A Rooftop Helipad at New Acute Hospital at Kai Tak Development Area

Environmental Impact Assessment Report
Executive Summary

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Submitted to

Wong Tung & Partners Limited

Hospital Authority

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1. Introduction

1.1 Background

1.1.1.1 The Kai Tak Development (KTD) is a major development project covering the ex-Kai Tak Airport located in Kowloon City and Kwun Tong. The New Acute Hospital (NAH) will be a major acute hospital in central Kowloon, providing a comprehensive range of acute hospital services, with modern service models, technology and facilities, comprising an Accident & Emergency Department (AED), an oncology centre and providing enhanced neuroscience services. In order to provide a rapid and seamless transfer of patients and survivors for prompt and appropriate treatment, it is proposed to construct and operate a helipad on the roof of the Acute Block of the NAH ("the Project") to further enhance the overall efficiency and effectiveness of the emergency response of the NAH. The location of the proposed helipad and its environs are shown in **Figure 1.1**.

1.1.1.2 In September 2017, HA commissioned Wong Tung & Partners Ltd. (WTPL) as the Architectural Consultant for the design of the NAH and the proposed helipad. Meinhardt Infrastructure and Environment Limited (MIEL) was simultaneously appointed by WTPL to provide consultancy services in respect of this Project, including preparation of this Environmental Impact Assessment (EIA) Study. The Project is a Designated Project by virtue of Item B.2 of Schedule 2, Part I of the Environmental Impact Assessment Ordinance (EIAO), which specifies "A helipad within 300 m of existing or planned residential development". Hence, an Environmental Permit (EP) is required for the construction and operation of the Project and an EIA Report has to be prepared for application for an EP.

1.1.1.3 The EIA Study has been conducted for the Project in accordance with the requirements in the EIA Study Brief No. ESB-311/2019, issued for the Project and the Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO). This EIA Report is prepared on behalf of the Hospital Authority (HA), who is the Project Proponent, for seeking approval under the EIAO.

1.1.1.4 This executive summary (ES) summarises the key findings, recommendations and conclusions of the EIA Report for the proposed helipad.

2. Project Description

2.1 Project Components and Layout

2.1.1.1 The project details of the proposed Helipad are summarised in **Table 2.1**. The erection of a helipad on the rooftop of the Acute Block of NAH will provide a permanent facility to facilitate helicopter emergency medical services. The Government Flying Service's (GFS) helicopters can land at NAH directly using the proposed helipad, with no onward transfer of patients by ambulance being required. The location and surroundings of the Project are shown in **Figure 1.1** and **Figure 2.1**.

Table 2.1 Summary of Project Description

Project Information	Details
Project Location	Roof of the Acute Block of NAH
Helipad Height	19m above the roof of Acute Block (+119.15 mPD)
Helipad Size	30m in diameter
Major Components of the Project	Helipad structure, Covered safety walkway, Access ramp, Staircase

2.2 Need and Benefits of the Project

2.2.1.1 The New Acute Hospital (NAH) in the Kai Tak Development Area (KTDA) will be a new major acute general hospital located in central Kowloon region, serving not only the community of the Kai Tak area, but also, providing support to the adjacent districts such as Kowloon City, Wong Tai Sin, Kwun Tong and Yau Tsim Mong.

2.2.1.2 According to the Clinical Services Plan for the Kowloon Central Cluster (KCC) formulated by the HA in 2016, the NAH will have a planned capacity of around 2,400 numbers of in-patient and day beds, with the objectives of meeting the long-term rising demand for healthcare services and facilities in Kowloon arising from the growing and ageing population. The NAH will be established as an acute hospital to provide 24-hour Accident and Emergency, in-patient, out-patient, ambulatory and rehabilitation services, in addition to being a designated trauma centre, which will be relocated from its current location at the Queen Elizabeth Hospital (QEH). The trauma centre, to be housed in the Acute Block, will be integrated with other hospital functional units comprising critical care areas in order to provide a full range of comprehensive care for critically ill/ injured patients.

2.2.1.3 The transfer of patients from the helipad will be via a pair of dedicated "hot lifts" with override controls for expedition. With the helipad located on the roof top of the Acute Block building and the AED being directly located on the ground level of the same block, critically ill/ injured patients will be able to receive a continuum of high quality, efficient and effective emergency response services. Furthermore, the proposed NAH helipad will, also, serve emergency services by incorporating the advantages discussed in the sections below.

Location Advantages

2.2.1.4 The NAH is strategically located in the heart of Kowloon which is a better location than the existing helipads at Tuen Mun Hospital (TMH), Pamela Youde Nethersole Eastern Hospital (PYNEH) and the planned Queen Mary Hospital (QMH) for serving the public in the Kowloon, the outlying islands and some remote country park areas in the north-eastern part of the New Territories.

Multiple Casualty Transfer

2.2.1.5 The proposed rooftop helipad at NAH can be operated in conjunction with GFS's Kai Tak Division when major disasters occur involving a large number of patients. This helps to cater for multiple casualty transfers when multiple helicopters are involved, by serving as the primary landing site or as an emergency support landing site.

Weather Alternatives

2.2.1.6 The helipads at the PYNEH or the proposed New Block of QMH may not be available for operational use due to adverse weather conditions such as poor visibility, low cloud base or strong wind conditions. Therefore, it is necessary to provide alternative sites for the emergency rescue team to consider. The proposed rooftop helipad at NAH provides a primary and secondary landing point for air ambulance and rescue missions with critically ill/ injured patients or survivors by sharing part of the landings for emergency services with the PYNEH and the QMH, ensuring the most optimal flights and effective use of resources.

Environmental Benefits and Dis-benefits

2.2.1.7 The helipad is proposed to be constructed on the rooftop of the Acute Block of the NAH. As the provision of the helipad has been taken account of in the early planning stage, there will be no additional foundation and superstructure implications of the Project to the Acute Block. Thus, the potential environmental impacts arising from the construction and operation of helipad will be small. In addition, the helipad could share the air ambulance traffic among helicopter landings at the PYNEH, TMH and future QMH, which alleviate the potential noise and disturbance to residents nearby these hospitals. Potential adverse noise would be anticipated to Noise Sensitive Receivers (NSRs) without the implementation of noise mitigation measures.

