S12A AMENDMENT OF PLAN APPLICATION
APPROVED NGAU TAM MEI
OUTLINE ZONING PLAN NO. S/YL-NTM/12

PROPOSED REZONING FROM "R(C)" TO "G/IC" FOR A PROPOSED "SOCIAL WELFARE FACILITIES" (RESIDENTIAL CARE HOMES FOR THE ELDERLY) (RCHE)

AT LOT 4823 IN D.D.104, 81 SAN TAM ROAD, SAN TIN, N.T.

APPENDIX 3

ENVIRONMENTAL IMPACT ASSESSMENT

S12A Amendment of Plan Application,

Approved Ngau Tam Mei Outline Zoning Plan No. S/YL-NTM/12

Proposed Rezoning from "R(C)" to "GIC" for a Proposed "Social Welfare Facilities"

At Lot 4823 in DD 104, 81 San Tam Road, San Tin

Environmental Assessment Report

12 July 2022

Ref No.: C220410W-01

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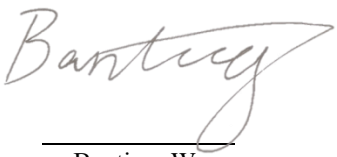

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1 INTRODUCTION

1.1 BACKGROUND

Wonder Pacific Development Limited (the Applicant) intends to develop an 10-storey Residential Care Home for the Elderly (RCHE) (the Development) at Lot 4823 in D.D. 140 in 81 San Tam Road, San Tin (the Site).

For a proposed amendment to the approved Ngau Tam Mei Outline Zoning Plan No. S/YL-NTM/12, a planning application to the Town Planning Board (TPB) under Section 12A of the Town Planning Ordinance (TPO) is required for rezoning from "R(C)" zone to "G/IC" zone.

To satisfy the Section 12A planning application, Novox Ltd is commissioned to conduct an environmental assessment to evaluate the potential environmental impact based on the latest master layout plan.

1.2 THE PROJECT AREA

The Site area is approximately 736.3m^2 and it is located at Lot 4823 in D.D. 140 in 81 San Tam Road, as shown in **Appendix 1.1.** It locates within the R(C) zone of the OZP. The site is currently an existing House. The Proposed Development is an 10-storey RCHE which comprises a total 142 bed spaces. The anticipated year of construction completion and occupation is 2027.

The floor layout plans, and section diagrams of the Proposed Development are provided in the Planning Statement of the Planning Application.

1.3 OBJECTIVE AND SCOPE OF ENVIRONMENTAL ASSESSMENT

The key objectives of this EA are to identify environmental key issues and constraints of the project, to identify possible environmental impacts, to propose mitigation measures against any unacceptable environmental impacts during the construction and operation phases of the project, including

- Identify all sensitive receivers of the Proposed Development.
- Assess the potential air quality impact at the Proposed Development due to vehicular and any industrial emissions.
- Carry out a Noise Impact Assessment (NIA) during construction and operation of the RCHE Proposed Development.
- Assess the potential impact of water quality and waste management impact due to the Proposed Development.
- Recommend the necessary mitigation measures to alleviate any unacceptable impacts.

2 AIR QUALITY IMPACT ASSESSMENT

2.1 AIR QUALITY STANDARDS

The Air Pollution Control Ordinance (APCO) provides the statutory authority for controlling air pollutants from a variety of sources. The Hong Kong Air Quality Objectives (AQOs), which stipulate the statutory limits of air pollutants and the maximum allowable numbers of exceedance over specific periods should be met. With passage of Hong Kong's Air Quality Objectives (AQOs) in the Air Pollution Control Ordinance (Cap. 311), the latest AQOs as listed in Table 1 have been in effect.

Table 1 Hong Kong Air Quality Objectives

Pollutant	Averaging time	Concentration limit[1] (µg/m^3)	Allowable number of exceedances
Sulphur Dioxide (SO_2)	10-minute	500	3
	24-hour	50	3
Respirable Suspended Particulates (PM_{10}) [2]	24-hour	100	9
	Annual	50	Not Applicable
Fine Suspended Particulates ($PM_{2.5}$) [3]	24-hour	50	35
	Annual	25	Not Applicable
Nitrogen Dioxide (NO_2)	1-hour	200	18
	Annual	40	Not Applicable
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	Not Applicable

Note: [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 293Kelvin 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.

2.1.1 The Site Environment

The existing environment of the proposed development is primarily affected by the local traffic such as San Tin Highway and San Tam Road. A site visit was carried out on 22nd June 2022 within 500m study area of the project, and no chimneys were observed near the Site during the site visit. The Site is used an existing House of GFA 294.258 m^2 and a plot ratio of 0.4. The uses adjoining to the Site is a small mountain full of greenery to the east, village houses namely Maple Garden and Casa Paradizo with 3 storeys to the north, and the south of the Site. Far away to the west of the Site are scattered building structures surrounding primarily for uses including warehouses, workshops and with several village houses. As such,

local traffic is considered to be the dominant emission source affecting the ambient air quality in these areas.

There is currently an air quality monitoring station operated by Environmental Protection Department (EPD) located outside the Project Site, namely Yuen Long Monitoring Station (situated at Yuen Long District Office, 269 Castle Peak Road). Despite this, in terms of geographical location, this monitoring station is considered the closest to the proposed Project Site. The annual average of air pollutants in $\mu g/m^3$ monitored at this station for the year 2021-2022 are summarized in Table 2 below.

Table 2 EPD Air Quality Monitoring Record at Yuen Long Monitoring Station in 2021-2022

Pollutant	Annual Average Concentration ($\mu g/m^3$)	AQO
NO_2	40	40
RSP	30	50
FSP	17	25

2.1.2 Representative Air Quality Sensitive Receivers (ASRs)

All the residential units within the proposed development are identified as sensitive receivers for air quality impact assessment. **Appendix 2.1** shows the locations of Representative ASRs of proposed RCHE development.

2.1.3 Hong Kong Planning Standards and Guidelines (HKPSG)

According to Chapter 9, Environment of the Hong Kong Planning Standard and Guidelines (HKPSG), adequate buffer distance or screening should be provided between sensitive receptors and potential air pollution emitters. For roads that are distinguished as local distributor and truck road for active and passive recreational uses, the buffer distance must be greater than 5m and 20m respectively as shown in Table 3 below.

Table 3 Guidelines on Usage of Open Space Site

Pollution Source	Parameter	Buffer Distance	Permitted Uses
Road and Highways	*Type of Road*		
	Trunk Road and Primary Distributor	>20m	Active and passive recreation uses
		3 - 20m	Passive recreational uses
		<3m	Amenity areas
	District Distributor	>10m	Active and passive recreational uses
		<10m	Passive recreational uses

	Local Distributor	>5m	Active and passive recreational uses
		<5m	Passive recreational uses
	Under Flyovers		Passive recreational uses

2.2 OPERATIONAL VECHICULAR EMISSION SOURCES

2.2.1 Evaluation of Air Quality Impact

The development may be subject to vehicular emission impact from roads nearby during the operational phase of the project. According to the Annual Traffic Census 2020 published by the Transport Department (TD), San Tam Road is classified as a rural road and San Tin Highway is classified as a trunk road. With a view to achieving a better air quality environment, the project proponent proposed to incorporate a separation distance of more than 20m and more than 5m between the sensitive uses of this Project and from the road kerb of the San Tin Highway and San Tam Road, respectively, which satisfies the buffer distance requirement for active and passive recreation uses according to Chapter 9, Environment of the Hong Kong Planning Standard and Guidelines (HKPSG) as shown in Section 2.1.3. No adverse vehicular emission impact is anticipated upon incorporation of the relevant buffer distance stipulated under the HKPSG into the layout design. The buffer distance between the said roads and the proposed RCHE development is shown in **Appendix 2.1**. In order to avoid adverse air quality impact from the traffic emission, a buffer zone is recommended for the Proposed Development with the following requirements:

- No fresh air intake for air sensitive uses including recreational use, etc., shall be located within the buffer zone; and
- Any air sensitive uses within the buffer zone shall not rely on openable windows for ventilation.
- With the provision of the buffer zone, the buffer distances recommended in HKPSG will be satisfied. Therefore, no adverse air quality impact on the Site from traffic emission is anticipated.

2.3 OPERATIONAL INDUSTRIAL EMISSION SOURCES

2.3.1 Evaluation of Air Quality Impact

As discussed in Section 2.1.1, it has confirmed in a site visit carried out on 22 June 2022 within 200m study area of the project, that no chimneys were observed near the Site during the site visit. The uses adjoining to the Site is a small mountain full of greenery to the east, village houses namely Maple Garden and Casa Paradizo with 3 storeys to the north, and the south of the Site. To the west of the Site are scattered building structures surrounding primarily for uses including warehouses, workshops and with several village houses. As such, local traffic is considered to be the dominant emission source affecting the ambient air quality in these areas. Thus, no adverse air quality impact to the proposed RCHE development due to industrial source emissions is anticipated.

2.4 CONSTRUCTION DUST EMISSION SOURCES

2.4.1 Evaluation of Air Quality Impact

The potential air quality impacts include the dust and exhaust emissions arising from the construction (e.g., demolition, site formation, foundation and formworks etc.). This may cause short–term air quality (i.e., dust) impacts on the surrounding air sensitive receivers. To minimize the potential dust emissions and for good site practice, relevant mitigation measures under the Air Pollution Control (Construction Dust) Regulation would be incorporated in the relevant works contracts.

- Good practice and mitigation measures to be implemented during the construction phase are as follows:
- Regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.
- Frequent watering for particularly dusty areas and areas close to ASRs.
- Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs.
- Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.
- Tarpaulin covering of all dusty vehicle loads transported to and from the Site.
- Establishment and use of vehicle wheel and body washing facilities at the exit points of the Site.
- Use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry weather.
- Provision of not less than 2.4m high hoarding from ground level along site boundary where adjoins a road, streets or other accessible to the public except for a site entrance or exit.
- Imposition of speed controls for vehicles within the Site.
- Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from off-site ASRs.
- Every stock of more than 20 bags of cement or dry Pulverised Fuel Ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides.

With implementation of the recommended mitigation measures, no adverse air quality impacts during construction are anticipated.

3 NOISE IMPACT ASSESSMENT

3.1 NOISE ENVIRONMENT

3.1.1 The Site Environment

The Subject Site is surrounded by mainly low-rise residential development, including Maple Garden and Casa Paradizo. San Tin Highway is located near the western side of the development nearby which will generate road traffic noise impact. There is no significant fixed noise sources located in the vicinity.

3.1.2 Representative Noise Sensitive Receivers (NSRs)

All the residential units within the proposed development are identified as sensitive receivers for noise impact assessment. Representative Noise Sensitive Receivers (NSRs) at each flat was selected for the quantitative traffic noise impact assessment and their locations are shown in **Appendix 3.1**. The assessment points include all openable windows in habitable rooms such as living rooms and bedrooms. Windows in noise tolerance spaces such as toilets, bathroom and staircases are excluded.

The assessment points have been taken to be situated at 1.2 m above floor slabs and at 1 m away from the external facade of openable windows of habitable room of the flats.

3.2 ENVIRONMENTAL LEGISLATION AND STANDARDS

3.2.1 Road Traffic Noise Assessment Criteria

Noise standards are recommended in the *Hong Kong Planning Standards and Guidelines* (HKPSG) for planning against noise impact from road traffic. As stated in Table 4.1 of Chapter 9 of HKPSG, the criterion for road traffic noise impact on domestic premises (habitable rooms) is L_{10}(1-hour) 70dB(A). This criterion applies to uses which rely on openable windows for ventilation.

3.2.2 Fixed Noise Sources Assessment Criteria

Impacts of fixed noise sources within the Proposed Development on nearby noise sensitive buildings is governed by the *Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM)* issued under the *Noise Control Ordinance ("NCO")* and sections of Chapter 9 of HKPSG.

In setting the ANL, reference has to be made to the Area Sensitive Rating ("ASR") in Table 1 of IND-TM reflecting the type of area where the noise sensitive receivers ("NSRs") are situated. The proposed development and surrounding existing residential developments are considered low density residential area. Future noise sensitive uses of the proposed development are expected to be directly affected by San Tin Highway with Annual Average Daily Traffic ("AADT") in excess of 30,000 (i.e. influencing factor, IF). An ASR of "C" is considered representative of the noise sensitive uses. ANL and operation noise criteria for different Area Sensitivity Ratings (ASRs) are summarized in **Table 3-1** and **Table 3-2**.

According to the HKPSG, the level of the intruding noise at the façade of the nearest sensitive use should be at least 5 dB(A) below the appropriate ANL shown in the IND-TM or, in the case of the background being 5 dB(A) lower than the Acceptable Noise Level (ANL), the predicted noise level should not exceed the background.

Background noise level in terms of L_{90}(1-hr) will be measured onsite by future contractor so that it can be adopted for determining necessary noise mitigation measures to meet the requirement. Regarding the identified existing NSR discussed above, it is close to and directly affected by road traffic along San Tin Highway so that the background noise level is more likely to be higher than ANL-5.

Table 3-1 Area Sensitivity Rating (ASR)

Type of Area Containing NSR \ Degree to which NSR is affected by IF	Not Affected	Indirectly Affected	Directly Affected
(i) Rural area, including country parks or village type developments	A	B	B
(ii) Low density residential area consisting of low-rise or isolated high-rise developments	A	B	**C**
(iii) Urban area	B	C	C
(iv) Area other than those above	B	B	C

Table 3-2 Acceptable Noise Levels (ANLs)

Time Period \ ASR	A	B	**C**
Day (0700 to 1900 hours)	60	65	**70**
Evening (1900 to 2300 hours)			
Night (2300 to 0700 hours)	50	55	**60**

Remarks:

1) Prevailing background noise level to be measured by future contractor. Prevailing background noise level or ANL-5 will be finally adopted.

3.2.3 Construction Noise Assessment Criteria

The main piece of legislation controlling environmental noise nuisance impact is the *Noise Control Ordinance (NCO)*. The NCO enables regulations and Technical Memoranda (TM) to be made, which introduce detailed control criteria, measurement procedures and other technical matters.

