

Appendix 7

**Technical Note – Relocation of
Helicopter Landing Pad**

{ Ove Arup & Partners Hong Kong Ltd }

Relocation of Helipad

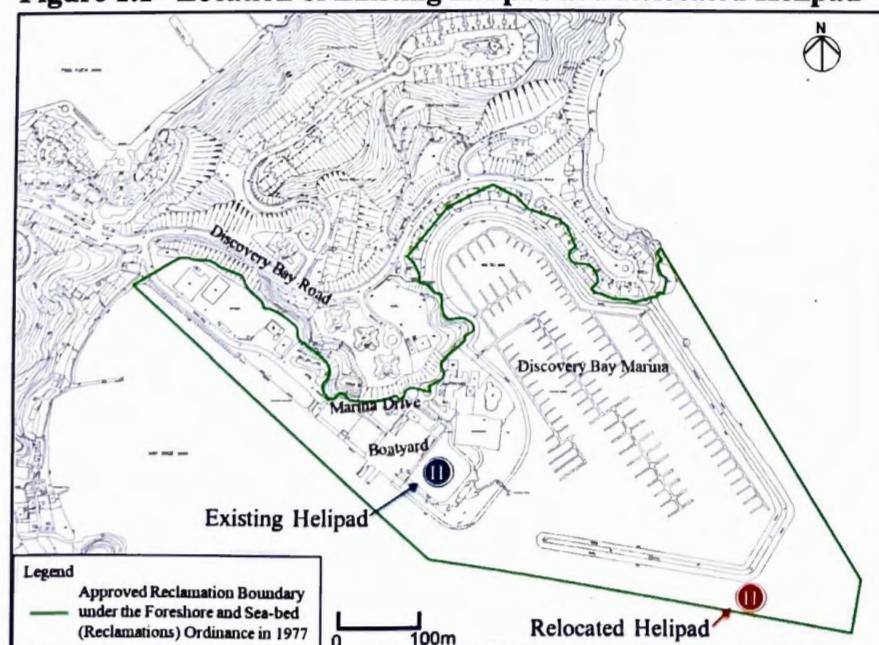
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1 Introduction

1.1 Background

- 1.1.1.1** The Hong Kong Resort Company Limited (HKRCL) has been considering the preliminary feasibility to relocate the existing helicopter landing pad (Helipad LT17) near Marina Drive next to the boatyard to the Discovery Bay Marina within the approved reclamation boundary under the Foreshore and Sea-bed (Reclamations) Ordinance (Cap. 127) in 1977 as shown in **Figure 1.1**. After the relocation of existing helipad, additional residential towers are considered to be provided at proposed revised Area 10b and proposed Area 4a as shown in **Figure 1.2**. The existing helipad is about 30m diameter on plan, and is embraced by Vista Avenue along its NE, SE and SW boundaries.
- 1.1.1.2** The existing helipad was originally required for emergency response services prior to there being direct road access via the Discovery Bay Tunnel. According to the past records, the existing helipad has never been used for such purpose since its operation.
- 1.1.1.3** The relocation of helipad (**Figure 1.1**) has been reviewed to determine whether it is qualified as a Schedule 2 Designated Project (DP) under the EIAO. Item B2 of Schedule 2 refers to “*A helipad within 300 m of existing or planned residential development.*” The nearest residential development is located at about 390m away from the relocated helipad. Hence, it is not qualified as a DP under B2 of Schedule 2.
- 1.1.1.4** This Technical Note includes flight path and relevant information of the relocated helipad, and helicopter noise impact assessment.

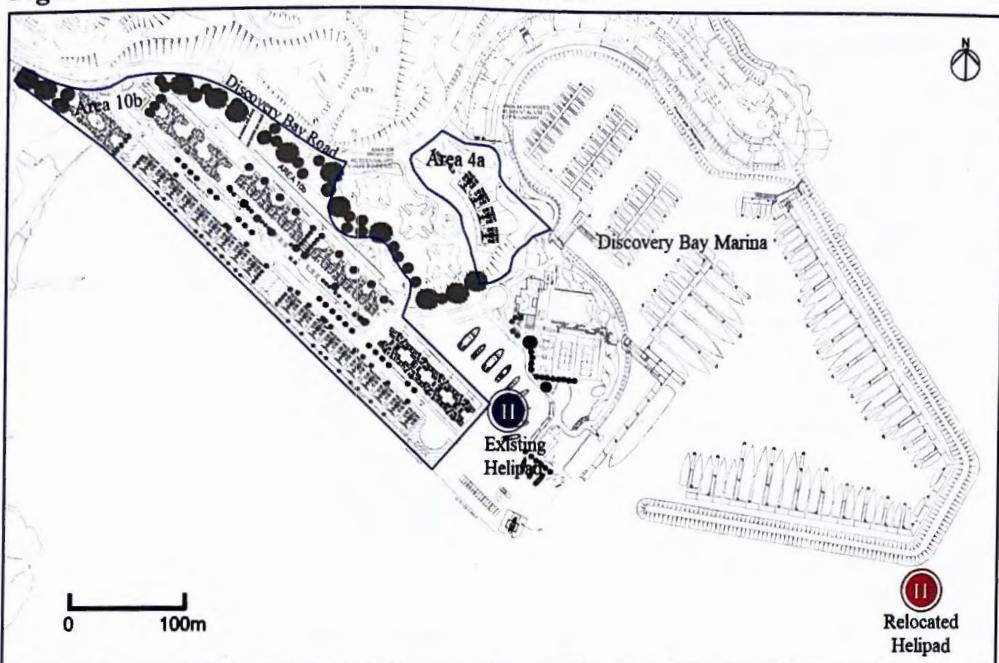
Figure 1.1 Location of Existing Helipad and Relocated Helipad



Relocation of Helipad

Environmental Consultancy for Optimization of Land Use in Discovery Bay for proposed revised Area 10b and proposed Area 4a

Figure 1.2 Location of Area 10b and Area 4a



2 Flight Path and Clearance Requirements

2.1.1.1

The proposed relocation of Helipad LT17 is situated at the south-eastern end of the Discovery Bay Marina within the reclamation boundary and approximately 400m from the existing LT17 location. A location plan is shown in **Figure 2.1** with enlarged sketches provided in **Appendix 2.1**. Given the close proximity of the proposed relocation to the existing helipad location, the meteorological and visibility conditions at the new location will be on par with those of the existing helipad. It is envisaged that a piled deck structure will be used to construct the relocated helipad, similar to Helipad HK02 on Lamma Island, with an additional access road for emergency vehicle access along the existing breakwater.

