BMT Asia Pacific

Environmental Impact Assessment for A Rooftop Helipad at the Proposed New Block of Queen Mary Hospital (Executive Summary)

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BMT Asia Pacific

A Rooftop Helipad at the Proposed New Block at Queen Mary Hospital

Environmental Impact Assessment (Executive Summary)

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1 Introduction

1.1 Background

1.1.1.1 BMT Asia Pacific Limited (BMT) was appointed by the Architectural Services Department (ArchSD) for the Consultancy Agreement Ref. No. 2OC469 – Application for an Environmental Permit under the Environment Impact Assessment Ordinance (EIAO) (Cap. 499) for a Rooftop Helipad at the Proposed New Block at Queen Mary Hospital (QMH). The proposed helipad development has been classified as Designated Project (DP) under Item B.2, Schedule 2 of the EIAO by virtue of being: "A *helipad within 300m of existing or planned residential development*".

1.1.1.2 An EIA study has been conducted for the construction and operation of the rooftop helipad (hereafter as "Proposed Helipad" or "the Project") at the proposed new block (hereafter as "New Block") at QMH and to seek approval of the EIA report under the EIAO and the Technical Memorandum on behalf of the Food and Health Bureau (hereafter as "the Applicant"). The environmental study for the demolition of existing structures and construction of the New Block shall be conducted separately in the Preliminary Environmental Review (PER) under the Public Works Programme (PWP). Figure 1.1 shows the location of the Proposed Helipad and its environs.

1.1.1.3 The EIA Report was prepared in accordance with the EIA Study Brief (No. ESB-284/2015) and the Technical Memorandum of the Environmental Impact Assessment Process (TM-EIAO).

1.1.1.4 This executive summary summarises the results of the EIA 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 presented in Table 2.1. The erection of a helipad on the rooftop of the New Block of QMH provides a permanent facility to facilitate helicopter emergency medical services. GFS's helicopters can land at QMH directly using the Proposed Helipad and no onward transfer by ambulance will be required. The layout and section view of the Proposed Helipad are shown in Figure 1.1 and Figure 2.1 respectively.

Table 2.1 Summary of Project Description

Project Information	Details
Project Location	Rooftop of New Block at the northern portion of QMH
Helipad Height	17m above the rooftop of New Block (at 299.4 mPD)
Helipad Size	40m in diameter
Major Components of the Project	Helipad Structure, Safety walkway, Access ramp, Staircase

2.2 Need and Benefits for the Project

2.2.1.1 As Hong Kong is experiencing an aging population issue, the need for medical services in an effective and efficient manner will be increasing in future. At present, public hospitals under the Hospital Authority (HA) provided with helipad facilities are only at Pamela Youde Nethersole Eastern Hospital (PYNEH) and Tuen Mun Hospital (TMH). Emergency patients and casualties are mainly landed at PYNEH as landing at TMH is restricted to day time operation due to safety consideration. For any patient who requires to be transferred to QMH through air transportation, landings will take place at Wan Chai Heliport for onward transfer of the patient to QMH by ambulance. The transfer time of a patient from landing at Wan Chai Heliport to QMH by ambulance can be up to 20 minutes, which is too long for critical life-saving. Therefore, HA has reviewed the current transportation arrangement for life saving service and recognised the need to upgrade the existing Helicopter Emergency Medical Services (HEMS) in Hong Kong, and maintain the speedy transfer of patients to hospital.

2.2.1.2 Given that QMH is a major acute hospital, a Trauma and Transplant Centre, and the only hospital in Hong Kong which is able to handle certain emergency medical cases such as neonatal with major procedure, liver transplant, heart/lung transplant and aortic dissection. It is of essence for the public to have a helipad in order to enable a point-to-point speedy transfer of patients/ survivors suffering from special cases for appropriate treatment and receipt of donated organs. The Proposed

Helipad at QMH has been the prime consideration in ensuring that the general public can receive the best emergency service as needed.

