Douglas PARTNERS

GROUNDED EXPERTISE

Remediation Action Plan

Proposed Mixed-Use Development

270 Pacific Highway, Crows Nest NSW

Prepared for Silvernight (Crows Nest) Landowner Pty Ltd

Project 214296.03

3 July 2025

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.

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Remediation Action Plan
Proposed Mixed-Use Development
270 Pacific Highway, Crows Nest NSW

1. Introduction

Douglas Partners Pty Ltd (Douglas) has prepared this remediation action plan (RAP) for a proposed mixed-use development at 270 Pacific Highway, Crows Nest (the site). The site is shown on Drawing 1, Appendix A. The RAP was commissioned by Keylan Consulting Pty Ltd on behalf of Silvernight (Crows Nest) Landowner Pty Ltd (Silvernight) and was undertaken in accordance with Douglas' proposal 214296.03.P.002.Rev0 dated 19 June 2025.

Douglas previously prepared a detailed site investigation (DSI) to support the state significant development application (SSDA) submission for the project. The laboratory results were below the site acceptance criteria, however data gaps in the characterisation of contamination at the site were identified based on the risk of contamination from potential sources and limitations to testing the site prior to demolition. As such further assessment is considered necessary following demolition to finalise the contamination assessment and identify if remediation or management of contamination is required to render the site suitable for the proposed use from a contamination perspective.

Comments from the Department of Planning, Housing and Infrastructure (DPHI) regarding outcomes of the previous contamination investigation noted:

> *Given the contamination assessment has not been fully completed, the Department would not have sufficient information to complete our assessment of the contamination level of the site and be able to conclude the site is suitable / can be made suitable for residential development.*
>
> *The other issue presented is that if the additional testing reveals that remediation is required, the application would be required to be amended to include remediation in the development description. In other applications where this data gap is presented, a Remediation Action Plan (RAP) is provided as a precautionary measure and enables the Department to be satisfied remediation requirements, if needed, are satisfactorily addressed. It is recommended that a RAP is prepared as part of the EIS.*

This remediation action plan (RAP) has been prepared to address the DPHI comments, and outlines the requirements for further data gap investigation(s) and (as a precautionary measure) general remediation / management strategies if required based on the results of the further investigation.

Specifically, this RAP presents the procedures and plans which provide the means by which the site remediation objectives, if required, can be achieved. The Remediation Contractor must base their detailed work methodologies around the requirements of this RAP.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013) [NEPM] (NEPC, 2013);
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020a); and
- CRC CARE *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives* (CRC CARE, 2019a).

The remediation objectives, devised in accordance with CRC (2019a), are to:

- Address potentially unacceptable risks to relevant environmental values from contamination; and
- Render the site suitable, from a contamination perspective, for the proposed development.

This report must be read in conjunction with all appendices including the notes provided in Appendix B.

2. Proposed development

A copy of the provided plans for the proposed development are included in Appendix A. The site is located at an approximate offset of about 60 m to the Sydney Metro rail tunnel that runs underneath the corner of Falcon Street and the Pacific Highway.

The proposed development comprises a 16-storey mixed use development at 270 Pacific Highway, Crows Nest, comprising 168 build to rent units and non-residential uses in the podium.

Specifically, the State significant development application (SSDA) seeks development consent for:

- Demolition of two, existing 5-storey commercial buildings.
- Construction of a maximum 16-storey building, including:
  - 2 basement parking levels;
  - 3 podium levels comprising non-residential uses such as medical centre, retail, and residential uses (build to rent units and residential amenity facilities such as a gym and sauna, steam room, outdoor pool, class space, cinema room, coworking space);
  - 13-storeys of residential uses in the tower, comprising build-to-rent units;
  - Communal open space;
  - Landscaping on Ground, Level 2 – Level 15;
  - Rooftop solar panels; and
  - Internal and external residential amenities space on roof top.
- Streetscape upgrades; and
- Office and substation along the southwestern boundary.

The architectural plans available at the time of reporting are included in Appendix A. The plans show that:

- The proposed basements will cover the majority, but not all of the site, with at grade areas expected along the southwestern boundary and southern 'panhandle' area adjacent to Bruce Street;
- Only minor soft land scaping will be present in the non-basement areas, which will be predominantly covered by driveway access, an office and substations;
- The lowest level with residential use will be the ground floor; and
- Dewatering will be required as part of the basement construction and it is understood that the basement will be a drained basement.

3. Scope of work

The scope of work to achieve the objective is as follows:

- Summarise the findings of previous investigations used to inform the status of contamination and contamination risk at the site;
- Present a conceptual site model (CSM) to list potential and likely contamination source(s), pathway and receptor linkages to address potentially unacceptable risks to human health and relevant environmental values from contamination;
- Identify gaps in the current understanding of contamination at the site, and how these are to be addressed to support the remediation process;
- Define the anticipated extent of remediation;
- Assess potentially suitable remediation options to render the site suitable for its proposed use, and which will minimise potentially unacceptable risk to human health and/or the environment and which includes the consideration of the principles of ecologically sustainable development;
- Establish the remediation acceptance criteria (RAC) to be adopted for validation of remediation;
- Identify how successful implementation of the RAP will be validated;
- Outline waste classification, handling and tracking requirements;
- Outline environmental safeguards required to complete the remediation works;
- Include contingency plans and an unexpected finds protocol; and
- Identify the need for, and nature of, any long-term management and/or monitoring following the completion of management / remediation and, if required, provide an outline of an environmental management plan.

4. Site description

4.1 Site information

Site address	270 Pacific Highway, Crows Nest NSW
Legal description	Lot 22 Deposited Plan 706776
Area	3,796 m^2
Zoning	Zone MU1 Mixed Use
Local Council Area	North Sydney Council
Current use	Commercial and office buildings
Surrounding uses	Northeast - Pacific Highway then commercial Southeast – Commercial and Bruce Street, then residential and commercial Southwest - Residential then Sinclair Street Northwest - Commercial and fire station

The site boundary is shown on Drawing 1.



Figure 1: Site location and site boundary

4.2 Site features

The following key site features pertinent to the previous contamination assessments are summarised below:

- The site consists of two, medium-rise, commercial buildings with a shared, single-level basement carpark. It is understood that the basement carpark occupied most of the site area.
- The ground level consisted of retail spaces and medical-related clinics with office spaces on the upper levels.
- Plant rooms, an aboveground grease trap and an underground water sump were observed in the basement level. The plant rooms contained electrical and telecommunication switchboards. The capacity of the grease trap was unknown and anecdotal information from the Senior Facilities Manager indicated the water sump was used for the temporary storage of rainwater overflow.
- Some of the storage rooms located at the rear (west / central portion) of the premises (on ground level) were leased to tenants. It is understood that the rooms were used for the storage of medical waste associated with the clinics.
- A review of council records pertaining to the site indicated the intention to install a standby diesel-powered generator on top of the building at the end of 1999. However, the Senior Facilities Manager stated that there was no diesel generator or associated structures (i.e. a diesel tank) installed on top of the building at the time of the site walkover during the preliminary site investigation (PSI) in 2022.

5. Environmental setting

Regional Topography	Regional topography slopes downwards towards the south-east.
Site Topography	The site is relatively flat with an approximately reduced level (RL) of 96 m relative to the Australian Height Datum (AHD).
Soil Landscape	The Sydney 1:100 000 Soils Landscape Sheet indicates that the site is underlain by Blacktown soils. The Blacktown soils landscape group comprises deep yellow podzolic soils and soloths on lower slopes and in areas of poor drainage, shallow to moderately deep red and brown podzolic soils on crests, upper slopes and well drained areas. Moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.
Geology	Reference to the Sydney 1:100 000 Geological Series Map indicates that the site is underlain by rock of the lower Ashfield Shale formation, overlying the Mittagong Formation which is a transitional unit between the Ashfield Shale and underlying Hawkesbury Sandstone. The lower Ashfield Shale formation typically comprises shale, siltstone and finely laminated sandstone and siltstone (laminite). The Mittagong formation comprises interbedded shale, laminite and medium grained quartz sandstone. Hawkesbury Sandstone typically comprises

	medium to coarse grained quartz sandstone with some shale bands and lenses.
Acid Sulphate Soils	Reference to the 1:25 000 Acid Sulphate Soils (ASS) Risk map indicates that the site is in an area of no known occurrence of acid sulphate soils. The nearest mapped occurrence of ASS is bottom sediments of Balls Head Bay located at about 1.2 km distance to the southwest of the site.
Surface Water	The closest watercourse to the site is Berrys Creek, located approximately 850 m south (down gradient) of the site. With respect to surface water, given the highly urbanised nature of the area, most surface water is anticipated to be collected by the local stormwater network.
Groundwater	A search of the publicly available registered groundwater bore database indicated that there are no registered groundwater bores within a 1 km radius of the site. Based on the regional topography the anticipated flow direction of groundwater beneath the site is to the south-west down the Berrys Creek valley, towards the Parramatta River at Balls Head Bay, the likely receiving surface water body for the groundwater flow path.

6. Summary of previous investigations

The following previous reports are relevant to the current investigation:

- Douglas *Report on Preliminary Site Investigation (Contamination), Proposed Commercial Tower, 270-272 Pacific Hwy, Crows Nest*, Project 214296.01 (Douglas, 2024); and
- Douglas *Report on Detailed Site Investigation, Proposed Mixed-Use Development, 270 Pacific Highway, Crows Nest NSW*, Project 214296.03 (Douglas, 2025).

6.1 Preliminary Site Investigation (Contamination) (Douglas, 2024)

Douglas was engaged by Fitzpatrick + Partners Pty Ltd, acting on behalf of Ascent Property Group Pty Ltd to complete a preliminary site investigation (PSI) for a proposed commercial tower for the site at 270-272 Pacific Hwy, Crows Nest. The scope of works for the assessment comprised a review of site history, environs information and online and council records, a site walkover and preparation of a preliminary conceptual site model (CSM), as presented in Section 7.

The site history information suggested that most of the site may have been used for residential purposes at least from 1910 until before the 1930s. Commercial use commenced *circa* 1930s to date except for some parts that remained residential until before the 1960s. Some identified known or suspected industrial or commercial uses included property development companies. The historical business activities review indicated the presence of a dry cleaner and motor garages / service station historically located on the site, and a dry cleaner adjacent to the site in the 1970s. The public database of records of contaminated sites notified to the EPA under Section 58 under the CLM Act indicated that the site is not registered.

The local fire station identified in Section 4.1 is located 100 m to the north-west of the site, review of historical information indicates that there was no evidence of fire-fighting training ground used at or near the fire station. In addition, considering that the regional groundwater is flowing in a south-westerly direction, the fire station is considered to be cross gradient from the site, and the potential for migration of per- and polyfluoroalkyl substances (PFAS) in groundwater from the fire station onto the site is unlikely and was therefore ruled out during the analysis of the CSM.

The key features observed during the previous site walkover are outlined in Section 4.2.

The PSI concluded that the site could be made suitable, from a contamination standpoint, for the proposed commercial development subject to further investigations comprising a detailed site investigation (DSI) and a hazardous building materials assessment prior to demolition.

6.2 **Detailed Site Investigation (Douglas, 2025)**

Douglas was engaged by Silvernight to prepare a DSI report for the proposed mixed-use development at 270 Pacific Highway, Crows Nest. The objective of the investigation was to assess the suitability of the site for the proposed development and whether further investigation and/or management of contamination is required.

The scope work for the DSI comprised a review of previous reports, drilling of eleven (11) soil boreholes (BH1-BH11) using a combination of the proline system and hand tools and construction of three (3) groundwater wells at boreholes BH2, BH4 and BH6.

Test locations were selected based on a general site coverage and geotechnical requirements.

Boreholes are shown on Drawing 2, Appendix A, and borehole logs are included in Appendix C.

The general subsurface profile logged during the investigation was as follows:

Concrete slab:	Thicknesses of between 110 mm and 230 mm were observed in the basement concrete slab. Note borehole location BH3A initially encountered 0.7 m of concrete before being discontinued and relocated 1.5 m away to BH3;
Fill / Sand:	Grey and brown gravelly sand with varying proportions of silt, clay, siltstone at test locations BH1, BH2, BH4, BH7, BH8, BH10, BH11 to depths of between 0.17 m to 0.60 m bgl; underlain by
Fill:	Generally comprising clay with varying proportion of sand, igneous gravel and siltstone gravel at BH1, BH3, BH5, BH10 to depths of 0.45 m to 0.90 m bgl; underlain by
Clay:	Clay in test locations BH1 to BH6 to a maximum depth of 1.0 m; underlain by
Siltstone:	Siltstone in test locations BH1 to BH6 to a maximum depth of 10.80 m bgl. Test locations BH1 and BH3, were terminated at this depth.
Sandstone:	Sandstone in test location BH2, BH4, BH5 and BH6 to a maximum termination depth of 15.89 m bgl.

No visual or olfactory evidence (e.g. staining, odours, free phase product) was observed during the investigations to suggest the presence of contamination within the soils or groundwater at the site.

The photoionisation detector (PID) screening recorded values of less than 1 ppm suggesting the absence, or very low concentrations, of volatile organic compounds (VOC)in the samples tested.

No free groundwater was observed during drilling of boreholes. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time. Additionally, the use of drilling fluid can often make it difficult to ascertain the presence of groundwater.

A summary of soil, waste classification and groundwater laboratory results are outlined below. A summary of the laboratory results for site suitability and waste classification assessment is included in Appendix D.

Soil results:

The analytical for all contaminants tested in all samples were below the adopted site assessment criteria (SAC) for residential / commercial land use scenario (refer to Appendix G). However, copper concentrations were recorded in the following sample:

- Copper in sample BH10 / 0.15-0.2 m at 120 mg/kg exceeding the ecological investigation levels (EIL) of 65 mg/kg. This exceedance is not, however, considered to be of concern as the calculated 95% upper confidence limit (UCL) of the arithmetic mean (95% H-UCL) for all fill samples was below the SAC at 63.77 mg/kg.

Waste classification results:

- The DSI assessed the laboratory results for fill at the site to be consistent with a general solid waste – GSW (non-putrescible) classification. Further *in-situ* or *ex-situ* investigation including visual and analytical process is required to confirm the preliminary waste classification of any surplus soils, prior to off-site disposal.

Groundwater results:

All results were below the SAC for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), polychlorinated biphenyls (PCB) and VOC. The results exceeded the SAC for the following metals:

- Cadmium exceedances of (hardness adjusted) DGV of 0.7 µg/L in samples BH2 at 1.4 µg/L, BH4 at 4.7 µg/L, BH6 at 7.9 µg/L and BD1 (replicate of BH6) at 6.6 µg/L;
- Copper exceedances (DGV of 1.4) in samples BH2 at 49 µg/L, BH4 at 640 µg/L, BH6 at 1100 µg/L and BD1 at 1000 µg/L;
- Nickel exceedances (hardness adjusted DGV of 36.9 µg/L) in samples BH4 at 110 µg/L, BH6 at 330 µg/L and BD1 at 280 µg/L; and
- Zinc exceedances (hardness adjusted DGV of 26.8 µg/L) in samples BH2 at 160 µg/L, BH4 at 670 µg/L, BH6 at 930 µg/L and BD1 at 750 µg/L.

The DSI considered that the recorded heavy metal concentrations were likely to be associated with general background conditions in the area, noting similarly elevated concentrations in both BH4 and BH6. It is also possible that the elevated concentrations could be associated with the historical service station, dry cleaners and motor garages on site and/or hydraulic upgradient as described in Section 6.1.

Overall, whilst some groundwater contamination was identified, it was not considered to render the site unsuitable for the proposed development. This is based on that most of the metal concentrations were below the recreational / drinking water guidelines, and the concentrations of potentially volatile contaminants being low.

The groundwater analyte concentrations will need to be considered in terms of future dewatering, with groundwater likely to require some form of treatment prior to disposal.

Based on the results of the DSI it was considered that the site could be made suitable for the proposed development subject to the implementation of the following recommendations:

- *A hazardous building materials assessment is required for the existing buildings* [note: a hazardous building materials assessment is being undertaken by Douglas concurrently with preparation of this RAP];
- *Following demolition of existing site structures, the footprints of the buildings should be inspected by a suitably qualified environmental consultant for signs of contamination and sampled as necessary. If signs of contamination are identified, then further investigation and / or the need for remediation / preparation of a RAP should be considered;*
- *Asbestos has not been identified in the samples analysed during the current investigation. However, given that sporadic pockets of asbestos contamination can sometimes be present amongst demolition debris and noting that intrusive sampling was undertaken using test bores (due to the operational nature of the site and associated access limitations), the potential for undetected and/or sporadic pockets of asbestos contamination cannot be completely ruled out. Therefore, it is recommended that an unexpected finds protocol should be prepared and implemented to address any unexpected contamination identified during the civil and construction phase;*
- *Confirmation of the preliminary waste classification reported herein by a suitably qualified environmental consultant prior to off-site disposal of surplus soils at a licensed receiving facility; and*
- *The dewatering management plan (DMP) for the site must give adequate consideration to groundwater quality, noting the elevated metals concentrations reported herein. It is likely that groundwater requiring disposal will need to be treated prior to disposal depending on the levels of contaminants in the collected water. Given the inherent variability in groundwater conditions with time, it is recommended that a baseline groundwater quality assessment be undertaken close to the proposed dewatering date and reported as part of the DMP.*

7. Conceptual site model

The source (and associated contaminants of potential concern (CoPC)), pathway and receptor linkages are summarised in Table 1, Table 2 and Table 3.

Table 1 shows the CoPC which are considered to be potentially present based on the DSI field and laboratory results.

Table 1: Summary of potential sources

Potential sources and associated CoPC
On-site sources
S1: Fill of unknown origin: Associated with levelling, demolition of former buildings on the site CoPC: metals, TRH, BTEXN, PAH, PCB, OCP, OPP and asbestos **S2:** Historical site uses and offsite uses (historical dry cleaners and motor garages and service station) CoPC: metals, TRH, BTEX, PAH, PFAS and VOC **S3:** Former and existing buildings CoPC: asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB

The following potential human and environmental receptors, along with relevant potential pathways, have been identified and summarised in Table 2.

Table 2: Summary of potential receptors and pathways

Potential human receptors
HR1: Construction and maintenance workers **HR2:** End users [commercial and residential] **HR3:** Adjacent site users [residential and commercial]
Potential environmental receptors
ER1: Surface water **ER2:** Groundwater **ER3:** Terrestrial ecosystems (noting this is only relevant to the upper 2 m of the soil profile in areas considered to provide a high value habitat for terrestrial ecology)
Potential pathways to human receptors
HP1: Ingestion and dermal contact **HP2:** Inhalation of dust and/or vapours
Potential pathways to environmental receptors
EP1: Surface water run-off **EP2:** Lateral migration of groundwater providing base flow to water bodies **EP3:** Leaching of contaminants and vertical migration into groundwater **EP4**: Disposal of groundwater extracted by dewatering into the stormwater system **EP5:** Inhalation, ingestion and absorption

A summary of the potentially complete exposure pathways for the proposed land use is shown in the table below.

Table 3: Summary of potentially complete exposure pathways

Potential source and CoPC	Exposure pathway	Receptor	Risk management action
S1: Fill: metals, TRH, BTEXN, PAH, PCB, OCP, OPP, phenols and asbestos **S2:** Historical onsite and offsite activities: metals, TRH, BTEX, PAH, PFAS and VOC	**HP1:** Ingestion and dermal contact **HP2:** Inhalation of dust and / or vapours	**HR1:** Construction and maintenance workers **HR2:** End users [commercial / residential]	Data gap investigation following site vacancy or demolition is recommended to assess for potential contaminants including asbestos or other hazardous building material. Additional round(s) of groundwater monitoring is recommended as part of the dewatering management.
	HP2: Inhalation of dust and / or vapours	**HR4:** Adjacent site users [commercial / industrial]	
	EP1: Surface water run-off **EP2:** Lateral migration of groundwater providing base flow to water bodies **EP4**: Disposal of groundwater extracted by dewatering into the stormwater system	**ER1:** Surface water	
	EP3: Leaching of contaminants and vertical migration into groundwater	**ER2:** Groundwater	
	EP4: Inhalation, ingestion and absorption	**ER3:** Terrestrial ecosystems	
S4: Existing and historical buildings / structures on site: asbestos, SMF, lead (in paint) and PCB	**HP1:** Ingestion and dermal contact **HP2:** Inhalation of dust and / or vapours	**HR1:** Construction and maintenance workers **HR2:** Adjacent site users [residential and commercial]	A hazardous building materials survey was being undertaken concurrently with the RAP preparation.

8. Data gap investigation (DGI)

The objectives of the proposed data gap investigation (DGI) following site vacancy / demolition are to:

- Assess the final classification of fill / soil with respect to off-site disposal and, where applicable, its suitability to remain on-site. This also includes assessing potential PFAS contamination associated with possible historical use of the site as a service station.
- Additional groundwater monitoring (targeting metals, VOC and PFAS) proposed to further assess groundwater conditions and to inform dewatering.
- If volatile contaminants are identified during the above investigations, conduct soil vapour investigation (e.g. following bulk excavation to the final basement level).

A summary of the DGI sampling rationale is outlined in Table 4, below.

Subject to the results of the DGI, the RAP may need to be updated.

Table 4: Summary of DGI target locations and CoPC

Investigation	Purpose	Test Location	CoPC
Fill / Soil	To determine the final classification of fill / soil and/or its suitability to be retained on site.	A minimum of ten (10) test pits distributed evenly across the site, to be determined following demolition.	Metals, TRH, PAH, BTEX, OPP, OCP, PCB, phenols, asbestos, PFAS and VOC.
Groundwater	Measurement of groundwater levels and sampling and testing of groundwater quality in three existing groundwater wells installed during the DSI.	Groundwater wells, BH2, BH4 and BH6 to be sampled prior to site demolition or following site vacancy. Noting additional groundwater wells, if constructed as part of the dewatering groundwater assessment may also be sampled and analysed to inform the baseline groundwater conditions for treatment.	Metals, TRH, BTEX, naphthalene, PFAS and VOC.
Soil vapour (contingency, if required based on soil and / or groundwater results)	To assess the potential for vapour intrusion risks via soil vapour investigation if required based on soil / groundwater results	• Sample design, if required, to be based on results of the soil and groundwater investigation	Volatile TRH, BTEX, naphthalene and VOC.

The recommended investigation scope comprises the following, to be completed by a suitably qualified Environmental Consultant:

- Site inspection and identification of suitable locations for sampling.

Fill / Soil

- Excavate test locations using an excavator to the full vertical extent of fill. Test pits should be extended into natural soil or on top of rock;
- Collection of soil samples by the Environmental Consultant from the test locations at regular depth intervals, changes in strata or upon signs of contamination (i.e. odours, staining) for analysis of the CoPC;
- Field screening for potential VOC using a photoionisation detector (PID);
- Preparation of field logs and photographs;
- Selected soil samples (including quality control samples) will be analysed for the CoPC outlined in Table 4 at a NATA accredited laboratory. Additional analysis of toxicity characteristic leaching procedure (TCLP) concentrations if required for waste classification purposes;
- Compare and report the results against the relevant waste classification assessment criteria and/or SAC in Section 12; and

- Include the results as part of the data gap investigation report and assess the need for further delineation, remediation or management of any identified contamination.

Groundwater

- Redevelopment of the three existing groundwater wells, BH2, BH4 and BH6 prior to sampling.
- One to two additional rounds of monitoring in the three wells including measurement of groundwater levels, sampling and testing of groundwater quality following stabilisation of field parameters.
- Analysis samples (including quality control samples) at a NATA accredited laboratory for the CoPC identified in Table 4.

Soil vapour (contingency, if required based on soil and/or groundwater results)

The following, inter alia, would trigger the need for further soil vapour investigation:

- If soil and/or groundwater results indicate elevated levels of volatile contaminants.

The scope of the soil vapour investigation, if required, would be determined to target the areas / depths of concern, and could include sub sab vapour ports or vapour wells. The sampling method is expected to comprise:

- Sample each location as follows:
  - Connect sample tubing directly to the installed vapour port following removal of the plastic cap;
  - Perform shut in tests (minimum 30 seconds) following assembly of the sampling apparatus to the extent practical (i.e. connecting summa canister to the regulator), then open the canister valve to apply the vacuum (of between -29 mmHg to -30 mmHg) to the sampling train, while the regulator is still cap;
  - Purge the soil vapour well prior to sampling by removing one volume of air / vapour from the well (~ 500 ml);
  - Introduce liquid isopropyl alcohol (IPA) into the sampling shroud to act as a tracer gas for leaks in the soil vapour well and/or the sampling train. All samples are analysed for IPA as part of the TO 15 analysis;
  - Take PID readings from the soil vapour pins prior to and following application of the IPA tracer gas. Take a PID reading inside the shroud to provide a field indication of potential leak;
  - Measure general gas parameters from the soil vapour ports, including methane, oxygen and carbon dioxide, on-site using a calibrated landfill gas analyser;
  - Collect primary samples directly from the soil vapour port into 1 L Summa canisters with a flow regulator set by the analytical laboratory (approximately 100 ml/min). The regulators are to be supplied by the analytical laboratory and are decontaminated by the laboratory prior to shipment;
  - Collect an intra-laboratory QC duplicate soil vapour sample;

- Collect a shroud sample on a carbon tube to conduct analysis for IPA and determine the concentration of the tracer compound in the shroud; and
- Label the sample canisters and record on chain of custody documentation. Complete field sampling sheets and transport samples to the laboratory in an appropriate sealed container.

- Analysis samples (including quality control samples) to a NATA accredited laboratory and subject samples to TO-15 analysis for the CoPC identified in Table 4.

Quality control (QC) samples

- Collect and analyse the following field QA samples:
  - Inter-laboratory replicate samples: at a rate of 5% of primary samples. Analysis for metals, TRH/BTEX and VOC (soil / groundwater);
  - Intra-laboratory replicate samples: at a rate of 5% of primary samples. Analysis for metals, TRH/BTEX and VOC (soil / groundwater); and
  - Intra-laboratory replicate samples: at a rate of 10% of primary samples. Analysis for VOC (soil vapour).
- Rinsate samples (where reusable sampling equipment is used): at a rate of one sample per sampling day. Analysis for metals, TRH/BTEX and VOC (soil / groundwater);
- Trip spike samples: at a rate of one sample per sampling day. Analysis for BTEX (soil / groundwater);
- Trip blank samples: at a rate of one sample per sampling day. Analysis for BTEX (soil / groundwater); and
- Shroud sample: IPA (soil vapour).

Analysis and reporting

- Interpretation of the analytical results against the adopted SAC and waste classification assessment criteria; and
- Preparation of a data gap investigation report detailing the methods and results of the investigation, waste classification of fill / soil and recommendations on the suitability of the site for the proposed development and need for further assessment and/or remediation.

9. Remediation extent

The extent of remediation for known / identified onsite contamination sources provisionally comprises:

- Any areas of contamination identified as requiring remediation based on the results of the DGI.

10. Remediation options assessment

The objective of the remediation options assessment and evaluation is to establish a preferred remediation strategy. The process involves canvassing various remediation options which may be viable and then ranking each option based on a number of evaluation criteria. The remediation options assessment was undertaken with reference to CRC CARE *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment* (CRC CARE, 2019b).

The remediation options assessment is included in Appendix F.

11. Preferred remediation strategy

If site contamination is identified as requiring remediation based on the results of the DGI the following will be conducted:

- The Environmental Consultant is to assess the results of the DGI with respect to relevant guidelines, including (as applicable):
  - NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013) [NEPM] (NEPC, 2013);
  - NSW DECC *Guidelines for the Assessment and Management of Groundwater Contamination* (2007); and
  - NSW EPA *Assessment and Management of Hazardous Ground Gases: Contaminated Land Guidelines* (2020).
- The Environmental Consultant is to provide recommendations with respect to further assessment, remediation and/or management requirements;
- If remediation and/or management are required, a suitably qualified Environmental Consultant is to prepare an addendum to this RAP describing the works required;
- The project Principal is to submit the Addendum to the consent authority for approval; and
- Once the works in the Addendum have been approved by the consent authority, they will be implemented as part of the redevelopment.

12. Assessment criteria

12.1 Remediation acceptance criteria

The overarching remediation acceptance criterion (RAC) to be adopted for the project is for 'no unacceptable risks posed by the relevant media (i.e. soils, groundwater or soil vapour) to human health or the environment'.

The remediation works are to be validated as meeting the RAC by the Environmental Consultant by means of visual inspection, field screening, recovery and analysis of samples and review of any available plans as set out in this report.

In the absence of derivation of Tier 2 site specific target levels (SSTL), the RAC for contaminants in soil are the same as the Tier 1 site assessment criteria (SAC) as detailed in Section 11 and Appendix G.

12.2 Site assessment criteria

Results from the DGI and any area(s) of contamination encountered during the site redevelopment will initially be assessed using the SAC in Appendix G. This is on the provision that other considerations such as risks to groundwater are also taken into account.

The SAC should also be used as part of the assessment framework for imported soils (i.e. contaminant concentrations in imported soils must comply with the SAC).

The following considerations were made when applying the current investigation levels:

- The development comprises residential and commercial uses;
- Partially and permanent paved surface with minor landscaping; and
- Two basement parking levels, excavated to a maximum RL 90.5 m AHD (~3 m).

The SAC are not RAC, and an exceedance of the SAC does not automatically trigger the need for remediation. Exceedances of the SAC will trigger the need for further assessment of risk by the Environmental Consultant to determine the need for remediation in accordance with NEPC (2013) and Appendix G.

13. Validation plan

13.1 Data quality objectives

The data quality objectives (DQO) for the validation plan are included in Appendix H.

13.2 Validation assessment requirements

The following site validation work may be required:

- Field assessment by the Environmental Consultant comprising:
  - Visual inspection, including taking photographs for record purposes;
  - Collecting validation samples from excavations resulting from the removal of contaminated soils, including contaminated soil stockpile footprints (if relevant); and
  - Collecting validation / characterisation samples for materials to be re-used on-site.
- Surveying by the Surveyor comprising:
  - Survey of the extent and levels of contained contamination and capping.
- Laboratory analysis of validation samples at a NATA accredited laboratory for:
  - The CoPC relevant to the remediation area; and
  - Quality control (QC) samples in accordance with Section 16.

- Comparison by the Environmental Consultant of the laboratory results with the SAC and/or RAC as appropriate (refer to Section 12); and
- Preparation by the Environmental Consultant of a validation report detailing the methods and results of the remediation works and validation assessment.

13.3 Visual inspections

All areas to be assessed and validated will first be subject to a visual inspection by the Environmental Consultant.

13.4 Validation sampling

The sampling frequency will depend on the volume or area to be assessed and the previous results. The following approximate sampling frequencies will be adopted but may be modified by the Environmental Consultant to take into account previous results, where applicable, and findings from the visual inspections.

- Small to medium excavations / areas (base <500 m^2):
  - Area / base of excavation: one sample per 25 m^2 or part thereof, with a minimum of three samples where the base of the excavation is fill rather than natural soils; and
  - Sides of excavation: one sample per 10 m to 20 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in fill.
- Large excavations / areas (base ≥500 m^2):
  - Area / base of excavation: sampling on a grid at a density in accordance with Table 2 in NSW EPA (2022) or a minimum of 10 samples. In sub-areas with any specific signs of concern, a higher sampling density may be required; and
  - Sides of excavation: one sample per 20 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in fill.

Where contaminated soils are stored or treated on bare soils, the footprint of the stockpile will require validation following removal of the contaminated soils. In the event that contamination extends beyond site boundaries or in areas that can't be practically chased out (e.g. under buildings), validation samples will be taken at the limit of excavation. Notwithstanding that there may be residual contamination present.

Advice may need to be obtained from a qualified geotechnical or structural engineer regarding excavation and/or structure stability if excavations approach site boundaries and/or existing structures.

Validation samples will be analysed by a NATA accredited laboratory for the relevant CoPC relevant to the remediation area.

Validation sample test results will be compared to the RAC, as per the DQO (Appendix G). Where the RAC are considered to have not been met, the remediation excavation(s) will be expanded to 'chase-out' impacted material, as advised by the Environmental Consultant, with the validation sampling then continuing into the extended excavation. This process will continue until all results are below the RAC.

14. Waste classification and disposal

Disposal of waste must be to an appropriately licensed waste facility, as per *Protection of the Environment Operations Act 1997* NSW (POEO Act) and the *Protection of the Environment (Waste) Regulation 2014* NSW.

Any waste disposed off-site must be initially classified by the Environmental Consultant in accordance with:

- NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (NSW EPA, 2014a);
- NSW EPA Waste Classification Guidelines, Part 2: Immobilisation of Waste (NSW EPA, 2014b);
- NSW EPA Waste Classification Guidelines, Part 4: Acid Sulfate Soils (NSW EPA, 2014c); and
- NSW EPA Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste (NSW EPA, 2016) [addendum for per- and poly-fluoroalkyl substances (PFAS)].

Samples will be collected from stockpiles / *in situ* fill at various depths to characterise the full depth of the material to be classified for disposal. The frequency of sampling and analytical suite is to be determined by the Environmental Consultant based on the risk of contamination and heterogeneity of the material.

For stockpiles comprising similar materials and a:

- Volume up to 200 m^3: a recommended minimum frequency of one sample per 25 m^3, with a minimum of three per stockpile (NSW EPA, 2022); or
- Volume greater than 200 m^3: a recommended minimum frequency of one sample per 25 m^3, with a minimum of 12 samples OR a minimum of 10 samples and calculation of the 95% upper confidence limit of the arithmetic mean for all applicable analytes (NSW EPA, 2022). Note that this does not apply to stockpiles impacted, or potentially impacted, by asbestos. For stockpiles greater than 200 m^3 which are impacted, or potentially impacted, by asbestos the Environmental Consultant shall provide guidance in accordance with NSW EPA (2022).

It may be possible to classify excavated soil / fill for reuse on another site under a relevant NSW EPA resource recovery order (RRO) so that it can be used on other sites under the requirements of the corresponding NSW EPA resource recovery exemption (RRE). For this option, the frequency of sampling should be in accordance with the relevant RRO and the contaminants to be analysed will be determined by the Environmental Consultant. The Environmental Consult will provide a report confirming the suitability of the spoil for reuse under a RRO, or otherwise.

All waste must be tracked by the Remediation Contractor from 'cradle to grave'. Copies of all consignment notes / disposal dockets (or similar) and environment protection licences for receipt and disposal of the materials must be maintained by the Remediation Contractor as part of the site log and must be provided to the Environmental Consultant for inclusion in the validation report.

15. Imported material

Any soil, aggregate, landscaping materials etc imported for the remediation works must have contaminant concentrations that meet the relevant criteria outlined in Section 12. Imported materials will only be accepted for use at the site if:

- It can legally be accepted onto the site (e.g. classified as virgin excavated natural material (VENM), accompanied by a report / certificate prepared by a qualified Environmental Consultant);
- Visual inspection of the imported soil confirms that the soil has no signs of concern and is consistent with those described in the supporting classification documentation;
- It has no aesthetic issues of concern, and
- The materials are validated (by inspection / sampling) by the Environmental Consultant as being suitable for use at the site.

The classification report / certificate for all material proposed for import must be reviewed and approved in writing by the Environmental Consultant prior to import. Materials to be imported may need to meet other requirements (e.g. geotechnical, landscaping) which are to be assessed by others, as required.

If permitted by the development consent and approved by the site owner, Remediation Contractor and Environmental Consultant, material classified under a NSW EPA RRO may also be accepted, provided the material can be used on site in accordance with the corresponding RRE. This could include excavated natural material (ENM), classified under NSW EPA *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The excavated natural material order 2014* (NSW EPA, 2014d).

The need for check-sampling of VENM and/or RRO material is to be determined by the Environmental Consultant depending on the source of the material, adequacy of the supporting documentation provided and inspection(s) of material. Quarried material / VENM may need little or no check sampling.

Any recycled materials proposed for importation must be sampled at a frequency of one sample per 25 m^3, with a minimum of three samples per load. The recycled material will not be permitted to be used on site until the results of the inspection and laboratory analysis have been approved in writing by the Environmental Consultant.

16. Quality assurance and quality control

Field quality assurance and quality control (QA / QC) testing will include the following:

- Replicate samples: 5% sample intra-laboratory and 5% inter-laboratory analysis, analysed for the same suite as primary sample;
- Rinsate samples (where re-useable sampling equipment is used), analysed for the suite of analytes analysed by the majority of the primary samples; and
- Trip spike and trip blank samples (analysed for BTEX) (approximately one per batch of samples where volatile contaminants are CoPC).

The laboratory will undertake analysis in accordance with its NATA accreditation, including in-house QA / QC procedures.

- The QC analytical results will be assessed using the following criteria:
  - Sampling location rationale met the sampling objective;
  - Standard operating procedures (SOP) are followed;
  - Appropriate QA / QC samples are collected / prepared and analysed;
  - Samples are stored under secure, temperature-controlled conditions;
  - Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory;
  - Conformance with specified holding times;
  - Accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants);
  - Field and laboratory duplicate, and replicate samples will have a precision average of +/- 30% relative percentage difference (RPD); and
  - Rinsate samples will show that the sampling equipment (if used) is free of introduced contaminants, i.e. the analytes show that the rinsate sample is within the normal range for deionised water.

17. Management and responsibilities

17.1 Site management plan

A general site management plan for the operational phase of site remediation is included in Appendix I. The management plan includes soil, noise, dust, work health safety (WHS), remediation schedule, hours of operation and incident response. The Remediation Contractor is to implement the general site management plan for the duration of remediation works by incorporating the plan into their over-arching construction environmental management plan (CEMP).

17.2 Site responsibilities

The site management plan (Appendix I) provides a summary of the general program management and associated responsibilities. Contact details for key utilities are also included in the event of needing to respond to any incidents.

17.3 Contingency plan and unexpected finds protocol

Plans for contingency situations (e.g. encountering asbestos in fill), along with an unexpected finds protocol for dealing with unexpected finds during remediation work / earthworks, are included in Appendix E.

18. Validation reporting

18.1 Documentation

The following documents will need to be collated and reviewed by the Environmental Consultant as part of the validation assessment (including those items that are prepared by the Environmental Consultant):

- Any licences and approvals required for the remediation works (Remediation Contractor);
- Waste classification report(s) (Environmental Consultant);
- Transportation Record: comprising a record of all truckloads of soil (including aggregate) entering the site, including truck identification (e.g. registration number), date, time, source site, load characteristics (e.g. type of material, i.e. quarried aggregate, etc.), approximate volume, use (e.g. general site raising, service trenches, etc.) (Remediation Contractor);
- Disposal dockets: for any soil disposed off-site including transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility / site (Remediation Contractor). Note: A record of the building materials disposed off-site is also to be kept and provided to the Principal, on request;
- Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records (Remediation Contractor);
- Records relating to any unexpected finds and contingency plans implemented (Remediation Contractor);
- Laboratory certificates and chain-of-custody documentation;
- Inspections records from the Environmental Consultant; and
- Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities (Remediation Contractor).

18.2 Reporting

A validation assessment report will be prepared by the Environmental Consultant in accordance with NSW EPA (2020).

The validation report shall describe the remediation approach adopted, methodology, results and conclusion of the assessment and make a statement regarding the suitability of the site for the proposed development.

If long term management of contamination is required a long-term environmental management plan (LTEMP) will be prepared.

19. Conclusions

This RAP describes the requirements to render the site suitable from a contamination perspective (if deemed necessary following demolition and further contamination investigations) for the proposed mixed-use residential / commercial development.

It is considered that through implementation of the RAP the site can be made suitable for the proposed development.

It is also considered that conformance with this RAP will minimise the potential for environmental, public and worker health impacts during the remediation works at the site.

The remediation works undertaken will need to be documented in the validation report.

If upon completion of remediation works, a long-term environmental management plan (LTEMP) is required it must be legally enforceable. Suitable methods for legal enforcement include compliance with an appropriately worded development consent condition.

20. References

CRC CARE. (2019a). *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives.* National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

CRC CARE. (2019b). *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment.* National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

Douglas. (2024). *Report on Preliminary Site Investigation (Contamination), Proposed Commercial Tower, 270-272 Pacific Hwy, Crows Nest prepared for Ascent Property Group Pty Ltd.*

Douglas. (2025). *Report on Detailed Site Investigation, Proposed Mixed-Use Development, 270 Pacific Hwy, Crows Nest NSW.* (Ref: 214296.03.R.001.Rev2 dated 21 May 2025).

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW DECC. (2007). *Guidelines for the Assessment and Management of Groundwater Contamination.* NSW Department of Environment and Climate Change.

NSW EPA. (2014a). *Waste Classification Guidelines, Part 1: Classifying Waste*. NSW Environment Protection Authority.

NSW EPA. (2014b). *Waste Classification Guidelines, Part 2: Immobilisation of Waste*. NSW Environment Protection Authority.

NSW EPA. (2014c). *Waste Classification Guidelines, Part 4: Acid Sulfate Soils*. NSW Environment Protection Authority.

NSW EPA. (2014d). *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The excavated natural material order 2014*. NSW Environment Protection Authority.

NSW EPA. (2016). *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste*. NSW Environment Protection Authority.

NSW EPA. (2020). *Assessment and Management of Hazardous Ground Gases*. NSW Environment Protection Authority.

NSW EPA. (2020a). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

NSW EPA. (2020b). *Underground Petroleum Storage Systems - Guidelines for implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019*. Doc Ref: EPA 2020P2700: NSW Environment Protection Authority.

NSW EPA. (2022). *Sampling Design, Part 1: Application; Part 2: Interpretation*. NSW Environment Protection Authority.

21. **Limitations**

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 270 Pacific Highway, Crows Nest in line with Douglas' proposal 214296.03.P.002.Rev0 dated 19 June 2025 and acceptance received from Silvernight (Crows Nest) Landowner Pty Ltd dated 19 June 2025. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Silvernight (Crows Nest) Landowner Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental / groundwater components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

Drawings





SITE LOCATION

NOTE:
1. Drawing projection in WGS 84, adapted from aerial imagery from "MetroMap"

LEGEND

Site Boundary

0 10 20 30 40 50 m

Douglas PARTNERS	CLIENT: Silvernight (Crows Nest) Landowner P/L	TITLE: **Site Location and Boundary** **Proposed Mixed-Use Development** **270 Pacific Highway, Crows Nest, NSW**	PROJECT: 214296.03
	OFFICE: Sydney / DRAWN BY: IR		DRAWING No: 1
	SCALE: 1:923 @A3 / DATE: 26 June 2025		REVISION: 0

DP.QGIS.A3LandscapeDrawingLayout.Rev3 -



REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	07.03.2025	IR

SCALE: 0 6 12 18 24 30 m
1:600 @ A3

Douglas PARTNERS
OFFICE: SYDNEY
96-98 Hermitage Rd, West Ryde NSW 2114
(02)9809 0666

CLIENT:
Silvernight (Crows Nest) Landowner Pty Ltd

NOTE:
1: Basemap from Metromap Dated (27.01.2025)

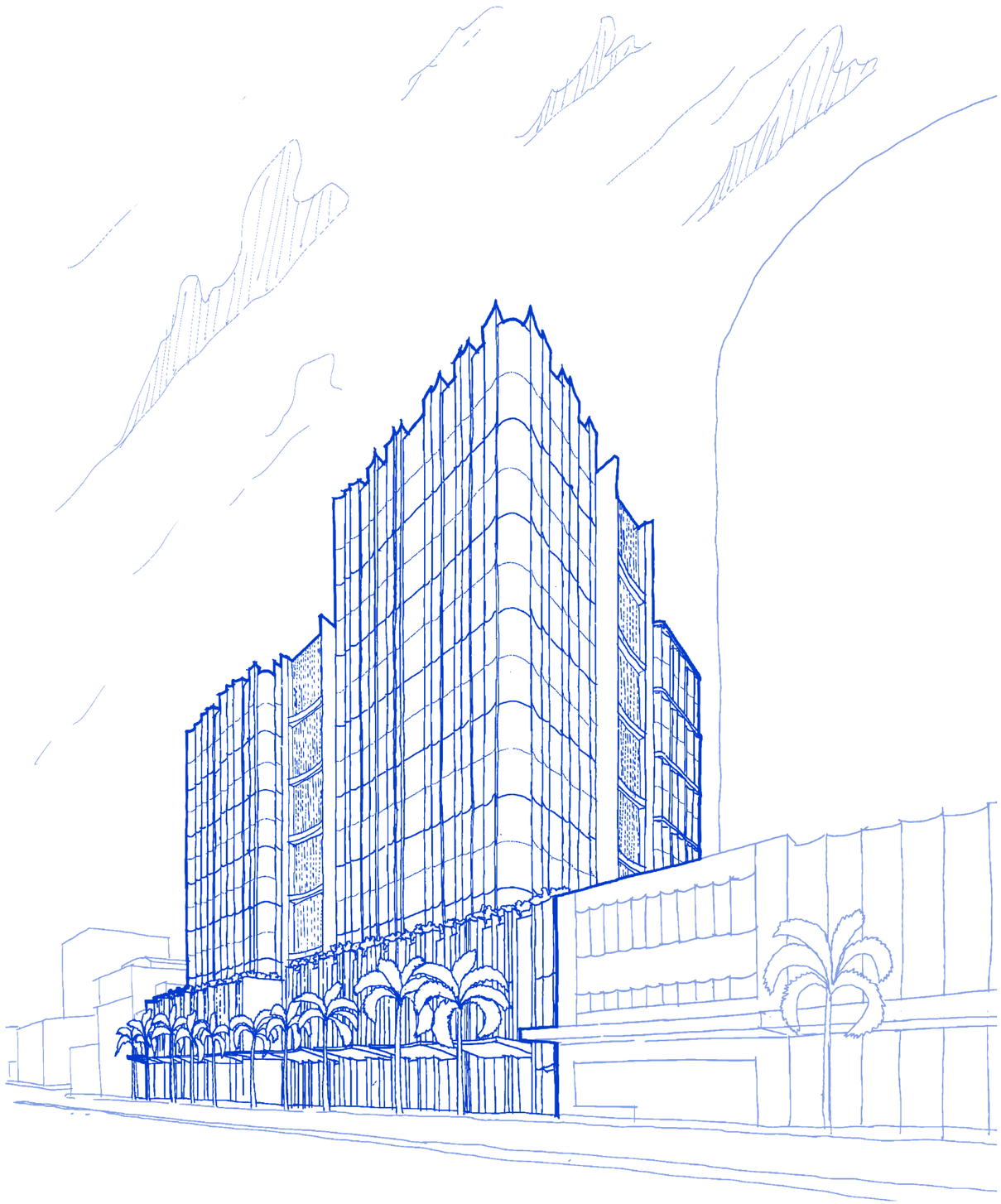
COORDINATE REFERENCE SYSTEM: GDA2020 / MDA zone 56

PROJECT NAME:
Proposed Mixed-Use Development
PROJECT ADDRESS:
270 Pacific Hwy, Crows Nest

DRAWING TITLE:
Previous Test Locations

PROJECT NO: **214296.03**
DRAWING NO: **2**
REVISION: **0**

fitzpatrick+partners



Prepared For
DEVELOPMENT APPLICATION

Client
SILVERNIGHT

Version
B

Development Application

270 Pacific Highway BTR

Issued
19/06/2025

fitzpatrick + partners

Fitzpatrick + Partners acknowledge that we work on the Traditional Lands of the Gadigal people of the Eora Nation.

