world-class consultants to work out high quality exterior designs for the tunnel buildings. In developing the exterior designs,

² Either directly from the ventilation building (in the case of the West Ventilation Building and Middle Ventilation Building) or through a separate vent shaft (in the case of the East Ventilation Building).

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

the consultants have given due regard to the Harbour Planning Principles as promulgated by the HEC, and the Urban Design Guidelines for Hong Kong.

8. We have consulted the Central and Western District Council, Wan Chai District Council and Eastern District Council on the initial exterior designs of the tunnel buildings in July 2009. We subsequently improved the designs taking into account the comments of DC members. In order to obtain public views on the exterior designs, a series of roving exhibitions were conducted between 29 July and 3 September 2010. On the basis of the public views received and any comments that the Harbourfront Commission may have, we will fine-tune the designs for further consultation with the Commission and relevant DCs before finalizing the designs.³

West Ventilation Building (WVB)

*[layout plan and photomontages of the exterior design options at **Annex 3**]*

9. The WVB is located above the western portal of the CWB tunnel. The footprint of the WVB at ground level is approximately 49m long x 30m wide. The maximum building height is about 18m.

10. As the WVB is in close proximity to the future open space areas in Central Harbourfront, we have been closely liaising with the Planning Department regarding the designs of the WVB and the future elevated landscaped deck of the public space of Sites 1 and 2 between the International Finance Centre (IFC) and the Central Piers (under the Urban Design Study for the New Central Harbourfront) (see location plan at **Annex 4**) to ensure harmony of both designs. Taking into account the location and the level of the future landscaped deck, the WVB will not block the harbour view of the public. The two exterior design options are outlined below :

(i) Exterior Design Option 1 – Streamlined Green Roof

The holistic, streamlined green roof stretches over the West Tunnel Portal, creating a symbolic yet discreet and aesthetically softened tunnel portal. The planted, wing-like roof form is

³ In accordance with the requirement of the Town Planning Board during the approval process of the amendments to the relevant outline zoning plans, the final exterior designs for the East Ventilation Building, East Vent Shaft and Administration Building will also be submitted to Town Planning Board for endorsement.

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

designed to facilitate the effective merging of the tunnel portal with the adjacent greening areas. The form symbolizes a suspended green leaf with colour and texture which is reminiscent of the existing green lawn. The palette of metal and planting, shading fins and dynamic form are in harmony with the surrounding commercial and landscape development.

(ii) Exterior Design Option 2 – The Play of Illusion

Form and façade break down into smaller scale to reduce the perception of the mass of the west ventilation building. External cladding engraved with wavy cloudy images suggests extension of surrounding scenery of the sky and the waterfront. Green roof and planting on the sides enhance the aesthetic effects.

Middle Ventilation Building (MVB)

*[layout plan and photomontages of the exterior design options at **Annex 5**]*

11. The footprint of MVB at ground level is about 60m long x 20m wide. The maximum building height is about 18m. The two exterior design options are outlined below :

(i) Exterior Design Option 1 – Juxtaposition of Layers

The design of the ventilation building aims at minimizing the height and footprint to enhance its visual effects. The building mass is broken down by the use of layered projecting blade walls, different colours and lighting effects, and corner louvre screens. The overall form aims to achieve elegance and the louvres create a lightweight, filigree quality in harmony with the surrounding landscape.

(ii) Exterior Design Option 2 – Waves

The roof forms an artistic wave which breaks away from the monotony and creates energetic atmosphere for the surrounding. Two wing-like roofs together with the organic landscape enhance the vividness of the Hong Kong Convention and Exhibition Centre and its vicinity.

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

East Ventilation Building (EVB)

*[layout plan and photomontages of the exterior design options at **Annex 6**]*

12. The footprint at ground level of the EVB is about 24m long x 35m wide. The building height is about 9m. The two exterior design options are outlined below :

(i) Exterior Design Option 1 – Natural Greening

The design concept aims to blend the EVB into the adjacent open space by using stone cladding material with natural colours. Green hedges and rows of trees around the building aesthetically soften the building mass and perimeter fence while the green roof and green bluish cladding are in harmony with the natural setting.

(ii) Exterior Design Option 2 – Wood Screen

The design takes the surrounding environment into consideration. Fibre slats made of treated waste wood are used for the screening to mimic natural harbourfront setting and to blend the building into the adjacent open space. Green hedges and rows of trees around the building aesthetically soften the building mass and perimeter fence.

Vent Shaft of EVB – East Vent Shaft (EVS)

*[layout plan and photomontages of the exterior design options at **Annex 7**]*

13. The vent shaft of the EVB is located at the northern end of the eastern breakwater of the Causeway Bay Typhoon Shelter (CBTS). The size of the vent shaft is about 9m in diameter and 19m in height. The three exterior design options are outlined below :

(i) Exterior Design Option 1 – Layered Cylinder

The modern cylindrical form on the eastern breakwater creates a sculptural landmark in front of the Victoria Park. The external finishes will be metal cladding. The simple building design, with wavy strip outlines, forms an interesting silhouette of the waterfront.

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

(ii) Exterior Design Option 2 – Flowing Sails (formerly called Twisted Sails)

The design theme of this option is to create an abstract form of three flowing sails on the harbour. It stands as a sculptural landmark in the North Point waterfront and CBTS area. The external finishes will be metal cladding for wavy fins and the cylinder itself. The form represents the energy of the harbour and harmonizes with the sails of boats passing by. The profiled fins also echo the roof of the Hong Kong Convention and Exhibition Centre in a distance at Wan Chai waterfront.

(iii) Exterior Design Option 3 – Light Tower

The design theme of this option is to mimic a light tower at the eastern breakwater, and adds interests and waterfront character to the harbour. Exterior wall, decorated with windows and louvers, adopts light and earth colour. This suggests emergence of the tower from the eastern breakwater.

Administration Building (ADB)

*[layout plan and photomontages of the exterior design options at **Annex 8**]*

14. The ADB is located under the reconstructed Island Eastern Corridor Link flyover. The footprint at ground level of the main block and subsidiary block of ADB is about 89m long x 25m wide and 15m long x 17m wide respectively. The building height is about 6.5m. The exterior design options are outlined below :

(i) Exterior Design Option 1 – 3-D Geometry

The use of three-dimensional geometry creates kaleidoscopic visual effects. The design of protrusion and void with varying dimensions offers a rhythm on the façade, and stimulates a piece of symphony. Shrubs and lianes will be planted in the surrounding area to maximize greening opportunities.