2.2.1.3 The need and benefits of the Proposed Helipad are presented in Table 2.2 below:

Table 2.2 The need and benefits of the Project

Speedy transfer of patients to QMH	• allow point-to-point transfer of patients to QMH • reduce the chance of delay from traffic congestion during patients transfer by ambulance
Lower Risk of Additional Transfer	• reduce the risk of deterioration of injury from onward movement by ambulance when crossing road bumps or unpaved roads
Relief Ambulance Resource	• reduce the need of patients transfer from Wan Chai Heliport to QMH by ambulance
Location Advantage	• an ideal drop-off point for injured survivors/ patients travelling from South and South-west of Hong Kong
Weather Alternative	• provide alternative landing location during poor visibility period at East of Hong Kong in spring season
Allow Multiple Casualties Transfer	• will be operated in parallel with PYNEH for multiple casualties transfer
Environmental Benefits	• no additional foundation work for a rooftop helipad is required • offer a longer separation distance from Proposed Helipad to NSRs compared with the helicopter operations in PYNEH • reduce number of helicopter landings in PYNEH
Uniqueness of QMH	• one of the five major trauma centres in Hong Kong • provide organ transplantation, neurosurgery, intensive care and paediatric surgical services. Medical services such as neonatal with major procedure, liver transplant, heart/ lung transplant and aortic dissection is only available in QMH

2.3 Project Programme

2.3.1.1 The tentative planning and implementation programme for the Proposed Helipad is as below:

- Construction of the Proposed Helipad [1 year between 2022 & 2024]
  (about 4 months for structural works)
- Helipad Operation [2024]

2.4 Concurrent Projects

2.4.1.1 Only one concurrent project has been identified within 500m of the Site which is the finishing works and building services installation works at the New Block of QMH. Cumulative environmental impacts from the concurrent projects, if any, have been assessed in the EIA study.

3 Consideration of Alternatives

3.1 Site Selection

3.1.1.1 There are only two acute hospitals provided with helipad for air transportation of medical emergency cases, namely PYNEH and TMH in Hong Kong. However, there are different constraints for both helipads for air transportation of medical emergency cases to serve the western and southern part of Hong Kong. In order to complement the operation gaps and the emergency service requirements, there is a need to explore an alternative site for a helipad.

3.1.1.2 There are three acute hospitals with A&E services and located at western/ southern part of Hong Kong, i.e. Pok Oi Hospital, Queen Mary Hospital and Yan Chai Hospital. In considerations of factors on type of hospital and medical services, location, space availability and environmental benefit and dis-benefit, QMH is the selected location for installation of the helipad.

3.2 Development Options

3.2.1.1 With reference to *Clause 3.3* of the EIA Study Brief, 5 alternative development options have been considered for the Project as presented in Figure 3.1. Consideration has been given to the following alternatives:

- Option 1: Adjacent hillside area of QMH;
- Option 2: Existing vacant area in QMH;
- Option 3: Rooftop of existing buildings within QMH;
- Option 4a: Helipad siting at the centre of the rooftop of New Block; and
- Option 4b: Helipad siting at the north-east of the rooftop of New Block.

3.2.1.2 The comments for the 5 alternative development options are summarised in Table 3.1 below.

Table 3.1 Comments for Alternative Development Options

Alternative Options of Helipad Siting	Preferable Option?	Comment
Option 1 - Adjacent Hillside Area of QMH	✘	This option is NOT suitable due to the operational constraints from helipad to hospital and the possible ecological impact to the surrounding hillside area.
Option 2 - Existing Vacant Area within QMH	✘	This option is NOT considered due to insufficient vacant space in QMH for the Proposed Helipad.

Option 3 - Rooftop of Existing Buildings in QMH	✘	This option is NOT considered. The existing buildings in QMH was not designed for helicopter landing and the building structure is unable to support the loading of helipad and helicopter.
Option 4a - Helipad Siting at the Centre of the Rooftop of New Block	✘	The rooftop of New Block will be the highest location in the QMH which provides a better condition for helicopter landings and away from obstacles (Option 4a). This option is more preferable.
Option 4b - Helipad Siting at the North-East of the Rooftop of New Block	✓	To further minimise the noise impact, the positioning of the helipad is carefully considered. Position the Proposed Helipad from centre to north-eastern side at rooftop of New Block could increase the separation distance and provide noise screening to some NSRs. Option 4b is selected.