We pay our respects to Elders past, present and emerging.

Always was, always will be, Aboriginal land.

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REV.	DATE	DESCRIPTION	CHK
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A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE @A3

DRAWN BY

APPROVED BY

30mm ON ORIGINAL

PRINT DATE 19/06/2025

DRAWING
PHOTOMONTAGES
PERSPECTIVES

PROJECT NUMBER **22501**

DRAWING NUMBER **DA-00101**

ISSUE **B**



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A	20/05/2025	DA	

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270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney
NSW 2000 Australia

SCALE @A3

30mm ON ORIGINAL

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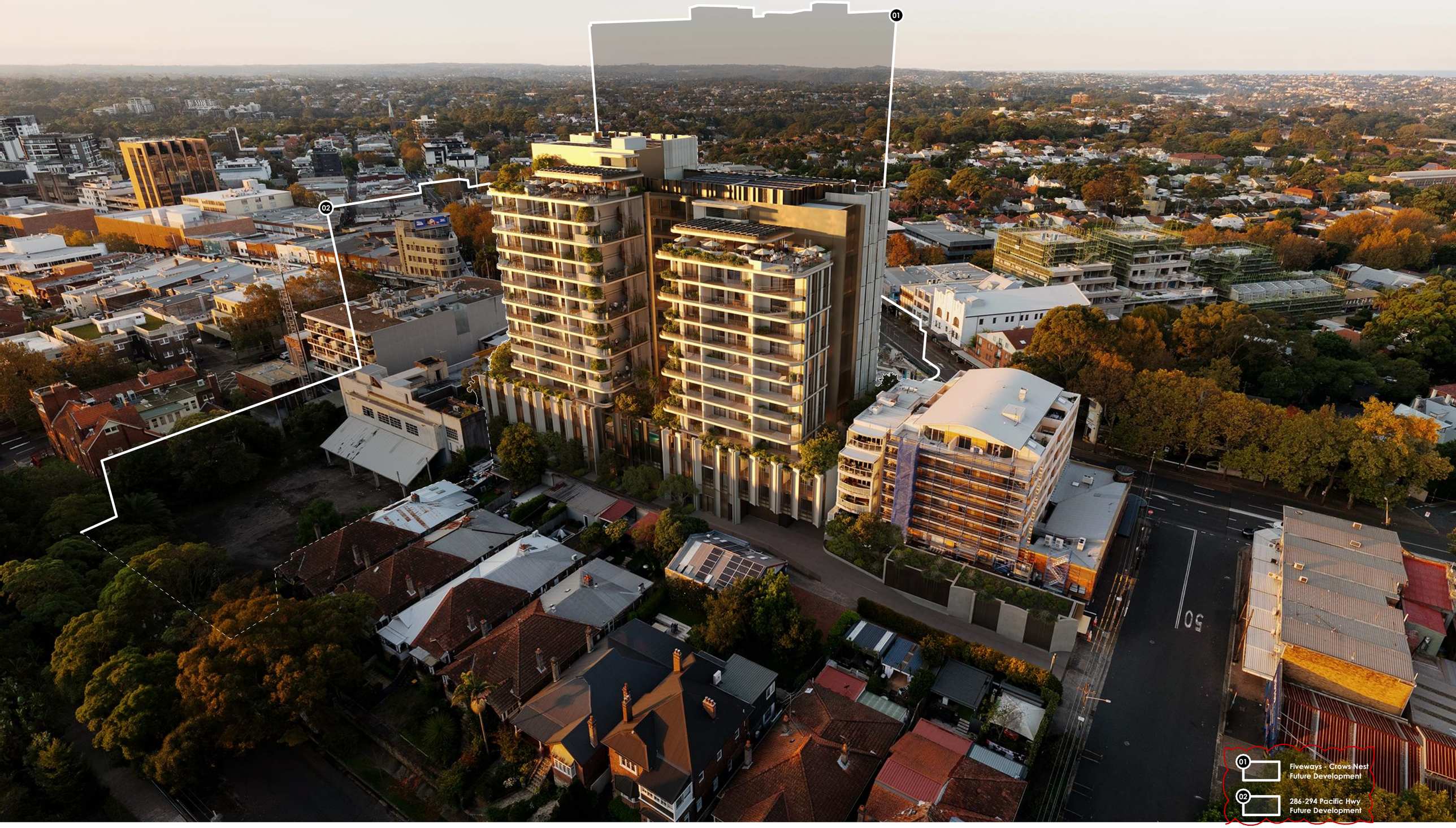
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DRAWING
PHOTOMONTAGES
PERSPECTIVES

PROJECT NUMBER **22501**

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ISSUE **B**



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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

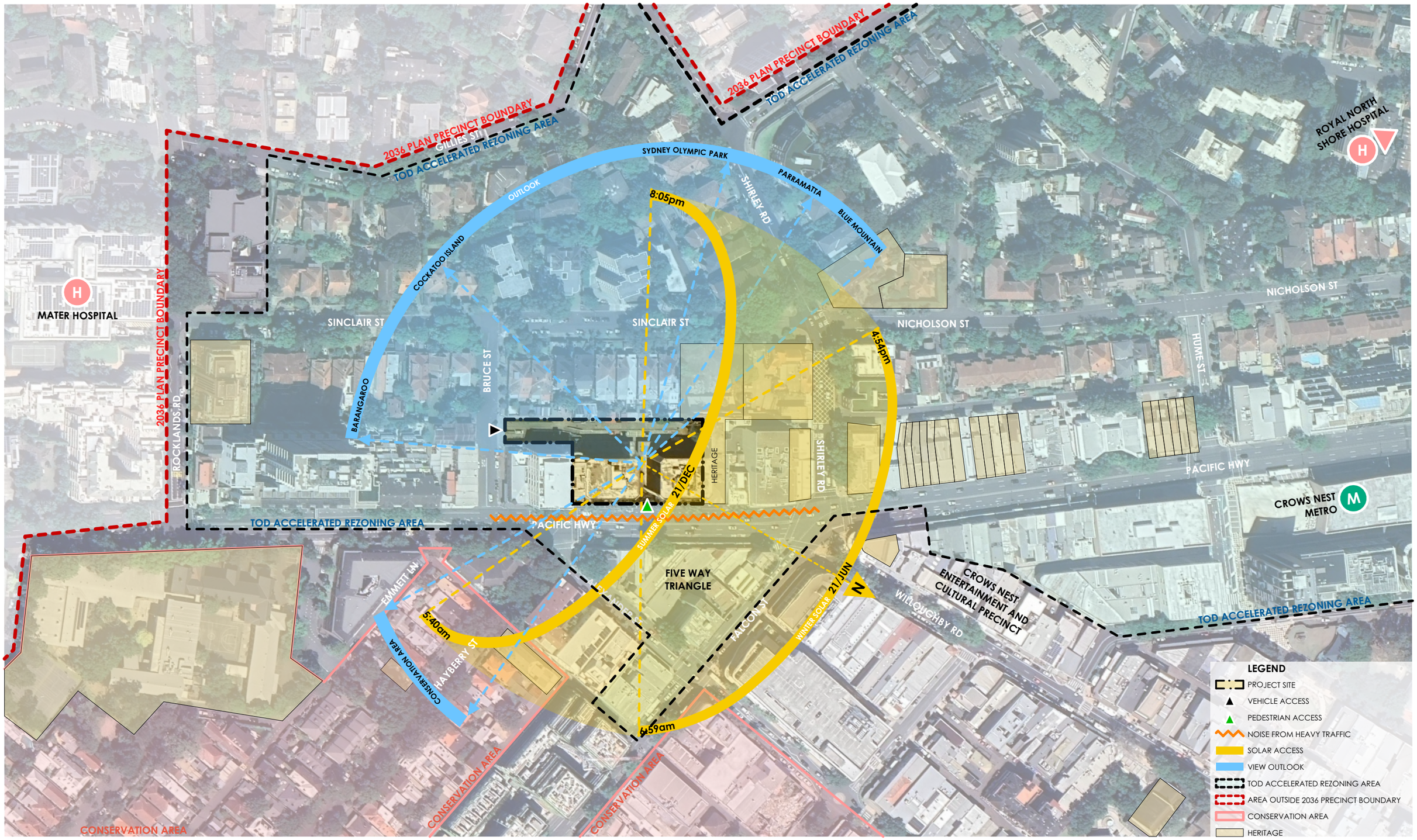
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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

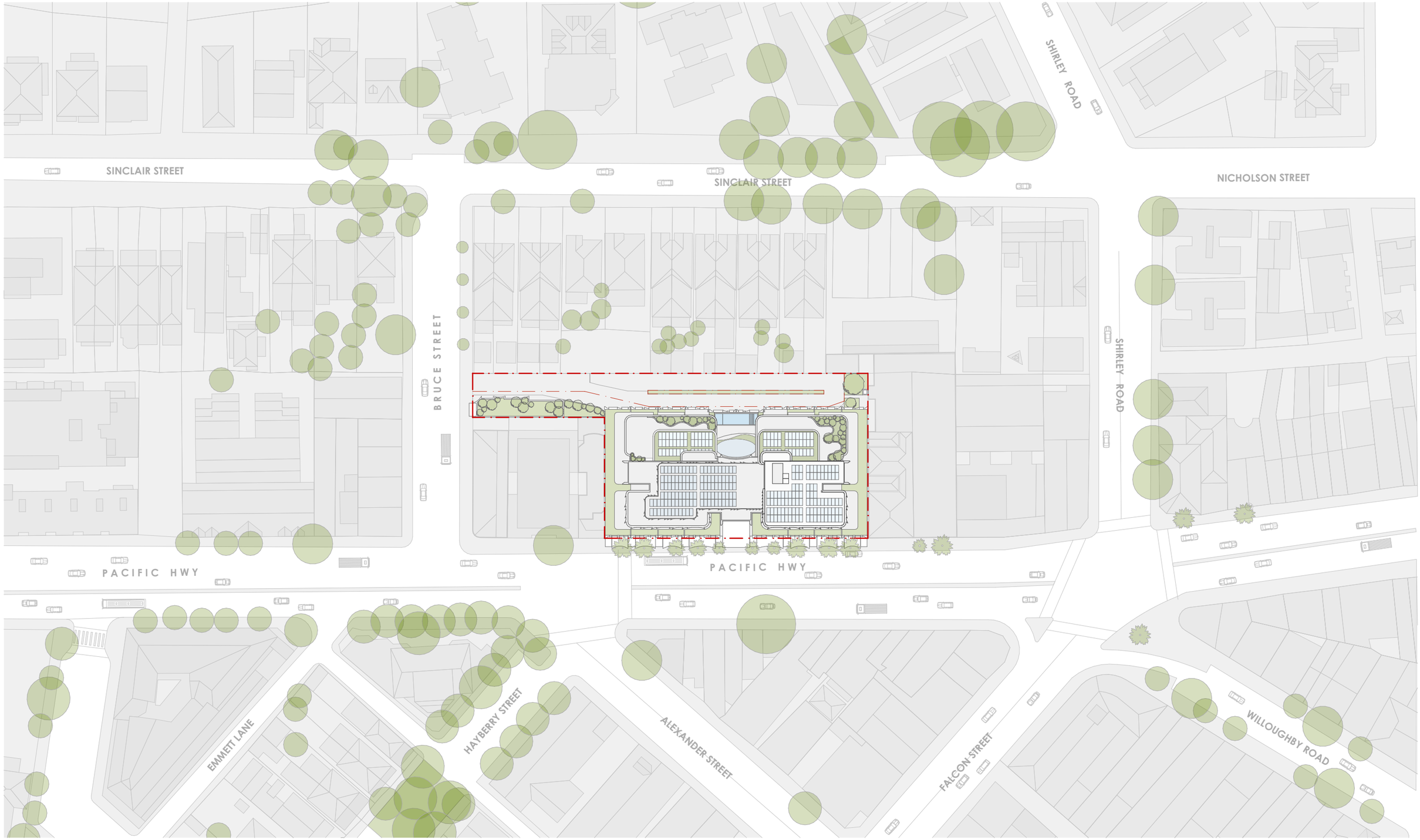
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LOCATION PLAN

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PROJECT
270 PACIFIC HWY BTR
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CROWS NEST NSW 2064
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PROJECT NORTH

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SITE PLAN

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A	20/05/2025	DA	

PROJECT
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CROWS NEST NSW 2064
AUSTRALIA

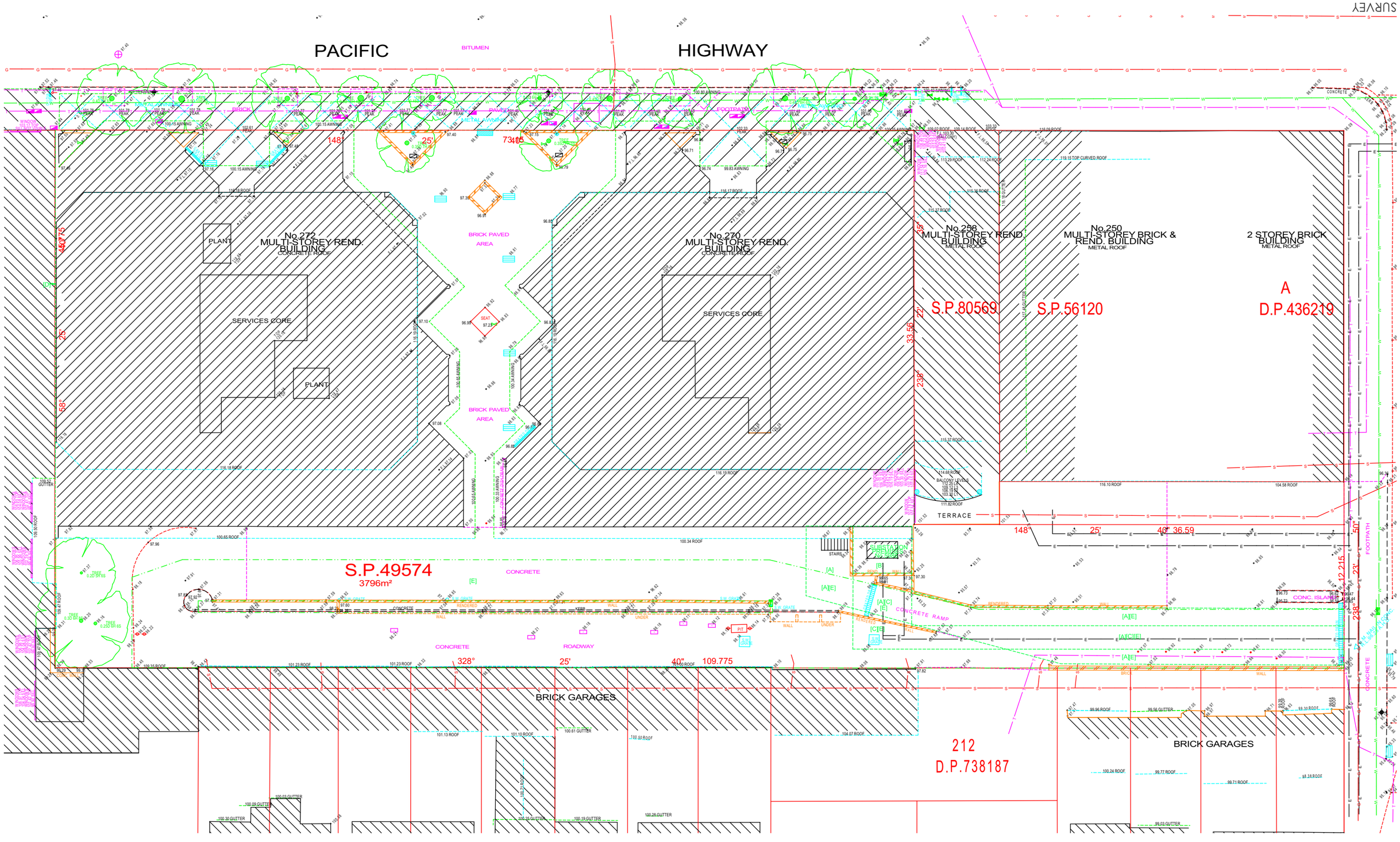
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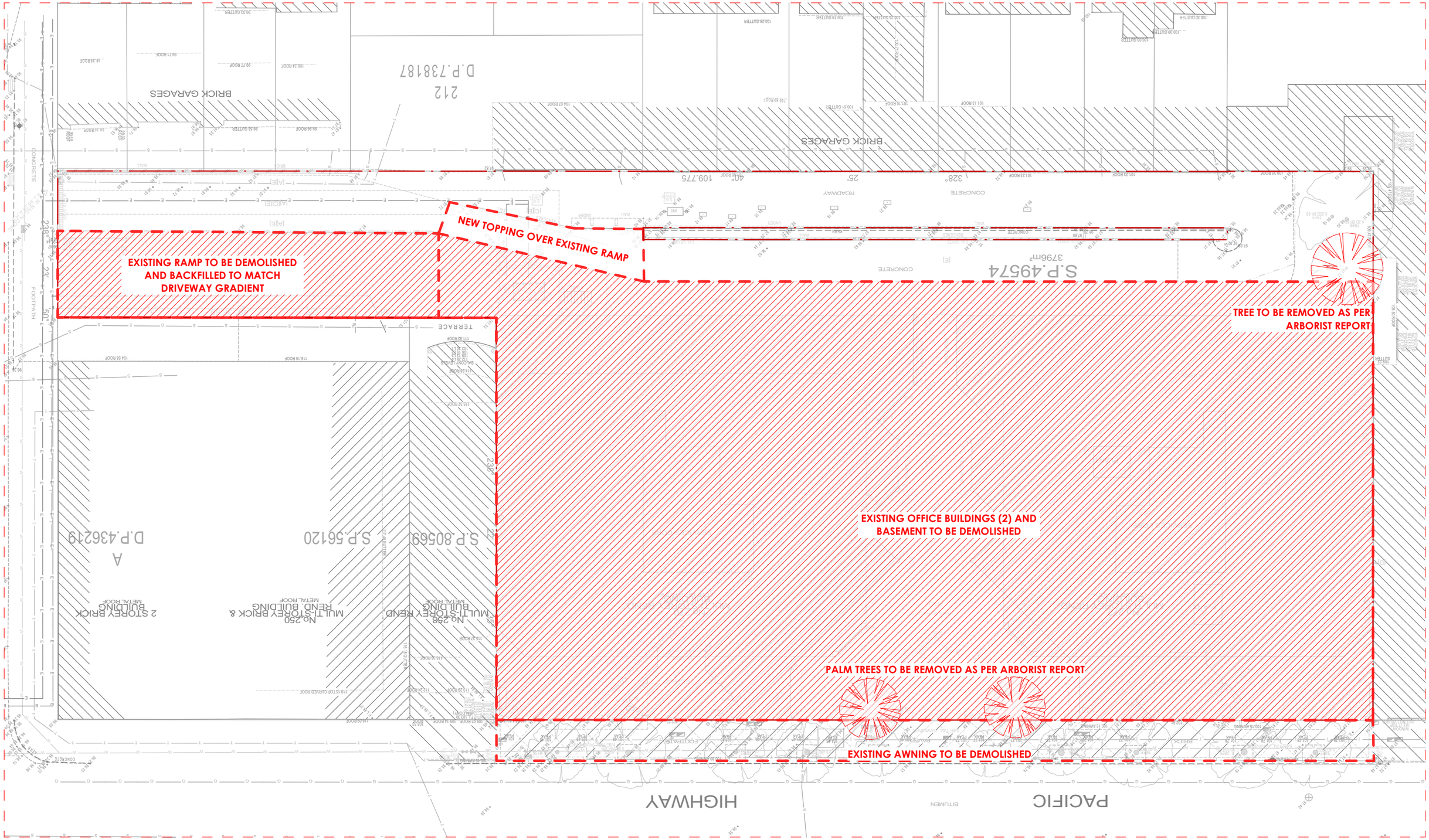
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PROJECT

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SURVEY
1:300





DEMOLITION PLAN
1:300

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CROWS NEST NSW 2064
AUSTRALIA

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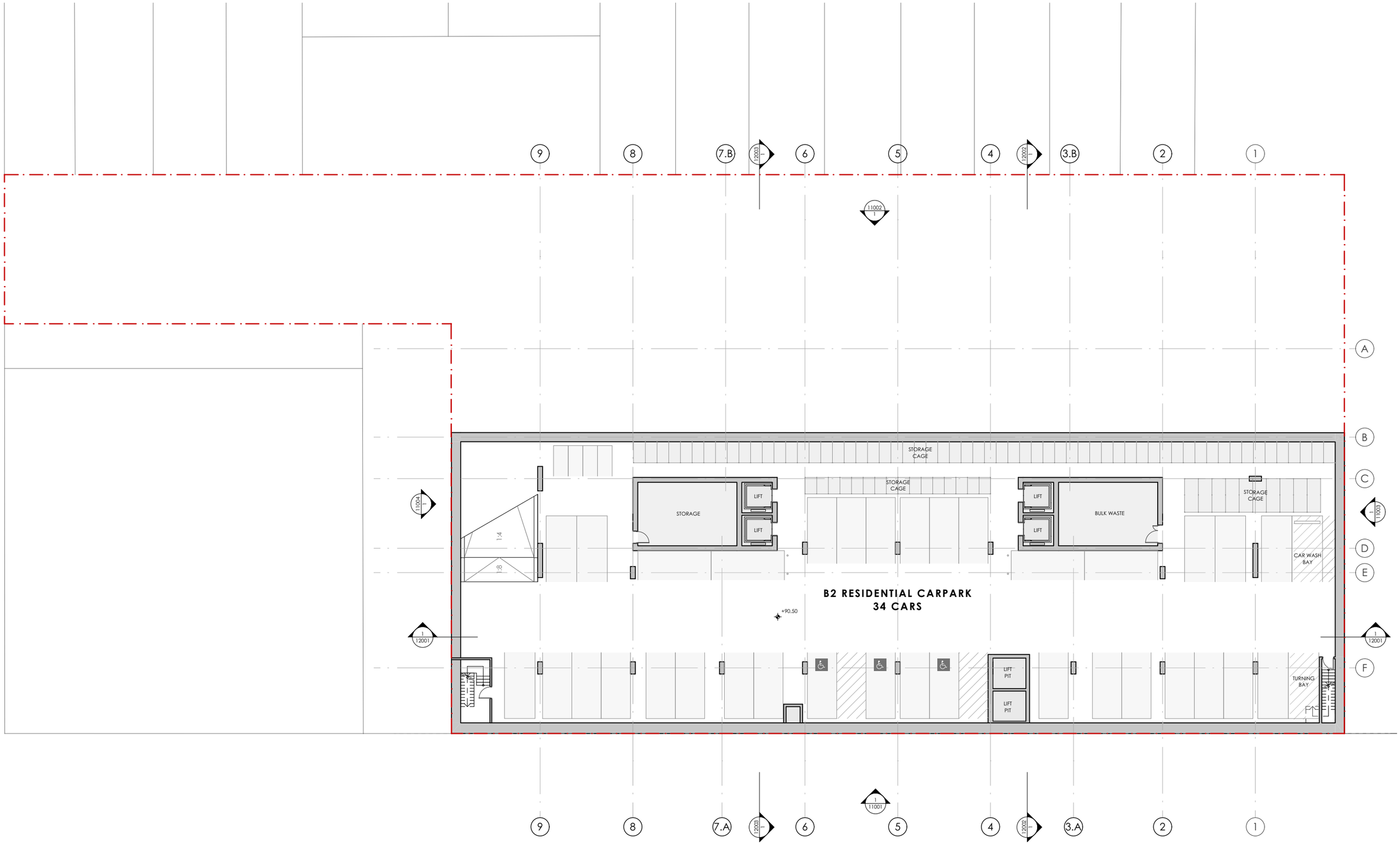
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DEMOLITION PLAN
DEMOLITION PLAN

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PROJECT
270 PACIFIC HWY BTR
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AUSTRALIA

PHASE: Development Application

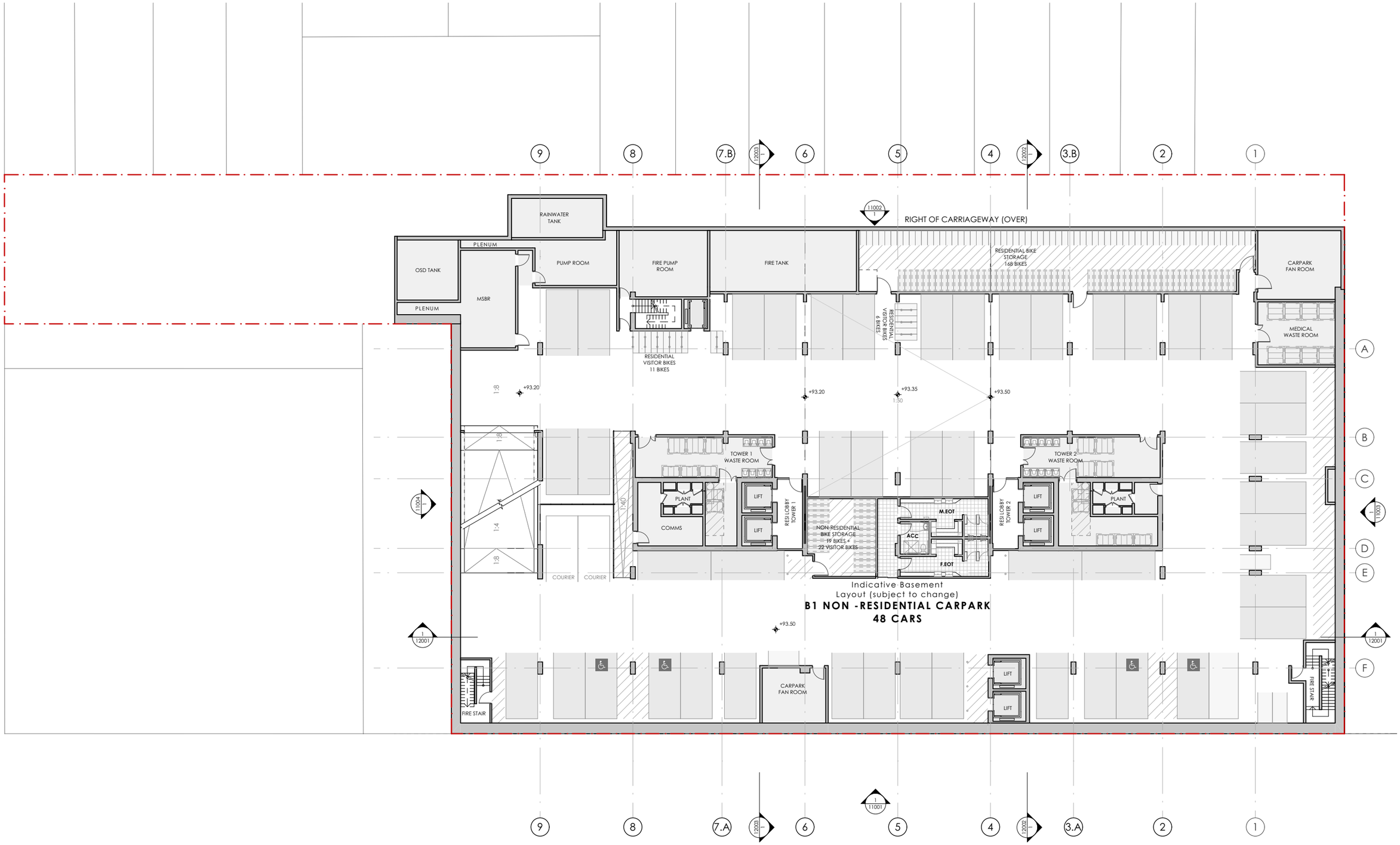
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DRAWING
GENERAL ARRANGEMENT PLANS
BASEMENT 02

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BASEMENT 01
1:300

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270 PACIFIC HWY BTR
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CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

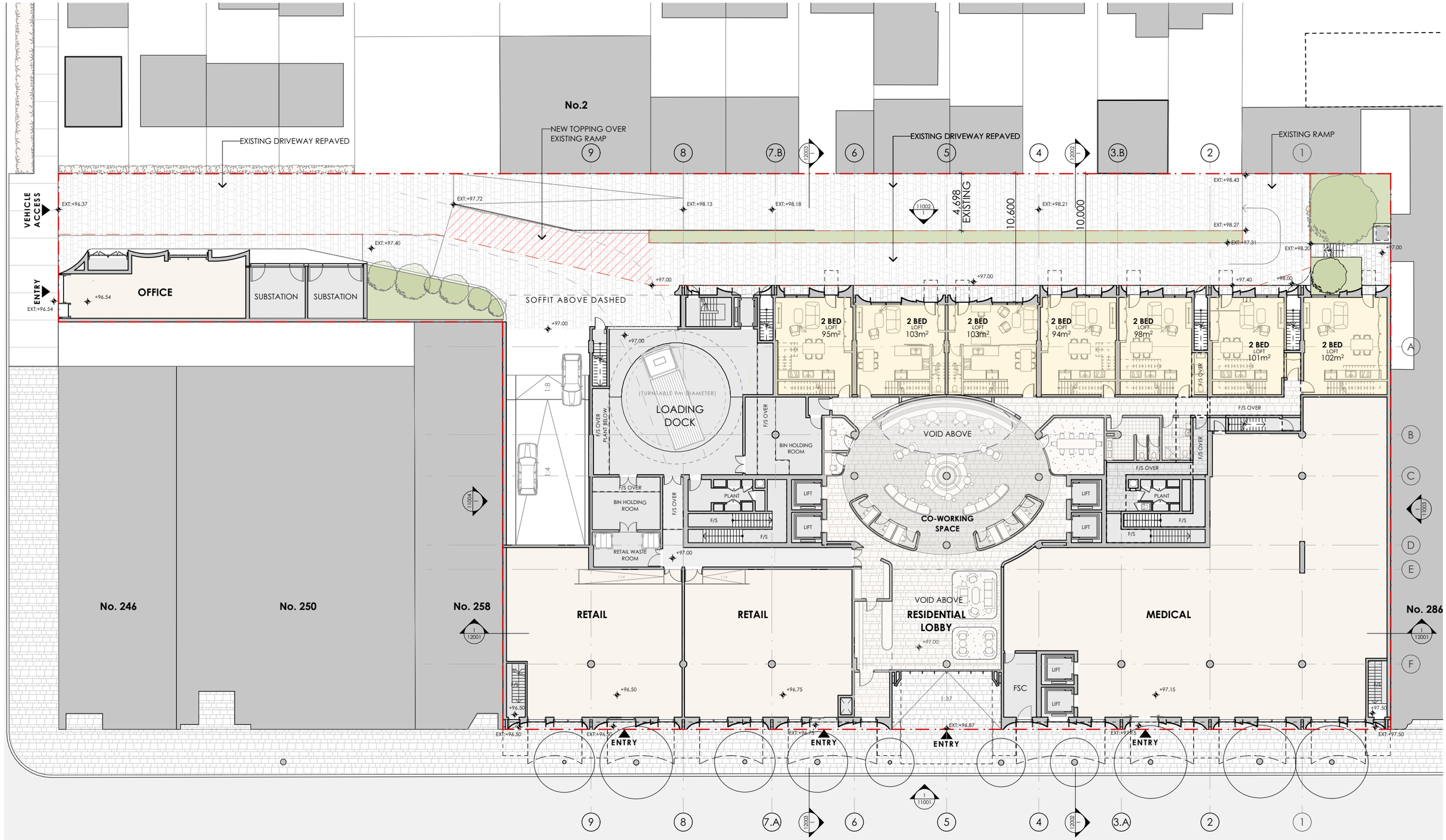
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BASEMENT 01

PROJECT NUMBER **22501**
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A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
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AUSTRALIA

PHASE: Development Application

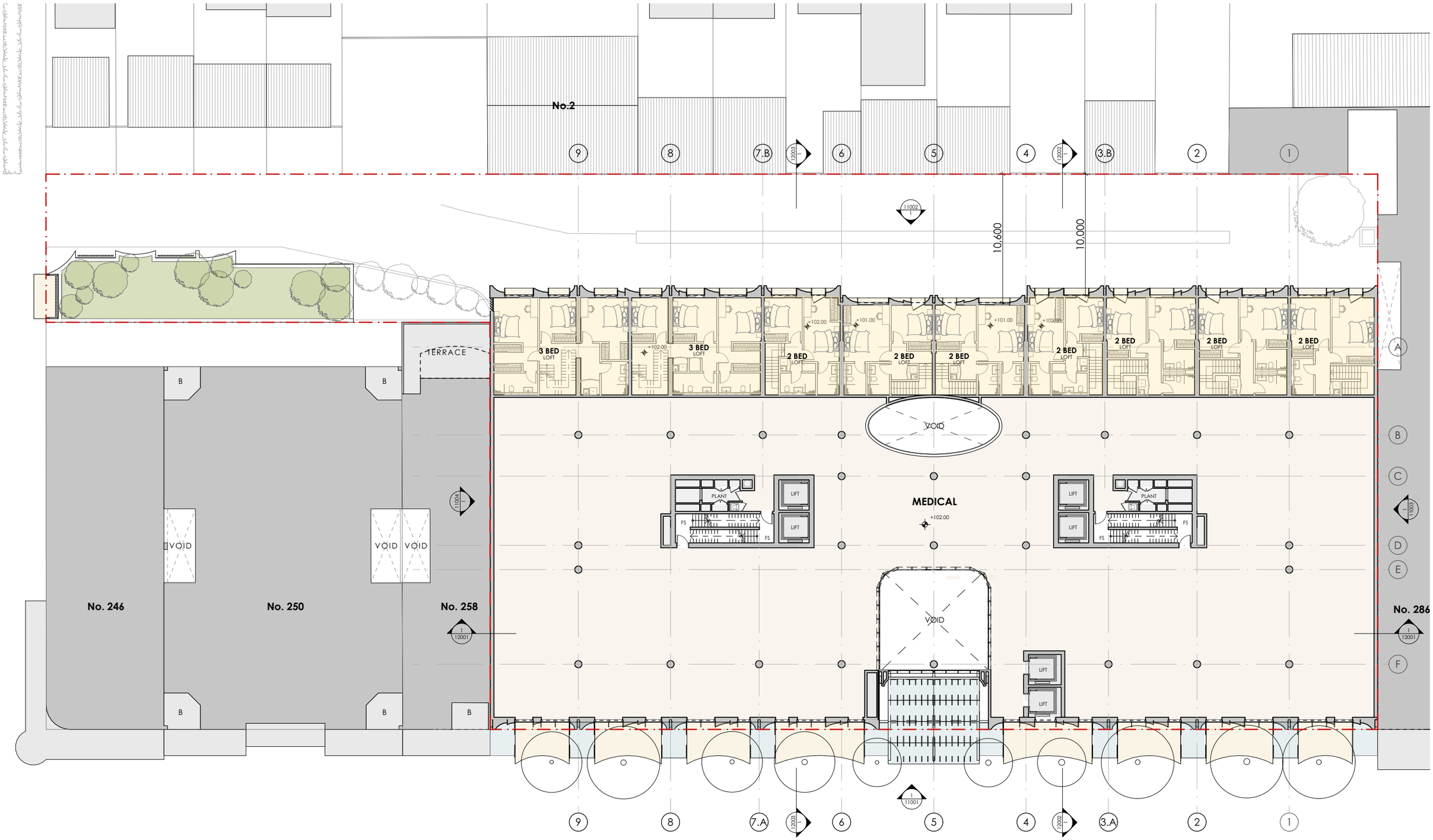
PROJECT NORTH

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DRAWING
GENERAL ARRANGEMENT PLANS
GROUND FLOOR

PROJECT NUMBER	DRAWING NUMBER	ISSUE
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A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

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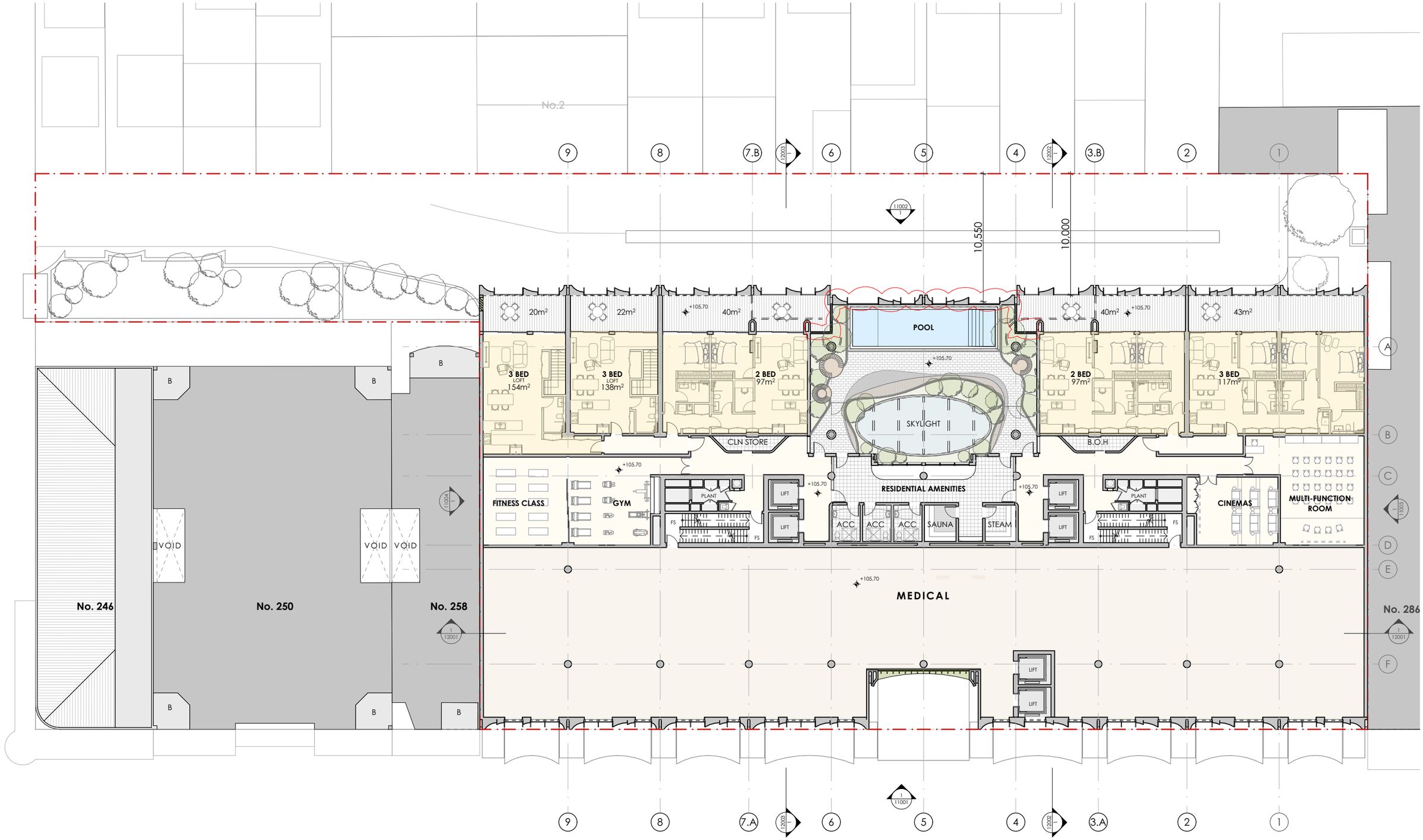
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DRAWING
GENERAL ARRANGEMENT PLANS
LEVEL 01 - NON-RESIDENTIAL

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-10004**	**A**



AMENDMENTS:
1, EXTEND GLASS BALUSTRADE FROM 1.2m to 1.8m FOR ACOUSTIC PROTECTION.
2, CHANGE PALISADE FENCE TO SOLID SCREEN BETWEEN S.O.U AND C.O.S FOR ACOUSTIC PROTECTION.