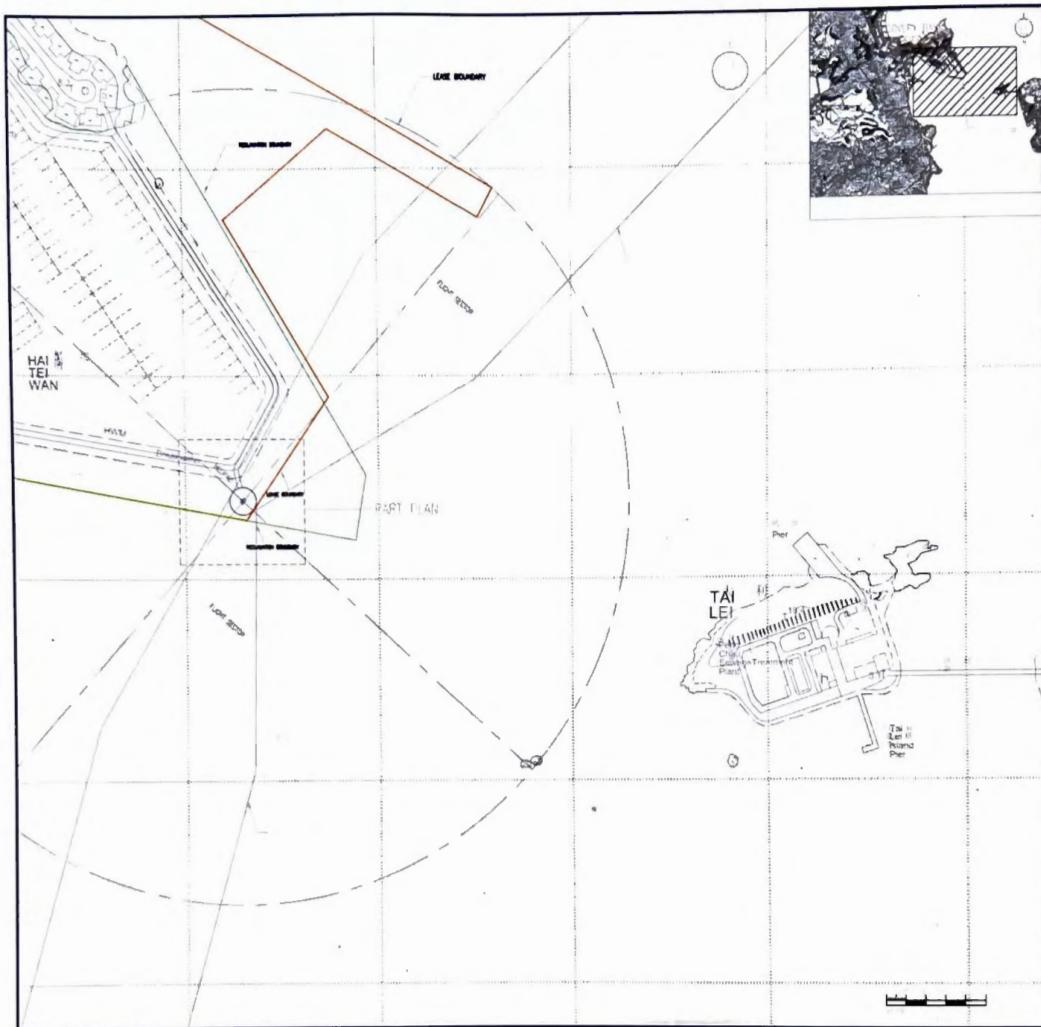
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Figure 2.1 Proposed Relocated Helipad Near Waterfront



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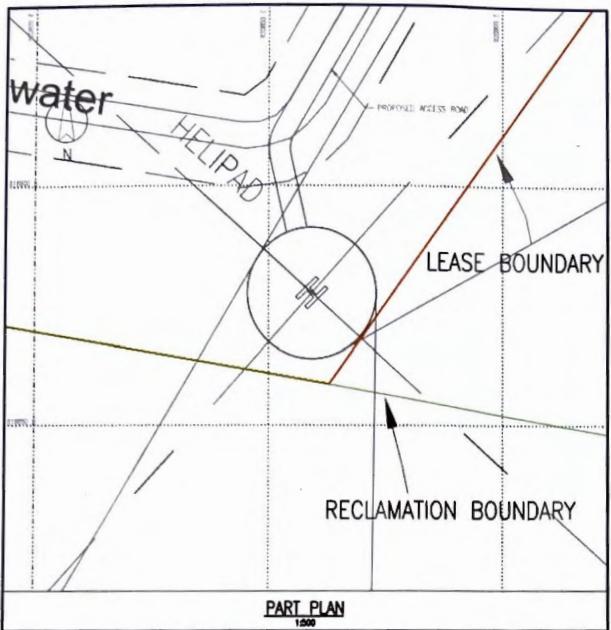
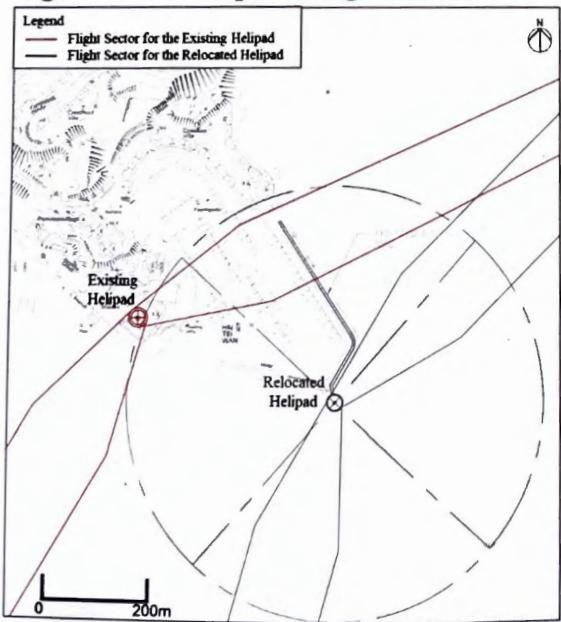


Figure 2.2 Anticipated Flight Paths of Existing and Proposed Relocated Helipad



- 2.1.1.2** Located near the waterfront means that the area surrounding the relocated helipad will be clear of fixed obstacles and will permit the option of emergency landing on water in case of emergency. The proposed new helipad is 32m in diameter, so it is of adequate size to enable the safe landing and take-off of the largest helicopter in Government Flying Services (GFS)'s fleet, which is expected to be an Airbus H175 helicopter.

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2.1.1.3 Figure 2.2 shows the two flight sectors for the existing and relocated helipad extending towards the north-east and south-west directions subtending an 150° angle. The water body between Peng Chau and Nim Shue Wan allows a relatively wide approach and departure sector that is clear of terrain for inbound and outbound helicopter flights.