3.2.1.3 Option 4b is chosen as the best option as it provides a better condition for helicopter landings, away from obstacles and the distance between noise sensitive receivers (NSRs).

3.3 Selection of Flight Sectors

3.3.1.1 The flight sector design for the Proposed Helipad shall allow minimum impacts to the immediate surroundings and ensure flight safety which was carefully investigated by the Government Flying Service (GFS). Four flight sector options as below have been considered based on the associated noise impact on noise sensitive receivers, terrain condition, obstacles clearance and other ambient conditions such as wind and turbulence.

- Zone 1: North-west of QMH;
- Zone 2: East of QMH;
- Zone 3: South QMH; and
- Zone 4: South-west of QMH

3.3.1.2 Zone 1 (North-west) and Zone 3 (South) are selected by GFS as the optimum operation zones for safe helicopter operations with minimum environmental impact on the immediate surrounding which are shown in Figure 3.2.

3.4 Helipad Management Alternatives

3.4.1.1 Upon the completion of the helipad in QMH, the heli-services would be shared among the existing helipad facilities in TMH, PYNEH and the new helipad at QMH. The transportation of patients to which hospital will depend on a number of factors including the proximity of the hospital, nature of the incident, weather condition, wind velocity, etc. It should also take into account of the uniqueness of certain emergency medical cases. Hence, management/ administrative measures that HA will take on the heli-service diversion among the existing and future hospitals are very much depended on the above mentioned factors and the professional opinion of HA and GFS.

3.5 Type of Helicopter

3.5.1.1 As advised by GFS, there is a replacement programme for the existing helicopter fleet which will be completed before 2024, the year of commencement of operation of the Proposed Helipad. The new helicopters will be equipped with more advanced engines and will provide a quieter flight compared with the existing helicopters in general.

3.6 Construction Alternatives

3.6.1.1 There are 3 methods for constructing the Proposed Helipad have been put forward as below:

- Helipad constructed by in-situ concrete (Option 1)
- Helipad constructed by steel structure prefabricated off-site (Option 2)
- Helipad main structure constructed by in-situ concrete and cantilevered structure constructed by prefabricated steelwork (Option 3)

3.6.1.2 The environmental impact brought about by the proposed construction methods are similar for the three methods. Option 3 is the preferred method with consideration to the nature of the proposed construction methods, costs and construction programme.

3.7 “Without Project” Scenario

3.7.1.1 Without the Project, emergency patients and casualties will continue to be landed at PYNEH or TMH, but those landings may be precluded or restricted due to adverse weather or safety consideration. In addition, situation like the Lamma Island vessel collision incident when casualties require multiple air-lifting might have to be diverted to more than one hospital but lacking shared helipad facilities, will result in cases that have to be transferred to QMH by ambulance after the

helicopter landing at Wan Chai Heliport. This arrangement is undesirable as valuable time is lost in the transportation leading to critical patients unable to receive treatment in the shortest possible time.

3.7.1.2 QMH is the only hospital in Hong Kong that is equipped to handle certain emergency/critical medical cases. Without the helipad service, speedy treatment such as immediate transfer of donated organs and patients for instantaneous treatment will not be possible.

3.7.1.3 As such, if the project is not implemented, it will have an undesirable effect on the speedy provision of care services to the critical patients and on responding to emergency situation in particular to patients with life-threatening conditions in the best possible time, as the transfer of patients to hospital is unnecessarily prolonged.

4 Summary of the Environmental Impacts

4.1 Introduction

4.1.1.1 The EIA report has assessed the following potential environmental impacts during construction and operation stages of the Proposed Helipad:

- Air Quality Impact;
- Noise Impact;
- Waste Management;
- Ecological Impact – Terrestrial; and
- Visual Impact

4.2 Air Quality Impact

4.2.1 Construction Stage

4.2.1.1 Construction dust shall be controlled through the proper implementation of control measures stipulated under the Air Pollution Control (Construction Dust) Regulation, and no adverse residual impacts are anticipated.

4.2.2 Operational Stage

4.2.2.1 According to the GFS's flight records between 2011 and 2015, the average number of emergency helicopter operations at the helipad of PYNEH is less than once per day, and the operation during daytime period is about once every two days on average. Moreover, the duration of landing and take-off of a helicopter would be less than 10 minutes. Based on the assessment results, the air quality impact of the operation of the Proposed Helipad will comply with the Air Quality Objectives. Hence, no adverse impact on nearby air sensitive receivers is anticipated.

