
Appendix C

Air Quality Impact Assessment

Prepared for

Leverson Ltd.

Prepared by

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**SECTION 16 PLANNING APPLICATION FOR SUBMISSION
OF LAYOUT PLAN FOR PERMITTED 'FLAT' AND
'SOCIAL WELFARE FACILITY' USES AT TSUEN WAN
INLAND LOT 5 AND LOT NO. 429 IN D.D. 399,
TING KAU, TSUEN WAN**

AIR QUALITY IMPACT ASSESSMENT

Date **July 2024**

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Project Reference **SHKTKBHSEI00**

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1. INTRODUCTION

1.1 Background and Objectives

- 1.1.1 The Subject Site falls in "Residential (Group B) 2" ("R(B)2") Zone at TWIL 5 and Lot No. 429 in D.D. 399, Ting Kau, Tsuen Wan according to the approved Tsuen Wan West Outline Zoning Plan ("OZP") No. S/TWW/21 gazetted under section 9(1)(a) of Town Planning Ordinance.
- 1.1.2 Ramboll Hong Kong Limited is commissioned by the project proponent to conduct the Air Quality Impact Assessment ("AQIA") to support the planning application for the proposed redevelopment. This AQIA report is prepared based upon the proposed master layout plan. Corresponding mitigation measures will be proposed if it is required. The potential noise impact upon the proposed master layout plan will be addressed by a separate assessment report.

1.2 Subject Site and its Environs

- 1.2.1 The Subject Site is located to the east of Tsing Long Highway (Toll Road) and south of Castle Peak Road (Ting Kau) as well as between Lido Beach and Ting Kau Beach. **Figure 1.1** shows the location of the Subject Site and its environs.
- 1.2.2 The Proposed Redevelopment is tentatively scheduled for completion in 2028.

1.3 Proposed Redevelopment

- 1.3.1 The development site area of Proposed Redevelopment is approximately 6,066 m² and consists of two residential blocks (Tower 1 and 2), a social welfare facility underneath Tower 1 and a car park at the basement. The Proposed Redevelopment will provide a total number of not more than 674 residential units. **Appendix 1.1** shows the MLP of the Proposed Development.

1.4 Appraisal on Air Quality Impact

Construction Phase

- 1.4.1 During the construction phase, the potential air quality impacts would be mainly caused by the dust emissions generated during construction activities. A qualitative air impact assessment for construction phase is prepared and will be discussed in subsequent sections of this report.

Operation Phase

- 1.4.2 With respect to the potential vehicular emission impact, the Subject Site is affected by nearby carriageways such as Castle Peak Road – Ting Kau and Tsing Long Highway. In addition, a site visit was conducted in November 2023 to identify presence of any active chimney within 500m from the Subject Site. The study also considers the major point sources within 4km assessment area from the Subject Site.
- 1.4.3 A quantitative air quality impact assessment for operation phase is prepared to address the potential air quality impact under Hong Kong Air Quality Objectives (AQOs) and will be discussed in subsequent sections of this report.

2. AIR QUALITY IMPACT ASSESSMENT

2.1 Scope of Work

- 2.1.1 This assessment predicts air quality pollutant concentration at the Proposed Development, informing the provision of air quality mitigation measures to ensure future residents are not exposed to unacceptable levels of air quality. Potential air quality impacts associated with the surrounding road carriageways, industrial emission and marine vessel emission (if any) within 500m assessment area shall be identified and assessed.
- 2.1.2 With reference to EPD's Guidelines on Assessing the 'Total' Air Quality Impact, any major point sources which are within 4km from the Subject Site and identified to have direct impact to the ASRs, have also been considered in this assessment.
- 2.1.3 The key air pollutants of vehicular emission are Nitrogen Dioxide (NO₂), Respirable Suspended Particulate (RSP) and Fine Suspended Particulate (FSP). Concentrations of these pollutants are predicted at air sensitive receivers (ASRs) within the Proposed Redevelopment through the use of quantitative computer modelling and are compared with the relevant AQOs.
- 2.1.4 The assessment area of 500m from the Subject Site is shown in **Figure 2.1**.
- 2.1.5 Appropriate mitigation measures will be recommended if exceedances of AQOs are identified.
- 2.1.6 The air quality control measures during the construction phase of Proposed Redevelopment are also addressed in this chapter.

2.2 Relevant Legislations, Standards and Guidelines

- 2.2.1 The following legislation and regulations provide the standards and guidelines for evaluation of air quality impacts and the type of works that are subject to air pollution control:
- Air Pollution Control Ordinance (APCO) (Cap. 311) and the Air Quality Objectives (AQO)
 - Air Pollution Control (Construction Dust) Regulation
 - Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation
 - Air Pollution Control (Fuel Restriction) Regulation
 - Recommended Pollution Control Clauses for Construction Contracts
 - Development Bureau Technical Circular (Works) No.13/2020, Timely Application of Temporary Electricity and Water Supply for Public Works Contracts and Wider Use of Electric Vehicles in Public Works Contracts (DEVB TC No. 13/2020)
 - Development Bureau Technical Circular (Works) No.1/2015, Emissions Control of NRMM in Capital Works Contracts of Public Work (DEVB TC No. 1/2015)
 - Control of Air Pollution in Car Parks (ProPECC PN 2/96)

Air Pollution Control Ordinance (CAP 311)

- 2.2.2 To achieve as soon as reasonably practicable and to maintain thereafter to safeguard the health of the community, a set of Air Quality Objectives (AQOs) is established under the Air Pollution Control Ordinance (Cap. 311). The latest set of AQOs that came into effect on 1 January 2022 is presented in **Table 2.1**.

Table 2.1 Hong Kong Air Quality Objectives

Pollutants	Average Time	Standard ^[i] ($\mu\text{g}/\text{m}^3$)	No. of exceedances allowed
SO ₂	10-min	500	3
	24-Hour	50	3
RSP (PM ₁₀) ^[ii]	24-Hour	100	9
	Annual	50	NA
FSP (PM _{2.5}) ^[iii]	24-Hour	50	35
	Annual	25	NA
NO ₂	1-Hour	200	18
	Annual	40	NA
Ozone (O ₃)	8-Hour	160	9
Carbon Monoxide (CO)	1-Hour	30,000	0
	8-Hour	10,000	0
Lead (Pb)	Annual	0.5	NA

Notes:

[i] All measurements of the concentration of gaseous air pollutants, i.e. sulphur dioxide, nitrogen dioxide, ozone and carbon monoxide, are to be adjusted to a reference temperature of 293 Kelvin and a reference pressure of 101.325 kilopascal.

[ii] Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 μm or less.

[iii] Fine suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 2.5 μm or less.

Air Pollution Control (Construction Dust) Regulation

2.2.3 Made under Section 43 of the APCO, this Regulation defines notifiable and regulatory works for achieving the purpose of dust control for a number of activities. The Regulation requires that any notifiable work shall give advance notice to EPD, and the Contractors shall ensure that the notifiable and regulatory works are carried out in accordance with the Schedule of the Regulation. Dust control and suppression measures are also provided in the Schedule.

2.2.4 The proposed construction works for the proposed Project are both regulatory and notifiable works due to activities including material stockpiling and dusty material handling as potential sources of fugitive dust emissions as detailed under Parts I to IV of the Schedule on Dust Control Requirements.

Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation

2.2.5 The Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation, which aims to control emissions from non-road mobile machinery (NRMMS) to improve air quality, became effective on 1 June 2015. NRMMS include non-road vehicles, as well as mobile machines and equipment (regulated machines) such as crawler cranes, excavators and air compressors.

2.2.6 Under the regulation, regulated machines have to comply with the Stage IIIA emission standards of the European Union (EU). It also requires all regulated machines sold or leased for use in Hong Kong to bear an approval or exemption label issued to them by the EPD, started from 1 September 2015. It restricts specified activities and locations including construction sites, designed waste disposal facilities and specified processes to use only NRMMS that bear an approval or exemption label issued to them by the EPD, with effect from 1 December 2015.

Air Pollution Control (Fuel Restriction) Regulation

2.2.7 The Air Pollution Control (Fuel Restriction) Regulation was enacted in 1990 to impose legal control on the type of fuels allowed for use and their sulphur contents in

commercial and industrial processes to reduce sulphur dioxide (SO₂) emissions. In June 2008, the Regulation was amended to tighten the control requirements of liquid fuels.

Development Bureau Technical Circular (Works) No.13/2020, Timely Application of Temporary Electricity and Water Supply for Public Works Contracts and Wider Use of Electric Vehicles in Public Works Contracts (DEVB TC No. 13/2020)

- 2.2.8 DEVB TC no. 13/2020, effective from 1 February 2021 and onwards, requires timely provision of electricity and water supply in all public works contracts which helps reducing the carbon emission and water and noise pollution from the operation of diesel generators as well as personal hygienic matters. It requires the electrical cables and watermains laying works to be completed before the commencement of the works contract. The Contractor shall also specify the number of electric vehicles to be used with reference to the requirement in the TC.

Development Bureau Technical Circular No.1/2015 "Emissions Control of NRMM in Capital Works Contracts of Public Works" (DEVB TC No.1/2015)

- 2.2.9 DEVB TC No.1/2015 stipulates additional requirement on the use of NRMM approved under the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation for all public works contract with an aim on deploying more approved NRMM in the execution of public works. The use of exempted NRMM regrading generators, air compressors, excavators and crawler cranes have been banned on or after 1 June 2015.

Practice Note on Control of Air Pollution in Car Parks

- 2.2.10 This practice notes include air quality guidelines required for the protection of public health and factors that should be considered in the design and operation of car parks in order to achieve the required air quality. The limits for air pollutants as recommended by the practice notes are summarised in **Table 2.2**.

Table 2.2 Limits of Air Pollutant Concentrations Inside Car Parks

Air Pollutant	Average Time	Maximum Concentration (µg/m ³) ^[1]	Parts Per Million (ppm)
Carbon Monoxide (CO)	5 minutes	115,000	100
Nitrogen Dioxide (NO ₂)	5 minutes	1,800	1

Notes:

- i. *All limits are expressed as at reference conditions of 298K and 101.325kPa.

2.3 Existing and Simulated Air Quality in Tsuen Wan District

- 2.3.1 The nearest air quality monitoring station (AQMS) to the Proposed Redevelopment is the Tsuen Wan (TWN) AQMS. The five most recent years of air quality monitoring data, 2018 to 2022, from this station are summarized in . According to the AQMS monitoring data presented in **Table 2.3**, exceedance in NO₂ and O₃ concentrations are recorded.

Table 2.3 Air Quality Monitoring Data at Tsuen Wan AQMS

Air Pollutant	Averaging Time	AQO ^(a) (b)	Concentration Level ($\mu\text{g}/\text{m}^3$)				
			2018	2019	2020	2021	2022
SO ₂	10-min (4 th highest)	500 (3)	113	45	24	23	32
	24-hr (4 th highest)	50 (3)	21	13	10	8	12
RSP	24-hr (10 th highest)	100 (9)	71	65	54	60	52
	Annual	50	30	30	24	24	22
FSP	24-hr (19 th highest)	50 (35)	34	34	27	27	26
	Annual	25	20	20	15	16	14
NO ₂	1-hr (19 th highest)	200 (18)	181	177	142	151	140
	Annual	40	45	46	36	44	39
O ₃	8-hr (10 th highest)	160 (9)	148	171	130	130	152
CO ^(d)	1-hr (1 st highest)	30,000	1680	1970	1440	1240	1430
	8-hr (1 st highest)	10,000	1421	1835	1355	1164	1390
Notes:							
a. The measured concentrations are benchmarked against the prevailing AQOs.							
b. Numbers in brackets is the number of exceedances allowed per year.							
c. Bolded values exceed the relevant AQO.							
d. Data extracted from EPD's Smart Air Modelling Platform (VIA)							
e. Kwun Tong AQMS does not measure CO.							

2.3.2 The future background air quality data was extracted from the Pollutants in the Atmosphere and their Transport over Hong Kong model version 3.0 (PATH v3.0) released by EPD in January 2024.

2.3.3 As the tentative year of completion of the Proposed Redevelopment is 2028, the year of 2025 hourly background concentrations of NO₂, RSP and FSP in Grid 30, 38 and Grid 30, 39 which has been adopted for the purpose of this assessment is summarized in **Table 2.4**. With respect to the future background air quality predicted by PATH in **Table 2.4**, all values are below the relevant AQOs except O₃.

Table 2.4 Year 2025 Background Annual Average Concentrations of the Air Pollutants from PATH v3.0

Air Pollutant	Averaging Time	Concentration Level ($\mu\text{g}/\text{m}^3$) ^(b)		AQO ^(a)
		Grid 30, 38	Grid 30, 39	
SO ₂	10-min (4 th highest)	33	27	500 (3)
	24-hr	8	7	50 (3)
RSP	24-hr (10 th highest)	55	56	100 (9)
	Annual	21	21	50
FSP	24-hr (19 th highest)	28	28	50 (35)
	Annual	13	13	25
NO ₂	1-hr (19 th highest)	102	98	200 (18)

Air Pollutant	Averaging Time	Concentration Level ($\mu\text{g}/\text{m}^3$) ^(b)		AQO ^(a)
		Grid 30, 38	Grid 30, 39	
	Annual	28	23	40
O ₃	8-hr (10th highest)	176	175	160 (9)
CO	1-hr (1st highest)	578	579	30,000
	8-hr (1st highest)	562	559	10,000
(a) Numbers in brackets is the number of exceedances allowed per year				
(b) Bolded values exceed the relevant AQO				
(c) Data extracted from EPD's Smart Air Modelling Platform (VIA)				

2.4 Identification of Air Sensitive Receivers (ASRs) during Construction Phase

2.4.1 There are a number of residential buildings located within 500m of the Proposed Development. The representative ASRs are tabulated in **Table 2.5**. The location of these ASRs can be referred to **Figure 2.2**.

Table 2.5 Representative ASRs during Construction Phase

Ref	Descriptions	Type	Approximate minimum horizontal distance to Subject Site
1	Sea Cliff Lodge	Residential	16m
2	Aztec Lodge House 5	Residential	36m
3	Ting Kau Sitting-out Area	Recreation	67m
4	113 Ting Kau	Residential	50m
5	115 Ting Kau	Residential	59m
6	117 Ting Kau	Residential	62m
7	Grand Riviera	Residential	151m
8	Lindo Green Lam's	Residential	128m
9	Lido Beach Office	Commercial	137m
10	Edinburgh Villa	Residential	248m
11	Riviera Apartment	Residential	255m
12	DEAUVILLE	Residential	308m
13	Ting Kau Village Playground	Recreation	135m

2.5 Identification of Potential Emissions during Construction Phase and Recommended Mitigation Measures

Identification of Potential Emissions

- 2.5.1 Fugitive dust will be the potential major source of air quality impact during the construction phase. Besides, the Subject Site is located at developed urban area where supply of electricity is available for the Subject Site. Therefore, it is anticipated that the number of diesel/ petroleum fuelled machinery operated at the Subject Site can be minimized as practically as possible with the availability of the supply of electricity. Moreover, under the Air Pollutant Control (Non-road Mobile Machinery) (Emission) Regulation, only approved or exempted non-road mobile machineries (including mobile generator, air compressor, crawler crane, bulldozer, etc.) with a proper label are allowed to be used in the construction site, which would meet the prescribed emission standards and requirement. According to the requirements stipulated in the Air Pollution Control (Fuel Restriction) Regulation and its amendment, using liquid fuel with a sulphur content of less than 0.005% by weight (such as Ultra Low Sulphur Diesel) for the equipment should be fulfilled to control the SO₂ and PM emissions. Travelling of the dump trucks is another potential source of construction dust. At this planning application stage, there is no detailed information on the construction program or amount of excavated material to be handled. An EM&A programme will be implemented to ensure that the nearby ASRs will not be subject to adverse air quality impact during the construction stage. In addition, the number of PME shall be provided to justify that the number is limited.

Mitigation Measures for Fugitive Dust Emission

- 2.5.2 Since paved roads are already existing within the Subject Site, it is expected that the construction dust to be generated by vehicle movement within the Subject Site are limited. Fugitive dust emission mostly arises from construction activities and can be effectively suppressed by incorporating proper mitigation measures into work procedures through contractual clauses with reference to EPD's Recommended Pollution Control Clauses for Construction Contracts, where applicable, good site management, and close monitoring by the resident engineers. The contractor shall be required to follow the requirements of the Air Pollution Control (Construction Dust) Regulations for demolition and construction of the project. With the adaptation of good practices, it is expected that emission of construction dust can be kept at an acceptable level. Mitigation measures including but not limited to the followings with respect to demolition, infrastructure construction of a building should be implemented as appropriate.

In the case of demolition works:

- The area at which demolition work takes place shall be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the demolition activities so as to maintain the entire surface wet;
- For any wall of the building to be demolished that abuts or fronts upon a street, service lane or other open area accessible to the public, impervious dust screens or sheeting shall be used to enclose the whole wall to a height of at least 1m higher than the highest level of the structure being demolished;
- Any dusty materials remaining after a stockpile is removed shall be wetted with water and cleared from the surface of roads or streets.

In the case of infrastructure construction works:

- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting shall be provided to enclose the scaffolding from the ground floor level of the building;

- Any skip hoist for material transport shall be totally enclosed by impervious sheeting;
- Any relevant requirements set out in Parts III and IV of Air Pollution Control (Construction Dust) Regulations shall be met;
- Vehicle washing facilities including a high pressure water jet shall be provided at every discernible or designated vehicle exit point;
- Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4 m high from ground level shall be provided along the entire length of that portion of the site boundary except for a site entrance or exit;
- Locate all the dusty activities away from any nearby ASRs as far as practicable;
- Erect higher hoarding at the locations with ASRs in immediate proximity to the project site boundary;
- Avoid using exempted non-road mobile machineries;
- Consider connecting construction plant and equipment to mains electricity supply and avoid use of diesel generators and diesel-powered equipment as far as practicable.

The recommended dust mitigation measures are described below:

Monitoring and Auditing

- 2.5.3 Monitoring and auditing program will be implemented to ensure that mitigation measures are in place and there is no significant air quality impact arising from the construction activities of the Proposed Redevelopment on the nearby ASRs during the construction phase.

General Site Management

- 2.5.4 Appropriate working methods should be devised and arranged to minimise dust emissions and to ensure any installed control system and/or measures are operated and/or implemented in accordance with their design merits. No free falling of construction debris should be allowed, which should be let down by hoist or enclosed tunnel to the ground.
- 2.5.5 A high standard of housekeeping shall be maintained. Any piles of materials accumulated on or around the work areas shall be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas shall be carried out in a manner that does not generate fugitive dust emissions. Prior to cleaning, the materials should be handled properly to prevent fugitive dust emission. Any exposed earth shall be properly treated by compacting or hydro seeding, within 6 months after the last construction activity.
- 2.5.6 Frequent mist/ water spraying should be applied on dusty areas. The frequency of spraying will depend upon local conditions such as rainfall, temperature, wind speed and humidity. The amount of water spraying should be just enough to dampen the material without over-watering which could result in surface water runoff.

Vehicles

- 2.5.7 Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of not less than 2.4 m high from ground level shall be provided along the entire length of that portion of the site boundary except for a site entrance or exit.

Material Stockpiling and Handling

- 2.5.8 The amount of stockpiling should be minimised where possible. Construction material or debris should be covered and stored inside enclosed areas. Other control measures such as enclosed or semi-enclosed windboard should be used, where applicable, to minimise dust emission. Regular watering is needed at areas such as storage piles, where there could be potential dust emission.

Dust Emissions from Site Traffic

- 2.5.9 Dust emission from construction traffic is generated predominantly from the travelling of waste removal lorries. Areas within the Subject Site where there are regular vehicle movements should have a hard surface. Speed controls at an upper limit of 10km/hr should be imposed and their movements should be confined to designated roadways within the Subject Site. All dusty vehicle loads should have side and tail boards covered by tarpaulin extending at least 300mm over the edges. Wheel-wash troughs and hoses should be provided at exit points of the Subject Site.
- 2.5.10 "Recommended Pollution Control Clauses for Construction Contracts" is available on the EPD website which set out the recommended air pollution control measures to be implemented by the contractor(s) during the construction stage of the Project.
- 2.5.11 With the adoption of good practices, it is expected that emission of construction fugitive dust can be kept to an acceptable level.

2.6 Identification of Air Sensitive Receivers (ASRs) during Operational Phase

- 2.6.1 Representative ASRs within the Proposed Redevelopment as shown in **Figure 2.3** are selected to assess the air quality at the Proposed Redevelopment and determine the appropriate fresh air intake locations for the podium of the Proposed Development. Assessment Height for the ASRs scattered around the Proposed Redevelopment are taken starting from the local ground level (1.5m breathing zone added if applicable, i.e. (27.50mPD + 1.50 = 29.0mPD).
- 2.6.2 Details of these representative ASRs are shown in **Table 2.6** below.