3 Helicopter Noise Impact Assessment

3.1.1 Noise Standard for Helicopter Noise

3.1.1.1 The Hong Kong and Planning Standards and Guidelines (HKPSG) has stipulated the noise standards for helicopter noise (between 07:00 – 19:00) for planning purposes as shown in **Table 3.1**.

Table 3.1 Noise standards for helicopter noise

Uses	Helicopter Noise L _{max} dB(A) 0700-1900 hours
All domestic premises including temporary housing accommodation;	85
Hotel and hostels;	85
Offices	90
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required;	85
Places of public worship and courts of law; and	85
Hospitals, clinics, convalescences and home for the aged, diagnostic rooms, wards	85

Note:

1. The above standards apply to uses which rely on opened windows for ventilation.
2. The above standards should be viewed as the maximum permissible noise levels assessed at 1m from the external facade.

3.1.2 Helicopter Noise Impact Assessment Methodology

3.1.2.1 Helicopter noise will be generated during manoeuvring over the helipad and during lateral (approach/departure) flight. Operational modes that may generate noise will be considered. Helicopter noise is considered as a ‘point’ source and has been evaluated based on standard acoustic principle of point source propagation. Corrections have been applied for the distance attenuation, façade, barrier or topographical effect where applicable.

3.1.3 Noise Sensitive Receivers

3.1.3.1 Representative Noise Sensitive Receivers (NSRs) have been selected and are summarised in **Table 3.2** and illustrated in **Figure 3.1**.

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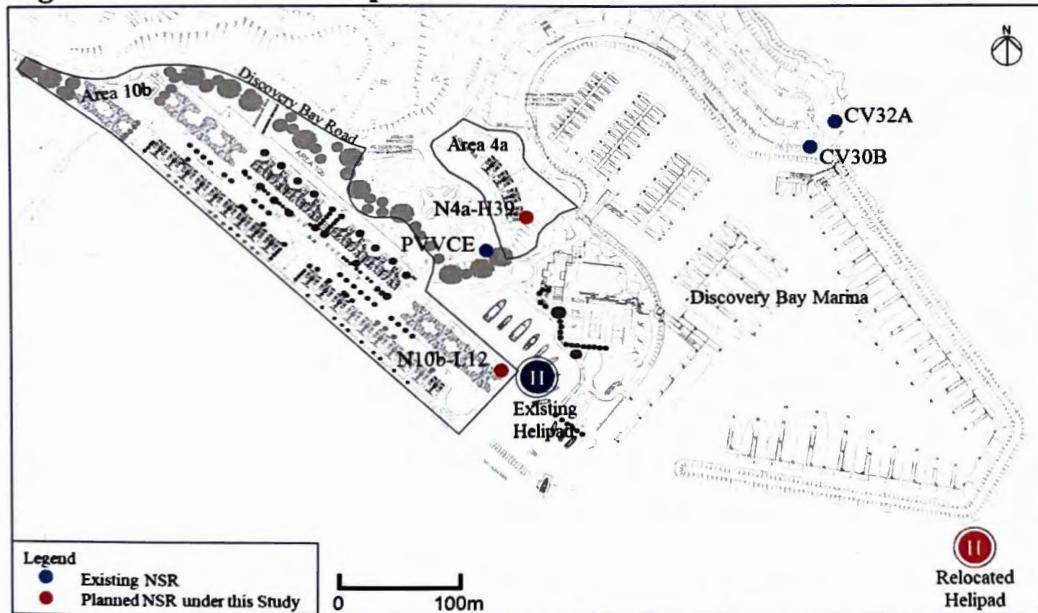
Table 3.2 Representative NSRs for helicopter noise assessment

NSR ID ^[1]	Location	Uses ^[2]
Existing NSRs		
CV32A	Coastline Villa No. 32	R
CV30B	Coastline Villa No. 30	R
PVVCE	Peninsula Villa Verdant Court	R
Planned NSRs under this Study		
N4a-H39	Area 4a H39	R
N10b-L12	Area 10b L12	R

Note:

1. The assessment only includes include NSRs which rely on opened windows for ventilation.
2. R – Residential Premises.

Figure 3.1 Location of Representative NSRs



3.1.4 Inventory of Noise Source

3.1.4.1 According to the previously approved EIA report for the Rooftop Helipad at New Acute Hospital at Kai Tak Development Area (AEIAR-224/2020), the three Super Puma AS332 L2 helicopters and four Dauphin EC155 B1 helicopters previously utilised for emergency evacuations have been replaced by seven medium-sized single-model helicopters Airbus H175 by the Government Flying Service (GFS).

3.1.4.2 The new Airbus H175 helicopters will be equipped with more advanced engines resulting in quieter helicopter noise compared with the Super Puma AS332 L2 and Dauphin EC155 B1. The Airbus H175 will comply with the latest standards on noise for helicopters as stipulated by the International Civil Aviation Organization (ICAO). The ICAO has

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stipulated noise standards for lateral movements of helicopters, including approach, take-off and flyover. The maximum Effective Perceived Noise Levels (EPNLs) for helicopters' lateral movements operating at full load conditions is used as the noise certification standard adopted by the ICAO Council. The EPNLs data are summarised in **Table 3.3**.

Table 3.3 Helicopter noise data for Airbus H175 (lateral movements)

Flying mode	Reference Distance, m	Noise Level	
		EPNL, EPNdB ^[1]	L _{max} , dB(A) ^[2]
Approach	120	95.1	82.1
Take-off	150	89.8	76.8
Flyover	150	91.0	78.0

Note:

1. The EPNLs are determined under conditions prescribed in Chapter 8 and Appendix 4 of Annex 16 of ICAO, and prescribed in 14 CFR 36 Appendix.
2. L_{max} = EPNdB-13, with reference to "Transportation Noise Reference Book" (Nelson, 1987), Equation (6a) "Conversion Relationship of Aircraft Noise Indices between WECPNL and DENL" (Proceedings of 20th International Congress of Acoustics), Section 2.1 "Consideration to noise index for evaluating airport noise in Japan" (The 33rd International Congress and Exposition on Noise Control Engineering) and Section 2 "Evaluation and Prediction of Airport Noise in Japan" (Journal of the Acoustical Society of Japan).

3.1.4.3 However, the noise data for non-lateral movements are not available in the Noise Certificate for the Airbus H175. As such, the noise measurement results of Airbus H175 in non-lateral movements in the previously approved EIA report for the Rooftop Helipad at New Acute Hospital at Kai Tak Development Area (AEIAR-224/2020) has been adopted for Airbus H175 as presented in **Table 3.4**.