Construction noise is governed under the following TMs:

- *Technical Memorandum on Noise from Percussive Piling (PP-TM).*

- *Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM).*
- *Technical Memorandum on Noise from Construction Work in Designated Areas (DA-TM).*

During "Restricted Hours", defined as 7pm to 7am from Monday to Saturday and all day on public holidays, the construction contractor must apply for and receive a Construction Noise Permit (CNP) from EPD for percussive piling (at any time) or any other construction activities conducted. While there is no planned construction works to be carried out during the restricted hours, the relevant TMs should be followed in case there is any need to carry out works in such time period in future.

3.3 ROAD TRAFFIC NOISE ASSESSMENT

3.3.1 Assessment Model

The U.K. Department of Transport's procedure *"Calculation of Road Traffic Noise"* (CRTN) is used to predict the hourly L_{10}(1-hour) noise levels generated from road traffic at selected representative NSRs using proprietary noise prediction software CadnaA. Road traffic noise impacts on various floor levels on the respective residential blocks/houses have been predicted. Practicable environmental mitigation measures will be recommended where necessary. The predicted noise levels are compared with the relevant HKPSG noise standards (i.e. L_{10}(1-hour) 70dB(A)).

The assessment methodology was implemented using noise prediction software CadnaA, which is a graphically based computer programs in full compliance with the noise prediction methodologies as set out in CRTN.

This proprietary modeling software is capable of simulating various road traffic conditions, road conditions and the form of noise mitigation measures. All the topographic effect, distance information, view angle information, shielding effects, ground absorption and façade reflection can be accurately illustrated and computed.

Topographic barrier including surrounding building structures, retaining walls, and natural terrains etc. all provide screening or reflection effect to the noise source. This information is retrieved from the latest digital map data provided by Lands Department and digitized in the road traffic noise model.

For the propagation of noise, a worst-case hard ground as defined in CRTN was assumed throughout the Study Area.

A +2.5dB(A) correction for façade reflection was applied at receptor locations in accordance with CRTN.

3.3.2 Traffic Flow Data

The road layout defines the road width, opposing traffic lane separation, road surface type, traffic mix, traffic flow and design speed. For the purpose of this road traffic noise impact assessment, traffic flows have been forecasted for all major roads within 300m of the

proposed development. The road network was divided into discrete segments, each of which was assigned a segment number.

The proposed development is scheduled for construction completion and operation in year 2027. Traffic forecast for year 2042 representing the worst situation within 15 years from the operation of the residential care home is provided by project traffic consultant and included in **Table 3-3**. The traffic forecast was conducted by the Project's traffic consultant and agreed with Transport Department (TD) and Planning Department (PlanD).

Table 3-3 Year 2042 Traffic Forecast for Noise Impact Assessment

Road ID.	Road Name	Direction	Road Surface	Road Speed [km/h]	AM Peak		PM Peak	
					Traffic Flows [veh/hr]	% of HV *1	Traffic Flows [veh/hr]	% of HV *1
A	Geranium Path	Two-way	Impervious	50	20	10%	20	10%
B	Royal Palms Boulevar	Two-way	Impervious	50	540	10%	520	10%
C1	Castle Peak Road - Mai Po	NB	Impervious	50	205	34%	220	30%
C2	Castle Peak Road - Mai Po	SB	Impervious	50	285	34%	215	23%
D1	Castle Peak Road - Mai Po	NB	Impervious	50	365	25%	410	20%
D2	Castle Peak Road - Mai Po	SB	Impervious	50	565	20%	355	20%
E1	Castle Peak Road - Mai Po	NB	Impervious	50	340	23%	385	20%
E2	Castle Peak Road - Mai Po	SB	Impervious	50	590	21%	380	20%
F1	San Tin Highway	NB	Pervious	100	3990	49%	3490	50%
F2	San Tin Highway	SB	Pervious	100	4005	50%	4215	49%
G1	San Tam Road	NB	Impervious	50	390	17%	265	15%
G2	San Tam Road	SB	Impervious	50	315	22%	340	20%
H1	San Tam Road	NB	Impervious	50	340	15%	335	15%
H2	San Tam Road	SB	Impervious	50	405	20%	305	20%

Remarks:

1) HV includes Light Van, Public Light Bus, Light Goods Vehicle, Medium Goods Vehicle, Heavy Goods Vehicle and Container/Tractor, Coach and Bus.

3.3.3 Road Surface Conditions

The CRTN modelling method uses emission level adjustments to take into account the influence of various road surfaces and gradients on noise emission level. A -1dB correction to the basic road source noise level is applied to impervious road surface with traffic speed below 75km/hr, and -3.5dB correction to the basic road source noise level for pervious road surface.

3.3.4 Road Traffic Noise Impact for Baseline Scenario

Quantitative road traffic noise impact assessment has been carried out and compared against

the criterion. Noise levels were calculated for the baseline scenario without noise mitigation in place. Predicted maximum traffic noise levels for each assessment point are shown in table below. The detailed noise model and contour map are shown in **Appendix 3.1** for reference. The assessment is based on conservation assumption of hard reflecting ground surface over the entire Study Area.

In the baseline scenario the building layout and orientation has been duly considered with respect to traffic noise impact. Whereas practicable, the housing units are oriented away from major roads. Noise tolerant facades are used for self-screening. Notwithstanding the above, there is still slight noise exceedance. Noise mitigation measures are necessary.

Table 3-4 Predicted Road Traffic Noise Impact for Unmitigated Scenario

Window ID	Predicted Noise Level $L_{10,\ 1\ hour}$, dBA						Noise Criteria, dBA
	2/F	3/F	4/F	5/F	6/F	7/F	
W01	77.8	76.8	76.8	76.8	76.9	77.0	70
W02	76.8	77.0	77.1	77.1	77.2	77.2	70
W03	77.0	76.9	76.9	77.0	77.1	77.1	70
W04	77.0	76.7	76.7	76.7	76.9	77.0	70
W05	76.9	63.4	64.3	65.7	67.0	68.3	70
W06	76.7	53.0	53.0	53.3	54.4	56.5	70
W07	56.9	52.7	52.7	53.0	54.2	56.4	70
W08	53.3	56.0	57.1	57.4	57.9	58.9	70
W09	52.6	61.6	63.1	63.5	64.0	64.9	70
W10	52.6	68.2	70.6	71.1	71.3	71.4	70
W11	54.3	72.3	75.3	76.0	76.0	76.0	70
W12	58.6	69.2	73.4	74.3	74.4	74.3	70
W13	61.7	60.8	72.1	73.2	73.3	73.3	70
W14	63.5		71.0	72.1	72.3	72.3	70
W15	61.5		70.9	72.2	72.4	72.4	70
W16	60.4		69.8	70.1	70.4	70.5	70
W17	59.1		61.8	62.1	62.6	63.3	70
W18			63.7	65.0	65.3	65.6	70
W19			65.3	65.6	65.7	66.1	70
W20			61.6	61.8	62.2	62.8	70

3.3.5 Road Traffic Noise Impact for Mitigated Scenario

Practicable noise mitigation noise measures have been incorporated in the building layout

design, in accordance with *Practice Note on Application of Innovative Noise Mitigation Designs in Planning Private Residential Developments against Road Traffic Noise Impact*, including:

- At the northern façade, vertical architectural fins are provided next to each individual dorm units. The fins extend 1.7m from the building façade.
- At the eastern façade, vertical architectural fins are provided at the two corners. The fins extend 1.5m from the building façade.
- At the southern façade, NSRs are located within a building void with self noise screening. Yet there are still some NSRs having direct line of sight towards San Tin Highway, thus vertical architectural fins are provided at entrance towards the building void to block the line of sight. The fins extend 1.8m and 0.9m from the building façade.

The location and details of mitigation measures are illustrated in **Appendix 3.1.**

With the above mitigation measures in place, predicted maximum traffic noise levels for each assessment point are shown below. Since all the noise assessment points comply with the HKPSG noise standard, the residual noise impact is considered to be satisfactory.

Table 3-5 Predicted Road Traffic Noise Impact for Mitigated Scenario

Window ID	Predicted Noise Level $L_{10,\ 1\ hour}$, dBA						Noise Criteria, dBA
	2/F	3/F	4/F	5/F	6/F	7/F	
W01	56.9	64.1	65.6	66.9	68.1	69.2	70
W02	63.9	62.5	64.0	65.7	67.4	68.5	70
W03	60.6	58.6	60.0	62.4	64.9	66.7	70
W04	63.2	58.2	59.4	61.5	63.9	66.1	70
W05	61.1	51.0	51.1	51.8	53.8	57.1	70
W06	57.6	51.0	51.0	51.4	53.2	55.9	70
W07	51.0	51.3	51.3	51.6	53.3	55.9	70
W08	51.0	51.5	51.4	51.8	53.4	56.1	70
W09	51.0	51.5	51.7	52.1	53.8	56.8	70
W10	51.3	51.6	51.8	52.4	54.3	57.9	70
W11	51.4	52.0	52.2	53.6	56.1	60.2	70
W12	51.5	62.7	68.0	69.4	69.6	69.8	70
W13	51.5	63.0	67.9	69.4	69.7	69.8	70
W14	61.8		67.6	69.0	69.2	69.4	70
W15	59.7		66.6	68.4	68.7	68.9	70
W16	57.7		67.2	67.5	68.1	68.4	70

W17	56.0		63.9	63.9	64.1	64.4	70
W18			60.3	60.8	61.5	62.2	70
W19			59.0	59.2	59.9	61.1	70
W20			63.2	63.3	63.5	64.0	70

3.4 FIXED SOURCE NOISE ASSESSMENT

3.4.1 Assessment Model

Standard acoustical principles in accordance with *"ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation"* will be adopted for prediction of fixed noise impact. The general equation used to calculate the equivalent continuous sound pressure level at a receiver location arising from each individual noise source is described below:

$$L_{eq} = L_w + D_c - A_{div} - A_{atm} - A_{gr} - A_{bar} - A_{misc}$$

Where

L_w is the sound power level of the noise source;

D_c is the directivity factor of the noise source;

A_{div} is the attenuation due to geometrical divergence;

A_{atm} is the attenuation due to atmospheric absorption;

A_{gr} is the attenuation due to ground effect;

A_{bar} is the attenuation due to barrier;

A_{misc} is the attenuation due to miscellaneous other effects.

The prediction methodology described in ISO 9631-2 is implemented via noise prediction software CadnaA. A 3D model was constructed taking into account the topology and site layout plan. CadnaA is proprietary software for noise mapping of road traffic, railway as well as fixed industrial plants, etc. It has been used for city-scale Strategic Noise Mapping in Europe according to the EC Directive 2002/49/EC, the reliability has been well verified and accepted.

Topographic barrier including surrounding buildings, retaining walls, and natural terrains etc. all provide screening effect to the noise source. This information is retrieved from the latest digital map data provided by Lands Department.

The noise barriers within the proposed development include self-screening by noise tolerant building blocks and architectural fins. These barriers are constructed in the 3D model based on latest master layout plan. For calculation of barrier screening effect, maximum insertion loss is capped at 20dB for single barrier, 25dB for double barrier, according to ISO 9613.

For the propagation of noise, a worst-case hard ground was assumed throughout the Study Area. No ground attenuation effect is applied.

A +3.0dB(A) correction for façade reflection was applied at receptor locations.

3.4.2 Identified Fixed Noise Source Generated by the Project

Planned fixed noise sources within the Proposed RCHE Development are identified as shown in **Appendix 3.2**

Among the identified sources, the dominate sources are two nos. of cooling towers located on the open rooftop having direct line of sight to NSRs. The noise may potentially affect Casa Paradizo and Maple Garden in the close proximity.

Most of the Mechanical and Electrical (M&E) equipment, such as chiller, water pumps, lift machines, etc. will be installed in enclosed plant rooms of the Proposed RCHE Development. Transformers and Sewage Treatment Plant will be located in the basement level and placed inside enclosed structure. The guidance of "Good Practices on Ventilation System Noise Control" and "Good Practices on Pumping System Noise Control" issued from EPD shall be referred to. Appropriate mitigation measures, where necessary, shall be provided to comply with the noise criteria.

Small power rating split type air conditioning systems will be installed for individual room. However, the noise impact of those small power rating outdoor units shall be minimal, and the contribution is hence not considered in the noise impact assessment.

3.4.3 Allowable Sound Power Level

At this stage the cooling towers for the project had not been confirmed as which shall be designed in future by the design and build contractor. As such the maximum allowable sound power level will be determined by back calculation from the separation distance between the noise source and nearby representative nearest noise sensitive receivers are given in table below.

A catalogue of low noise type cooling towers as shown in **Appendix 3.2** for reference. The Sound Power Level (SWL) of this cooling tower model is 93dB which is adopted in the noise model. The sound power level and noise mitigation requirements will be stipulated in the project contractor specification governing the equipment selection by the design and build contractor.

Table 3-6 Proposed Fixed Source Noise Mitigation Treatment

Noise Sources	**Allowable SWL**	**Noise Mitigation Description** (refer to **Appendix 3.2**)
Cooling Tower (Intake)	73 dB(A)	- Low noise type cooling tower - Intake silencer with IL of 20dB(A), the silencer is typically 900 to 1200 long subject to supplier model selection
Cooling Tower (Discharge)	93 dB(A)	- Low noise type cooling tower - No silencer to be provided since fan noise is directed upward in the open rooftop and not affecting low rise residential premises

3.4.4 Fixed Plant Noise Assessment Results

Based on the allowable SWL and two cooling towers in full load operation, the noise impact at the worst affected façade at nearby representative NSRs are tabulated below.

Table 3-7 Predicted Fixed Source Noise Impact to Surroundings

ID	NSR	Predicted Noise Level at Worst Façade, dB(A)	Nighttime Noise Criteria, dB(A)
N01	Maple Garden G3	34.8	55
N02	Casa Paradizo A17	32.5	55
N03	Casa Paradizo C7	39.7	55

As such, provided the fixed plant noise generation at the cooling tower does not exceed the allowable SWL, fixed plant noise impact towards the affected NSRs will not exceed the noise criteria stipulated in the HKPSG.