Table 2.6 Details of Representative ASRs for Air Quality Impact Assessment

Grid	ASR ID	Local Ground Level, mPD	Flagpole Height, mAG	Assessment Height, mPD
30,39	A1 to A9	27.50	1.50 – 48.65	29.0 – 76.15
30,38	A10			

2.7 Identification of Pollution Sources During Operational Phase

General

- 2.7.1 In line with EPD's "Guidelines on Assessing the 'TOTAL' Air Quality Impacts", all three tiers of emissions that will contribute to the total air quality impacts on ASRs within the assessment area have been identified, including:
- (1) Primary Contribution: Project induced
 - (2) Secondary Contributions: Pollutant-emitting activities in the immediate neighbourhood
 - (3) Background Contributions: Pollution not accounted for by (1) and (2)
- 2.7.2 Primary and secondary contributions are near-field source impacts due to sources within the assessment area such as vehicular emission from existing road network

and proposed roads, industrial emissions from identified chimneys as well as marine vessel emissions (if any). Background contributions are far-field source impacts outside the assessment area and are predicted using the PATH v3.0. The cumulative air quality impact assessment for operation phase is a combination of all three tiers of contributions and thus has taken into account the near-field and far-field sources.

- 2.7.3 Within the 4km radius area of the Subject Site, one major point source, i.e. Asphalt Plant (AP-05), has been identified within the 4km radius area of the Subject Site.

Source Description and Emission Inventory

- 2.7.4 As mentioned in **Section 2.1**, emissions from open roads, industrial emission, marine vessel emission and major point source have been considered and assessed if applicable.

(i) Open Roads Emissions

- 2.7.5 Air pollutant concentration at the Subject Site due to the emission from the nearby road networks (vehicular tailpipe emissions) was assessed. The traffic data is provided by the Project Traffic Consultant (see **Appendix 2.1**) while Transport Department's (TD) endorsement letter would be provided when available. The emission rate of each road within 500m from the Subject Site is calculated from the latest EMFAC-HK issued by EPD. According to the "Guidelines on Choice of Models and Model Parameters", the open road emissions would be modelled by AERMOD. Its modelling methodology is referred to the "Technical Note for Modelling Vehicular Emissions using AERMOD".

(ii) Industrial Emissions

- 2.7.6 A site visit was conducted in November 2023 to verify the presence of chimneys. Upon visit, there is no chimney or industrial activities identified within 500m assessment area from the Subject Site. Besides, there will not be any proposed air emission sources within the Site anticipated.

(iii) Marine Vessel Emissions

- 2.7.7 Based on the desktop review and a site visit was conducted in November 2023, there is no marine vessel activities identified within 500m assessment area from the Subject Site.

(iv) Emissions from Public Transport Interchanges and Open Carparks

- 2.7.8 No public transport interchanges are found within the 500m assessment area from the Subject Site. Ting Kau Car Park is located at around 80m north of the Subject Site. The utilisation rate of the open carpark is low, and there are no parking spaces assigned for FBDD and FBSD according to site survey. Nevertheless, start emission of all 18 vehicle classes (except FBDD and FBSD) have been assigned to the road connecting to the open carpark (i.e. Road L6, L7, L8, L9, L10, L11, L15, L16, L7, L15, L16, L17, L18, L19, L20, L21, L22 and L23) as broad-brush approach to prevent any underestimation of emission from the open carpark.

(v) Major Point Source within 4km

- 2.7.9 Asphalt Plant (AP-05) at Tsing Yi was identified as a major point source about 1.87km from the Subject Site. However, the emission from asphalt plant (AP-5) would not have a direct impact to the representative ASRs of the Application Site due to screening by natural terrain. Therefore, the emission source from AP-5 would be excluded in the assessment.

2.8 Dispersion Modelling and Modelling Approach for Emission Sources

AERMOD

- 2.8.1 The dispersion of NO, NO₂, RSP and FSP were modelled using AERMOD software released by Lakes Environmental Software. The model is based on the principle of Gaussian dispersion and is widely accepted by EPD and is used in this assessment to predict both concentration and deposition of pollutants from line sources. As discussed in **Section 1.1.1** and **2.3.3**, PATH v3.0 was adopted to provide the background pollutant concentrations in assessing the total air quality impact on the representative ASRs. In addition, met data including temperature and relative humidity extracted from the EPD's Smart Air Modelling Platform (VIA) were also adopted for modelling.
- 2.8.2 The Application Site and its 500m assessment area fall within the PATH grids (30,38), (30,39), (31,38) and (31,39). The predicted meteorological data for the relevant PATH grids from PATH v3.0 obtained from EPD's website were used for model input. The WRF meteorological data, including wind data, temperature, relative humidity, pressure, cloud cover, mixing height and Pasquill stability classes, for Year 2019 extracted from the PATH v3.0 released by EPD in January 2024 at the relevant grids have been adopted as on-site data into AERMET.
- 2.8.3 Land use types surrounding the Proposed Development, the albedo, Bowen ratio for the 10km x 10 km area, surface roughness for the 1km area, and the Surface File and Profile File to be used as input in AERMOD are downloaded and extracted from the AERMET tool in the VIA. The relevant information is provided in **Appendix 2.2**.
- 2.8.4 AERMET and AERMOD model input parameters and assumptions for the operation phase are summarised in **Table 2.7**.

Table 2.7 Model Input Parameters and Assumptions for Operation Phase

Input Parameters & Assumptions	Descriptions
Type of Sources	<ul style="list-style-type: none"> • Vehicular Emissions: Line sources
Assessment Parameters	<ul style="list-style-type: none"> • Hourly and annual NO and NO₂ • Daily and annual RSP • Daily and annual FSP
Meteorological data	<ul style="list-style-type: none"> • Year 2019 WRF data from PATH v3.0 • PATH grids: (30,38), (30,39) • Mixing height values recorded by HKO in 2019 were in the range of 119m to 2009m. Mixing heights from WRF data which are lower than 119 or higher than 2009 were adjusted to 119m and 2009m, respectively • Wind speed <0.5m/s adjusted to 0.5m/s • Anemometer height of WRF data: 8.5m

EMFAC-HK

- 2.8.5 2028 is chosen as the Model Year for EMFAC-HK year in the VIA to represent the worst case scenario emission.
- 2.8.6 In accordance with a Guideline of Use of Temperature and Relative Humidity Data for Vehicular Emission Factor Prediction published by EPD in March 2021, the monthly minimum temperature and relative humidity (RH) were applied for both short-term (i.e. hourly/ daily average) and long-term (i.e. annual average) air quality impact of NO₂, RSP and FSP. Summary of met data is shown in **Appendix 2.3**.

Traffic Data

- 2.8.7 Four sets traffic data predicted by the project traffic consultant, AECOM Asia Company Limited, includes hourly traffic flows with a composition of 18 vehicle classes according to "Guideline on Modelling Vehicle Emissions". Traffic forecast of Year 2028, 2033, 2038 and 2043, based on the traffic count are included in **Appendix 2.1**, which shows the hourly Vehicle Kilometre Travelled (VKT), the number of trips travelled, and the hourly average speed (kph) of road carriageways respectively.
- 2.8.8 The estimated 18-class distribution as defined in EMFAC-HK was derived by sectoring the relevant classes in the Transport Department's Annual Traffic Census record or vehicle distribution obtained from manual traffic count surveys, in proportion to the recorded distribution in EPD document: "2018 Vehicle Licensed Number by Age and Technology Group Fractions".
- 2.8.9 All concerned roadways shall be characterized with speed limits. Average speeds of 24 hours were prepared for each road.
- 2.8.10 The roadway network within the 500m study area consists of 20 distinct roadway links. The established road traffic data, including traffic flow, 24-hour vehicle mix and 24-hour average speed is provided by the Project Traffic Consultant. Relevant correspondence of the endorsement and the confirmation letter from traffic consultant on the validity of the traffic data will be provided when it is available.

Comparison of Calculated Total Vehicular Emissions

- 2.8.11 The air quality impact of the vehicular emissions are typically calculated based on the highest emission strength from the traffic forecast data within the first 15 years after the completion of the Proposed Redevelopment. The assessment year is selected to represent the highest emission scenario given the combination of vehicular emission factors and traffic flow for the same year. The worst assessment year has been determined based on the highest NO, NO₂, RSP and FSP emission scenario using the EMFAC-HK model. Sensitivity tests have been conducted to determine the worst-case scenario given the combination of vehicular emission factors and the projected traffic flow for the following selected years within 15 years after the completion of the Proposed Redevelopment. The representative years are 2028 (i.e. commissioning), 2033 (i.e. five year after commissioning), 2038 (i.e. ten year after commissioning) and 2043 (i.e. fifteen year after commissioning).
- 2.8.12 The calculated total vehicular emissions of NO, NO₂, RSP and FSP from the roads within 500m assessment area of the above modelling years generated from VIA have been compared and summarized in **Table 2.8**.

Table 2.8 Summary of Total Vehicular Pollutant Emissions

Assessment Year	Predicted Traffic Forecast Year	Total Vehicular Emission (tonnes/ year)			
		NO ₂	NO	RSP	FSP
2028	2028	<u>5.1</u>	<u>34.7</u>	<u>2.1</u>	<u>1.9</u>
2033	2033	2.5	15.4	1.1	1.0
2038	2038	2.7	10.3	0.6	0.6
2043	2043	3.1	11.6	0.7	0.6

- 2.8.13 The highest vehicle emission year was found to be Year 2028, and hence has been selected as the assessment year for the operation phase air quality impact assessment to represent the worst-case scenario.

Noise Barrier

- 2.8.14 No vertical or cantilevered noise barriers are found within 500m from the Site.

2.9 Post-processing of Modelling Results and Background Pollutant Contribution

2.9.1

- 2.9.1 Pollutant dispersion from vehicular and industrial emissions have been simulated using the AERMOD model. Dispersion results and background pollutant contributions have been combined and post-processed for the different averaging periods required for comparison with the relevant AQOs.

Ozone Limiting Method for Short-term Cumulative NO₂ Assessment

- 2.9.2 The conversion of NO_x to NO₂ is a result of a series of complex photochemical reactions and determines the prediction of near field impact of NO_x emissions. To determine vehicular emission impacts, the emission factors of NO₂ are extracted from the results of the EMFAC-HK Model version 4.3 and the emission factors of NO are calculated from the emission factors of NO_x and NO₂ for all motor vehicle types.
- 2.9.3 For NO_x in particularly, an algorithm has been built-in to convert a portion of NO_x predicted at ASRs into NO₂ using the Ozone Limiting Method (OLM) when they mix with the ambient O₃. The OLM assumes a conversion process that is stoichiometrically limited by the ambient O₃ levels, and hence the latter can be used to predict the maximum convertible NO₂ from NO_x for superimposing onto the initial "out-of-tailpipe / in-stack" NO₂ levels as the base level. OLM has been applied for the sum of the vehicular and industrial sources to compare with the available ozone for conversion to NO₂.

$$[NO_2]_{Predicted} = [NO_2]_{initial} + Min([NO]_{Predicted} \text{ or } \frac{46}{48}[O_3]_{PATH})$$

where

$[NO_2]_{Predicted}$	is the predicted NO ₂ Concentration;
$[NO_2]_{initial}$	is the initial NO ₂ Concentration;
Min	means the minimum of the two values within the bracket;
$[O_3]_{PATH}$	is the representative O ₃ PATH Concentration (from other contribution);
$\frac{46}{48}$	is the molecular weight of NO ₂ divided by the molecular weight of O ₃ .

Jenkin Method for Long-term Cumulative NO₂ Assessment

- 2.9.4 For the long-term cumulative NO₂ assessment (i.e. predictions of annual average NO₂ concentration), Jenkin Method was adopted for the conversion of cumulative annual average NO_x to cumulative annual average NO₂. The details of Jenkin Method for this assessment extracted from the VIA are shown in **Appendix 2.4**.

Background Pollutant Contribution

- 2.9.5 The latest Pollutants in the Atmosphere and their Transport over Hong Kong model (PATH v3.0) released by EPD is used to estimate the background air quality. Since

Year 2028 has been selected as the assessment year, PATH v3.0 for Year 2025 of Grid 30,38 and Grid 30,39 have been adopted as the background concentration.

- 2.9.6 In this assessment, data of different PATH levels with respect to the assessment height of ASRs have been adopted and summarized in **Table 2.9**.

Table 2.9 Summary of PATH Level Adopted for Air Quality Impact Assessment

PATH Level	Height above Model Ground (m)	Flag Pole Receiver Height (mAG)	Floor
L1	0 to 17	1.5 – 15.35	Level 1 to Level 7
L2	17 to 35	18.35 – 33.35	Level 8 to Level 15
L3	35 to 55	36.35 – 48.65	Level 16 to Level 19, Roof Floor

2.10 Assessment Results

- 2.10.1 The predicted air pollutant concentrations resulting from the surrounding vehicular emissions have been quantitatively assessed separately for NO₂, RSP and FSP. The predicted discrete results of NO₂, RSP and FSP at all predetermined ASRs are summarized in **Appendix 2.5**.
- 2.10.2 The fresh air intake for the Proposed Redevelopment is recommended to be located at or above 1.5mAG. The contour plots for hourly/ daily and annual average NO₂, RSP and FSP at 1.5mAG are shown in **Appendix 2.6**. The contour plots show that there is no exceedance within the Subject Site at 1.5mAG, the future occupant will not be subject to adverse air quality impact.

NO₂

- 2.10.3 The predicted results of 19th highest 1-hour average NO₂ and annual average NO₂ concentrations for all selected ASRs at selected levels are summarized in **Appendix 2.5**. The results indicate that NO₂ concentrations at all of the Proposed Redevelopment comply with the relevant AQOs.

RSP

- 2.10.4 The predicted results of the 10th highest 24-hour average and annual average RSP concentrations for all selected ASRs at selected levels are summarized in **Appendix 2.5**. The results indicate that RSP concentrations at all locations of the Proposed Redevelopment comply with the relevant AQOs.

FSP

- 2.10.5 The predicted results of the 36th highest 24-hour average and annual average FSP concentrations for all selected ASRs at selected levels are summarized in **Appendix 2.5**. The results indicate that FSP concentrations at all locations of the Proposed Redevelopment comply with the relevant AQOs.

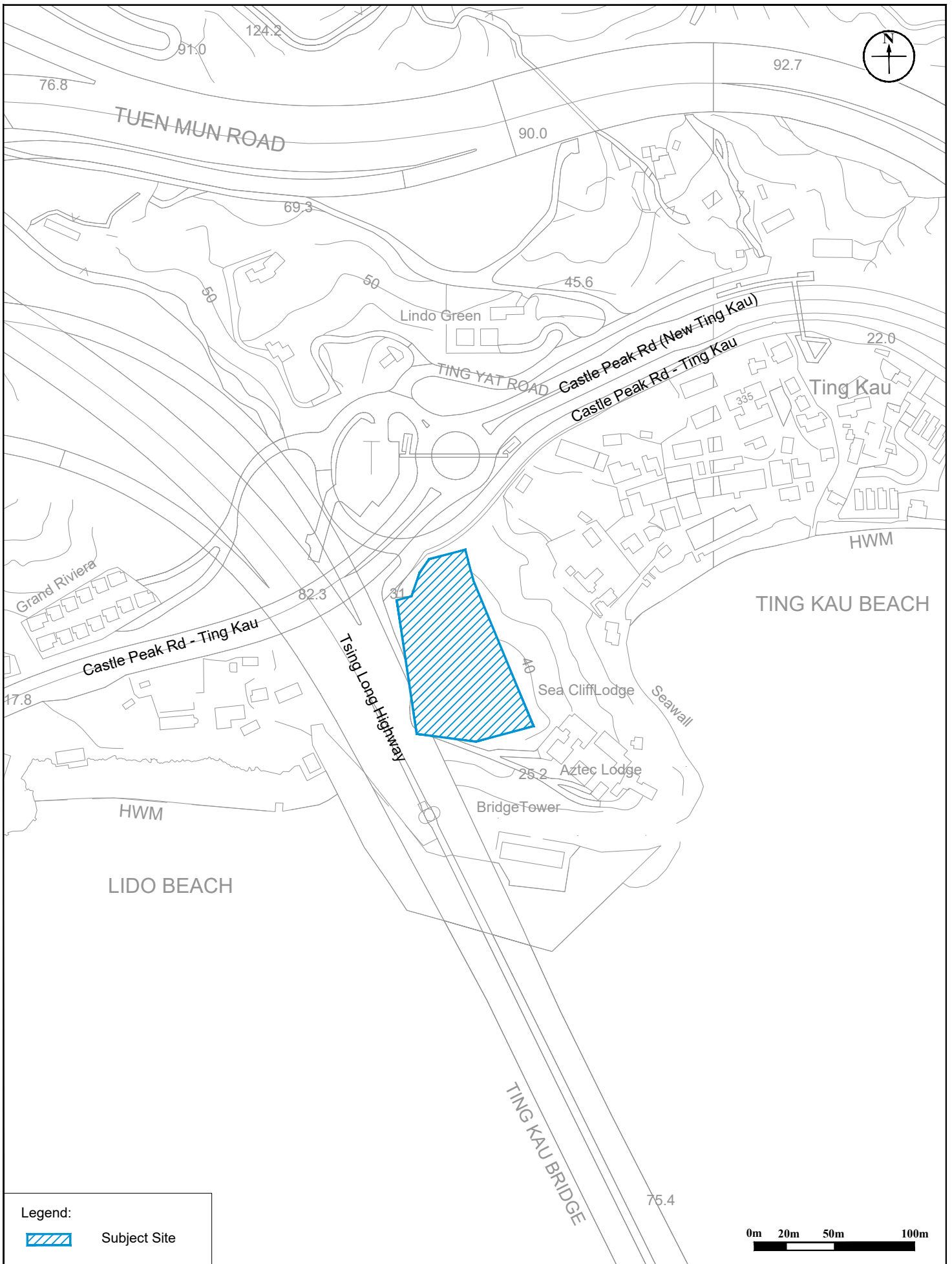
2.11 Review on Impact from Proposed Carpark

- 2.11.1 Basement carpark has been proposed for the Site. The air quality inside the basement carpark should satisfy the air pollutant standards as recommended by the ProPECC PN 2/96 Control of Air Pollution in Car Parks. Therefore, the mechanical ventilation system and layout the basement carpark should be properly designed. Furthermore, the exhaust outlet of the mechanical ventilation system of the basement carpark should also be designed by facing away from all the nearby ASRs as far as practicable to ensure not to cause a nuisance to the occupants/ residents of the air sensitive uses including the surrounding developments and the Proposed Redevelopment. As the Project is still under initial design stage, the location of the exhaust outlet of the mechanical ventilation system is yet available.


3. OVERALL CONCLUSION

- 3.1.1 Based on the assessment results, the predicted air quality pollutant concentration at all levels starting from the local ground level (1.5mAG) of the Proposed Redevelopment comply with the relevant AQOs. Besides, the fresh air intake for the Proposed Redevelopment is recommended to be located at or above 1.5mAG. The contour plots show that there is no exceedance within the Subject Site, therefore, the future occupants of the Proposed Redevelopment will not be subjected to insurmountable air quality impact.
- 3.1.2 Based on above conclusion, it confirms the feasibility and acceptability of the Proposed Redevelopment from an environmental perspective.