4.3 Noise Impact

4.3.1 Construction Stage

4.3.1.1 The period of structural works for the Proposed Helipad would take approximately 4 months only.

4.3.1.2 Based on the latest information obtained, the unmitigated construction noise level at the representative Noise Sensitive Receivers (NSRs) will comply with the relevant noise criterion.

4.3.2 Operational Stage

4.3.2.1 Helicopter noise impact is the major consideration in the design of the Proposed Helipad and a key issue of this EIA study. A detailed helicopter noise impact assessment was carried out based on the best available information. Table 4.1 summarised all practicable approaches to minimise the helicopter noise impact. With the implementation of direct noise mitigation measures, the predicted helicopter noise levels at representative NSRs comply with the daytime noise criterion (i.e. 85 dB(A) L_{max}). No adverse residual helicopter noise impact is anticipated during daytime period. There is no standard on helicopter noise in evening and night-time periods in Hong Kong. Nevertheless, noise from operation of the helipad in the above time periods may arise concern. According to the GFS's flight records between 2011 and 2015, the average number of emergency helicopter operations at the helipad of PYNEH is less than once per day, and operation during daytime period is about once every two days on average. Under normal circumstances, the duration of helicopter idling at the Proposed Helipad will not be more than 5 minutes for casualty handover. All practicable noise mitigation measures have been exhausted and adopted in the design of the Proposed Helipad. Noise impacts on noise sensitive receivers have been minimised.

Table 4.1 Design Considerations and Approaches for Helicopter Noise Mitigation

Design Considerations	Noise Mitigation Approach
Avoidance of Impact	• Helipad siting with setback to north-eastern side on the rooftop of New Block can increase the separation distance from NSRs and provide noise screening to some NSRs.
	• Flight sectors have been carefully selected to avoid flying over densely populated areas during helicopter approaching and departure.
Impact Minimization	• Existing GFS's helicopter fleet will be replaced by seven new medium-sized helicopters (Airbus H175) which will be equipped with more advanced engines and will provide quieter helicopter operation in general.
	• Adopt quiet helicopter approaching/ departure procedure with steeper glide slope and larger take-off angle.
	• Avoid using same flight sector for both approaching and departure in each operation.
Direct Mitigation	• Provide noise barriers and noise reducers at rooftop of the New Block to reduce the noise impact arising from helicopter during hovering, touchdown, lift-off and idling on or above the helipad.

4.4 Waste Management

4.4.1 Construction Stage

4.4.1.1 As the helipad will be built on the rooftop, limited quantity of waste would be generated during the construction stage. As the handling and disposal of the construction wastes will follow relevant requirements, no adverse waste management related impact arising from the Project during the construction stage is anticipated.

4.4.2 Operational Stage

4.4.2.1 Given that no waste or by-products would be generated during the operation stage, waste management impacts arising from the operation of helipad would not be anticipated.

4.5 Ecological Impact – Terrestrial

4.5.1.1 During the construction stage, construction works and the operational area would not encroach into the area of the Lung Fu Shan Country Park and Pok Fu Lam Country Park. During the operation stage, although the proposed flight sector overlaps with some woodland habitat within the Lung Fu Shan Country Park, the helicopter would only be flying over this area. Hence, adverse ecological impact during both construction and operation phases on surrounding habitat particularly the Country Parks is not anticipated.

4.5.1.2 Given the short duration from approach to lift-off and the anticipated usage of the Proposed Helipad is less than one flight a day in average of a year, potential ecological impact on avifauna and bats, if any, is limited. With the implementation of good site practice and current practice of GFS in avoiding bird strike, no significant impact to the avifauna and bats is anticipated.

4.6 Visual Impact

4.6.1.1 No high mass lighting and floodlight will be installed for the Project. In summary, only two lights would be switched on during night time operation, including landing light of helicopter and perimeter lights on the helipad. Nevertheless the operation time of those lights is short and the lights will be completely screened off by the helipad itself. Moreover the helipad is at the highest altitude, there is no direct line of sight from the visual sensitive receivers to the lights. Adverse visual impact from lights during night time operation of the Project is not anticipated.