2.3 Project Programme

2.3.1.1 The operation, management and maintenance of the helipad will be undertaken by HA, while the GFS will be the user of this helipad, solely be used for emergency patients, causalities and emergency medical transportation and there will be no commercial and planned flights except trial flights.

2.3.1.2 The tentative planning and implementation programme for Project are shown in **Table 2.2** below:

Table 2.2 Tentative Programme of the Project

Activities	Key Milestone Dates
Construction of the Helipad	Q4 2023 to Q4 2024
Commissioning / Operation of the Helipad	2025

2.4 Concurrent Projects

2.4.1.1 Key concurrent projects in the vicinity of the Project are identified and summarised in **Table 2.3**. Potential cumulative impacts from these concurrent projects (if any) have been assessed in this EIA Study, and mitigation measures if found necessary will be implemented."

Table 2.3 Summary of Concurrent Projects

Project Name	Target Works Commencement Dates	Target Work Completion Dates
Government Flying Service Kai Tak Division and the cross-boundary heliport by CEDD	Fourth quarter of 2018	First quarter of 2021
Kai Tak Development - Stage 3 Infrastructure Works for Developments at the Southern Part of the Former Runway by CEDD	2015	2020
Central Kowloon Route - Slip Road S5 by HyD	2023	2024
Kai Tak Development - Trunk Road T2 and Infrastructure at South Apron by CEDD	2020	2026
Kai Tak Development - Remaining Infrastructure works for Developments at the Former Runway and South Apron, Road L10 & L18 by CEDD by CEDD	2019	2026
New Acute Hospital at Kai Tak Development Area by Hospital Authority	2018	2024

3. Consideration of Alternatives

3.1 Site Selection

3.1.1.1 The key rationale to locate a helipad at an acute hospital is to enable point-to-point transfer of patients under critical conditions to the AED swiftly under various emergency circumstances including trauma incidents (e.g. disasters).

3.1.1.2 Key considerations in selecting the site for a helipad included the type of hospitals and medical services, location constraints, space availability and the environmental benefit / dis-benefit. It is necessary to consider existing or future hospitals in Kowloon with trauma centres to meet, not only the strategic and geographical objectives of the new facility, but to integrate with an acute hospital with trauma facilities. In addition, the designated trauma centre at the QEH is planned to close once the trauma centre at the NAH is put into service. Hence, NAH has been selected as the optimum location for installation of the helipad.

3.2 Hospital Sites

3.2.1.1 **Table 3.1** summarize the key considerations for the selection of a helipad location at two suitable acute hospitals in Kowloon, including QEH and NAH.

Table 3.1 Selection of Acute Hospitals for the Proposed Helipad

Considerations	Queen Elizabeth Hospital	New Acute Hospital
Type of Hospital and medical services	• A Major Acute Hospital • 24-hour A&E Service • Current trauma centre (planned to be relocated)	• A Major Acute Hospital • 24-hour A&E Service • Proposed trauma centre
Site Location	• Kowloon Central Cluster – Gascoigne Road, King's Park	• Former South Apron area of KTDA. Space is available.
Space availability	• No extra space at both ground and roof level for a helipad • Existing buildings may not have spare structural loading for helipad and rooftop helicopter landing; need additional structural support to cater the loading	• No extra space at ground level for a helipad • The main building works of NAH have not been commenced and the structural loading of a proposed rooftop helipad can be accommodated
Flight Path	• High rise residential buildings are found to the north and northeast, so flight sector is limited • Recreation developments and facilities to the south are comparably low-rise, which is preferred in terms of accessible flight path	• High rise residential buildings are found to the east. • Three flight paths are available, southeast, south and northwest of the hospital(1)
Environmental Benefit/ Dis-benefit	Benefit: • Extensive and complicated construction activities involved for a retrofit Dis-benefit: • NSRs at all directions • NSRs are very close to the	Benefit • Minor construction activities involved\ • Existing NSRs for construction stage are far away Dis-benefit: • NSRs at southwest and southeast of the hospital

Considerations	Queen Elizabeth Hospital	New Acute Hospital
	hospital	
Distances of the Nearest Sensitive Receivers	22m to Methodist School from the main building block of QEH	150m from helipad to the nearest planned residential zone

Note:
1. There are high rise buildings near NAH but not within the designated flight paths. Besides, the main roof levels of the high rise buildings are lower than the helipad deck level.

3.2.1.2 Based on the consideration in the above table, QEH is not preferred for helipad operations. In addition, HA propose to transfer the trauma facilities at the QEH to the NAH once the latter is operational.

Other Suitable Locations

3.2.1.3 Notwithstanding the above, suitable land in the Kowloon area is available at the former Kai Tak Airport in the KTDA. However, a Government Flying Service Kai Tak Division (GFS KTD) will be established at the tip of the Ex-Kai Tak Runway in KTDA, which is around 1.5km to the southeast of the NAH site. Additional travelling time is required from GFS KTD to the NAH. Furthermore, if ambulances are not available, it would cause further delays in transferring patients to the NAH. Therefore, NAH is considered as the most preferred acute hospital for helipad operations in Kowloon.

3.3 Selection of Helipad Locations at NAH

3.3.1.1 Six alternative within the NAH have been proposed for the location of the helipad at the NAH. The six options are as follows:

- Option 1: South corner on the roof of the proposed Acute Block of NAH in Site A;
- Option 2: West corner on the roof of the proposed Acute Block of NAH in Site A;
- Option 3: Roof of the proposed Administration Block of NAH in Site A;
- Option 4: Roof of the proposed Education Block of NAH in Site A;
- Option 5: Roof of the proposed Oncology Block of NAH in Site B; and
- Option 6: Roof of the proposed Specialist Out-Patient Clinic Block of NAH in Site B.