Figures

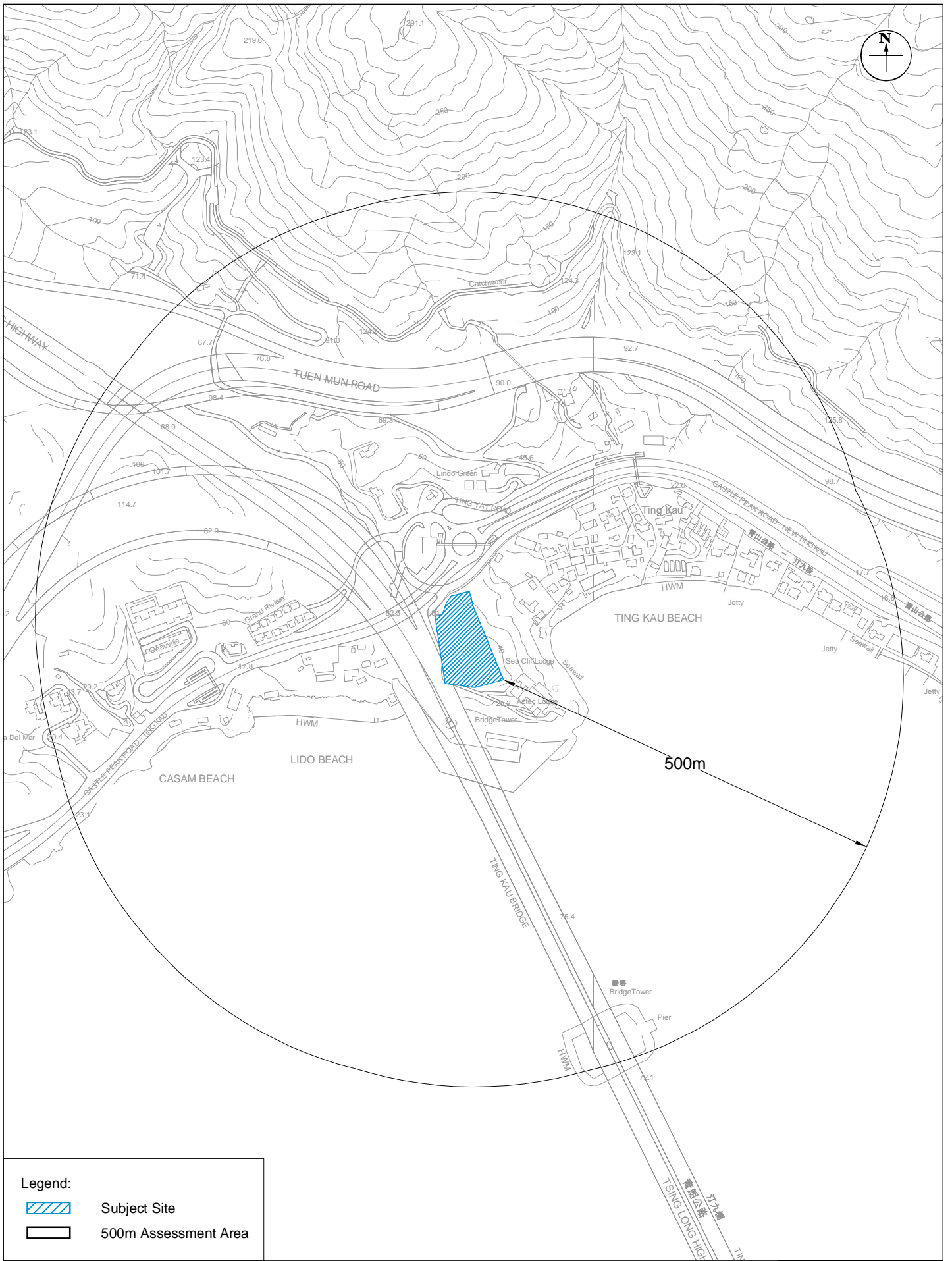


Legend:

 Subject Site

0m 20m 50m 100m

Figure: 1.1 Title: Location of Subject Site and its Environs	
	Drawn by: WT Checked by: TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tsuen Wan Inland Lot 5 and Lot No. 429 in D.D. 399, Ting Kau, Tsuen Wan	Rev.: 1.0
	Date: Dec 2023






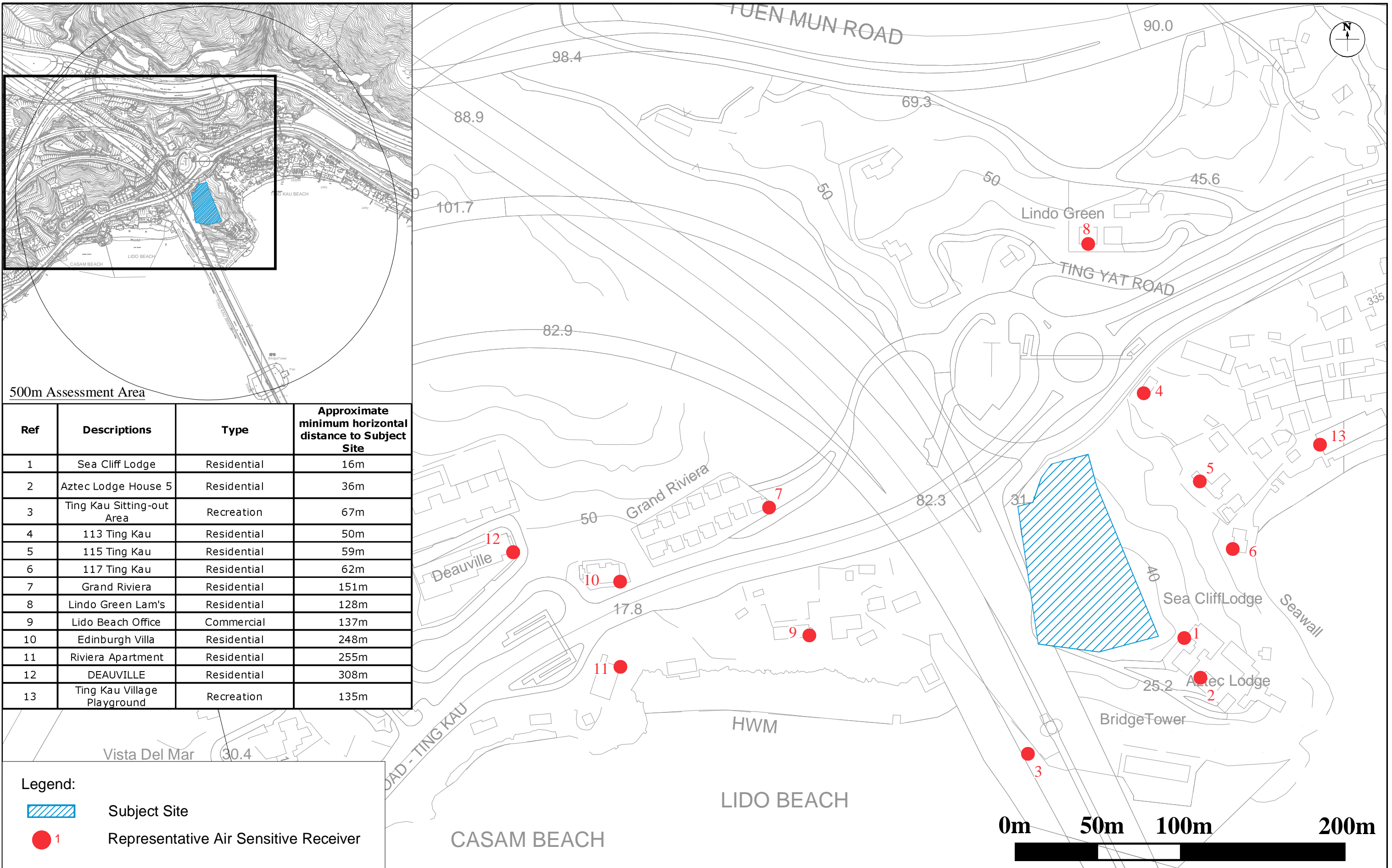
Legend:	
	Subject Site
	500m Assessment Area

Figure: 2.1 Title: Assessment Area of 500m from the Subject Site	
	Drawn by: WT Checked by: TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tsuen Wan Inland Lot 5 and Lot No. 429 in D.D. 399, Ting Kau, Tsuen Wan	Rev.: 1.0 Date: Dec 2023



500m Assessment Area

Ref	Descriptions	Type	Approximate minimum horizontal distance to Subject Site
1	Sea Cliff Lodge	Residential	16m
2	Aztec Lodge House 5	Residential	36m
3	Ting Kau Sitting-out Area	Recreation	67m
4	113 Ting Kau	Residential	50m
5	115 Ting Kau	Residential	59m
6	117 Ting Kau	Residential	62m
7	Grand Riviera	Residential	151m
8	Lindo Green Lam's	Residential	128m
9	Lido Beach Office	Commercial	137m
10	Edinburgh Villa	Residential	248m
11	Riviera Apartment	Residential	255m
12	DEAUVILLE	Residential	308m
13	Ting Kau Village Playground	Recreation	135m

Legend:



Subject Site



1 Representative Air Sensitive Receiver

Figure: 2.2

Title: Location of Representative Air Sensitive Receivers during Construction Phase

Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tsuen Wan Inland Lot 5 and Lot No. 429 in D.D. 399, Ting Kau, Tsuen Wan

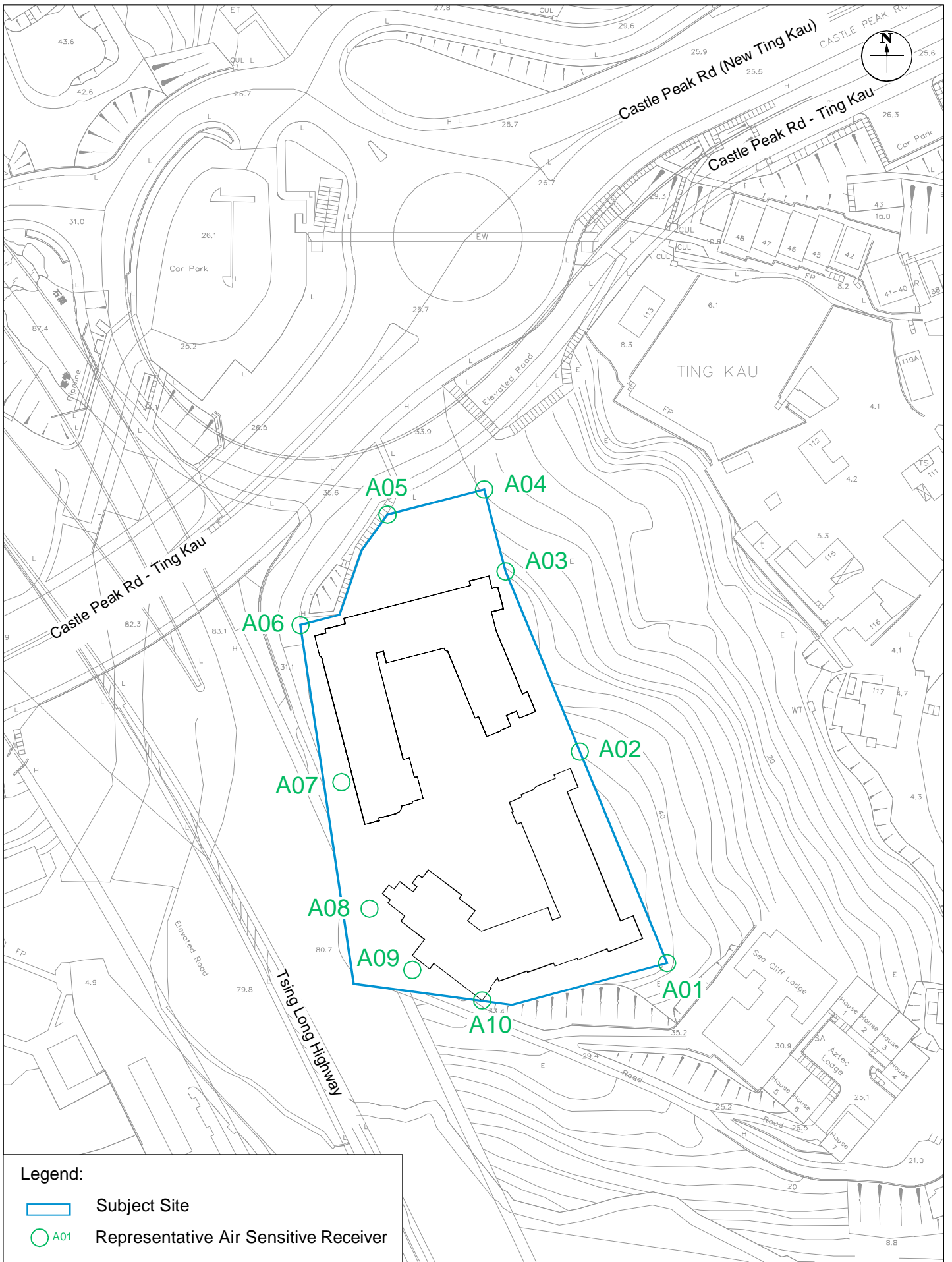
RAMBOLL

Drawn by: WT

Checked by: TC

Rev.: 1.0

Date: Dec 2023



Legend:

- Subject Site
- A01 Representative Air Sensitive Receiver

Figure: 2.3

Title: Location of Representative Air Sensitive Receivers during Operation Phase

Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tseun Wan Inland Lot 5 and Lot No. 429 in D.D.399, Ting Kau, Tsuen Wan



Drawn by: WT








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Rev.: 1.1

Date: Apr 2024

Appendix 1.1 Layout Plans of the Proposed Redevelopment

LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  FOOTPATH / COVERED AREA
-  CARPARK / DRIVEWAY
-  RESIDENTIAL USE
-  LANDSCAPE AREA
-  PRIVATE FLAT ROOF / PRIVATE GARDEN

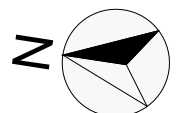


ABBREVIATION:

- DE = DAY CARE CENTRE FOR THE ELDERLY
- LMR = LIFT MACHINE ROOM

INDICATIVE MASTER LAYOUT PLAN

PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

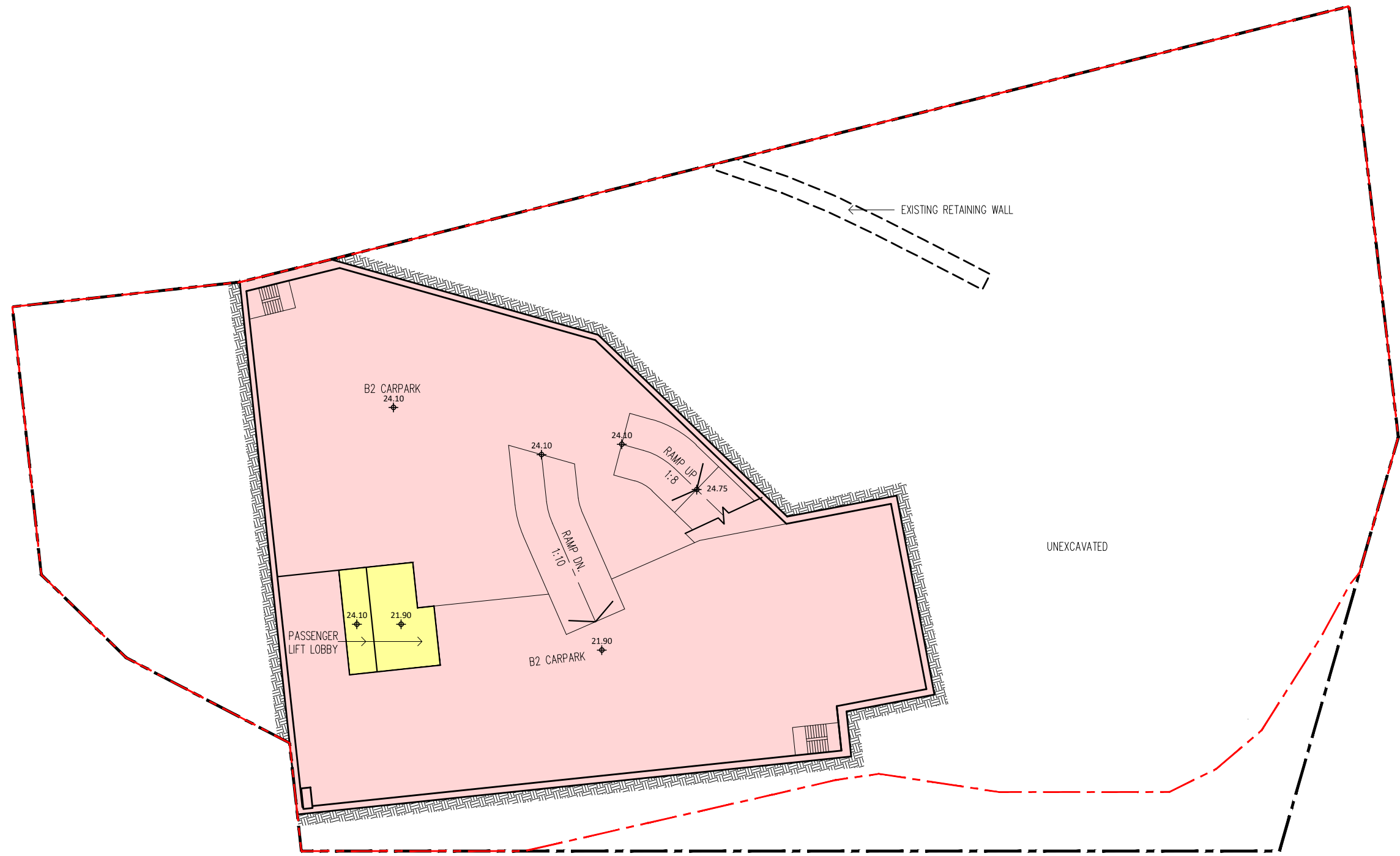


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LEGEND

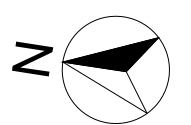
- APPLICATION SITE BOUNDARY
- DEVELOPMENT SITE BOUNDARY
- CARPARK / DRIVEWAY
- RESIDENTIAL USE



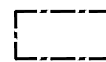



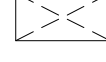

INDICATIVE BASEMENT 2 FLOOR PLAN

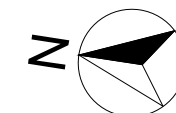
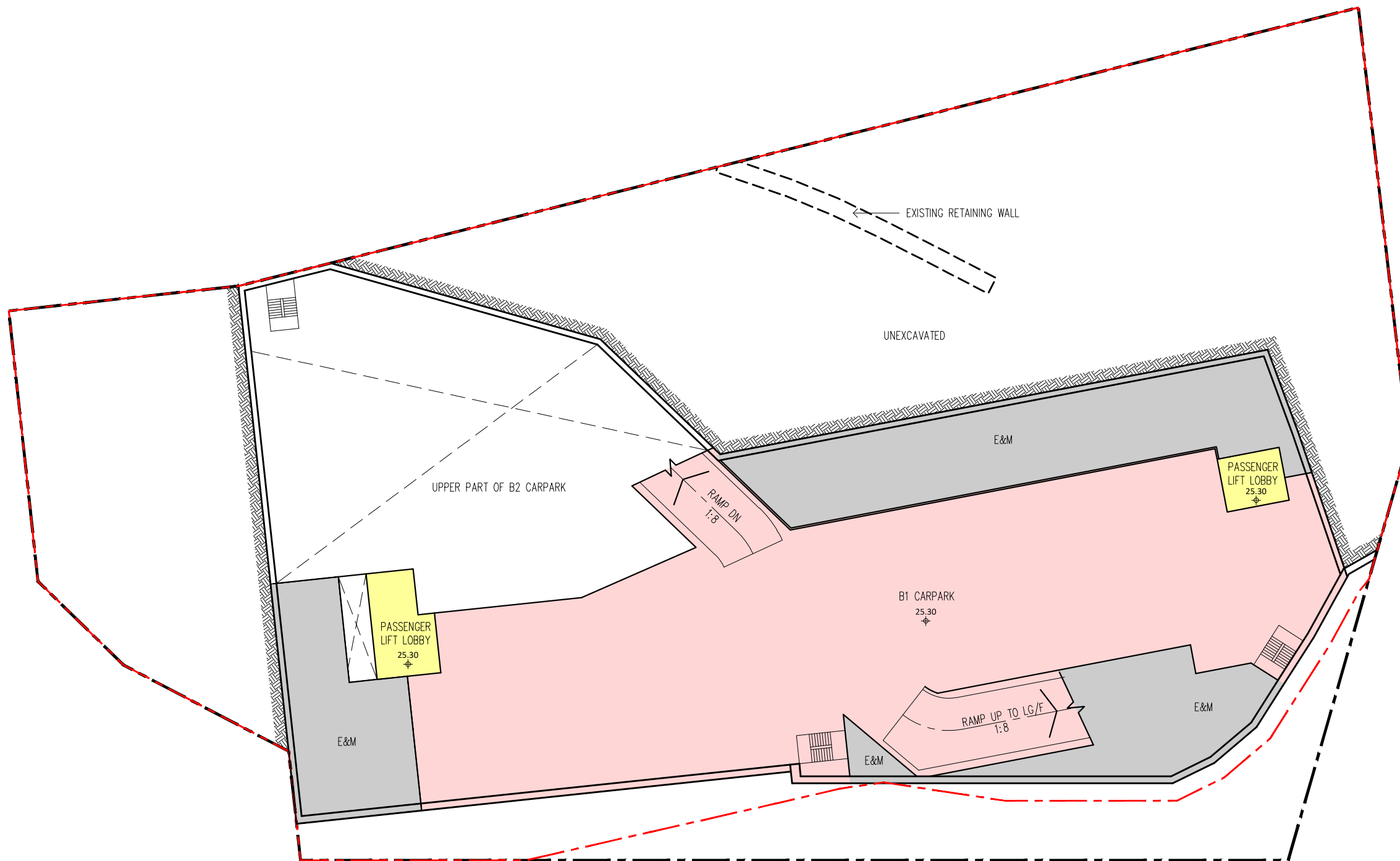
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

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LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  CARPARK / DRIVEWAY
-  RESIDENTIAL USE
-  VOID/LIGHT WELL
-  E&M AREA