(ii) Exterior Design Option 2 – Louvered Screen

The design aims to provide an external layer of louvered screen in creating a vivid appearance for the administration building. These light-coloured louvers echo with the elevation of the

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

building. Their miraculous shading pattern compliments the building. Shrubs and lianes will be planted in the surrounding areas to maximize greening opportunities.

Roving Exhibitions

15. We have conducted roving exhibitions for the proposed exterior design options for the tunnel buildings between 29 July 2010 and 3 September 2010. Visitors were invited to express their views and to choose their preferred design options. The exhibition sites, which are at locations convenient to the nearby residents or close to the future tunnel building sites, are as follows:

- One International Finance Centre
- Central Oasis
- Wan Chai MTR Station concourse
- Hong Kong Convention and Exhibition Centre (entrance at Golden Bauhinia Square)
- Times Square
- CWB Community Liaison Centre at Oil Street of North Point

16. More than 12 800 people patronised the exhibitions during the 33 days exhibition period, with about 7 050 participants having cast their votes on the options of the exterior designs of the tunnel buildings and 654 participants providing additional comments (mainly on the general design and environmental aspects of the tunnel buildings). The results of the poll on the options of the exterior designs of the tunnel buildings are summarized in the table below :

| | Percentage of Vote (%), number of votes in brackets | | | | |
|------------------------------------|--|------------------|-----------------|-----------------------------|------------------|
| | Option 1 | Option 2 | Option 3 | More than one option | No answer |
| West Ventilation Building | 87.8% (6 188) | 9.1% (643) | - | 0.4% (28) | 2.7% (191) |
| Middle Ventilation Building | 32.7% (2 306) | 61.9% (4 365) | - | 0.5% (34) | 4.9% (345) |
| East Ventilation Building | 47.7% (3 366) | 46.0% (3 246) | - | 0.3% (21) | 5.9% (417) |

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

| | Percentage of Vote (%), number of votes in brackets | | | | |
|--------------------------------|---|------------------|------------------|----------------------|---------------|
| | Option 1 | Option 2 | Option 3 | More than one option | No answer |
| East Vent Shaft | 16.5% (1 162) | 50.3% (3 548) | 26.8% (1 890) | 1.2% (84) | 5.2% (366) |
| Administration Building | 40.2% (2 832) | 52.1% (3 674) | - | 0.2% (17) | 7.5% (527) |

Way Forward

17. All views collected from the public during the roving exhibitions and the comments from this Task Force will be fully considered in finalizing the exterior designs of the tunnel buildings. We will further consult the Harbourfront Commission as well as relevant DCs on the final exterior designs.

Advice Sought

18. Members' comments on the exterior designs of the tunnel buildings are invited.

Annexures

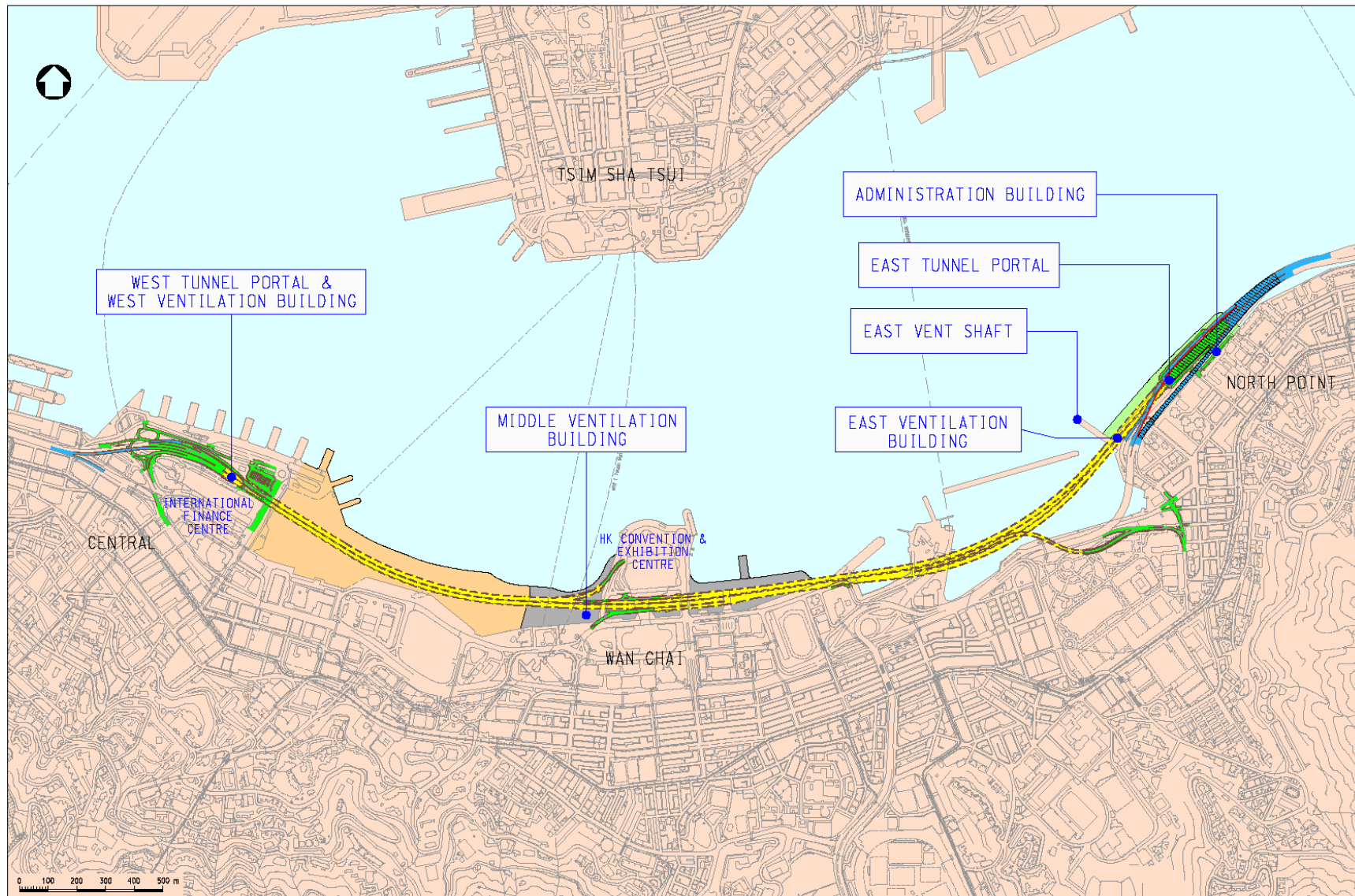
- Annex 1 Overall Layout Plan for the CWB
- Annex 2 Rationale on Location Selection of Ventilation Buildings
- Annex 3 West Ventilation Building Layout Plan and Photomontages of Exterior Design Options
- Annex 4 Locations of New Central Harbourfront Sites 1 and 2
- Annex 5 Middle Ventilation Building Layout Plan and Photomontages of Exterior Design Options
- Annex 6 East Ventilation Building Layout Plan and Photomontages of Exterior Design Options
- Annex 7 East Vent Shaft Layout Plan and Photomontages of Exterior Design Options