3.5 CONSTRUCTION NOISE IMPACT

Various construction activities will be the key noise sources generated during the construction phase. In particular, the use of PME and the vehicle movement within the Site are the major potential noise sources. Construction shall be carried out during non-restricted hours as far as practicable. The mitigation measures recommended in ProPECC PN2/93 should be implemented where applicable. In addition, the following measures and on-site practice are recommended in order to minimize the potential construction noise impacts during daytime:

- Quiet PME and construction method should be adopted if possible.
- The Contractor shall devise and execute working methods to minimise the noise impacts on the surrounding sensitive uses, and provide experienced personnel with suitable training to ensure that those methods are implemented.
- Switch off idling equipment.
- Regular maintenance of equipment.
- Fit muffler or silencer for equipment.
- Noisy equipment and noisy activities should be located as far away from the NSRs as is practical.
- Use quiet construction method, e.g. use saw-cut or hydraulic crusher instead of excavator mounted percussive breaker.
- PME should be kept to a minimum and the parallel use of noisy equipment / machineries should be avoided.
- Erect noise barriers or noise enclosure for the PME if appropriate.

- Implement good house-keeping and provide regular maintenance to the PME.
- Spot check resultant noise levels at nearby NSRs.

If construction work involving use of PME will be required during restricted hours, a CNP shall be applied for under the NCO. The noise criteria and assessment procedures for obtaining a CNP are specified in GW-TM.

With the implementation of the abovementioned mitigation measures, adverse construction noise impact is not anticipated.

4 WATER QUALITY IMPACT ASSESSMENT

4.1 INTRODUCTION

This section reviews the water quality impacts from the Project. The potential environmental impacts from construction effluent generated by the proposed works and operation of the proposed residential home for elderly are assessed. Standards, guidelines and legislation, recommended mitigation measures and the disposal strategy are reviewed.

4.2 LEGISLATIONS, STANDARDS AND GUIDELINES

The following relevant Hong Kong legislations/guidelines governing water pollution control have been referenced in carrying out the assessment:

- *Environmental Impact Assessment Ordinance and EIAO-TM (Annex 6 and 14);*
- *Water Pollution Control Ordinance (WPCO) (Cap. 358) (as amended by the Water Pollution Control (Amendment) Ordinance 1990 and 1993);*
- *Water Pollution Control (General) Regulations (as amended by the Water Pollution Control (General) (Amendment) Regulations 1990 and 1994);*
- *Water Pollution Control (Sewerage) Regulation;*
- *Water Quality Objectives (WQOs) for relevant Water Control Zones (WCZs);*
- *Practice Note for Professional Persons ProPECC Note PN1/94, Construction Site Drainage; and*
- *Practice Note for Professional Persons ProPECC Note PN 5/93, Drainage Plans subject to Comment by the Environmental Protection Department.*

4.3 IDENTIFICATION OF WATER SENSITIVE RECEIVERS

The project site is located within the Northwest of New Territories and within the catchment of the Deep Bay Water Control Zone.

No communal foul sewer connection is available for the project area.

The quality of effluent during the construction and operation phase of the projects will be bounded by the discharge standard of Deep Bay Water Control Zone, subject to the estimated discharge quantity. Standards for effluents discharged into the coastal waters of Deep Bay Water Control Zone is annexed in *Cap. 358AK Technical Memorandum on Effluent Standards*.

4.4 WATER QUALITY IMPACTS AND MITIGATIONS DURING CONSTRUCTION

Proposed construction works mainly involve excavation of soil, piling and building construction works. During construction phase of the Project, the primary sources of potential impacts to water quality will be from pollutants in site run-off, which may enter surface waters directly or enter storm drains. The primary pollutant will be mainly suspended

solids.

Pre-bored piling works will be adopted for foundation works. Significant amount of water will be used for ground boring and drilling for site investigation or rock/soil anchoring.

Spillage, hydraulic leakage and runoff from the surface of standby construction equipment during rainy conditions may also release oil and lubricants to the environment if surface runoff is not adequately controlled.

Sewage generated by the workforce will not be directly disposed of. Instead, chemical toilets will be provided at the work sites. Regular cleansing and servicing of these toilets should be provided for the chemical toilets to maintain their proper operation. No canteen will be provided in the project site.

Wastewater may also be generated from building construction activities including concreting, plastering, internal decoration, cleaning of works and similar activities.

The potential impacts of land-based construction activities on water quality can be readily controlled by appropriate on-site measures pursuant to the *ProPECC Note PN 1/94*. The applicable measures should be implemented and will be sufficient to control/prevent impacts to the water sensitive receivers in the vicinity of the works area and downstream.

In particular, the following measures should be properly implemented to mitigate any potential adverse water quality impacts:

- Recirculate and reuse wastewater generated from onsite facilities, e.g., wheel washing facilities, and piling works, as far as practicable, after sedimentation.
- Provide and maintain adequately designed treatment system for all wastewater generated on site, including but not limited to runoff, onsite facilities, piling and building construction works, etc., in case disposal is required.
- Provide and maintain chemical toilets for workers on site.
- Provide and maintain sufficient drip trays for all generators, oil, chemicals, and chemical waste containers.

Water discharge license should be obtained for the Project during the entire construction phase. All the requirements and conditions as stipulated on the license shall be followed and complied with.

4.5 WATER QUALITY IMPACTS AND MITIGATIONS DURING OPERATION PHASE

The Project is to build a residential care home for elderly, accommodating at most 142 nos. of bedspaces. Sewage from the residents as well as workers and visitors will be generated from bathing and showers, toilet flushing, pantry, toilet basins, etc.

All storm water/rainwater from both open paved and developed areas of the site will be conveyed to the storm water drain.

The *ProPECC Note PN 5/93* provides guidelines and practices for handling, treatment, and disposal of various effluent discharges to stormwater drains and foul sewers. The design of site drainage and disposal of site effluents generated within the proposed development area should follow the relevant guidelines and practices as given in the *ProPECC Note PN 5/93*.

Since there is no communal foul sewer connection, an onsite sewage treatment plant (STP) will be installed to handle all sewage generated from the proposed residential care home before discharging offsite. Preliminary design of the STP is annexed in **Appendix 4.1**. Proper operation and maintenance should be provided for the STP. Storm water/rainwater should be separated from the sewage collection network to avoid overload to the STP.

All storm water/rainwater from open paved and developed areas of the site will be conveyed to the storm water drain via properly designed surface drainage. Facilities such as standard gully grating, with spacing which is capable of screening off large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system. Good management measures such as regular cleaning and sweeping open paved area of the site is suggested during operational phase.

Similar to that during the construction phase, a water discharge license should be obtained for the operation of the proposed residential care home for elderly. All the requirements and conditions as stipulated on the license shall be observed and complied with.

5 WASTE MANAGEMENT

5.1 INTRODUCTION

This section reveals and discusses types of wastes generated from the Project during construction and operation phases. Hence, proper waste management strategies are recommended to reduce, reuse, recycle and dispose of wastes.

5.2 LEGISLATIONS, STANDARDS AND GUIDELINES

The following relevant Hong Kong legislations and guidelines governing waste disposal and management have been referenced in carrying out the assessment:

- *Waste Disposal Ordinance (Cap. 354);*
- *A Guide to the Chemical Waste Control Scheme;*
- *A Guide to the Registration of Chemical Waste Producers;*
- *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes; and*
- *Code of Practice for the Management of Clinical Waste – Small Clinical Waste Producers.*

5.3 WASTE MANAGEMENT IMPLICATIONS OF THE CONSTRUCTION PHASE

Major construction activities for the Project include demolition of existing property, site clearance, piling, construction of substructure and superstructure. Considering the small scale of the Project, it is anticipated not much waste would be generated though the exact quantity will be subject to detailed construction methods.

Wastes generated from the Project during the construction phase generally consist of:

- Construction and demolition (C&D) waste;
- General refuse; and
- Chemical waste.
- Possible wastes generated from the Project are detailed in Table 5-1.

Table 5-1 Possible Waste Generated During the Construction Phase

WASTE TYPE	POSSIBLE WASTE GENERATED FROM THE PROJECT
INERT C&D WASTE	• CONCRETE FROM DEMOLITION OF EXISTING PROPERTY • EXCAVATED MATERIALS (EXCLUDING TOPSOIL)

WASTE TYPE	POSSIBLE WASTE GENERATED FROM THE PROJECT
NON-INERT C&D WASTE	• FELLED TREES • REMOVED PLANT • TOPSOIL • DISCARDED FURNITURE • DAMAGED SCAFFOLDING BAMBOO • WOOD FORMWORK • USED PACKAGING MATERIALS
GENERAL REFUSE	• WASTEPAPER • FOOD DEBRIS • PACKAGING MATERIAL
CHEMICAL WASTE	• SPENT LUBRICATING OIL • PAINT

A Waste Management Plan (WMP) will be prepared to outline the estimated types and quantities of waste generated in the Project and formulate the approaches in dealing with them. Typical hierarchy of waste management, i.e., avoid, minimize, recycle and disposal as the last resort, will be adopted for the Project. The aims of the WMP are to:

- improve the resource efficiency.
- increase the waste and materials awareness of staff; and
- help to discharge duty of care obligations.

5.3.1 Waste Avoidance

To avoid generation of waste during the construction phase, good and detailed planning and smart procurement is crucial. The following approaches are suggested:

- avoid excess order;
- arrange delivery of goods according to construction progress;
- reject and return damaged goods;
- keep protective packaging on and ensure storage areas are secure and weatherproofs;
- minimize movement of goods to lower the chance of damage to goods; and
- eliminate over packaging and liaise with suppliers to return packaging materials to them.

5.3.2 Construction and Demolition Materials

Excavated materials, such as soil and rock, and demolition concrete should be reused for backfilling on site as far as practicable. Surplus materials of these inert types should be delivered to the Civil Engineering and Development Department (CEDD) managed public fill

reception points and/or sorting facilities. Prior licensing is required from the CEDD.

Non-inert C&D wastes, in particular steel bars and used cables from demolition works of this project, are recyclables and should be delivered to proper outlets for recycling. On the other hand, felled trees, removed plant and topsoil are normally not reusable and should be delivered to the landfill for disposal.

Considering that there are many types of wastes generated, proper sorting and segregation of various C&D wastes could minimize cross contamination and enhance waste recovery quantity.

A trip ticket system will be implemented for any wastes disposal to the public fill reception points, sorting facilities and landfills. All the disposal records should be properly maintained.

5.3.3 Chemical Waste

Chemicals, including lubricating oil, paint, thinner, etc. will be used in the Project. Should there be any chemical wastes generated in the Project, the Contractor is required to register as chemical waste producer pursuant to the Waste Disposal (Chemical Waste) (General) Regulation. Proper containers, labels and storage areas must be provided in accordance with the aforesaid regulation.

All the chemical waste should be collected by licensed chemical waste collector for disposal at the Chemical Waste Treatment Centre (CWTC) at Tsing Yi or other licensed chemical waste treatment/disposal facilities.

5.3.4 General Refuse

General refuse includes wastepaper, packaging materials and food debris generated by the workforce on site. No canteen will be provided on site during the construction phase. The quantity of general waste is anticipated minimal in view of the small scale of the construction works. Nonetheless, before offsite disposal, they should be segregated into recyclable and non-recyclable wastes and kept in different covered storage areas/bins, where all of them should be sufficiently maintained and cleaned, to avoid attracting vermin and pests. All the general refuse will be collected on-site, separately from C&D materials by an appropriate waste collector employed by the contractor to the landfill.

Training should be provided for all site workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling. The training is expected to ensure their awareness of good waste management and the specific measures used at the site.

5.4 WASTE MANAGEMENT IMPLICATIONS OF THE OPERATIONAL PHASE

The project site will be converted into a residential care home for elderly. Wastes generated during operation phase includes:

- General refuse; and
- Clinical waste.

5.4.1 General Refuse

General refuse during the operation phase mainly comes from daily living of residents in the care home, e.g., food waste, packaging of goods, used plastic and glass bottles, bedding and blankets, etc., which are similar to those from general households. Considering the number of residents is low, the quantity of general waste should not be significant.

Solid waste should be properly kept in covered containers/storage areas to avoid attracting of vermin or pests. Recycling containers are recommended to be provided at suitable locations to encourage recycling in the care home.

5.4.2 Clinical Waste

Residential care home for elderly is considered as a small clinical waste producer. It is likely that some types of clinical wastes, particularly needles and sharps, would be generated from its operation. As such, the Operator of the care home should complete the "*Clinical Waste Producer Premises Code Request Form*" and manage the clinical waste in accordance with the *Code of Practice for the Management of Clinical Waste – Small Clinical Waste Producers*.

Clinical waste should be segregated from other wastes. Used needles and sharps are classified as Group 1 clinical waste and should be stored safely in sharps box, before transferring to a disposal site. Colour of the sharps box should be either in yellow or a combination of yellow and white and sealed with proprietary closure.

The care home operator shall engage the service of licensed collectors to collect and transport clinical waste to the CWTC for proper disposal. Alternatively, the clinical waste may also be delivered by a health professional under the clinical waste producer, if there is any, and subject to compliance of additional requirements as stipulated in the *Code of Practice for the Management of Clinical Waste – Small Clinical Waste Producers*.

The care home operator must also keep all the records of the clinical waste consigned to a licensed collector or delivered to a collection point or licensed disposal facility. To achieve it, it is suggested to retain the Waste Producer Copy of the Clinical Waste Trip Tickets of each delivery.

6 CONCLUSION

This Environmental Assessment presents the findings from assessing the potential impacts associated with the operation of the proposed RCHE development to confirm its environmental suitability. Key environmental concerns have been addressed and potential impacts assessed covering the following:

- Air Quality
- Noise
- Water Quality
- Waste Management

Overall, it would be environmentally acceptable with no adverse impacts on the identified sensitive uses. Suitable noise mitigation measures are recommended to minimize noise impacts to meet the specified noise standard.