INDICATIVE BASEMENT 1 FLOOR PLAN

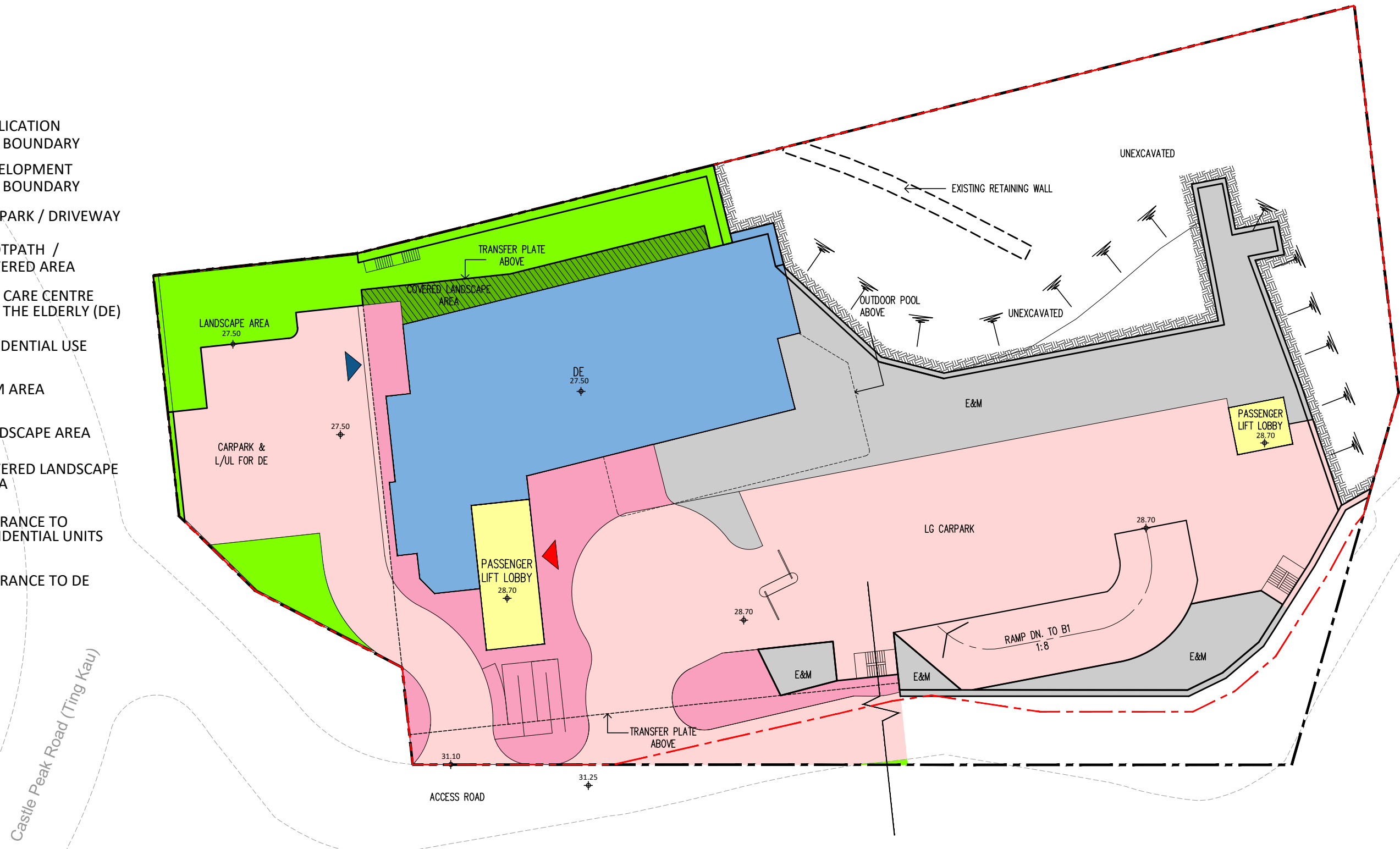
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

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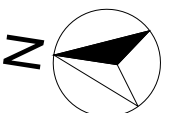
LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  CARPARK / DRIVEWAY
-  FOOTPATH / COVERED AREA
-  DAY CARE CENTRE FOR THE ELDERLY (DE)
-  RESIDENTIAL USE
-  E&M AREA
-  LANDSCAPE AREA
-  COVERED LANDSCAPE AREA
-  ENTRANCE TO RESIDENTIAL UNITS
-  ENTRANCE TO DE



INDICATIVE LOWER GROUND FLOOR PLAN













PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.



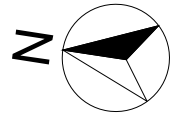
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LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  CARPARK / DRIVEWAY
-  FOOTPATH / COVERED AREA
-  CLUB HOUSE
-  RESIDENTIAL USE
-  E&M AREA
-  TRANSFER PLATE
-  LANDSCAPE AREA
-  PRIVATE GARDEN
-  ENTRANCE TO RESIDENTIAL UNITS
-  ENTRANCE TO CLUB HOUSE

Castle Peak Road (Ting Kau)








INDICATIVE GROUND FLOOR PLAN

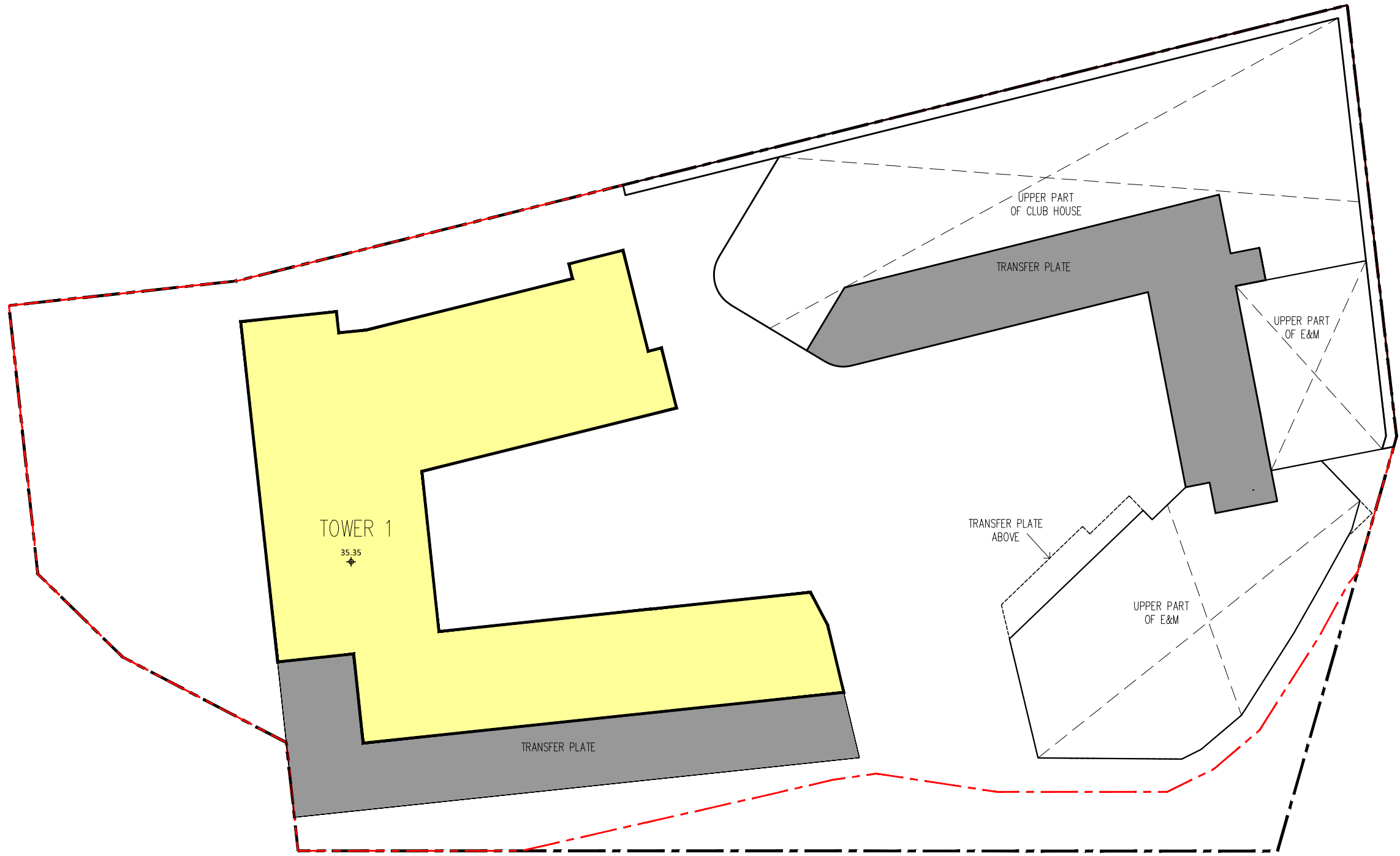
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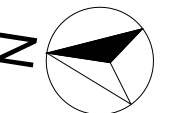
LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  RESIDENTIAL USE
-  TRANSFER PLATE
-  VOID/LIGHT WELL



INDICATIVE T1 1st. & T2 UPPER PART OF CLUB HOUSE FLOOR PLAN

PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

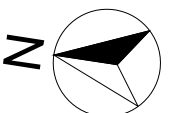
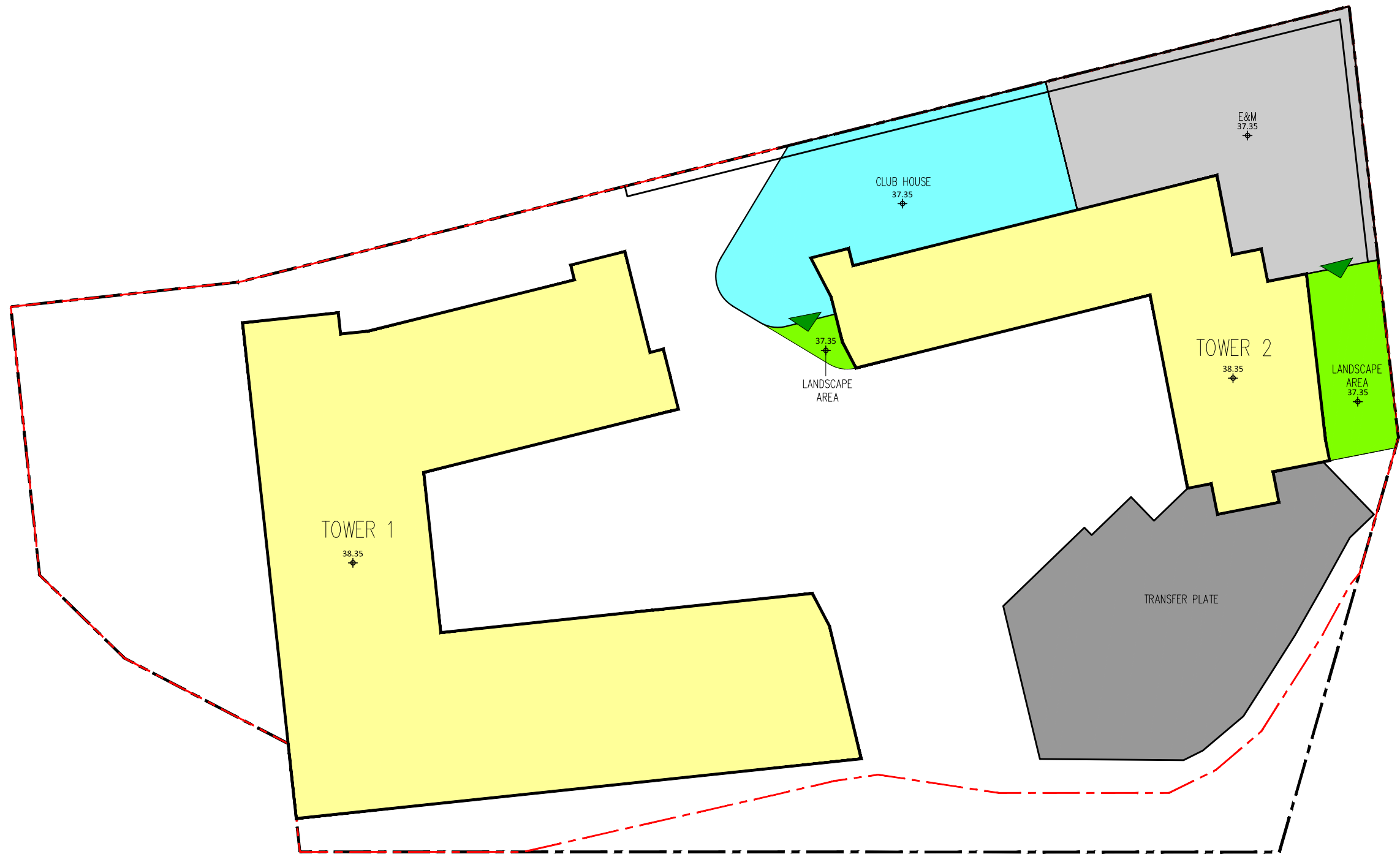


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LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  RESIDENTIAL USE
-  CLUB HOUSE
-  E&M AREA
-  TRANSFER PLATE
-  LANDSCAPE AREA
-  ACCESS TO LANDSCAPE AREA



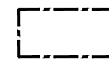

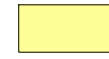




INDICATIVE T1 2nd. & T2 1st. FLOOR PLAN

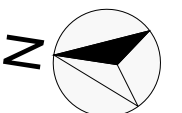
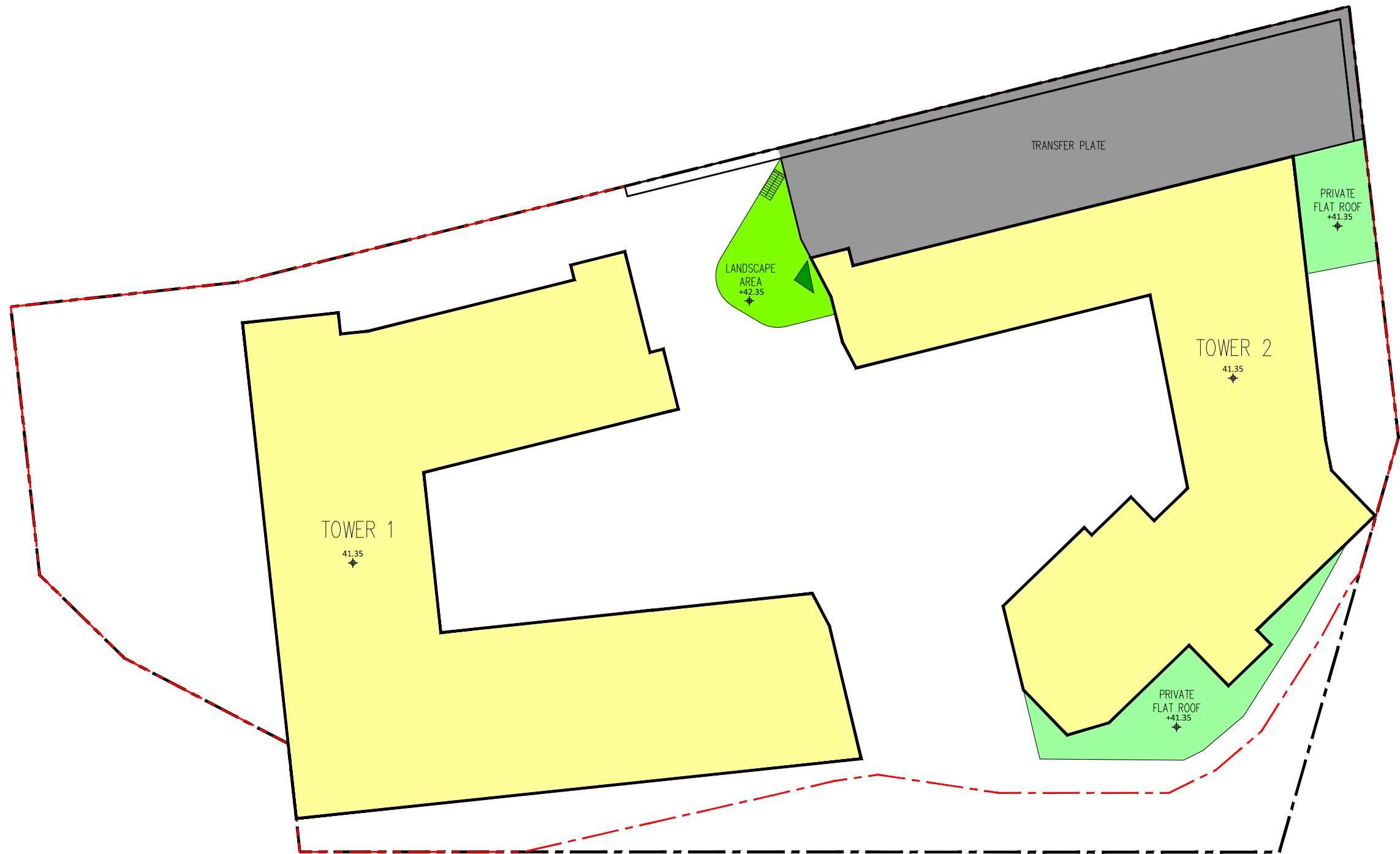
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

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LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  RESIDENTIAL USE
-  TRANSFER PLATE
-  PRIVATE FLAT ROOF
-  LANDSCAPE AREA
-  ACCESS TO LANDSCAPE AREA

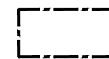

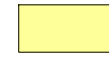




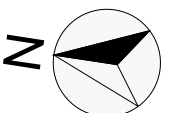
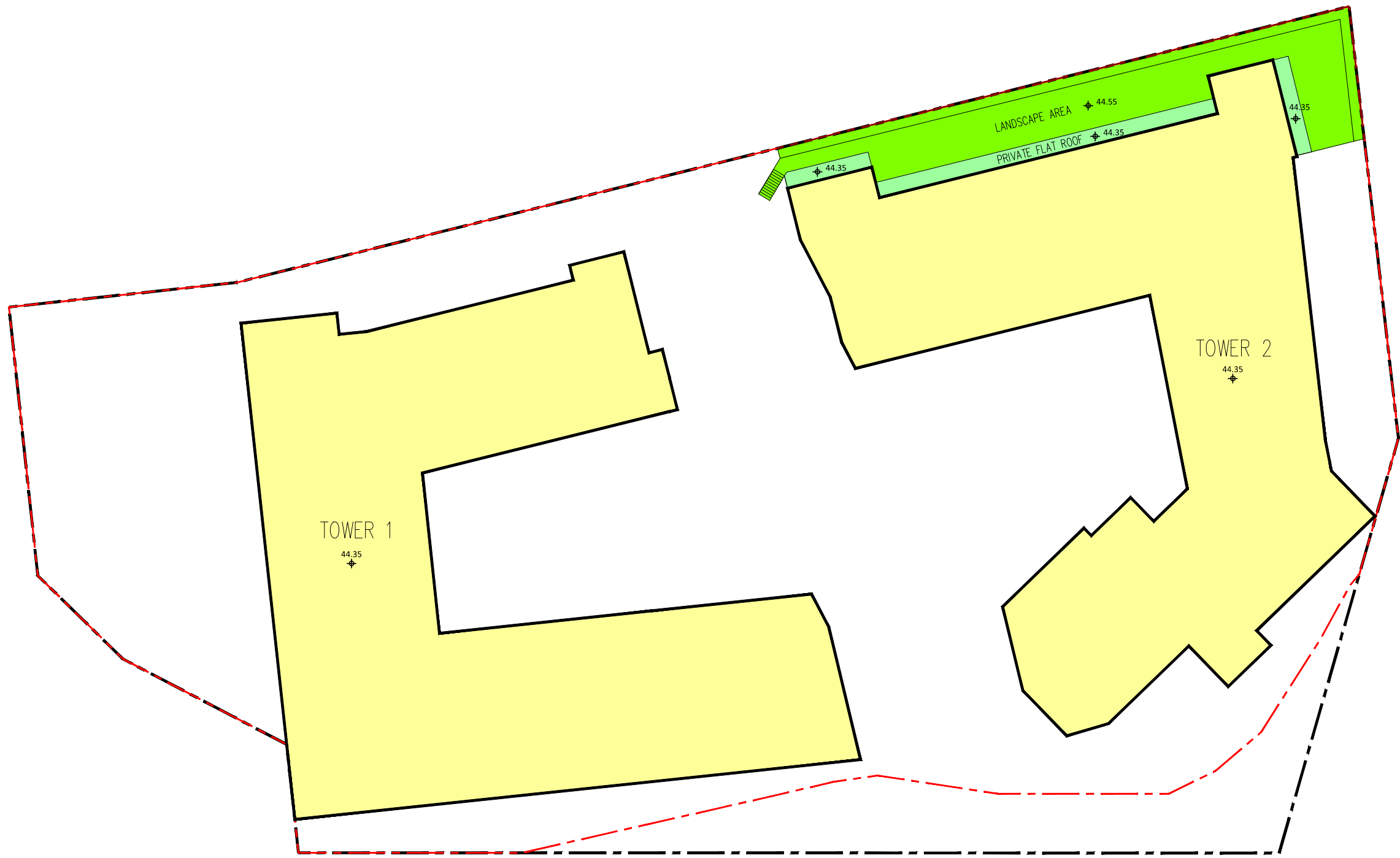
INDICATIVE T1 3rd. & T2 2nd. FLOOR PLAN

PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

DATE : 23/07/2024
1 : 400 (A3)

LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  RESIDENTIAL USE
-  PRIVATE FLAT ROOF
-  LANDSCAPE AREA



INDICATIVE T1 4th. & T2 3rd. FLOOR PLAN

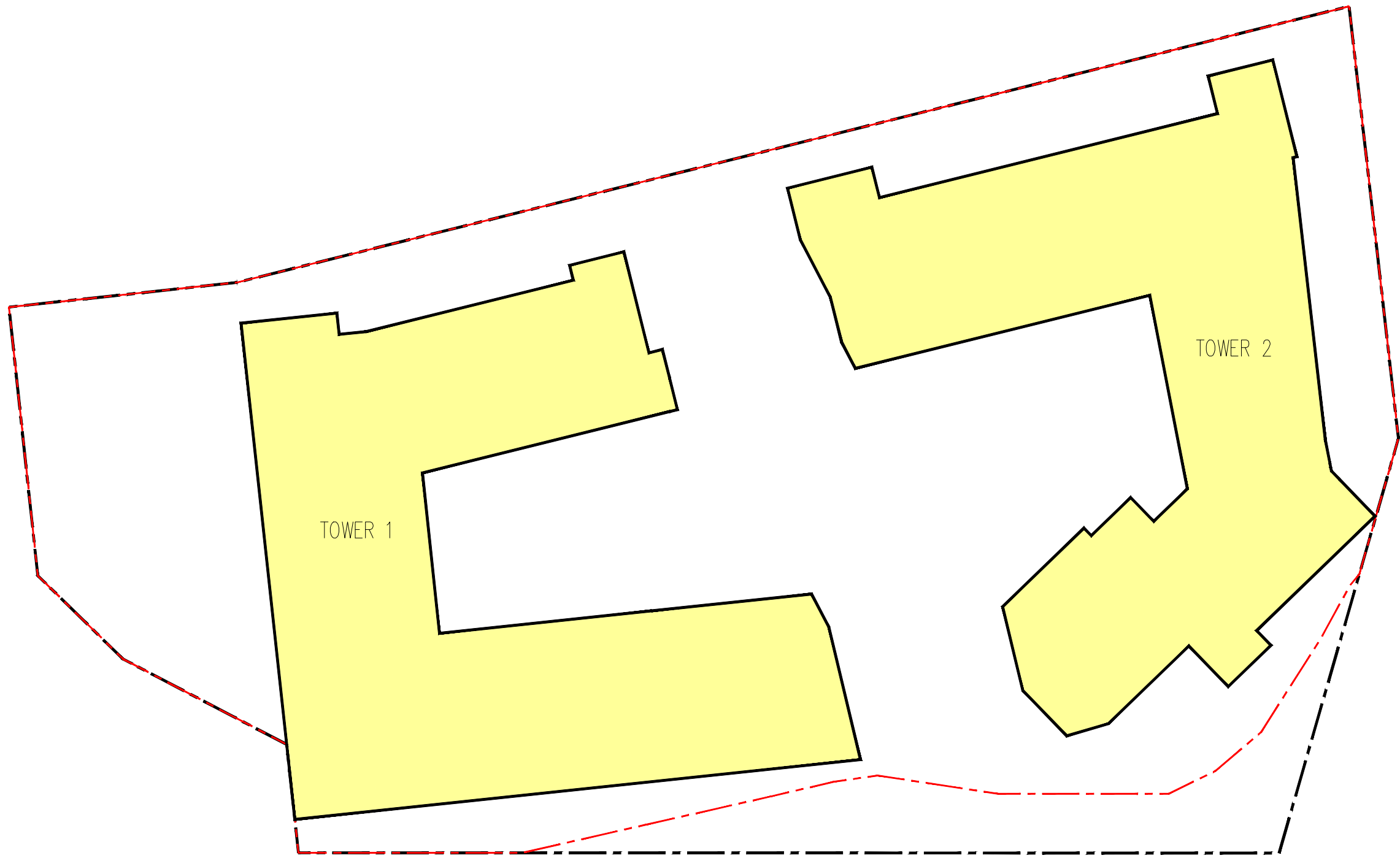
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

DATE : 23/07/2024
1 : 400 (A3)

ARCHI+
ARCHIPLUS INTERNATIONAL LIMITED

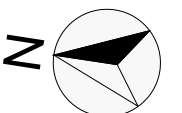
LEGEND

- APPLICATION SITE BOUNDARY
- DEVELOPMENT SITE BOUNDARY
- RESIDENTIAL USE



INDICATIVE TYPICAL FLOOR PLAN

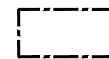

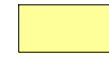

PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

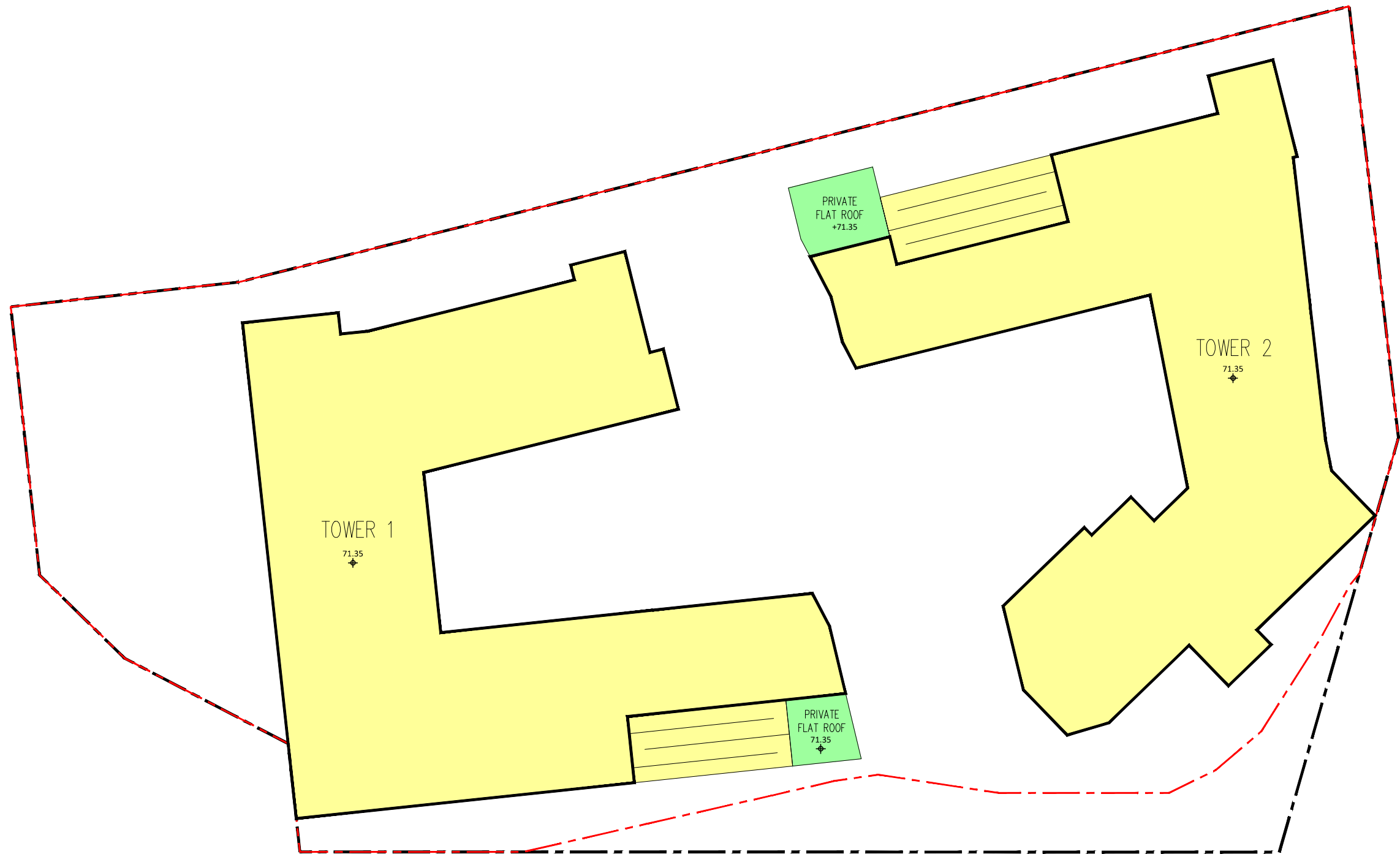


DATE : 23/07/2024
1 : 400 (A3)

ARCHI+
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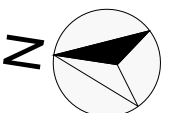
LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  RESIDENTIAL USE
-  PRIVATE FLAT ROOF



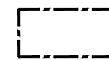

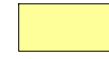

INDICATIVE T1 13th. & T2 12th. FLOOR PLAN

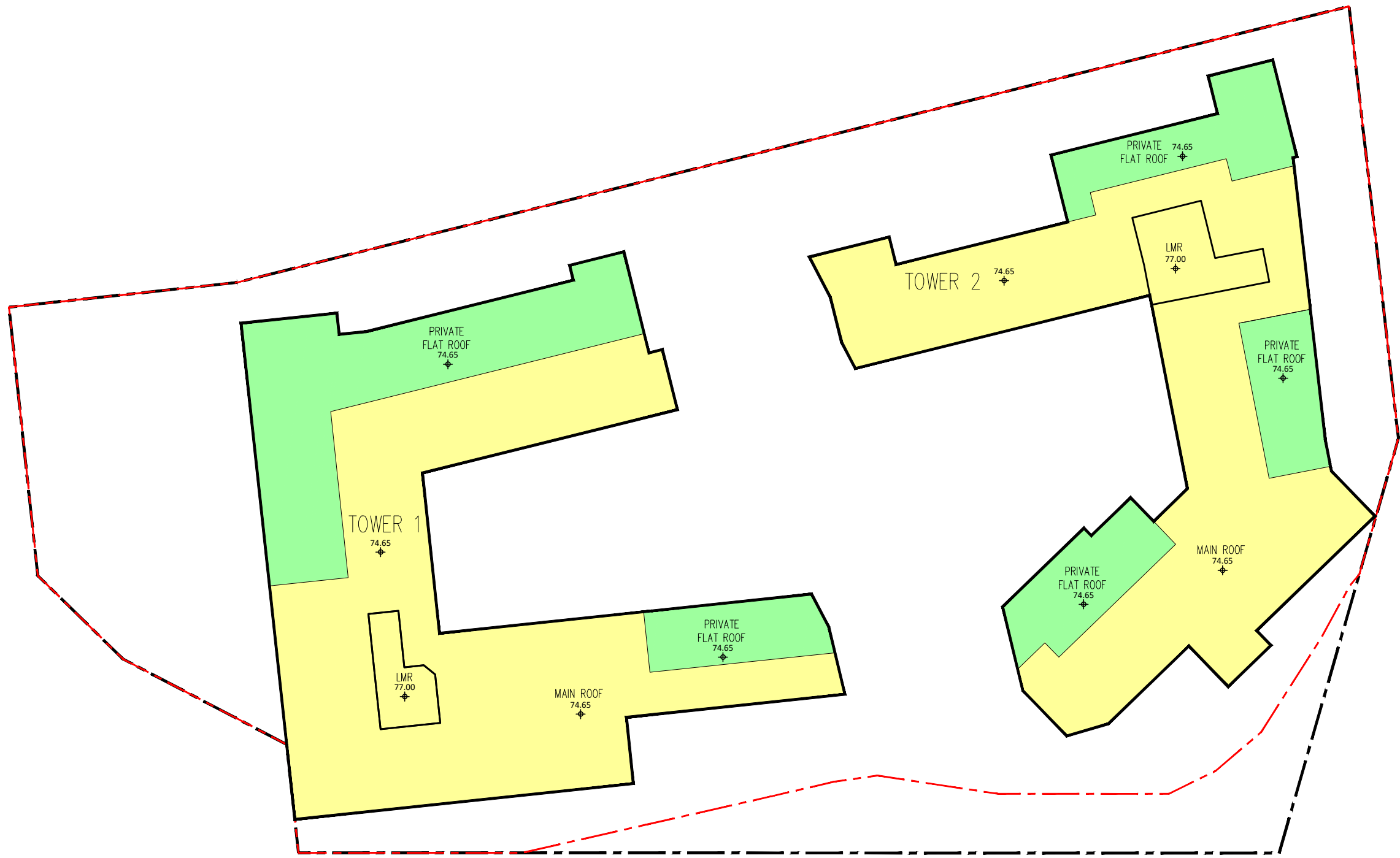
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.



DATE : 23/07/2024
1 : 400 (A3)

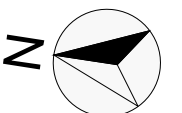
LEGEND

-  APPLICATION SITE BOUNDARY
-  DEVELOPMENT SITE BOUNDARY
-  RESIDENTIAL USE
-  PRIVATE FLAT ROOF



ABBREVIATION:

LMR = LIFT MACHINE ROOM



INDICATIVE ROOF FLOOR PLAN

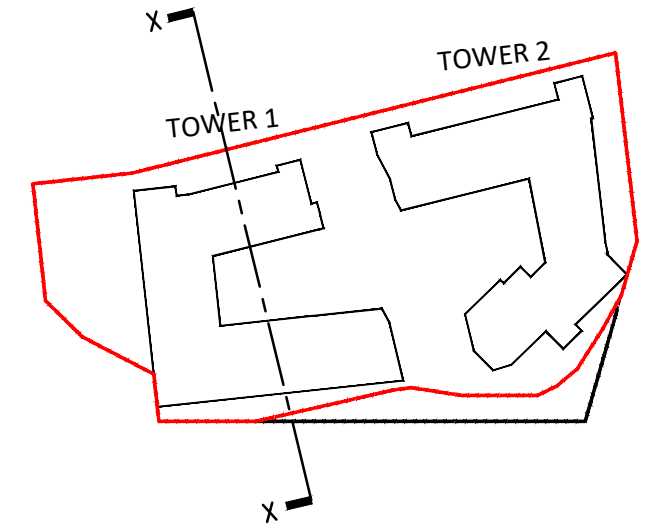
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

DATE : 23/07/2024
1 : 400 (A3)

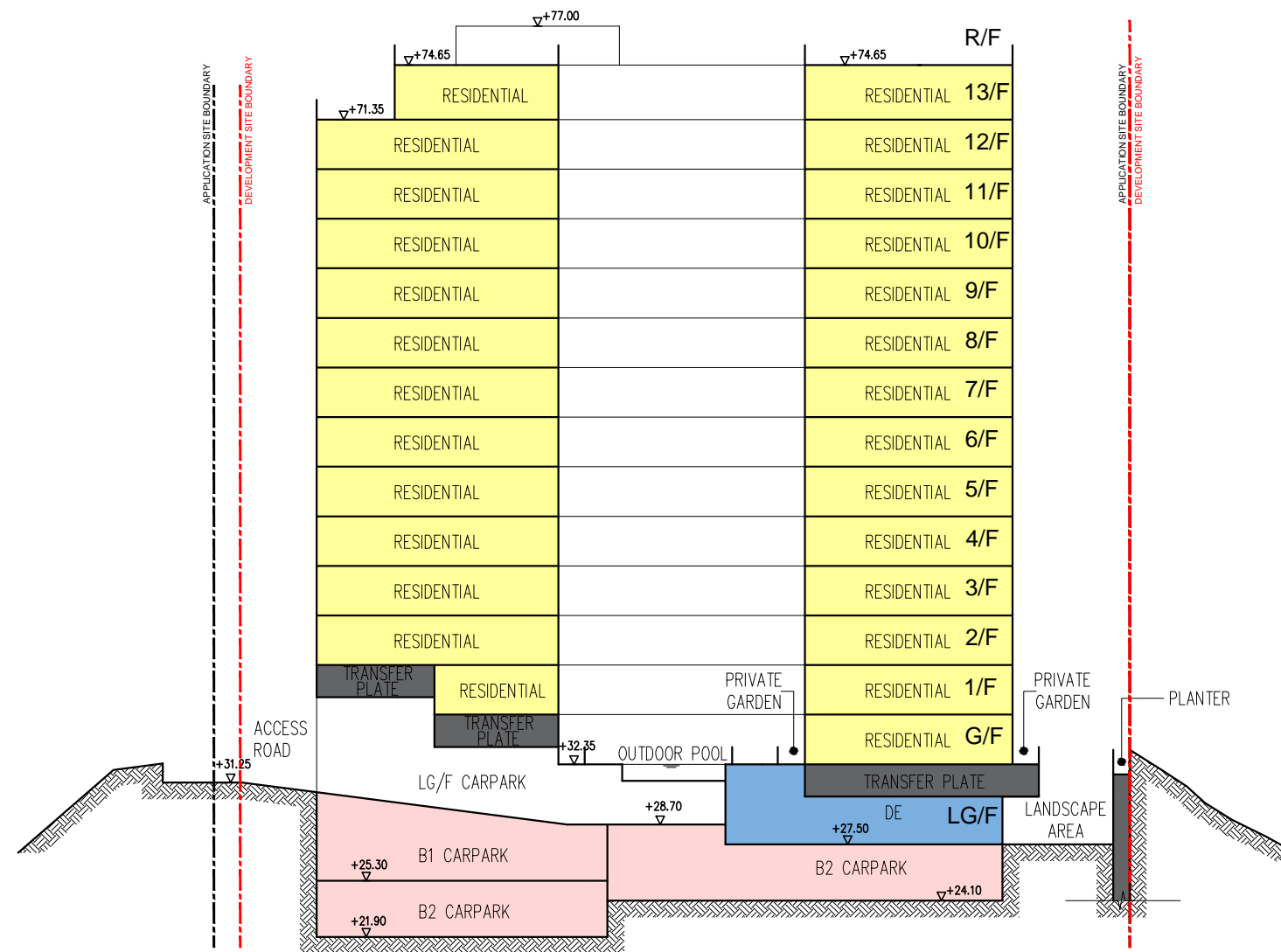
ARCHI+
ARCHIPLUS INTERNATIONAL LIMITED

LEGEND

- APPLICATION SITE BOUNDARY
- DEVELOPMENT SITE BOUNDARY
- RESIDENTIAL USE
- DAY CARE CENTRE FOR THE ELDERLY (DE)
- CARPARK / DRIVEWAY

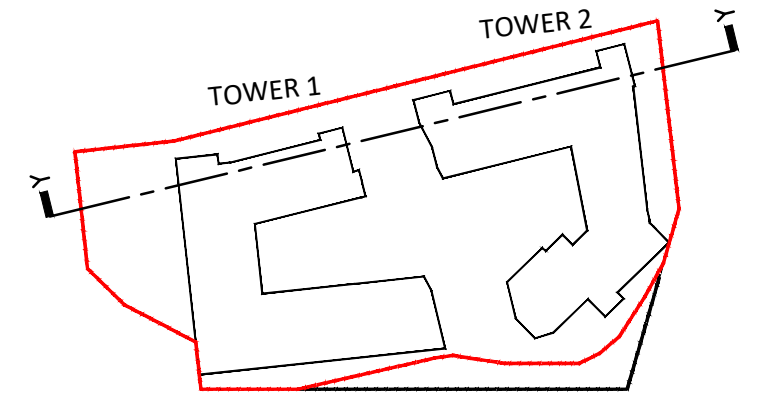


**TOWER 1
14 STOREYS RESIDENTIAL FLOOR**



INDICATIVE SITE SECTION X-X

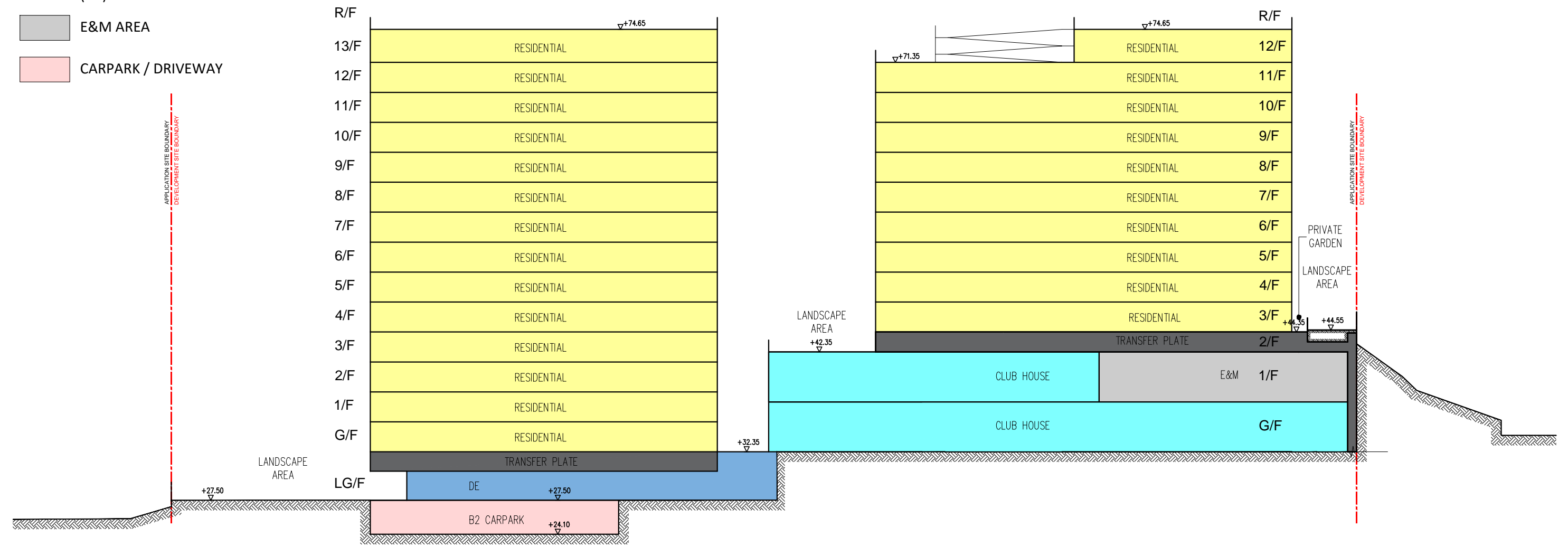
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.