4.7 Impact Summary

4.7.1.1 A summary of the environmental impacts for individual aspects in the EIA report is presented in Table 4.2.

Table 4.2 Summary of Environmental Impacts

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Air Quality - Construction Phase					
ASRs located within 500m from the project boundary	• Insignificant dust impact	• AQO & Annex 4 of TM-EIAO: - 1-hr average TSP Concentration: 500 µg/m^3 - 24-hr average RSP Concentration: 100 µg/m^3 (Number of exceedance allowed : 9) - Annual average RSP Concentration: 50 µg/m^3 - 24-hr Average FSP Concentration: 75 µg/m^3 (Number of exceedance allowed : 9) - Annual average FSP Concentration: 35 µg/m^3	• N/A	• Implementation of dust control measures as recommended in Air Pollution Control (Construction Dust) Regulation	• No residual impact
Air Quality - Operation Phase					
New Block and Block K of QMH	• 4th Highest 10-min Average SO_2 Concentration: 256.8 µg/m^3	• AQO: - 10-min Average SO2 Concentration: 500 µg/m3 (Number of exceedance allowed : 3)	• No exceedance of relevant AQO is predicted.	• N/A	• No residual impact

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Noise - Construction Phase					
Wei Lun Hall (student hall)	• No noise exceedance at the NSR	• Annex 5 of TM-EIAO: 75 dB(A) $L_{eq\ (30\ mins)}$ stipulated in TM-EIAO for domestic premises from 0700 to 1900 hours on any day not being a Sunday or general holiday.	• N/A	• N/A	• No residual impact
Noise - Operation Phase (Helicopter Noise)					
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} 79 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; • Adopt new GFS's helicopters (Airbus H175); • Operate helicopters within the proposed flight sectors; • Quiet approaching/ departure procedures; • Avoid using same flight sector for approaching and departure in each operation; • Noise barriers and noise reducers at rooftop of the New Block in QMH.	• No residual impact
Waste Management					
Project area	• Estimated quantity of waste generation - Inert C&D Materials: 0m^3 - Non-inert C&D Materials: 340.8m^3 - Chemical Waste: <1 litre - General Refuse: 0.3m^3	• TM-EIAO Annex 7 and Annex 15	• Not applicable	• The reuse/ recycling of all materials on-site shall be investigated prior to treatment/ disposal off-site; • Good site practices shall be adopted from the commencement of works; • All waste materials shall be sorted on-site into inert and non-inert C&D materials, and where the materials can be recycled or reused, they shall be further segregated; • The Contractor shall register as a	• No residual impact

Sensitive Receivers/ Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards/Criteria	Extents of Exceedance (Without Mitigation)	Impact Avoidance Measures/Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				Chemical Waste Producer if chemical wastes such as spent lubricants and paints are generated on-site; • A sufficient number of covered bins shall be provided on-site for the containment of general refuse; • Site specific induction training and tool-box talks should be provided to workers about the concepts of site cleanliness, environmental nuisance abatement and appropriate waste management procedures, including waste reduction, reuse and recycling.	
Ecology - Terrestrial					
Avifauna, bats and surrounding habitats	• Overlap between the proposed flight sector and bird appearance locations.	• Environmental Impact Assessment Ordinance - Technical Memorandum (TM-EIAO), Annexes 8 and 16; • Country Parks Ordinance (Cap. 208) and its subsidiary legislation • Wild Animals Protection Ordinance (Cap. 170)	• N/A	• N/A	• No residual impact
Visual					
Residential premises, hiking trail	• No direct line of sight from the VSRs to the perimeter lights; • Landing lights will be switched on to illuminate the helipad only during approaching and departure. The overall operation of landing lights takes 2 minutes approximately.	• Annex 10 and Annex 18 of the Technical Memorandum on EIA Process (TM-EIAO)	• N/A	• N/A	• No residual impact

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, handling of complaints and documentation are specified in the EM&A Manual.