Table 3.4 Helicopter noise data for Airbus H175 (non-lateral movements)

Flying mode	Reference Distance, m	Measured L _{max} , dB(A) ^[1]
Idling	150	75.4
Lift-off	150	82.4
Hovering	150	83.5
Touchdown	150	78.9

Note:

1. Noise measurement results is extracted from the previously approved EIA report for the Rooftop Helipad at New Acute Hospital at Kai Tak Development Area (EIA-266/2020).

3.1.5 Prediction and Evaluation of Helicopter Noise Impact

3.1.5.1 The helicopter noise impact assessment has been conducted for two scenarios, one for the existing helipad and the other one for the relocated helipad. The results for the prediction of helicopter noise impact assessment have been presented and discussed in the subsequent sections.

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Existing Helipad

- 3.1.5.2 The predicted helicopter noise levels at the representative NSRs for the existing helipad are shown in the table below. Flight path of existing helipad as discussed in Section 2.1.1.3 and detailed calculations are provided in Appendix 3.1.

Table 3.5 Predicted helicopter noise levels for existing helipad

NSR ID	Uses	Criterion, L _{max} dB(A)	Maximum Predicted L _{max} , dB(A)	Exceedance [Y/N]
Existing NSRs				
CV32A	R	85	98	Y
CV30B	R	85	103	Y
PVVCE	R	85	90	Y

Note:

1. The assessment only includes include NSRs which rely on opened windows for ventilation.
2. R – Residential Premises.
3. Bolded values mean exceedance of the relevant noise criteria.

- 3.1.5.3 The maximum predicted helicopter noise levels at the representative NSRs for the existing helipad is 103 dB(A). According to above table, all existing NSRs will exceed the noise criterion of L_{max} 85 dB(A).

Relocated Helipad

- 3.1.5.4 The predicted helicopter noise levels at the representative NSRs for the relocated helipad are shown in the table below. Flight path of relocated helipad as discussed in Section 2.1.1.3 and detailed calculations are provided in Appendix 3.2.

Table 3.6 Predicted helicopter noise levels for relocated helipad

NSR ID	Uses	Criterion, L _{max} dB(A)	Maximum Predicted L _{max} , dB(A)	Exceedance [Y/N]
Existing NSRs				
CV32A	R	85	78	N
CV30B	R	85	79	N
PVVCE	R	85	76	N
Planned NSRs under this Study				
N4a-H39	R	85	77	N
N10b-L12	R	85	78	N

Note:

1. The assessment only includes include NSRs which rely on opened windows for ventilation.
2. R – Residential Premises.
3. Bolded values mean exceedance of the relevant noise criteria.

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- 3.1.5.5 The maximum predicted helicopter noise levels at the representative NSRs regarding the relocated helipad is 79 dB(A). According to above table, all NSRs will comply with the noise criterion of L_{max} 85 dB(A).

Evaluation of Results

- 3.1.5.6 According to the predicted helicopter noise levels at representative NSRs for two scenarios (i.e. existing and relocated helipad), all existing NSRs will exceed the noise criterion of L_{max} 85 dB(A) for the existing helipad, while all NSRs will comply with the corresponding noise criterion for the relocated helipad. After the relocation of helipad, the maximum predicted helicopter noise levels will decrease for about 14-24 dB(A). As such, the helicopter noise impact at NSRs is expected to be improved after the relocation of helicopter.
- 3.1.5.7 In addition, as mentioned in Section 1, the existing helipad has never been used since its operation. Also, the frequency of usage is not expected to be increased after the relocation of helipad. Hence, adverse helicopter noise impact due to the relocation of helipad is not anticipated.

4

Conclusion

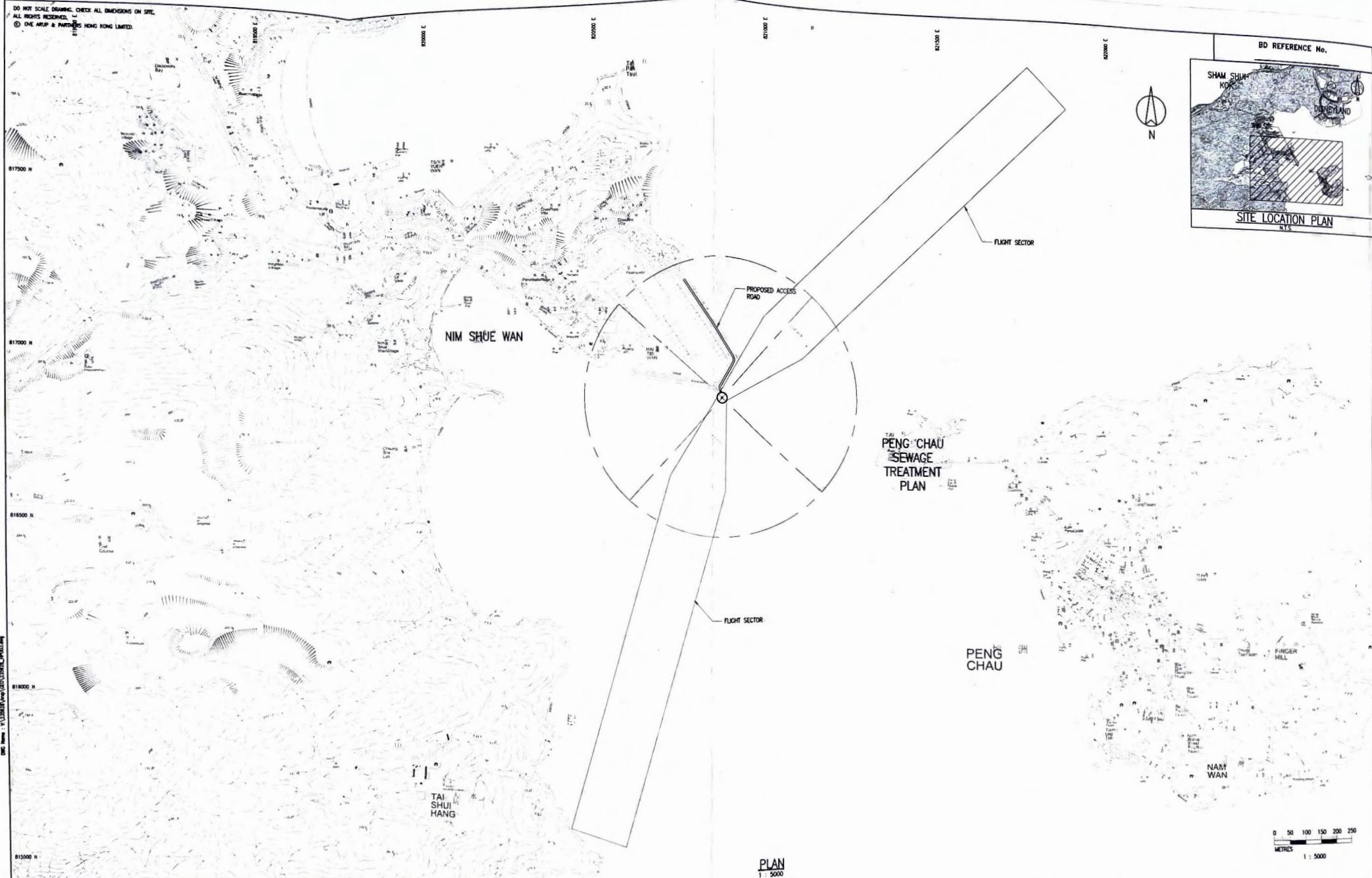
- 4.1.1.1 This Study investigates the preliminary feasibility of relocating the existing helipad near Marina Drive next to the boatyard to the Discovery Bay Marina.
- 4.1.1.2 This Technical Note presents the flight path and relevant information of the relocated helipad, and the helicopter noise impact assessment for two scenarios (i.e. existing and relocated helipad) has also been conducted. Under the scenario for relocated helipad, the noise criterion of L_{max} 85 dB(A) will be met. The assessment results also show a decrease of maximum predicted helicopter noise levels after the relocation of helipad. As such, the helicopter noise impact at NSRs is expected to be improved after the relocation of helicopter. In addition, the existing helipad has never been used for emergency purpose since its operation and the frequency of usage is not expected to be increased after the relocation of helipad. Hence, adverse helicopter noise impact due to the relocation of helipad is not anticipated.