- LEGEND**
- APPLICATION SITE BOUNDARY
 - ... DEVELOPMENT SITE BOUNDARY
 - RESIDENTIAL USE
 - CLUB HOUSE
 - DAY CARE CENTRE FOR THE ELDERLY (DE)
 - E&M AREA
 - CARPARK / DRIVEWAY

TOWER 1
14 STOREYS RESIDENTIAL FLOOR

TOWER 2
12 STOREYS RESIDENTIAL FLOOR



INDICATIVE SITE SECTION Y-Y

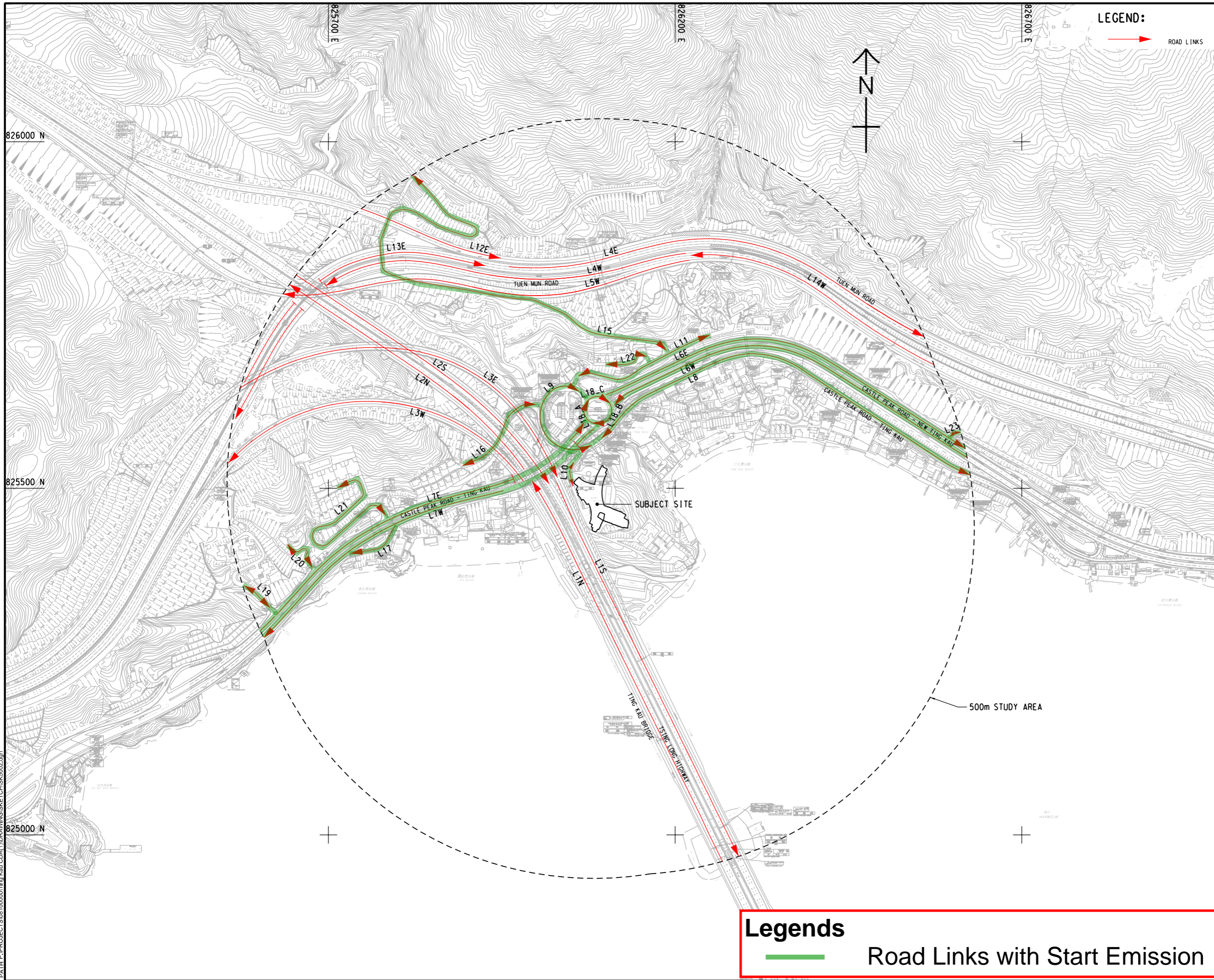
PROPOSED REDEVELOPMENT AT ROYAL VIEW HOTEL AT TING KAU, N.T.

DATE : 23/07/2024
1 : 400 (A3)



**Appendix 2.1 Traffic Forecasts (Year 2028, 2033, 2038 & 2043) for Air
Quality Impact Assessment**

ISO A1 594mm x 841mm
 Approved:
 Checked:
 Designer:
 Project Management Initials:
 Plot File by: ZHACHC2_3/21/2024
 PATH: P:\PROJECTS\06100000\TING KAU CDA(1)\DRAWINGS\SKETCH\SK5002.dgn



LEGEND:
 ROAD LINKS

Legends
 Road Links with Start Emission



PROJECT
 SECTION 16 PLANNING
 APPLICATION FOR SUBMISSION OF
 LAYOUT PLAN FOR PERMITTED
 'FLAT' AND 'SOCIAL WELFARE
 FACILITY' USES AT TSUEN WAN
 INLAND LOT 5 AND LOT NO. 429 IN
 D.D. 399, TING KAU, TSUEN WAN,
 NEW TERRITORIES

CLIENT

CONSULTANT
 AECOM Asia Company Ltd.
 www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

IR	DATE	DESCRIPTION	CHK.

STATUS

SCALE
 A3 1 : 5000

DIMENSION UNIT
 METRES

KEY PLAN

PROJECT NO.
 TING KAU CDA(1)/SK5002

CONTRACT NO.

SHEET TITLE
 INDEX PLAN FOR
 AQIA ROAD LINKS

SHEET NUMBER
 TING KAU CDA(1)/SK5002

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Speed Limit and Road Classification

Road Link Ref.	Road Link	From	To	Speed Limit (km/hr)	Road Classification	Cold Start? (Y/N)
L1N	Tsing Long Highway	North West Tsing Yi Interchange	Tuen Mun Road / Tai Lam Tunnel	80	Expressway	N
L1S	Tsing Long Highway	Tuen Mun Road / Tai Lam Tunnel	North West Tsing Yi Interchange	80	Expressway	N
L2N	Tsing Long Highway	Ting Kau Bridge	Tai Lam Tunnel	80	Expressway	N
L2S	Tsing Long Highway	Tai Lam Tunnel	Ting Kau Bridge	80	Expressway	N
L3E	Slip Road	Tuen Mun Road	Ting Kau Bridge	70	Expressway	N
L3W	Slip Road	Ting Kau Bridge	Tuen Mun Road	70	Expressway	N
L4E	Tuen Mun Road	Tuen Mun Road / Tai Lam Tunnel	Tsuen Wan Road	70	Expressway	N
L4W	Tuen Mun Road	Tsuen Wan Road	Sham Tseung	70	Expressway	N
L5W	Slip Road	Tuen Mun Road	Tai Lam Tunnel	70	Expressway	N
L6E	Castle Peak Road - New Ting Kau	Castle Peak Road - Ting Kau	Hoi On Road	70	Rural Road	N
L6W	Castle Peak Road - New Ting Kau	Hoi On Road	Castle Peak Road - Ting Kau	70	Rural Road	N
L7E	Castle Peak Road - New Ting Kau	Castle Peak Road - Sham Tseng	Castle Peak Road - New Ting Kau	70	Rural Road	N
L7W	Castle Peak Road - New Ting Kau	Castle Peak Road - New Ting Kau	Castle Peak Road - Sham Tseng	70	Rural Road	N
L8	Castle Peak Road - Ting Kau	Hoi On Road	Castle Peak Road - Ting Kau	50	Rural Road	Y
L9	Castle Peak Road - Ting Kau (Flyover)	Castle Peak Road - Ting Kau	Castle Peak Road - Ting Kau	50	Rural Road	N
L10	Access Road to Subject Site	Subject Site	Castle Peak Road - Ting Kau	50	Rural Road	Y
L11	Ting Yat Road	Castle Peak Road - Ting Kau	La Casetta	50	Rural Road	Y
L12E	Slip Road	Tai Lam Tunnel	Tuen Mun Road	70	Expressway	N
L13E	Tuen Mun Road	Sham Tseung	Tsuen Wan Road	70	Expressway	N
L14W	Tuen Mun Road	Tsuen Wan Road	Tuen Mun Road / Tai Lam Tunnel	70	Expressway	N

Average Speed (Year 2028)

Road Link Ref.	Average Speed (km/h)																							
	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	00:00
L1N	80	80	80	80	80	80	80	80	80	80	80	76	76	74	74	72	71	71	77	80	80	80	80	80
L1S	80	80	80	80	80	80	80	66	40	63	70	71	80	80	80	80	80	79	80	80	80	80	80	80
L2N	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L2S	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L3E	70	70	70	70	70	70	70	63	58	63	64	66	70	70	70	70	69	69	70	70	70	70	70	70
L3W	70	70	70	70	70	70	70	69	70	70	70	68	68	67	67	65	64	65	69	70	70	70	70	70
L4E	70	70	70	70	70	70	70	70	68	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L4W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L5W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L6E	69	70	70	70	70	70	69	68	68	68	68	68	69	69	69	69	69	69	69	69	69	69	69	69
L6W	69	70	70	70	70	70	69	68	68	69	69	69	69	69	69	68	69	68	68	69	69	69	69	69
L7E	69	70	70	70	70	70	69	68	68	68	69	69	69	69	69	69	69	69	69	69	69	69	69	69
L7W	69	70	70	70	70	70	69	68	68	68	68	69	69	69	69	68	69	68	68	69	69	69	69	69
L8	50	50	50	50	50	50	50	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	50
L9	50	50	50	50	50	50	49	49	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
L10	50	50	50	50	50	50	50	49	49	49	49	49	50	49	50	49	49	49	49	49	50	50	50	50
L11	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
L12E	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L13E	70	70	70	70	70	70	70	70	68	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L14W	70	70	70	70	70	70	70	70	68	70	70	70	67	66	65	65	63	62	62	67	70	70	70	70

Average Speed (Year 2033)

Road Link Ref.	Average Speed (km/h)																							
	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	00:00
L1N	80	80	80	80	80	80	80	80	80	80	80	80	75	75	73	73	71	69	70	76	80	80	80	80
L1S	80	80	80	80	80	80	80	62	35	59	69	71	80	80	80	80	80	78	78	80	80	80	80	80
L2N	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L2S	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L3E	70	70	70	70	70	70	70	62	51	62	64	65	70	70	70	70	69	68	68	70	70	70	70	70
L3W	70	70	70	70	70	70	70	70	69	70	70	70	68	68	66	66	65	64	64	69	70	70	70	70
L4E	70	70	70	70	70	70	70	68	66	69	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L4W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	69	70	70	70	70	70
L5W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L6E	69	70	70	70	70	70	69	67	67	68	68	68	69	69	69	69	68	69	68	69	69	69	69	69
L6W	69	70	70	70	70	70	69	68	68	68	69	69	69	68	69	69	68	68	68	69	69	69	69	69
L7E	69	70	70	70	70	70	69	68	68	68	68	68	69	69	69	69	69	69	69	69	69	69	69	69
L7W	69	70	70	70	70	70	69	67	68	68	68	68	69	68	69	69	68	68	68	68	69	69	69	69
L8	50	50	50	50	50	50	50	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	50
L9	49	50	50	50	50	50	49	48	48	49	49	49	49	49	49	49	49	49	48	49	49	49	49	49
L10	50	50	50	50	50	50	50	49	49	49	49	49	50	49	50	49	49	49	49	49	50	50	50	50
L11	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
L12E	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L13E	70	70	70	70	70	70	70	68	65	68	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L14W	70	70	70	70	70	70	70	69	67	69	70	70	65	65	63	63	62	60	60	66	70	70	70	70

Average Speed (Year 2038)

Road Link Ref.	Average Speed (km/h)																							
	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	00:00
L1N	80	80	80	80	80	80	80	80	79	80	80	80	74	74	72	71	70	68	68	75	80	80	80	80
L1S	80	80	80	80	80	80	80	53	24	50	66	69	80	80	80	80	79	77	77	80	80	80	80	80
L2N	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L2S	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L3E	70	70	70	70	70	70	70	61	43	60	62	64	70	70	70	69	67	67	70	70	70	70	70	70
L3W	70	70	70	70	70	70	70	70	68	70	70	70	67	67	65	65	64	63	63	68	70	70	70	70
L4E	70	70	70	70	70	70	70	67	65	68	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L4W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	69	68	70	70	70	70	70	70
L5W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L6E	69	70	70	70	70	70	69	67	67	68	68	68	69	68	69	69	68	69	68	69	69	69	69	69
L6W	69	70	70	70	70	70	69	68	68	68	68	68	69	68	68	68	68	68	68	68	69	69	69	69
L7E	69	70	70	70	70	70	69	67	67	68	68	68	69	69	69	69	68	69	68	69	69	69	69	69
L7W	69	70	70	70	70	70	69	67	67	68	68	68	69	68	68	68	68	68	68	68	69	69	69	69
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L9	49	50	50	50	50	50	49	48	48	49	49	49	49	48	49	49	49	49	48	49	49	49	49	49
L10	50	50	50	50	50	50	50	49	49	49	49	49	50	49	50	49	49	49	49	49	50	50	50	50
L11	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
L12E	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L13E	70	70	70	70	70	70	70	67	64	67	69	70	70	70	70	70	70	70	70	70	70	70	70	70
L14W	70	70	70	70	70	70	70	68	66	68	70	70	64	64	62	62	61	55	55	65	70	70	70	70

Average Speed (Year 2043)

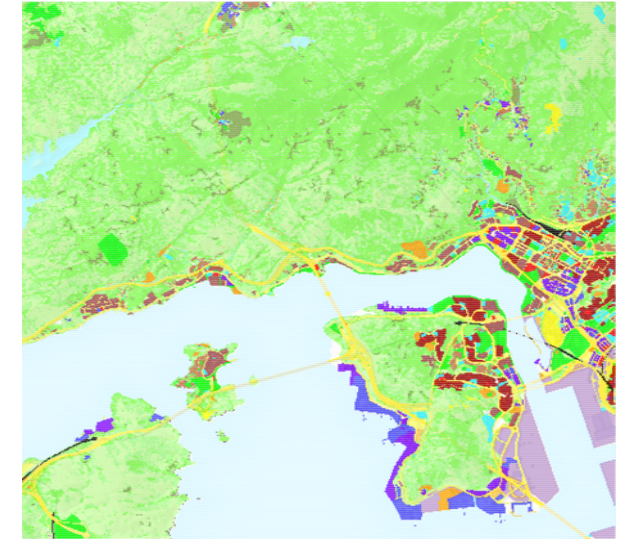
Road Link Ref.	Average Speed (km/h)																							
	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	00:00
L1N	80	80	80	80	80	80	80	80	78	80	80	73	72	70	70	68	59	60	74	80	80	80	80	80
L1S	80	80	80	80	80	80	80	43	14	40	57	67	80	80	79	79	78	76	80	80	80	80	80	80
L2N	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L2S	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
L3E	70	70	70	70	70	70	70	58	34	55	61	63	70	70	69	69	68	66	66	70	70	70	70	70
L3W	70	70	70	70	70	70	70	69	67	69	70	70	66	66	64	64	63	61	62	67	70	70	70	70
L4E	70	70	70	70	70	70	70	66	64	67	69	70	70	70	70	70	70	70	70	70	70	70	70	70
L4W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	68	68	70	70	70	70	70
L5W	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	69	69	70	70	70	70	70	70
L6E	69	69	70	70	70	70	69	67	67	68	68	68	69	68	69	69	68	69	68	68	69	69	69	69
L6W	69	70	70	70	70	70	69	67	68	68	68	68	69	68	68	68	68	68	68	68	68	69	69	69
L7E	69	70	70	70	70	70	69	67	67	68	68	68	69	69	69	69	68	69	68	69	69	69	69	69
L7W	69	69	70	70	70	70	69	67	67	68	68	68	68	68	68	68	68	68	68	68	68	69	69	69
L8	50	50	50	50	50	50	50	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	50
L9	49	50	50	50	50	50	49	48	48	48	49	49	49	48	49	49	48	49	48	49	49	49	49	49
L10	50	50	50	50	50	50	50	49	49	49	49	49	49	49	49	49	49	49	49	49	50	50	50	50
L11	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
L12E	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
L13E	70	70	70	70	70	70	70	66	63	66	69	70	70	70	70	70	70	70	70	70	70	70	70	70
L14W	70	70	70	70	70	70	70	68	65	67	69	70	63	63	61	61	56	46	47	64	70	70	70	70

Appendix 2.2 Detailed calculations of Albedo, Bowen ratio and surface roughness generated by Smart Air Modelling Platform (VIA)

Code	Co	Hong Kong Planning Department Classification	Roughness	Albedo	Bowen Ratio	Grid Count	Percent	Albedo x Percent	b^4n/Sn
1		Private Residential	1	0.18	1.5	14403	1.44%	0.00259254	1.005856999
2		Public Residential	1	0.18	1.5	11577	1.16%	0.00208386	1.004705104
3		Rural Settlement	0.375	0.165	0.9	6886	0.69%	0.00113619	0.999274751
11		Commercial/Business and Office	1	0.18	1.5	1914	0.19%	0.00034452	1.000776361
21		Industrial Land	0.7	0.18	1.5	9514	0.95%	0.00171252	1.003865045
22		Industrial Estates/Science and Technology Parks	0.7	0.18	1.5	0	0.00%	0	1
23		Warehouse and Open Storage	0.7	0.18	1.5	9868	0.99%	0.00177624	1.004009145
31		Government, Institutional and Community Facilities	0.7	0.18	1.5	8286	0.83%	0.00149148	1.003365334
32		Open Space and Recreation	0.04	0.15	1	19496	1.95%	0.0029244	1
41		Roads and Transport Facilities	0.7	0.18	1.5	43254	4.33%	0.00778572	1.017692681
42		Railways	0.7	0.18	1.5	1729	0.17%	0.00031122	1.000701295
43		Airport	0.07	0.18	1.5	0	0.00%	0	1
44		Port Facilities	0.7	0.18	1.5	20602	2.06%	0.00370836	1.008388379
51		Cemeteries/Funeral Facilities	0.7	0.18	1.5	3374	0.34%	0.00060732	1.001368975
52		Utilities	0.7	0.18	1.5	5631	0.56%	0.00101358	1.002285782
53		Vacant Land/Construction in Progress	0.2	0.18	1	3233	0.32%	0.00058194	1
54		Others	0.2	0.18	1	1054	0.11%	0.00018972	1
61		Agricultural Land	0.1575	0.18	0.55	14521	1.45%	0.00261378	0.991356382
62		Fish Ponds/Gei Wais	0.001	0.1	0.1	0	0.00%	0	1
71		Woodland	1.05	0.1625	0.75	244683	24.47%	0.039760988	0.932029407
72		Shrubland	0.3	0.18	1.25	170767	17.08%	0.03073806	1.038840882
73		Grassland	0.065	0.185	0.8	139433	13.94%	0.025795105	0.969365471
74		Mangrove/Swamp	0.065	0.14	0.225	47	0.00%	0.00000658	0.999929895
81		Badland	0.15	0.1625	0.75	42	0.00%	0.000006825	0.999987917
83		Rocky Shore	0.05	0.2	4.75	260	0.03%	0.000052	1.0004052
91		Reservoirs	0.001	0.1	0.1	6988	0.70%	0.0006988	0.984038295
92		Streams and Nullahs	0.001	0.1	0.1	1838	0.18%	0.0001838	0.995776792
99		SZ Residential *	1	0.18	1.5	0	0.00%	0	1
0		Open Sea *	0.001	0.1	0.1	260600	26.06%	0.02606	0.548782179
			0.154176	0.527247		1000000			

* Outside Hong Kong border, not belong to PlanD categories.