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B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

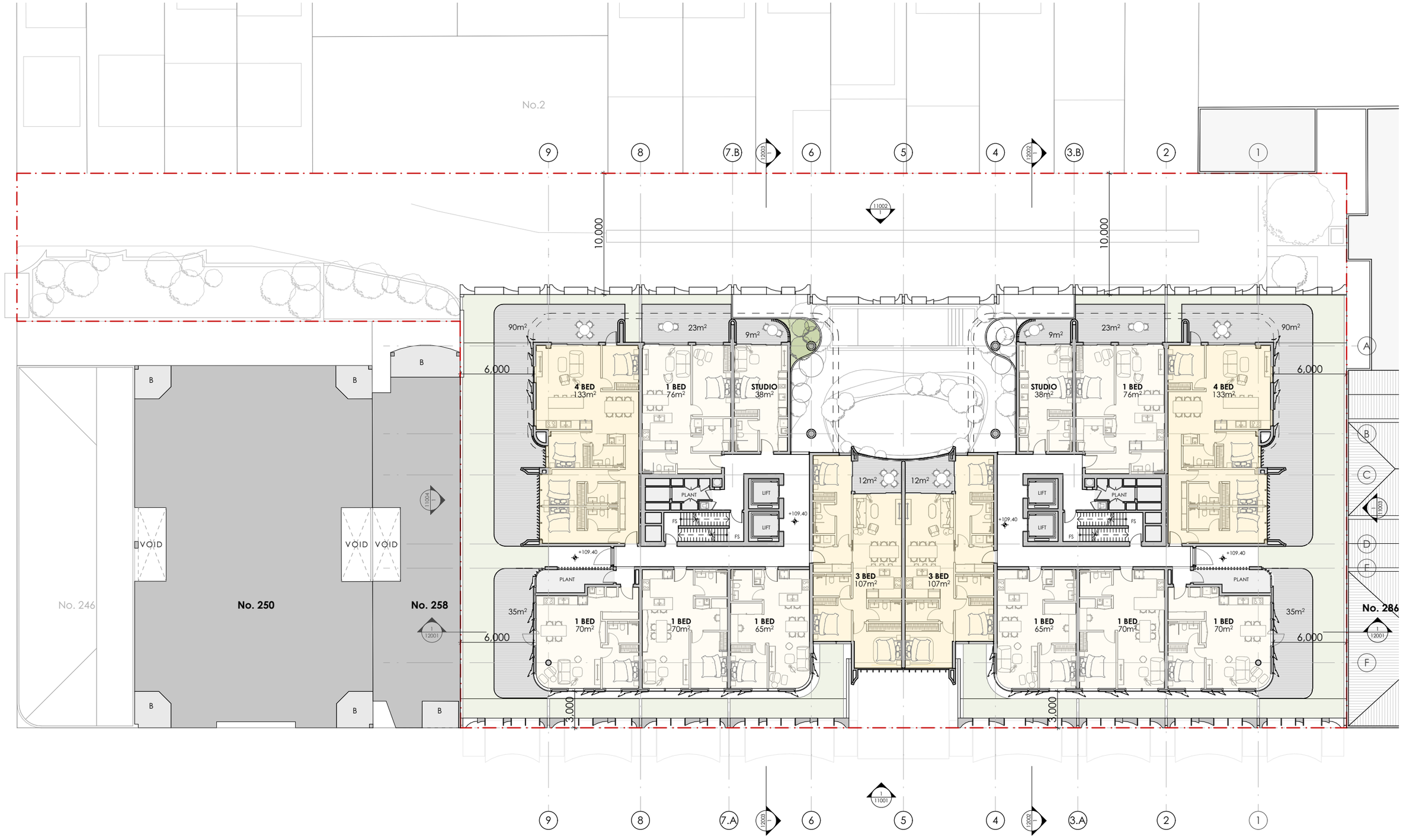
PROJECT NORTH

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DRAWING
GENERAL ARRANGEMENT PLANS
LEVEL 02 - RESIDENTIAL AMENITIES

PROJECT NUMBER **22501**
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ISSUE **B**



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REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
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PHASE: Development Application

PROJECT NORTH

CLIENT
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DRAWING
GENERAL ARRANGEMENT PLANS
LEVEL 3 TERRACE

PROJECT NUMBER **22501**
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REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
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PROJECT NORTH

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DRAWING
GENERAL ARRANGEMENT PLANS
LEVEL 4

PROJECT NUMBER **22501**
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PROJECT
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DRAWING
GENERAL ARRANGEMENT PLANS
L5,L7,L9,L11 TYP. RESI FLOOR - WITHOUT TERRACE

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-10008**	**A**



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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

PROJECT NORTH

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney
NSW 2000 Australia

SCALE	DRAWN BY	APPROVED BY
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30mm ON ORIGINAL	PRINT DATE	19/06/2025

DRAWING
GENERAL ARRANGEMENT PLANS
L6,L8,L10 TYP. RESI FLOOR - WITH TERRACE

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-10009**	**A**



AMENDMENTS:
1, EXTEND GLASS BALUSTRADE FROM 1.2m to 1.8m FOR WIND PROTECTION.
2, ADD 600mm GLASS BALUSTRADE EXTENSION ABOVE 1.2m SOLID PLANTING WALL FOR WIND PROTECTION.

NOTES:
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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

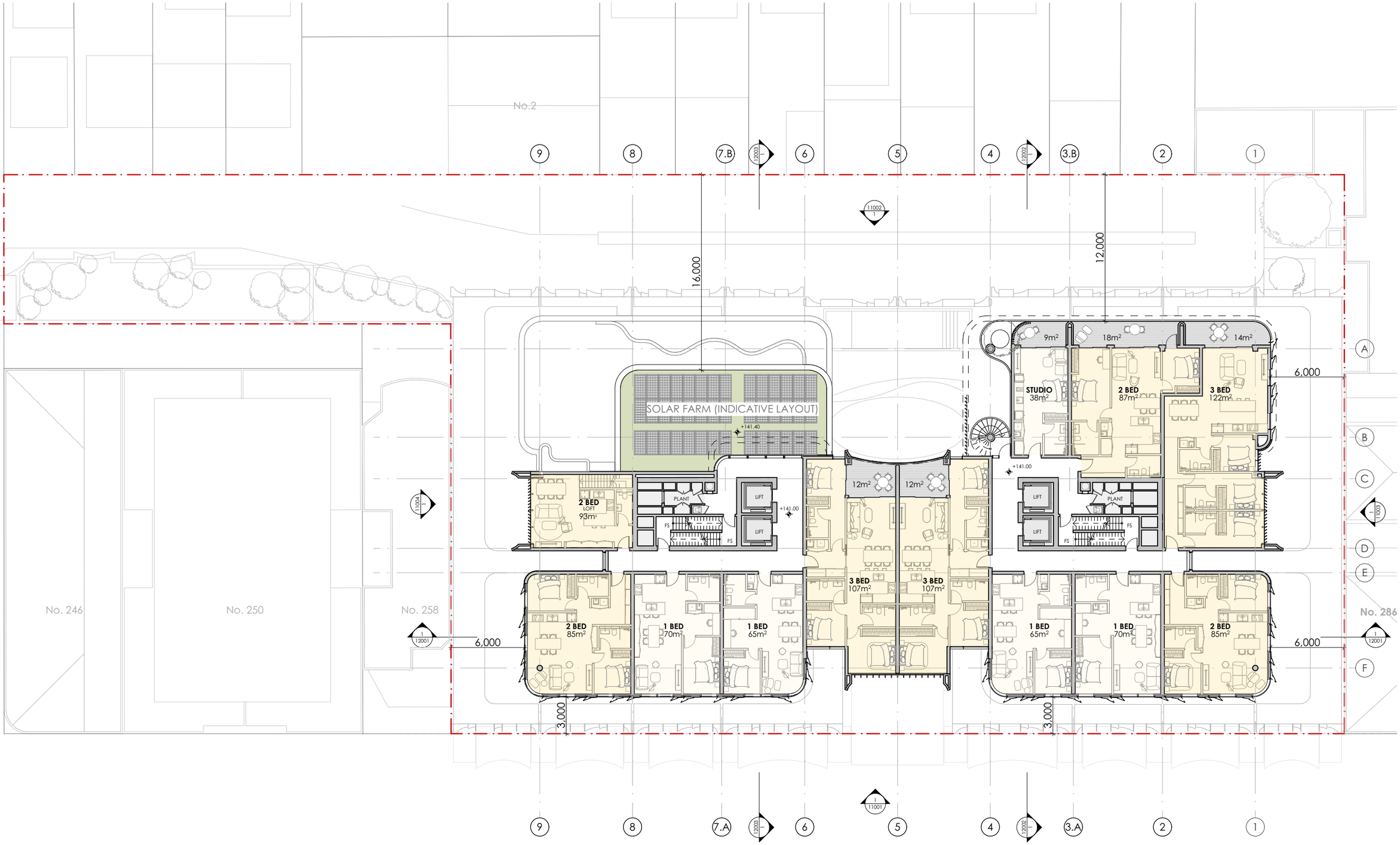
PROJECT NORTH

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DRAWING
GENERAL ARRANGEMENT PLANS
L12 TOWER 1 ROOF TERRACE

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-10010**
ISSUE **B**



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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

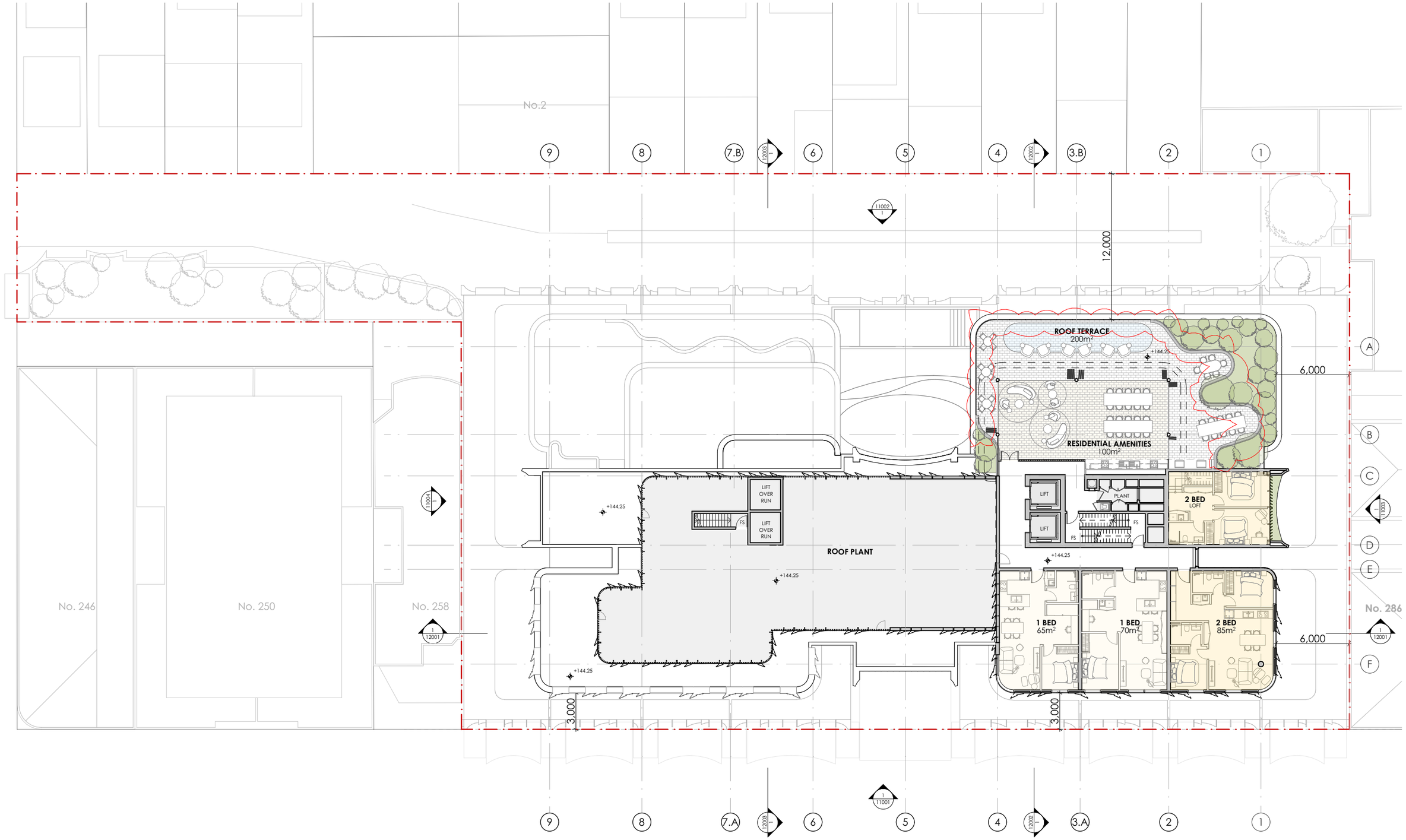
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DRAWING
GENERAL ARRANGEMENT PLANS
L13

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-10011**	**A**



AMENDMENTS:
1, EXTEND GLASS BALUSTRADE FROM 1.2m to 1.8m FOR WIND PROTECTION.
2, ADD 600mm GLASS BALUSTRADE EXTENSION ABOVE 1.2m SOLID PLANTING WALL FOR WIND PROTECTION.

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

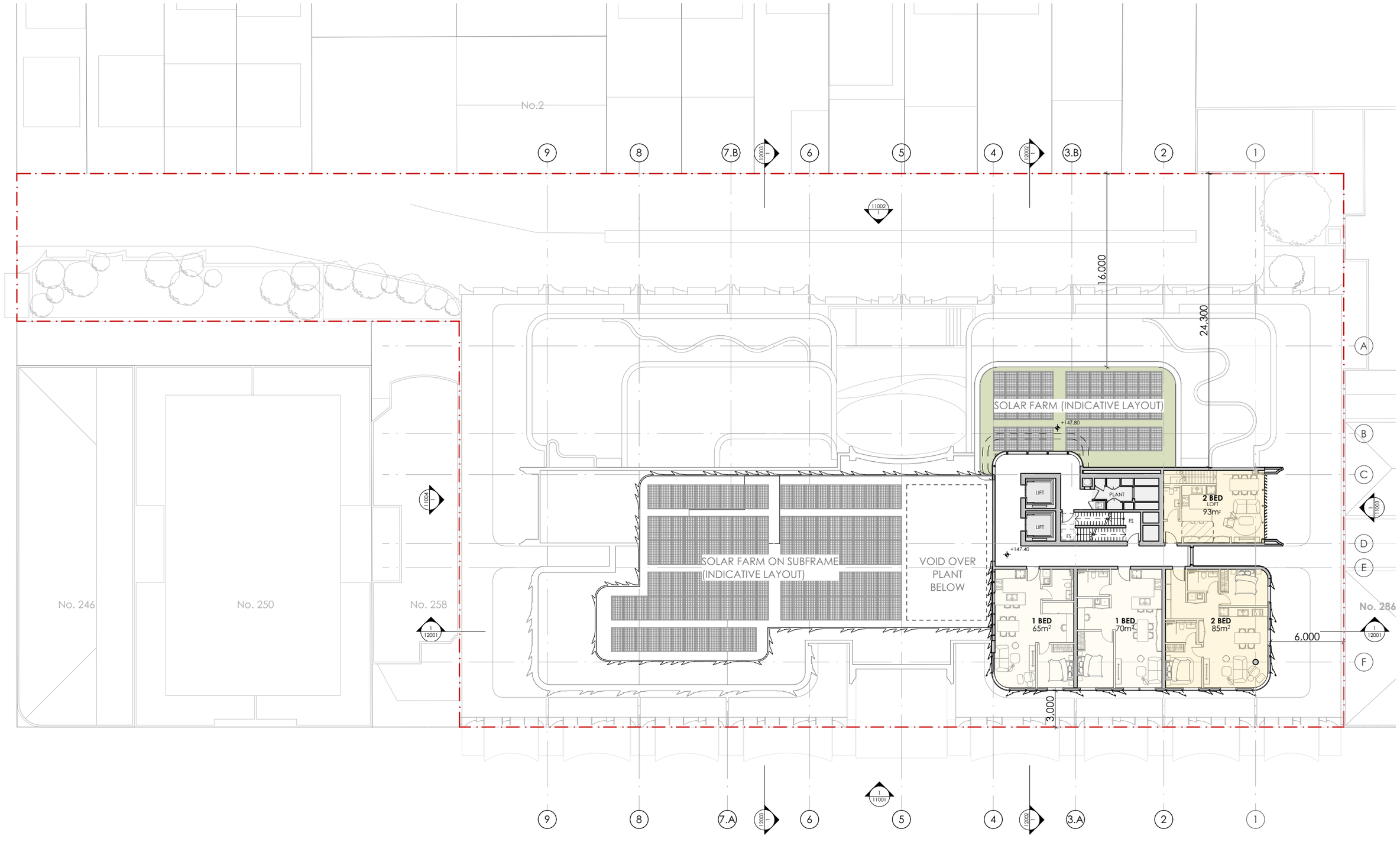
PROJECT NORTH

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DRAWING
GENERAL ARRANGEMENT PLANS
L14 TOWER 2 ROOF TERRACE/ROOF PLANT

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-10012**
ISSUE **B**



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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

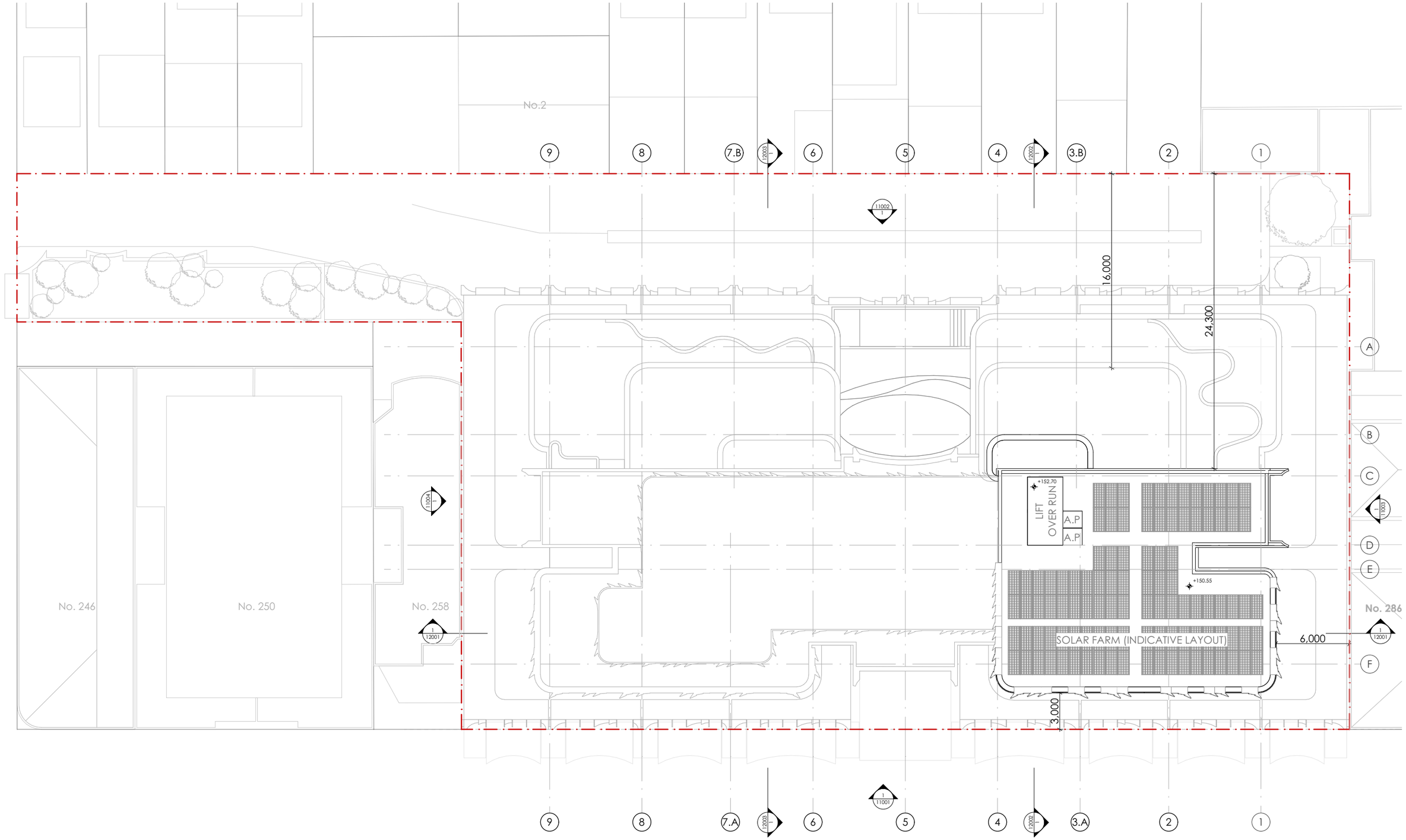
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DRAWING
GENERAL ARRANGEMENT PLANS
L15

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-10013**	**A**



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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

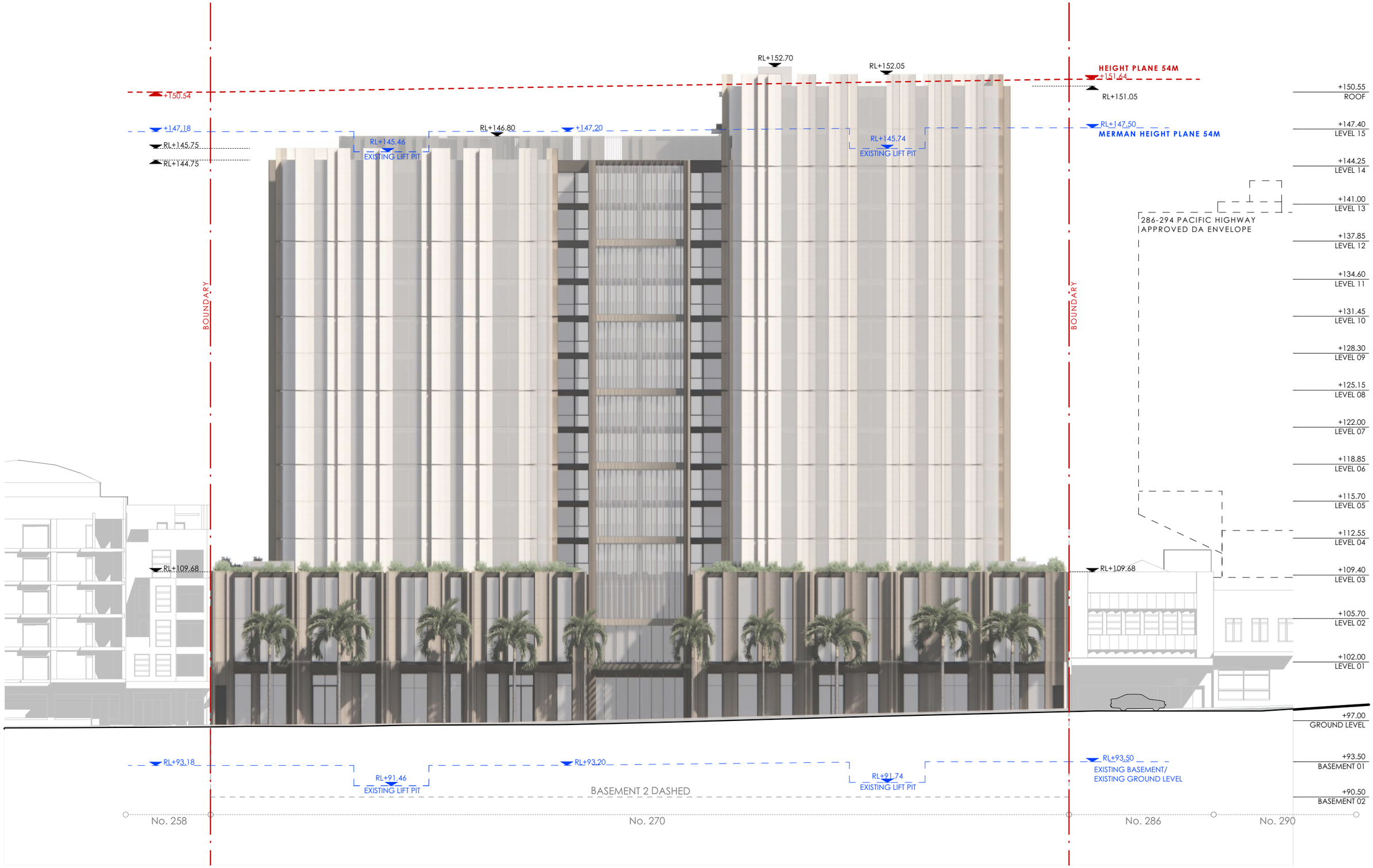
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DRAWING
GENERAL ARRANGEMENT PLANS
L16 TOWER 2 ROOF

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-10014**	**A**



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AMENDMENTS

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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

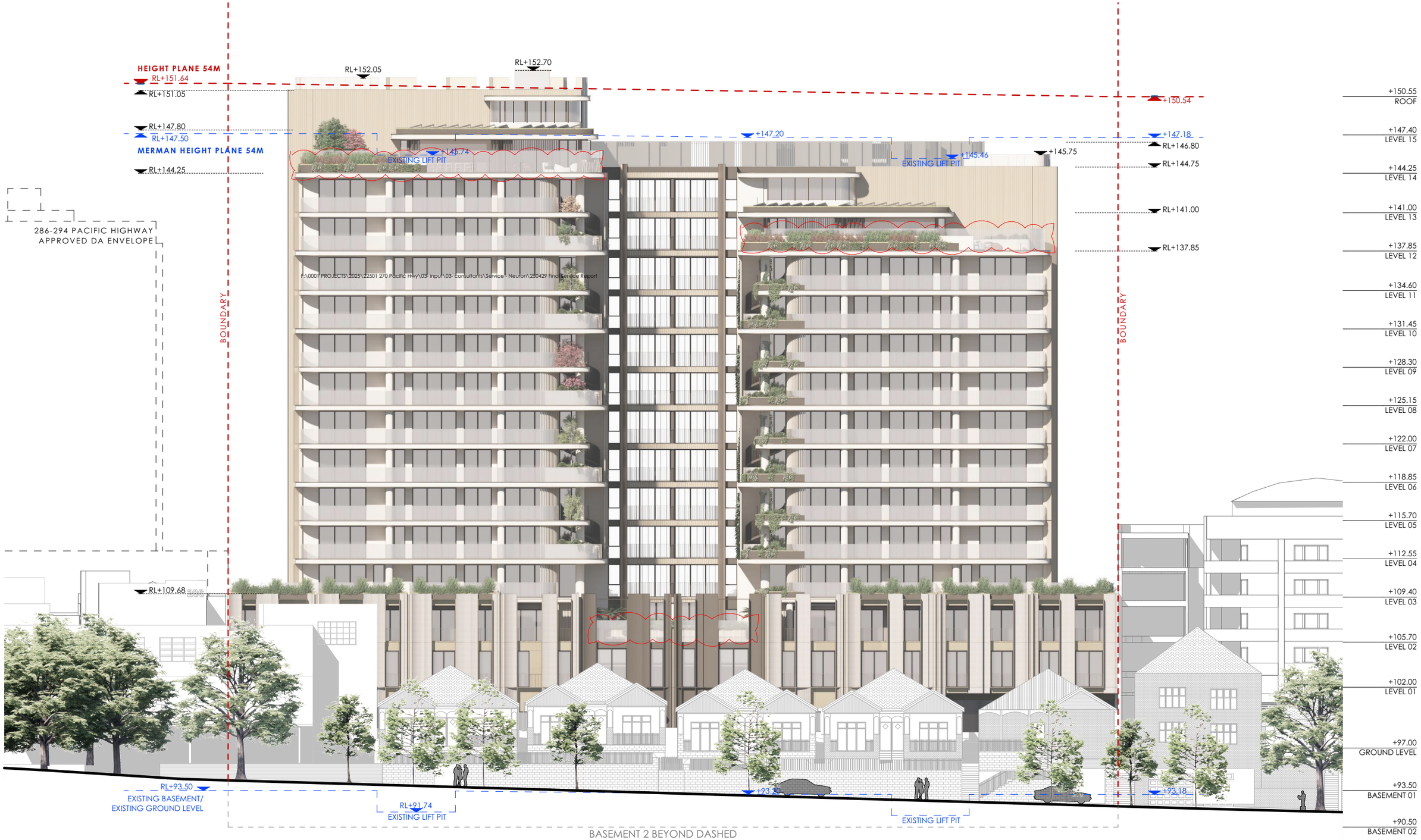
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DRAWING
ELEVATION
ELEVATION - EAST

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-11001**	**A**



AMENDMENTS:
1. EXTEND GLASS BALUSTRADE FOR WIND/ACOUSTIC PROTECTION.

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

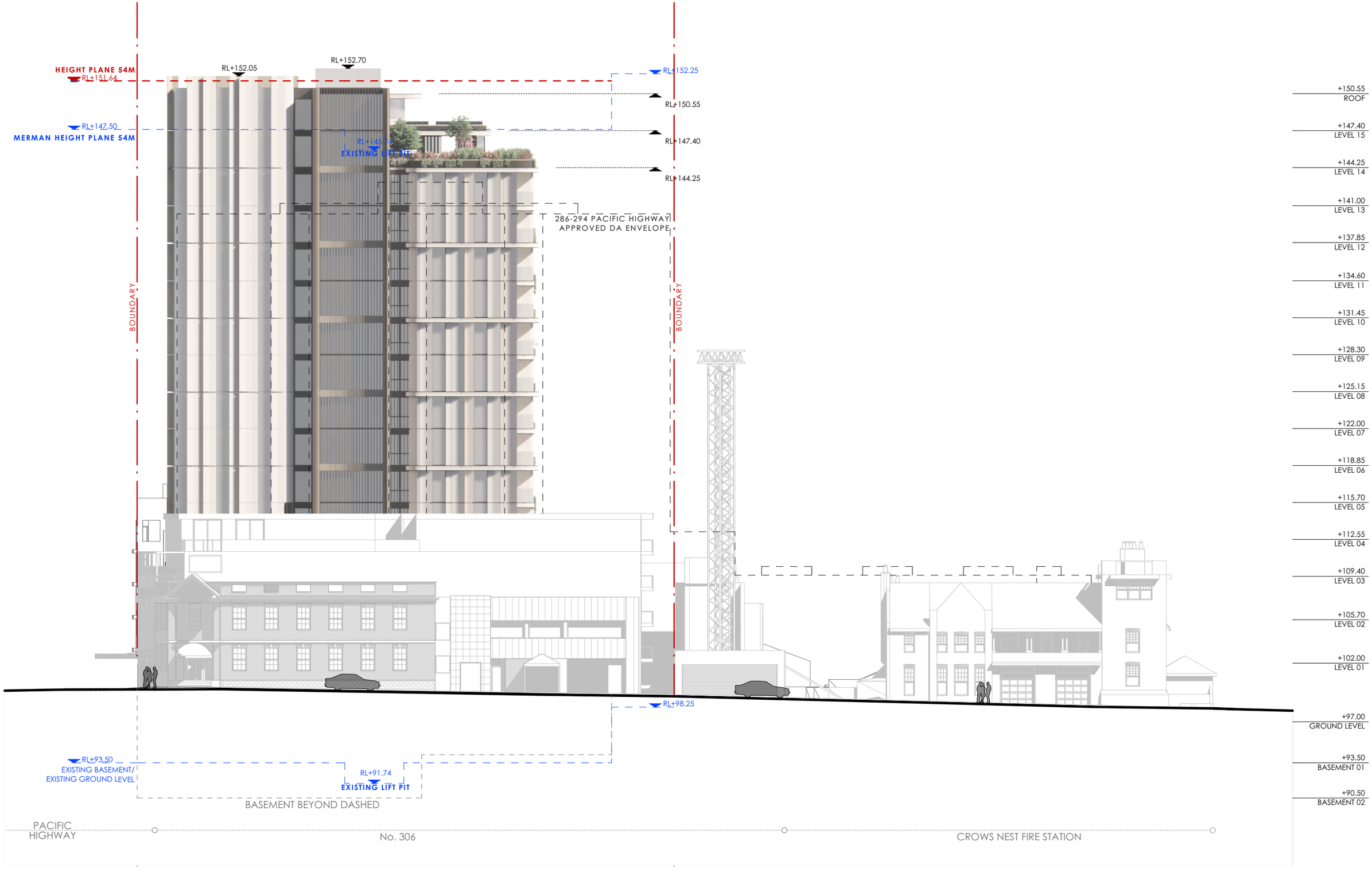
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DRAWING
ELEVATION
ELEVATION - WEST

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-11002**	**B**



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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

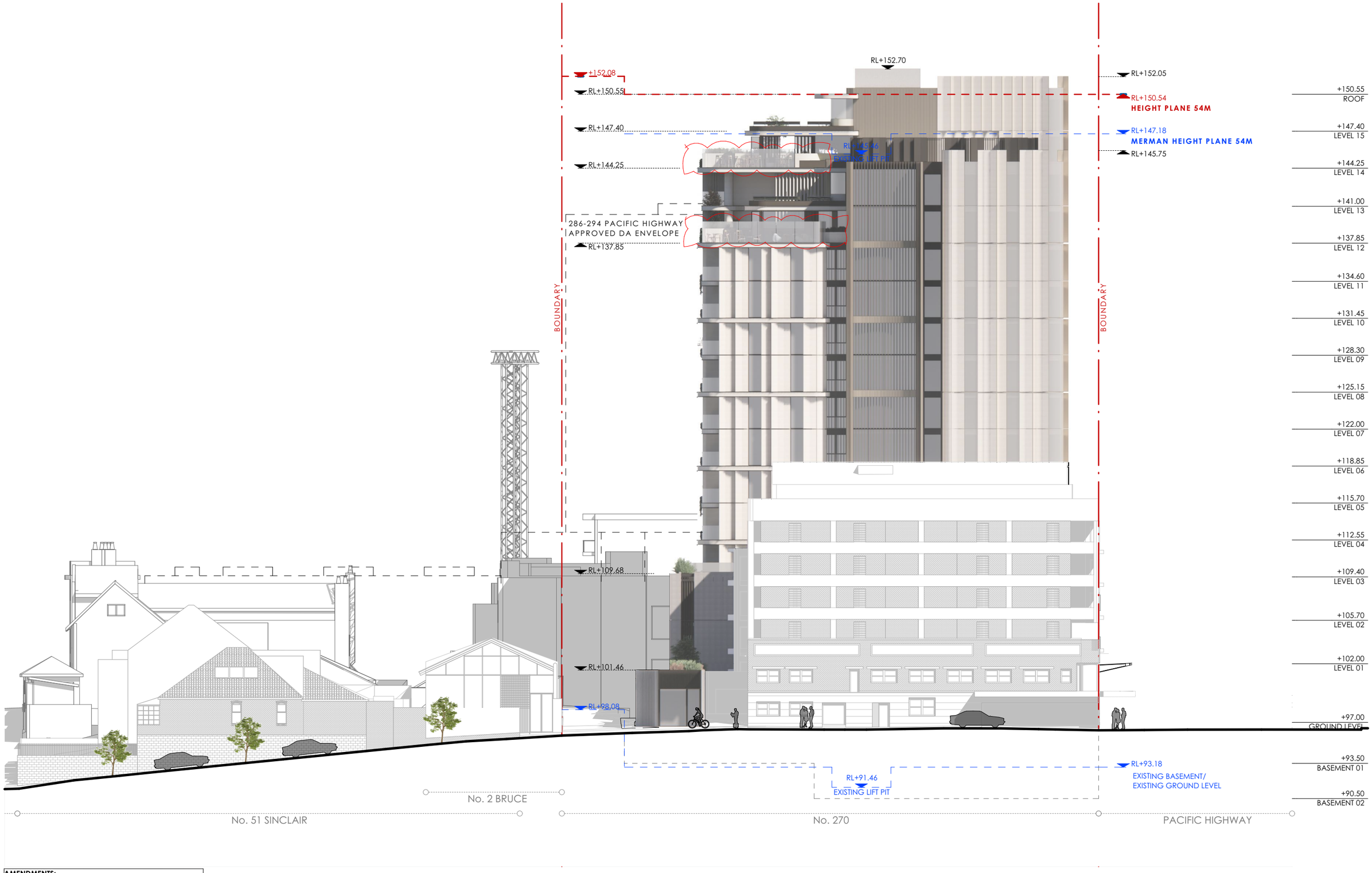
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DRAWING
ELEVATION
ELEVATION - NORTH

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-11003**	**A**



AMENDMENTS:
1, EXTEND GLASS BALUSTRADE FOR WIND/ACOUSTIC PROTECTION.

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AMENDMENTS

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A	20/05/2025	DA	

PROJECT
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270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

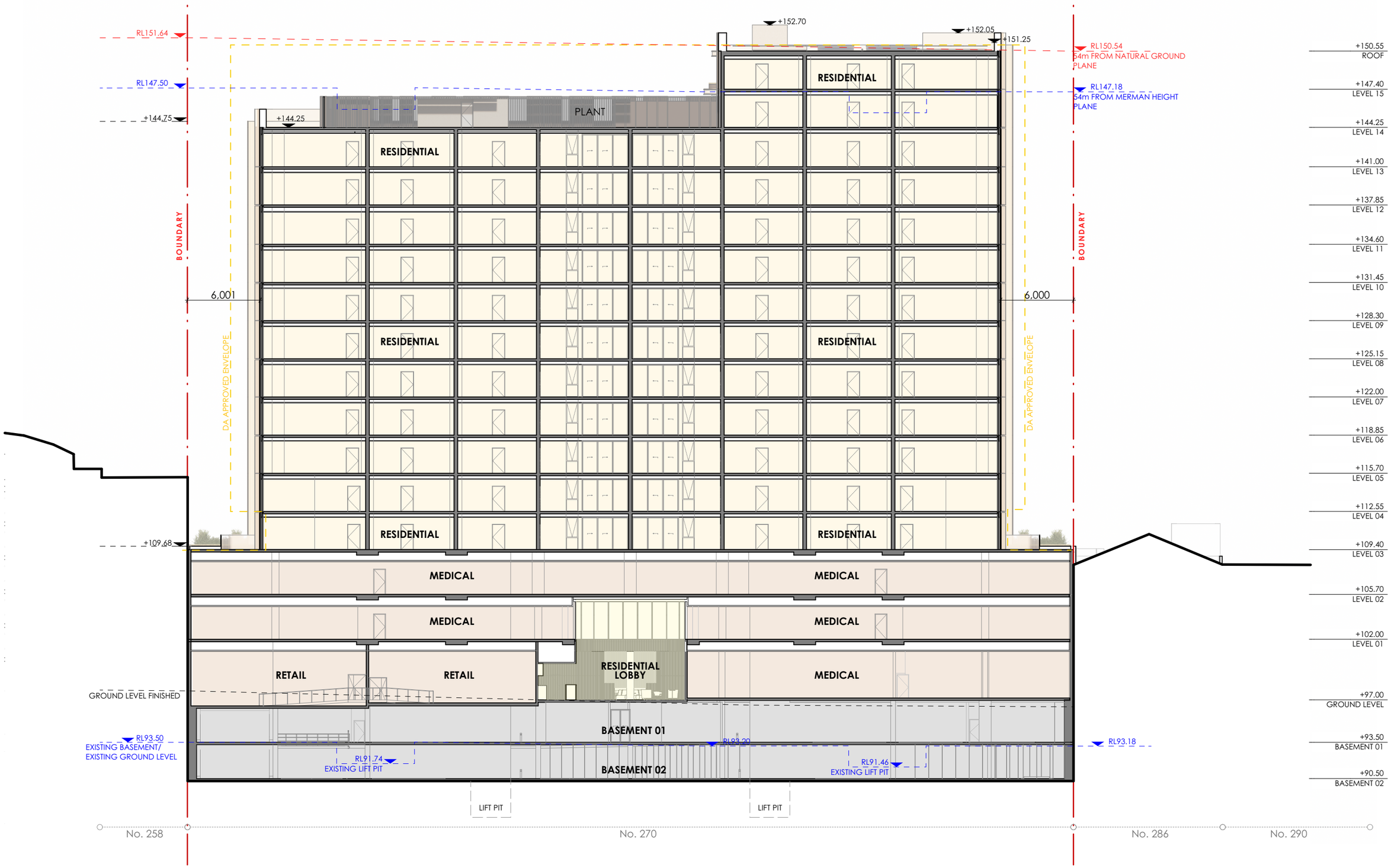
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DRAWING
ELEVATION
ELEVATION - SOUTH

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22501	**DA-11004**	**B**



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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

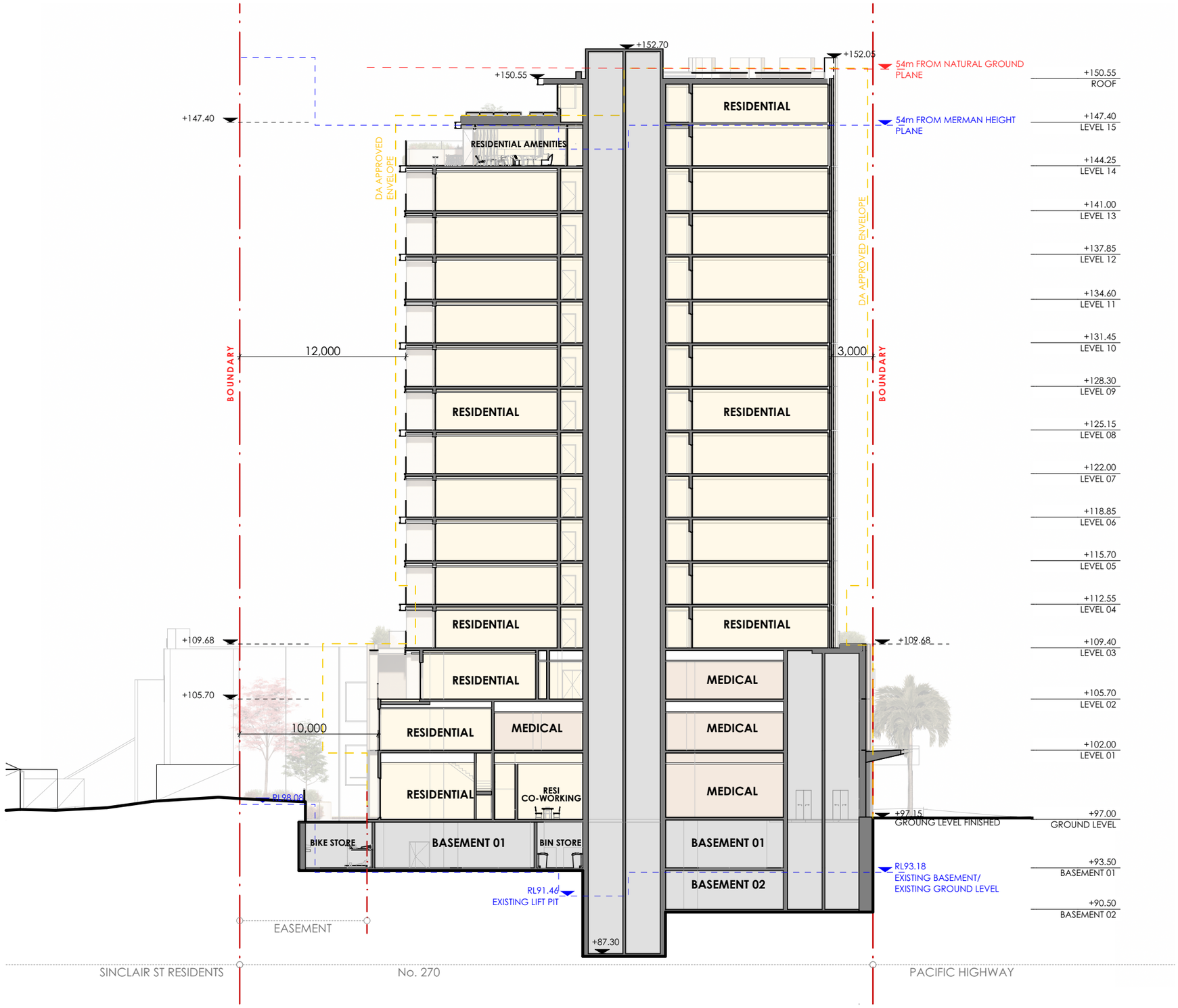
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DRAWING
GENERAL ARRANGEMENT SECTIONS
SECTION - NS

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-12001**
ISSUE **A**



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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

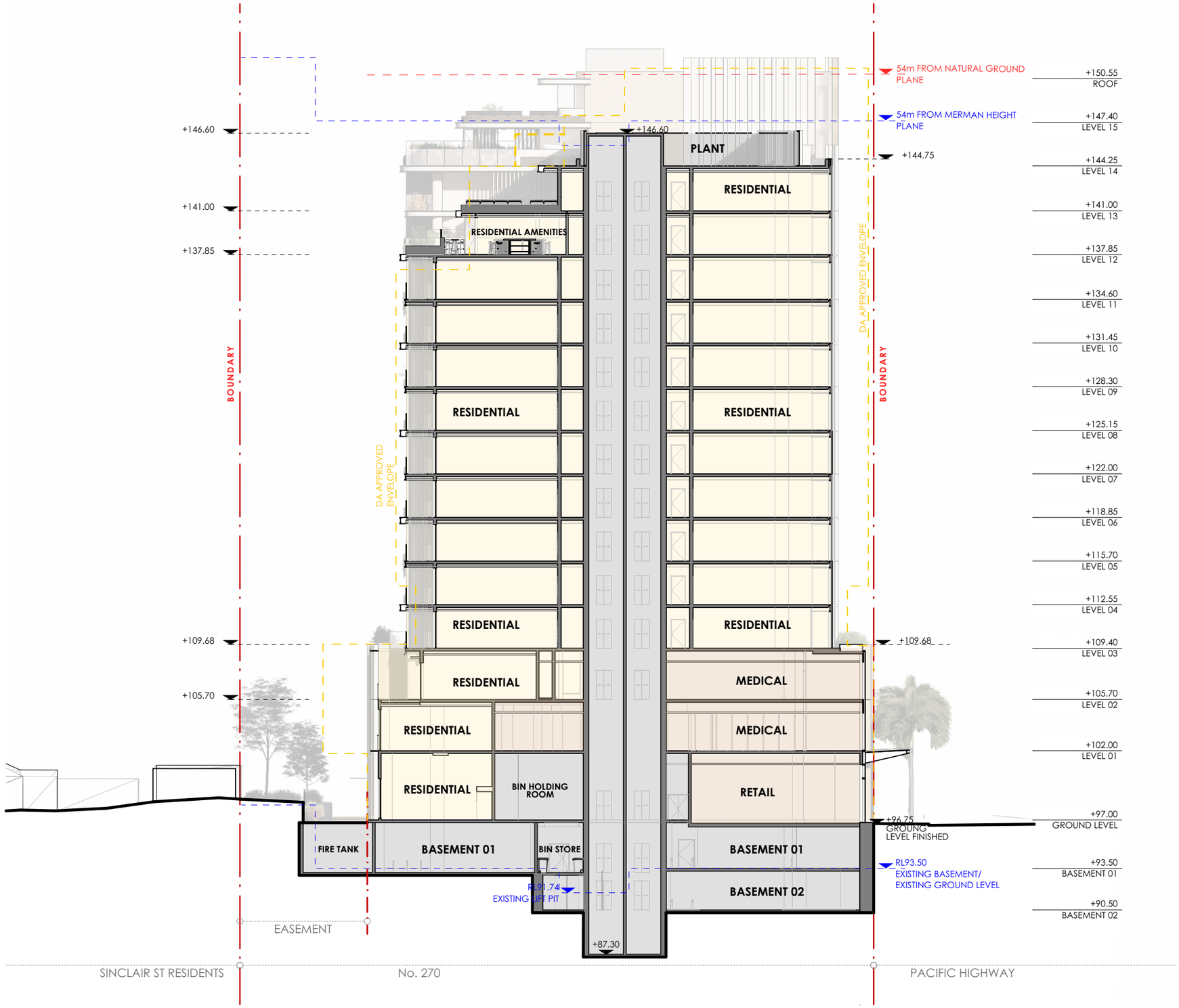
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DRAWING
GENERAL ARRANGEMENT SECTIONS
SECTION - EW - NORTH TOWER

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-12002**
ISSUE **A**



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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
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AUSTRALIA

PHASE: Development Application

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30mm ON ORIGINAL	PRINT DATE	19/06/2025

DRAWING
GENERAL ARRANGEMENT SECTIONS
SECTION - EW - SOUTH TOWER

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-12003**	**A**





01. TOWER FACADE
GRC CLADDING IN VAILLA FERROR LIGHT



02. TOWER FACADE
ALUMINIUM GLAZING FRAME AND FACADE REVEAL FINISH IN LIGHT BRONZE



03. PODIUM CLADDING
GROUND FLOOR FACADE CLADDING WITH GLAZED FLUTED TERRACOTTA PANELS IN DARK SANDSTONE FINISH



04. PODIUM CLADDING
UPPER PODIUM CLADDING WITH GLAZED CERAMIC TILE IN DARK SANDSTONE FINISH



05. PODIUM REVEALS
ALUMINIUM WINDOW GLAZING FRAME AND REVEALS IN DARK BRONZE FINISH



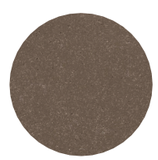
06. AWNING & RECESSED FACADE
ALUMINIUM PANELS IN DARK CHAMPAGNE FINISH



07. FACADE GLAZING
CLEAR LOW E IGU WITH SHADOW BOX SPANDREL



08. PLANTING
PLANTER BOX ON STRUCTURE, WITH CASCADING PLANT, PLANTER TO MATCH DARK BRONZE FINISH



09. ROOF PLANT
GRC CLADDING IN DARK BRONZE CLADDING

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE 1:300 @A3
DRAWN BY
APPROVED BY
30mm ON ORIGINAL
PRINT DATE 19/06/2025

DRAWING
MATERIALITY
MATERIALITY - EAST

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-14001**
ISSUE **A**





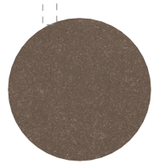
01. METAL CLADDING
ALUMINIUM METAL CLADDING AND STEEL AWNING IN LIGHT BRONZE FINISH



02. PODIUM CLADDING
GRC CLADDING IN SOFT SANDSTONE FINISH



03. PODIUM CLADDING
GRC CLADDING WITH GROOVES IN SOFT SANDSTONE FINISH



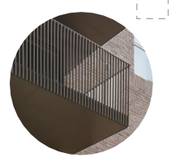
04. PODIUM CLADDING
GRC CLADDING IN DARK BRONZE CLADDING



05. WINDOW SYSTEM
ALUMINIUM WINDOW FRAME AND PORTAL FRAME REVEAL IN THE RECESSED AREA, FINISH IN DARK BRONZE



06. TOWER BALCONY
CLEAR GLASS BALUSTRADE, SLAB EDGE TOP AND BOTTOM PROFILE TO MATCH LIGHT BRONZE METAL CLADDING



07. RECESSED BALCONY
STEEL PALISADE BALUSTRADE TO MATCH DARK BRONZE FINISH



08. RECESSED FACADE
ALUMINIUM CLADDING IN DARK CHAMPAGNE FINISH



09. PLANTING
PLANTER BOX ON STRUCTURE, WITH CASCADING PLANT, PLANTER TO MATCH DARK BRONZE FINISH



10. SUBSTATION
ALUMINIUM LOUVRED FACADE, TO MATCH DARK BRONZE FINISH

AMENDMENTS:
1, EXTEND GLASS BALUSTRADE FOR WIND/ACOUSTIC PROTECTION.