Air Quality

The development may be subject to vehicular emission impact from roads nearby during the operation of the project. However, no adverse vehicular emission impact is anticipated upon incorporation of the relevant buffer distance stipulated under the HKPSG into the layout design.

There is no chimney within 200m from site boundary, i.e., complying the buffer distance for chimney emissions under the HKPSG. Thus, no adverse air quality impact to the proposed residential development due to industrial chimney emissions is anticipated.

Noise

Road traffic would be the major source of noise nuisance during the Project operation. After implementation of recommended architectural fins, the predicted noise levels at all residential units comply with HKPSG $L_{10(1\ hour)}$ 70dB(A) noise criterion.

A catalogue of low noise type cooling towers as shown in Appendix 3.2 for reference. The Intake Silencers will be provided for the cooling towers located on open rooftop. The sound power level and noise mitigation requirements will be stipulated in the project contractor specification governing the equipment selection by the design and build contractor. Provided the fixed plant noise generation at the cooling tower does not exceed the allowable SWL, fixed plant noise impact towards the affected NSRs will not exceed the noise criteria stipulated in the HKPSG.

Water Quality

With a properly designed sewerage and drainage system, no insurmountable water quality impacts would be generated from the construction and operation phases of the Project.

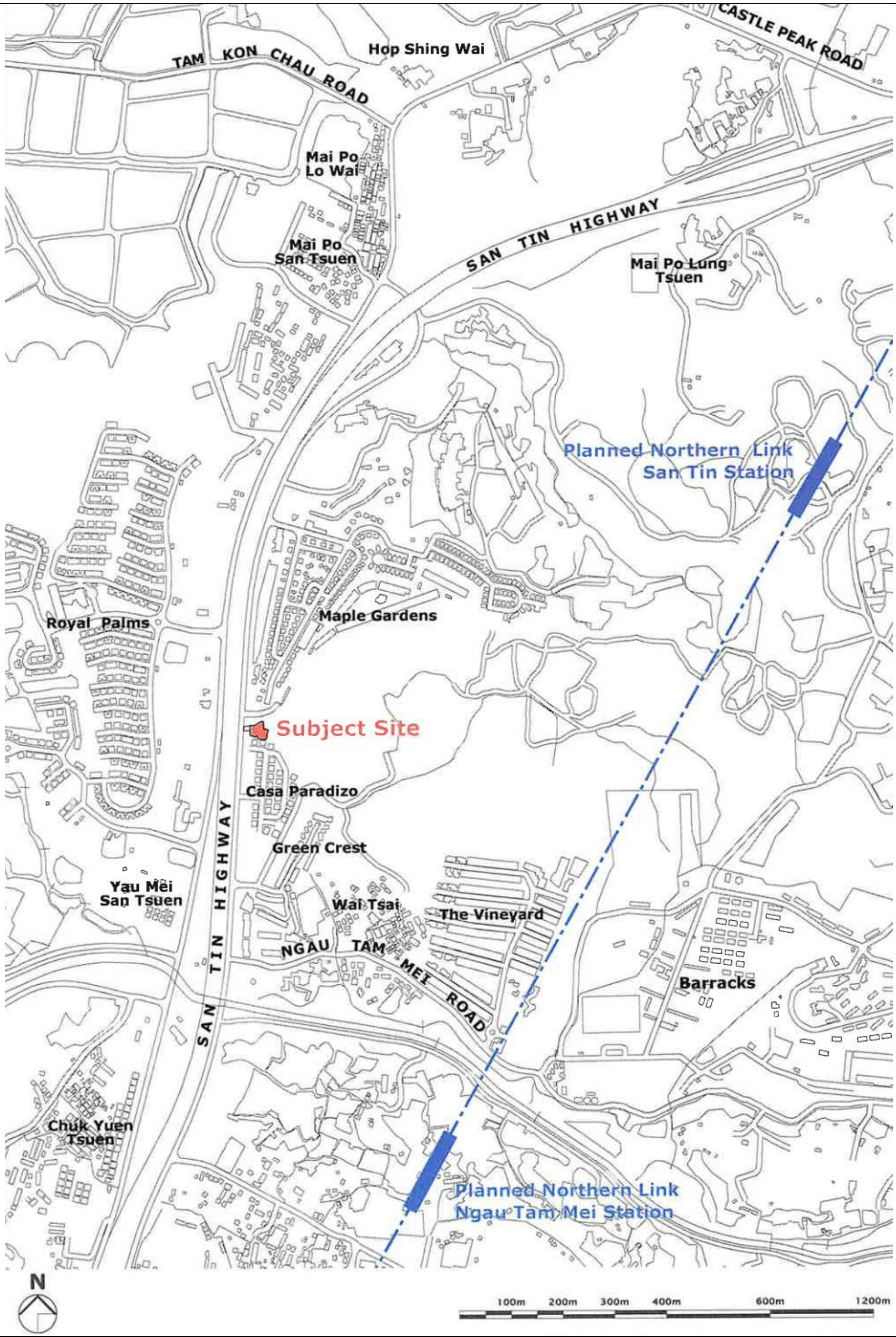
Waste Management

The quantity of waste to be generated from the Project is anticipated not significant, considering the small project scale. Through proper project planning and execution, waste

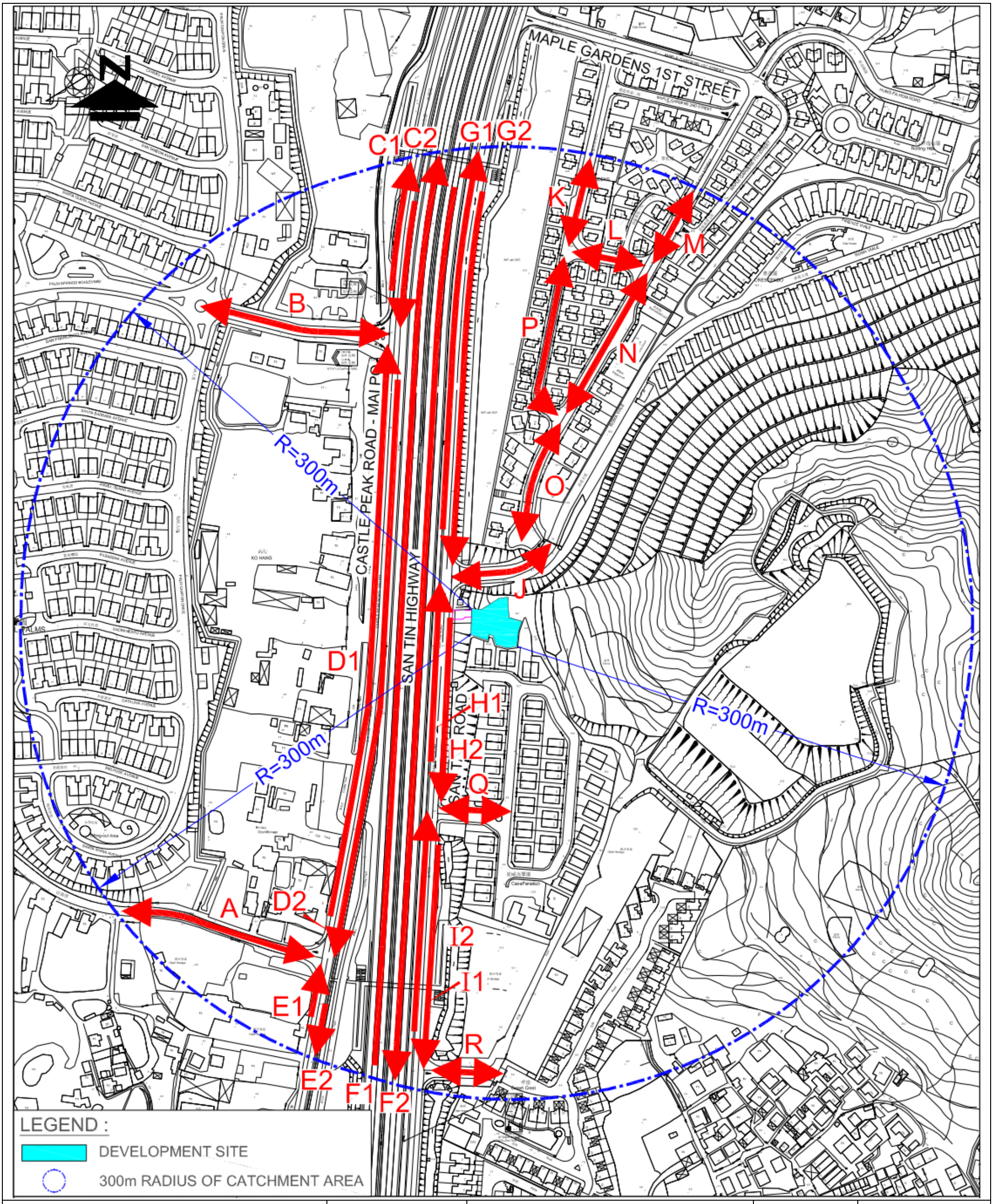
could be further avoided while useful materials could be reused or recycled. With implementation of the statutory procedures and recommended mitigation measures for offsite disposal of surplus excavated material, non-inert wastes, general refuse, chemical and clinical wastes, there should not be any insurmountable waste impact.

Appendix 1.1.

SITE LAYOUT PLAN & SURROUNDING ENVIRONMENT



PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 1.1.1		LEAD ARCHITECT: R Lee Architects (HK) Ltd	PREPARED BY	Phoenix Lee
DRAWING TITLE: SITE LAYOUT PLAN AND SURROUNDING ENVIRONMENT	SCALE: N.T.S.	REV: A	ENVIRONMENTAL CONSULTANT: Novox	CHECKED BY	Eddy Ng
				APPROVED BY	Banting Wong



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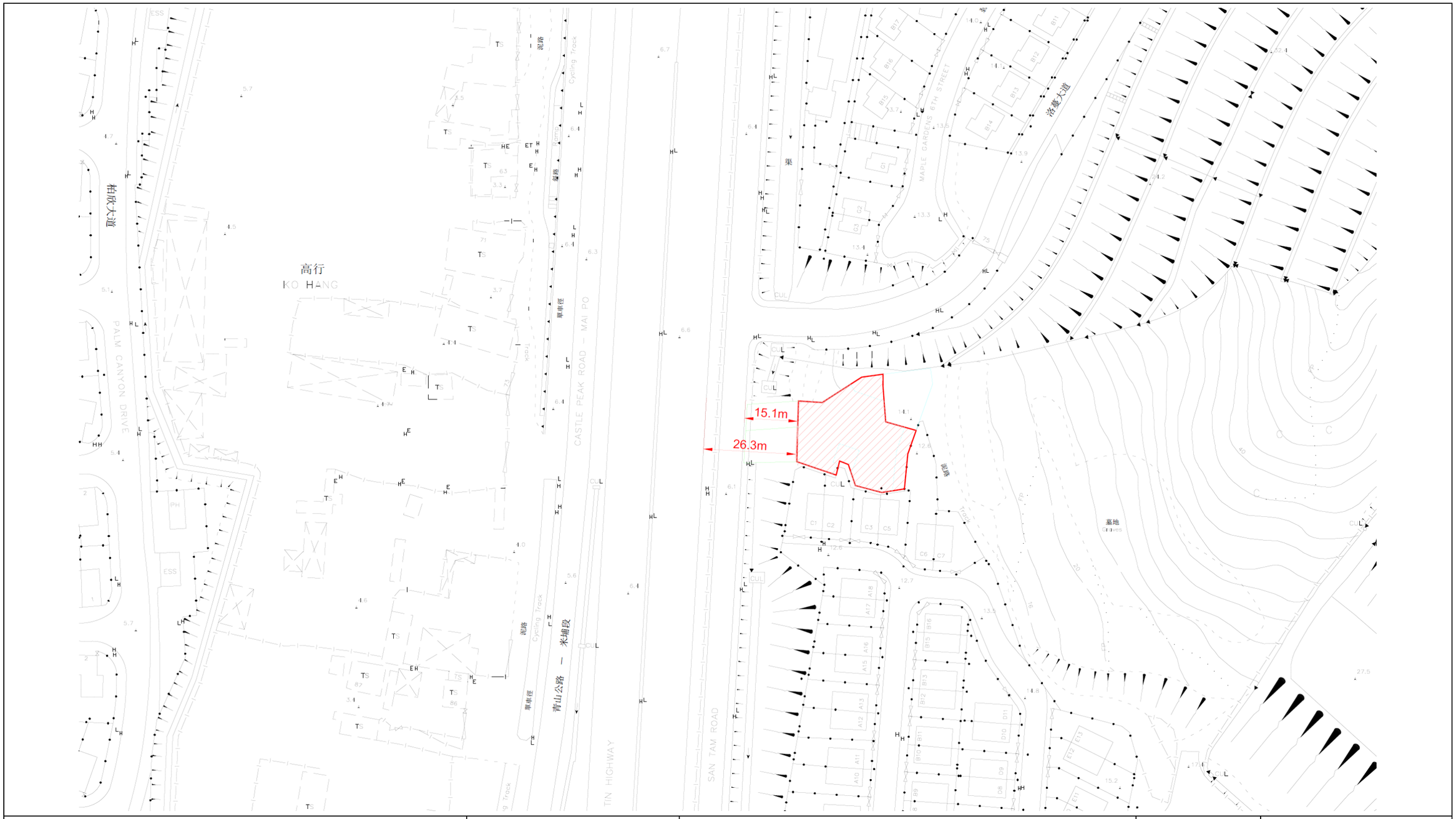
DRAWING TITLE: LOCATION OF ADJACENT ROADS	SCALE: N.T.S.	REV: A	ENVIRONMENTAL CONSULTANT: Novox	CHECKED BY	Eddy Ng
				APPROVED BY	Banting Wong