3.3.1.2 The pros and cons for each of these options are examined in **Table 3.2** below and the locations of the helipad for each of the options are shown in **Figure 3.1**.

Table 3.2 Summary of Outcome of Options Evaluation of Helipad Siting in NAH

Options of Helipad Siting	Height as stipulated in OZP	Pros	Cons	Preferable Option?
Option 1: South corner on the roof of Acute Block	• 100mPD	• Maximize the overall efficiency and effectiveness of NAH's emergency response services	• Likely adverse noise impact to the adjacent residential zone	No
Option 2: West corner on the	• 100mPD	• Smaller noise impact compared	• Potential adverse noise	Yes

Options of Helipad Siting	Height as stipulated in OZP	Pros	Cons	Preferable Option?
roof of Acute Block		with Option 1 • Increase the separation distance while maintaining immediate access to critical care units of NAH	impact to NSRs	
Option 3: Roof of the Administration Block	• 100mPD	• High distance attenuation for helicopter noise from the helipad	• Operational constraints from helipad to hospital and increased risks to critically ill/ injured patient	No
Option 4: Roof of the Education Block	• 100mPD	• High distance attenuation for helicopter noise from the helipad	• Operational constraints from helipad to hospital and increased risks to critically ill/ injured patient	No
Option 5: Roof of the Oncology Block	• 60mPD	• High distance attenuation for helicopter noise from the helipad	• Operational constraints from helipad to hospital and increased risks to critically ill/ injured patient	No
Option 6: Roof of the Specialist Out-Patient Clinic Block	• 60mPD	• High distance attenuation for helicopter noise from the helipad	• Operational constraints from helipad to hospital and increased risks to critically ill/ injured patient	No

3.3.1.3 Option 2 is considered technically feasible and the most preferred as it matches with the medical planning, helicopter flight path and distance attenuation for reducing helicopter noise implications.

3.4 Construction Method and Alternatives

3.4.1.1 Based on the latest design development, three methods for constructing the proposed helipad have been considered, which are listed below:

- Helipad deck and associated supporting structural frame constructed by in-situ concrete (Option A);
- Helipad deck constructed by in-situ concrete and associated supporting structural frame by prefabricated steelwork (Option B); and
- Helipad deck and associated supporting structural frame constructed by steel/ aluminium structure prefabricated off-site outside Hong Kong territories (Option C).

3.4.1.2 The environmental impacts associated with the proposed construction methods are considered to be similar for the three, with Option C having the benefit of the shorter period of noise generation during construction and smaller amount of waste generation. With the preferred construction method, the sequence of construction works will be the construction of supporting structural frame, followed by the construction of proposed helipad, the safety walkway and the access ramp.

3.4.1.3 According to the preferred construction method (Option C), the main structure of the proposed helipad will be constructed by in-situ aluminum, steel and formworks. The safety walkway and access ramp will be formed by prefabricated steel members and aluminum of a suitable size and weight and to be assembled on site by welding or bolting.

3.5 Type of Helicopters

3.5.1.1 As advised by GFS, the Airbus H-175 have been in operation since April 2020 and replaced all of the helicopters. According to the noise measurement carried out under this Study, the Airbus H-175s have operating noise levels significantly lower (with a range of 7-10 dB(A) of different non-lateral movements) than the previous helicopters (Super Puma AS332 L2 / EC155 B1), in general. The operating noise levels of the Airbus H-175 helicopters have been adopted in the noise assessment for the EIA Study.

3.6 Design of the Project

3.6.1.1 The helipad will be designed as a circular shape of about 30m in diameter plus 1.5m safety net along its outer perimeter. The size of the helipad was based on the needs of the new helicopters (Airbus H-175) with less room required as compared to the previous helicopters used by GFS. Thus, 30m in diameter for the proposed helipad is adopted.

3.6.1.2 The helipad will solely be used for emergency patients, causalities and emergency medical transportation and there will be no commercial and planned flights except trial flights. The patient will be transferred to the AED directly at the same block via the dedicated “hot lifts”.

3.7 “Without Project” Scenario

3.7.1.1 Currently, there is no helipad at any of the hospitals, including the QEH which is a designated trauma centre, in the Kowloon Central Cluster (KCC). Without the Project, emergency patients and casualties requiring air transportation will have to be transferred to the PYNEH, the TMH, or the planned helipad at QMH, but those landings may be precluded or restricted due to adverse weather or safety considerations. In addition, the TMH helipad cannot be used during evening and night-time due to flight safety reasons. The above arrangements are undesirable to the helicopter medical emergency services and emergency patients, especially for the patients in the New Territories and Kowloon region.

3.7.1.2 As such, if the Project is not implemented, there would be an undesirable situation as the transfer of the critically ill/ injured patients to hospital may be unnecessarily prolonged, causing impacts on the emergency response services to patients with life-threatening conditions.

4. Summary of the Environmental Impacts

4.1 Approach to Environmental Impact Assessment

4.1.1.1 EIA process provides a means of scoping, assessing and reporting the environmental impacts and benefits of the Project. It is an iterative process that has been followed in parallel with the design process to identify the potential environmental effects of various design options, and develop alternatives as well as mitigation measures to be incorporated into the design, construction and operation of the helipad. Mitigation measures have been proposed to avoid the potential environmental impacts, or to minimise or mitigate to acceptable levels.

4.1.1.2 This EIA report has assessed the following parameters for potential environmental impacts during the construction and operation stages of the proposed helipad, in accordance with the EIAO Study Brief:

- Air quality impact;
- Hazard to life impact;
- Noise impact;
- Waste management;
- Visual impact; and
- Water quality impact.