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

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DRAWING
MATERIALITY
MATERIALITY- WEST

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-14002**
ISSUE **B**



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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE	DRAWN BY	APPROVED BY
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30mm ON ORIGINAL		PRINT DATE 19/06/2025

DRAWING
FACADE SETOUT
BAY STREET SCAPE FACADE (1 of 2)

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-25001**	**A**



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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

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DRAWING
FACADE SETOUT
BAY STREET SCAPE FACADE (2 of 2)

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-25002**
ISSUE **A**



AMENDMENTS:
1, EXTEND GLASS BALUSTRADE FOR ACOUSTIC PROTECTION.

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE	DRAWN BY	APPROVED BY
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DRAWING
FACADE SETOUT
MEW STREET SCAPE FACADE (1 of 2)

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-25003**	**B**



AMENDMENTS:
1, EXTEND GLASS BALUSTRADE FOR ACOUSTIC PROTECTION.

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
B	19/06/2025	DA AMENDMENTS	
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

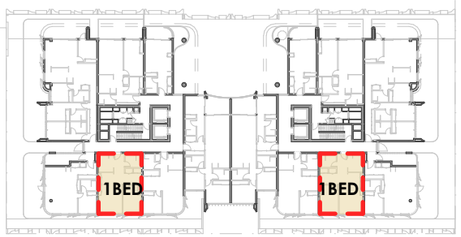
PHASE: Development Application

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SILVERNIGHT
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30mm ON ORIGINAL	PRINT DATE	19/06/2025

DRAWING
FACADE SETOUT
MEW STREET SCAPE FACADE (2 of 2)

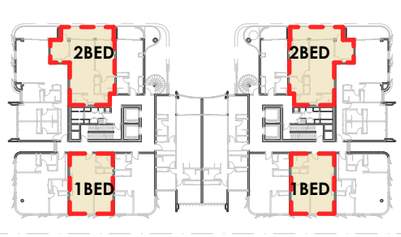
PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-25004**	**B**



LEVEL 03



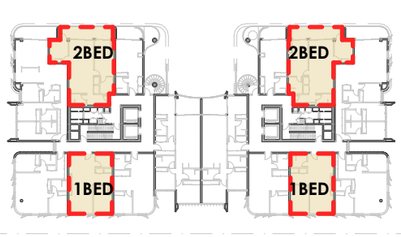
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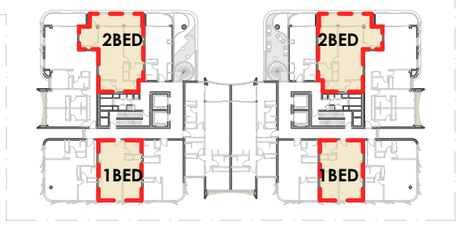
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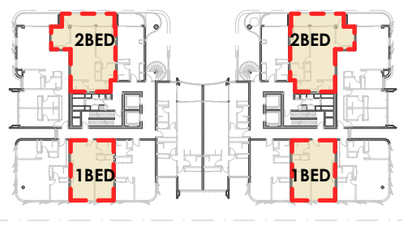
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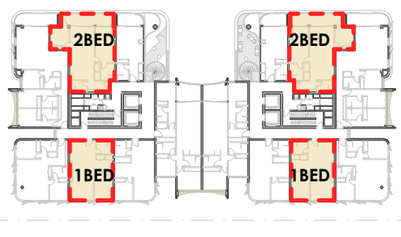
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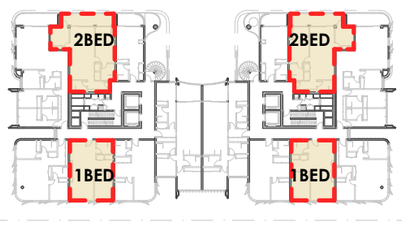
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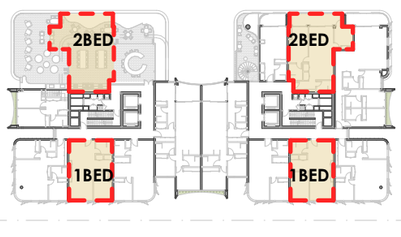
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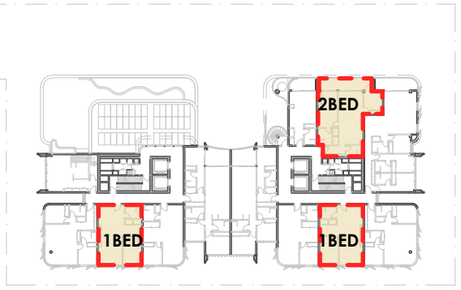
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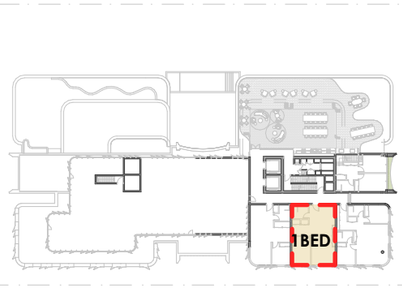
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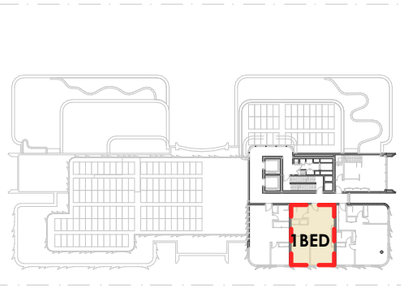
LEVEL 12



LEVEL 13



LEVEL 14



LEVEL 15

SUMMARY:	
ADAPTABLE 2 BEDS:	18 UNITS (11%)
ADAPTABLE 1 BEDS:	24 UNITS (14%)
TOTAL ADAPTABLE APARTMENTS:	42 UNITS (25%)

ADAPTABLE UNITS

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

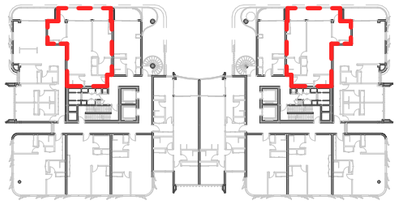
PROJECT NORTH

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE @A3
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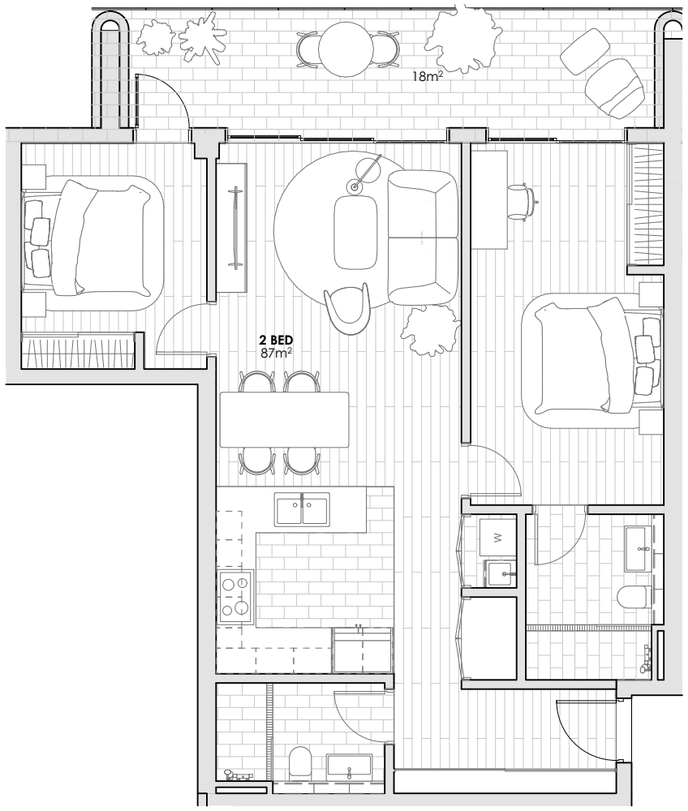
DRAWING
TYPICAL APARTMENT LAYOUT PLANS
TYPICAL APARTMENT LAYOUT PLANS

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-30001**
ISSUE **A**

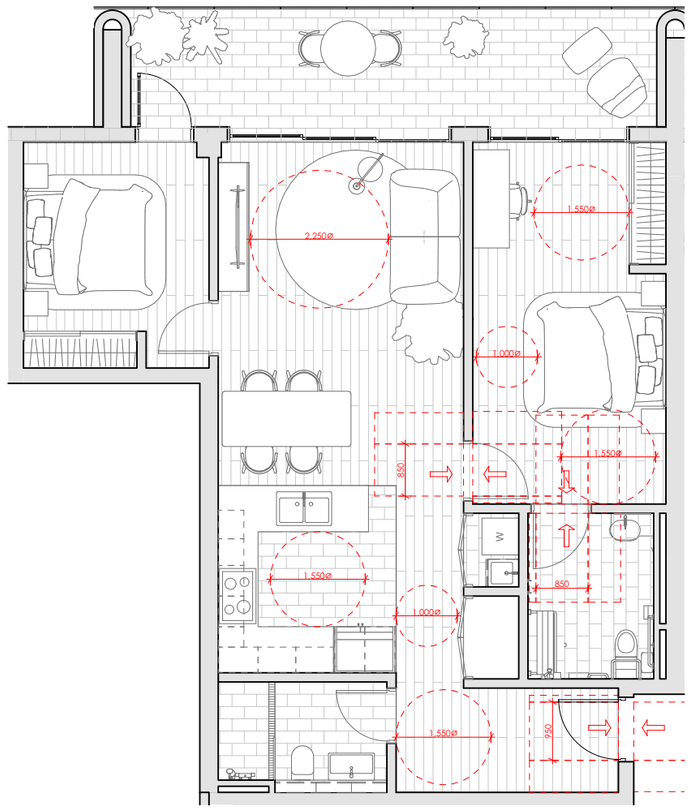


KEYPLAN

ADAPTABLE UNITS



1 TYPICAL APARTMENT TYPE - 2 BED - PRE ADAPTABLE
1:100



2 TYPICAL APARTMENT TYPE - 2 BED - POST ADAPTABLE
1:100

NOTES:
ALL INTERNAL LAYOUTS ARE INDICATEIVE ONLY
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REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

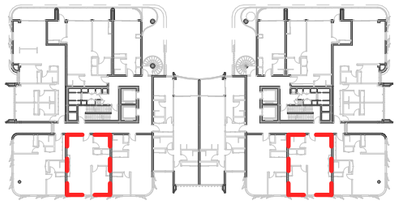
PROJECT NORTH

CLIENT
SILVERNIGHT
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NSW 2000 Australia

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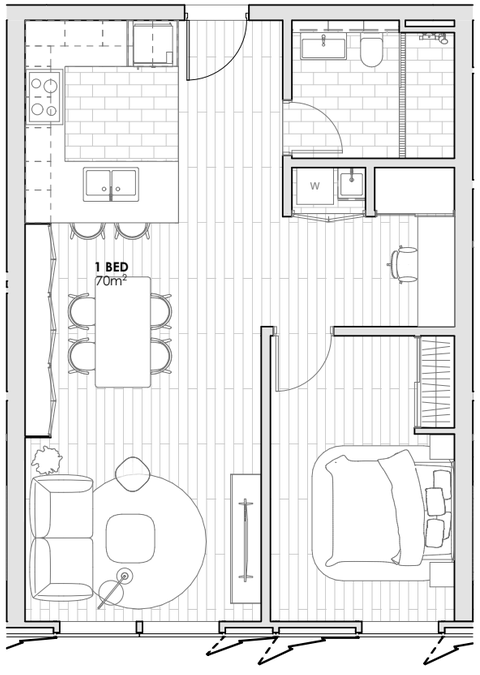
DRAWING
TYPICAL APARTMENT LAYOUT PLANS
ADAPTABLE APARTMENT LAYOUT

PROJECT NUMBER **22501**
DRAWING NUMBER **DA-30002**
ISSUE **A**

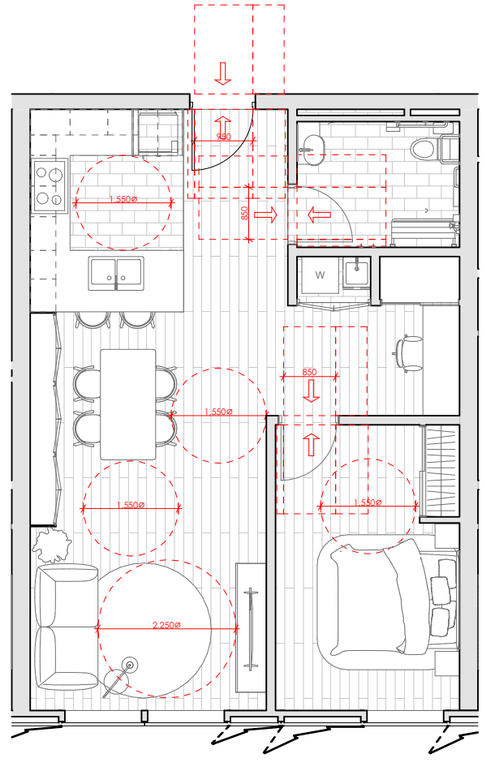


KEYPLAN

ADAPTABLE UNITS



1 TYPICAL APARTMENT TYPE - 2 BED - PRE ADAPTABLE
1:100



2 TYPICAL APARTMENT TYPE - 2 BED - POST ADAPTABLE
1:100

NOTES:
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A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

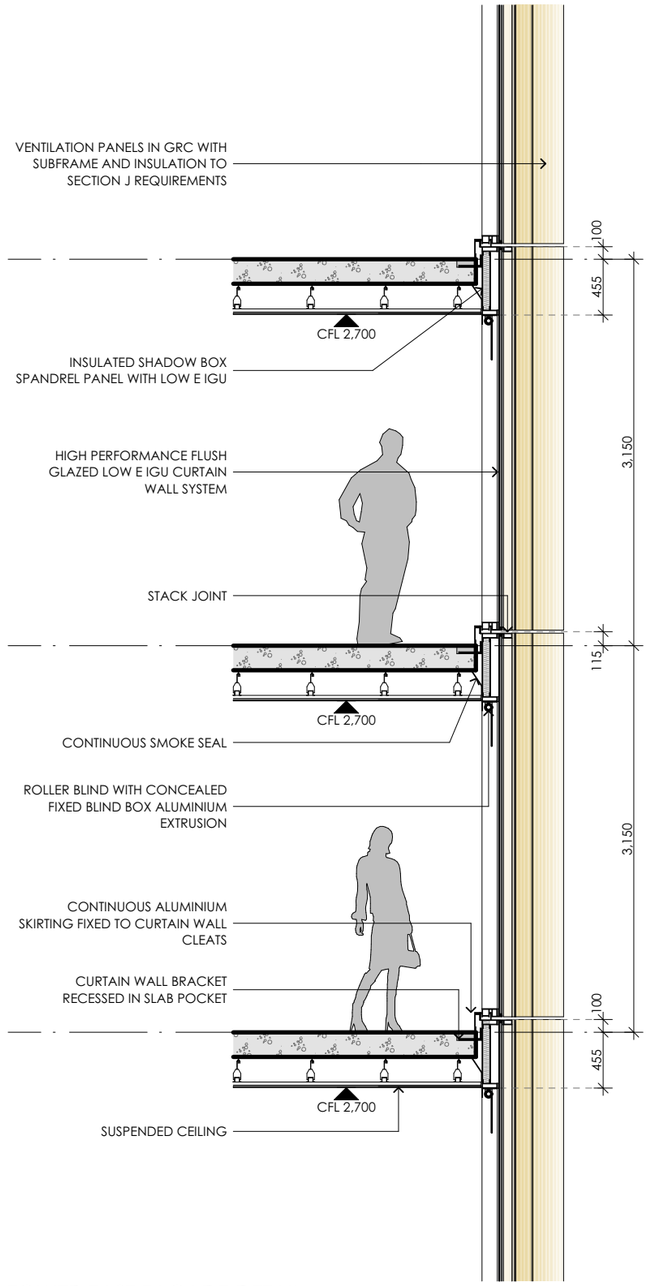
PROJECT NORTH

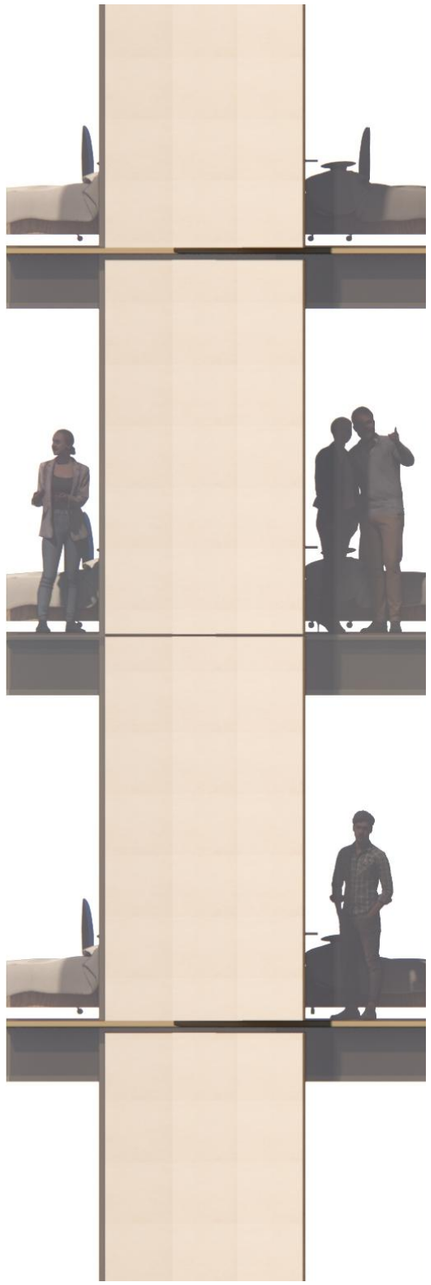
CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney
NSW 2000 Australia

SCALE	DRAWN BY	APPROVED BY
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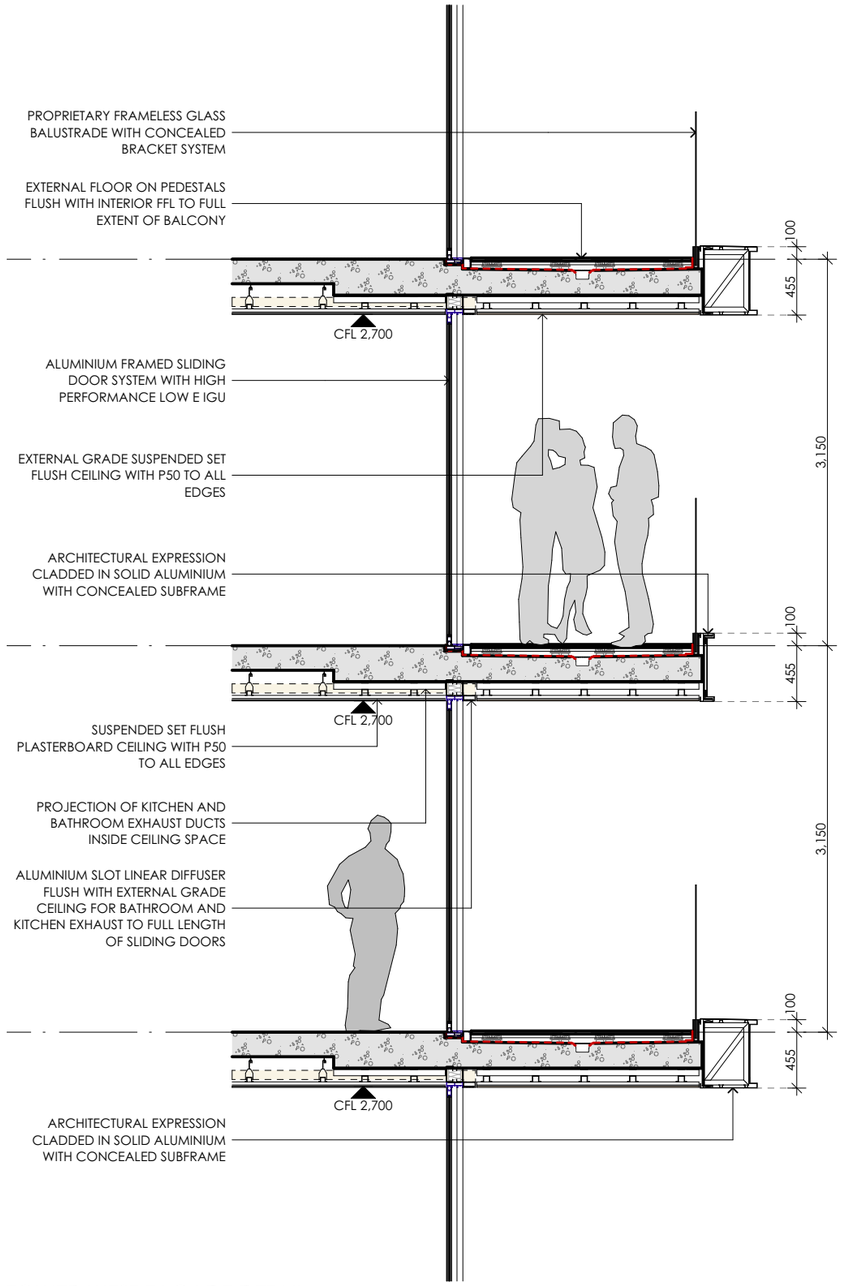
DRAWING
TYPICAL APARTMENT LAYOUT PLANS
ADAPTABLE APARTMENT LAYOUT

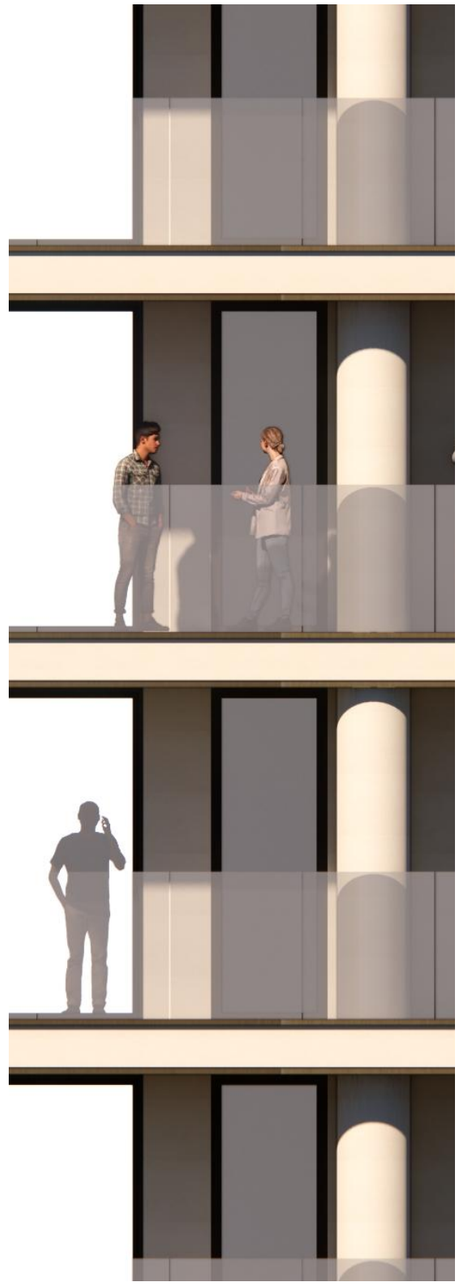
PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-30003**	**A**





TOWER EAST FACADE DETAIL
1:50





TOWER WEST FACADE DETAIL
1:50

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

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DRAWING
FACADE DETAIL
FACADE DETAILS

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-65001**	**A**

Area Schedule - BTR SCHEME

Project Title / Address	**270-272 Pacific Highway, Crows Nest**

Document	
Issue	P
Date	9/05/2025
Prepared by	QY
Checked by	PR

Site	
Site Area	3,796m²
Allowable FSR	5.60
Proposed FSR Excl. Basement GFA	**5.60:1**
Residential FSR	*4.6:1*
Non-Residential FSR	*1:1*
Allowable GFA	21,258m²
Proposed Total GFA	**21,258m²**
Proposed Height	16 Storeys
Total height above ground	53.55m

Affordable Housing	
Affordable Housing 3% Residential GFA	526m²

Apartments	
Total Apartment Numbers	168 Apts
Total Adaptable Apartments	42 Apts

Parking		
Cars Req Commercial (1/400sqm)	1 spaces	
Cars Req BTR (0.2/Dwelling)	34 spaces	*as per Section 74 (d)(i)*
Cars Req Medical(1/70sqm) by TTPP	45 spaces	
Courier Parking	2 spaces	

Bikes				
Residential				
Bike	(1/1 Dwelling)- Residential	168	*Level B Security*	
Visitor Bikes	(1/10 Residential Dwellings)	17	*Level C Security*	
Non - Residential Bikes				
Bike	(1/150sqm)- Commercial	1	*Level B Security*	
	(1/5 Practitioners) - Medical	16	*Practitioner assumption*	*80*
	(1/250sqm)- Retail Service	2		
Visitor Bikes	(1/400sqm) - Commercial	1	*Level C Security*	
	(1/200sqm) - Medical	16		
	(2+1/100sqm over 100sqm) - Retail	5		
Non-Residential EOT Shower (1/10 Bikes)		4		
Motorcycle Parking (1/10 Carspace)		8		

Level	Lift over run/Solar Farm
Level 15	Residential
Level 14	Residential/Plant/Communal Terrace
Level 13	Residential
Level 12	Residential/Communal Terrace
Level 11	Residential
Level 10	Residential
Level 9	Residential
Level 8	Residential
Level 7	Residential
Level 6	Residential
Level 5	Residential
Level 4	Residential
Level 3	Residential / Plant/Communal Terrace
Level 2	Non-Residential
Level 1	Non-Residential
Ground	Resi-Lobby/Loading/Non-Residential
Basement 1	Parking Bike/Store/EOT
Basement 2	Parking/Store
Cars	82 spaces
Motorcycles	8 spaces
Bikes	226 spaces

			Non-Residential		Residential			
RL (m)	Floor-to-Floor (m)	GBA (sqm)	GFA* (sqm)	NSA/NLA (sqm)	GFA* (sqm)	NSA/NLA (sqm)	GFA/GBA (%)	NLA/GFA (%)
150.55	2.00							
147.40	3.15	430			333	264	77%	79%
144.25	3.15	545			435	269	80%	62%
141.00	3.25	1,362			1,103	945	81%	86%
137.85	3.15	1,510			1,205	950	80%	79%
134.60	3.25	1,613			1,313	1,148	81%	87%
131.45	3.15	1,672			1,313	1,148	79%	87%
128.30	3.15	1,613			1,313	1,148	81%	87%
125.15	3.15	1,672			1,313	1,148	79%	87%
122.00	3.15	1,613			1,313	1,148	81%	87%
118.85	3.15	1,672			1,313	1,148	79%	87%
115.70	3.15	1,613			1,313	1,148	81%	87%
112.55	3.15	1,672			1,289	1,118	77%	87%
109.40	3.15	1,608			1,289	1,118	80%	87%
105.70	3.70	2,375	969	953	925	430	80%	73%
102.00	3.70	2,416	1,601	1,581	520	506	88%	98%
97.00	5.00	2,623	1,023	968	944	363	75%	68%
94.00	3.00	3,087	128	-	303	-		
91.00	3.00	1,803						
	53.6m	30,899m²	**3,721m²**	**3,502m²**	**17,537m²**	**13,999m²**	69%	82%

Total GFA	**21,258m²**
Total NLA	**17,501m²**

Resi-Communal	
(GFA) Internal Amenities (sqm)	Outdoor Terrace (sqm)
100	200
100	235
	76
	76
	76
	76
427	225
425	
-	-
1,052m²	**964m²**

% Site Area	**53.11%**
Area/Dwelling	**12m²**

Apartment Typology

TYPOLOGY					#APARTMENTS	ADAPTABLE APTS
STUDIO	1 BED	2 BED	3 BED	4 BED		
	2	2	-		4	1
	2	1	-		3	1
1	4	4	3		12	3
1	4	3	3		11	3
2	4	4	4		14	4
2	4	4	4		14	4
2	4	4	4		14	4
2	4	4	4		14	4
2	4	4	4		14	4
2	4	4	4		14	4
2	4	4	4		14	4
2	6	2	4		14	4
2	8	-	2	2	14	2
		2	3		5	
		6	1		7	
APARTMENT NUMBER					TOTAL APTS	TOTAL ADAPTABLE
20	54	48	44	2	**168 Apts**	42 Apts
APARTMENT MIX						
12%	32%	29%	26%	1%	100%	25%

Car Space

	Retail (sqm)	Office (sqm)	Medical (sqm)	Residential (Apts)
				4
				3
				12
				11
				14
				14
				14
				14
				14
				14
				14
				14
				14
			969	5
			1,601	
	396	65	562	7
Total Area	396m²	65m²	3,132m²	
Total Apartment	-		-	168 Apts
Cars	1 cars		45 cars	34 cars

Notes

1) Area schedule is a draft and subject to review and update with design development

2) GBA for basement levels not included in the overall calculations

Definitions

Gross Floor Area

GFA is typically defined by the relevant Planning Authority for a project.

GFA is measured from the internal face of external walls or from the internal face of walls separating the building from any other building, measured at a height of 1.4 metres above the floor.

Net Lettable Area

NLA as defined by PCA Method of Measurement 2008

NLA means the sum of its whole floor lettable area, which is measured by the internal finished surfaces of permanent internal walls and the internal finished surfaces of dominant portions of the permanent outer building walls.

i.e
included dividing wall between sole-occupancy units for the apartment floors
stairs within the sole occupancy units are measured on both floors

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PROJECT
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270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

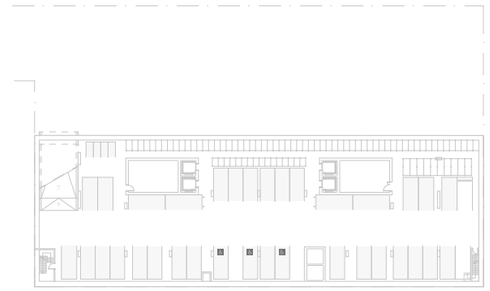
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Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

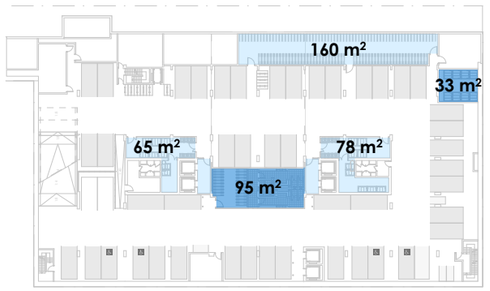
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DRAWING
AREA SCHEDULES
AREA SCHEDULE SUMMARY

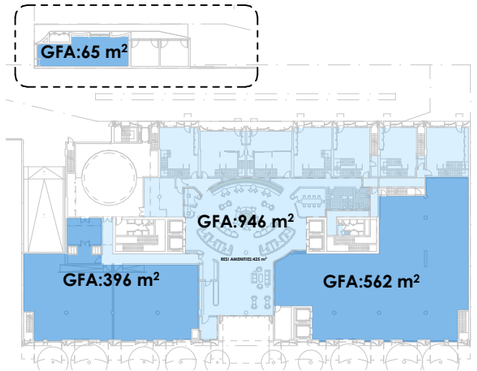
PROJECT NUMBER **22501**
DRAWING NUMBER **DA-92001**
ISSUE **A**



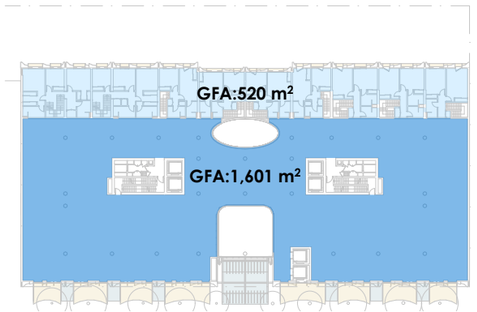
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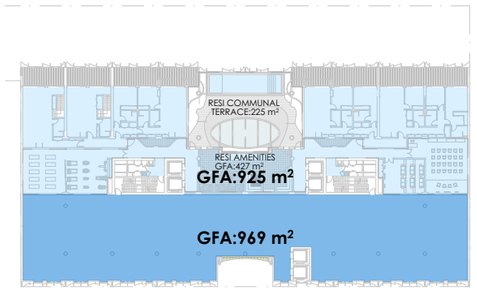
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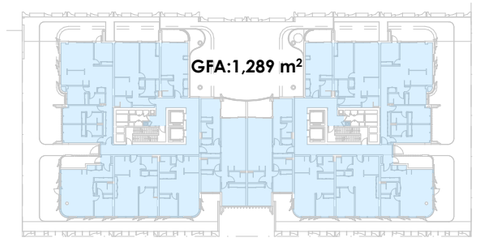
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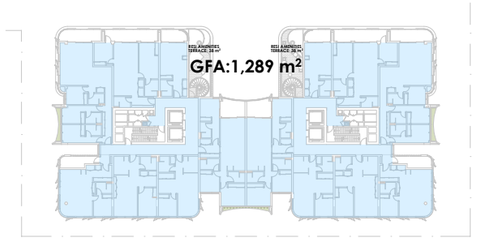
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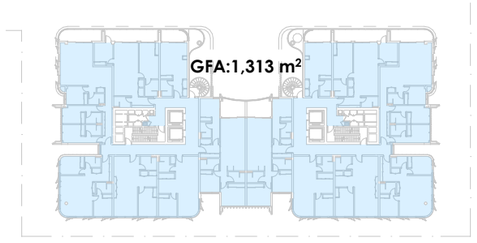
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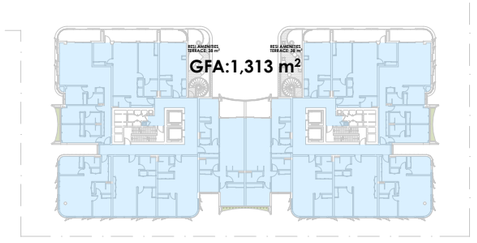
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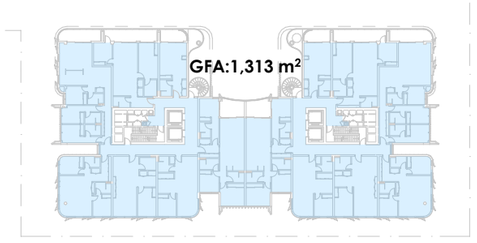
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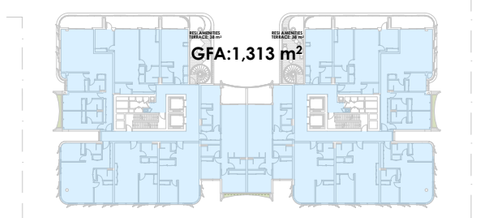
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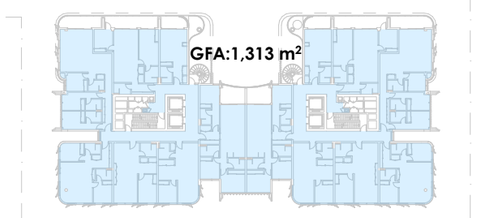
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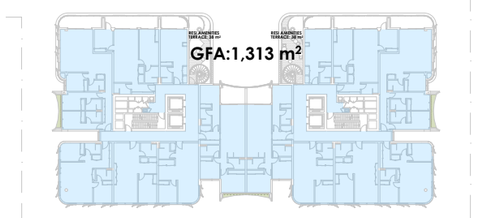
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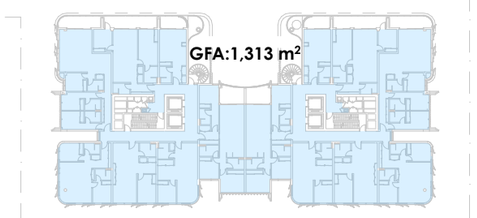
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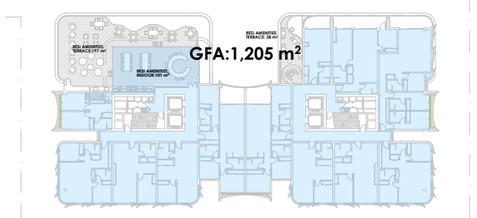
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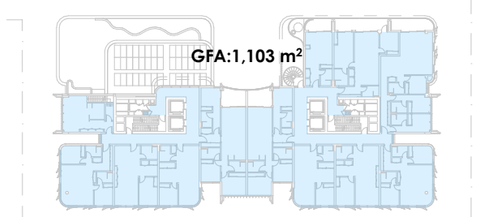
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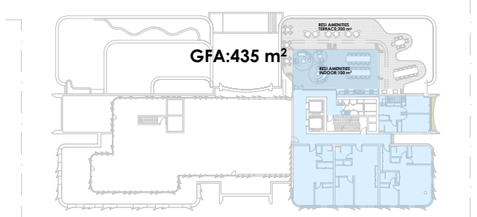
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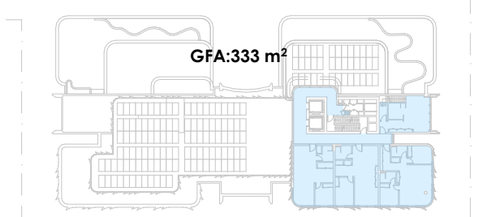
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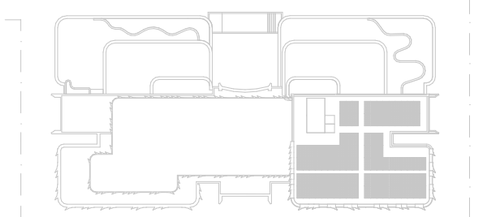
LEVEL 13



LEVEL 14



LEVEL 15



ROOF

RESIDENTIAL GFA

NON-RESIDENTIAL GFA

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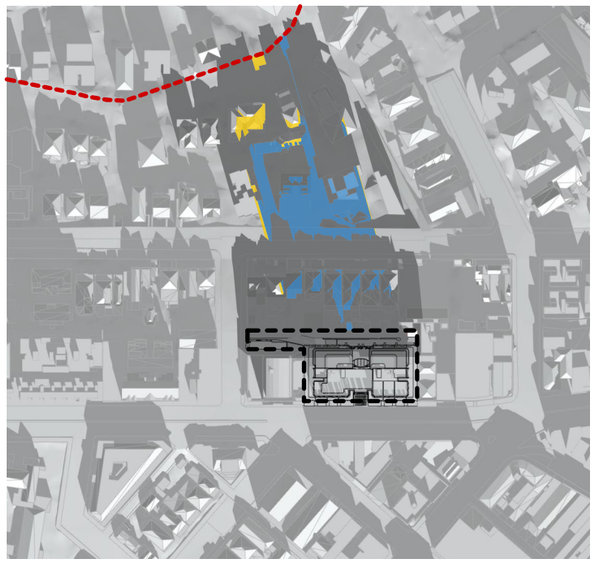
PROJECT NORTH

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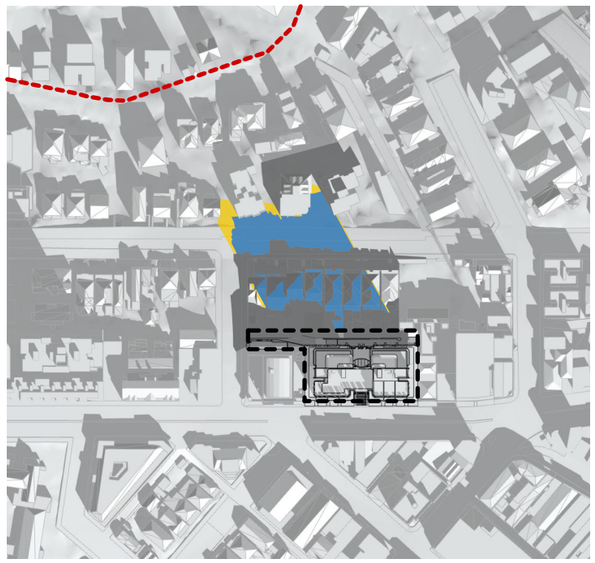
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DRAWING
AREA SCHEDULES
AREA SCHEDULE - GFA