Task Force on Harbourfront Developments on Hong Kong Island

TFHK/02/2010

Annex 8 Administration Building Layout Plan and Photomontages of
Exterior Design Options

**Highways Department
September 2010**



Annex 1 – Overall Layout Plan of CWB

**Exterior Design of Tunnel Buildings of
the Central - Wan Chai Bypass and Island Eastern
Corridor Link (the “CWB”)**

**Rationale on Location Selection of Tunnel
Buildings**

Key Considerations on Location Selection of Ventilation Buildings

The ventilation buildings for the CWB provide accommodation for the essential facilities for tunnel operation (including tunnel ventilation system and fire safety system), and it is fundamental to select sites with sufficient space to accommodate the plants required for the operation of the CWB tunnel.

2. Effective operation of the ventilation system is also an important consideration. The ventilation system needs to be effective to ensure the air quality inside the tunnel. It is also of paramount importance to the safety of tunnel users in case of fire. Maximum effectiveness for ventilation will be achieved if the ventilation buildings can be situated as close to the CWB tunnel as possible. This could also avoid the need for additional ventilation tunnel and electrical and mechanical (E&M) cable tunnel to link the tunnel portal with the ventilation building. The energy consumption and the size of the E&M plant, especially tunnel ventilation fans, would also be minimized.

3. Land is scarce resources especially in the case of the CWB, which runs along the prime sites on the northern shore of Hong Kong Island. The locations of ventilation buildings should be so selected to minimize occupation of land in the vicinity. Off-site buildings which will require the construction of additional ventilation and cable tunnels connecting the CWB tunnel and off tunnel ventilation buildings should be avoided as far as possible.

4. Other considerations including environmental impact, minimum disruption to the public during construction and physical constraints have also been taken into account.

5. In taking forward the CWB project, the air quality, noise, visual and other environmental aspects of the CWB – including all ventilation buildings – have also been fully assessed in accordance with the Environmental Impact Assessment (EIA) Ordinance. To alleviate the environmental impact due to the CWB project, we will implement mitigation measures set out in the EIA report as approved by the Environmental Protection Department (EPD). The approved EIA report concluded that the environmental impact due to the various buildings would be acceptable. The size and bulk of the ventilation buildings have also been kept to a minimum by locating many of the equipment underground.

(a) West Ventilation Building (WVB)

6. The WVB is located just above the western portal, i.e. the western ingress and egress of CWB tunnel in Central (see **Annex 3** for location). The site area is sufficient to accommodate the required tunnel essential facilities to ensure effective tunnel operation.

7. The proposed site can also achieve maximum effectiveness for ventilation as the ventilation fans and E&M systems of the tunnel can be directly installed on top of the CWB tunnel. No additional ventilation tunnel and E&M cable tunnel for linking up an off tunnel alignment WVB and the CWB tunnel are necessary. The high effectiveness of the ventilation system of such a direct connection configuration arrangement is beneficial to tunnel safety in case of fire. The energy consumption and the size of the E&M plant, especially tunnel ventilation fans, can also be minimized which will be more beneficial to the environment.

8. The western portal is within the CWB tunnel protection zone upon which no permanent structure or buildings other than tunnel buildings will be allowed. Adopting this location for the WVB will mean the best use of land resources and least intrusion onto other sites in the Central. Most notably, it will not take up any public space in Sites 1 and 2 of the New Central Harbourfront (see plan at **Annex 4** for location).

9. As the WVB situates directly above and integrates with the structure of the CWB tunnel, working space for construction of WVB and CWB tunnel and disruption to existing traffic during the construction stage are also minimized.

10. Recently, the International Finance Centre (IFC) has suggested an alternative location for the WVB at the lawn area (zoned government/institution/community facilities) near Central Pier No. 2 and between Man Chiu Street and Man Po Street. We have in fact considered this option at the initial stages of the project, and have come to the view that it is not a technically viable option.

11. The site in question is approximately 300m to the west of the western portal, in a form of roundabout entirely surrounded by future carriageways. The problems of the site are as follows:

(a) Limited usable area

The usable area of this site is limited by two factors :

- (i) The building structure should be set back from the carriageway for 2 metres (m) for delivery and access to the plant room, and at some points up to 11m to maintain sufficient sightline for road safety; and
- (ii) A 3.6m(W) x 3.3m(H) cooling water discharge tunnel serving the existing Hong Kong Central Station and a 9.5m(W) by 3.1m(H) stormwater box culvert of the Drainage Services Department (DSD) cut through and occupy part of the site underground. Building on top of these structures is not allowed for operational and maintenance considerations, and diversion of these facilities is not feasible in view of the substantial disruption.

Taking into account the constraints mentioned above, the net usable area of this site is only around 680m², which is very limited when compared to the usable area of the existing location (around 1 470 m²).

(b) Safety concerns

For considerations of fire safety, operational safety, etc., designated electrical and mechanical facilities must be housed above ground. Our assessment is that the area of the site (i.e. 680 m²) is insufficient for accommodating the essential plant rooms, delivery access, fireman's lift, escape staircase and ventilation system in the WVB, which require a minimum area of 850m².

(c) High construction risks

Taking into account the constraints imposed by the foundations of the heavily used footbridge connecting IFC Complex and Central Pier no. 3 (Footbridge FB4), a proposed retaining wall for the CWB tunnel along Man Kwong Street, and the existence of the MTR cooling water intake culvert, the ventilation and E&M tunnels will need to be constructed underneath the MTR culvert, at almost 26m and 35m respectively deep into the ground within very confined space. Construction of the tunnel extensions at this depth would pose very high risk to the safety of the construction workers as well as road users on the ground in case of collapse of the excavation. Moreover, the existing MTR cooling water intake culvert is an important facility for the normal operation of Hong Kong Station. Deep excavation underneath or adjacent to this important facility is hence very risky, as any damage to the culvert would have tremendous impacts to the operation of essential systems such as the air conditioning system of Hong Kong Station.