4.1.1.3 A summary of the findings of the assessments are detailed in the sections below.

4.2 Air Quality Impact

4.2.1.1 Potential air quality impacts associated with the Project have been assessed in accordance with Clause 3.4.3 and Appendix A of the EIA Study Brief, as well as Annex 4 and Annex 12 of TM-EIAO to ensure compliance of the Hong Kong Air Quality Objectives (HKAQOs) and relevant criteria and guidelines. The assessment area for air quality impact assessment is within 500m from the boundary of the Project site.

Construction Stage

4.2.1.2 Fugitive dust during the construction of proposed helipad would be expected to be insignificant with the implementation of good site practice stipulated under the Air Pollution Control (Construction Dust) Regulation. No adverse residual impacts are anticipated.

Operation Stage

4.2.1.3 According to the previous flight records, the average daily emergency helicopter flights for the helipad of the PYNEH between 2015 and 2019 is less than one, with flights occurring about once every one to two days on average in the daytime period. The duration of the Landing and Take-off cycles of the helicopter are short, being less than 10 minutes. In order to verify the air quality impact induced by the proposed helipad and the helicopter on air sensitive receivers, the cumulative SO_2 (10-mins) air quality impact for both scenarios of “without barrier” and “with barrier” for helicopter

emission have been assessed under a conservative approach. In addition to the helicopter emission, marine emission within 500m from the boundary of project site and emission from Kai Tak Cruise Terminal are also included in the cumulative assessment. The predicted SO_2 (10-mins) value should be in the range of 112 to 215 μgm^{-3} and no adverse operation phase impacts are expected to occur.

4.2.1.4 Given the minor emissions due to the non-scheduled, infrequent and short-term nature of the emergency helicopter movements, and the large margin from AQO for NO_2 (1-hour), SO_2 (24-hour) and RSP and FSP (24 hours and annual) in the local area, it is not anticipated that the Project would cause AQO exceedance for these parameters. That said, air quality enhancement measures, including the use of electric vehicles and the NO_x-neutralising paver, would be incorporated in the design of NAH to enhance air quality in the vicinity of the Project. With the air quality enhancement measures in place, it is not anticipated that the Project would cause adverse air quality impact at the nearby air sensitive receivers.

4.3 Hazard to Life Impact

4.3.1.1 Potential hazard to life impacts associated with the Project have been assessed in accordance with Clause 3.4.4 and Appendix B of the EIA Study Brief, as well as Annexes 4 of TM-EIAO to ensure compliance of relevant standard and guidelines.

4.3.1.2 A Quantitative Risk Assessment has been conducted to evaluate the risk associated with the proposed helipad at the Acute Hospital from the Kerry Dangerous Goods Warehouse (Kowloon Bay) (KDGW) and the LPG Filling Station at Cheung Yip Street. A sensitivity check has been performed assuming that all helicopter movements will be via only the flight path closest to the above mentioned potentially hazardous facilities with their maximum crash rates. The risk, both in terms of individual risk and societal risk, has been found to be in compliance with the risk criteria stipulated in Section 2 of Annex 4 of the TM-EIAO, i.e. the off-site individual risk level does not exceed 1×10^{-5} / year and the societal risk falls into the “Acceptable” region. In terms of Potential Loss of Life (PLL), the helicopter crash scenario contributes to only 1.5% of the total PLL of 2.01×10^{-5} per year for the LPG filling station. For KDGW, the helicopter crash scenario contributes to about 6.1% of the total of 6.82×10^{-6} per year. Therefore, no mitigation measures are required.

4.4 Noise Impact

4.4.1.1 Potential noise impacts associated with the Project have been assessed in accordance Clause 3.4.5 and Appendix C of the EIA Study Brief, as well as Annexes 5 and 13 of TM-EIAO to ensure compliance of relevant standards and guidelines. The assessment area for noise impact assessment is within 300m from the boundary of the Project site.

Construction Stage

4.4.1.2 The noise impacts arising from daytime construction activities for the Project have been evaluated, with no evening or nighttime works will be scheduled. Cumulative construction noise impacts with concurrent projects have also been considered. It is shown that the predicted noise levels at the one representative noise sensitive receiver (NSR) (NSR ID. P03 Proposed Residential Development at KDGW) (NKIL 5813) (61 dB(A) L_{eq} 30mins) will comply with the relevant construction noise criterion and no specific mitigation measures will be required. Nonetheless, the adoption of good site practices and use of quieter PMEs have been recommended to minimise the construction noise impacts. Hence, no adverse construction noise impacts are

anticipated.

Operation Stage

4.4.1.3 The noise impacts arising from GFS's helicopter operation associated with the Project have been evaluated. The helicopter noise impact assessment was conducted using a conservative approach under the worst-case scenario. All practicable measures, including carefully chosen flight sectors and one-way-direction for approaching and take-off subject to flight condition, and maintaining buffer distance for flight paths to fly away from NSRs, have been proposed for the helicopter operation. In addition, the emergency medical helicopter operation occurs randomly over the year and it is anticipated that the average helipad usage will be less than once per day, while the duration of each emergency use will be about 7 minutes. With the implementation of direct noise mitigation measures, including setback of helipad and installation of noise barrier and noise reducers, the helicopter noise impacts have been minimized, and the predicted helicopter noise levels at the representative NSRs are within the criteria (with the range of 78 to 85 dB(A) L_{max}).

4.5 Waste Management

4.5.1.1 Waste management implications associated with the Project have been assessed in accordance with Clause 3.4.6 and Appendix D of the EIA Study Brief, as well as the criteria and guidelines stipulated in Annexes 7 and 15 of TM-EIAO.

Construction Phase

4.5.1.2 Non-inert C&D materials, that is, formwork and steel/aluminium, are expected to be generated and recycled during the construction of the helipad. The amount of chemical waste and general refuse generated is expected to be minimal and no significant amount of non-recyclable C&D waste is expected as shown in **Table 4.1**. Hence, no adverse impacts in relation to waste management are anticipated during the construction of the Project.

Operational Phase

4.5.1.3 Insignificant amounts of general refuse would be generated from regular cleaning of the proposed rooftop helipad area. With the implementation of mitigation measures (such as proper storage, collection and transport of waste) and good site practices, no adverse impacts in relation to waste management are anticipated during the operation of the Project.