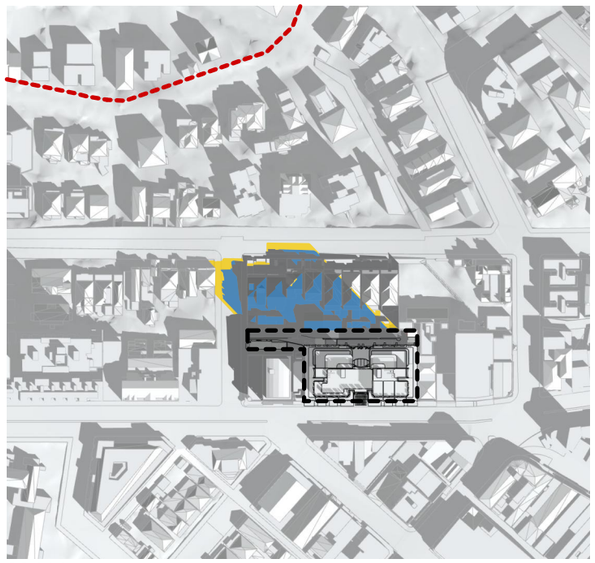
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22501	**DA-92002**	**A**



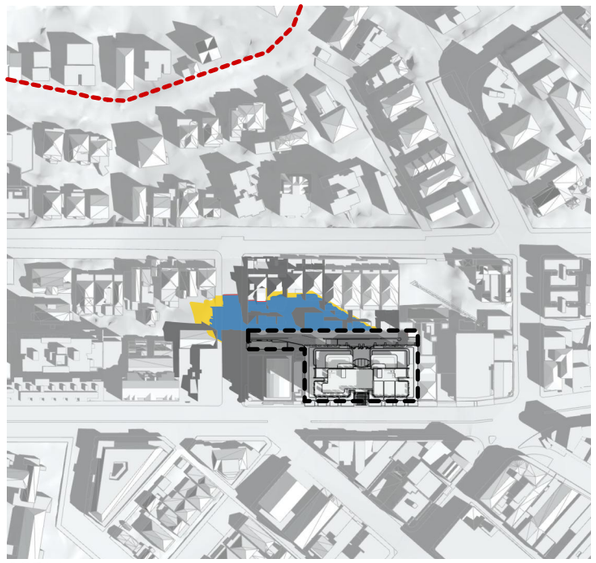
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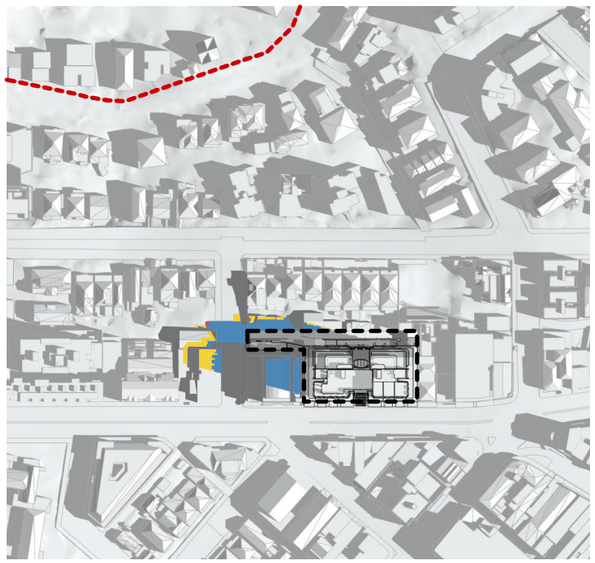
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11AM



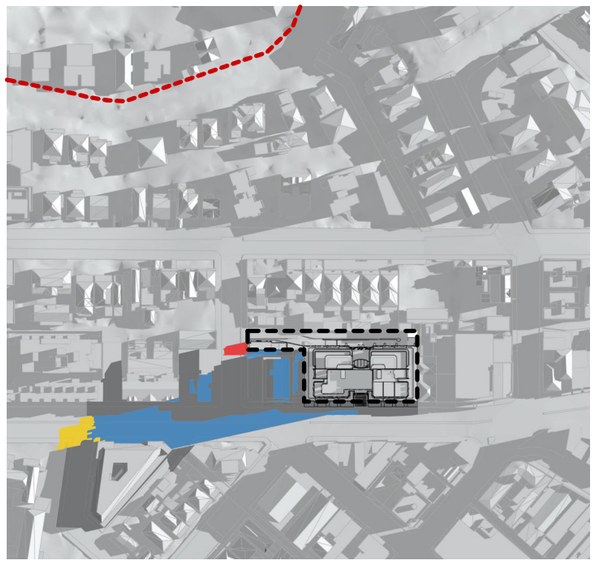
12PM



1PM



2PM



3PM

PRECINCT BOUNDARY

EXISTING SHADOW

SHADOW BY PROPOSED BTR AND APPROVED DA SCHEME

ADDED SHADOW BY PROPOSED BTR SCHEME COMPARED TO APPROVED DA SCHEME

ADDITIONAL SOLAR ACCESS COMPARED TO APPROVED DA SCHEME

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AUSTRALIA

PHASE: Development Application

PROJECT NORTH

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SCALE @A3

30mm ON ORIGINAL

DRAWN BY

APPROVED BY

PRINT DATE 19/06/2025

DRAWING
APPENDIX
SHADOW DIAGRAM

PROJECT NUMBER **22501**

DRAWING NUMBER **DA-94001**

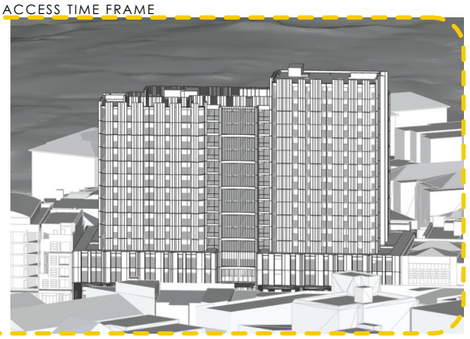
ISSUE **A**

OUTSIDE ADG SOLAR ACCESS TIME FRAME

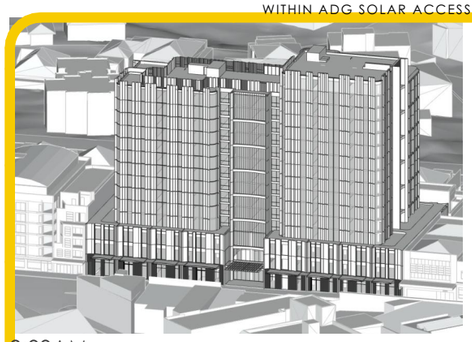
WITHIN ADG SOLAR ACCESS TIME FRAME



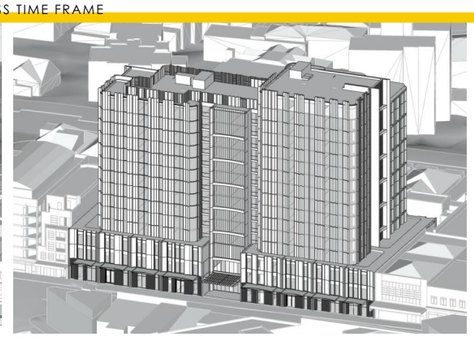
7:00AM(SUNRISE)
1:500



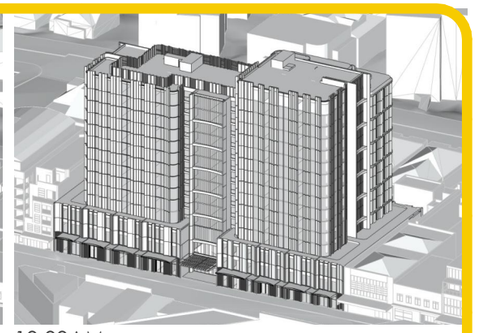
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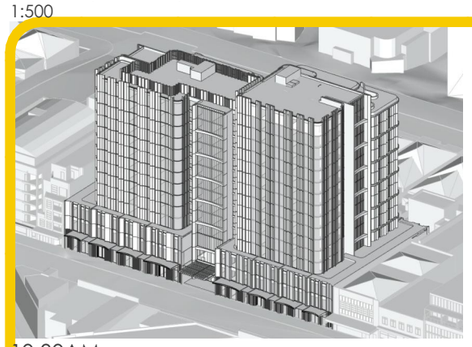
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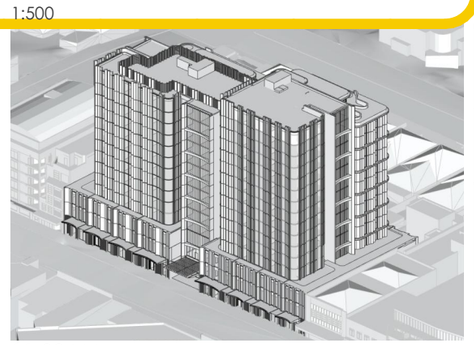
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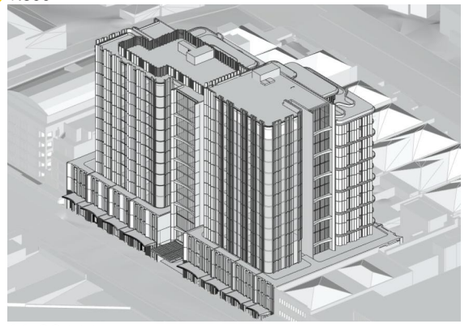
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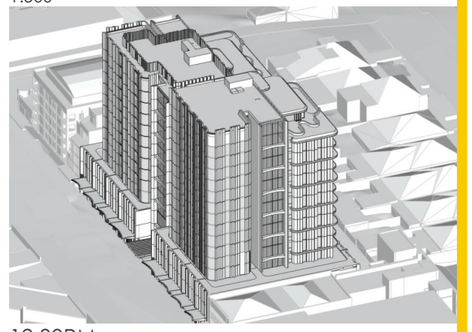
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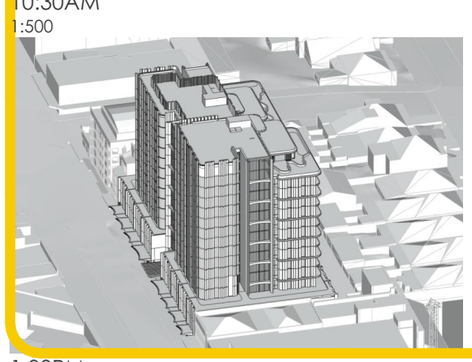
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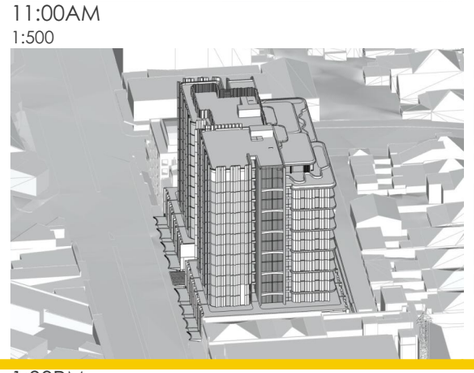
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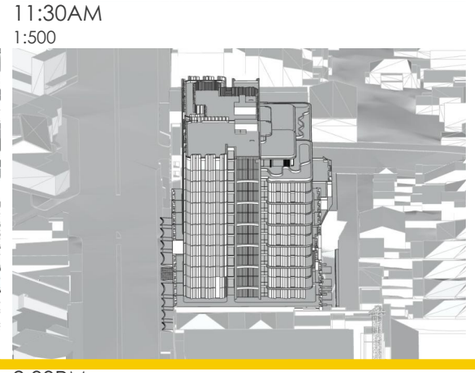
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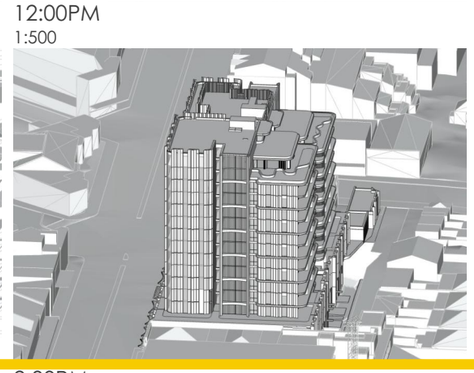
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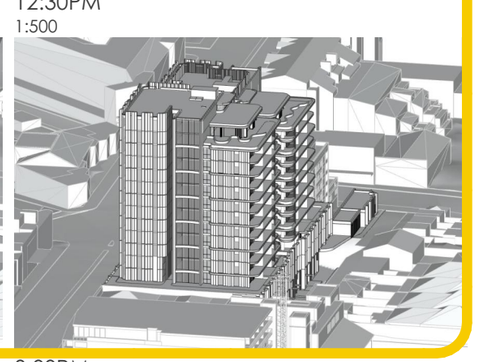
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2:00PM
1:500

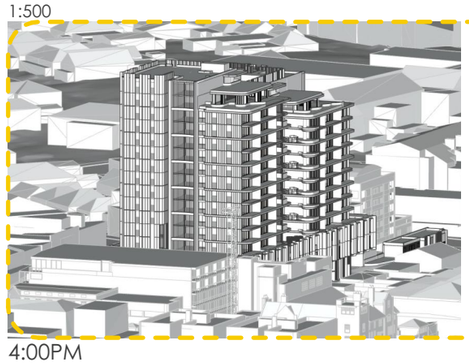


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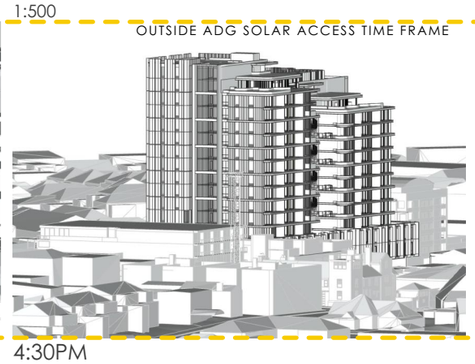


3:00PM
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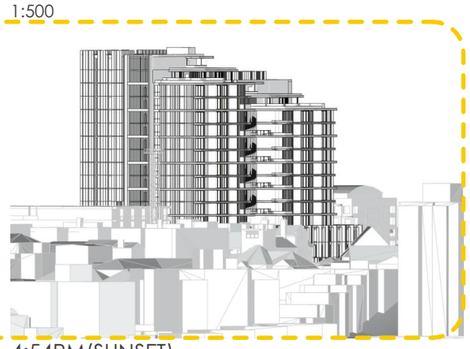
OUTSIDE ADG SOLAR ACCESS TIME FRAME



4:00PM
1:500



4:30PM
1:500



4:54PM(SUNSET)
1:500

fitzpatrick +partners

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w. WWW.FITZPATRICKPARTNERS.COM
a. LEVEL 6, 9 CASTLEREAGH STREET, SYDNEY 2000, AUSTRALIA

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

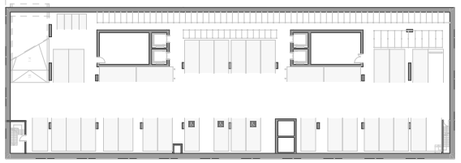
PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

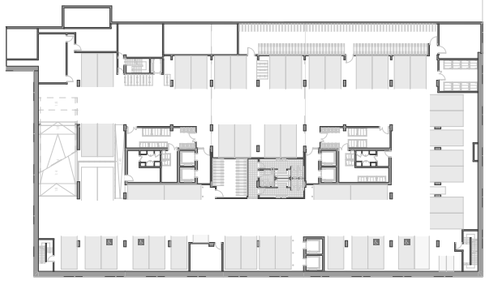
SCALE	DRAWN BY	APPROVED BY
1:500 @A3		
30mm ON ORIGINAL		PRINT DATE 19/06/2025

DRAWING
APPENDIX
SUN EYE VIEW - EXISTING CONDITION

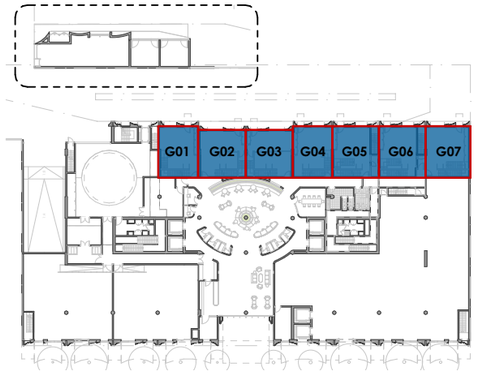
PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-94002**	**A**



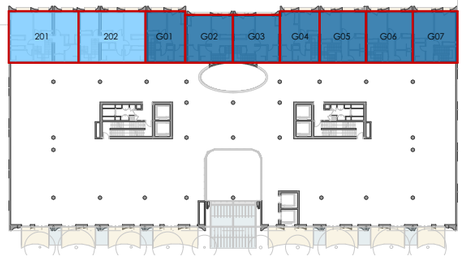
BASEMENT 02



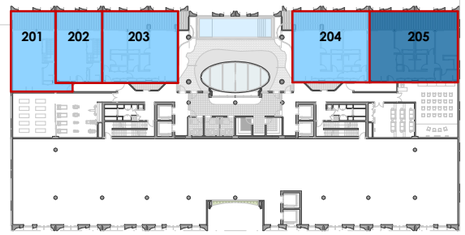
BASEMENT 01



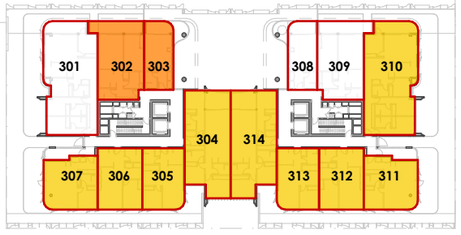
GROUND LEVEL



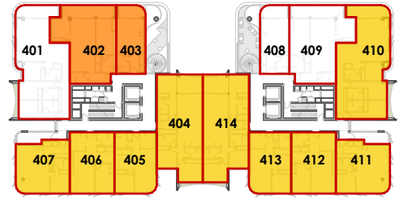
LEVEL 01



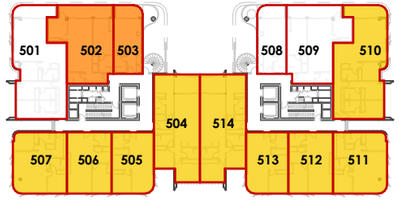
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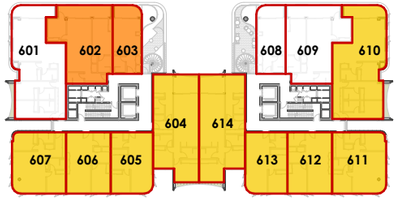
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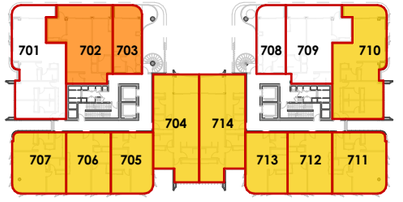
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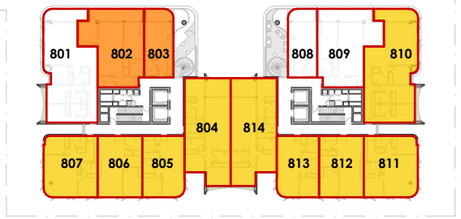
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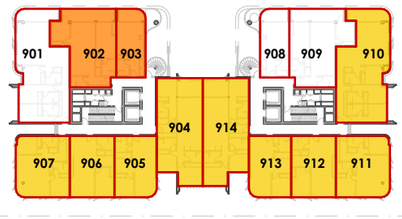
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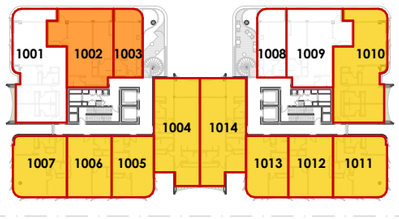
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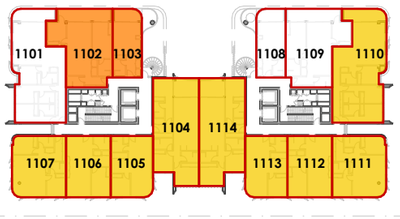
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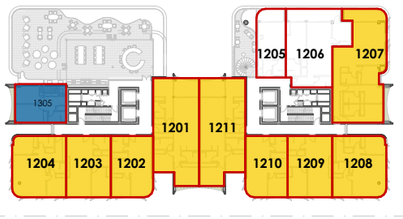
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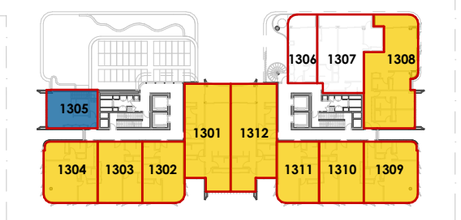
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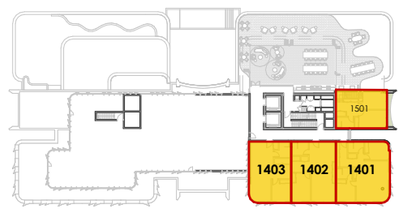
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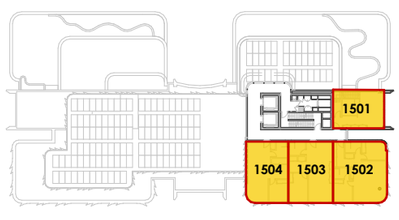
LEVEL 12



LEVEL 13



LEVEL 14



LEVEL 15

SUMMARY: SOLAR ACCESS WITH EXISTING CONDITION

9am - 3pm, 21/JUNE		SUNRISE - SUNSET, 21/JUNE	
>2 HOURS SOLAR ACCESS	**106^{APTS}(63%)**	>2 HOURS SOLAR ACCESS	**124^{APTS}(74%)**
NO DIRECT SUN	**13^{APTS}(8%)**	NO DIRECT SUN	**9^{APTS}(5%)**

APARTMENTS RECEIVED > 2HRS SOLAR ACCESS (9am - 3pm)

ADDITIONAL APARTMENTS RECEIVED > 2HRS SOLAR ACCESS (SUNRISE TO SUNSET)

APARTMENTS WITH NO DIRECT SOLAR ACCESS (9am - 3pm) WITH SOLAR ACCESS OUTSIDE 9am to 3 pm

APARTMENTS WITH NO DIRECT SOLAR ACCESS (SUNRISE TO SUNSET)

fitzpatrick +partners

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a. LEVEL 6, 9 CASTLEREAGH STREET, SYDNEY 2000, AUSTRALIA

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

PROJECT NORTH

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE @A3
30mm ON ORIGINAL

DRAWN BY

APPROVED BY

PRINT DATE 19/06/2025

DRAWING
APPENDIX
ADG DIAGRAMS - SOLAR ACCESS - EXISTING

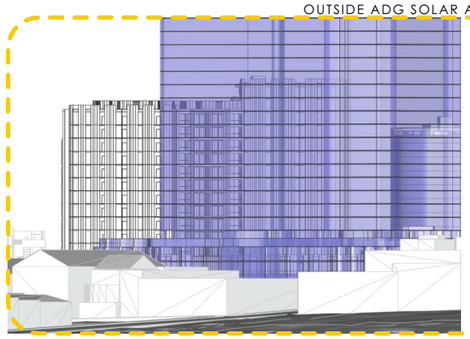
PROJECT NUMBER **22501**

DRAWING NUMBER **DA-94003**

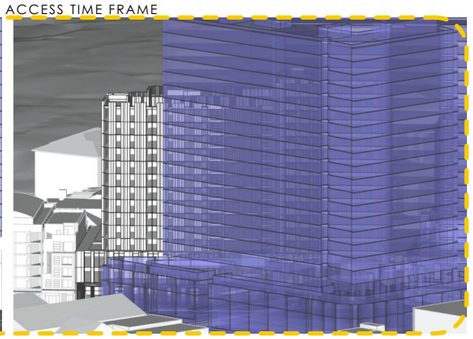
ISSUE **A**

OUTSIDE ADG SOLAR ACCESS TIME FRAME

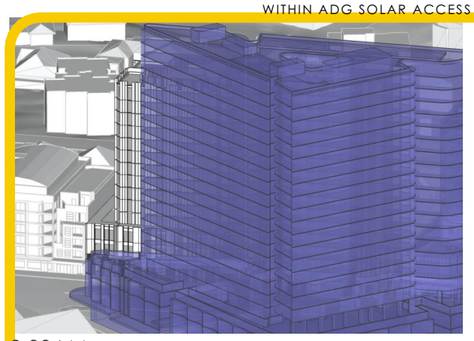
WITHIN ADG SOLAR ACCESS TIME FRAME



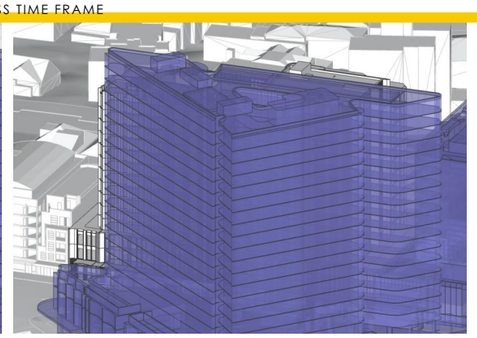
7:00AM(SUNRISE)
1:500



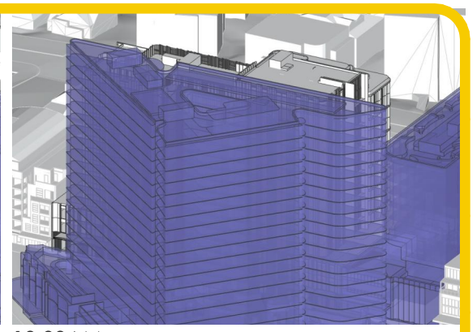
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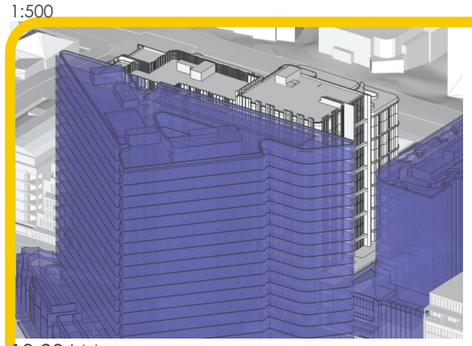
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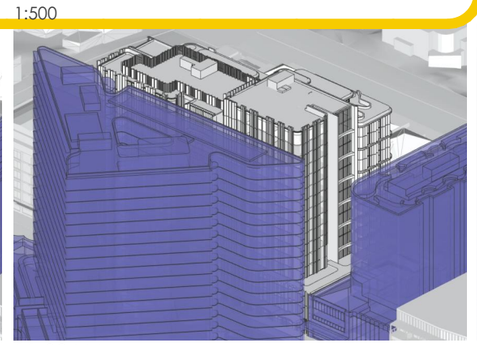
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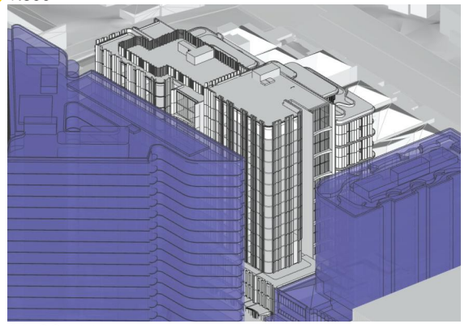
10:00AM
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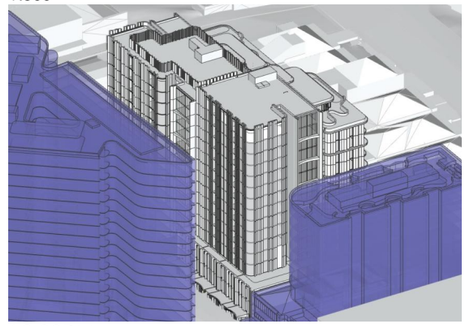
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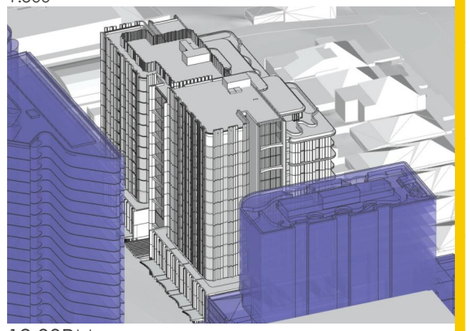
11:00AM
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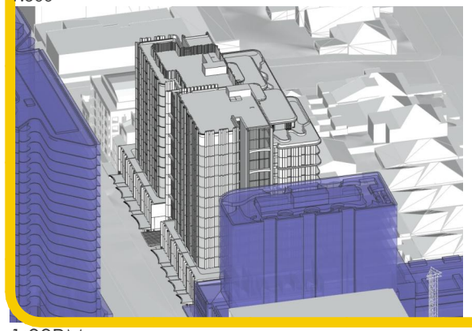
11:30AM
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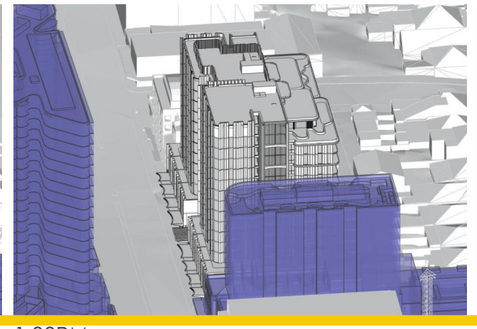
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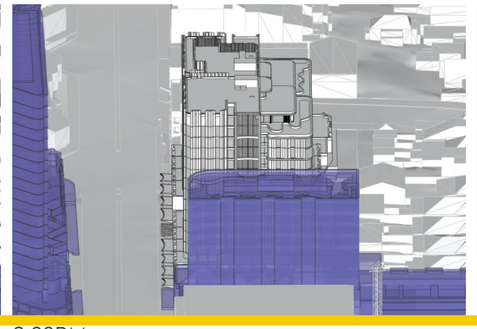
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1:00PM
1:500



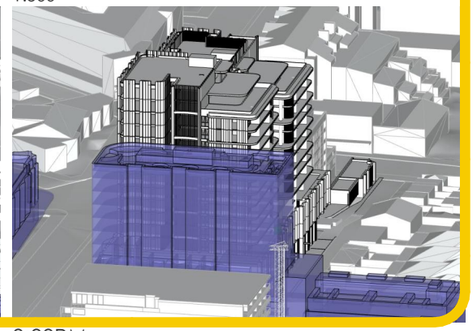
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2:00PM
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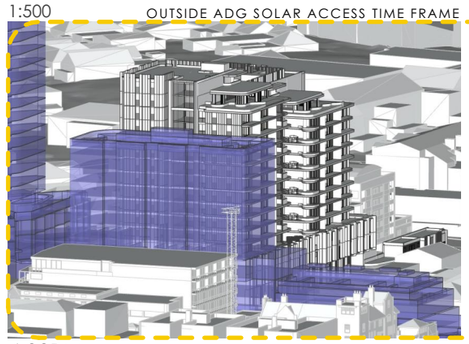


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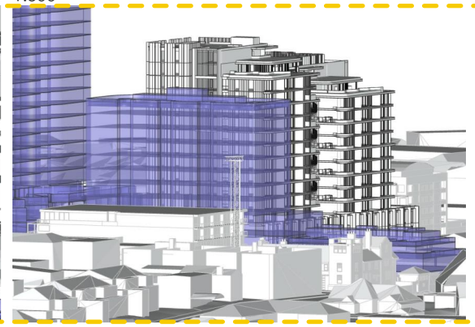


3:00PM
1:500

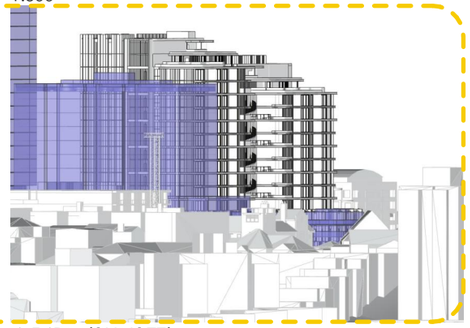
OUTSIDE ADG SOLAR ACCESS TIME FRAME



4:00PM
1:500



4:30PM
1:500



4:54PM(SUNSET)
1:500

fitzpatrick +partners

p. +61 (0)2 82748200
e. ENQUIRIES@FITZPATRICKPARTNERS.COM
w. WWW.FITZPATRICKPARTNERS.COM
a. LEVEL 6, 9 CASTLEREAGH STREET, SYDNEY 2000, AUSTRALIA

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

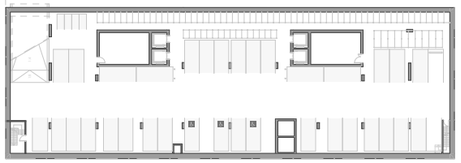
PHASE: Development Application

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

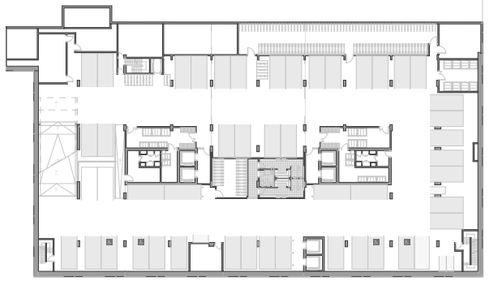
SCALE	DRAWN BY	APPROVED BY
1:500 @A3		
30mm ON ORIGINAL		PRINT DATE 19/06/2025

DRAWING
APPENDIX
SUN EYE VIEW - WITH FUTURE BUILDING

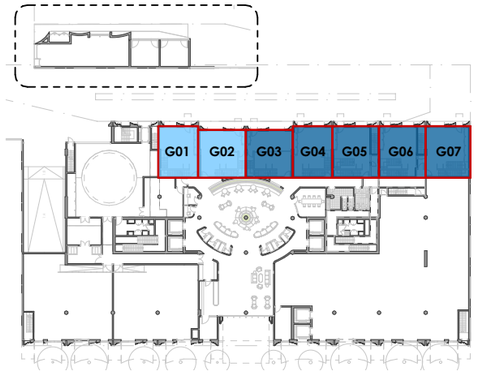
PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-94004**	**A**



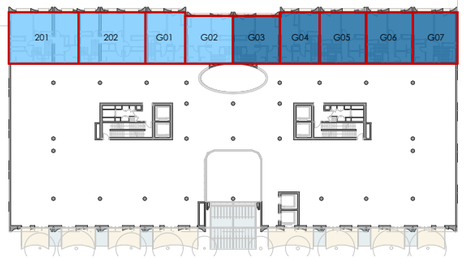
BASEMENT 02



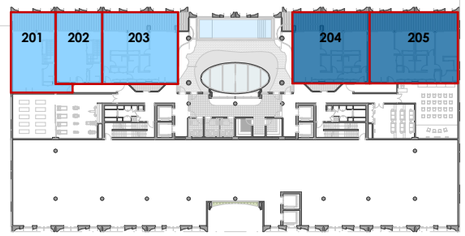
BASEMENT 01



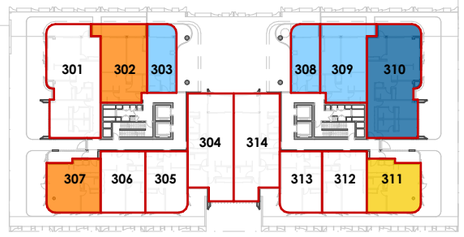
GROUND LEVEL



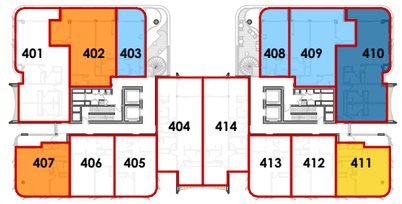
LEVEL 01



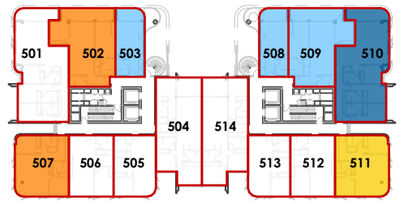
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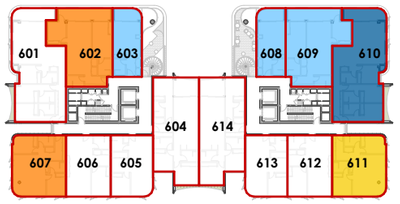
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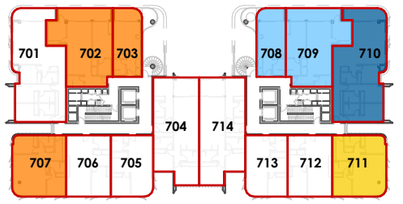
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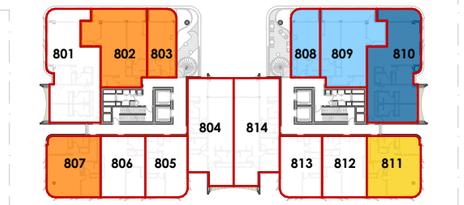
LEVEL 05



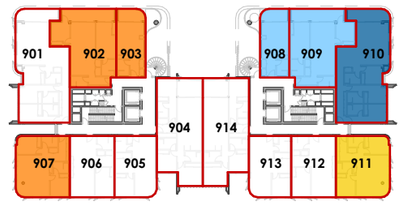
LEVEL 06



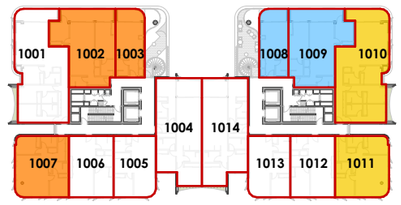
LEVEL 07



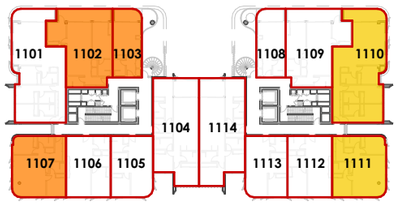
LEVEL 08



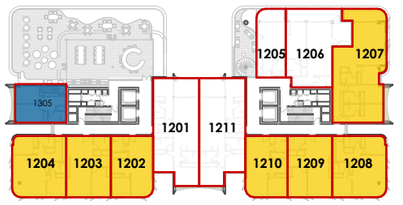
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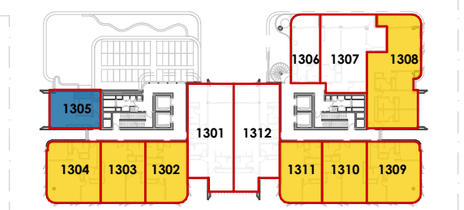
LEVEL 10



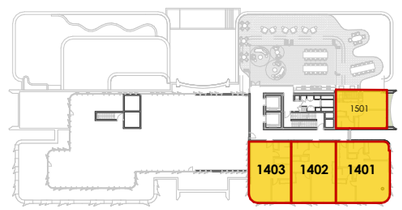
LEVEL 11



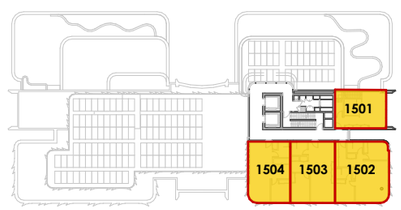
LEVEL 12



LEVEL 13



LEVEL 14



LEVEL 15

SUMMARY: SOLAR ACCESS WITH DA APPROVED FUTURE BUILDINGS

9am - 3pm, 21/JUNE		SUNRISE - SUNSET, 21/JUNE	
>2 HOURS SOLAR ACCESS	**32^{APTS}(19%)**	>2 HOURS SOLAR ACCESS	**55^{APTS}(33%)**
NO DIRECT SUN	**37^{APTS}(22%)**	NO DIRECT SUN	**15^{APTS}(9%)**

APARTMENTS RECEIVED > 15MINS < 2HRS SOLAR ACCESS (9am - 3pm)

APARTMENTS RECEIVED > 2HRS SOLAR ACCESS (9am - 3pm)

ADDITIONAL APARTMENTS RECEIVED > 2HRS SOLAR ACCESS (SUNRISE TO SUNSET)

APARTMENTS WITH NO DIRECT SOLAR ACCESS (9am - 3pm) WITH SOLAR ACCESS OUTSIDE 9am to 3 pm

APARTMENTS WITH NO DIRECT SOLAR ACCESS (SUNRISE TO SUNSET)

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

PROJECT NORTH

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE @A3
30mm ON ORIGINAL

DRAWN BY

APPROVED BY

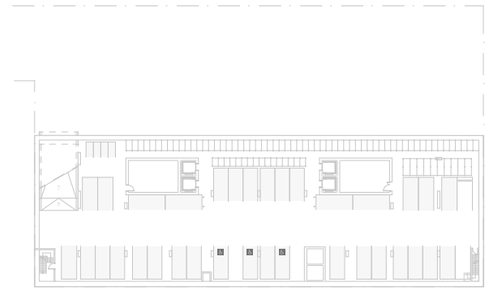
PRINT DATE 19/06/2025

DRAWING
APPENDIX
ADG DIAGRAMS - SOLAR ACCESS - FUTURE

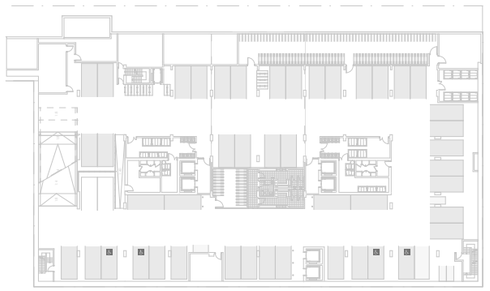
PROJECT NUMBER **22501**

DRAWING NUMBER **DA-94005**

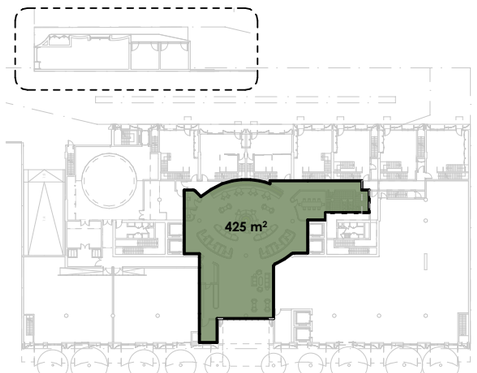
ISSUE **A**



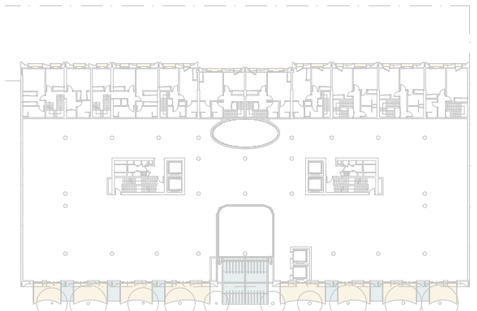
BASEMENT 02



BASEMENT 01



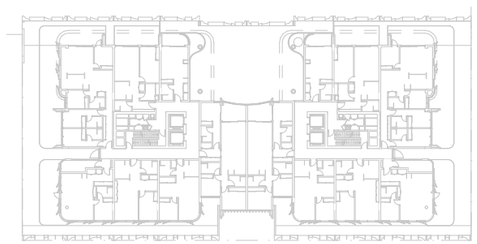
GROUND LEVEL



LEVEL 01



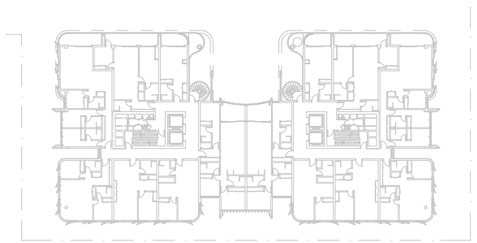
LEVEL 02



LEVEL 03



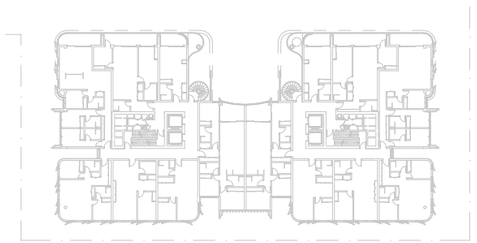
LEVEL 04



LEVEL 05



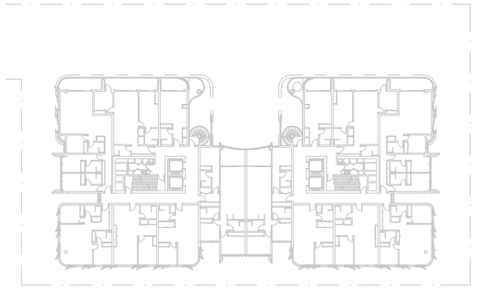
LEVEL 06



LEVEL 07



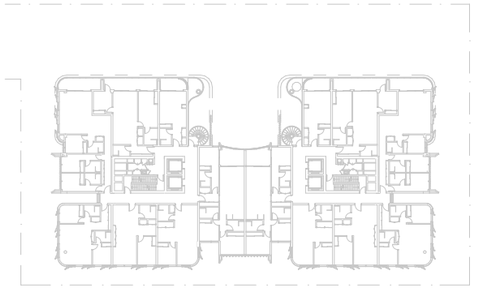
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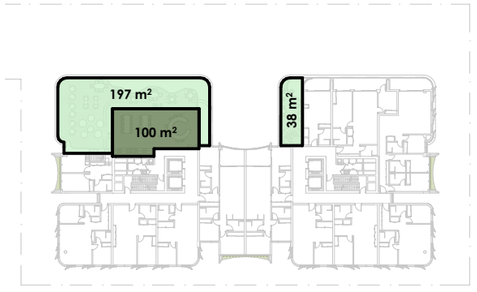
LEVEL 09