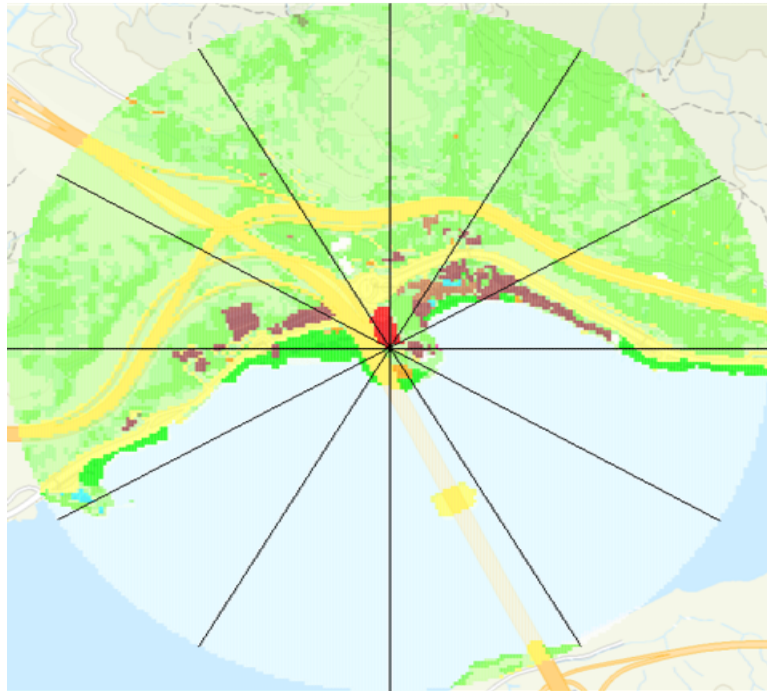
Center: X=826095, Y=825435, Z=44.0; Met Year=2019;



Land Utilization in Hong Kong 2022

Angle	Group	Inverse-distance	Roughness
0	0 - 30	5.176452751	0.414579
30	30 - 60	5.31768931	0.338515
60	60 - 90	5.176452751	0.072736
90	90 - 120	5.176452751	0.003084
120	120 - 150	5.31768931	0.002473
150	150 - 180	5.176452751	0.003002
180	180 - 210	5.176452751	0.001883
210	210 - 240	5.31768931	0.002013
240	240 - 270	5.176452751	0.035679
270	270 - 300	5.176452751	0.268145
300	300 - 330	5.31768931	0.406240
330	330 - 360	5.176452751	0.268581

Center: X=826095, Y=825435, Z=44.0; Met Year=2019;



Land Utilization in Hong Kong 2022

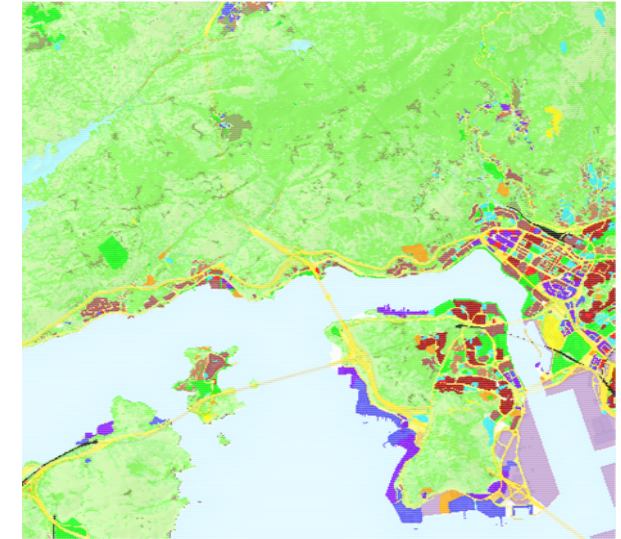
Code	Co	Hong Kong Planning Department Classification	Roughness	Albedo	Bowen Ratio
1		Private Residential	1	0.18	1.5
2		Public Residential	1	0.18	1.5
3		Rural Settlement	0.375	0.165	0.9
11		Commercial/Business and Office	1	0.18	1.5
21		Industrial Land	0.7	0.18	1.5
22		Industrial Estates/Science and Technology Parks	0.7	0.18	1.5
23		Warehouse and Open Storage	0.7	0.18	1.5
31		Government, Institutional and Community Facilities	0.7	0.18	1.5
32		Open Space and Recreation	0.04	0.15	1
41		Roads and Transport Facilities	0.7	0.18	1.5
42		Railways	0.7	0.18	1.5
43		Airport	0.07	0.18	1.5
44		Port Facilities	0.7	0.18	1.5
51		Cemeteries/Funeral Facilities	0.7	0.18	1.5
52		Utilities	0.7	0.18	1.5
53		Vacant Land/Construction in Progress	0.2	0.18	1
54		Others	0.2	0.18	1
61		Agricultural Land	0.1575	0.18	0.55
62		Fish Ponds/Gei Wais	0.001	0.1	0.1
71		Woodland	1.05	0.1625	0.75
72		Shrubland	0.3	0.18	1.25
73		Grassland	0.065	0.185	0.8
74		Mangrove/Swamp	0.065	0.14	0.225
81		Badland	0.15	0.1625	0.75
83		Rocky Shore	0.05	0.2	4.75
91		Reservoirs	0.001	0.1	0.1
92		Streams and Nullahs	0.001	0.1	0.1
99		SZ Residential *	1	0.18	1.5
0		Open Sea *	0.001	0.1	0.1

* Outside Hong Kong border, not belong to PlanD categories.

Code	Co	Hong Kong Planning Department Classification	Roughness	Albedo	Bowen Ratio	Grid Count	Percent	Albedo x Percent	b^n/Sn
1		Private Residential	1	0.18	1.5	14395	1.44%	0.0025911	1.005853737
2		Public Residential	1	0.18	1.5	11466	1.15%	0.00206388	1.004659887
3		Rural Settlement	0.375	0.165	0.9	7089	0.71%	0.001169685	0.999253378
11		Commercial/Business and Office	1	0.18	1.5	1896	0.19%	0.00034128	1.000769057
21		Industrial Land	0.7	0.18	1.5	9514	0.95%	0.00171252	1.003865045
22		Industrial Estates/Science and Technology Parks	0.7	0.18	1.5	0	0.00%	0	1
23		Warehouse and Open Storage	0.7	0.18	1.5	9955	1.00%	0.0017919	1.004044562
31		Government, Institutional and Community Facilities	0.7	0.18	1.5	8223	0.82%	0.00148014	1.003339704
32		Open Space and Recreation	0.04	0.15	1	19176	1.92%	0.0028764	1
41		Roads and Transport Facilities	0.7	0.18	1.5	43246	4.32%	0.00778428	1.01768938
42		Railways	0.7	0.18	1.5	1720	0.17%	0.0003096	1.000697643
43		Airport	0.07	0.18	1.5	0	0.00%	0	1
44		Port Facilities	0.7	0.18	1.5	20210	2.02%	0.0036378	1.008228116
51		Cemeteries/Funeral Facilities	0.7	0.18	1.5	3393	0.34%	0.00061074	1.00137669
52		Utilities	0.7	0.18	1.5	5634	0.56%	0.00101412	1.002287002
53		Vacant Land/Construction in Progress	0.2	0.18	1	3227	0.32%	0.00058086	1
54		Others	0.2	0.18	1	1053	0.11%	0.00018954	1
61		Agricultural Land	0.1575	0.18	0.55	14651	1.47%	0.00263718	0.991279338
62		Fish Ponds/Gei Wais	0.001	0.1	0.1	0	0.00%	0	1
71		Woodland	1.05	0.1625	0.75	246851	24.69%	0.040113288	0.931448286
72		Shrubland	0.3	0.18	1.25	172086	17.21%	0.03097548	1.039146685
73		Grassland	0.065	0.185	0.8	140354	14.04%	0.02596549	0.969166272
74		Mangrove/Swamp	0.065	0.14	0.225	42	0.00%	0.00000588	0.999937352
81		Badland	0.15	0.1625	0.75	54	0.01%	0.000008775	0.999984465
83		Rocky Shore	0.05	0.2	4.75	255	0.03%	0.000051	1.000397406
91		Reservoirs	0.001	0.1	0.1	7112	0.71%	0.0007112	0.983757372
92		Streams and Nullahs	0.001	0.1	0.1	1848	0.18%	0.0001848	0.995753863
99		SZ Residential *	1	0.18	1.5	0	0.00%	0	1
0		Open Sea *	0.001	0.1	0.1	256550	25.66%	0.025655	0.553923767
			0.154462	0.531575		1000000			

* Outside Hong Kong border, not belong to PlanD categories.

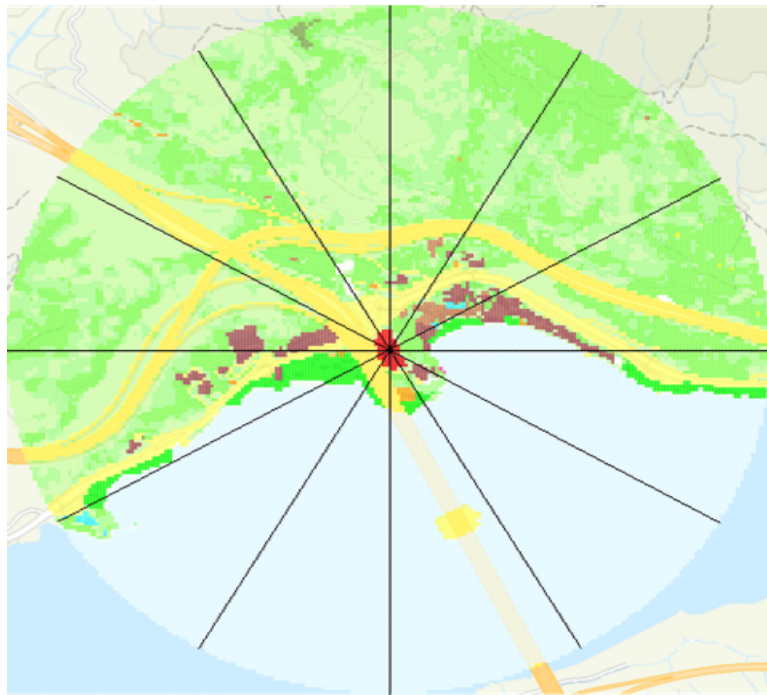
Center: X=826085, Y=825495, Z=34.0, Met Year=2019;



Land Utilization in Hong Kong 2022

Angle	Group	Inverse-distan	Roughness
0	0 - 30	5.176452751	0.386382
30	30 - 60	5.31768931	0.429702
60	60 - 90	5.176452751	0.184270
90	90 - 120	5.176452751	0.004491
120	120 - 150	5.31768931	0.003313
150	150 - 180	5.176452751	0.003636
180	180 - 210	5.176452751	0.002468
210	210 - 240	5.31768931	0.002799
240	240 - 270	5.176452751	0.126997
270	270 - 300	5.176452751	0.302976
300	300 - 330	5.31768931	0.407404
330	330 - 360	5.176452751	0.241191

Center: X=826085, Y=825495, Z=34.0; Met Year=2019;



Land Utilization in Hong Kong 2022

Code	Co	Hong Kong Planning Department Classification	Roughness	Albedo	Bowen Ratio
1		Private Residential	1	0.18	1.5
2		Public Residential	1	0.18	1.5
3		Rural Settlement	0.375	0.165	0.9
11		Commercial/Business and Office	1	0.18	1.5
21		Industrial Land	0.7	0.18	1.5
22		Industrial Estates/Science and Technology Parks	0.7	0.18	1.5
23		Warehouse and Open Storage	0.7	0.18	1.5
31		Government, Institutional and Community Facilities	0.7	0.18	1.5
32		Open Space and Recreation	0.04	0.15	1
41		Roads and Transport Facilities	0.7	0.18	1.5
42		Railways	0.7	0.18	1.5
43		Airport	0.07	0.18	1.5
44		Port Facilities	0.7	0.18	1.5
51		Cemeteries/Funeral Facilities	0.7	0.18	1.5
52		Utilities	0.7	0.18	1.5
53		Vacant Land/Construction in Progress	0.2	0.18	1
54		Others	0.2	0.18	1
61		Agricultural Land	0.1575	0.18	0.55
62		Fish Ponds/Gei Wais	0.001	0.1	0.1
71		Woodland	1.05	0.1625	0.75
72		Shrubland	0.3	0.18	1.25
73		Grassland	0.065	0.185	0.8
74		Mangrove/Swamp	0.065	0.14	0.225
81		Badland	0.15	0.1625	0.75
83		Rocky Shore	0.05	0.2	4.75
91		Reservoirs	0.001	0.1	0.1
92		Streams and Nullahs	0.001	0.1	0.1
99		SZ Residential *	1	0.18	1.5
0		Open Sea *	0.001	0.1	0.1

* Outside Hong Kong border, not belong to PlanD categories.

Appendix 2.3

**Summary of Met Data generated by Smart Air Modelling
Platform (VIA)**

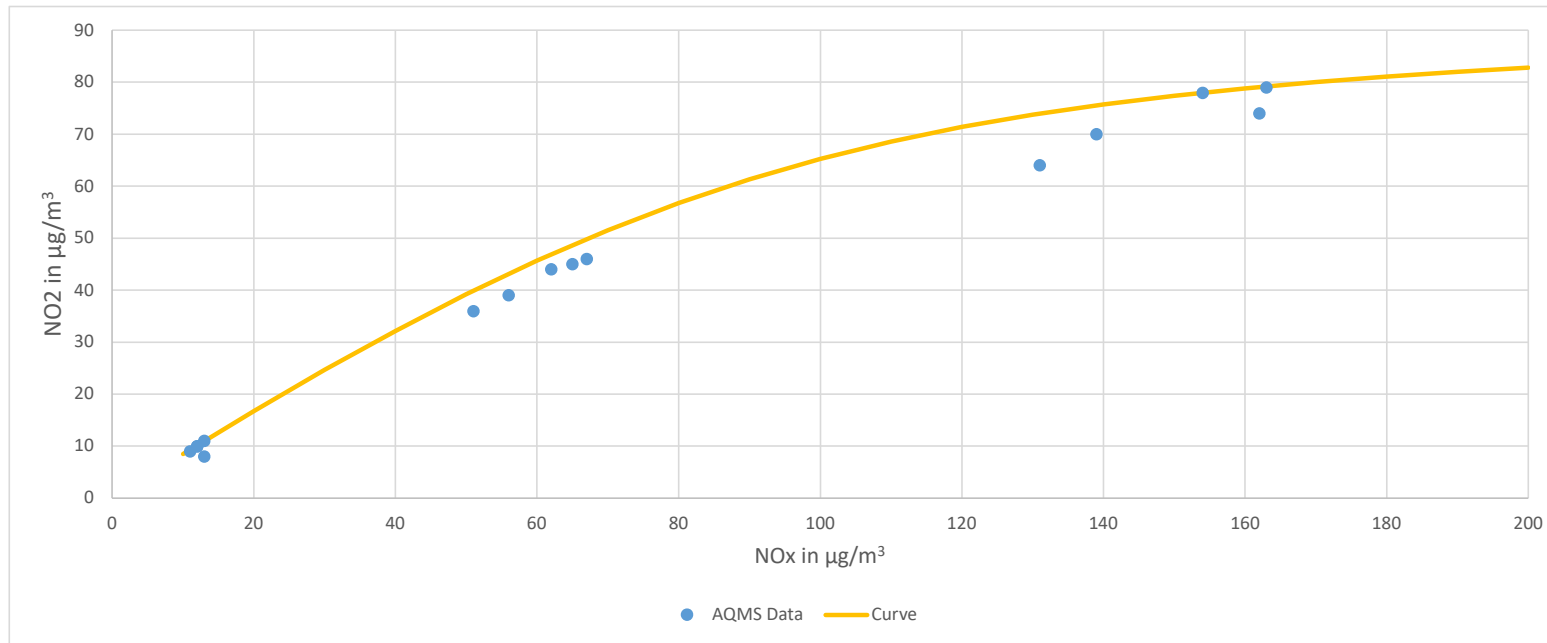
Appendix 2.4

**Details of Jenkin Method extracted from Smart Air
Modelling Platform (VIA)**

AQMS Data of the Past 5 Years

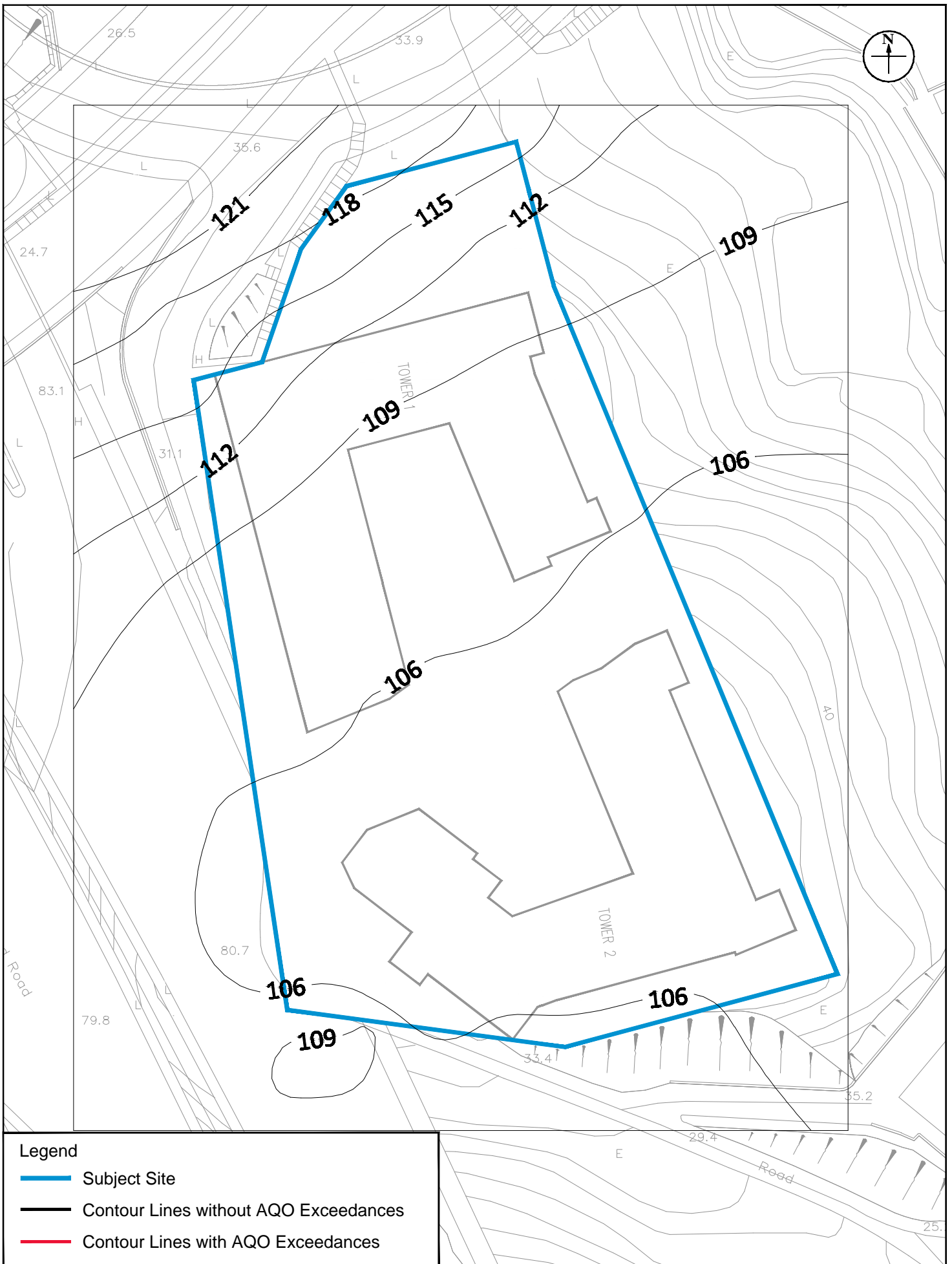
Year	Station	NO2 (ug/m3)	NOx (ug/m3)	Conversion
2018	TSUEN WAN	45	65	48.7
2019	TSUEN WAN	46	67	49.8
2020	TSUEN WAN	36	51	39.8
2021	TSUEN WAN	44	62	46.9
2022	TSUEN WAN	39	56	43.1
2018	TAP MUN	11	13	11.0
2019	TAP MUN	10	12	10.2
2020	TAP MUN	9	11	9.3
2021	TAP MUN	10	12	10.2
2022	TAP MUN	8	13	11.0
2018	MONG KOK	79	163	79.2
2019	MONG KOK	78	154	78.0
2020	MONG KOK	74	162	79.1
2021	MONG KOK	70	139	75.5
2022	MONG KOK	64	131	74.0