4.6 Visual Impact

4.6.1.1 Potential visual impacts associated with the Project have been assessed in accordance with Clause 3.4.7 and Appendix E of the EIA Study Brief, EIAO Guidance Note No. 8/2010, and Annexes 10 and 18 of the TM-EIAO.

4.6.1.2 During the operational stage, the presence of the noise barrier and helipad structure would be compatible with the surroundings and would not decrease the visual amenity Although the helicopter landing lights, apron lights and perimeter lights on the helipad have the potential to cause visual impacts, the operation timings of these lights will be short and infrequent. Moreover, as the project is located in an urban commercial area, the introduction of this lighting would be considered to be largely masked by the illuminated surrounding area. In addition, many of the surrounding buildings are for commercial use and would not have significant numbers of occupants, if any, at

nighttime.

4.6.1.3 Considering the distances and altitudes of the identified VSRs compared to the helipad and with the implementation of good practice and design measures (such as perimeter lights to be inset into the helipad emitting upward) to minimise the light nuisance of the nighttime operations of the helipad, no significant visual impact is anticipated during the construction and operation phases of the Project. No adverse residual impacts are expected.

4.7 Water Quality Impact

4.7.1.1 Potential water quality impacts associated with the Project have been assessed in accordance with Clause 3.4.8 of the EIA Study Brief, Annexes 6 and 14 of the TM-EIAO to ensure compliance of relevant standards and guidelines. The assessment area for water quality impact assessment covered Kwun Tong Typhoon Shelter within 300m from the boundary of the Project site.

Construction Phase

4.7.1.2 The main construction works would be the installation of the prefabricated metal structures of the elevated helipad, elevated covered walkway and other associated structures on the rooftop of NAH. The project would not involve any soil excavation nor marine works. Only land-based activities would be undertaken during the construction of the structure of the helipad. Potential water pollution sources would include surface runoff and effluent arising from the construction site activities including general construction works, sewage from the construction workforce, storage of construction materials and accidental spillage due to the use of the mechanical plant. With the implementation of good site practices and adoption of the mitigation measures, no adverse impacts are anticipated during the construction stage.

Operational Phase

4.7.1.3 During the operation phase, no wastewater generation and potential chemical or oil spillage will be expected. Fire-fighting system either in the form of water or foam system, is still under consideration for fire protection purposes at the helipad for emergency situations.

4.7.1.4 If the foam system is used for fire-fighting purpose, the foam to be used will be biodegradable. In the worst-case scenario, foam system is selected for assessment purpose. With the automatic switching system, it diverts the foam-based wastewater to foul water system. The foam utilised will be discharged to, and combined with, the daily sewage from the NAH and ultimately flow to the sewage treatment plant for treatment. The foam discharge would comprise only around 1% of the total discharge per day from the NAH and no significant adverse water quality impact caused to the environment is expected during the operational phase.

4.8 Impact Summary

4.8.1.1 A summary of the environmental impacts for individual aspects in the EIA report is present in **Table 4.1**.

Table 4.1 Summary of Environmental Impacts

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extent of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Air Quality Impact					
Construction Phase					
ASRs located within 500m from the Project boundary	• Insignificant dust Impact	• Annexes 4 and 12 of the TM-EIAO • Air Quality Objectives (AQO)	• N/A	• Implementation of dust control measures as recommended in Air Pollution Control (Construction Dust) Regulation • Incorporation of Guidelines stipulated in EPD's Recommended Pollution Control Clauses for Construction Contracts	• No adverse residual impact
Operation Phase					
ASRs located within 500m from the Project boundary	• No exceedances of AQO at the ASRs would be caused by the Project	• AQO	• N/A	• Air quality enhancement measures including the use of electric vehicles and the NOx-neutralising paver in the design of NAH	• No adverse residual impact
Hazard to Life Impact					
KDGW and the LPG Filling Station at Cheung Yip Street	• Acceptable for both individual risk and societal risk	• Annex 4 of the TM-EIAO	• N/A	• Professional trainings and guidelines should be provided to the helicopter pilots	• No adverse residual impact

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extent of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Noise Impact					
Construction Phase					
NSRs located within 300m from the project boundary	• No noise exceedances at the NSRs	• Annex 5 of TM-EIAO: 75 dB(A) $L_{eq(30mins)}$ stipulated in TM-EIAO for domestic premises from 0700 to 1900 hours on any day not being a Sunday or general holiday.	• N/A	Good site practices: • Quiet powered mechanical equipment (QPME) shall be used and serviced regularly during the construction programme; • Only well maintained plants shall be used in the project; and • Machines and plant that may be in intermittent use should be shut down between works periods or throttled down to a minimum between work periods.	• No adverse residual impact
Operation Phase					
NSRs located within 300m from the project boundary and areas potentially affected by the flight paths of helicopter	• Predicted helicopter noise levels at the NSRs are in the range of L_{max} 78 to 86 dB(A)	• Annex 5 of TM-EIAO: L_{max} 85dB(A) for domestic premises, hostels, educational institutions, places of public worship, convalescences and home for aged, etc. from 0700 to 1900 hours	• Exceedance of the criterion by 1 dB(A)	• Setback of helipad; • Carefully chosen flight sectors and one-way-direction for approaching and take-off subject to flight condition; • Maintain buffer distance for flight paths to fly away from NSRs; and • Noise barrier and noise reducers installation.	• No adverse residual impact