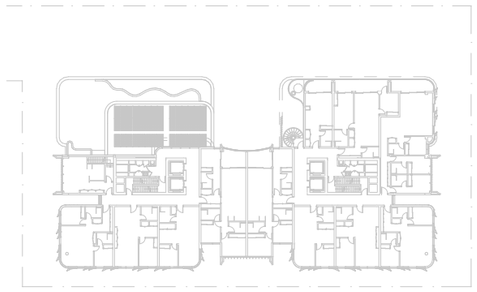
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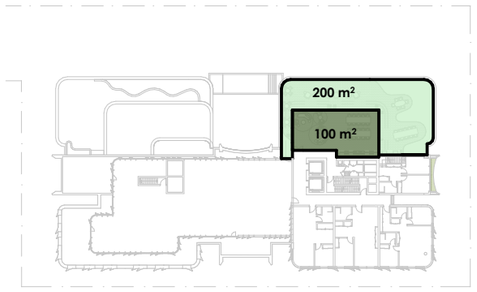
LEVEL 11



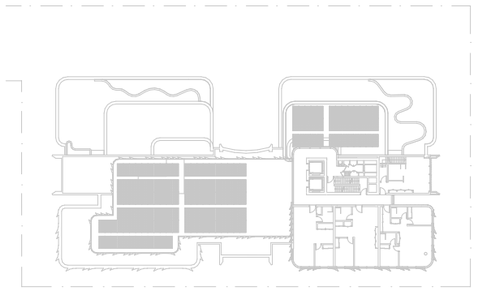
LEVEL 12



LEVEL 13



LEVEL 14



LEVEL 15

SUMMARY: COMMUNAL AMENITIES

INTERNAL AMENITY FACILITIES		OUTDOOR TERRACE AND AMENITIES SPACE	
INTERNAL AMENITIES SPACES	**1,052m²(27.7%)**	OUTDOOR AMENITIES SPACES	**964m²(25.4%)**
OVERALL COMMUNAL AMENITY SPACES			
TOTAL COMMUNAL AMENITY SPACE			**2,016m²(53.1%)** **12m²/Dwelling**

OUTDOOR COMMUNAL AMENITIES
INDOOR COMMUNAL AMENITIES

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

PROJECT NORTH

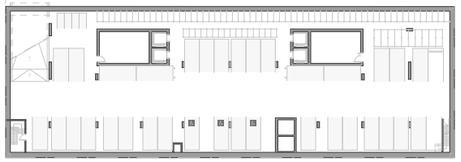
CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE	DRAWN BY	APPROVED BY
@A3		
30mm ON ORIGINAL		PRINT DATE 19/06/2025

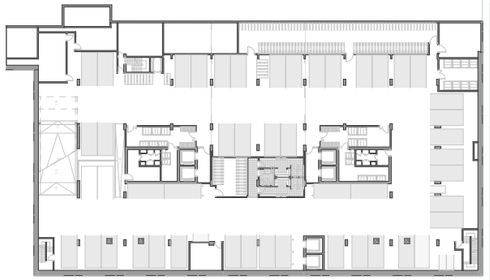
DRAWING
APPENDIX
ADG DIAGRAMS - COS

PROJECT NUMBER	DRAWING NUMBER	ISSUE
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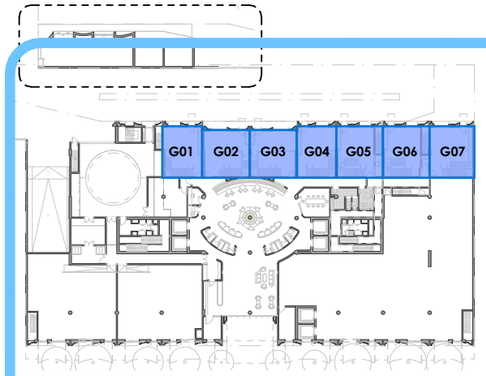
NATURAL VENTILATION FOR FIRST 9 FLOORS: 96 APARTMENTS



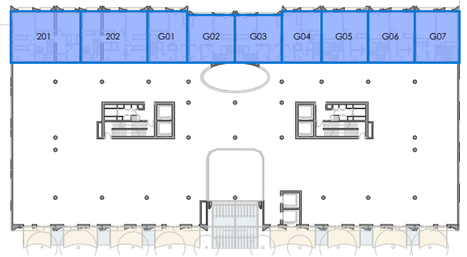
BASEMENT 02



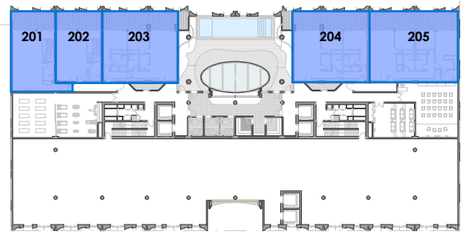
BASEMENT 01



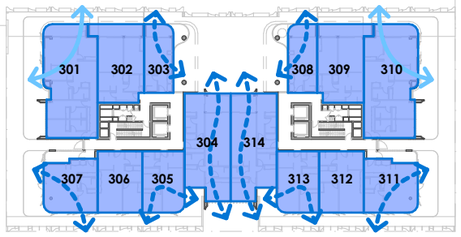
GROUND LEVEL



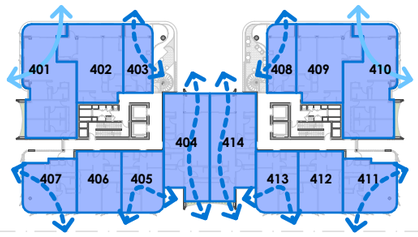
LEVEL 01



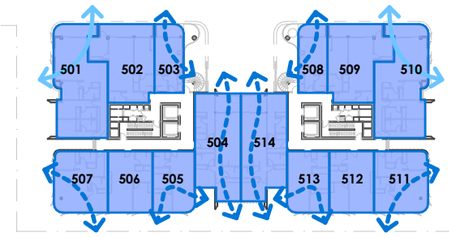
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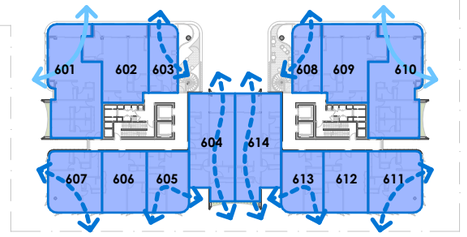
LEVEL 03



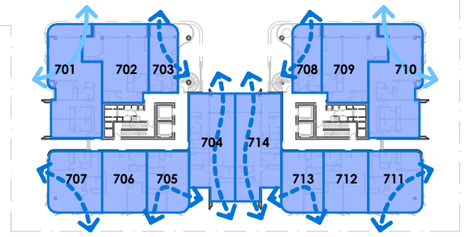
LEVEL 04



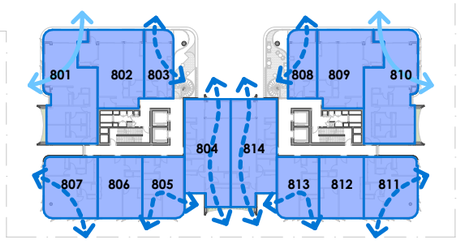
LEVEL 05



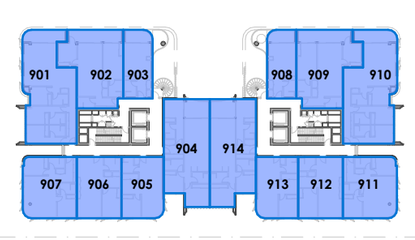
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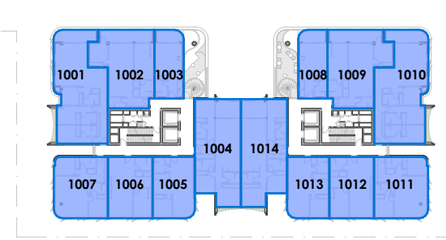
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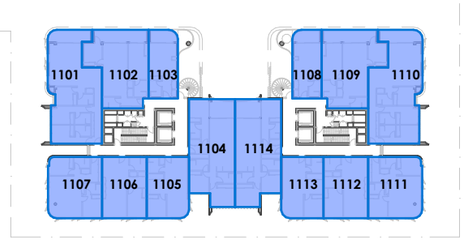
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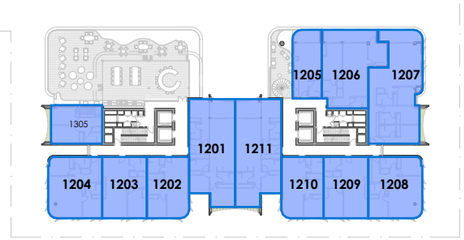
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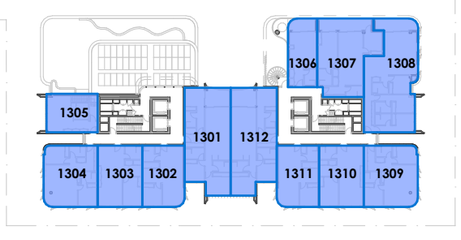
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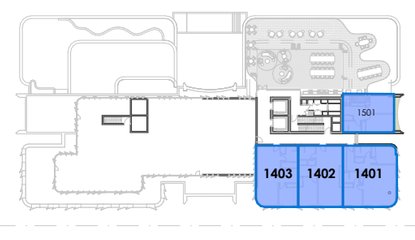
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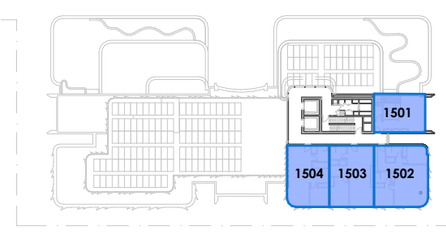
LEVEL 12



LEVEL 13



LEVEL 14



LEVEL 15

SUMMARY: NATURAL VENTILATION

NATURAL CROSS VENTILATION		MECHANICAL ASSISTED FRESH AIR	
NATURALLY CROSS-CROSS VENTILATED APARTMENTS	**60/96^{APTS}(62.5%)**	MECHANICALLY ASSISTED FRESH AIR APARTMENTS	**168/168^{APTS}(100%)**

NATURALLY CROSS- VENTILATED APARTMENTS

NATURALLY CROSS-VENTILATED APARTMENTS COULD BE ACHIEVED, BUT PROPOSED TO MECHANICALLY ASSISTED FRESH AIR INSTEAD TO ADDRESS NOISE AND AIR POLLUTION ISSUES (refer to design report for more details)

MECHANICALLY ASSISTED FRESH AIR APARTMENTS

fitzpatrick +partners

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e. ENQUIRIES@FITZPATRICKPARTNERS.COM
w. WWW.FITZPATRICKPARTNERS.COM
a. LEVEL 6, 9 CASTLEREAGH STREET, SYDNEY 2000, AUSTRALIA

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
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PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

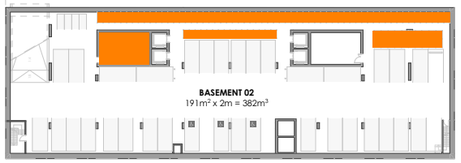
PROJECT NORTH

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

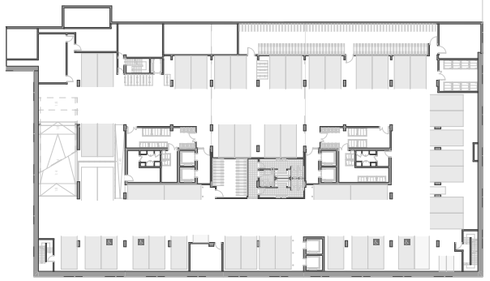
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@A3		
30mm ON ORIGINAL	PRINT DATE	19/06/2025

DRAWING
APPENDIX
ADG DIAGRAMS - CROSS VENTILATION

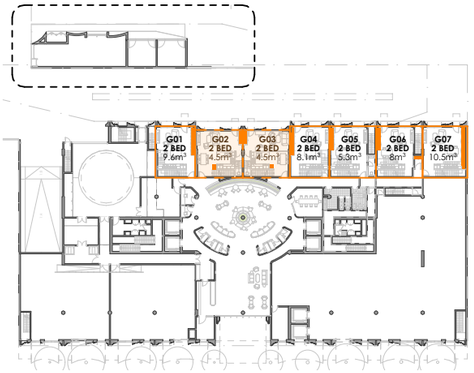
PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-94007**	**A**



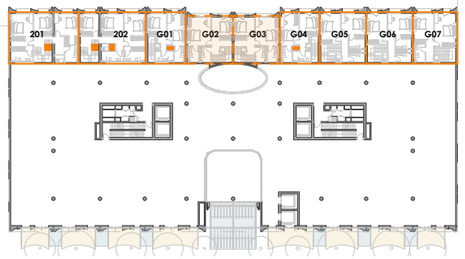
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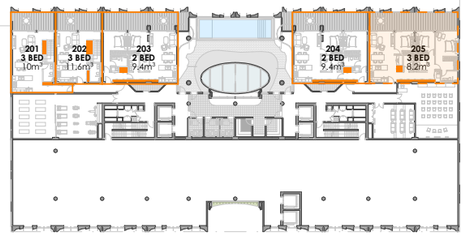
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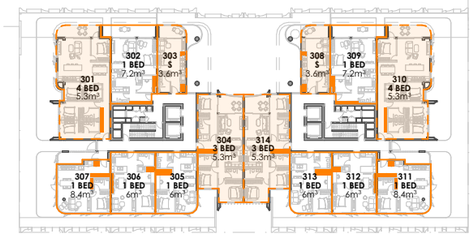
GROUND LEVEL



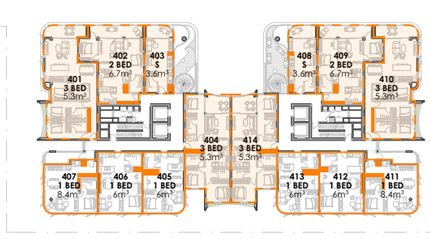
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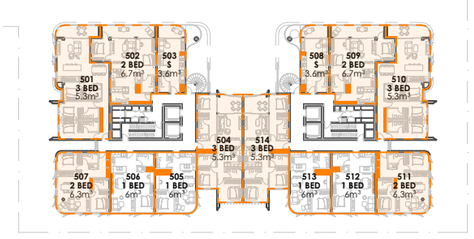
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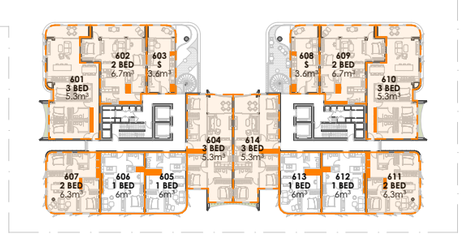
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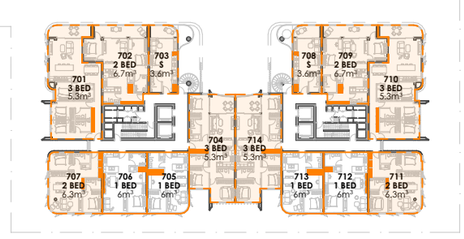
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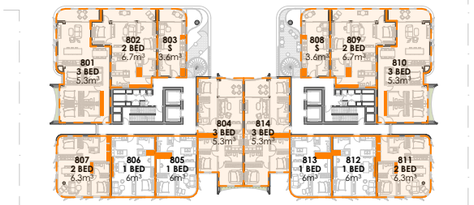
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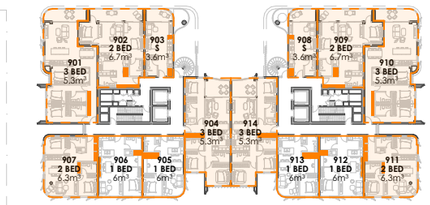
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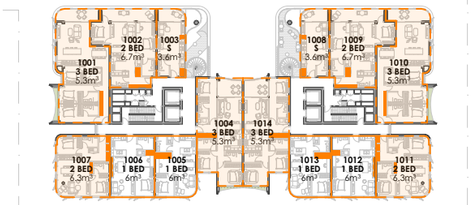
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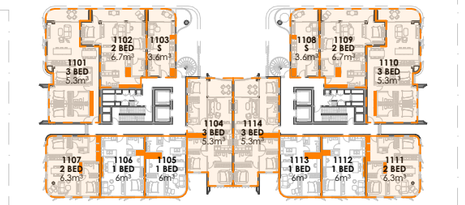
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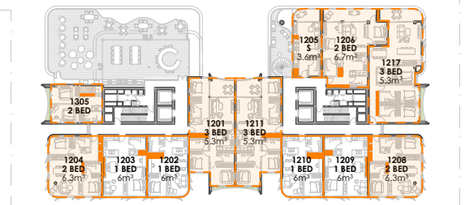
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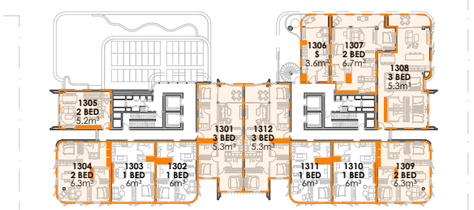
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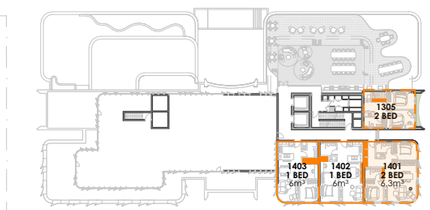
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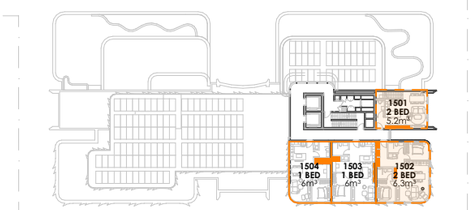
LEVEL 12



LEVEL 13



LEVEL 14



LEVEL 15

SUMMARY: APARTMENT STORAGE

BASEMENT STORAGE REQUIRED		BASEMENT STORAGE SUPPLIED	
STORAGE REMAINING	**228m³**	BASEMENT STORAGE SPACE	**382m³**

STORAGE ALLOCATION (CALCULATED 2.4m EFFECTIVE HEIGHT IN APARTMENT AND 2m IN BASEMENT)
MORE THAN 50% OF THE REQUIRED STORAGE SPACE WITHIN THE APARTMENT, REMAINING STORAGE TO BE LOCATED IN THE BASEMENT
100% OR MORE THAN REQUIRED STORAGE SPACE WITHIN APARTMENT

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AMENDMENTS

REV.	DATE	DESCRIPTION	CHK
A	20/05/2025	DA	

PROJECT
270 PACIFIC HWY BTR
270 PACIFIC HIGHWAY
CROWS NEST NSW 2064
AUSTRALIA

PHASE: Development Application

PROJECT NORTH

CLIENT
SILVERNIGHT
Darling Park Tower 2, L16, 201 Sussex Street, Sydney NSW 2000 Australia

SCALE	DRAWN BY	APPROVED BY
@A3		
30mm ON ORIGINAL		PRINT DATE 19/06/2025

DRAWING
APPENDIX
ADG DIAGRAMS - STORAGE

PROJECT NUMBER	DRAWING NUMBER	ISSUE
22501	**DA-94008**	**A**

Appendix B

About this Report

About this Report

November 2023

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

continued next page

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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Appendix C

Field Notes

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.5 AHD
COORDINATE: E:333516.0, N:6255426.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 214296.02
DATE: 24/02/25
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
18/02/25 NFGWO whilst augering	93	0.14	CONCRETE SLAB			NA	NA									A/ES	0.14–0.20	0.14	PID	0.3ppm; DCP 5 10 15 (B) 25/90mm
		0.20	FILL / Gravelly SAND: dark grey-brown; fine to coarse.		FILL															
			FILL / Clayey GRAVEL, with sand: grey-brown; fine to coarse, rounded, river stone.		FILL	(VC)	M									A/ES	0.40–0.50		PID	0.1ppm
		0.70	FILL / Sandy CLAY: pink-brown with dark grey mottling; medium to high plasticity.		FILL		w=PL									A	0.70–0.80		PID	0.1ppm
		0.90			RS	(H)	w<PL									A/ES	0.80–0.90		PID	0.0ppm
	92	1.17	CLAY (CI-CH), trace sand: brown; medium to high plasticity.						1.17							A	0.90–1.00		PID	0.0ppm
			SILTSTONE: grey-brown; 5-10% fine sandstone laminations, distinct bedding at 0-5°. Ashfield Shale					MW		VL - L	100	0		1.58m: JT, 45°, PR, CN, SM			1.00–1.10	1.10		
	91	2												2.16m: JT, 45°, PR, SN Fe, RF; 2.25m: JT, 20°, PR, SN Fe, RF; 2.41m: JT, 30°, PR, SN Fe, RF; 2.51-2.75m: JT, 90°, PR, SN Fe, SM				2	PLT	PL(A)=0.09MPa
		3						SW	2.80	L	90	48	SEAM	3.02m: JT, 45°, PR, VNR Clay, SM; 3.18m: JT, 45°, PR, VNR Clay, SM; 3.27-3.53m: JT, 90°, PR, CT Clay 5mm, SM				3	PLT	PL(A)=0.12MPa
	90	3.53	CORE LOSS: 210 mm						3.27 SEAM 3.43 3.48 3.53											
		3.74	SILTSTONE: dark grey; 5-10% fine sandstone laminations, distinct bedding at 0-5°. Ashfield Shale					SW	3.74									4	PLT	PL(A)=0.15MPa
	89	4							4.10	L	100	100								
	88	5						FR						5.25-5.35m: JT, 80-90°, CU, CN, SM; 5.35m: DS, 40mm; 5.42m: JT, 45°, PR, CN, SM				5	PLT	PL(A)=0.13MPa
		5.90	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale											5.93-6.11m: JT, 70-90°, CU, CN, SM; 6.25m: JT, 30°, CU, CN, SM; 6.44m: JT, 0-30°, CU, CN, SM; 6.53m: B, 0°, PR, CT Clay 2mm, SM; 6.58m: JT, 20°, PR, CN, SM; 6.60-6.69m: JT, 70°, PR, CN, SM; 6.72m: DS, 90mm; 7.01-7.34m: JT, 80°, PR, CN, SM; 7.22m: B, 0°, PR, CT Clay 5mm, SM; 7.42m: F, 50mm; 7.47-7.67m: JT, 90°, PR, CN, SM			6	PLT	PL(A)=0.10MPa
	87	6							6.72 SEAM 6.81		100	76	SEAM							
		7						SW		L	82	73						7	PLT	PL(A)=0.15MPa
	86	7.67	CORE LOSS: 250 mm						7.92		93	77							PLT	PL(A)=0.13MPa
		7.92																		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

Generated with CORE-GS by Geroc - Combined Log

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.14 m, HA to 1.17 m, NMLC to 10.00 m
CASING: PVC to 0.45m
REMARKS: BH backfilled with drilling spoil. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.5 AHD
COORDINATE: E:333516.0, N:6255426.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 214296.02
DATE: 24/02/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL			ROCK																
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	85	8.83	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					SW			93	77		8.03m: JT, 60-80°, CU, CN, SM 8.05m: F, 10mm 8.20m: JT, 80°, PR, CN, SM 8.47m: JT, 10°, PR, CN, SM 8.55m: DS, 50mm				9	PLT	PL(A)=0.11MPa
		9	CORE LOSS: 220 mm						9.05											
	84	9.05	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					SW			81	55		9.22m: JT, 30°, PR, CN, SM 9.46m: JT, 40°, PR, CN, SM 9.58m: JT, 60°, PR, CN, SM 9.61m: JT, 60°, PR, CN, SM 9.68m: DS, 20mm 9.73-9.84m: JT, 60°, PR, CN, SM 9.84m: DS, 100mm					PLT	PL(A)=0.16MPa
		9.84							9.84	SEAM			SEAM							
		9.94																		
		10	Borehole discontinued at 10.00m depth. Target depth reached.																	
		11																		
		12																		
		13																		
		14																		
		15																		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.14 m, HA to 1.17 m, NMLC to 10.00 m
CASING: PVC to 0.45m
REMARKS: BH backfilled with drilling spoil. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

CORE PHOTO LOG

CLIENT:	Silvernight (Crows Nest) Landowner Pty Ltd	**SURFACE LEVEL:**	93.5 AHD	**LOCATION ID:**	BH1
PROJECT:	Proposed Mixed-Use Development	**COORDINATE:**	E:333516.0, N:6255426.0	**PROJECT No:**	214296.02
LOCATION:	270-272 Pacific Hwy, Crows Nest, NSW	**DATUM/GRID:**	MGA2020 Zone 56	**DATE:**	24/02/25
		DIP/AZIMUTH:	90°/---°	**SHEET:**	1 of 1



1.17-5.00 m depth



5.00-10.00 m depth

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Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333536.0, N:6255397.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 214296.02
DATE: 17/02/25
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
17/02/25 NFGWO whilst augering	93	0.20	CONCRETE SLAB:			NA	NA											0.20	PID	1.5ppm	Bentonite	Flush cover
		0.30	FILL / SAND: brown; fine.		FILL	(VC)	M									A/ES		0.30	PID	1.7ppm	Gravel	Class 9/150
		0.40	FILL / Gravelly SAND: brown; fine; fine to coarse gravel; trace concrete fragments.		FILL											A/ES		0.40	PID	1.7ppm		
		0.60			RS	H	w<PL		0.60					0.64m: B, 5°, PR, VNR Clay, SM,		A/ES		0.55				
			CLAY (CI-CH), trace sand: pale grey; medium to high plasticity.											0.78m: DS, 5mm								
	92	1	SILTSTONE: grey-brown; 5-10% fine sandstone laminations, distinct bedding at 0-5°. Ashfield Shale					MW			100	74		0.91m: JT, 45°, IR, HE Fe 1.04m: DS, 5mm 1.57m: B, 0-5°, PR, VNR Clay 3mm, 1.35-1.81m: JT, 80-90°, UN, VNR Clay, SM				1	PLT	PL(A)=0.07MPa		
	91	2							2.00	VL - L								2	PLT	PL(A)=0.07MPa		
		3									95	95		2.64m: B, 5°, PR, VNR Clay, RF, 2.64-2.72m: JT, 45-50°, ST, HE Fe 2.79m: B, 0°, PR, CN, SM 3.52m: JT, 90°, PR, VNR Clay, SM				3	PLT	PL(A)=0.10MPa		
	90	4						SW	3.60	L								4	PLT	PL(A)=0.14MPa		
	89	5							4.60	VL	100	72		4.51-4.79m: JT, 70°, PR, VNR Clay, SM 4.80m: B, 0°, PR, CT Clay, SM, 5.07m: JT, 45°, UN, VNR Clay, SM, 5.35m: JT, 35°, UN, SN Fe, RF				5	PLT	PL(A)=0.04MPa		
	88	6							5.67	SEAM			SEAM	5.67-5.80m: DS, 130mm,				6	PLT	PL(A)=0.14MPa		
		6.23							5.80	L	92	56		6.07m: B, 0°, PR, VNR Clay 5mm, SM, 6.10m: JT, 70°, PR, VNR Clay, SM, 6.12m: DS, 10mm 6.23-6.28m: JT, 70°, CU, CN								
	87	6.44	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale						6.33					6.33-6.44m: FG, 110mm 6.60-6.76m: JT x2, 50-60°, ST, CN, SM,								
		6.53	CORE LOSS: 90 mm						6.53									7	PLT	PL(A)=0.23MPa		
	86	7	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					FR		L	100	60		7.43-7.48m: JT x2, 40-50°, ST, CN, SM, 7.52m: B, 0°, PR, CT Clay, SM, 7.61m: JT, 70°, CU, CN, SM					PLT	PL(A)=0.17MPa		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

Generated with CORE-GS by Geroc - Combined Log

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: D. Pham/J. Miller
METHOD: 150 mm Ø DT to 0.20 m, HA to 0.60 m, NMLC to 12.37 m
CASING: PVC to 0.55m
REMARKS: 7.5 m monitoring well installed. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333536.0, N:6255397.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 214296.02
DATE: 17/02/25
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH (VL L M H VH EH)	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS	BACKFILL	WELL PIPE
	85		[CONT] SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					FR		L	100	60		7.75-7.86m: B x3, 10-30°, PR, CN, SM, 7.90m: B, 25°, CU, CN, RF, 8.07m: JT, 70°, CU, CN, SM, 8.24m: JT, 60°, CN, SM 8.40-8.68m: JT, 90°, SN, SM								
		9									77	55		8.90-9.15m: FG, 250mm				9	PLT	PL(A)=0.18MPa	Gravel	
	84	9.23	CORE LOSS: 310 mm											9.15-9.23m: DS, 88 mm								
		9.54	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale						9.54					9.69m: B, 10°, CU, VNR Clay, SM 9.87m: B, 10°, PR, CT Clay 1mm, SM 9.90m: DS, 20mm 9.94-10.27m: JT x5, 40°, PR, CN, SM								
		10								VL - L	100	56		10.15m: DS, 20mm 10.33-10.44m: JT, 90°, ST, CT Clay 5mm, SM 10.44m: DS, 20mm 10.54-10.90m: FG, 360mm				10	PLT	PL(A)=0.08MPa		
	83	10.80	SANDSTONE: grey, fine to medium grained; indistinct to distinct bedding at 0-10°. Mittagong Formation					SW	10.80	L				10.67-10.77m: DS, 100mm							Bentonite	
		11									100	90		11.55m: B, 5°, PR, CT Clay 5mm, SM				11	PLT	PL(A)=0.16MPa		
	82								11.55	VL				11.90-11.91m: DS, 10mm								
		12							12.00	L				12.30-12.37m: DS, 70mm				12	PLT	PL(A)=0.06MPa		
			Borehole discontinued at 12.37m depth. Target depth reached.																			
		13																				
		14																				
		15																				

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: D. Pham/J. Miller
METHOD: 150 mm Ø DT to 0.20 m, HA to 0.60 m, NMLC to 12.37 m
CASING: PVC to 0.55m
REMARKS: 7.5 m monitoring well installed. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

CORE PHOTO LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333536.0, N:6255397.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 214296.02
DATE: 17/02/25
SHEET: 1 of 2



0.60-5.00 m depth



5.00-10.00 m depth

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CORE PHOTO LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333536.0, N:6255397.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 214296.02
DATE: 17/02/25
SHEET: 2 of 2



10.00-12.37 m depth

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BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.2 AHD
COORDINATE: E:333549.0, N:6255369.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 214296.02
DATE: 18/02/25
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
21/02/25 NFGWO whilst augering	93	0.20	CONCRETE SLAB			NA	NA											0.20	PID	2.9ppm
		0.30	FILL / Sandy CLAY, with gravel: yellow-brown; medium to high plasticity; fine to medium, sandstone gravel.		FILL	(PC)	w<PL									A/ES		0.30	PID	2.3ppm
		0.45			RS	H			0.45	M				0.59m: B, 0-5 °, PR, CT Clay 1mm, RF		A/ES		0.40		
			CLAY (CI-CH), trace gravel: purple-brown; medium to high plasticity; fine, angular, ironstone gravel.											0.81m: B, 0-5 °, PR, CT Clay 1mm, RF					PLT	PL(A)=0.69MPa
	92	1	SILTSTONE: purple and pale grey; Iron indurated through shrink/swell fractures , 5-10% fine to medium disaggregated shale. Ashfield Shale											0.83m: DS, 40mm 0.90m: JT, 45°, ST, SN Fe, RF 1.03m: B, 20°, PR, VNR Clay, RF 1.19m: JT, 30°, CU, CT Clay 3mm, RF 1.28m: JT, 40°, PR, CT Clay 5mm, RF 1.36m: DS, 100mm 1.64m: B, 0°, PR, CT Clay 1mm, RF			1		
									1.36	SEAM	100	76	SEAM							
									1.46	M										
	91	2												2.12m: , 27mm, clast 2.28m: DS, 210mm				2	PLT	PL(A)=0.40MPa
									2.28	SEAM			SEAM							
									2.49	L	100	60		2.67m: B, 5°, PR, CT Clay 2mm, RF 2.75m: 70mm, clast 2.93m: B, 20°, IR, SN Fe, RF						
		3						HW	3.00	SEAM			SEAM	3.00m: DS, 200mm				3	PLT	PL(A)=0.19MPa
	90								3.20	M				3.20m: FG, 40mm 3.33m: B, 0-10°, CU, CT Clay 5mm, RF 3.48m: 60mm, clast 3.63m: DS, 50mm						
														3.84m: , 8mm, clast						
		4							3.97	SEAM			SEAM	3.97m: DS, 90mm				4	PLT	PL(A)=0.40MPa
	89								4.08	VL	100	46		4.18m: DS, 80mm 4.40m: JT, 50°, PR, SN Fe, RF 4.75m: JT, 60°, PR, CT Clay 5mm, SM						
		5							4.85	VL - L								5	PLT	PL(A)=0.11MPa
	88							MW												
		5.35	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale						5.59	VL	100	99		5.59m: B, 0-5 °, PR, CT Clay 3mm, SM 5.90m: JT, 60°, PR, CN, RF					PLT	PL(A)=0.06MPa
		6						SW	6.00					6.11m: B, 0-5 °, PR, CT Clay 3mm, SM 6.22m: DS, 20mm				6		
	87													6.36-6.51m: JT, 70°, CU, INF Clay 5mm, SM					PLT	PL(A)=0.11MPa
														6.51m: B, 5°, PR, CT Clay 5mm, SM						
		7						FR		VL - L				6.85m: B, 5°, PR, CT Clay 5mm, SM				7		
	86										100	98		7.59m: JT, 60°, PR, CN, SM						
									7.74	VL				7.74m: FG, 30mm 7.86m: B, 0-5 °, PR, CT Clay 5mm, SM					PLT	PL(A)=0.06MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

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PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.20 m, HA to 0.45 m, NMLC to 10.00 m
CASING: PVC to 0.44m
REMARKS: BH backfilled with drilling spoil. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.2 AHD
COORDINATE: E:333549.0, N:6255369.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 214296.02
DATE: 18/02/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL			ROCK																
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.05 0.06 0.10 0.60 5.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	85		[CONT] SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					FR	8.10	VL	100	98		8.20-8.42m: JT, 70°, ST, VNR Clay, SM						
								MW	8.47		100	83		8.52m: DS, 30mm 8.60m: DS, 20mm 8.69m: DS, 10mm						
		9						SW	8.69	L	100	81		9.55-9.64m: JT, 90°, PR, CN, SM				9	PLT	PL(A)=0.16MPa
	84																			
		9.77	SANDSTONE: grey, fine grained; indistinct to distinct bedding at 0-10°. Mittagong Formation					HW	9.77	VL - L				9.95m: DS, 50mm					PLT	PL(A)=0.07MPa
		10	Borehole discontinued at 10.00m depth. Target depth reached.																	
		11																		
		12																		
		13																		
		14																		
		15																		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.20 m, HA to 0.45 m, NMLC to 10.00 m
CASING: PVC to 0.44m
REMARKS: BH backfilled with drilling spoil. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

CORE PHOTO LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.2 AHD
COORDINATE: E:333549.0, N:6255369.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 214296.02
DATE: 18/02/25
SHEET: 1 of 1



0.45-5.00 m depth



5.00-10.00 m depth

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BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.2 AHD
COORDINATE: E:333550.0, N:6255366.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3A
PROJECT No: 214296.02
DATE: 12/02/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(^) DENSITY.(^)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	93	0	CONCRETE: 30-40% 20 mm angular to sub-angular aggregate, 3 mm voids 0.32m: 30 mm Ø rebar 0.45m: 30 mm Ø rebar										
	92	1	Borehole discontinued at 0.70m depth.										
	91	2											
	90	3											
	89	4											



NOTES: (#)Soil origin is "probable" unless otherwise stated. (^)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools
METHOD: 150 mm Ø DT to 0.70 m
REMARKS: BH discontinued due to depth of concrete. Located 1.5 m SE of BH3

OPERATOR: Douglas (IH)

LOGGED: I. Howsam
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

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BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.5 AHD
COORDINATE: E:333494.0, N:6255412.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 214296.02
DATE: 20/02/25
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
20/02/25 NFGWO whilst augering	93	0.11	CONCRETE SLAB			NA	NA											0.15	PID	0.1ppm	Bentonite	
		0.40	FILL / Gravelly SAND, with silt: grey-brown; fine to coarse; fine to medium, drainage gravel.		FILL	(VC)	M									A/ES		0.30			Flush cover	
		0.47	CLAY (CI-CH): dark grey; medium to high plasticity.		RS	H	w<PL	MW	0.47					0.60-0.66m: B, 5°, PR, SN Fe, RF, x4		A/ES		0.45	PID	0.3ppm		
	92	1	SILTSTONE: grey-brown; 5-10% fine sandstone laminations, distinct bedding at 0-5°. Ashfield Shale					SW	0.90	VL	100	28		1.08m: JT, 45°, PR, CT Clay 1mm, SM 1.27-1.45m: JT, 70°, PR, VNR Clay, SM 1.52-1.61m: JT, 60°, IR, VNR Clay, SM				1	PLT	PL(A)=0.07MPa		
		2							1.60		100	98		1.89m: B, 0°, PR, CT Clay 3mm, SM 2.13m: JT, 20°, CU, VNR Clay, SM				2	PLT	PL(A)=0.17MPa		
	91	3	3.10m: becoming dark grey							L				2.56m: B, 5°, PR, CT Clay 1mm, SM 3.04m: JT, 45°, PR, CN, SM 3.14m: JT, 40°, PR, CN, SM 3.16m: JT, 30°, PR, CN, SM 3.27m: B, 0-5°, PR, CT Clay 1mm, SM 3.37m: FG, 10mm 3.51m: JT, 10°, PR, CN, SM				3	PLT	PL(A)=0.18MPa		
	90	4						FR	3.50	VL - L	100	95		4.18m: JT, 40°, PR, CT Clay 1mm, SM				4	PLT	PL(A)=0.09MPa		
	89	4.90	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale						4.18					4.79-4.86m: JT, 70-80°, CU, CN, SM 4.87m: JT, 30°, PR, CN, SM				5	PLT	PL(A)=0.12MPa		
	88	6							5.60	L	100	79		5.29-5.53m: JT, 70-90°, CU, CN, SM 5.55m: JT, 30°, PR, CN, SM 5.62m: JT, 30°, PR, CN, SM 5.66m: DS, 10mm 5.82m: FG, 20mm 5.86m: JT, 20°, PR, CN, SM 5.89m: FG, 50mm 6.14m: JT, 45°, PR, CN, SM 6.17-6.21m: JT, 70°, PR, VNR Clay, SM 6.22m: DS, 10mm 6.24m: DS, 10mm 6.29m: DS, 10mm 6.61m: JT, 45°, PR, CN, SM 6.79m: JT, 45°, PR, CN, SM 6.87-7.10m: JT, 80°, PR, CN, SM 7.10m: B, 5°, PR, CT Clay 3mm, SM 7.27m: FG, 30mm 7.35-7.42m: JT, 90°, ST, CN, SM 7.57m: B, 0°, PR,				6	PLT	PL(A)=0.14MPa		
	87	7						SW			100	64						7	PLT	PL(A)=0.15MPa		
	86								7.70		100	84										
								FR			100	100							PLT	PL(A)=0.15MPa		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

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PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.11 m, HA to 0.47 m, NMLC to 15.00 m
CASING: PVC to 0.47m
REMARKS: 7.5 m monitoring well installed. Elevations interpolated from provided survey plan.. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.5 AHD
COORDINATE: E:333494.0, N:6255412.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 214296.02
DATE: 20/02/25
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS	BACKFILL	WELL PIPE
	85	9	[CONT] SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					FR			100	100		CT Clay 3mm, SM 7.64m: DS, 10mm; 8.37m: JT, 50°, PR, CN, SM; 8.64m: JT, 20°, PR, CN, SM; 8.86m: JT, 20°, PR, CN, SM; 8.96m: B, 0-5 °, PR, CT Clay 2mm, SM; 9.07m: JT, 30°, PR, CN, SM; 9.38m: JT, 30°, PR, CN, SM; 9.47m: JT, 40°, PR, CN, SM; 9.48-9.50m: JT, 80°, PR, CN, SM; 9.66m: JT, 40°, PR, CN, SM; 9.78m: JT, 20°, PR, CN, SM; 10.36m: JT, 45°, PR, CN, SM; 10.39m: B, 0°, PR, VNR Clay, SM; 10.45-10.51m: JT, 90°, IR, CT Clay 5mm, SM; 11.39m: B, 0°, PR, VNR Clay, RF; 11.41m: B, 5°, PR, VNR Clay, RF; 11.70m: DS, 10mm; 12.19m: B, 0°, PR, SN Fe, RF; 12.70m: DS, 10mm; 12.75m: DS, 20mm; 12.79m: DS, 10mm; 12.91m: DS, 10mm				9	PLT	PL(A)=0.15MPa		
	84	10								L	100	86						10	PLT	PL(A)=0.11MPa		
	83	10.79							10.79													
		11	SANDSTONE: grey, fine to medium grained; 5-10 % brown siltstone clasts and laminations, indistinct to distinct bedding at 0-10°. Mittagong Formation								100	92						11	PLT	PL(A)=0.11MPa	Bentonite	
	82																					
		12							11.80									12	PLT	PL(A)=0.42MPa		
	81							SW		M	100	91										
		13																13	PLT	PL(A)=0.46MPa		
	80																					
		14							13.95	L - M	100	100						14	PLT	PL(A)=0.26MPa		
	79	14.50	SANDSTONE: grey and pale grey, fine to coarse grained; 5-10 % siltstone clasts and laminations, indistinct to distinct bedding at 0-10°. Hawkesbury Sandstone						14.50	M												
		15	Borehole discontinued at 15.00m depth. Target depth reached.																PLT	PL(A)=0.63MPa		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.11 m, HA to 0.47 m, NMLC to 15.00 m
CASING: PVC to 0.47m
REMARKS: 7.5 m monitoring well installed. Elevations interpolated from provided survey plan.. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

CORE PHOTO LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.5 AHD
COORDINATE: E:333494.0, N:6255412.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 214296.02
DATE: 20/02/25
SHEET: 1 of 2



0.47-5.00 m depth



5.00-10.00 m depth

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CORE PHOTO LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.5 AHD
COORDINATE: E:333494.0, N:6255412.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH4
PROJECT No: 214296.02
DATE: 20/02/25
SHEET: 2 of 2