APPENDIX 2.1. AIR QUALITY SENSITIVE RECEIVERS & EMISSION SOURCES



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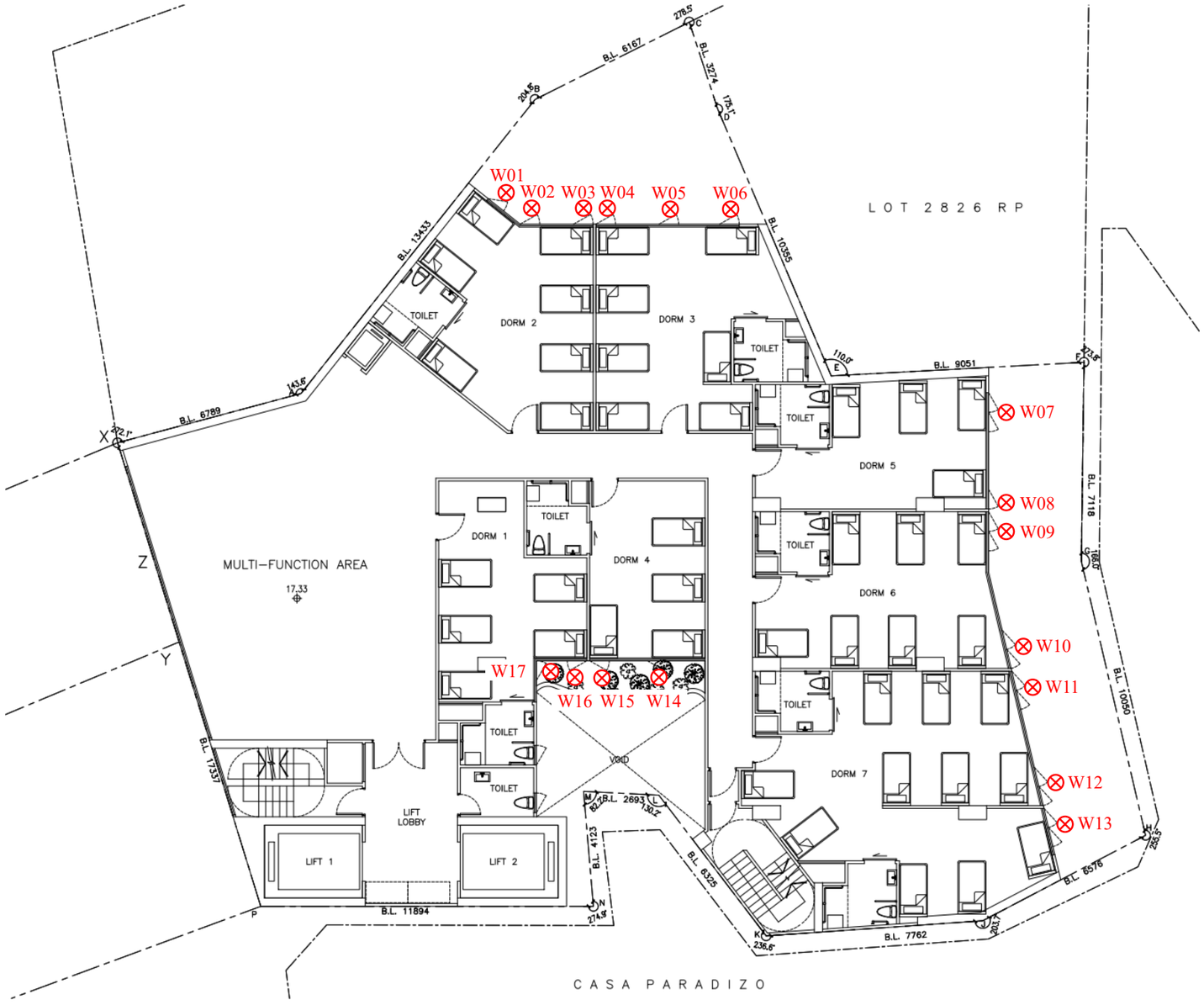
DRAWING TITLE: REPRESENTATIVE ASRS & BUFFER DISTANCE FROM VEHICLE SOURCES	SCALE: N.T.S.	REV: A			CHECKED BY	Eddy Ng
					APPROVED BY	Banting Wong

APPENDIX 3.1. TRAFFIC NOISE IMPACT ASSESSMENT



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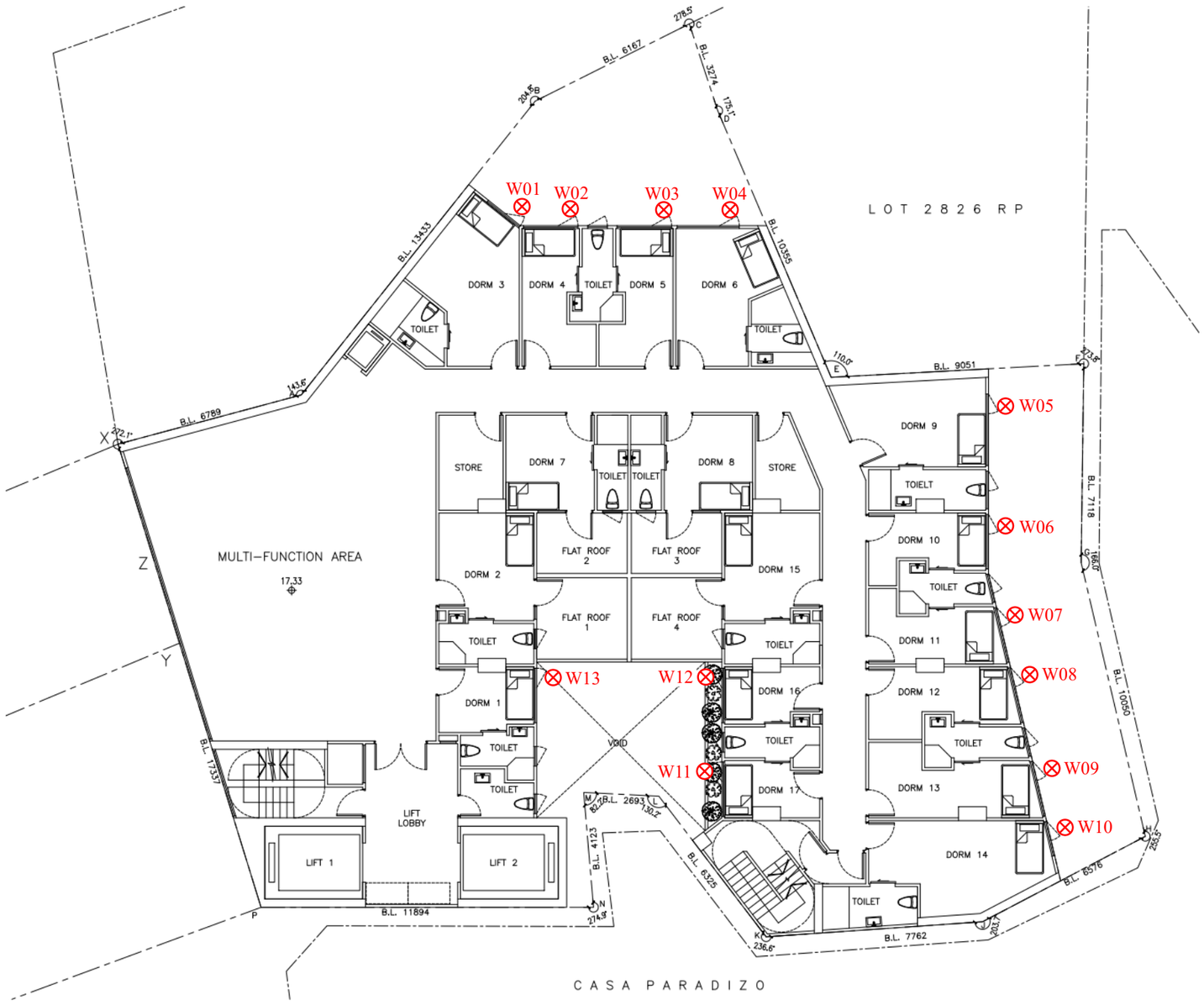
DRAWING TITLE: REPRESENTATIVE NOISE SENSITIVE RECEIVERS FOR TRAFFIC NOISE IMPACT ASSESSMENT (2/F)	SCALE: N.T.S.	REV: A			CHECKED BY	Eddy Ng
					APPROVED BY	Banting Wong



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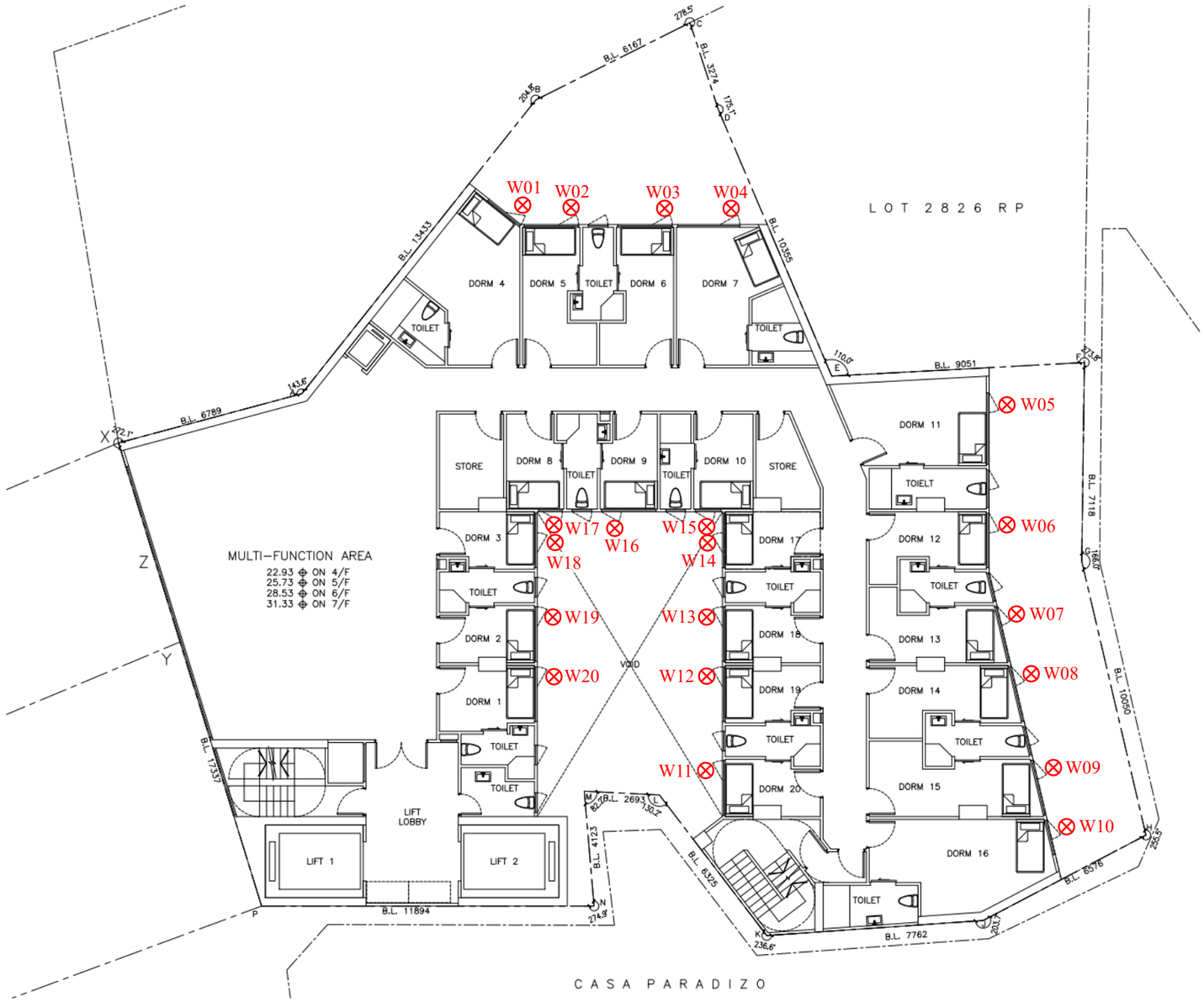
DRAWING TITLE: REPRESENTATIVE NOISE SENSITIVE RECEIVERS FOR TRAFFIC NOISE IMPACT ASSESSMENT (3/F)	SCALE: N.T.S.	REV: A			CHECKED BY	Eddy Ng
					APPROVED BY	Banting Wong