(d) Adverse environmental impacts

Given the distance between the location and the CWB tunnel portal, additional 450m long underground ventilation and E&M cables tunnels will be required to link up the tunnel and the WVB with space requirement of 96m² and 100m² respectively. This will result in additional power consumption, additional requirement in the size and bulk of the ventilation building, and an increase in the noise levels during operation, hence more significant environmental impact.

(e) Significant disruption during construction

Apart from the above-mentioned existing infrastructures, there are a lot of underground services and utilities around the proposed site, including but not limited to large diameter stormwater drain, gas main and electricity cables. Extensive temporary traffic diversion and utilities diversion will be required to make way for the construction of the proposed tunnel extensions throughout the entire construction period. This will inevitably cause significant

disruption to existing roads, access, traffic and the public.

(f) Constraints on the future development of Site 1 and Site 2

Given the physical constraints of the site as mentioned above, the ventilation and E&M tunnels will encroach heavily into the boundary of the future Site 1 and Site 2 developments, and seriously affect the flexibility in the planning and construction of the sites.

(g) Delay in the project completion date

Relocating the ventilation building at this stage will not only require re-design but also re-gazettal and environmental impact assessment for the new option. Since the construction works of CWB are now in full swing, such changes at this stage will inevitably delay the commissioning of the project by at least 2 years. Having regard to the traffic congestion along Connaught Road West and Gloucester Road, it is important that the CWB project be taken forward as quickly as possible to allow early improvement to the traffic situation along Connaught Road West and Gloucester Road.

12. Considering the above deficiencies and drawbacks, it is concluded that the relocation of the WVB to the alternative site proposed by the IFC is not a technically feasible option.

(b) Middle Ventilation Building (MVB)

13. Given functional need, the MVB should be located approximately midway between the West Portal and East Portal and will fall within Wan Chai area. The MVB will be situated on the new reclamation to the south of the CWB tunnel (see **Annex 5** for location), which is the only possible location in Wan Chai North for the building.

14. The site is bounded by the MTRCL Tuen Wan Line, CWB tunnel and Slip Road 3. The size of site will be sufficient for the MVB. Since the site is next to the CWB tunnel and close to Slip Roads 1 and 3, no additional ventilation tunnel and E&M cable tunnel will be necessary. The energy consumption and the size of the E&M plant, especially tunnel

ventilation fans, would therefore be minimal.

(c) East Ventilation Building (EVB)

15. The EVB is located above CWB Tunnel and to the east of the Causeway Bay Typhoon Shelter (CBTS) Eastern Breakwater (see **Annex 6** for location).

16. Due to strong public interest in the location of this building, we have heavily engaged the public in the site selection process in 2007 by way of consultation meetings involving nearby residents, schools and hotels. Upon several rounds of discussions, the selected location will be at some 230m to the west of the east portal of CWB, which is the west-most possible location at the eastern edge of the CBTS.

17. The EVB will still be directly above the CWB tunnel and thus no extension of E&M cable and ventilation tunnels is required. Also, the CWB tunnel at this location is of adequate cover depth and underground space for providing extra space to house some tunnel facilities inside a basement structure of the EVB.

(d) East Vent Shaft (EVS)

18. The EVS is located at the far end of Eastern Breakwater of CBTS (see **Annex 7** for location).

19. There is no infrastructure or underground services and utilities along the Eastern Breakwater. Moreover, as the EVB will be built on reclaimed land, there will be no obstruction for the air ventilation tunnel to be constructed between the EVS at the tip of eastern breakwater and the EVB.

Key Considerations on Location Selection of the Administration Building (ADB)

20. The criterion for locating the ADB is that it should be as close to the tunnel portal as possible where the tunnel operation and maintenance vehicles can access the tunnel efficiently. Since there is no suitable site with sufficient area for the ADB in Central near West Portal, we could only place the ADB in North Point.

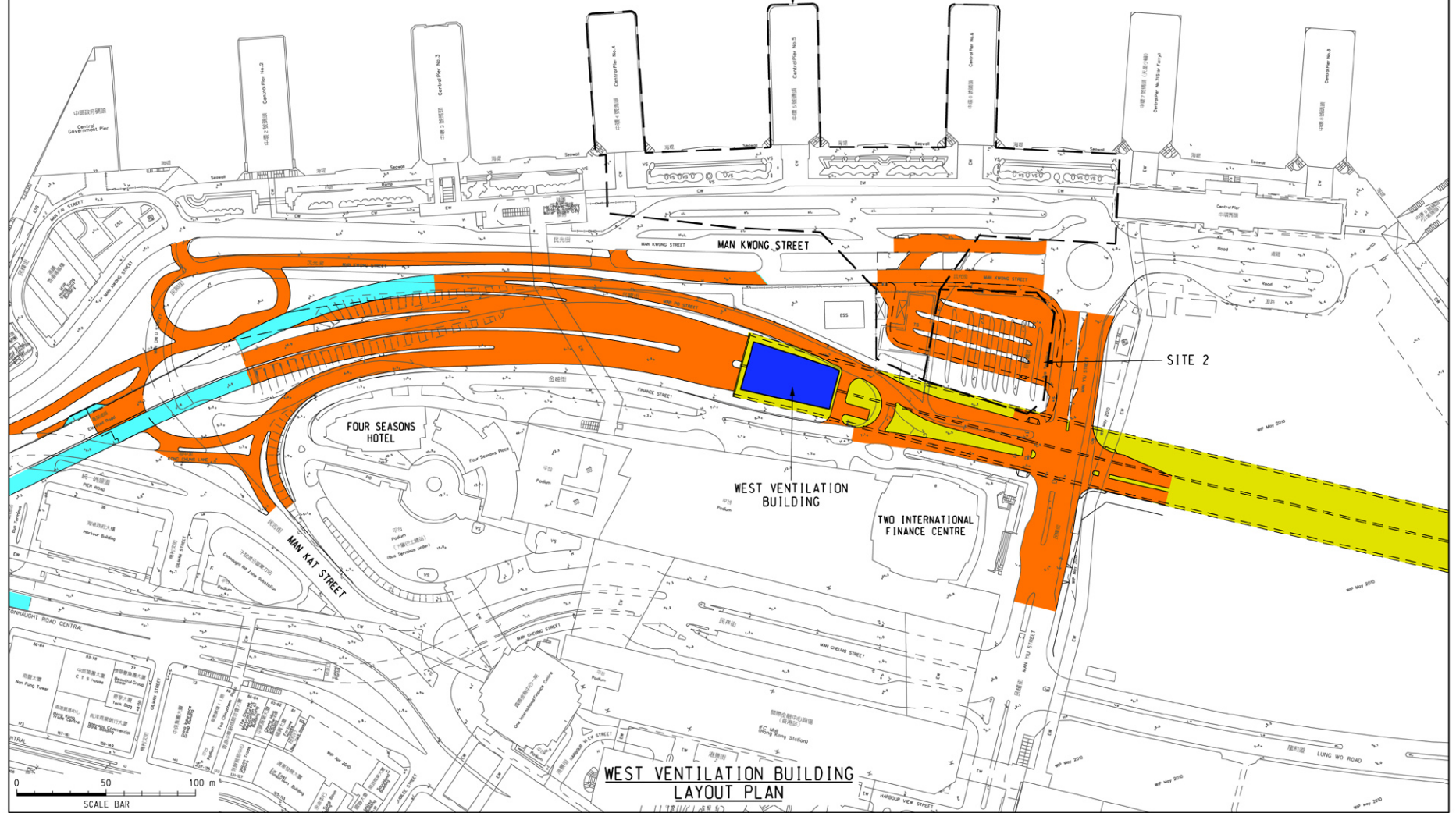
21. The ADB will be located underneath the reconstructed Island Eastern Corridor Link (IECL) westbound viaduct (see **Annex 8** for location). Owing to the limited height underneath the reconstructed IECL bridge structure, other beneficial use for the site is limited. The size of the site is in fact marginally sufficient for the operation need of the ADB and it is also the least prominent location along the available waterfront area in North Point and adjacent to the tunnel portal area, where the tunnel operation and maintenance staff and vehicles can efficiently access the tunnel. Hence, the current location is the best possible option.