10.00-15.00 m depth

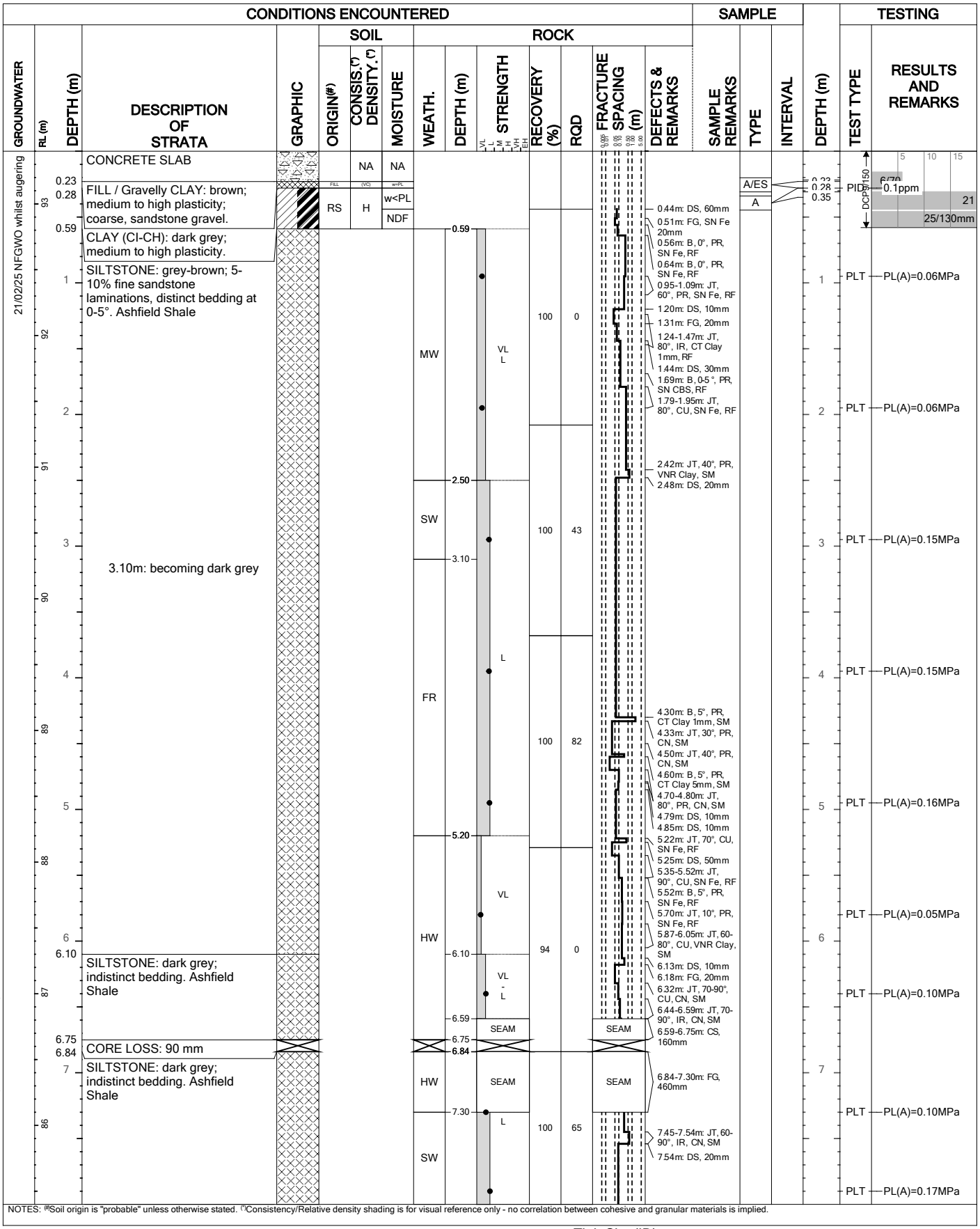
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BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333510.0, N:6255382.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH5
PROJECT No: 214296.02
DATE: 21/02/25
SHEET: 1 of 2



NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.23 m, HA to 0.44 m, NMLC to 15.89 m
CASING: PVC to 0.44m
REMARKS: BH backfilled with drilling spoil. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333510.0, N:6255382.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH5
PROJECT No: 214296.02
DATE: 21/02/25
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH (VL L M H VH EH)	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
	85		[CONT] SILTSTONE: dark grey; indistinct bedding. Ashfield Shale																	
	84	9						SW		L	100	65		8.68m: DS, 10mm 8.22-9.18m: JT, 70-90°, CU, CN, SM				9	PLT	PL(A)=0.13MPa
	83	10							9.80		100	83		8.76m: B, 5°, ST, CN, SM 9.25m: DS, 10mm 9.26-9.35m: JT, 80-°, IR, CN, SM 9.51m: DS, 10mm 9.52-9.76m: JT, 60-90°, IR, CN, SM 9.84m: FG, 50mm 9.89-10.13m: JT, 90°, IR, CN, SM				10	PLT	PL(A)=0.09MPa
								HW		VL	100	0		10.27m: JT, 30°, PR, CT Clay 1mm, SM 10.40m: DS, 50mm					PLT	PL(A)=0.07MPa
	82	11	10.80 SANDSTONE: grey, fine to medium grained; indistinct to distinct bedding at 0-10°. Mittagong Formation											10.79m: DS, 40mm 10.91m: FG, 40mm				11	PLT	PL(A)=0.08MPa
									11.60											
	81	12	12.29 SANDSTONE: pale grey, medium to coarse grained; indistinct to distinct bedding at 0-10°. Hawkesbury Sandstone								100	69		11.61m: JT, 30°, CU, CT Clay 1mm, SM 11.64m: B, 0-5°, PR, SN CBS, RF 11.69m: B, 0-5°, PR, SN CBS, RF 11.74m: B, 0-5°, PR, SN CBS, RF 11.78m: B, 0-5°, PR, SN CBS, RF 12.10m: DS, 40mm 12.18m: DS, 100 mm				12	PLT	PL(A)=0.13MPa
										L										
		13						SW						12.53m: DS, 40mm 12.59m: DS, 30mm 12.71m: B, 0°, PR, CT Clay 3mm, RF 12.81m: B, 0°, PR, CT Clay 3mm, RF 13.05m: DS, 10mm 13.06-13.12m: JT, 90°, PR, CN Clay, RF 13.12m: B, 0°, PR, CT Clay 1mm, RF 13.23m: DS, 90mm 13.43m: DS, 20mm 13.70m: B, 5°, PR, CT Clay 1mm, RF 13.78m: DS, 10mm 13.90m: B, 0°, PR, CN, RF 14.00m: DS, 20mm 14.02m: B, 0°, PR, CN, RF 14.02-14.10m: JT, 90°, PR, CN, RF 14.06m: B, 0°, PR, CN, RF 14.62m: B, 5-10°, CU, VNR Clay, RF				13	PLT	PL(A)=0.25MPa
	80		13.70m-13.78m: siltstone bed, dark grey						13.35											
										M										
		14	14.50m: becoming distinctly cross bedded at 0-30°						14.03		100	53						14	PLT	PL(A)=0.76MPa
	79																			
		15						FR		H	100	99		15.12m: JT, 40°, PR, CN, RF 15.13m: JT, 30°, PR, CN, RF 15.34m: B, 0-5°, UN, CT Clay 1mm, RF 15.64m: B, 5°, PR, SN CBS, RF				15	PLT	PL(A)=1.5MPa
	78		Borehole discontinued at 15.89m depth. Target depth reached.																PLT	PL(A)=1.1MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.23 m, HA to 0.44 m, NMLC to 15.89 m
CASING: PVC to 0.44m
REMARKS: BH backfilled with drilling spoil. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

CORE PHOTO LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333510.0, N:6255382.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH5
PROJECT No: 214296.02
DATE: 21/02/25
SHEET: 1 of 2



0.44-5.00 m depth



5.00-10.00 m depth

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CORE PHOTO LOG

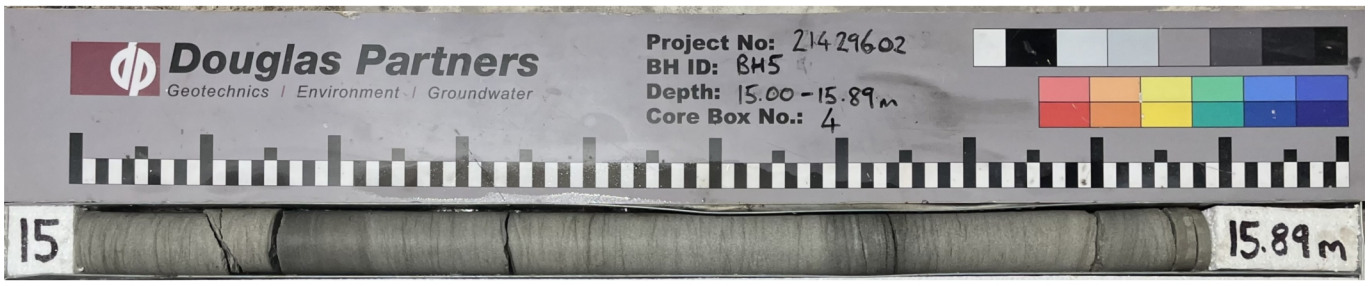
CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.4 AHD
COORDINATE: E:333510.0, N:6255382.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH5
PROJECT No: 214296.02
DATE: 21/02/25
SHEET: 2 of 2



10.00-15.00 m depth



15.00-15.89 m depth

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Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.3 AHD
COORDINATE: E:333521.0, N:6255365.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH6
PROJECT No: 214296.02
DATE: 19/02/25
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
18/02/25 NFGWO whilst augering	93	0.20	CONCRETE SLAB			NA	NA															
		0.37	CLAY (CI-CH): purple-brown; medium to high plasticity.		RS	VSt	w<PL									A/ES A		0.30	PID DCP	0.2ppm	Bentonite Flush cover	
	92	1	SILTSTONE: grey-brown; 5-10% fine sandstone laminations, distinct bedding at 0-5°. Ashfield Shale					MW	0.37 0.91 1.13	VL SEAM	100	0	SEAM	0.47m: DS, 10mm 0.62m: B, 5-10°, PR, CT Clay 5mm, SM 0.64m: DS, 50mm 0.91-1.13m: DS, 220mm				1	PLT	PL(A)=0.05MPa		
	91	2	2.25m: becoming dark grey						2.25		100	0		1.38-1.52m: JT, 70°, IR, CT Clay 2mm, SM 2.24m: B, 5°, PR, CT Clay, SM 2.36m: B, 5°, PR, CT Clay 1mm, SM				2	PLT	PL(A)=0.08MPa		
	90	3								VL	100	0		2.92m: B, 10°, PR, CN Clay 1mm, SM 3.39m: DS, 10mm				3	PLT	PL(A)=0.07MPa		
	89	4									100	0						4	PLT	PL(A)=0.07MPa	Gravel	
	88	5.00	SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					SW	4.83	VL - L	100	8		4.83-4.93m: JT, 60°, PR, CN, SM 5.28m: B, 0°, PR, CT Clay 2mm, SM 5.29m: B, 0°, PR, CT Clay 2mm, SM 5.30m: B, 0°, PR, CT Clay 2mm, SM 5.78m: JT, 45°, PR, CT Clay 3mm, SM				5	PLT	PL(A)=0.09MPa		
	87	6							6.40 6.48	SEAM	100	99	SEAM	6.35m: DS, 50mm 6.40m: FG, 80mm				6	PLT	PL(A)=0.09MPa		
	86	7								L				7.11-7.66m: JT, 60°, PR, CN, SM 7.59m: DS, 10mm				7	PLT	PL(A)=0.15MPa		
											100	97							PLT	PL(A)=0.16MPa	Bentonite	

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.20 m, HA to 0.37 m, NMLC to 10.00 m
CASING: PVC to 0.37m
REMARKS: 7.5 m monitoring well installed. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.3 AHD
COORDINATE: E:333521.0, N:6255365.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH6
PROJECT No: 214296.02
DATE: 19/02/25
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS	BACKFILL	WELL PIPE
	85		[CONT] SILTSTONE: dark grey; indistinct bedding. Ashfield Shale					SW		L	100	97		8.68m: JT, 45°, PR, CN, SM								
		9																9	PLT	PL(A)=0.13MPa	Bentonite	
	84								9.18	SEAM			SEAM	9.18m: DS, 90mm								
								HW	9.27	L												
									9.48	VL	100	70		9.50m: DS, 50mm								
		9.65	SANDSTONE: grey, fine to medium grained; indistinct to distinct bedding at 0-10°. Mittagong Formation						9.62m: DS, 30mm													
		10	Borehole discontinued at 10.00m depth. Target depth reached.					MW	9.65	L				9.85m: DS, 20mm					PLT	PL(A)=0.16MPa		
		11																				
		12																				
		13																				
		14																				
		15																				

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools and proline
OPERATOR: TightSite (ID)
LOGGED: J. Miller
METHOD: 150 mm Ø DT to 0.20 m, HA to 0.37 m, NMLC to 10.00 m
CASING: PVC to 0.37m
REMARKS: 7.5 m monitoring well installed. Elevations interpolated from provided survey plan. Coordinates inferred from georeferenced aerial imagery.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

CORE PHOTO LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270-272 Pacific Hwy, Crows Nest, NSW

SURFACE LEVEL: 93.3 AHD
COORDINATE: E:333521.0, N:6255365.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH6
PROJECT No: 214296.02
DATE: 19/02/25
SHEET: 1 of 1



0.37-5.00 m depth



5.00-10.00 m depth

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BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH7
DATE: 12/02/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/02/25 No free groundwater observed during augering			CONCRETE SLAB: 170mm.			ND	NA						
		0.17	FILL / Gravelly SAND, with silt: grey and brown; medium to coarse; sub-angular gravel.		FILL		M		ES		0.17 0.18	PID	<1ppm
			Borehole discontinued at 0.18m depth. Refusal on inferred siltstone .										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools
METHOD: 150mm diameter diatube to 0.17m, HA to 0.18m
REMARKS: NA

OPERATOR: A1 Concrete

LOGGED: I Riaz
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH8
DATE: 12/02/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(^) DENSITY.(^)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/02/25 No free groundwater observed during augering		CONCRETE SLAB: 110 mm.				NA						
	0.11	FILL / Gravelly SAND, with clay, trace sandstone, siltstone, timber; medium to coarse; angular to sub-angular (up to 5mm) gravel.		FILL	ND	M		* ES		0.11	PID	<1ppm
								ES		0.25	PID	<1ppm
	0.30	SILTSTONE: grey-brown.				D						
		Borehole discontinued at 0.35m depth. Refusal on inferred siltstone .										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (^)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools
METHOD: 150mm diameter diatube to 0.11m, HA to 0.35m
REMARKS: *Replicate sample BD2 taken from 0.11-0.13 depth.

OPERATOR: A1 Concrete

LOGGED: I Riaz
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH9
DATE: 12/02/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed during augering		CONCRETE SLAB: 150 mm.			ND	NA						
	0.15	Sandy CLAY (CI-CH): pale brown and grey; medium to high plasticity; medium to coarse sand.		RS		NDF	0.2	ES		0.15	PID	<1ppm
12/02/25		Borehole discontinued at 0.21m depth. Refusal on inferred siltstone or hard clay.										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools
METHOD: 150mm diameter diatube to 0.15m, HA to 0.21m
REMARKS: NA

OPERATOR: A1 Concrete

LOGGED: I Riaz
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH10
DATE: 12/02/25
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(^) DENSITY.(^)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	TESTING AND REMARKS: RESULTS AND REMARKS
12/02/25 No free groundwater observed during augering		0.00	CONCRETE SLAB: 150mm thick.				NA						
		0.15	FILL / Silty Gravelly SAND: pale brown; fine to coarse; low to medium plasticity silt; igneous and sandstone gravel.		FILL		NDF		ES		0.15	PID	<1ppm
		0.20									0.20		
		0.25	FILL / Sandy CLAY, trace gravel: pale-brown and dark grey-brown; medium to high plasticity; fine to coarse sand; sandstone gravel.		FILL	ND	w<PL		ES		0.30	PID	<1ppm
		0.40									0.40		
		0.70							ES		0.70	PID	<1ppm
		0.90	CLAY (CI-CH): dark grey; medium to high plasticity.		RS						0.90		
		1									1		
		1.20							* ES		1.20	PID	<1ppm
		1.30	Borehole discontinued at 1.30m depth. Target depth reached.								1.30		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (^)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools
METHOD: 150mm diameter diatube to 0.15m, HA to 1.3m
REMARKS: * Replicate sample BD1 taken at 1.2-1.3m depth

OPERATOR: A1 Concrete

LOGGED: I Riaz
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: Silvernight (Crows Nest) Landowner Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 270 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH11
DATE: 12/02/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(^) DENSITY.(^)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/02/25 No free groundwater observed during augering		CONCRETE SLAB: 220 mm thick.			ND	NA						
	0.22	FILL / Gravelly SAND, with silt, trace siltstone: grey and brown; medium to coarse.		FILL		M		ES		0.22 – 0.24	PID	<1ppm
	0.25	SILTSTONE: grey-brown.				D						
		Borehole discontinued at 0.26m depth. Refusal on inferred siltstone .										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (^)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand tools
METHOD: 150mm diameter diatube to 0.22m, HA to 0.26m
REMARKS: NA

OPERATOR: A1 Concrete

LOGGED: I Riaz
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style XW. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	KL
Unknown	Information was not available to allow classification of the property. For example, when auguring in loose, saturated sand auger cuttings may not be returned.	UK
No data	Information required to allow classification of the property was not available. For example if drilling is commenced from the base of a hole predrilled by others	ND
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example providing a description of the strength of a concrete pavement	NA

Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Soil Descriptions

Terminology
Symbols
Abbreviations

March 2024

Introduction

All materials which are not considered to be "in-situ rock" are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:



The "classification" comprises a two character "group symbol" providing a general summary of dominant soil characteristics. The "name" summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either "fine grained" (also known as "cohesive" behaviour) or "coarse grained" ("non cohesive" behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as "oversize"	
Cobble	63 - 200		
Gravel[1]	2.36 - 63	Coarse	>65%
Sand[1]	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

[1] – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer "component proportions" below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a "Sandy CLAY", this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a "primary", "secondary", or "minor" component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition[1]	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor[2]	Present in the soil, but not significant to its engineering properties	All other components	All other components

[1] As defined in AS1726-2017 6.1.4.4

[2] In the detailed material description, minor components are split into two further sub-categories. Refer "identification of minor components" below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, "INTERBEDDED Silty CLAY AND SAND".

Soil Descriptions

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component [1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code NDF, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example (VS).

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as "extremely weathered material" in reports and by the abbreviation code XWM on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than 'very low' as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Fluvial	Deposited by channel fill and overbank (natural levee, crevasse splay or flood basin)	FLV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

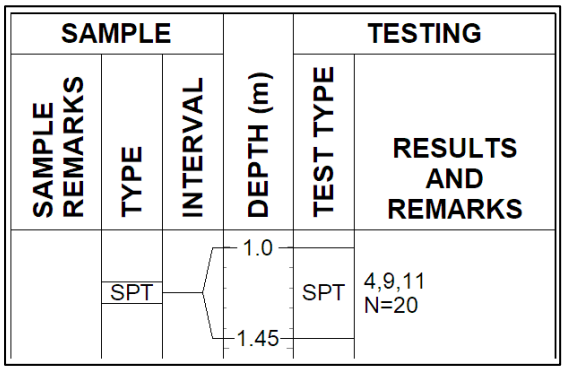
The presence of particles considered to be "oversize" may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with "MIXTURE OF".

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Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Acid Sulfate sample	ASS
Bulk sample	B
Core sample	C
Disturbed sample	D
Environmental sample	ES
Driven Tube sample	DT
Gas sample	G
Piston sample	P
Sample from SPT test	SPT
Undisturbed tube sample	U[1]
Water sample	W
Material Sample	MT
Core sample for unconfined compressive strength testing	UCS

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y =*x* blows for *y* mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(_)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP9/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150
Dynamic probe super heavy, followed by blow count penetration increment in mm	DPSH/100

Groundwater Observations

	water seepage/inflow
	water seepage/outflow
	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Direct Push	DP
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD[1]
Air Track	AT
Diatube	DT[1]
Hand auger	HA[1]
Hand tools (unspecified)	HAND
Existing exposure	X
Hollow flight auger	HSA[1]
HQ coring	HQ3
HMLC series coring	HMLC
NMLC series coring	NMLC
NQ coring	NQ3
PQ coring	PQ3
Predrilled	PD
Push tube	PT[1]
Ripping tyne/ripper	R
Rock roller	RR[1]
Rock breaker/hydraulic hammer	EH
Sonic drilling	SON[1]
Mud/blade bucket	MB[1]
Toothed bucket	TB[1]
Vibrocore	VC[1]
Vacuum excavation	VE
Wash bore (unspecified bit type)	WB[1]

[1] – numeric suffixes indicate tool diameter/width in mm

Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location	Cows nest.				Project Number	
Well Construction Details	Well ID	BH2	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions	25/2/25			Purged By	IR
Purge Method / Equipment	Twister Pump				
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)	Y	
GW Level (pre-purge)	1.37	m bgl	Observed Well Depth	10.58	m bgl
Height of Water Column (H)	9.21	m bgl	Estimated Bore Volume*	25.78	L
GW Level (post-purge)	wet/dry	m bgl	Total Volume Purged**		L
Appearance/Comments	pale brown, silty towards the end				

Sampling Details					
Date / Time / Weather Conditions	5/3/24			Sampled By	IR
Sampling Method / Equipment	Reri Pump				
WQM Model	YSI		WQM Calibration Date		
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-micropurge)	1.14	m bgl	Observed Well Depth	10.78	m bgl
Height of Water Column		m bgl	Estimated Bore Volume*		L
GW Level (post sample)		m bgl	Total Volume of Micro-Purged		L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
1	2	22.1	3.21	789	3.92	500.5	37.73
2	5	22.1	2.99	743	3.93	504.6	29.07
3	10	22.1	2.76	789	3.96	508.9	32.32
4	15	22.1	2.73	726	4.01	509.7	35.63
5	20	22.1	2.66	738	4.00	509.4	66.04
6							
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details						
Sampling Depth (rationale)	5	m bgl,	mid water column.			
Sample Observations (e.g. colour, sediment, sheen, odour)	BH2					
Sample ID						
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	✓	Plastic	✓	PFAS (no teflon)	
	Metals (F/UF) (HNO3)	✓	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	✓
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments						

*Estimated Well Volume = H * F	Std. Drilling Diameter	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

Groundwater (GW) Field Sheet

Project and Bore Installation Details	Crows Nest					
Project Name / Site Location					Project Number	
Well Construction Details	Well ID	BH4	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details	25/2/25				
Date / Time / Weather Conditions	Indoor - overcast/rainy			Purged By	IR
Purge Method / Equipment	Twister pump.				
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-purge)	1.25	m bgl	Observed Well Depth	7.82	m bgl
Height of Water Column (H)	6.57	m bgl	Estimated Bore Volume*	18.4	L
GW Level (post-purge)	Well dry	m bgl	Total Volume Purged**	~20	L
Appearance/Comments	pale brown, no odour.				

Sampling Details	5/3/25				
Date / Time / Weather Conditions				Sampled By	IR
Sampling Method / Equipment	peri pump				
WQM Model	YSI		WQM Calibration Date		
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-micropurge)	0.41	m bgl	Observed Well Depth	7.78	m bgl
Height of Water Column		m bgl	Estimated Bore Volume*		L
GW Level (post sample)	2.73	m bgl	Total Volume of Micro-Purged		L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
1	2	23.1	6.34	1878	4.20	397.1	39.12
2	5	22.2	1.56	1905	4.61	430.3	38.41
3	10	22.6	1.70	1912	4.83	422.5	80.52
4	15	22.2	1.63	1884	4.50	424.7	371.0
5	20	22.2	1.61	1883	4.55	4208	370.17
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details						
Sampling Depth (rationale)	3	m bgl,				
Sample Observations (e.g. colour, sediment, sheen, odour)	BH4 / clear.					
Sample ID						
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	✓	Plastic	✓	PFAS (no teflon)	
	Metals (F/UF) (HNO3)	✓	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	✓
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments						

*Estimated Well Volume = H * F	Std. Drilling Diameter	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

2.8
× 6.57

Douglas PARTNERS

Groundwater (GW) Field Sheet

Project and Bore Installation Details	Crows Nest					
Project Name / Site Location		BH6			Project Number	
Well Construction Details	Well ID		Drilling Method		Hole Diameter (m)	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions	25/12/25			Purged By	IR
Purge Method / Equipment	Twister pump.				
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-purge)	3.28	m bgl	Observed Well Depth	7.77	m bgl
Height of Water Column (H)	4.49	m bgl	Estimated Bore Volume*	12.6	L
GW Level (post-purge)	welldry	m bgl	Total Volume Purged**	~20L	L
Appearance/Comments	well pale brown, turning clear, no odour.				

Sampling Details					
Date / Time / Weather Conditions	5/3/25			Sampled By	IR
Sampling Method / Equipment	Peri pump				
WQM Model	YSI		WQM Calibration Date		
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-micropurge)	2.37	m bgl	Observed Well Depth	7.79	m bgl
Height of Water Column		m bgl	Estimated Bore Volume*		L
GW Level (post sample)	5.22	m bgl	Total Volume of Micro-Purged		L

Water Quality Parameters pale brown, turning clear - no odour

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
1	2	20.5	3.23	974	4.37	437.5	10.21
2	5	20.7	3.17	1061	4.52	447.9	10.57
3	10	21.0	3.54	1051	4.61	449.1	49.19
4	15	21.1	3.92	1057	4.45	445.5	102.84
5	20	21.1	3.84	1065	4.39	458.7	115.12

Notes: # Considered stabilised if three DO values are less than 0.5 mg/L ^ Considered stabilised if three Turbidity values are less than 5 NTU

Sample Details							
Sampling Depth (rationale)	5	m bgl,	mid.				
Sample Observations (e.g. colour, sediment, sheen, odour)	clear.						
Sample ID	BH6 (BD)						
QAQC Samples	Replicate	✓	Triplicate		Other		
Sample Containers Quantity / Preservation / Filtration	Amber glass	✓	Plastic	✓	PFAS (no teflon)		
	Metals (F/UF) (HNO3)	✓	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	✓	
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other		
Comments							

*Estimated Well Volume = H * F	Std. Drilling Diameter	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

Appendix D

Table Summary Results

Douglas PARTNERS

Table G1: Summary of Laboratory Results – Soil

			Priority metals								Priority PAH				PAH												Priority TRH					
			Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene [b]	Benzo(a)pyrene (B(a)P)	Benzo(a)pyrene TEQ (B(a)P TEQ)	Total PAH	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	TRH C6 - C10	TRH >C10-C16	F1 ([C6-C10]-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34- C40)
HIL B			500	150	500	30 000	1200	120	1200	60 000			4	400																		
HSL B (2 m to <4 m)											NL																		150	NL		
HSL D (2 m to <4 m)											NL																		NL	NL		
EIL			100		410	65	1100		65	210	170																					
ESL												0.7																	180	120	300	2800
		PQL	4	0.4	1	1	1	0.1	1	1	1	0.05	0.5	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	25	50	25	50	100	100
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH8	0.11 - 0.13 m	12/02/25	<4	<0.4	**6**	**5**	**5**	**0.1**	**5**	**23**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BD2	0 m	12/02/25	<4	<0.4	**6**	**5**	**4**	<0.1	**6**	**16**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH8	0.25 - 0.3 m	12/02/25	<4	<0.4	**8**	**6**	**7**	<0.1	**8**	**22**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH11	0.22 - 0.24 m	12/02/25	<4	<0.4	**7**	**59**	**6**	**0.2**	**12**	**19**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH10	0.15 - 0.2 m	12/02/25	<4	<0.4	**7**	**120**	**4**	**0.2**	**14**	**16**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH10	0.3 - 0.4 m	12/02/25	<4	<0.4	**8**	**3**	**13**	<0.1	**2**	**14**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH10	0.7 - 0.9 m	12/02/25	<4	<0.4	**5**	**1**	**11**	<0.1	<1	**8**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH10	1.2 - 1.3 m	12/02/25	<4	<0.4	**5**	**1**	**12**	<0.1	**1**	**8**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BD1	0 m	12/02/25	<4	<0.4	**7**	**2**	**12**	<0.1	<1	**5**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH9	0.15 - 0.2 m	12/02/25	<4	<0.4	**10**	**10**	**7**	<0.1	**13**	**21**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH7	0.17 - 0.18 m	12/02/25	<4	<0.4	**7**	**57**	**5**	**0.7**	**21**	**29**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH1	0.14 - 0.2 m	24/02/25	<4	<0.4	**6**	**12**	**4**	<0.1	**8**	**15**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH1	0.8 - 0.9 m	24/02/25	<4	<0.4	**7**	**3**	**9**	<0.1	**2**	**15**	<1	**0.06**	<0.5	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	**0.2**	<25	<50	<25	<50	<100	<100
BH2	0.2 - 0.3 m	17/02/25	**5**	<0.4	**4**	**2**	**1**	<0.1	**3**	**3**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH2	0.4 - 0.5 m	17/02/25	**4**	<0.4	**8**	**3**	**5**	<0.1	**4**	**11**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH3	0.15 - 0.2 m	17/02/25	<4	<0.4	**9**	**8**	**10**	<0.1	**4**	**23**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH3	0.3 - 0.4 m	17/02/25	**15**	<0.4	**45**	**1**	**15**	**0.2**	<1	**3**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH4	0.11 - 0.3 m	18/02/25	<4	<0.4	**7**	**12**	**4**	<0.1	**14**	**20**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH5	0.2 - 0.3 m	21/02/25	**6**	<0.4	**8**	**7**	**11**	<0.1	**4**	**28**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH6	0.2 - 0.25 m	18/02/25	**13**	<0.4	**10**	**6**	**15**	<0.1	<1	**2**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH6	0.4 - 0.45 m	18/02/25	<4	<0.4	**7**	**20**	**7**	<0.1	**11**	**7**	<1	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100
BH1 - [TRIPLICATE]	0.14 - 0.2 m	24/02/25	<4	<0.4	**5**	**14**	**4**	<0.1	**8**	**13**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Naphthalene reported as highest detection from the BTEXN or PAH suite, or if both results <PQL as lowest PQL

c EIL criteria applies to DDT only

270 Pacific Hwy, crows nest, NSW, 2065

Table G1: Summary of Laboratc

			TRH		BTEX				VOC	Priority phenols	OCP										OPP		PCB				
			TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	All VOC	Total Phenolics	DDT+DDE+DDD c	Aldrin + Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Mirex	All other OCP	Chlorpyriphos	All other OPP	Total PCB	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation
HIL B										45 000	600	10	90	400	20	10	15	500			340		1			
HSL B (2 m to <4 m)					2	NL	NL	NL																0.04		0.001
HSL D (2 m to <4 m)					9	NL	NL	NL																0.05		0.001
EIL																										
ESL					50	85	70	105																		
		PQL	25	50	0.2	0.5	1	1	1	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.01		0.001
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%(w/w)	g	%(w/w)
BH8	0.11 - 0.13 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	<1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.001
BD2	0 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	0.25 - 0.3 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.22 - 0.24 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	<1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.001
BH10	0.15 - 0.2 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.001
BH10	0.3 - 0.4 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
BH10	0.7 - 0.9 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
BH10	1.2 - 1.3 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1	0 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	0.15 - 0.2 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	<1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.001
BH7	0.17 - 0.18 m	12/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-
BH1	0.14 - 0.2 m	24/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	-	<0.001
BH1	0.8 - 0.9 m	24/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	0.2 - 0.3 m	17/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	-	<0.001
BH2	0.4 - 0.5 m	17/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	<0.001
BH3	0.15 - 0.2 m	17/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	-	<0.001
BH3	0.3 - 0.4 m	17/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4	0.11 - 0.3 m	18/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	-	<0.001
BH5	0.2 - 0.3 m	21/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	-	<0.001
BH6	0.2 - 0.25 m	18/02/25	<25	<50	<0.2	<0.5	<1	<1	-	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	-	<0.001
BH6	0.4 - 0.45 m	18/02/25	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1 - [TRIPLICATE]	0.14 - 0.2 m	24/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

a QA/QC replicate of sample listed di

b Naphthalene reported as highest c

c EIL criteria applies to DDT only

270 Pacific Hwy, crows nest, NSW, 2065

Douglas PARTNERS

Table G2: Summary of Laboratory Results – Groundwater

		Metals - Dissolved								TRH				BTEX						PAH															
		Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Naphthalene	Benzo(a)pyrene (BaP)	Benzo(b+k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Sum of detected PAH
	PQL	1	0.1	1	1	1	0.05	1	1	10	50	100	100	1	1	1	1	2	1	0.1	0.1	0.1	0.1	1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NEPC (2013) HSL B (2-4m)										NL	NL			5000	NL	NL			NL					NL											
NEPC (2013) HSL D (2-4m)										NL	NL			30 000	NL	NL			NL					NL											
ANZG (2018) 95% LOP Fresh (Hardness adjusted)		13	0.7	10.6	1.4	20.8	0.06	36.9	26.8					950	180	80	350	75				0.01		16	0.1					1			0.6		
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	5/03/2025	<1	**1.4**	<1	**49**	<1	<0.05	**17**	**160**	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH4	5/03/2025	**2**	**4.7**	<1	**640**	**1**	<0.05	**110**	**670**	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH6	5/03/2025	**1**	**7.9**	<1	**1,100**	**1**	<0.05	**330**	**930**	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BD1	5/03/2025	**1**	**6.6**	<1	**1000**	<1	<0.05	**280**	**750**	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Notes:

- No criterion / not defined / not tested / not applicable
* QA/QC replicate of sample listed directly below the primary sample
NL Not limiting
PQL Practical quantitation limit
Shaded cell is exceedance of guideline value
Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded
NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Clay 2-4m
ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals]
ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is 'unknown' level of protection
Underlining of ANZG (2018) criteria indicates a criteria with an 'unknown' level of protection.
ANZG (2018) DGV adopted for most conservative species of following analytes: DGV for xylene (m) adopted for xylene (m+p); DGV for CrVI adopted for total chromium; DGV for AsV adopted for total arsenic
ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered
ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

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Table G2: Summary of Labora

		OCP																					OPP																					
		DDE	DDT	DDD	Aldrin	Dieldrin	Aldrin + Dieldrin (calculated)	alpha-chlordane	gamma-Chlordane	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Methoxychlor	alpha-BHC	beta-BHC	delta-BHC	Lindane	Sum of detected OCP	Azinphos methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Ronnel (fenchlorphos)	Fenitrothion	Fenthion	Malathion	Parathion	Parathion-methyl	Methidathion	Fenamiphos	Sum of detected OPP
	PQL	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.02	0.05	0.009	0.05	0.01	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.004	0.05	0.05	0.05	0.004
NEPC (2013) HSL B (2-4m)																																										
NEPC (2013) HSL D (2-4m)																																										
ANZG (2018) 95% LOP Fresh (Hardness adjusted)			0.006		0.001	0.01							0.01		0.01			0.005								0.01		0.01		0.15			0.2		0.05	0.004					
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	5/03/2025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.05	<0.009	<0.05	<0.01	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.004	<0.05	<0.05	<0.05	<0.004
BH4	5/03/2025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.05	<0.009	<0.05	<0.01	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.004	<0.05	<0.05	<0.05	<0.004
BH6	5/03/2025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.05	<0.009	<0.05	<0.01	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.004	<0.05	<0.05	<0.05	<0.004
BD1	5/03/2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

- No criterion / not defined / not test
* QA/QC replicate of sample listed di
NL Not limiting
PQL Practical quantitation limit
Shaded cell is exceedance of guide
Where one or more guideline value
NEPC (2013) National Environment
ANZG (2018) Australian and New Ze
ANZG (2018) Australian and New Ze
Underlining of ANZG (2018) criteria
ANZG (2018) DGV adopted for most
ANZG (2018) DGV adopted for alum
ANZG (2018) Ammonia DGV is pH a

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Table G2: Summary of Labora

		PCB								VOC			
		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Sum of detected PCB	Bromodichloromethane	Chloroform	All other VOC	Sum of detected VOC
	PQL	2	2	2	2	2	2	2	2	1	1		1
NEPC (2013) HSL B (2-4m)													
NEPC (2013) HSL D (2-4m)													
ANZG (2018) 95% LOP Fresh (Hardness adjusted)					0.3		0.01				770		
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	5/03/2025	<2	<2	<2	<2	<2	<2	<2	<2	<1	**1**	<PQL	**1**
BH4	5/03/2025	<2	<2	<2	<2	<2	<2	<2	<2	<1	**1**	<PQL	**1**
BH6	5/03/2025	<2	<2	<2	<2	<2	<2	<2	<2	**1**	**5**	<PQL	**6**
BD1	5/03/2025	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

-	No criterion / not defined / not test
*	QA/QC replicate of sample listed di
NL	Not limiting
PQL	Practical quantitation limit
	Shaded cell is exceedance of guide
	Where one or more guideline value
	NEPC (2013) National Environment
	ANZG (2018) Australian and New Ze
	ANZG (2018) Australian and New Ze
	Underlining of ANZG (2018) criteria
	ANZG (2018) DGV adopted for most
	ANZG (2018) DGV adopted for alum
	ANZG (2018) Ammonia DGV is pH a

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Table G3: Summary of Laboratory Results – Waste Classification Assessment

			Metals						TRH		BTEX				PAH		Phenols	OCP				OPP	PCB	VOC																Asbestos				
			Total Arsenic	Cadmium	Total Chromium	Lead	Mercury (inorganic)	Nickel	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Benzo(a)pyrene (BaP)	Total PAH	Total Phenolics	Scheduled Chemical Waste (standard)	Total Endosulfan	Total Analysed OCP	Mirex	Total Analysed OPP	Total PCB	carbon tetrachloride	Monochlorobenzene	Chloroform	1,2-dichlorobenzene	1,4-dichlorobenzene	1,2-dichloroethane	1,1-Dichloroethene	Styrene (Vinylbenzene)	1,1,1,2-tetrachloroethane	1,1,2,2-tetrachloroethane	tetrachloroethene	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1,2-trichloroethylene	Vinyl Chloride	Asbestos ID in soil >0.1g/kg	Trace Analysis (AS)	Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)
		PQL	4	0.4	1	1	0.1	1	25	50	0.2	0.5	1	1	0.05	0.05	5	0.1	0.1	0.1	0.1	0.1	0.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	-	-	-	-
BH8	0.11 - 0.13 m	12/02/25	<4	<0.4	**6**	**5**	**0.1**	**5**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	NAD	NAD	NAD
BD2	0 m	12/02/25	<4	<0.4	**6**	**4**	<0.1	**6**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	0.25 - 0.3 m	12/02/25	<4	<0.4	**8**	**7**	<0.1	**8**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-
BH11	0.22 - 0.24 m	12/02/25	<4	<0.4	**7**	**6**	**0.2**	**12**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	NAD	NAD	NAD
BH10	0.15 - 0.2 m	12/02/25	<4	<0.4	**7**	**4**	**0.2**	**14**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH10	0.3 - 0.4 m	12/02/25	<4	<0.4	**8**	**13**	<0.1	**2**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH10	0.7 - 0.9 m	12/02/25	<4	<0.4	**5**	**11**	<0.1	<1	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH10	1.2 - 1.3 m	12/02/25	<4	<0.4	**5**	**12**	<0.1	**1**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1	0 m	12/02/25	<4	<0.4	**7**	**12**	<0.1	<1	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	0.15 - 0.2 m	12/02/25	<4	<0.4	**10**	**7**	<0.1	**13**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	NAD	NAD	NAD
BH7	0.17 - 0.18 m	12/02/25	<4	<0.4	**7**	**5**	**0.7**	**21**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	-	-	-
BH1	0.14 - 0.2 m	24/02/25	<4	<0.4	**6**	**4**	<0.1	**8**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH1	0.8 - 0.9 m	24/02/25	<4	<0.4	**7**	**9**	<0.1	**2**	<25	<50	<0.2	<0.5	<1	<1	**0.06**	**0.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	0.2 - 0.3 m	17/02/25	**5**	<0.4	**4**	**1**	<0.1	**3**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH2	0.4 - 0.5 m	17/02/25	**4**	<0.4	**8**	**5**	<0.1	**4**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH3	0.15 - 0.2 m	17/02/25	<4	<0.4	**9**	**10**	<0.1	**4**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH3	0.3 - 0.4 m	17/02/25	**15**	<0.4	**45**	**15**	**0.2**	<1	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4	0.11 - 0.3 m	18/02/25	<4	<0.4	**7**	**4**	<0.1	**14**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH5	0.2 - 0.3 m	21/02/25	**6**	<0.4	**8**	**11**	<0.1	**4**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH6	0.2 - 0.25 m	18/02/25	**13**	<0.4	**10**	**15**	<0.1	<1	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD
BH6	0.4 - 0.45 m	18/02/25	<4	<0.4	**7**	**7**	<0.1	**11**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1 - [TRIPLICATE]	0.14 - 0.2 m	24/02/25	<4	<0.4	**5**	**4**	<0.1	**8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Classification Criteria [f]																																											
CT1			100	20	100	100	4	40	-	10,000	10	288	600	1000	0.8	200	288	<50	60	-	-	4	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCC1			500	100	1,900	1,500	50	1,050	-	10,000	18	518	1,080	1,800	10	200	518	<50	108	-	-	7.5	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TCLP1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CT2			400	80	400	400	16	160	-	40,000	40	1,152	2,400	4,000	3.2	800	1,152	<50	240	-	-	16	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCC2			2,000	400	7,600	6,000	200	4,200	-	40,000	72	2,073	4,320	7,200	23	800	2,073	<50	432	-	-	30	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TCLP2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Total chromium used as initial screen for chromium(VI).

c Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)

d Criteria for scheduled chemicals used as an initial screen

e Criteria for Chlorpyrifos used as initial screen

f NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste

PQL Practical quantitation limit

CT1 Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste

SCC1 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

TCLP1 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

CT2 Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste

SCC2 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

TCLP2 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

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Appendix E

Unexpected Finds Protocol

1. General

Where the site conditions are found to be different than anticipated, the proposed remediation approach may not be appropriate for the contamination encountered. In such cases the Environmental Consultant is to re-assess the contamination and remediation approach. Where necessary the Environmental Consultant will prepare an addendum to, or revision of, this RAP.

2. Contingency plan

This contingency plan has been developed to provide guidance on processes to follow if contamination (or indicators of contamination), is encountered during the redevelopment works. Any such finds shall be surveyed and the location documented.

Although the site has been subject to previous investigation(s), there remains a potential for contamination to be present between sampled locations. In the event that signs of contamination, are encountered during remediation e.g. evidence of asbestos containing material (ACM), petroleum, or other chemical odours which were not previously identified the following protocols will apply:

- The Site Manager is to be notified and the affected area closed off by the use of barrier tape and warning signs;
- The Environmental Consultant is to be notified to inspect the area and assess the significance of the potential contamination and determine extent of remediation works (if deemed necessary) to be undertaken. An assessment report and management plan detailing this information will be compiled by the Environmental Consultant and provided to the Principal's Representative;
- The assessment results together with a suitable management plan shall be provided by the Principal's Representative to the Consent Authority (if required by the development consent);
- The agreed management / remedial strategy, based on the RAP and relevant guidelines, shall be implemented; and
- All details of the assessment and remedial works are to be included in the site validation report.

3. Unexpected finds protocol

This unexpected finds protocol (UFP) has been developed to provide guidance on processes to follow if any unexpected find is encountered during the remediation or future civil and construction works. Any unexpected finds should be surveyed and the location documented.

All site personnel are to be inducted into their responsibilities under this (UFP), which should be included or referenced in the Remediation Contractors Environmental Management Plan.

All site personnel are required to report unexpected signs of environmental concern to the Site Manager if observed during the course of their works e.g. presence of potential unexploded ordinance, unnatural staining, potential contamination sources (such as buried drums or tanks) or chemical spills.

Should signs of concern be observed, the Site Manager, as soon as practical, will:

- Stop work in the affected area and ensure the area is barricaded to prevent unauthorised access;
- Notify authorities needed to obtain emergency response for any health or environmental concerns (e.g. fire brigade);
- Notify the Principal's Representative of the occurrence;
- Notify any of the authorities that the Remediation Contractor is legally / contractually required to notify (e.g. EPA, Council); and
- Notify the Environmental Consultant.

The Principal's Representative is to notify any of the authorities which the Principal is legally / contractually required to notify (e.g. EPA, Council).

The Environmental Consultant will assess the extent and significance of the find and develop an investigation, remediation or management approach using (where possible) the principles and procedures already outlined in the RAP. Where a Site Auditor is involved, the proposed approach will be discussed and agreed with the Site Auditor prior to implementation.

4. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

WA DoH. (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.* WA Department of Health.

Appendix F

Remediation Options Assessment and Evaluation

1. Introduction

The following key guidelines and technical reports were consulted in the preparation of this remediation options assessment:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM])* (NEPC, 2013);
- CRC CARE *National Remediation Framework Guidelines: Remediation Action Plan Development - Guideline on Performing Remediation Options Assessment* (CRC CARE, 2019a);
- CRC CARE *National Remediation Framework Guidelines: Technology Guides: Soil* (CRC CARE, 2019b); and
- CRC CARE *National Remediation Framework Guidelines: Technology Guides: Groundwater* (CRC CARE , 2019c).