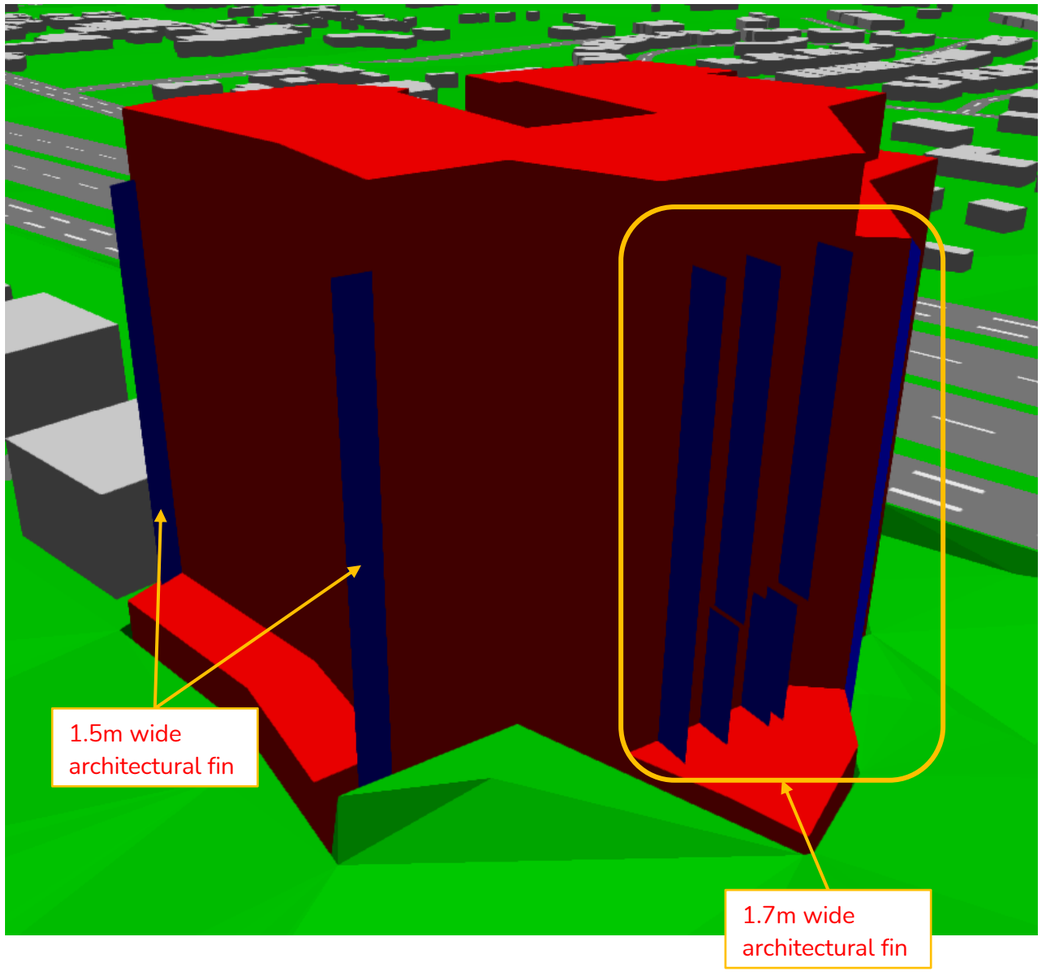


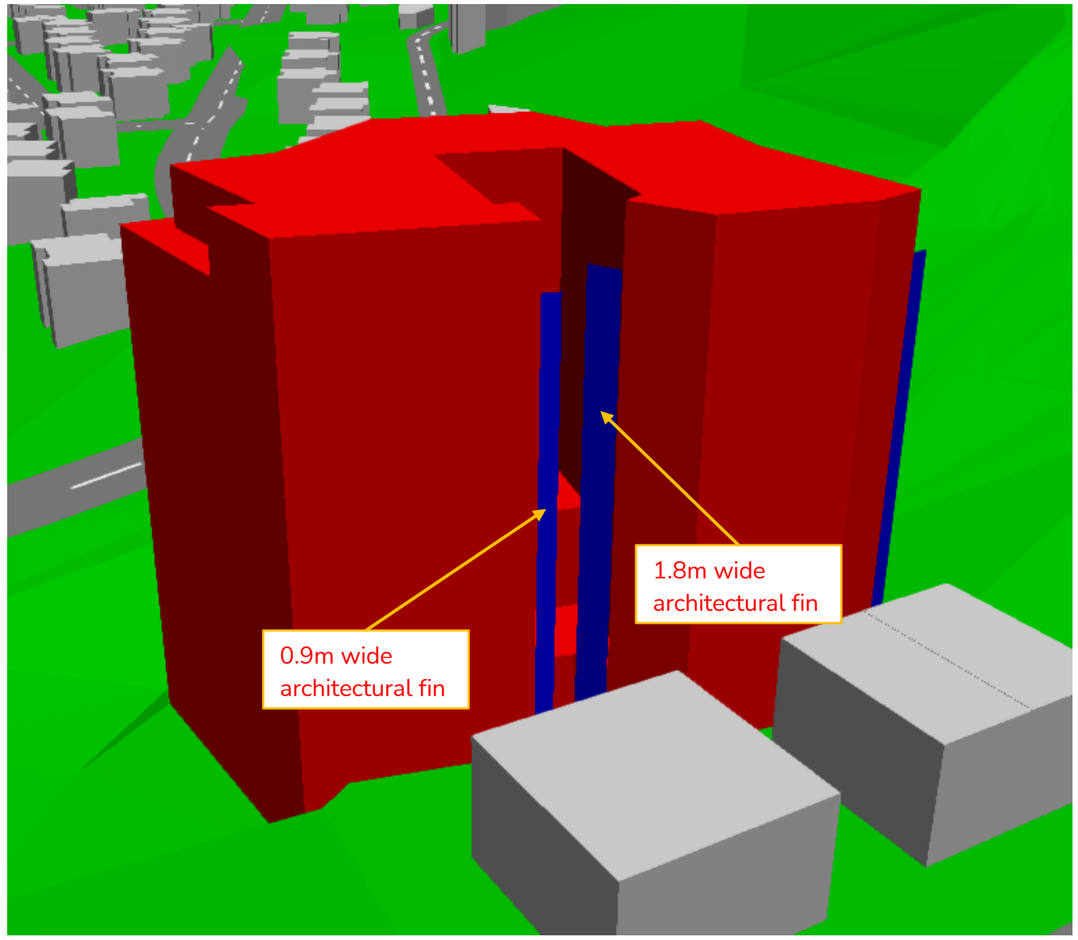
N

1 G–07 TYPICAL FLOOR PLAN PLAN

PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.1.3		LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY	Phoenix Lee
DRAWING TITLE: REPRESENTATIVE NOISE SENSITIVE RECEIVERS FOR TRAFFIC NOISE IMPACT ASSESSMENT (4/F TO 7/F TYPICAL)	SCALE: N.T.S.	REV: A			CHECKED BY	Eddy Ng
					APPROVED BY	Banting Wong

PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.1.4		LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY: Phoenix Lee
DRAWING TITLE: 3D VIEW OF NOISE MODEL, NOISE SOURCES AND REPRESENTATIVE NSRS	SCALE: N.T.S.	REV: A			CHECKED BY: Eddy Ng
					APPROVED BY: Banting Wong





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DRAWING TITLE: 3D VIEW OF NOISE MITIGATION MEASURES	SCALE: N.T.S.	REV: A			CHECKED BY: Eddy Ng
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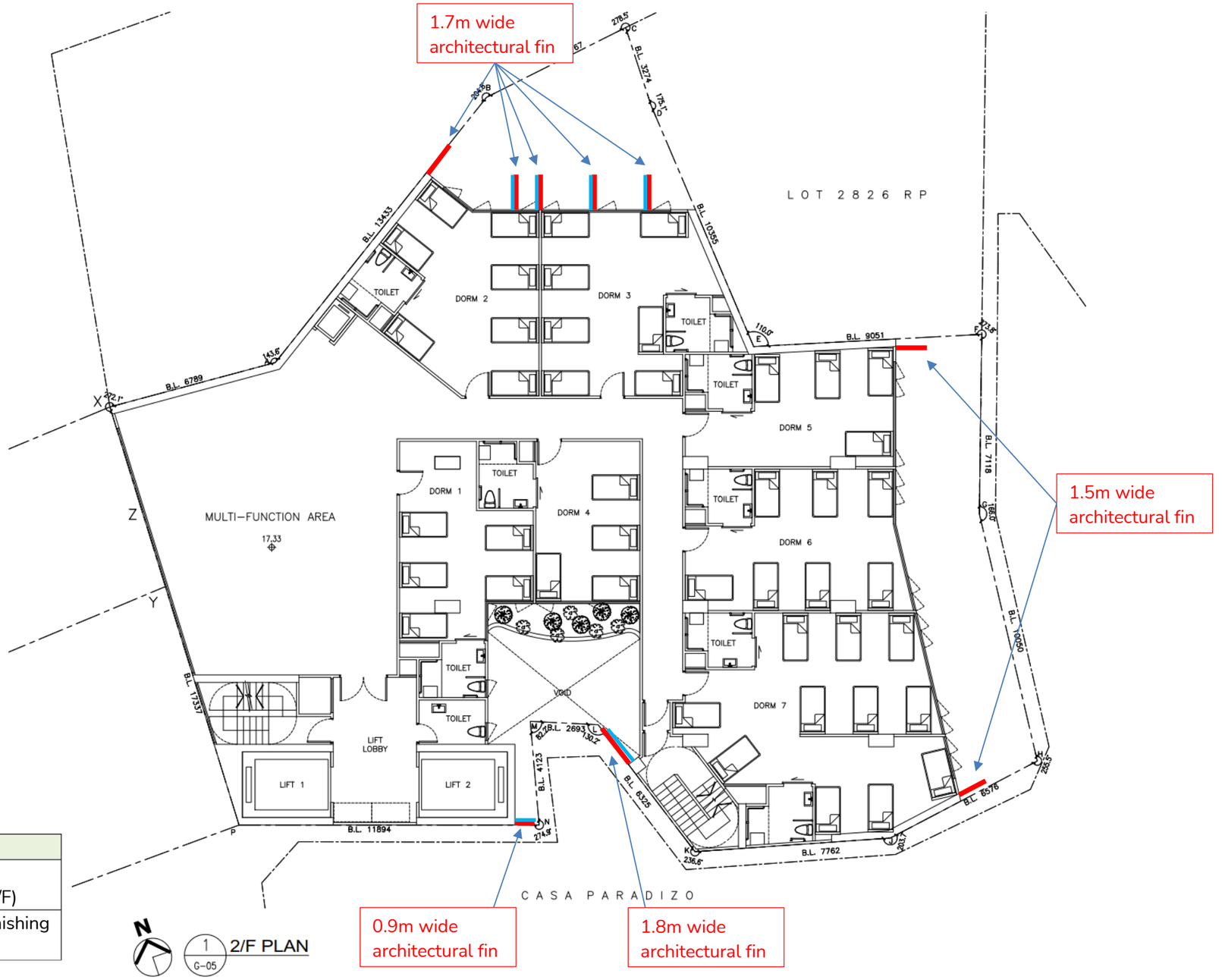
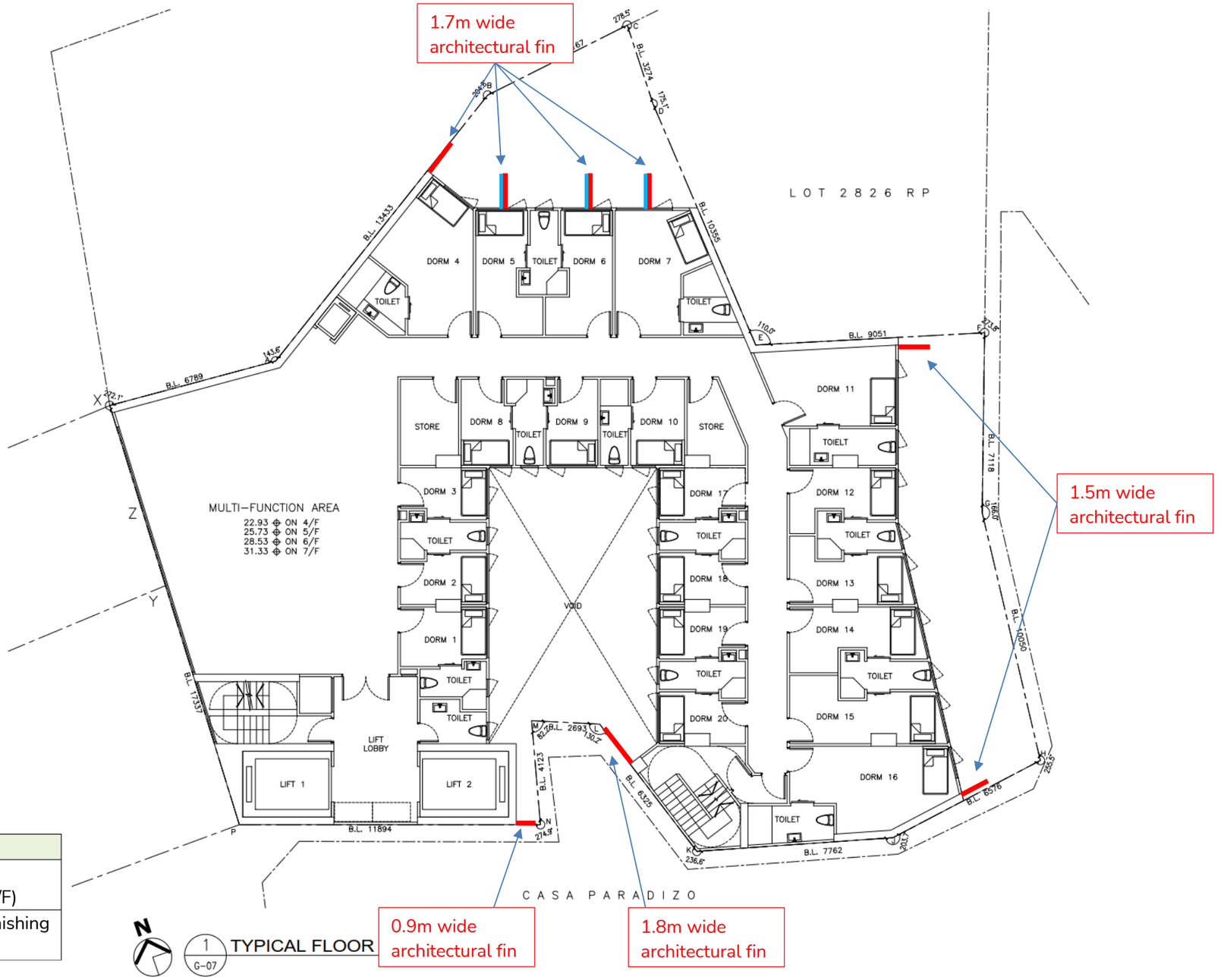


Legend	Description
	Architectural Fins (extend from 2/F to 3/F)
	Sound Absorption Finishing on one side of Fin

PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.1.6		LEAD ARCHITECT: R Lee Architects (HK) Ltd	PREPARED BY: Phoenix Lee
DRAWING TITLE: ACOUSTIC MITIGATION MEASURES FOR ROAD TRAFFIC NOISE (2/F)	SCALE: N.T.S.	REV: A	ENVIRONMENTAL CONSULTANT: Novox	CHECKED BY: Eddy Ng
				APPROVED BY: Banting Wong