Appendix 2.1

Helipad Layout Plan

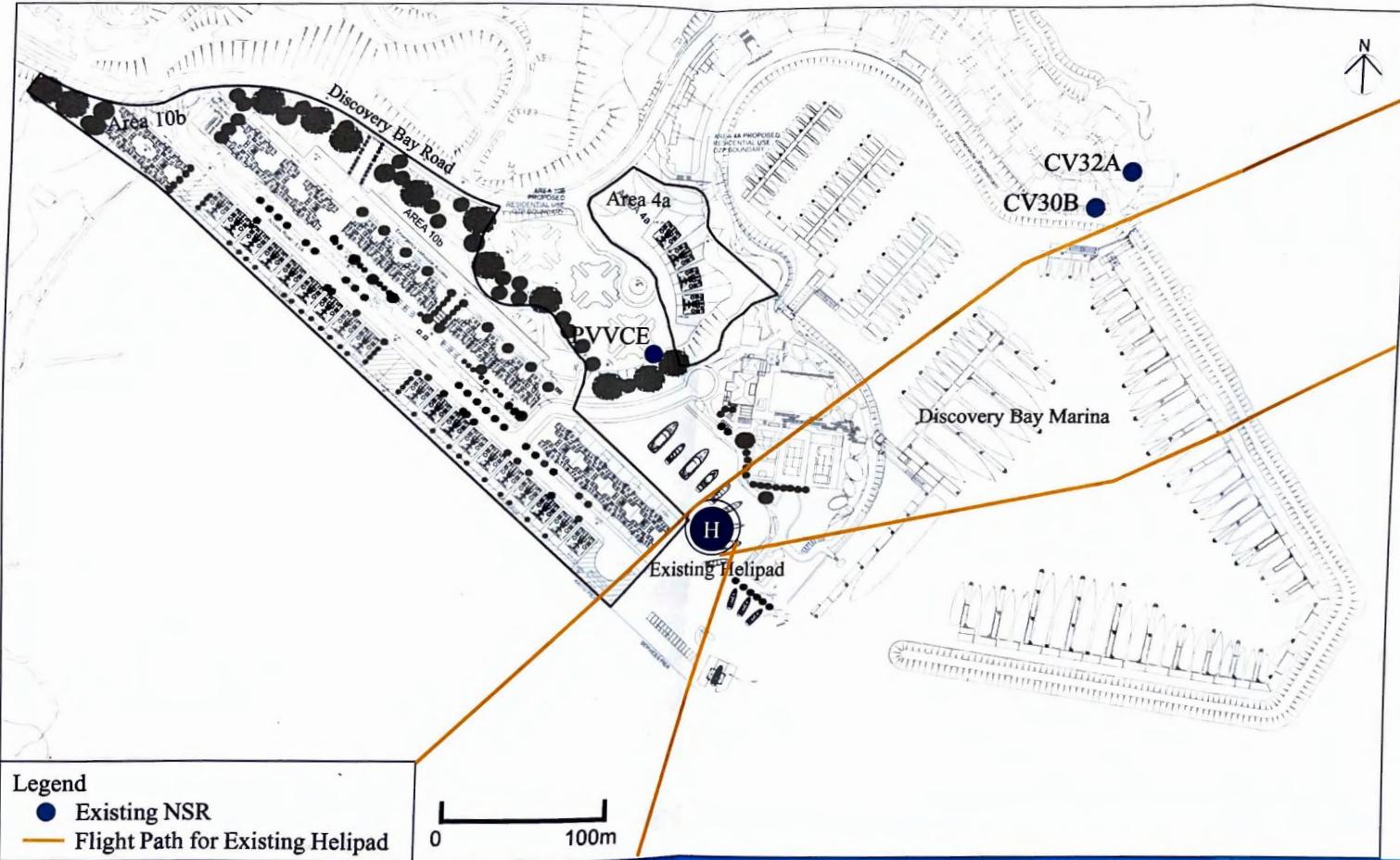
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Appendix 3.1

Detailed Helicopter Noise Assessment Results (Existing Helipad)



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Project: 235928 Optimization of Land Use in Discovery Bay
Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop Heliport at New Acute Hospital at Kai Tak Development Area" (EIA-266/2020),
the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Idling

Airbus H175 - Idling

NSR	Horizontal Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	325	75.4	-6.7	0.0	3.0	71.7	85.0	-
CV30B	295	75.4	-5.9	0.0	3.0	72.5	85.0	-
PVVCE	105	75.4	3.1	0.0	3.0	81.5	85.0	-

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop HeliPad at New Acute Hospital at Kai Tak Development Area" (EIA-286/2020),
 the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Lift-off

Airbus H175 - Lift-off

NSR	Horizontal Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	325	82.4	-6.7	0.0	3.0	78.7	85.0	-
CV30B	295	82.4	-5.9	0.0	3.0	79.5	85.0	-
PVCE	105	82.4	3.1	0.0	3.0	88.5	85.0	4

Project: 235928 Optimization of Land Use In Discovery Bay
Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop HeliPad at New Acute Hospital at Kai Tak Development Area" (EIA-266/2020),
the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Hovering

Airbus H175 - Hovering

NSR	Horizontal Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	325	83.5	-6.7	0.0	3.0	79.8	85.0	-
CV30B	295	83.5	-5.9	0.0	3.0	80.6	85.0	-
PVVCE	105	83.5	3.1	0.0	3.0	89.6	85.0	5