The first stage of developing a remediation strategy is to establish clear and measurable remediation objectives and remediation criteria (clean-up levels). These will form the requirements against which remediation options are assessed.

The next stage of the remediation options assessment is to select technology and management options, or combinations of options, that have the potential to reduce contaminant concentrations and/or apply management controls as necessary so that the remediation objectives are achieved, and no unacceptable risk is posed by the contamination in the context of the current and proposed site use. Where several viable options have been identified, an assessment of each of the options will be required to determine which option will most adequately and sustainably meet the remediation objectives.

The remediation objectives are to:

- Address potentially unacceptable risks to relevant environmental values from contamination (refer to the CSM in Section 7); and
- Render the site suitable, from a contamination perspective, for the proposed development (refer to Section 2).

2. Hierarchy of remediation options

NEPC (2013) stipulates the preferred hierarchy of options for site clean-up (remediation) and/or management which is outlined as follows:

- On-site treatment of the contamination so that it is destroyed, or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil, so that the contamination is destroyed, or the associated risk is reduced to an acceptable level, after which soil is returned to the site.

or, if these two options are not practicable:

- Consolidation and isolation of the soil on site by containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material.

or,

- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

3. Remediation options

Some of the most common remediation technologies or the identified potential contaminants of concern are considered in Table 1, referenced from the CRC CARE *National Remediation Framework Guidelines*. In some of the cases, a combination of remediation options outlined bleow may apply so that the remediation objecitves are achieved and no unaccetable risk is posed by the site contamination in relation to the current / proposed development.

Table 1: Soil, soil vapour and groundwater remediation / management options

Soil – Remediation / Management Options		
Option	**Pros**	**Cons**
Containment: contain soil contamination at depth, covering by a capping layer or structure (i.e. a building), or containment in an engineered onsite containment cell.	- Can be the most cost-efficient method of soil remediation. - Suitable for site developments with sufficient below ground area to contain contaminated soil (noting this may not be possible where basement excavations cover a large portion of the site). - Suitable for asbestos-contaminated soil to reduce the potential release of asbestos fibres during excavation / remediation.	- This option may not be allowed by the relevant development consent authorities. - The implementation and legal enforcement of a long-term environmental management plan (LTEMP); and the responsibility of the site owner to manage such as system on a long-term basis. - Potential devaluation of the property. - Not suitable for contaminants with high leaching potential / volatile contaminants.
Excavation: comprising delineation of soil contaminants followed by removal of identified contaminated soils. Excavation may be followed by ex situ treatment and reuse on site or offsite, or disposal at an approved landfill facility.	- Most suitable for proposed basement excavation. - Permanent removal of site contamination. - No need to comply with a long-term environmental management plan (LTEMP).	- The high disposal costs associated with off-site disposal of the contaminated waste in a landfill facility. - Requirements for geotechnical stabilisation, classification, segregation and use or disposal and final validation.

Soil – Remediation / Management Options		
Option	**Pros**	**Cons**
Chemical immobilisation and solidification (CIS): involves the addition of reagents / additives to contaminated soil to either immobilise / solidify contaminants within the soil.	- Commonly used and widely available at low cost. - Applicable to both *in situ* / *ex situ* remediation. - Suitable for inorganic contaminants such as metals and asbestos and organic contaminants such as pesticides, petroleum hydrocarbons, polycyclic aromatic hydrocarbons, volatile and semi volatile organic compounds and polychlorinated biphenyls.	- Time consuming requires bench / pilot trials prior to actual application. - Large machines may be required – not suitable for sites with limited space.
Soil Vapour - Remediation / Management Options		
Option	**Pros**	**Cons**
Soil vapour extraction/treatment: to remove contaminated soil vapour from the unsaturated zone in a soil profile / fractured rock. It applies a vacuum to extraction wells (vertical) and/or trenches or wells (horizontal) which have been installed in the subsurface of the area to be remediated. The vacuum induces the controlled flow of soil vapour, removing volatile and some semi-volatile organic contaminants from the soil profile. The extracted vapour stream is remediated via technologies such as the granular activated carbon, biofiltration, combustive technologies / condensation.	- The airway in the system may also enhance evaporation of non-aqueous phase liquids, volatilisation of contaminants dissolved in pore water, desorption of contaminants from the surface of soil particles and promote biodegradation.	- Cost / labour / time intensive to design and install a site-specific system.

Soil – Remediation / Management Options		
Option	**Pros**	**Cons**
Vapour barrier (with a passive or active venting system as required): placement of geomembrane or similar beneath the building / foundation / basement to prevent vapour intrusion. The vapour barrier method is normally adopted in concurrent with a venting system. The venting system involves the installing a venting layer beneath the building / foundation / basement. The build-up of vapours moves through the venting layer toward the sides of the building where it is vented outdoors. Venting systems can be passive or active.	- Cost effective and ideal for new construction / development. May not suitable for existing buildings / structures.	- Long-term management and maintenance of system under a LTEMP.
Groundwater - Remediation / Management Options		
Option	**Pros**	**Cons**
***In situ* air sparging (IAS):** is a process where air is injected directly into the saturated subsurface to volatilise contaminants from liquid to vapour phase for treatment / removal in the unsaturated zone and is normally combined with the soil vapour extraction / treatment system. In addition, it biodegrades contaminants in the saturated and unsaturated zone via stimulation by the introduction of oxygen.	- IAS is a mature technology and relatively easy technology to implement. - It is well known to regulatory agencies. - The equipment associated with IAS is generally inexpensive and easily obtained.	- The viability of the IAS is subject to the acceptable 'clean up' level, the uniformity and permeability of the local geology, and distribution, concentration and extent of the contaminant. In addition, other variables such as whether the contaminant is sufficiently volatile and whether the presence of air will be helpful in encouraging oxidation and reduction of the contamination will determine the success of IAS. - The risk of contaminant rebound. - Requires long-term groundwater monitoring to validate the success of IAS.

Soil – Remediation / Management Options		
Option	**Pros**	**Cons**
***In Situ* chemical oxidation (ISCO):** involves the injection of a chemical oxidant into the ground for the purpose of transforming contaminants such as carbon dioxide, water and inorganic chloride.	- ISCO technologies are useful as part of a sequential or more complex remedial approach.	- The complexity of many chemical reaction steps required to complete this transformation, the design of the oxidant delivery system and optimisation of the dose.
Monitored natural attenuation (MNA): is the monitoring of naturally occurring physical, chemical and biological processes to demonstrate via multiple lines of evidence that one or any combination of those processes reduce the mass, concentration, flux or toxicity of contaminants in groundwater, to an acceptable level within an acceptable timeframe.	- MNA is normally introduced towards the later stage of the remediation program and is ideal for sites where the contaminant plumes are no longer increasing in size (stable) or are shrinking in size.	- MNA cannot applied where migration of significant groundwater contamination is occurring, or there are unacceptable impacts to receptors. - Significant monitoring over a minimum of two years is normally required to verify that the processes of MNA are active and effective.

4. Preferred remediation strategy

If remediation for contaminated soil, groundwater or soil vapour is required, a remediation options assessment will be undertaken with reference to Table 1 above, and a preferred remediation strategy selected in conjunction with the site owner.

With reference to the current understanding of site contamination, but also noting the identified risk for additional contamination, the preferred remediation options, if required and appropriate for the identified contamination, are considered to be:

- Soil – Excavation and off-site disposal.
- Soil vapour - Vapour barrier (with a passive venting system as required).
- Groundwater: Monitored natural attenuation (MNA).

5. References

CRC CARE . (2019c). *Technology Guides: Groundwater* . National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment .

CRC CARE. (2019a). *CRC for Contamination Assessment and Remediation of the Environment*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

CRC CARE. (2019b). *Technology Guides: Soil* . National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

WA DoH. (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.* WA Department of Health.

WorkCover NSW. (2014). *Managing Asbestos in or on Soil.* March 2014: WorkCover NSW, NSW Government.

Appendix G

Site Assessment Criteria

1. Introduction

1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).
- ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
- NHMRC *Guidelines for Managing Risks In Recreational Water* (NHMRC, 2008).
- NHMRC, NRMMC *Australian Drinking Water Guidelines 6 2011, Version 3.2* (NHMRC, NRMMC, 2022).
- ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2025).

1.2 General

The SAC applied in the RAP are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The proposed mixed-use development includes residential apartments and commercial (retail / medical) spaces, which have been adopted to derive the SAC. More specifically, the following inputs are relevant to the selection and/or derivation of the SAC:

- Land use: residential / commercial:
  - Corresponding to land use category 'B', residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats. Applicable to the whole of the site.
  - Corresponding to land use category 'D', commercial such as shops and medical clinics. Applicable for health screening levels for volatile contaminants for the proposed basement footprint.
- Soil type: clay.

2. Soils

2.1 Health investigation and screening levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are outlined in the tables, below.

Table 1: Health investigation levels (mg/kg)

Contaminant	HIL-B
Metals	
Arsenic	500
Cadmium	150
Chromium (VI)	500
Copper	30 000
Lead	1200
Mercury (inorganic)	120
Nickel	1200
Zinc	60 000
PAH	
B(a)P TEQ	4
Total PAH	400
Phenols	
Phenol	45 000
Pentachlorophenol	130
OCP	
DDT+DDE+DDD	600
Aldrin and dieldrin	10
Chlordane	90
Endosulfan	400
Endrin	20
Heptachlor	10
HCB	15
Methoxychlor	500
OPP	
Chlorpyrifos	340

Contaminant	HIL-B
PCB	
PCB	1
VOC (various analytes)	-

Table 2: Health screening levels (mg/kg)

Contaminant	HSL-D	HSL-D
CLAY	**0 m to <1 m**	**2 m to <4 m**
Benzene	4	9
Toluene	NL	NL
Ethylbenzene	NL	NL
Xylenes	NL	NL
Naphthalene	NL	NL
TRH F1	310	NL
TRH F2	NL	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

Table 2a: Health screening levels for direct contact (mg/kg)

Contaminant	DC HSL-B	DC HSL-D	DC HSL-IMW
Benzene	140	430	1100
Toluene	21 000	99 000	120 000
Ethylbenzene	5900	27 000	85 000
Xylenes	17 000	81 000	130 000
Naphthalene	2200	11 000	29 000
TRH F1	5600	26 000	82 000
TRH F2	4200	20 000	62 000
TRH F3	5800	27 000	85 000
TRH F4	8100	38 000	120 000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
IMW intrusive maintenance worker

2.2 Health investigation levels for per- and poly-fluoroalkyl substances in soil

The laboratory analytical results for per- and poly-fluoroalkyl substances (PFAS) in soil have been assessed against HIL published in HEPA (2025). The HIL represent a nationally-agreed suite that should be used to inform site investigations. The HIL are intentionally conservative, and an exceedance of these criteria may not constitute a risk if other exposure pathways are controlled. An exceedance of the HIL should trigger further investigations, such as a site-specific risk assessment. At the time of this investigation, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The HIL derived from Table 5 of HEPA (2025) are in Table 3.

Table 3: Health investigation levels (mg/kg)

Contaminant	HIL-B
PFOS and PFHxS *	2
PFOA	20

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

2.3 Asbestos in soil

The HSL for asbestos in soil are based on likely exposure levels for different scenarios published in NEPC (2013) for the following forms of asbestos:

- Bonded asbestos containing material (ACM); and
- Fibrous asbestos and asbestos fines (FA and AF).

The HSL are in Table 4.

Table 4: Health screening levels for asbestos

Form of asbestos	HSL-B
ACM	0.04%
FA and AF	0.001%
FA and AF and ACM	No visible asbestos for surface soil *

Notes: Surface soils defined as top 10 cm.
* Based on site observations at the sampling points and the analytical results of surface samples.

Where insufficient sample recovery is possible for FA and AF analysis the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) will be adopted for the assessment as an initial screen.

2.4 Ecological investigation levels

Ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, have been derived in NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene. The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website are shown in Table 5, with inputs into their derivation shown in Table 5.

Table 5: Inputs to the derivation of the ecological investigation levels

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	No new known sources of contamination
pH	4.0	Assumed
CEC	6.6 $cmol_c/kg$	Average calculated from laboratory results
Clay content	10 %	Assumed
Traffic volumes	high	High traffic area
State / Territory	NSW	–

Table 6: Ecological investigation levels (mg/kg)(provisional, may be updated based on updated information on the soil parameters, such as pH)

Contaminant	EIL-A-B-C
Metals	
Arsenic	100
Copper	65
Nickel	65
Chromium III	410
Lead	1100
Zinc	210
PAH	
Naphthalene	170
OCP	
DDT	180

Notes: EIL-A-B-C urban residential and public open space

2.5 Ecological screening levels

Ecological screening levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table 7.

Table 7: Ecological screening levels (mg/kg)

Contaminant	Soil type	EIL-A-B-C	EIL-D
Benzene	Fine	65	95
Toluene	Fine	105	135
Ethylbenzene	Fine	125	185
Xylenes	Fine	45	95
TRH F1	Coarse/ Fine	180*	215*
TRH F2	Coarse/ Fine	120*	170*
TRH F3	Fine	1300	2500
TRH F4	Fine	5600	6600
B(a)P	Fine	0.7	1.4

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene

2.6 **Ecological soil guideline values**

The SAC applied to any contingency or unexpected finds scenarios during site remediation for PFAS will use the interim ecological soil guideline values (EGV) derived from Table 6 of HEPA (2025) are in Table 8.

Table 8: Ecological soil guideline values (mg/kg) – all land uses

Contaminant	Direct exposure	Indirect exposure
PFOS	1	0.003
PFOA	10 / 0.005	0.003
PFHxS	NC	NC

Notes: NC no criterion
*For intensely developed sites with no secondary consumers and minimal potential for indirect ecological exposure, a higher criterion of up to 0.14 mg/kg PFOS may be appropriate.

2.7 **Management limits**

The SAC applied to any contingency or unexpected finds scenarios during site remediation for TRH, in addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

These 'management limits' (NEPC, 2013) are in Table 9. Management limits must not be used as remediation acceptance criteria, or validation criteria for imported material. They are included for reference only, and to aid in assessment of contingency or unexpected finds scenarios.

Table 9: Management limits (mg/kg)

Contaminant	Soil type	ML-A-B-C	ML-D
TRH F1	Fine	800	800
TRH F2	Fine	1000	1000
TRH F3	Fine	3500	5000
TRH F4	Fine	10 000	10 000

Notes: TRH F1 is TRH C_6-C_{10} including BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ML-A-B-C residential, parkland and public open space

3. Soil vapour

3.1 Interim soil vapour health investigation levels

Soil vapour interim HIL for specific chlorinated VOC were published by NEPC (2013) to assess the vapour intrusion exposure pathway.

The interim HIL for chlorinated VOC methodology employs a simple though conservative approach using an attenuation factor that relates the concentration of a volatile contaminant in indoor air to the concentration in soil gas immediately below a building foundation slab.

The interim health investigation levels (IHIL) derived from NEPC (2013) are in Table 10.

Table 10: Soil vapour interim health investigation levels, chlorinated hydrocarbons (µg/m³)

Chemical	IHIL-D
TCE	80
1,1,1–TCA	230 000
PCE	8000
cis-DCE	300
VC	100

Notes: TCE trichloroethene
1,1,1–TCA 1,1,1-trichloroethane
PCE tetrachloroethene
cis-DCE cis-1,2-dichloroethene
VC chloromethane / vinyl chloride.

3.2 Health screening levels

Soil vapour HSL for petroleum hydrocarbons were published by NEPC (2013) to assess the vapour intrusion exposure pathway.

The HSL derived from NEPC (2013) are in Table 11.

Table 11: Soil vapour health screening levels for vapour intrusion (µg/m^3)

Contaminant	HSL-D	HSL-D	HSL-D	HSL-D	HSL-D
CLAY	0-1 m	1-2 m	2-4 m	4-8 m	>8 m
Benzene	5000	80 000	230 000	530 000	1 100 000
Toluene	6 500 000	100 000 000	NL	NL	NL
Ethylbenzene	1 800 000	31 000 000	NL	NL	NL
Xylene Total	1 200 000	21 000 000	NL	NL	NL
Naphthalene	4000	85 000	240 000	560 000	1 200 000
TRH F1	1 000 000	19 000 000	55 000 000	130 000 000	270 000 000
TRH F2	800 000	NL	NL	NL	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
The maximum possible soil vapour concentrations have been calculated based on vapour pressures of the pure chemicals. Where soil vapour HSL exceed these values, a soil-specific source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

4. Groundwater

4.1 Introduction

The groundwater investigation levels (GIL) used for interpretation of the groundwater data (as a Tier 1 assessment) have been selected based on the potential risks posed from contamination sourced from the site to receptors at or down-gradient of the site, as identified by the conceptual site model (CSM). The receptors, exposure points and pathways are summarised in Table 12.

Table 12: Summary of potential receptors and potential risks

Receptor	Location	Exposure point	Exposure pathway
Surface water aquatic ecosystem	Down-gradient from site.	Receiving surface water body at the groundwater discharge point.	Exposure to contaminants.
Occupants of buildings	On site and down-gradient from site.	Enclosed buildings (existing and proposed).	Inhalation of VOC (including TRH and BTEX) overlying VOC impacted groundwater via the vapour intrusion pathway. In the event of the basement intercepting groundwater, exposure may be through seepage into the basement, rather than through vapour intrusion.

The rationale for the selection of GIL is in Table 13.

Table 13: Groundwater investigation level rationale

Receptor / beneficial use	GIL	Source	Comments / rationale
Aquatic ecosystem	DGV	ANZG (2018)	Freshwater 99% LOP for bioaccumulative contaminants 95% LOP for non-bioaccumulative contaminants Hardness adjustment of metal compounds (Cd, Cr, Pb, Ni and Zn) based on average hardness as per recommendations and method outlined in Warne et al. (2018)
Aquatic ecosystem	DGV	HEPA (2020)	Freshwater 99% LOP as recommended for potential bioaccumulation
Building occupants (vapour intrusion)	HSL	NEPC (2013)	Initial screen based on a groundwater depth below basement of 2 m to <4 m (refer note below)

Notes: DGV default guideline value
% LOP percentage level of protection of species
HSL health screening level

NOTE: Based on measured standing water levels in the monitoring wells, and the proposal for a two-level basement, it is likely that the proposed basement excavation will be close to (less than 2 m) or below the standing water line. Under such a scenario, NEPC (2013) recommends undertaking soil vapour or indoor air measurements as an alternative, and/or conducting a site-specific risk of vapour intrusion, which may be generated through seepage water.

Practical quantitation limit (PQL) or otherwise known as laboratory reporting limit is adopted for GILs associated with health screening levels for vapour intrusion risks. Should the results exceed those criteria, further soil vapour assessment will be recommended once design details are finalised.

4.2 Groundwater investigation levels for aquatic ecosystems

The DGV for the protection of aquatic ecosystems derived from ANZG (2018) are in Table 14.

Table 14: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)

Contaminant	Freshwater DGV 95% LOP	Notes
Metals / metalloids		
Arsenic	24 / 13	Levels provided for As III / As IV respectively. Moderate reliability.
Cadmium	0.7	Very high reliability, hardness adjusted based on the receiving water body being identified as freshwater or brackish water. There is no need to adjust hardness if the

Contaminant	Freshwater DGV 95% LOP	Notes
		receiving water body is marine water. Hardness adjustment of metal compounds (Cd, Cr, Pb, Ni and Zn) based on average hardness recorded in groundwater samples (analysed by the laboratory) as per method outlined in Warne et al. (2018).
Chromium (VI)	10.6	Chromium VI levels adopted as initial screen for total chromium. Very high reliability, hardness adjusted based on the receiving water body being identified as freshwater or brackish water. There is no need to adjust hardness if the receiving water body is marine water. Hardness adjustment of metal compounds (Cd, Cr, Pb, Ni and Zn) based on average hardness recorded in groundwater samples (analysed by the laboratory) as per method outlined in Warne et al. (2018).
Copper	1.4	Very high reliability.
Lead	20.8	Moderate reliability. Hardness adjusted based on the receiving water body being identified as freshwater or brackish water. There is no need to adjust hardness if the receiving water body is marine water. Hardness adjustment of metal compounds (Cd, Cr, Pb, Ni and Zn) based on average hardness recorded in groundwater samples (analysed by the laboratory) as per method outlined in Warne et al. (2018).
Mercury (inorganic)	0.06	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Nickel	36.9	Low reliability. Hardness adjusted based on the receiving water body being identified as freshwater or brackish water. There is no need to adjust hardness if the receiving water body is marine water. Hardness adjustment of metal compounds (Cd, Cr, Pb, Ni and Zn) based on average hardness recorded in groundwater samples (analysed by the laboratory) as per method outlined in Warne et al. (2018).
Zinc	26.8	Very high reliability. Hardness adjusted based on the receiving water body being identified as freshwater or brackish water. There is no need to adjust hardness if the receiving water body is marine water. Hardness adjustment of metal compounds (Cd, Cr, Pb, Ni and Zn) based on average hardness recorded in groundwater samples (analysed by the laboratory) as per method outlined in Warne et al. (2018).
BTEX		
Benzene	950	Moderate reliability.

Contaminant	Freshwater DGV 95% LOP	Notes
Ethylbenzene	80	Unknown reliability.
m-Xylene	75	Unknown reliability.
o-xylene	350	Low reliability.
p-Xylene	200	Low reliability.
Toluene	180	Unknown reliability.
PAH		
Anthracene	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Benzo(a)pyrene	0.1	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Fluoranthene	1	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Naphthalene	16	Low reliability.
Phenanthrene	0.6	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
OCP		
Aldrin	0.001	Unknown reliability and LOP.
Chlordane	0.03	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
DDT	0.006	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Dieldrin	0.01	Unknown reliability and LOP.
Endosulfan	0.03	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Endrin	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Heptachlor	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Methoxychlor	0.005	Unknown reliability and LOP.
OPP		
Chlorpyrifos	0.01	Moderate reliability.
Diazinon	0.01	Moderate reliability.
Dimethoate	0.15	Low reliability.
Fenitrothion	0.2	Moderate reliability.
Malathion	0.05	Moderate reliability.

Contaminant	Freshwater DGV 95% LOP	Notes
Parathion	0.004	Moderate reliability.
PCB		
Aroclor 1242	0.3	99% LOP adopted as recommended due to potential for bioaccumulation. Low reliability.
Aroclor 1254	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
VOC		
Tetrachloroethene (PCE)	70	Unknown reliability.
Trichloroethene (TCE)	330	Unknown reliability.
cis-1,2-dichloroethene (DCE)	700	Unknown reliability.
Chloroethene (vinyl chloride / VC)	100	Unknown reliability.
Tetrachloromethane (carbon tetrachloride / CT)	240	Unknown reliability.
Trichloromethane (chloroform / TCM)	370	99% LOP adopted as recommended to protect key species from chronic toxicity. Unknown reliability.

Notes: 95% LOP for non-bioaccumulative contaminants
99% LOP for bioaccumulative contaminants

The DGV for the protection of aquatic ecosystems derived from HEPA (2025) are in Table 15.

Table 15: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)

Contaminant / LOP	Freshwater DGV
PFOS 99% LOP	0.00023
PFOA 99% LOP	19

4.3 Health screening levels for vapour intrusion

The HSL to evaluate potential vapour intrusion risks derived from NEPC (2013) are in Table 16. It is noted that groundwater HSL do not apply if the basement intercepts groundwater, which is anticipated based on current groundwater levels. As such, the presence of petroleum compounds in the groundwater above the laboratory PQL may trigger a recommendation for a site specific risk assessment.

Table 16: Groundwater health screening levels for vapour intrusion (µg/L)

Contaminant	HSL-D
CLAY	**2 m to <4 m (for reference purposes)**
Benzene	30 000
Toluene	NL
Ethylbenzene	NL
Xylenes	NL
Naphthalene	NL
TRH F1	NL
TRH F2	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
HSL B – applicable to areas of the site outside of the proposed building footprint
HSL D – applicable to the proposed building footprint

5. References

ANZECC. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australia and New Zealand Environment and Conservation Council.

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater.* Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

HEPA. (2025). *PFAS National Environmental Management Plan (NEMP).* Version 3.0: Heads of EPAs Australia and New Zealand.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NHMRC. (2008). *Guidelines for Managing Risks In Recreational Water.*

NHMRC, NRMMC. (2022). *Australian Drinking Water Guidelines 6 2011, Version 3.7.* Canberra: National Health and Medical Research Council, National Resource Management Ministerial Council.

Warne, M., Batley, G., van Dam, R., Chapman, J., Fox, D., Hickey, C., & Stauber, J. (2018). *Revised Method for Deriving Australian and New Zealand Water Quality Guideline Values for Toxicants.* Canberra: Australian Government Department of Agriculture and Water Resources.

Appendix H

Data Quality Objectives

1. Data quality objectives

The objective of the validation plan is to assess the results of validation testing against the remediation acceptance criteria (RAC) stated within Section 12, assess the resultant suitability of the site for the intended land use, and to provide information on any environmental impacts which may have resulted from the works.

The validation assessment will be conducted with reference to the seven step data quality objectives process (DQO) as outlined in NEPC (2013), described below.

Table 1: Data quality objectives

Step	Summary
1: State the problem	The site requires validation, and may require remediation, in order to render the site suitable for the proposed mixed use land use. The objective of the validation plan is to confirm the successful implementation of this remediation action plan. A conceptual site model (CSM) for the proposed development has been prepared (Section 7).
2: Identify the decisions / goal of the study	The CSM identified the contaminants of potential concern (CoPC) and the likely impacted media. The validation sampling results will be compared against the RAC. The success of the remediation and subsequent validation will be based on a comparison of the analytical results for all CoPC to the adopted RAC and, if necessary and appropriate, compared to the 95% upper confidence limit (UCL) of the arithmetic mean (955 UCL) concentrations.
3: Identify the information inputs	Relevant inputs to the decision include: • The CSM, identifying the CoPC and affected media; • Analysis for the relevant CoPC using NATA accredited laboratories and methods, where possible; • Field and laboratory QA / QC data to assess the suitability of the environmental data for the validation assessment; • Results compared with the RAC; and • A photoionisation detector (PID) to screen soils on site for VOC. PID readings will be used to inform sample selection for laboratory analysis.
4: Define the study boundaries	The lateral boundaries of the site are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment and site observations and previous investigation used to inform the RAP.
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with the RAC. Initial comparisons will be with individual results then, where appropriate, summary statistics (including mean, standard deviation and 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL)) to further assess potential risks posed by the site contamination.

Step	Summary
	Quality control results are to be assessed according to their relative percent difference (RPD) values. For field duplicates, triplicates and laboratory results, RPD values should generally be below 30%; for field blank and rinsate results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Section 15.
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site and/or statistical analysis of data exceed the RAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site and statistical analysis of data comply with the RAC and therefore, do not pose a potentially unacceptable risk to receptors (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it will be assumed that the baseline condition is true.
7: Optimise the design for obtaining data	Sampling design and procedures to be implemented to optimise data collection for achieving the DQO include the following: • Visual inspections in accordance with Section 13.3; • Sampling frequencies in accordance with Section 13.4; • Analysis for the CoPC at NATA accredited laboratories using NATA endorsed methods where possible; and • Adequately experienced environmental scientists / engineers conducting field work and sample analysis interpretation.

2. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

Appendix I

Site Management Plan

1. Introduction

This general site management plan (SMP) has been developed to minimise potentially adverse impacts on the environment, and worker and public health as a result of the proposed remediation works.

The Remediation Contractor must have in place a construction environmental management plan (CEMP) (or similar) which is specific to the equipment used for the remediation and the proposed methods to be adopted by the Remediation Contractor. This SMP has been prepared to augment the Remediation Contractor's CEMP and contains general details for aspects of the work, as per reporting requirements for a remediation action plan (RAP) under NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

Apart from the management principles outlined in this SMP, the Remediation Contractor must also ensure compliance with all relevant environmental legislation and regulations, including (but not limited to) the following:

- Contaminated Land Management Act 1997 NSW (CLM Act);
- Protection of the Environment Operations Act 1997 NSW (POEO Act);
- Protection of the Environment Legislation Amendment Act 2011 NSW;
- Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008 NSW;
- Environmentally Hazardous Chemicals Act 1985 NSW; and
- Work Health and Safety Act 2017 NSW (WHS Act) and Work Health and Safety Regulations 2017 NSW.

2. Roles and responsibilities

2.1 Principal

The Principal is responsible for the environmental performance of the proposed remediation works, including implementation of acceptable environmental controls during remediation works. The Principal will retain the overall responsibility for ensuring this RAP is appropriately implemented. The Principal is to nominate a representative (the Principal's Representative), who is responsible for overseeing the implementation of this RAP. The actual implementation of the RAP will, however, be conducted by the Remediation Contractor on behalf of the Principal.

The Principal is responsible for providing appropriate information to the Remediation Contractor to allow them to safely plan the required works. This includes the asbestos register for the site and this RAP.

The Principal is also responsible for implementing an appropriate communications plan.

2.2 Remediation contractor

The Remediation Contractor will be the party responsible for daily implementation of this RAP and shall fulfil the responsibilities of the Remediation Contractor as defined by SafeWork NSW. It is noted that the Remediation Contractor may appoint appropriately qualified sub-contractors or sub-consultants to assist in fulfilling the requirements of the procedures. The Remediation Contractor will appoint a Site Manager.

In addition to the implementation of the RAP it will be the Remediation Contractors responsibility to:

- Obtain / ensure relevant sub-contractors obtain specific related approvals as necessary to implement the earthworks including permits for removal of asbestos-containing material, SafeWork NSW notification etc.;
- Develop or request and review any site plans to manage the works to be conducted; and
- Ensure that all remediation works and other related activities are undertaken in accordance with this RAP.
- Maintain all site records related to the implementation of this RAP including but not limited to:
  - Tracking of all movement of soil within the site, on to site and off-site from cradle to grave;
  - Transportation Record: comprising a record of all truckloads of soil (including aggregate) entering the site, including truck identification (e.g. registration number), date, time, source site, load characteristics (e.g. type of material, i.e. quarried aggregate, etc.), approximate volume, use (e.g. general site raising, service trenches, etc.);
  - Disposal dockets: for any soil disposed off-site including transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility / site;
  - Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records;
  - Records relating to any unexpected finds and contingency plans implemented; and
  - Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities.
- Ensure sufficient information is provided to engage or direct all required parties, including sub-contractors, to implement the requirements of the RAP other than those that are the direct responsibility of the Remediation Contractor;
- Manage the implementation of any recommendation made by those parties in relation to work undertaken in accordance with the RAP;
- Inform, if appropriate, the relevant regulatory authorities of any non-conformances with the procedures and requirements of the RAP in accordance with the procedures outlined in this document;
- Retain records of any contingency actions;
- On completion of the project, to review the RAP records for completeness and update as necessary; and

- Recommend any modification to general documentation which would further improve the environmental outcomes of this RAP.

2.3 Surveyor

A project surveyor, if required, will be a registered surveyor engaged by the Remediation Contractor to undertake surveying works as required by this RAP.

2.4 Sub-contractors

All sub-contractors will be inducted onto the site, informed of their responsibilities in relation to this RAP and sign their agreement to abide by the RAP requirements. Where necessary, sub-contractors will also be trained in accordance with the requirements of this document. All sub-contractors must conduct their operations in accordance with the RAP as well as all applicable regulatory requirements.

2.5 Environmental Consultant

The Environmental Consultant will provide advice on implementing the RAP. The Environmental Consultant will be responsible for:

- Undertake any required assessments where applicable (e.g. waste classification, validation);
- Provide advice and recommendations arising from monitoring and/or inspections, including unexpected finds; and
- Notify the Client with any results of assessments, and any observed non-conformances.

2.6 Site workers

All workers on the site are responsible for observing the requirements of this RAP and other management plans. These responsibilities include the following:

- Being inducted on the site and advised of the general nature of the remediation / environmental issues at the site;
- Being aware of the requirements of this plan;
- Wearing appropriate personal protective equipment (PPE) as required by this plan;
- Only entering restricted areas when permitted; and
- Requesting clarification when unclear of requirements of this or any other plans (e.g. safe work method statements (SWMS)).

3. Water management

Stormwater must be managed during the remediation works such that potential adverse impacts from surface runoff (e.g. cross contamination, mobilisation of contaminants in soil particles, etc.) are appropriately mitigated. Accordingly, the Remediation Contractor will take appropriate measures which may include:

- Construction, where necessary, of stormwater diversion channels, bunding and linear drainage sumps with catch pits in and around the remediation areas to divert stormwater from the contaminated areas;
- Provision of appropriately located sediment traps including geotextiles; and
- Discharge of excess water in excavations / low points on a regular basis to limit the potential for flooding.

Extracted groundwater, if any, is to be managed in accordance with the dewatering management plan (DMP) (if required), and/or consent conditions.

4. Soil management plan

The Remediation Contractor will develop a plan to mitigate cross contamination as part of the CEMP to be implemented throughout the works.

4.1 Stockpiling of contaminated material

Contaminated material shall be excavated and stockpiled at a suitably segregated location(s) away from sensitive areas (e.g. water bodies, drainage lines, stormwater pits, etc.) and ongoing excavations, and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- An impermeable membrane such as plastic sheeting should be provided at the surface by the Remediation Contractor prior to stockpiling. Plastic sheeting should be taped at joins, as necessary;
- All stockpiles of contaminated material shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation (if remaining overnight);
- Stockpiles impacted, or potentially impacted, with asbestos must be covered by geotextile or similar cover to prevent dust generation;
- Measures should be taken by the Remediation Contractor to prevent the migration of stockpile materials (i.e. perimeter bunds, hay bales, silt fences, etc.); and
- A record of stockpile locations (stockpile register), dimensions, descriptions, environmental controls, etc. should be maintained by the Remediation Contractor.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

4.2 Stockpiling imported material

Imported material shall be stockpiled at a suitably segregated location(s) away from sensitive areas (e.g. water bodies, drainage lines, stormwater pits, etc.) and ongoing excavations, and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- Imported material should not be stockpiled within un-remediated areas of the site. If this is unavoidable an impermeable membrane such as plastic sheeting should be provided at the surface by the Remediation Contractor prior to stockpiling. Plastic sheeting should be taped at joins, as necessary;
- All stockpiles shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation (if remaining overnight); and
- A record of stockpile locations (stockpile register), dimensions, descriptions, environmental controls, etc. should be maintained by the Remediation Contractor.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

4.3 Transport of material off-site and on to site

Transport of contaminated material from the site and imported material to the site shall be via a clearly delineated haul route(s) and this route shall be used exclusively for entry and egress of vehicles used to transport contaminated materials within and away from the site, and onto and within the site. The proposed transport route(s) (to be determined by the Remediation Contractor) will be notified to Council and truck dispatch shall be logged and recorded by the Remediation Contractor for each load leaving or arriving the site. A record of the truck dispatch will be provided to the Environmental Consultant.

All haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site should be selected to meet the following objectives:

- Comply with all road traffic rules;
- Minimise noise, vibration and dust to adjacent premises; and
- Use State roads and minimise use of local roads as far as practicable.

The remediation work will be conducted such that all vehicles:

- Conduct deliveries of soil, materials, equipment or machinery only during the specified hours of remediation;
- Have securely covered loads to prevent any dust or odour emissions during transportation; and
- Exit the site in a forward direction.

In addition, measures will be implemented to ensure no contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Roadways will be kept clean throughout the remediation works and will be swept, if necessary, to achieve a clean environment.

All loads will be securely covered and may be lightly wetted, if required, to ensure that no materials or dust are dropped or deposited outside or within the site. Prior to exiting the site each truck should be inspected by Remediation Contractor personnel and either noted as clean (wheels and chassis) or swept prior to leaving the site. Any soil spilled onto surrounding streets will be cleaned by mechanical or hand methods, on a daily basis.

Removal of waste materials from the site shall only be carried out contractors holding the appropriate license(s), consent or approvals to dispose the waste materials according to the waste classification and with the appropriate approvals obtained from the EPA, were required.

Materials imported onto the site shall only be carried out contractors holding the appropriate license(s), consent or approvals to transport the materials with the appropriate approvals obtained from the EPA, were required.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

5. Noise and vibration control plan

All equipment and machinery should be operated in an efficient manner to minimise the emission of noise. The use of any plant and/or machinery should not cause unacceptable vibrations to nearby properties and should meet Council requirements.

6. Dust control plan

Dust emissions must be confined within the site boundary as far as is practicable. The following example dust control procedures could be employed to comply with this requirement, as necessary:

- Erection of dust screens around the perimeter of the site (as applicable);
- Securely covering all loads entering or exiting the site;
- Use of water sprays across the site to suppress dust;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation (if remaining overnight);
- Stockpiles impacted, or potentially impacted, with asbestos must be covered by geotextile or similar cover to prevent dust generation;
- Include wheel wash (if applicable); and
- Keeping excavation and stockpile surfaces moist.

Regular checking of the fugitive dust issues is to be undertaken. Remedial measures are to be undertaken to rectify any cases of excessive dust.

7. Odour control plan

No odours should be detected at any boundary of the site during remediation works by an authorised Council Officer relying solely on sense of smell. The following example procedures could be employed to comply with this requirement as necessary:

- Use of appropriate covering techniques such as plastic sheeting, polythene or geotextile membranes to cover excavation faces or stockpiles;
- Fine spray of water and/or hydrocarbon mitigating agent on impacted areas / stockpiles or loads to lightly condition the material;
- If required, restrict uncovered stockpiles to appropriate sizes to minimise odour generation;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust and odour issues to ensure compliance. Undertake immediate remediation measures to rectify any cases of excessive dust or odour (e.g. use of misting sprays or odour masking agent); and
- Adequate maintenance of equipment and machinery to minimise exhaust emissions.

8. Work health and safety plan

8.1 General

It is the Remediation Contractor's responsibility to devise a SWMS[1] (or series thereof, for various respective tasks) and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP and SMP does not relieve the Remediation Contractor or other contractors of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the 'remediation' workspace. This RAP and SMP sets out general procedures and the minimum standards and guidelines for remediation that will need to be used in preparing the safe work method statement.

This work health safety plan (WHSP) has been prepared with refence to CRC CARE *Remediation Action Plan: Implementation - Guideline on Health and Safety* (CRC CARE, 2019). The requirements of this WHSP must be incorporated into the Remediation Contractor's SWMS.

All site work must be undertaken in a controlled and safe manner with due regard to potential hazards, training and safe work practices. To attain this the SWMS developed by the Remediation Contractor must comply with policies specified in the Work Health and Safety Regulation 2011.

All appropriate permits, licences and notifications required for the remediation activities must be obtained prior to the commencement of remediation works.

[1] Either a SWMS or construction environmental management plan (CEMP), or other equivalent document incorporating health and safety aspects of the proposed remedial works.

8.2 Site access

Appropriate fencing and signage must be installed around and within the site to prevent unauthorised access and restrict access to remediation areas and/or deep excavations. Access restrictions and administrative arrangements for management of entry of workers or related personnel on site is the responsibility of the Remediation Contractor.

Any existing pits or unstable areas on site that may generate potential safety, or operational risk should be demarcated and taped off, with appropriate rectification action undertaken (e.g. backfilling of pits).

8.3 Personnel and responsibilities

Before undertaking works on site, all personnel will be made aware of the officer responsible for implementing WHS procedures. All personnel must read and understand this WHSP and over-arching SWMS prior to commencing site works and sign a statement to that effect. Contractors employed at the site will be responsible for ensuring that their employees are aware of, and comply with, the requirements of this WHSP and Remediation Contractor's SWMS.

8.4 Chemical contamination hazards

Chemical compounds or substances that may be present in the soils at the site include the key CoPC TRH, BTEX, TCE and, given the presence of fill, asbestos. There is also a lower probability of other contaminants being present.

The risks associated with the identified contaminants to site personnel and workers involved in the remediation are considered to be low due to the concentrations within groundwater and soil vapour and limited exposure durations. These risks are associated with:

- Ingestion of contaminated soil and/or water;
- Dermal contact with contaminated soil and/or water; and
- Inhalation of dusts or vapours of the CoPC.

If asbestos is encountered in fill, this risk evaluation should be revised.

Personnel will endeavour, wherever possible, to avoid direct contact with potentially contaminated material. Workers must avoid the potential exposures listed above as far as is practicable. Appropriate personal protective equipment (PPE) must be used to mitigate potential risks.

8.5 Physical hazards

The following physical hazards are associated with conditions that may be created during remediation works:

- Heat exposure;
- Excavations;
- Buried services;
- Noise;

- Dust;
- Electrical equipment;
- Heavy equipment and truck operation; and
- Asbestos.

Safe work practices must be employed to manage the physical risks identified above. For the most part these risks can be managed through appropriate demarcation, access controls and the use of appropriate PPE.

8.6 **Safe work practices**

The appropriate safe work practices should be clearly defined by the Remediation Contractor in their SWMS. As a minimum, all personnel on site will be required to wear the following PPE:

- Steel-capped boots (mandatory);
- High visibility clothing / vest (mandatory);
- Safety glasses or safety goggles with side shields requirements (as necessary);
- Hard hat (as necessary);
- Appropriate respiratory and protective equipment for any works involving asbestos (as necessary); and
- Hearing protection when working in the vicinity of machinery or plant equipment if noise levels exceed exposure standards (as necessary).

Each item of PPE should meet the corresponding relevant Australian Standard(s).

Specific safe work practices will be adopted when working with asbestos, in accordance with (but not limited to) the following codes of practice:

- SafeWork NSW *Code of Practice, How to Manage and Control Asbestos in the Workplace* (SafeWork NSW, 2019a);
- SafeWork *NSW Code of Practice, How to Safely Remove Asbestos* (SafeWork NSW, 2019b);
- WorkCover *NSW Managing Asbestos in or on Soil* (WorkCover NSW, 2014); and
- NOHSC *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed* (NOHSC, 2005).

9. Remediation schedule and hours of operation

The remediation works will be conducted within the days and hours specified in the development consent.

10. Response to incidents

The key to effective management of incidents is the timely action taken before any situation reaches a reportable or critical level. Therefore, surveillance activities are extremely important and should be conducted for the measures prescribed herein and any other measures prescribed in any additional environmental management plan developed subsequently. During construction activities on the site, the following inspection or preventative actions should be performed by the Remediation Contractor:

- Regular inspection of works;
- Completion of routine environmental checklists and follow-up of non-compliance situations;
- Maintenance and supervision on-site; and
- An induction process for site personnel involved in the remediation works that includes relevant information on the contamination status of the site, the remediation works being undertaken, worker health and environmental protection requirements and ensures that all site personnel are familiar with the site emergency procedures.

An emergency response plan will be in place for all aspects of site works. Any emergency will be reported immediately to the site office and/or the Site Manager (and Safety Officer), and the appropriate emergency assistance should be sought. The Site Manager should be responsible for initiating an immediate emergency response using the resources available on the site. Where external assistance is required, the relevant emergency services should be contacted.

The Remediation Contractor will be responsible for ensuring that site personnel are aware of the emergency services available and the appropriate contact details. A site Safety Officer should be contactable, or available, on-site during remediation and development works.

Contact details for key utilities are included in the event of needing to respond to incidents. Blank cells are 'to be confirmed' and should be completed prior to works commencing when all entities are confirmed.

Table 1: Summary of roles and contact details

Role	Personnel / contact	Phone contact details
Principal		
Principal's Representative		
Site Manager		
Remediation Contractor and Builder		
Site Office		
Environmental Consultant		
Consent Authority		
Regulator	NSW EPA (pollution line and general enquiries)	131 555
Utility Provider	Water (Sydney Water Corporation)	13 20 92

Role	Personnel / contact	Phone contact details
Utility Provider	Power (Ausgrid)	13 13 88
Utility Provider	Gas (Jemena Limited)	131 909
Utility Provider	Telecommunications (Telstra Corporation Limited)	13 22 03
Utility Provider	Telecommunications (Optus)	1800 505 777
Utility Provider	Telecommunications (NBN Co Limited)	1800 687 626

11. References

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2019). *Remediation Action Plan: Implementation - Guideline on Health and Safety*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NOHSC. (2005). *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed*. Canberra, April 2005, NOHSC:3003: National Occupational Health and Safety Commission, Commonwealth of Australia.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

SafeWork NSW. (2019a). *Code of Practice, How to Manage and Control Asbestos in the Workplace*. August 2019.

SafeWork NSW. (2019b). *Code of Practice, How to Safely Remove Asbestos*. August 2019: SafeWork NSW, NSW Government.

WorkCover NSW. (2014). *Managing Asbestos in or on Soil*. March 2014: WorkCover NSW, NSW Government.