Legend	Description
	Architectural Fins (extend from 3/F to 7/F)
	Sound Absorption Finishing on one side of Fin

PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.1.7	LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY	Phoenix Lee
DRAWING TITLE: ACOUSTIC MITIGATION MEASURES FOR ROAD TRAFFIC NOISE (3/F TO 7/F)	SCALE: N.T.S. / REV: A			CHECKED BY	Eddy Ng
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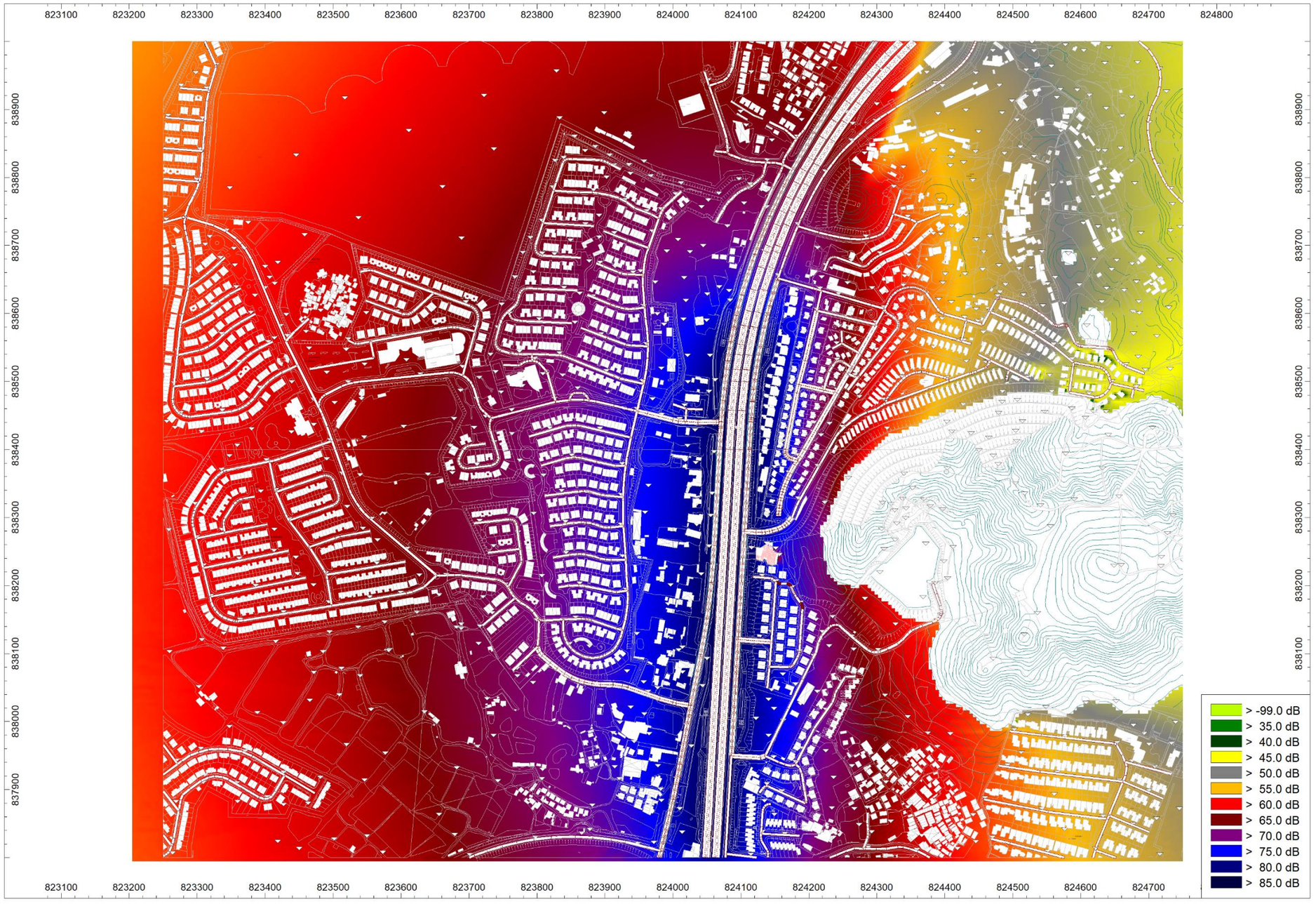

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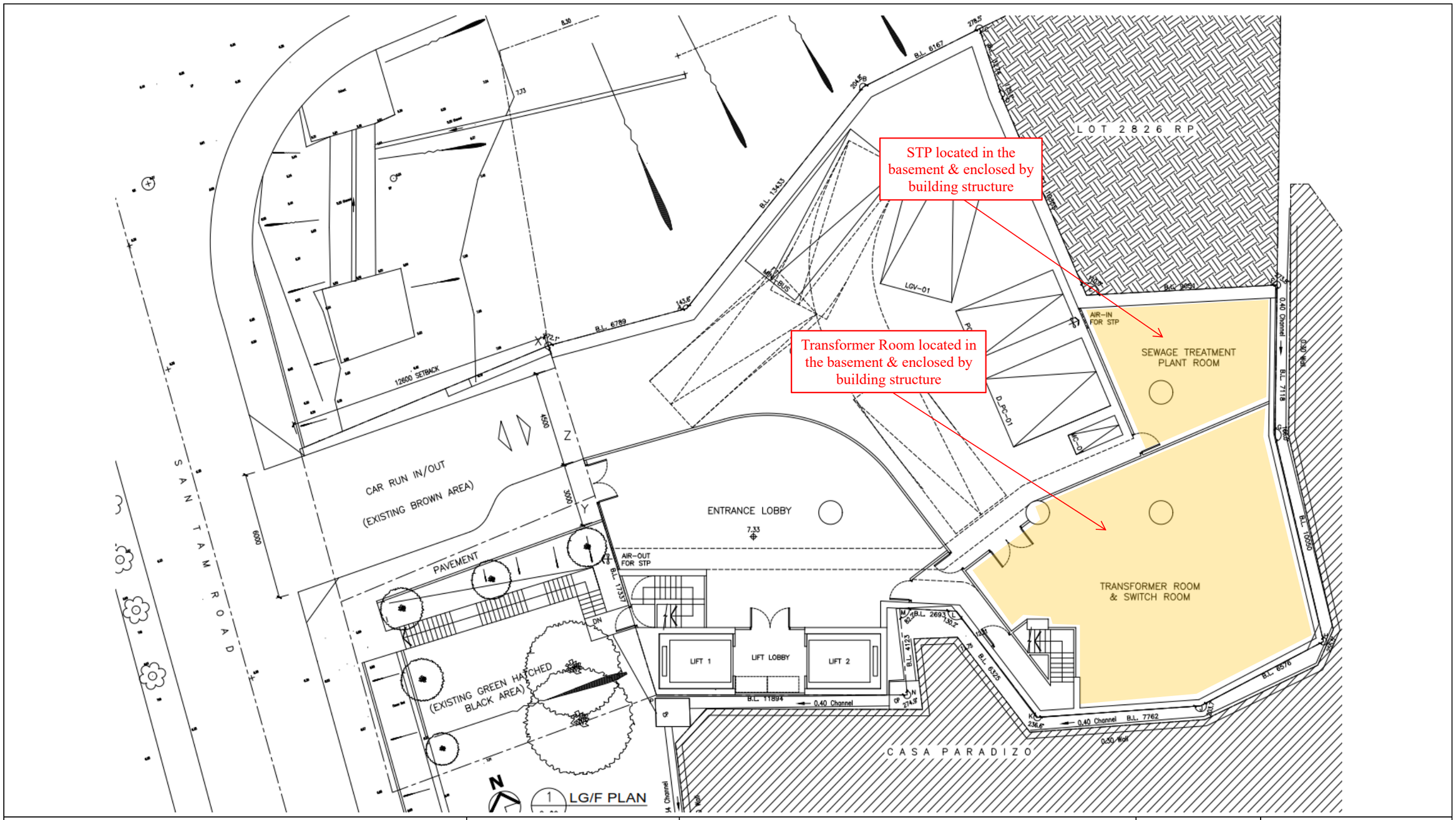
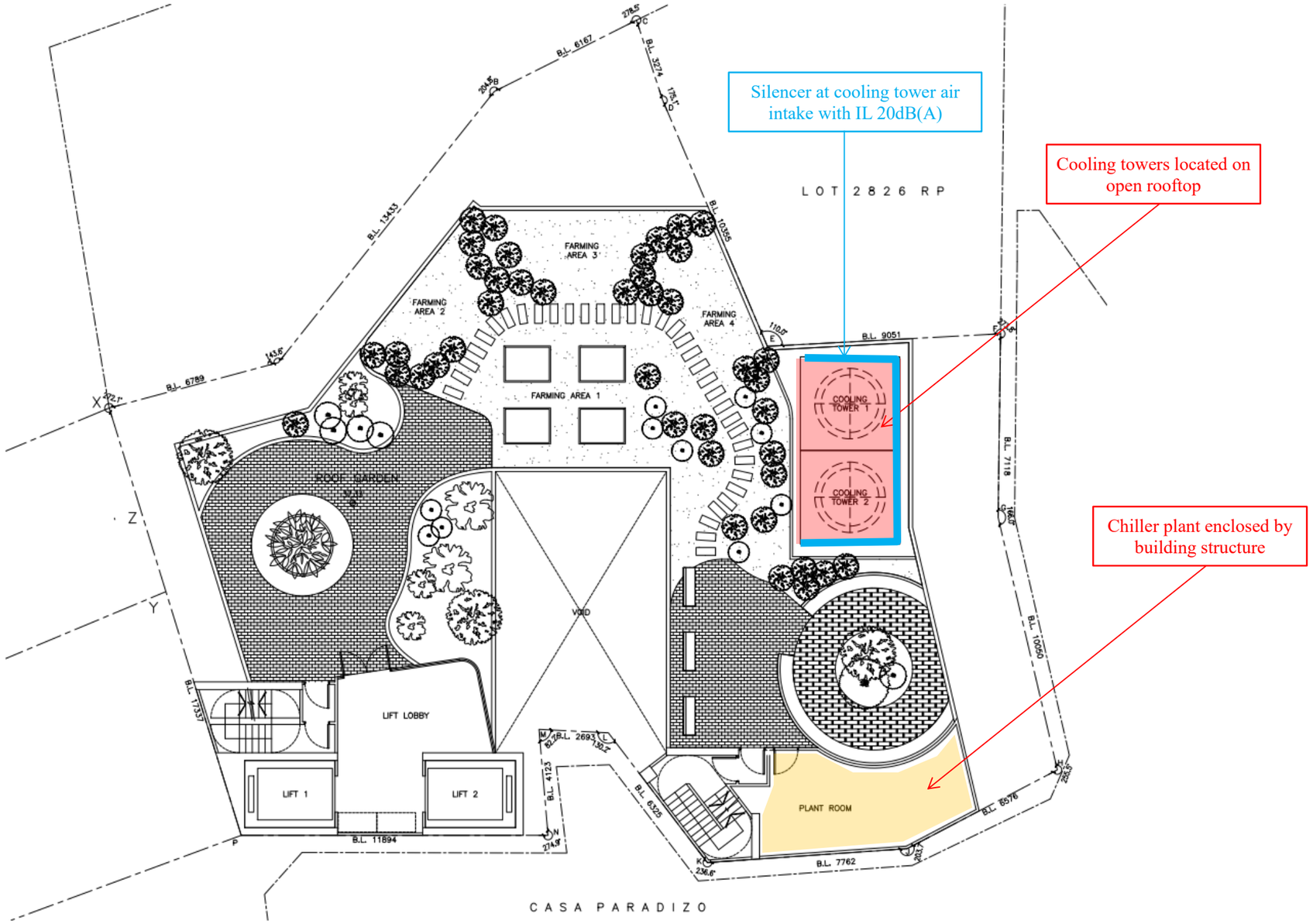
DRAWING TITLE: NOISE CONTOUR OF ROAD TRAFFIC NOISE IMPACT (MITIGATED)	SCALE: N.T.S.	REV: A			CHECKED BY	Eddy Ng
					APPROVED BY	Banting Wong

Appendix 3.2. FIXED SOURCE NOISE ASSESSMENT



PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.2.1		LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY	Phoenix Lee
DRAWING TITLE: FIXED NOISE SOURCES LOCATIONS & MITIGATION TREATMENT (LG/F)	SCALE: N.T.S.	REV: A			CHECKED BY	Eddy Ng
					APPROVED BY	Banting Wong



PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.2.2		LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY: Phoenix Lee
DRAWING TITLE: FIXED NOISE SOURCES LOCATIONS & MITIGATION TREATMENT (R/F)	SCALE: N.T.S.	REV: A			CHECKED BY: Eddy Ng
					APPROVED BY: Banting Wong

1

The ryowo Group is the pioneer and manufacturer of fiberglass-reinforced polyester (FRP) cooling towers in Hong Kong.

We offer a full range of product lines in FRP, stainless steel and galvanized steel water-cooling towers. With our vital production station, Shenzhen RYOWO Cooling Tower Company Limited, we manufacture, market and service a full range of water-cooling towers. Over 90% of the cooling tower parts are from our own factory and, as a result, control of cost and quality are ensured.

RYOWO has been a member of the Cooling Technology Institute since 1982. With our own R&D Department and testing facilities, we have five lines of product which are CTI-201 certified.

In 2004, our R & D department successfully developed a CTI STD-20l rated product line, the FWS series, the highest standard of water-cooling towers with guaranteed cooling capacity. In order to expand the application of our cooling towers, we developed the integrated drift eliminator, and used the super low noise fan as an option in this series.