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop Helipad at New Acute Hospital at Kai Tak Development Area" (EIA-266/2020),
 the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Touchdown

Airbus H175 - Touchdown

NSR	Horizontal Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	325	78.9	-6.7	0.0	3.0	75.2	85.0	-
CV30B	295	78.9	-5.9	0.0	3.0	76.0	85.0	-
PVVCE	105	78.9	3.1	0.0	3.0	85.0	85.0	-

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Lateral Movements)

With reference to the International Civil Aviation Organisation,
 the L_{max} (lateral movements) for helicopter Airbus H175 were :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175 [1][2]	
Approach	82.1	120.0
Take-Off	76.8	150.0
Flyover	78.0	150.0

Note :

[1] The EPNLs are determined under conditions prescribed in Chapter 8 and Appendix 4 of Annex 16 of ICAO, and prescribed in 14 CFR 36 Appendix

[2] $L_{max} = EPNL + 13$, with reference to "Transportation Noise Reference Book" (Nelson, 1987), Equation (6a) "Conversion Relationship of Aircraft Noise Indices between WECPNL and DENL" (Proceedings of 20th International Congress of Acoustics), Section 2.1 "Consideration to noise index for evaluating airport noise in Japan" (The 33rd International Congress and Exposition on Noise Control Engineering) and Section 2 "Evaluation and Prediction of Airport Noise in Japan" (Journal of the Acoustical Society of Japan).

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Approach

Airbus H175 - Approach

NSR	Horizontal Distance (m)	Distance to be Travelled by Helicopter before Approach ^[1] (m)	Altitude of Helicopter (m)	Helicopter Elevation ^[2] (mPD)	Building Height (m)	Vertical Separation (m)	Separation Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
									Distance	Barrier	Facade			
CV32A	25	338	31	37	28	9	28	82.1	12.7	0.0	3.0	97.8	85.0	12.8
CV30B	15	312	28	34	28	6	16	82.1	17.4	0.0	3.0	102.5	85.0	17.5
PVVCE	100	31	2	8	74	65	100	82.1	1.6	0.0	3.0	86.7	85.0	1.7

Note:

[1] According to the GFS Heliport Specification Guidelines, the helicopter approach and departure trajectory will be projected at an 8% slope within 245 metres from the edge of the helipad. Beyond 245 metres the slope increases to 12.5%.

[2] Heliport elevation at 6mPD.

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Lateral Movements)

With reference to the International Civil Aviation Organisation,
 the L_{max} (lateral movements) for helicopter Airbus H175 were :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175 [1]	
Approach	82.1	120.0
Take-Off	76.8	150.0
Flyover	78.0	150.0

Note :

[1] The EPNLs are determined under conditions prescribed in Chapter 8 and Appendix 4 of Annex 10 of ICAO, and prescribed in 14 CFR 38 Appendix.

[2] $L_{max} = EPNL - 13$, with reference to "Transportation Noise Reference Book" (Nelson, 1987), Equation (6a) "Conversion Relationship of Aircraft Noise Indices between WECPNL and DENL" (Proceedings of 20th International Congress of Acoustics), Section 2.1 "Consideration to noise Index for evaluating airport noise in Japan" (The 33rd International Congress and Exposition on Noise Control Engineering) and Section 2 "Evaluation and Prediction of Airport Noise in Japan" (Journal of the Acoustical Society of Japan).

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Take-off

Airbus H175 - Take-off

NSR	Horizontal Distance ^[2] (m)	Distance to be Travelled by Helicopter after Take-off ^[1] (m)	Altitude of Helicopter (m)	Helicopter Elevation ^[2] (mPD)	Building Height (mPD)	Vertical Separation (m)	Separation Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance
									Distance	Barrier	Facade			
									dB(A)	dB(A)	dB(A)			
CV32A	25	338	31	37	28	9	28	76.8	14.7	0.0	3.0	94.5	85.0	9.5
CV30B	15	312	28	34	28	5	18	76.8	19.3	0.0	3.0	99.1	85.0	14.1
PV/CCE	100	31	2	8	74	65	100	76.8	3.5	0.0	3.0	83.3	85.0	-

Note:

[1] According to the GFS Helpad Specification Guidelines, the helicopter approach and departure trajectory will be projected at an 8% slope within 245 metres from the edge of the helpad. Beyond 245 metres the slope increases to 12.5%.

[2] Helpad elevation at 6mPD.

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Lateral Movements)

With reference to the International Civil Aviation Organisation,
 the L_{max} (lateral movements) for helicopter Airbus H175 were :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175 [1]	
Approach	82.1	120.0
Take-Off	76.8	150.0
Flyover	78.0	150.0

Note :

- [1] The EPNLs are determined under conditions prescribed in Chapter 8 and Appendix 4 of Annex 16 of ICAO, and prescribed in 14 CFR 36 Appendix.
- [2] $L_{max} = EPNL - 13$, with reference to "Transportation Noise Reference Book" (Nelson, 1987), Equation (6a) "Conversion Relationship of Aircraft Noise Indices between WECPNL and DENL" (Proceedings of 20th International Congress of Acoustics), Section 2.1 "Consideration to noise index for evaluating airport noise in Japan" (The 33rd International Congress and Exposition on Noise Control Engineering) and Section 2 "Evaluation and Prediction of Airport Noise in Japan" (Journal of the Acoustical Society of Japan).

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Flyover

Airbus H175 - Flyover

NSR	Horizontal Distance [1] (m)	Helicopter Elevation [2] (m)	Building Height (mPD)	Vertical Separation (mPD)	Separation Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance
							Distance	Barrier	Facade			
							dB(A)	dB(A)	dB(A)			
CV32A	0	457	28	429	429	78.0	-9.1	0.0	3.0	71.9	85.0	-
CV30B	0	457	28	429	429	78.0	-9.1	0.0	3.0	71.9	85.0	-
PVCE	0	457	74	383	383	78.0	-8.1	0.0	3.0	72.9	85.0	-