6 Conclusion

6.1.1.1 The EIA study has been conducted in accordance with the EIA Study Brief (No. ESB-284/2015) issued under the EIAO for the Proposed Helipad, covering the following environmental issues:

- Air Quality Impact
- Noise Impact
- Waste Management
- Ecological Impact - Terrestrial
- Visual 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.

Figures

Environmental Impact Assessment for A Rooftop Helipad at the Proposed New Block at Queen Mary Hospital (Executive Summary)

Site Location and its Environs

Figure 1.1

Scale: As Shown

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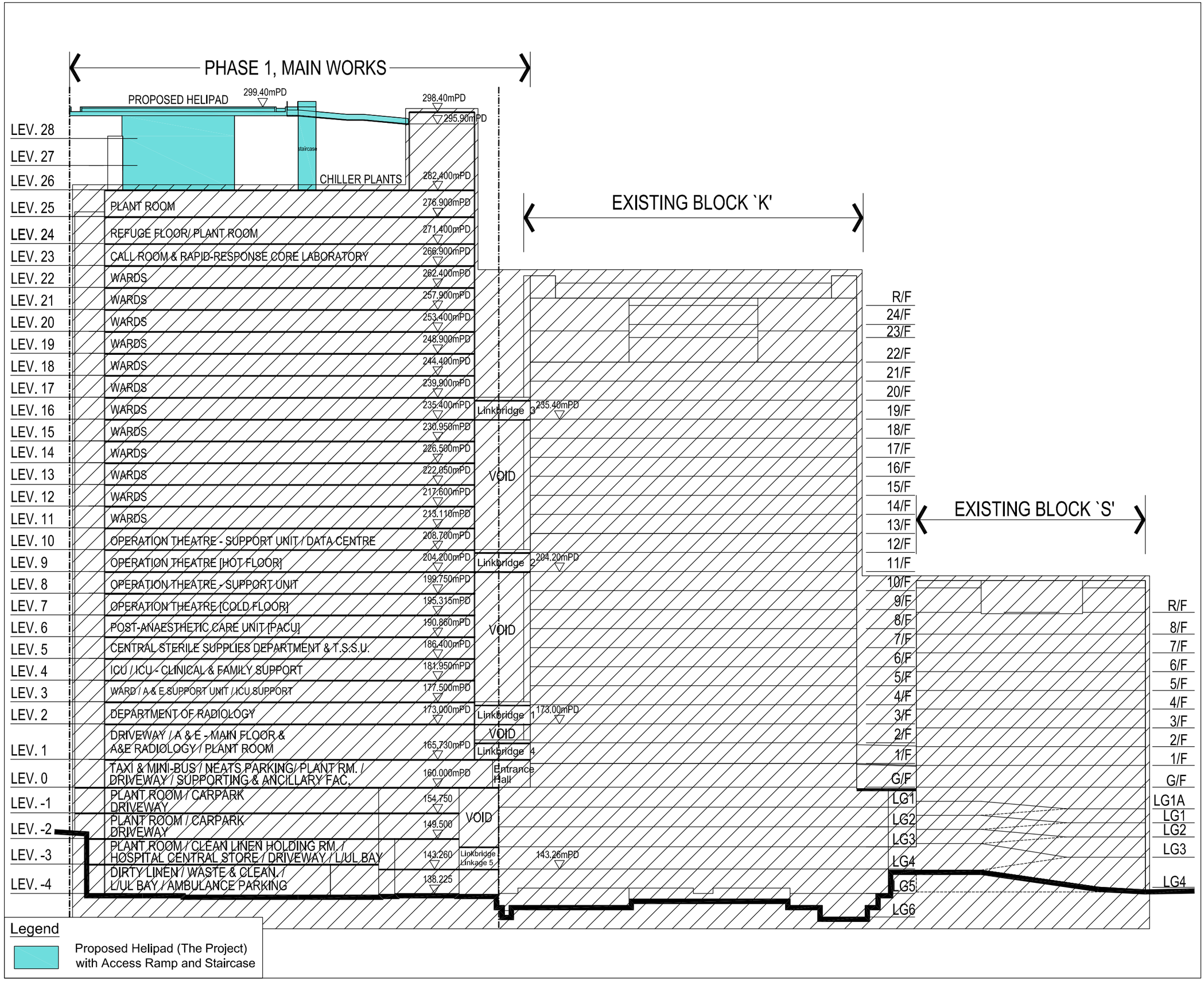
Section view of Proposed Helipad