OX 93.37
J/K 14.9759




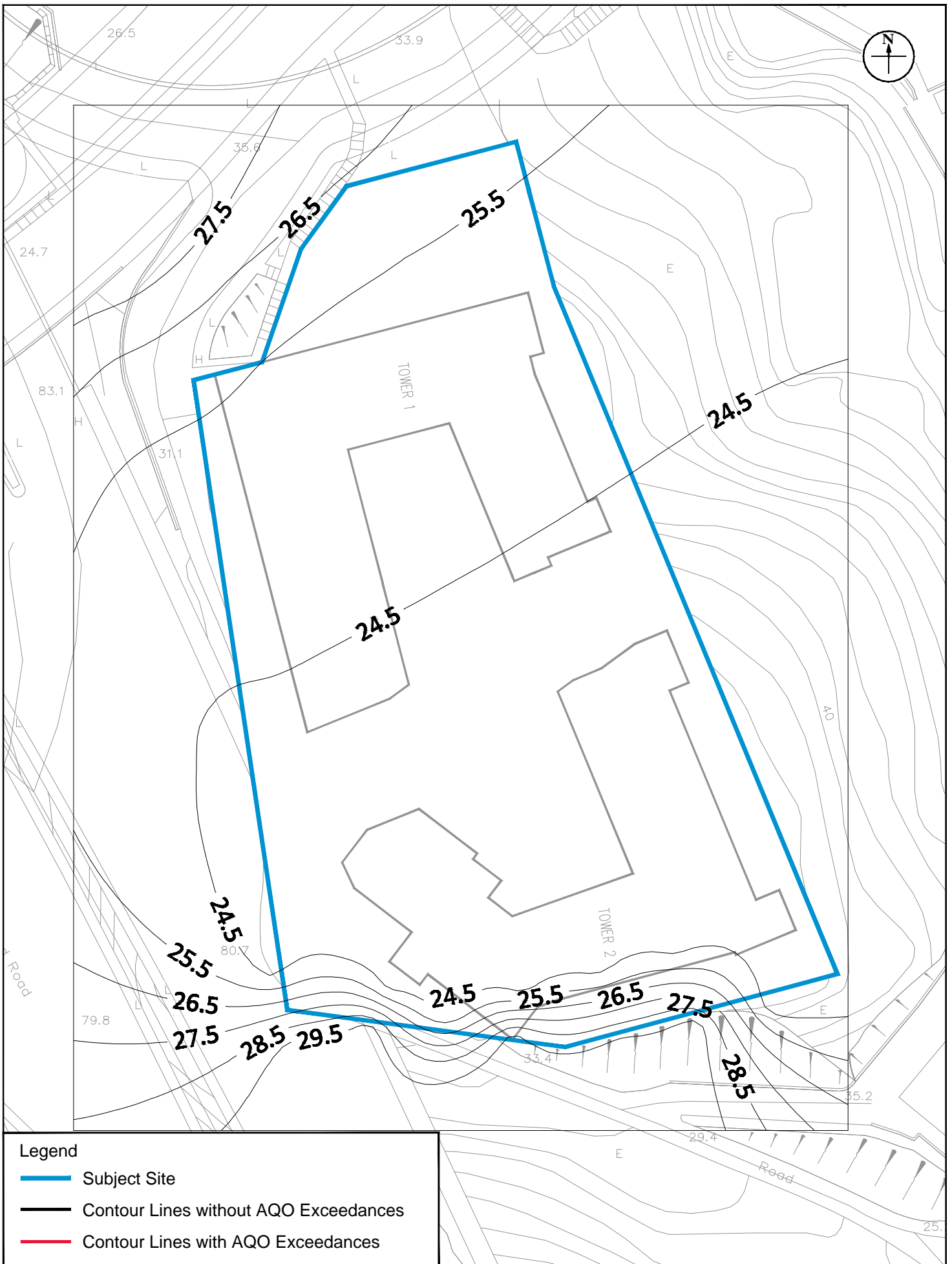
Appendix 2.5 Predicted Air Quality Impact Assessment Results




Appendix 2.6 Contour Map of NO₂, RSP and FSP




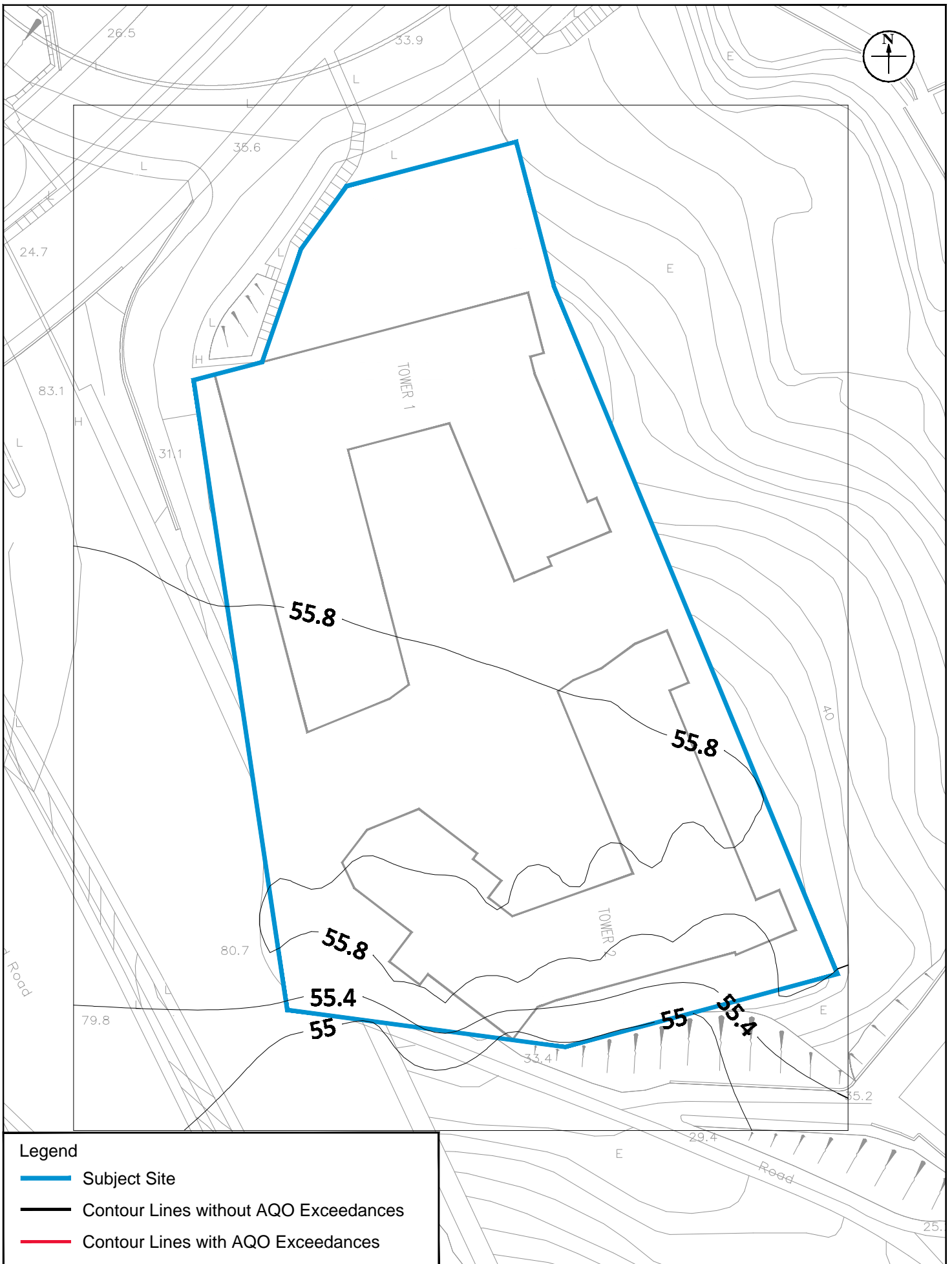
Legend	
	Subject Site
	Contour Lines without AQO Exceedances
	Contour Lines with AQO Exceedances




Appendix: 2.6a		
Title: Contour Map of the 19th Highest Hourly Average Concentration of NO ₂ in µgm-3 (Assessment Level: 1.5m Above Ground) (AQO standard: 200 µgm-3)	Drawn by:	WT
	Checked by:	TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tseun Wan Inland Lot 5 and Lot No. 429 in D.D.399, Ting Kau, Tsuen Wan	Rev.:	1.1
	Date:	Apr 2024




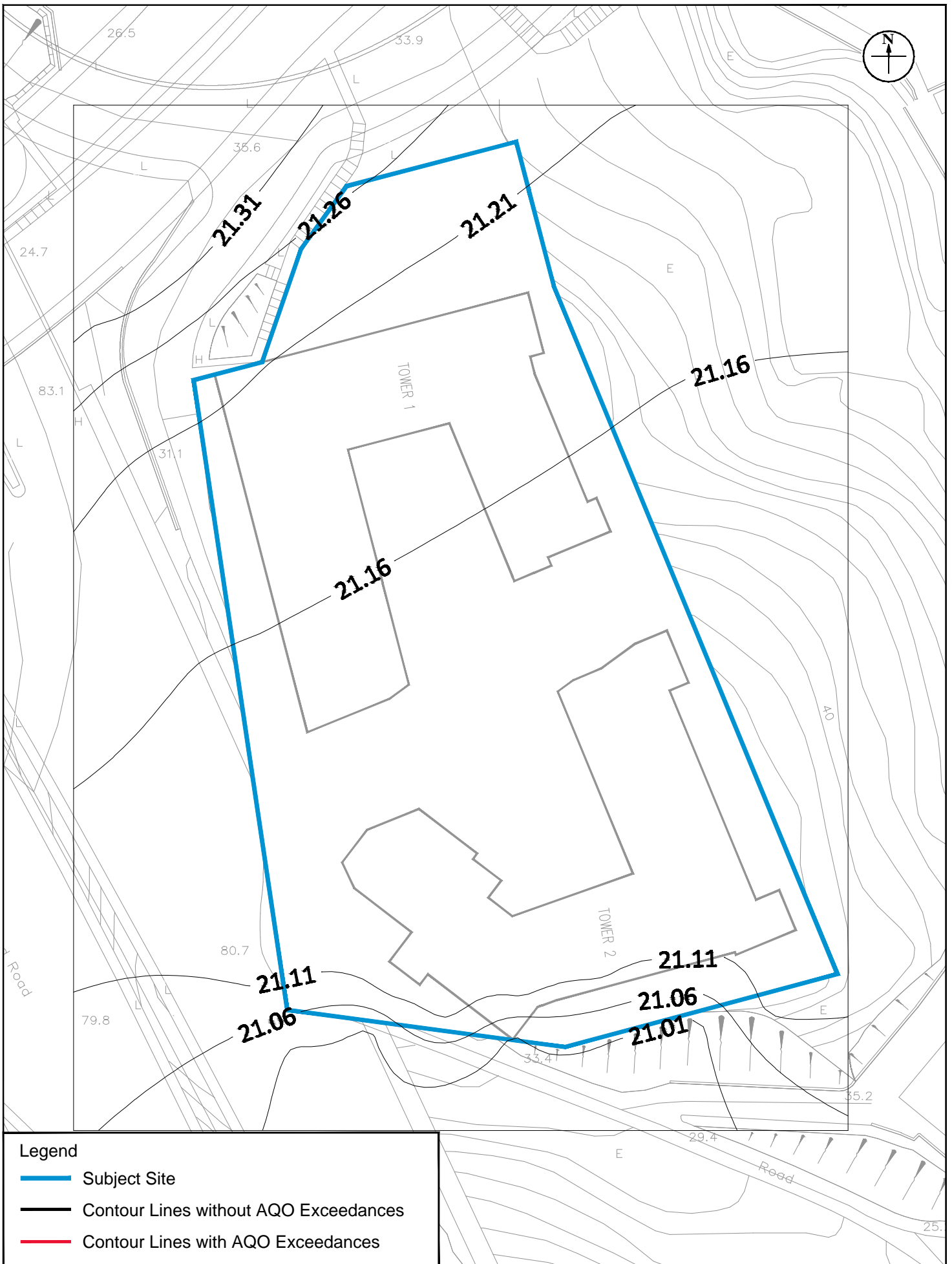
Legend	
	Subject Site
	Contour Lines without AQO Exceedances
	Contour Lines with AQO Exceedances




Appendix: 2.6b		
Title: Contour Map of the Annual Average Concentration of NO ₂ in µgm-3 (Assessment Level: 1.5m Above Ground) (AQO standard: 40 µgm-3)	Drawn by:	WT
	Checked by:	TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tseun Wan Inland Lot 5 and Lot No. 429 in D.D.399, Ting Kau, Tsuen Wan	Rev.:	1.1
	Date:	Apr 2024




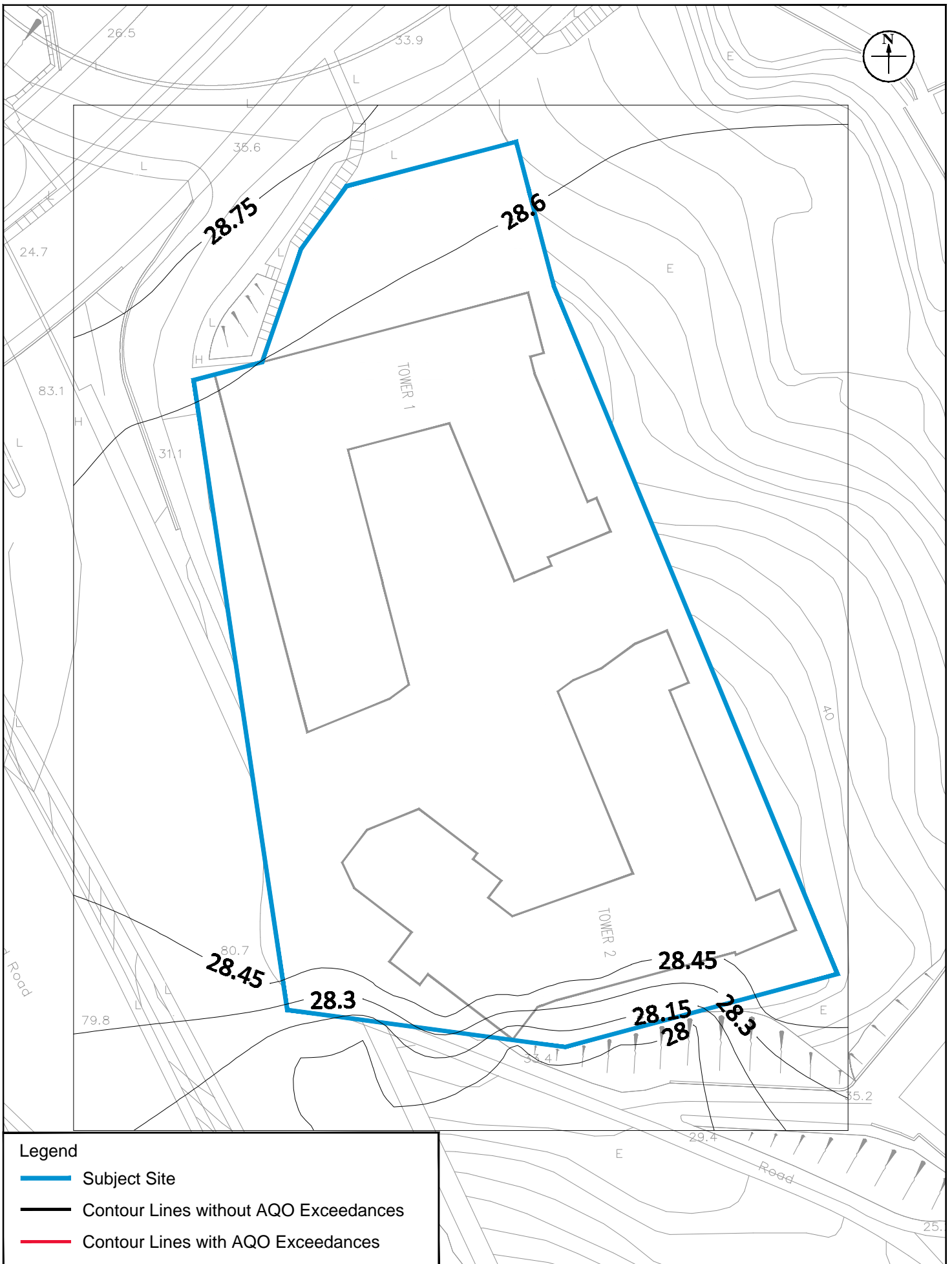
Legend	
	Subject Site
	Contour Lines without AQO Exceedances
	Contour Lines with AQO Exceedances




Appendix: 2.6c		
Title: Contour Map of 10 th Highest Daily Average Concentration of RSP in $\mu\text{g}\text{m}^{-3}$ (Assessment Level: 1.5m Above Ground) (AQO standard: 100 $\mu\text{g}\text{m}^{-3}$)	Drawn by:	WT
	Checked by:	TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tseun Wan Inland Lot 5 and Lot No. 429 in D.D.399, Ting Kau, Tsuen Wan	Rev.:	1.1
	Date:	Apr 2024




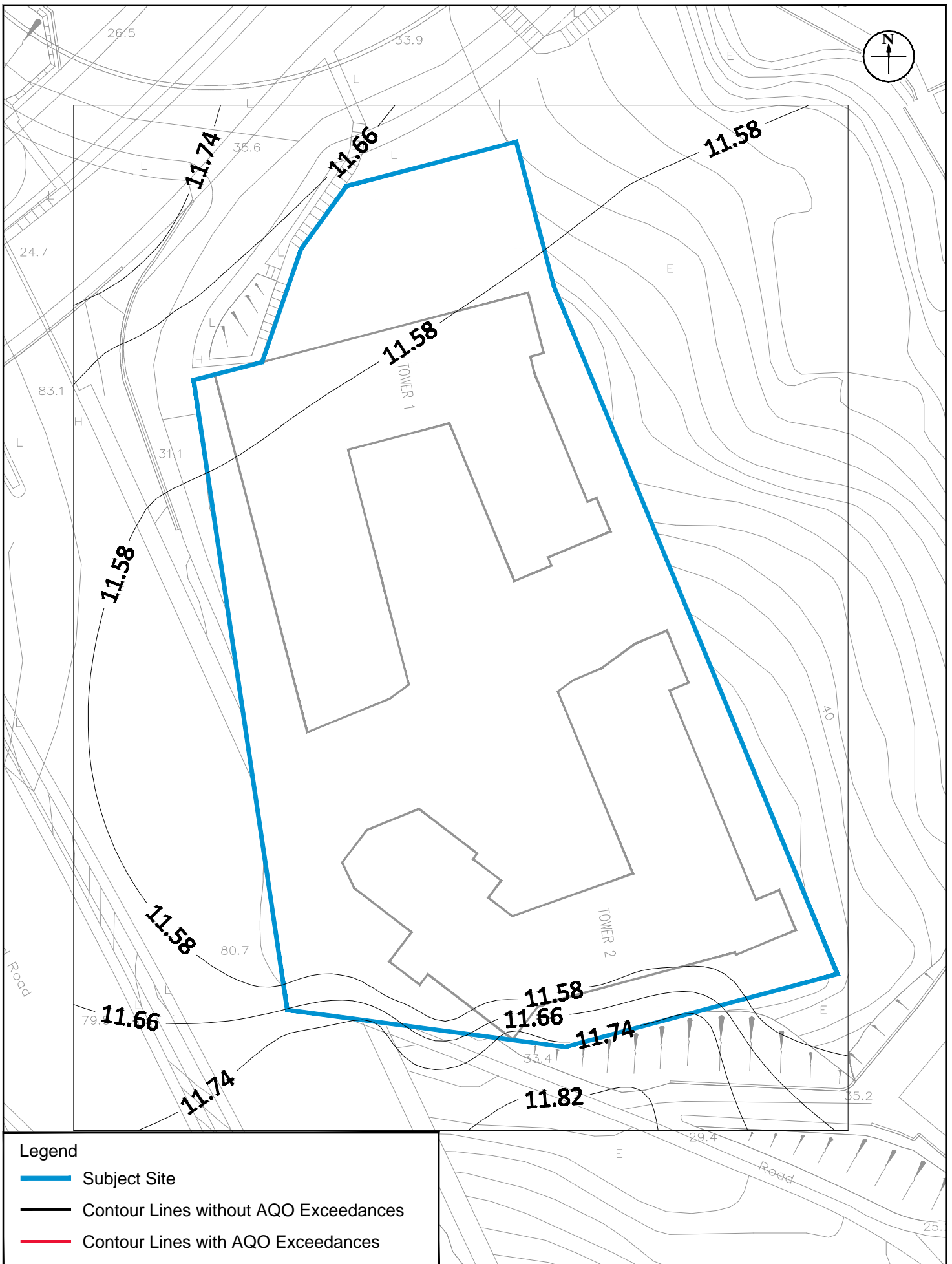
Legend	
	Subject Site
	Contour Lines without AQO Exceedances
	Contour Lines with AQO Exceedances




Appendix: 2.6d		
Title: Contour Map of Annual Average Concentration of RSP in $\mu\text{g-m}^{-3}$ (Assessment Level: 1.5m Above Ground) (AQO standard: 50 $\mu\text{g-m}^{-3}$)	Drawn by:	WT
	Checked by:	TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tseun Wan Inland Lot 5 and Lot No. 429 in D.D.399, Ting Kau, Tsuen Wan	Rev.:	1.1
	Date:	Apr 2024




Legend	
	Subject Site
	Contour Lines without AQO Exceedances
	Contour Lines with AQO Exceedances

Appendix: 2.6e		
Title: Contour Map of 36 th Highest Daily Average Concentration of FSP in µgm-3 (Assessment Level: 1.5m Above Ground) (AQO standard: 50 µgm-3)	Drawn by:	WT
	Checked by:	TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tseun Wan Inland Lot 5 and Lot No. 429 in D.D.399, Ting Kau, Tsuen Wan	Rev.:	1.1
	Date:	Apr 2024



Legend	
	Subject Site
	Contour Lines without AQO Exceedances
	Contour Lines with AQO Exceedances

Appendix: 2.6f		
Title: Contour Map of Annual Concentration of FSP in $\mu\text{g-m}^{-3}$ (Assessment Level: 1.5m Above Ground) (AQO standard: 25 $\mu\text{g-m}^{-3}$)	Drawn by:	WT
	Checked by:	TC
Project: Section 16 Planning Application for Submission of Layout Plan for Permitted 'Flat' and 'Social Welfare Facility' Uses at Tseun Wan Inland Lot 5 and Lot No. 429 in D.D.399, Ting Kau, Tsuen Wan	Rev.:	1.1
	Date:	Apr 2024