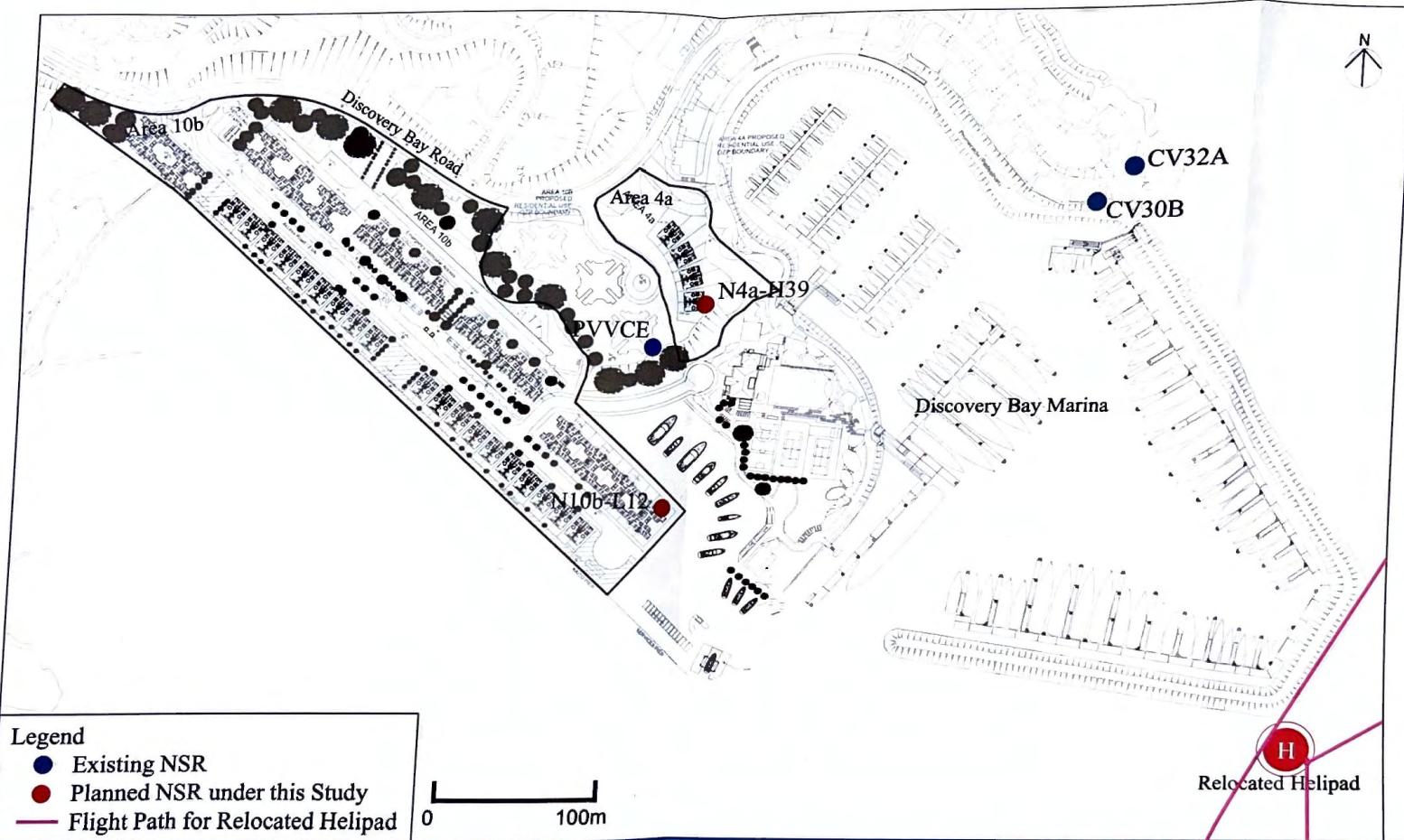
Note:

- [1] Horizontal distance is assumed to be zero for conservative assessment.

- [2] A helicopter should not fly over a congested area of a city, town or settlement below a height of 1500 feet (i.e. ~457m) according to Schedule 14, Cap.448c, Air Navigation (Hong Kong) Order 1995.

Appendix 3.2

Detailed Helicopter Noise Assessment Results (Relocated Helipad)



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Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop Heliport at New Acute Hospital at Kai Tak Development Area" (EIA-266/2020),
 the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L _{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Idling

Airbus H175 - Idling

NSR	Horizontal Distance (m)	L _{max} at Reference Distance dB(A)	Correction			Corrected L _{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	385	75.4	-8.2	0.0	3.0	70.2	85.0	-
CV30B	370	75.4	-7.8	0.0	3.0	70.6	85.0	-
PVCE	485	75.4	-10.2	0.0	3.0	68.2	85.0	-
N4a-H39	470	75.4	-9.9	0.0	3.0	68.5	85.0	-
N10b-L12	420	75.4	-8.9	0.0	3.0	69.5	85.0	-

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 Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop HeliPad at New Acute Hospital at Kai Tak Development Area" (EIA-266/2020),
 the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Lift-off

Airbus H175 - Lift-off

NSR	Horizontal Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	385	82.4	-8.2	0.0	3.0	77.2	85.0	-
CV30B	370	82.4	-7.8	0.0	3.0	77.6	85.0	-
PVVCE	485	82.4	-10.2	0.0	3.0	75.2	85.0	-
N4a-H39	470	82.4	-9.9	0.0	3.0	75.5	85.0	-
N10b-L12	420	82.4	-8.9	0.0	3.0	76.5	85.0	-

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop Heliport at New Acute Hospital at Kai Tak Development Area" (EIA-268/2020),
 the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Hovering

Airbus H175 - Hovering

NSR	Horizontal Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	385	83.5	-8.2	0.0	3.0	78.3	85.0	-
CV30B	370	83.5	-7.8	0.0	3.0	78.7	85.0	-
PVCE	485	83.5	-10.2	0.0	3.0	76.3	85.0	-
N4a-H39	470	83.5	-9.9	0.0	3.0	76.6	85.0	-
N10b-L12	420	83.5	-8.9	0.0	3.0	77.6	85.0	-

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Non-lateral Movements)

With reference to the approved EIA Study "A Rooftop Helped at New Acute Hospital at Kai Tak Development Area" (EIA-288/2020),
 the L_{max} (non-lateral movements) for helicopter Airbus H175 was :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175	
Helicopter on ground, Idling	75.4	150.0
Lift-off	82.4	150.0
Hovering	83.5	150.0
Touchdown	78.9	150.0

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Touchdown

Airbus H175 - Touchdown

NSR	Horizontal Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
			Distance dB(A)	Barrier dB(A)	Facade dB(A)			
CV32A	385	78.9	-8.2	0.0	3.0	73.7	85.0	-
CV30B	370	78.9	-7.8	0.0	3.0	74.1	85.0	-
PVVCE	485	78.9	-10.2	0.0	3.0	71.7	85.0	-
N4a-H39	470	78.9	-9.9	0.0	3.0	72.0	85.0	-
N10b-L12	420	78.9	-8.9	0.0	3.0	73.0	85.0	-

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Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Lateral Movements)

With reference to the International Civil Aviation Organisation,
 the L_{max} (lateral movements) for helicopter Airbus H175 were :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175 ^[1,2]	
Approach	82.1	120.0
Take-Off	76.8	150.0
Flyover	78.0	150.0

Note :

- [1] The EPNLs are determined under condition prescribed in Chapter 8 and Appendix 4 of Annex 16 of ICAO, and prescribed in 14 CFR 36 Appendix.
- [2] L_{max} = EPNL -13 , with reference to "Transportation Noise Reference Book" (Nelson, 1987), Equation (6a) "Conversion Relationship of Aircraft Noise Indices between WECPNL and DENL." (Proceedings of 20th International Congress of Acoustics), Section 2.1 "Consideration to noise index for evaluating airport noise in Japan" (The 33rd International Congress and Exposition on Noise Control Engineering) and Section 2 "Evaluation and Prediction of Airport Noise in Japan" (Journal of the Acoustical Society of Japan).