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extent of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Waste management					
Construction Phase					
Project area	Estimated quantity of waste generation: • Inert C&D Materials: 0m^3 • Non-inert C&D Materials: 170m^3 • Chemical Waste: <1 m^3 • General Refuse: 6.3m^3	• Annex 7 and 15 of TM-EIAO	• N/A	• The reuse/ recycling of all materials on-site shall be investigated prior to treatment/ disposal off-site; • Implementation of good site practices, waste reduction measures and proper storage, collection and transport of waste	• No adverse residual impact
Operation Phase					
Helipad	• Limited amounts of general refuse	• Annex 7 and 15 of TM-EIAO	• N/A	• Implementation of good site practices, waste reduction measures and proper storage, collection and transport of waste	• No adverse residual impact
Visual Impact					
Residential premises and occupational/ hospitals	• No direct line of sight from the VSRs to the perimeter lights and only be switched on during approach mode to take-off mode for 7 minutes approximately; • Landing lights will be switched on to illuminate the helipad	• Annex 10 and 18 of TM-EIAO	• N/A	Good practice measures: • Landing light of the helicopter would be switched on during approach and departure only and comprise a focused light used to illuminate the helipad only; • Perimeter lights on the helipad will be switched on during approach mode to	• No adverse residual impact

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extent of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	only during approaching and departure. The overall operation of landing lights takes 2 minutes approximately.			take-off mode of the helicopter only; • Perimeter lights will be inset into the helipad emitting upward; and • Minimise the external reflectance of the noise barrier material with the use of laminated glass.	
Water Quality Impact					
Construction Phase					
Kwun Tong Typhoon Shelter within 300m Project area	• General construction works for the Project would be land-based only. Potential water pollution sources include: • General construction works; • Sewage; • Storage of construction materials; and • Use of the mechanical plants.	• Annexes 6 and 14 of the TM-EIAO	• N/A	• Mitigation measures and good site practices in ProPECC PN1/94 "Construction Site Drainage"	• No adverse residual impact
Operation Phase					
Kwun Tong Typhoon Shelter within 300m	• The effluent from the emergency fire-	• Annexes 6 and 14 of the TM-EIAO	• N/A	• Automatic switching system to divert foam-based	• No adverse residual impact

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extent of Exceedance (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Project area	fighting system in the form of foam for the worst-case scenario.			wastewater to foul water system. • Discharge license for discharging from NAH.	

5. Environmental Monitoring and Audit Requirements

5.1.1.1 In order to ensure the effectiveness of the recommended mitigation measures and compliance with the statutory requirements during the construction and operation of the proposed helipad, an Environmental Monitoring and Audit (EM&A) programme will be implemented. Details of mitigation measures, audit programme and handling of complaints and documentation are specified in the EM&A Manual under separate cover.

5.1.1.2 A summary of the EM&A requirements by each of the environmental parameters is presented in **Table 5.1** below.

Table 5.1 Summary of EM&A Requirements

Environmental Aspect	Construction Phase Inspection/ Audit	Operational Phase Inspection/ Audit
Air Quality	✓	×
Hazard to Life	×	×
Noise	✓	×
Waste	✓	×
Visual Impact	×	×
Water Quality	✓	×