* * * * *



SITE 1

SITE 2



WEST VENTILATION BUILDING LAYOUT PLAN

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Annex 3
West Ventilation Building –
Exterior Design Option 1
“Streamlined Green Roof”



View 1

View 2



 New Central
Harbourfront
Landscaped Deck

Annex 3
West Ventilation Building –
Exterior Design Option 2
“The Play of Illusion”



View 1

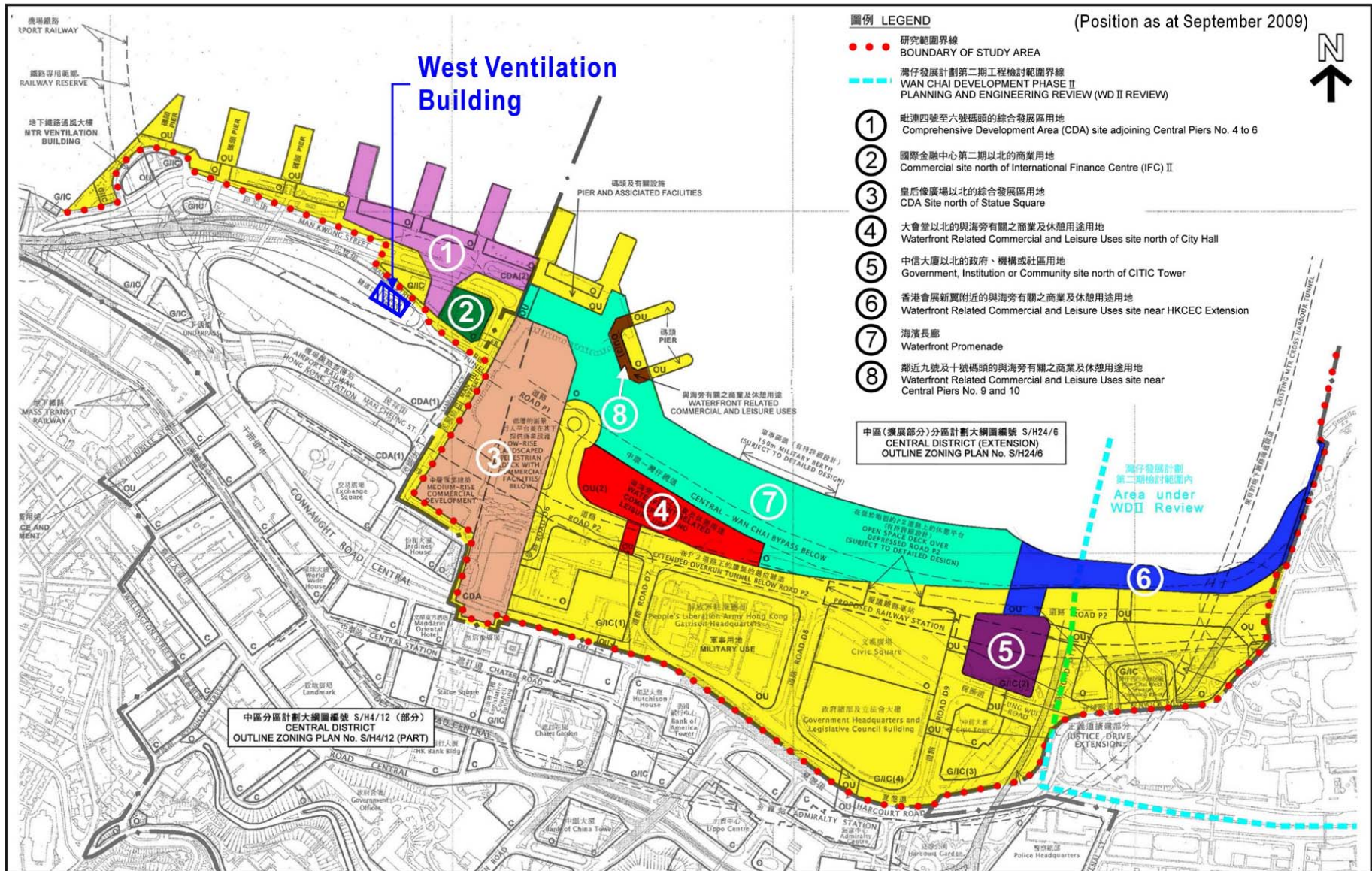
View 2



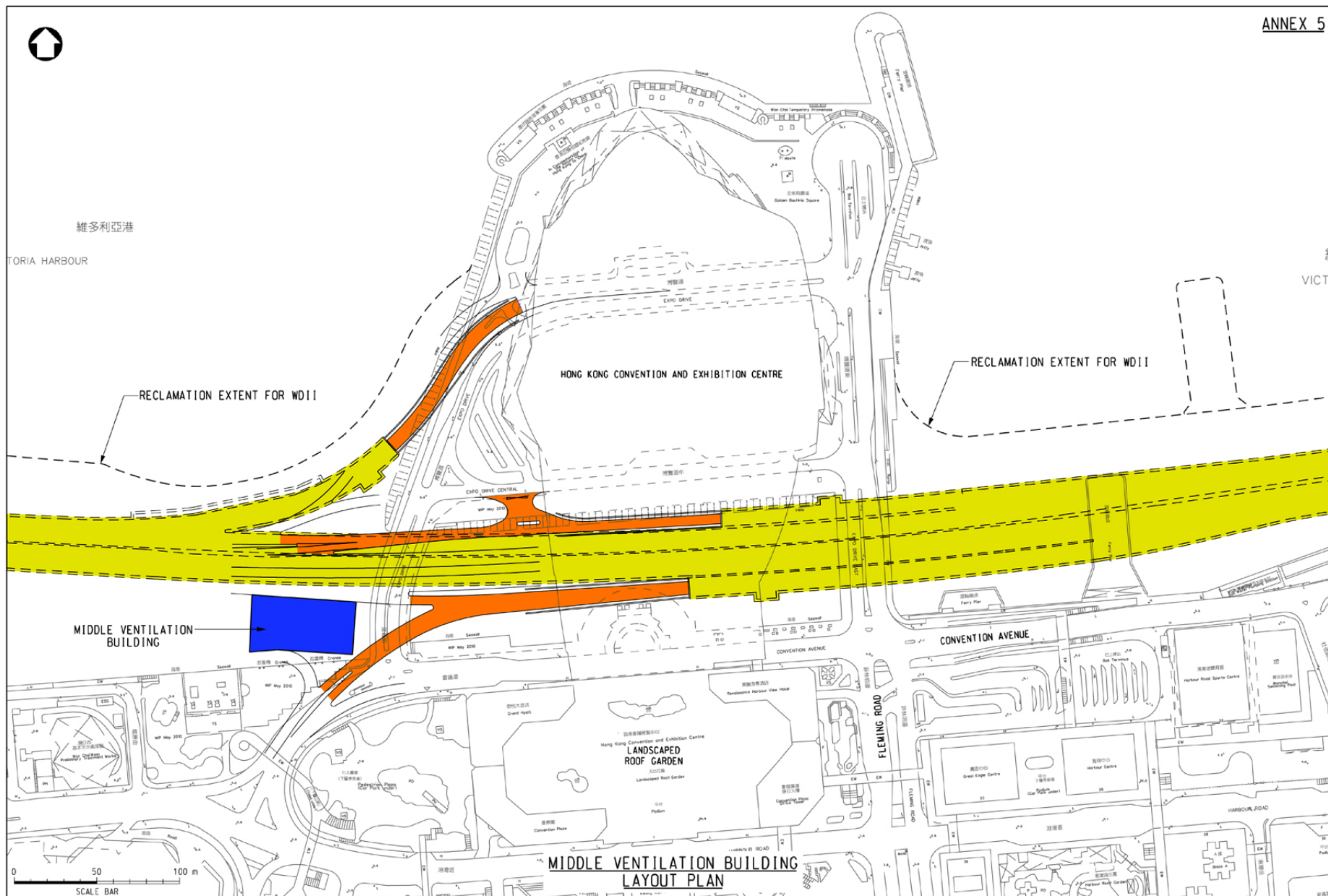
 New Central
Harbourfront
Landscaped Deck



Annex 3 – Option 1 of WVB in Harmony with the Proposed Landscaped Deck
under Urban Design Study for the New Central Harbourfront
For Indicative Purpose Only



Annex 4 – Location of New Central Harbourfront Sites 1 and 2





View 1

Annex 5
Middle Ventilation
Building – Exterior Design
Option 1
“Juxtaposition of Layers”