Figure 2.1



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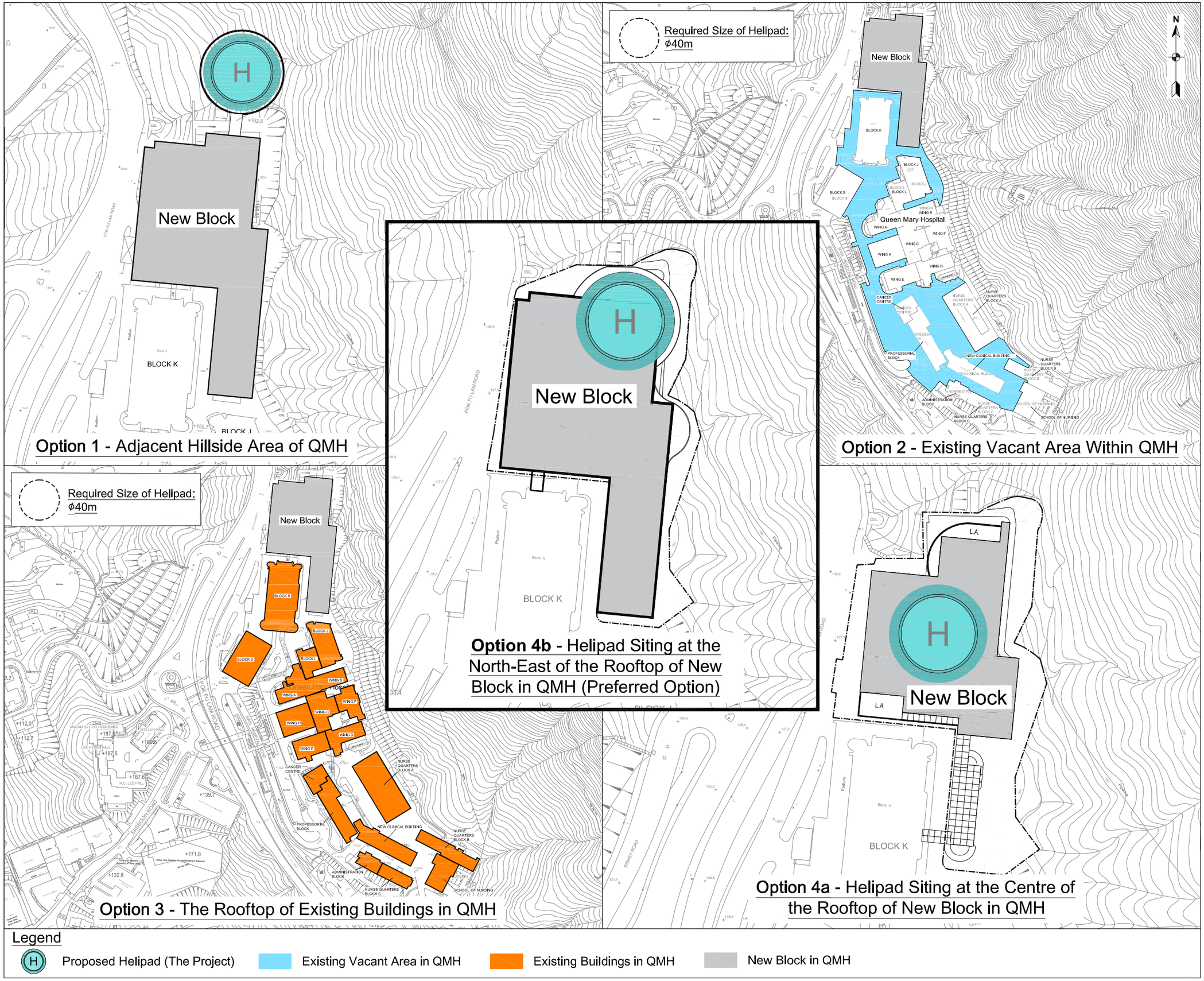
Alternatives of Helipad Siting

Figure 3.1



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Proposed Flight Sectors

Figure 3.2

Scale: As Shown

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