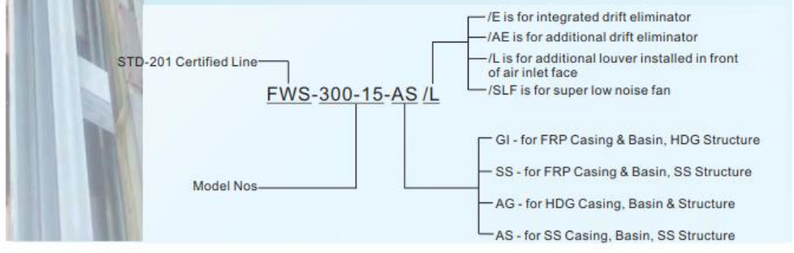
FWS

Low Noise Cross Flow Type

MANUFACTURER'S PUBLISHED THERMAL PERFORMANCE IS CERTIFIED BY THE COOLING TOWER INSTITUTE UNDER THE PROVISIONS OF STD-201 (02) CERTIFICATION VALIDATION NUMBER 04-27-01

THE COOLING TOWER YOU CAN RELY ON

MODEL DESIGNATION



ryowo

3 SPECIFICATION

Cooling Tower selected for 81 San Tam Road Yuen Long
Model FWS-94-7.5 by Ryowo, two units are required to be installed.

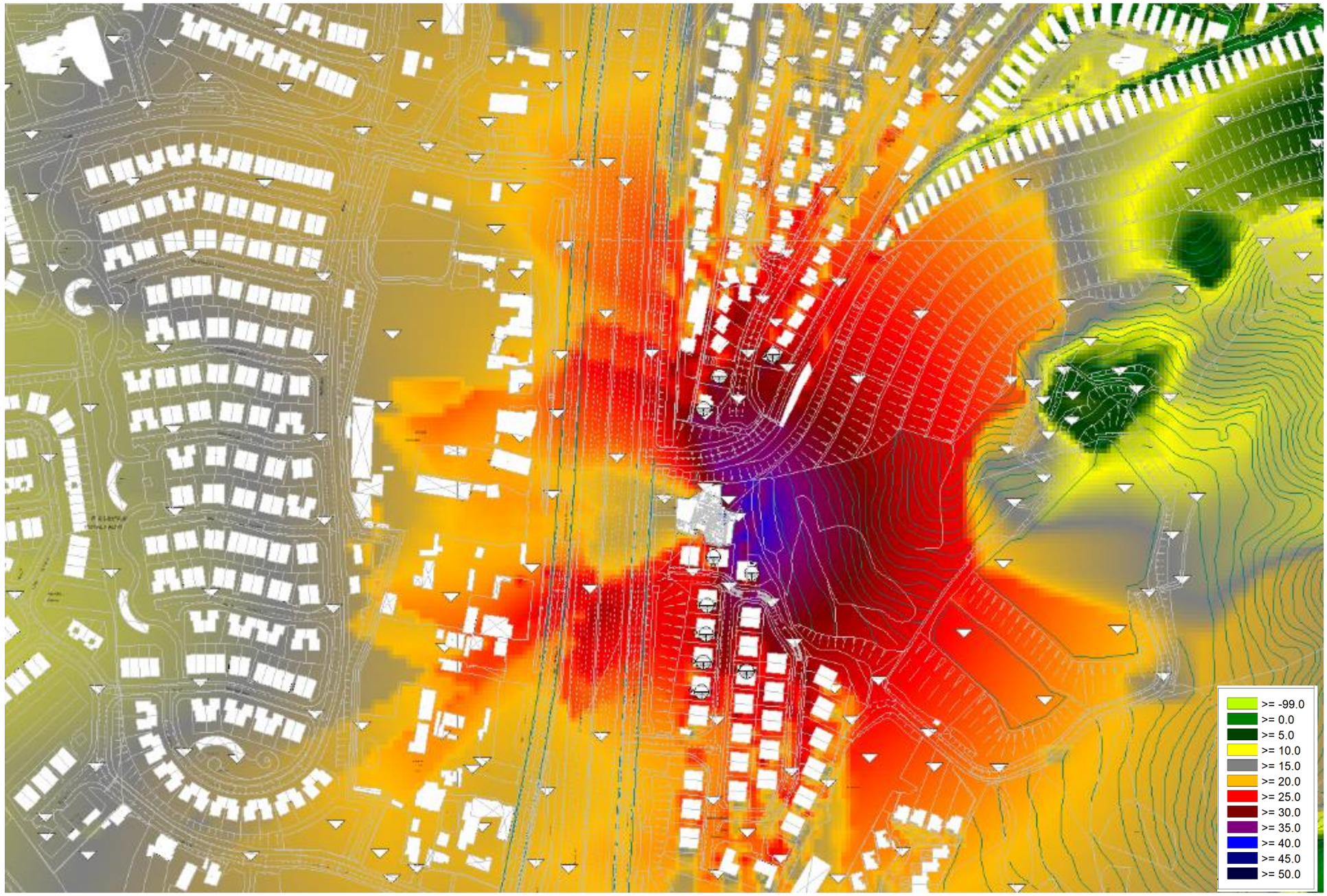
Model	Nominal Water Flow M³/hr	Dimension L mm	W mm	h mm	H mm	Fan Motor kW	Fan Dia mm	Piping In mm	Out mm	Fv mm	Of mm	Dr mm	Sound Power Level	Weight Dry kgs	Wet kgs
FWS-94-3.7	94				4625	3.7							88	1335	2300
FWS-94-5.5	107	4000	2000	4125	4705	5.5	1600	100x2	150	25	50	50	91	1385	2350
FWS-94-7.5	119				4745	7.5							93	1400	2365
FWS-127-5.5	127				4705	5.5							90	1570	3000
FWS-127-7.5	141	4400	2300	4125	4745	7.5	1800	100x2	150	25	50	50	92	1585	3015
FWS-127-11	160				4825	11							94	1650	3080
FWS-169-7.5	169				4745	7.5							92	1690	3700
FWS-169-11	192	4400	2600	4125	4825	11	2000	125x2	200	25	50	50	94	1760	3770
FWS-169-15	213				4870	15							95	1770	3780
FWS-200-7.5	190				4785	7.5							91	2195	4000
FWS-200-11	215	4600	2600	4145	4865	11	2400	125x2	200	40	80	50	93	2250	4055
FWS-200-15	235				4910	15							95	2255	4060
FWS-250-7.5	210				4985	7.5							90	2890	5000
FWS-250-11	240	4800	3200	4345	5065	11	2400	125x2	200	40	80	50	93	2945	5055
FWS-250-15	265				5110	15							94	2950	5060
FWS-275-7.5	225				4785	7.5							89	3050	5160
FWS-275-11	255	5200	3200	4145	4865	11	2900	150x2	200	40	80	50	92	3105	5215
FWS-275-15	285				5910	15							94	3110	5220
FWS-300-7.5	235				4895	7.5							89	3310	6500
FWS-300-11	270				5065	11							91	3365	6555
FWS-300-15	300	6000	3200	4345	5110	15	2400	150x2	200	40	80	50	93	3370	6560
FWS-300-18.5	320				5175	18.5							94	3410	6600
FWS-300-22	340				5215	22							95	3470	6660
FWS-330-7.5	260				4785	7.5							88	3405	6595
FWS-330-11	300				4865	11							91	3460	6650
FWS-330-15	330	6300	3200	4145	4910	15	2900	150x2	250	50	80	50	93	3465	6655
FWS-330-18.5	350				5175	18.5							94	3505	6695
FWS-330-22	375				5215	22							95	3565	6755
FWS-350-7.5	275				6065	7.5							89	3580	6770
FWS-350-11	315				6145	11							91	3635	6825
FWS-350-15	350	5400	3600	5425	6190	15	3000	150x2	250	50	80	50	93	3640	6830
FWS-350-18.5	375				6255	18.5							94	3680	6870
FWS-350-22	400				6295	22							95	3740	6930
FWS-400-7.5	285				4985	7.5							87	3630	7000
FWS-400-11	325				5065	11							89	3685	7055
FWS-400-15	360	6600	3600	4345	5110	15	3000	125x4	250	50	80	50	91	3690	7060
FWS-400-18.5	385				5135	18.5							92	3730	7100
FWS-400-22	410				5195	22							93	3790	7160
FWS-400-30	450				5255	30							94	3820	7185
FWS-500-7.5	305				5990	7.5							87	4230	8000
FWS-500-11	345				6070	11							90	4285	8055
FWS-500-15	385	6000	4200	5355	6115	15	3400	125x4	250	50	80	50	91	4290	8060
FWS-500-18.5	410				6180	18.5							93	4325	8100
FWS-500-22	435				6220	22							94	4390	8120
FWS-500-30	485				6280	30							95	4415	8145
FWS-550-7.5	315				5990	7.5							87	4350	8080
FWS-550-11	360				6070	11							89	4405	8135
FWS-550-15	400	6600	3600	5355	6115	15	3000	125x4	250	50	80	50	91	4410	8140
FWS-550-18.5	430				6180	18.5							92	4450	8180
FWS-550-22	455				6220	22							94	4510	8240
FWS-550-30	500				6280	30							95	4535	8275
FWS-600-11	435				6255	11							89	5015	9000
FWS-600-15	485				6300	15							91	5020	9005
FWS-600-18.5	520	7000	4200	5500	6365	18.5	3700	150x4	300	50	80	50	92	5060	9045
FWS-600-22	550				6405	22							94	5120	9085
FWS-600-30	610				6465	30							95	5140	9110
FWS-600-37	650				6485	37							96	5330	9300
FWS-700-11	515				6255	11							89	5650	12000
FWS-700-15	570				6300	15							91	5655	12005
FWS-700-18.5	610	7000	5000	5500	6365	18.5	3700	150x4	300	50	80	50	92	5690	12055
FWS-700-22	645				6405	22							93	5755	12120
FWS-700-30	720				6465	30							95	5780	12145
FWS-700-37	765				6485	37							96	5970	12335
FWS-800-11	555				7155	11							88	6905	14880
FWS-800-15	615				7200	15							90	6910	14885
FWS-800-18.5	655				7265	18.5	4200	150x4	300	50	80	50	91	6945	14920
FWS-800-22	695				7305	22							93	7010	14985
FWS-800-30	760	7500	5000	6400	7365	30							95	7035	15010
FWS-800-37	820				7385	37							98	7225	15200
FWS-800-45	880				7405	45	4200	150x4	350	50	80	50	99	7255	15230
FWS-800-55	940				7495	55							100	7365	15340

Notes:

1/CTI Certification applies to the operation with the Wet Bulb Temp. between 12.8°C and 32.2°C, Max. Entering Water Temp. 51.7°C, Min. Range of 2.2°C and Min. Approach of 2.8°C.
2/The nominal water flows are based upon 37°C HWT, 32°C CWT, 28°C WBT, 32°C DBT and 101.3 kPa Barometric pressure.
3/Sound Power Level is in dBA re 10^{-12} Watt.
4/Data and specifications are subjected to change without prior notice.

ryowo

PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.2.3	LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY	Phoenix Lee
DRAWING TITLE: ACOUSTIC DATA FOR PROPOSED COOLING TOWERS	SCALE: N.T.S. / REV: A			CHECKED BY	Eddy Ng
				APPROVED BY	Banting Wong



PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 3.2.4		LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY: Phoenix Lee
DRAWING TITLE: NOISE CONTOUR OF FIXED SOURCE NOISE IMPACT (MITIGATED)	SCALE: N.T.S.	REV: A			CHECKED BY: Eddy Ng
					APPROVED BY: Banting Wong

Appendix 4.1. WATER QUALITY STANDARD

Determinand / Flow rate (m^3/day)	≦10	>10 and ≦200	>200 and ≦400	>400 and ≦600	>600 and ≦800	>800 and ≦1000	>1000 and ≦1500	>1500 and ≦2000	>2000 and ≦3000	>3000 and ≦4000	>4000 and ≦5000	>5000 and ≦6000
pH (pH units)	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9
Temperature (℃)	45	45	45	45	45	45	45	45	45	45	45	45
Colour (lovibond units) (25mm cell length)	1	1	1	1	1	1	1	1	1	1	1	1
Suspended solids	50	50	50	50	50	50	25	25	25	25	25	25
BOD	20	20	20	20	20	20	10	10	10	10	10	10
COD	80	80	80	80	80	80	50	50	50	50	50	50
Oil & Grease	20	20	20	20	20	20	10	10	10	10	10	10
Iron	10	10	10	7	5	4	3	2	1	1	1	1
Boron	5	4	3	2.5	2	1.6	1.1	0.8	0.5	0.4	0.3	0.2
Barium	5	4	3	2.5	2	1.6	1.1	0.8	0.5	0.4	0.3	0.2
Mercury	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Other toxic metals individually	1	0.5	0.5	0.5	0.4	0.4	0.25	0.2	0.15	0.1	0.1	0.1
Total toxic metals	2	1	1	1	0.8	0.8	0.5	0.4	0.3	0.2	0.14	0.1
Cyanide	0.1	0.1	0.1	0.1	0.1	0.08	0.06	0.04	0.03	0.02	0.01	0.01
Phenols	0.5	0.5	0.4	0.3	0.25	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Sulphide	5	5	5	5	5	5	2.5	2.5	1.5	1	1	0.5
Total residual chlorine	1	1	1	1	1	1	1	1	1	1	1	1
Total nitrogen	100	100	100	100	100	100	80	80	50	50	50	50
Total phosphorus	10	10	10	10	10	10	8	8	5	5	5	5
Surfactants (total)	15	15	15	15	15	15	10	10	10	10	10	7
E. coli (count/100ml)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

PROJECT: PROPOSED RESIDENTIAL CARE HOME FOR ELDERLY AT 81 SAN TAM ROAD, YUEN LONG, N.T.	DRAWING NO.: C220410W-01 Figure 4.1.1	LEAD ARCHITECT: R Lee Architects (HK) Ltd	ENVIRONMENTAL CONSULTANT: Novox	PREPARED BY: Phoenix Lee
DRAWING TITLE: STANDARDS FOR EFFLUENTS DISCHARGED INTO THE COASTAL WATERS OF DEEP BAY WATER CONTROL ZONE	SCALE: N.T.S. / REV: A			CHECKED BY: Eddy Ng
				APPROVED BY: Banting Wong