View 2



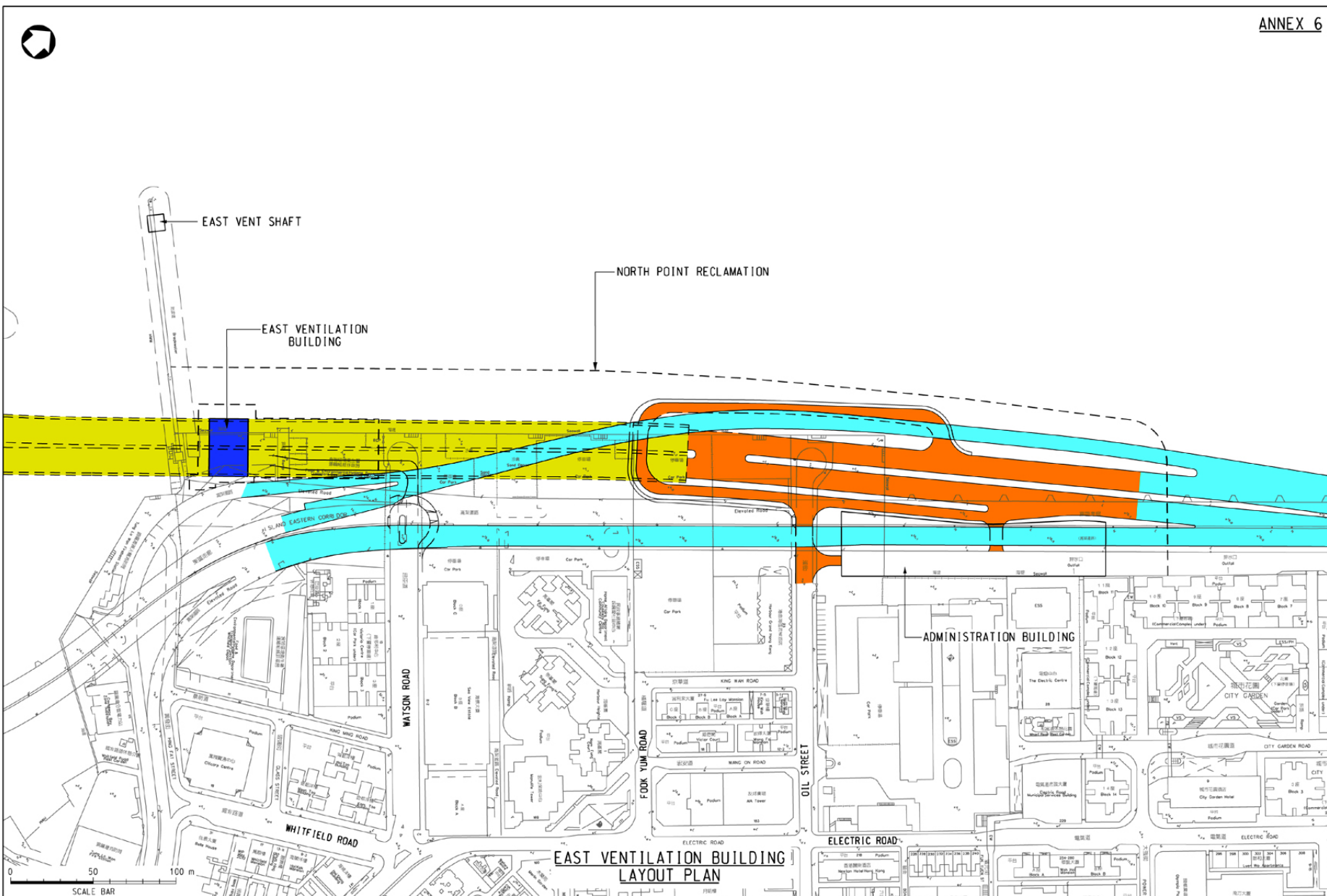


View 1

Annex 5
Middle Ventilation
Building – Exterior Design
Option 2
“Waves”

View 2





EAST VENTILATION BUILDING LAYOUT PLAN

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Annex 6
East Ventilation Building –
Exterior Design Option 1
“Natural Greening”