Legend:
✓ - Required
× - Not Required
N.A. – Not applicable

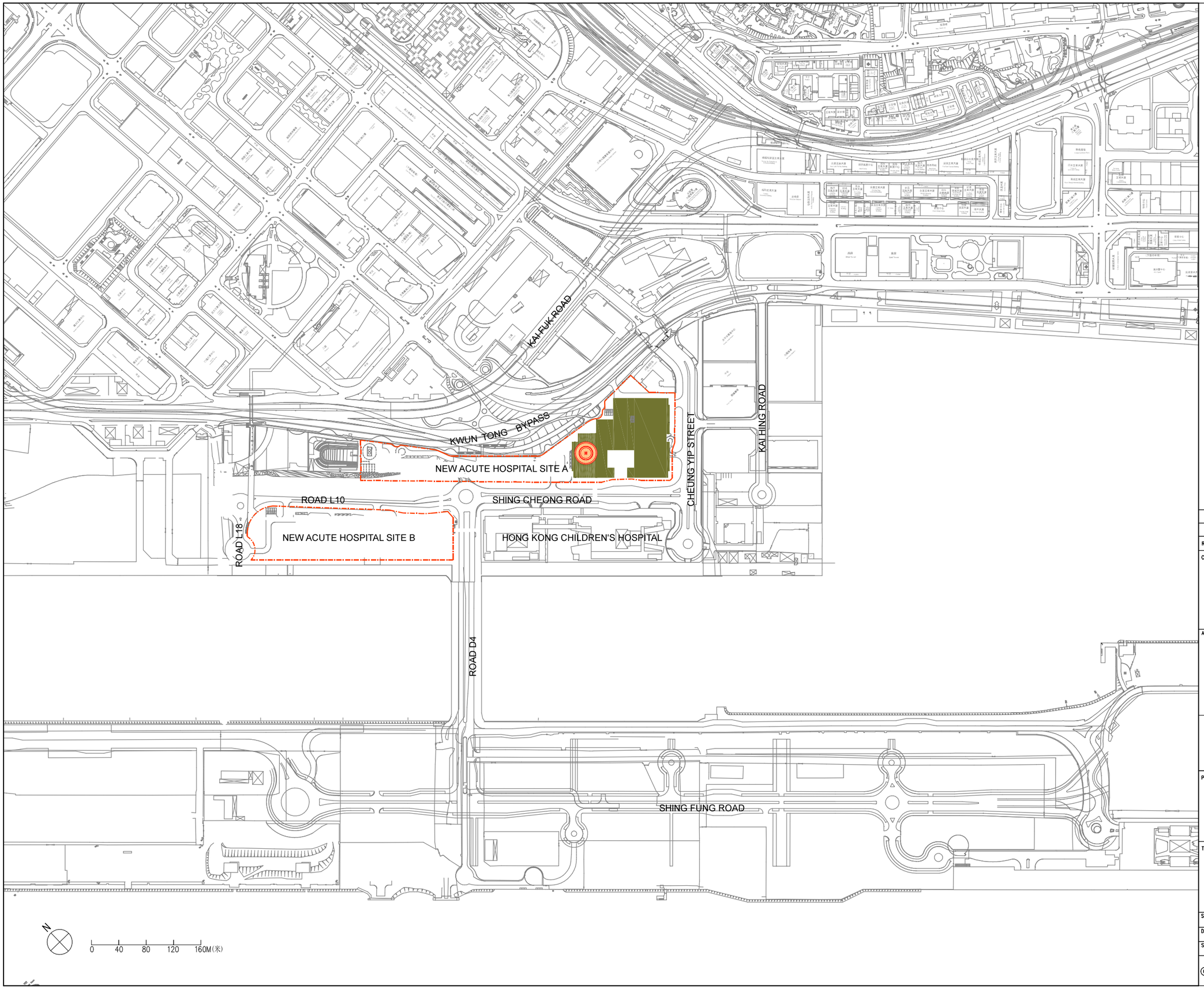
6. Conclusions

6.1.1.1 This EIA study has been conducted in accordance with the EIA Study Brief (No. ESB-311/2019) issued under the EIAO for the Proposed Helipad, covering the following environmental issues:

- air quality impact;
- hazard to life impact;
- noise impact;
- waste management;
- visual impact; and
- water quality impact

6.1.1.2 With the implementation of recommended mitigation measures, the environmental impacts arising from the construction and operation of the proposed helipad would comply with the relevant environmental criteria and no significant residual impacts would be predicted.

Figures



BOUNDARY LINE OF NEW ACUTE HOSPITAL AT KAI TAK DEVELOPMENT AREA

PROPOSED ROOFTOP HELIPAD

ACUTE BLOCK

Rev	Amendment	By	Chk.	App.	Date

Client

Architect

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滙謙基建環保工程顧問有限公司

Project

A ROOFTOP HELIPAD AT
NEW ACUTE HOSPITAL AT
KAI TAK DEVELOPMENT AREA

Title

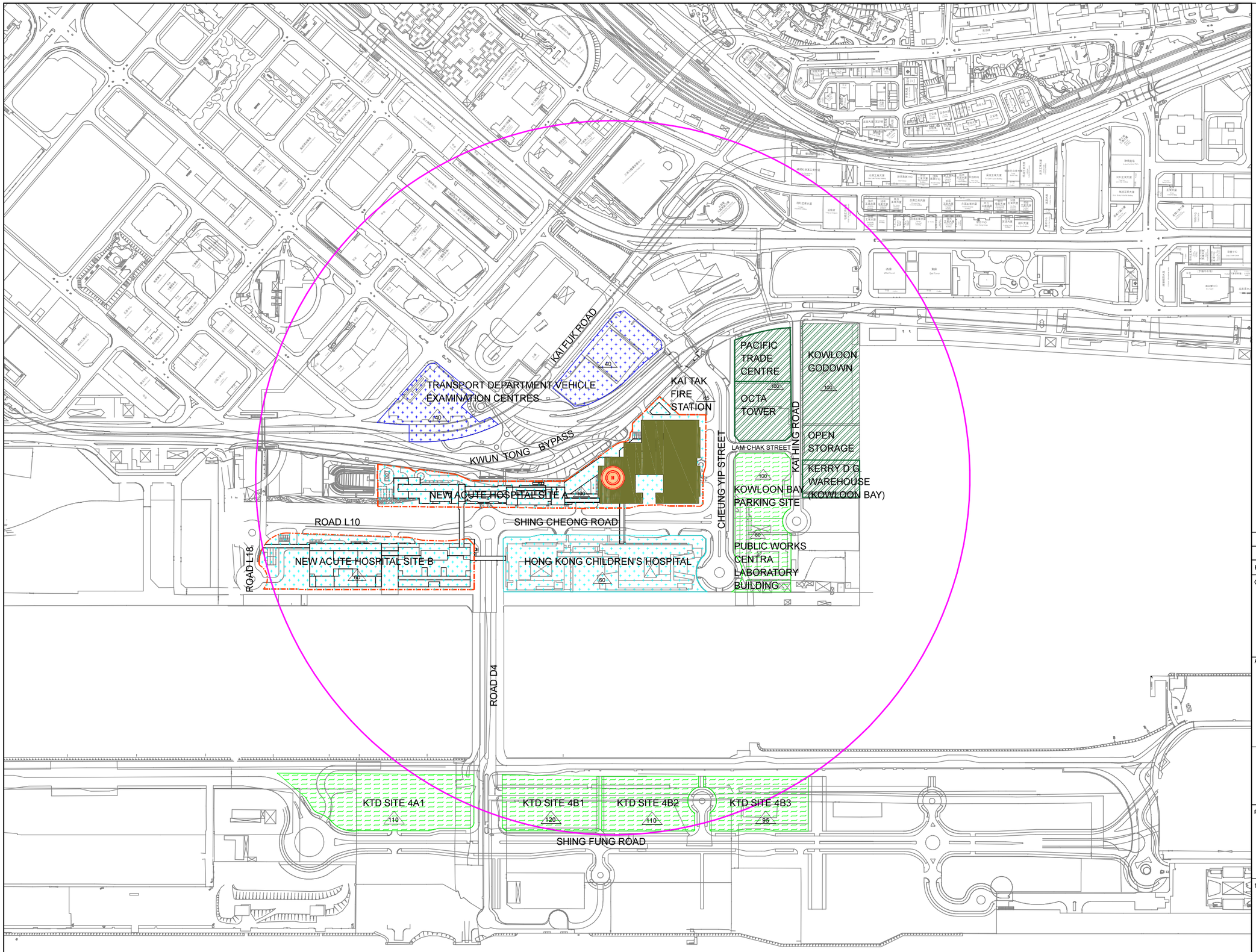
PROJECT LOCATION

Status

Drawn	Checked	Approved
CAD	–	–
Scale	CAD File Name	First Issued
AS SHOWN (A3)		MAY 2019

Drawing No. FIGURE 1.1

Rev. –



LEGEND :