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Approach

Airbus H175 - Approach

NSR	Horizontal Distance	Distance to be Travelled by Helicopter before Approach ^[1]	Altitude of Helicopter	Helicopter Elevation ^[2]	Building Height	Vertical Separation	Separation Distance	L_{max} at Reference Distance	Correction			Corrected L_{max}	Noise Criteria	Exceedance			
									Distance	Barrier	Facade						
CV32A	285	260	21	27	28	0	285	82.1	-7.5	0.0	3.0	77.6	85.0	-			
CV30B	295	232	19	25	28	3	295	82.1	-7.8	0.0	3.0	77.3	85.0	-			
PV/CCE	490	7	1	7	74	67	490	82.1	-12.2	0.0	3.0	72.9	85.0	-			
N49-H39	475	49	4	10	22	12	475	82.1	-12.0	0.0	3.0	73.1	85.0	-			
N10b-L12	415	66	5	11	26	15	415	82.1	-10.8	0.0	3.0	74.3	85.0	-			

Note:

- [1] According to the GFS Heliport Specification Guidelines, the helicopter approach and departure trajectory will be projected at an 8% slope within 245 metres from the edge of the helipad. Beyond 245 metres the slope increases to 12.5%.

- [2] Heliport elevation at 6mPD.

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Lateral Movements)

With reference to the International Civil Aviation Organisation,
 the L_{max} (lateral movements) for helicopter Airbus H175 were :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175 [1,2]	
Approach	82.1	120.0
Take-Off	76.8	150.0
Flyover	78.0	150.0

Note :

- [1] The EPNLs are determined under conditions prescribed in Chapter 8 and Appendix 4 of Annex 16 of ICAO, and prescribed in 14 CFR 36 Appendix.
- [2] $L_{max} = EPNL + 13$, with reference to "Transportation Noise Reference Book" (Nelson, 1987). Equation (Ba) "Conversion Relationship of Aircraft Noise Indices between WECPNL and DENL" (Proceedings of 20th International Congress of Acoustics), Section 2.1 "Consideration to noise index for evaluating airport noise in Japan" (The 33rd International Congress and Exposition on Noise Control Engineering) and Section 2 "Evaluation and Prediction of Airport Noise in Japan" (Journal of the Acoustical Society of Japan).

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Take-off

Airbus H175 - Take-off

NSR	Horizontal Distance ^[2] (m)	Distance to be Travelled by Helicopter after Take-off ^[1] (m)	Altitude of Helicopter (m)	Helicopter Elevation ^[3] (mPD)	Building Height (mPD)	Vertical Separation (m)	Separation Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance
									Distance	Barrier	Facade			
CV32A	285	260	21	27	28	0	285	76.8	-5.6	0.0	3.0	74.2	85.0	-
CV30B	295	232	19	25	28	3	295	76.8	-5.9	0.0	3.0	73.9	85.0	-
PVCE	490	7	1	7	74	67	490	76.8	-10.3	0.0	3.0	69.5	85.0	-
N4a-H39	475	49	4	10	22	12	475	76.8	-10.0	0.0	3.0	69.8	85.0	-
N10b-L12	415	66	5	11	26	15	415	76.8	-8.8	0.0	3.0	71.0	85.0	-

Note:

[1] According to the GFS Helpad Specification Guidelines, the helicopter approach and departure trajectory will be projected at an 8% slope within 245 metres from the edge of the helipad. Beyond 245 metres the slope increases to 12.5%.

[2] Helpad elevation at 6mPD.

Project: 235928 Optimization of Land Use in Discovery Bay
 Title: Predicted Noise Level from Helicopter Noise (Lateral Movements)

With reference to the International Civil Aviation Organisation,
 the L_{max} (lateral movements) for helicopter Airbus H175 were :

Configuration	L_{max} Noise Level, dB(A)	Reference Distance, m
	Airbus H175 [2]	
Approach	82.1	120.0
Take-Off	76.8	150.0
Flyover	78.0	150.0

Note :

[1] The EPNLs are determined under conditions prescribed in Chapter 8 and Appendix 4 of Annex 16 of ICAO, and prescribed in 14 CFR 36 Appendix.

[2] L_{max} = EPNLB-13, with reference to "Transportation Noise Reference Book" (Nelson, 1987), Equation (6a) "Conversion Relationship of Aircraft Noise Indices between WECPNL and DENL." (Proceedings of 20th International Congress of Acoustics), Section 2.1 "Consideration to noise index for evaluating airport noise in Japan" (The 33rd International Congress and Exposition on Noise Control Engineering) and Section 2 "Evaluation and Prediction of Airport Noise in Japan" (Journal of the Acoustical Society of Japan).

Predicted Unmitigated Noise Level (L_{max}) at Identified NSRs - Flyover

Airbus H175 - Flyover

NSR	Horizontal Distance [1] (m)	Helicopter Elevation [2] (m)	Building Height (mPD)	Vertical Separation (mPD)	Separation Distance (m)	L_{max} at Reference Distance dB(A)	Correction			Corrected L_{max} dB(A)	Noise Criteria dB(A)	Exceedance dB(A)
							Distance	Barrier	Facade			
							dB(A)	dB(A)	dB(A)			
CV32A	0	457	28	429	429	78.0	-9.1	0.0	3.0	71.9	85.0	-
CV30B	0	457	28	429	429	78.0	-9.1	0.0	3.0	71.9	85.0	-
PPVCE	0	457	74	383	383	78.0	-8.1	0.0	3.0	72.9	85.0	-
N4a-H39	0	457	22	435	435	78.0	-9.2	0.0	3.0	71.8	85.0	-
N10b-L12	0	457	26	431	431	78.0	-9.2	0.0	3.0	71.8	85.0	-

Note:

[1] Horizontal distance is assumed to be zero for conservative assessment.

[2] A helicopter should not fly over a congested area of a city, town or settlement below a height of 1500 feet (i.e. ~457m) according to Schedule 14, Cap 448c, Air Navigation (Hong Kong) Order 1995.