View 2

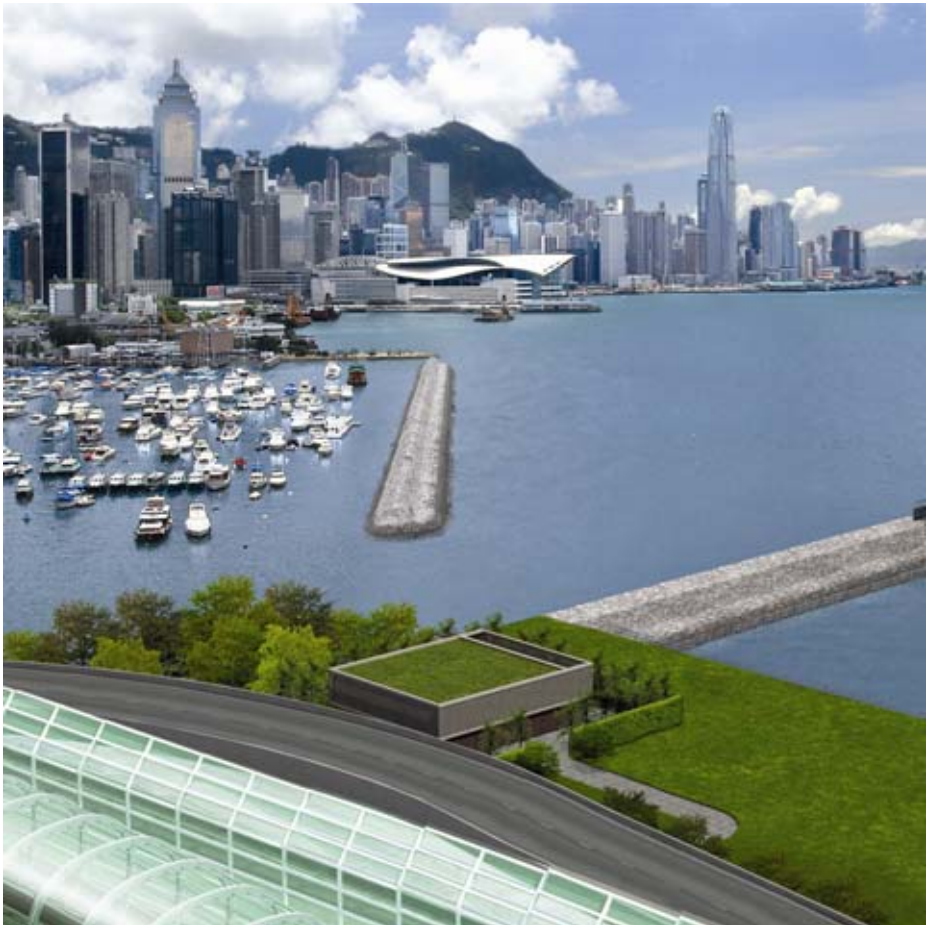


View 1



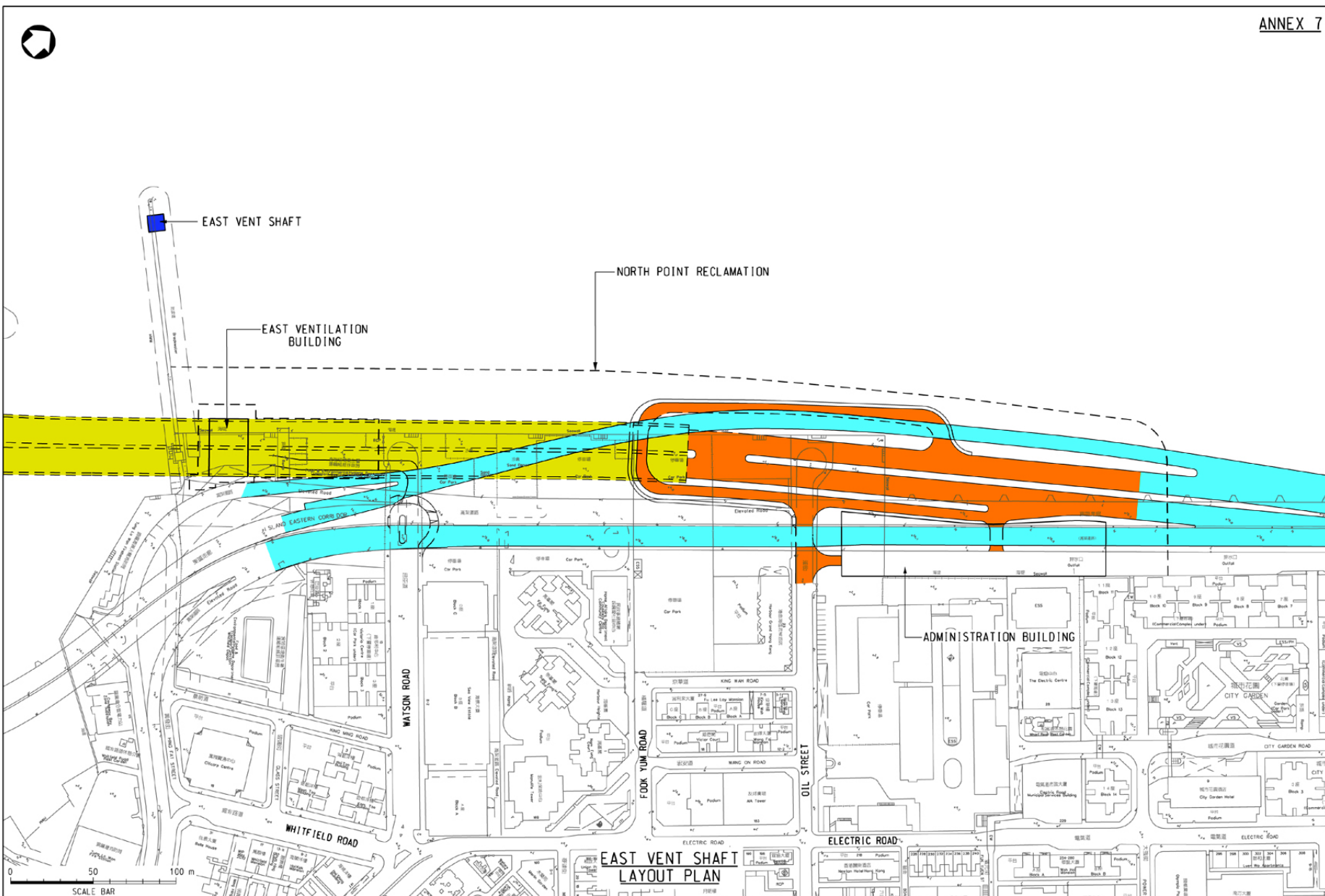
Annex 6
East Ventilation Building –
Exterior Design Option 2
“Wood Screen”

View 2



View 1





Annex 7
East Vent Shaft –
Exterior Design Option 1
“Layered Cylinder”



View 1

View 2



Annex 7
East Vent Shaft –
Exterior Design Option 2
“Flowing Sails”



View 1

View 2