- BOUNDARY LINE OF NEW ACUTE HOSPITAL AT KAI TAK DEVELOPMENT AREA
- PROPOSED ROOFTOP HELIPAD
- ACUTE BLOCK
- RESIDENTIAL (LAND USES ACCORDING TO THE APPROVED KAI TAK OUTLINE ZONING PLAN)
- COMMERCIAL (LAND USES ACCORDING TO THE APPROVED KAI TAK OUTLINE ZONING PLAN)
- GOVERNMENT, INSTITUTION OR COMMUNITY (LAND USES ACCORDING TO THE APPROVED KAI TAK OUTLINE ZONING PLAN)
- GOVERNMENT, INSTITUTION OR COMMUNITY (LAND USES ACCORDING TO THE APPROVED NGAU TAU KOK AND KOWLOON BAY ZONING PLAN)
- 500m FROM PROJECT SITE
- 100 MAXIMUM BUILDING HEIGHT (In Meters above principal datam)

Rev	Amendment	By	Chk.	App.	Date

Client

醫院管理局
HOSPITAL AUTHORITY

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Project

A ROOFTOP HELIPAD AT
NEW ACUTE HOSPITAL AT
KAI TAK DEVELOPMENT AREA

Title

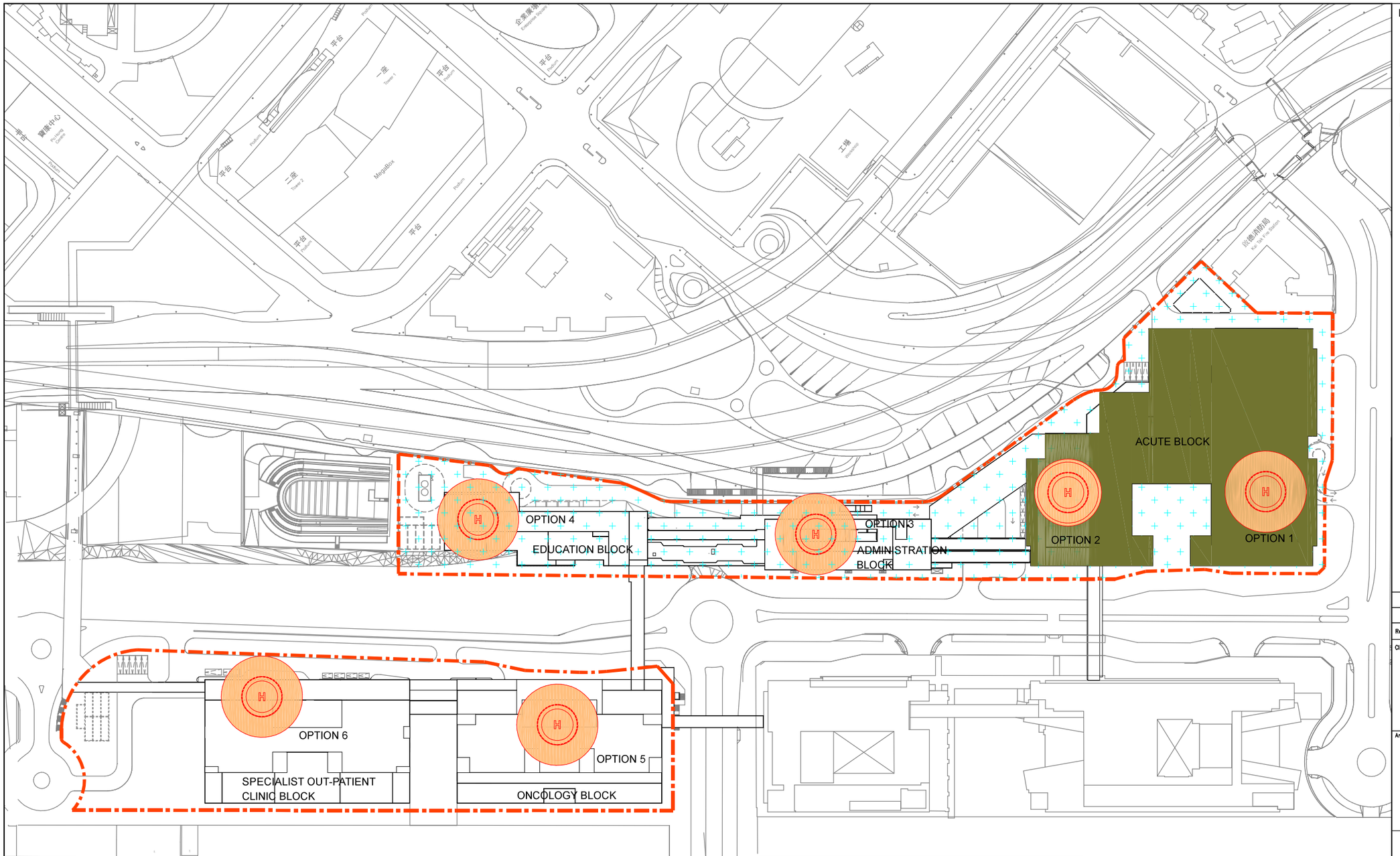
PROJECT SITE AND SURROUNDING LAND USES

Status

Drawn	Checked	Approved
CAD	–	–
Scale	CAD File Name	First Issued
AS SHOWN (A3)		MAY 2019

Drawing No. FIGURE 2.1

Rev –



LEGEND :

- BOUNDARY LINE OF NEW ACUTE HOSPITAL AT KAI TAK DEVELOPMENT AREA
- DEVELOPMENT OPTIONS OF HELIPAD
- ACUTE BLOCK

Rev	Amendment	By	Chk.	App.	Date

Client

醫院管理局
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Project

A ROOFTOP HELIPAD AT
NEW ACUTE HOSPITAL AT
KAI TAK DEVELOPMENT AREA

Title

OPTIONS FOR HELIPAD LOCATION
IN THE NAH

Status

Drawn	Checked	Approved
CAD	–	–
Scale	CAD File Name	First Issued
AS SHOWN (A3)		MAY 2019

Drawing No. FIGURE 3.1

Rev –

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