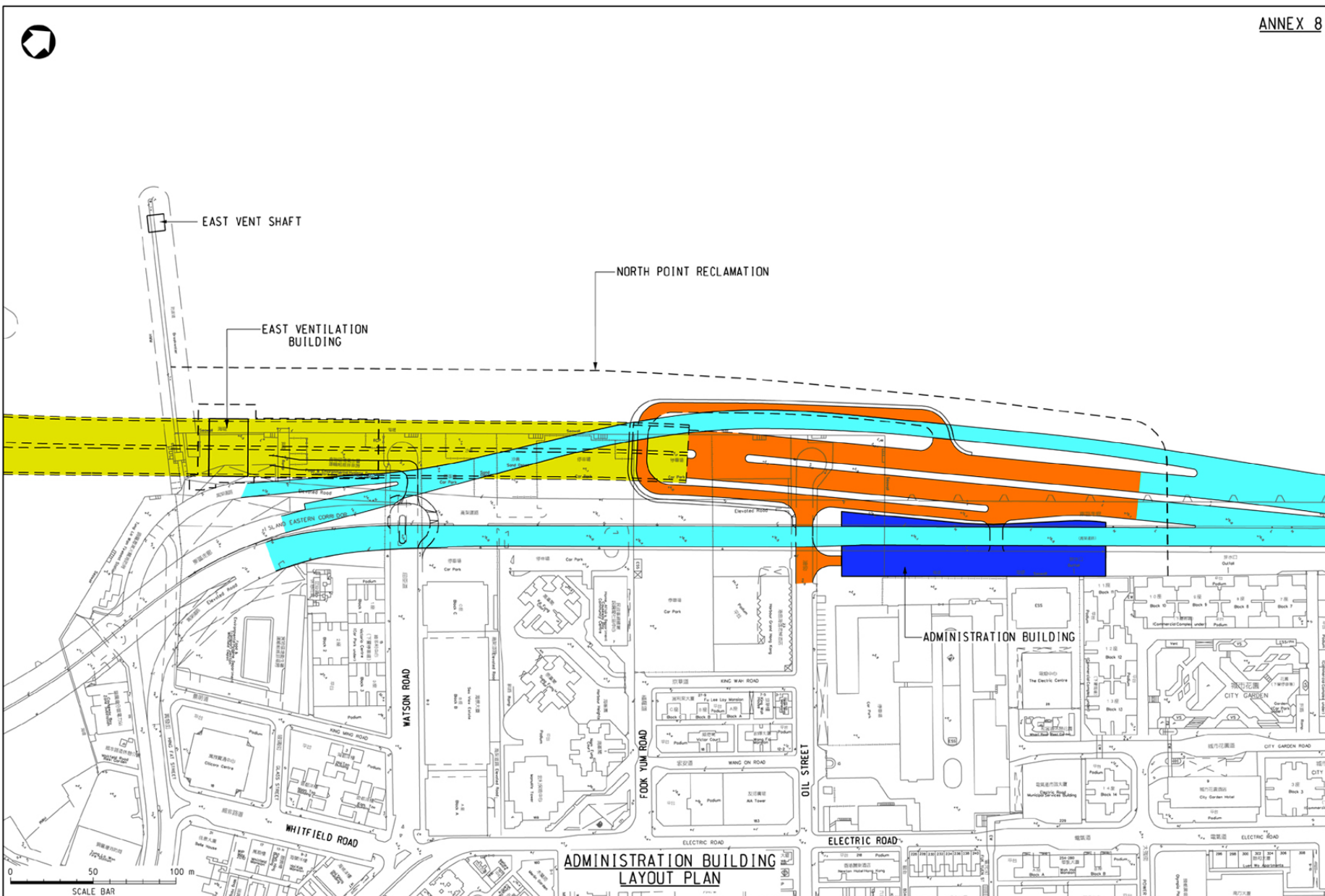
Annex 7
East Vent Shaft –
Exterior Design Option 3
“Light Tower”



View 1

View 2





ADMINISTRATION BUILDING LAYOUT PLAN

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Annex 8
Administration Building –
Exterior Design Option 1
“3-D Geometry”



View 1

View 2



Annex 8
Administration Building –
Exterior Design Option 2
“Louvered Screen”



View 1

View 2

