GEOTECHNICAL INVESTIGATION REPORT

PROPOSED NEW DWELLING
38 HILLTOP CRESCENT, FAIRLIGHT NSW

PREPARED FOR BALGOWLAH BUILDING PTY LTD
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Client:
Balgowlah Building Pty Ltd
PO BOX 337
Balgowlah NSW 2093

Author: S. McCormack (B. Eng – Civil) - CEnvP, MIEAust, CPEng, NER (geotechnical, environmental)
Field Engineer / Scientists: M.Kilham (B.Geol Hns) – ME-Sci

PHONE +61 (0) 2 9420 3361 MOBILE +61 (0) 431 480 980 EMAIL info@geoenvironmental.com.au
ADDRESS unit 2 / 5-7 malta street fairfield east nsw 2165 WEB www.geoenvironmental.com.au

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1 PROJECT INFORMATION

1.1 INTRODUCTION AND OBJECTIVE

Geo-Environmental Engineering Pty Ltd (GEE) was commissioned by Balgowlah Building Pty Ltd to undertake a geotechnical investigation at 38 Hilltop Crescent, Fairlight NSW (herein referred to as the 'site'). A survey plan showing existing site features is provided in **Appendix A**.

The investigation relates to the proposed construction of a new residential dwelling with pool and was requested to:

- ◊ Support a development application to Northern Beaches Council,
- ◊ Assist with the design and construction of the proposed development,
- ◊ Address, where possible from a geotechnical perspective, the requirements of Part 6, Clause 6.2 of the Manly Local Environmental Plan (LEP) 2013, as the proposed excavation works have the potential to impact adjoining developments,
- ◊ Address the geotechnical considerations relevant to Part 4, Clause 4.4.5 (Earthworks – Excavation and Filling) of the Manly Development Control Plan (DCP) 2013, and
- ◊ Address the requirements of Clause 3B.58(3)(a), Division 6 of the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008, which relate to excavation depth, groundwater, and the preparation of geotechnical investigation reports by a suitably qualified engineer.

This report presents the factual and interpreted results of the field investigations and provides interpretation and recommendations regarding the ground conditions at the site, in accordance with client requirements and the agreed scope of work.

1.2 PROPOSED DEVELOPMENT

According to the architectural plans (refer **Appendix A**), the existing dwelling and associated structures will be demolished, although the existing retaining wall along the southern boundary will remain. Following this, a new residential dwelling will be constructed which comprises three levels (Levels 1 to 3) and which will be constructed into and above the existing slope. An in-ground swimming pool and an adjoining stormwater On-Site Detention (OSD) tank is also proposed at the rear of Level 2.

Level 1 (the lowest level) will extend into the existing slope and will have a proposed finished floor level (FFL) of 55.35 m AHD. Allowing 0.30 m for floor slab construction,

excavation of up to 3.0 m into the slope will be required. This excavation will be setback approximately 1.5 m from the eastern boundary, 2.0 m from the western boundary, and approximately 18.0 m from both the front and rear boundaries.

The swimming pool, located along the rear boundary, will have an FFL of 54.60 m AHD and a maximum excavation depth of approximately 1.80 m. Allowing 0.30 m for the pool base construction, excavation of 1.0 to 1.5 m into the natural slope is expected. The pool will be setback approximately 2.5 m from the eastern boundary and 3.5 m from the western boundary.

The OSD tank will be located immediately adjacent to the pool and is expected to be constructed within a similar geotechnical setting. As such, excavation and founding conditions for the OSD tank are expected to be broadly consistent with those identified for the pool, involving excavation into fill, residual soils and potentially weathered sandstone.

As advised, all the foundations for the proposed dwelling and any associated minor structures such as retaining walls will be founded into the sandstone bedrock formation.

1.3 SCOPE OF WORK

The scope of work undertaken by GEE, to satisfy the above objectives, was as follows:

- ◊ Performance of a Before You Dig Australia (BYDA) desktop search of utilities within proximity of the site,
- ◊ Review of published geological, soils and acid sulphate maps for the area,
- ◊ Visual appraisal of the site conditions and locality,
- ◊ Drilling and logging of boreholes across the footprint of the site to assess the nature and consistency of subsurface soils and the depth to bedrock,
- ◊ Performance of Dynamic Cone Penetrometer (DCP) tests to assess the consistency and/or relative density of the soil profile and to assist with determining the depth to bedrock,
- ◊ Collection of representative soil samples from the boreholes,
- ◊ Analysis of selected soil samples for the preliminary analysis of soil aggressivity and salinity, and
- ◊ Engineering assessment and reporting.

2 SITE INFORMATION

2.1 SITE DESCRIPTION

The site is located on the northern side of Hilltop Crescent and is bounded by similar residential properties to the north, east, and west. It has a total surveyed area of 632.3 m² and is legally described as Lot 113 in Deposited Plan (DP) 1729.

At the time of the investigation, the site was occupied by an existing one- and two-storey dwelling, constructed both on and into the natural hillslope. Site access was via a concrete driveway from Hilltop Crescent.

The front portion of the site comprises a lawned area retained by a 2.30 m high concrete retaining wall along the southern boundary with No. 40. This wall appears to have been constructed to level the yard area adjacent to No. 36, which originally would have formed part of a stepped sandstone cliffline. A concrete footing traversing the front yard is interpreted to be a remnant of an earlier fence line possibly located along the original cliff crest.

The eastern side of the dwelling is largely hard-surfaced with concrete and paving, stepping down from the street to the rear via a series of concrete stairs. Boundary fencing along this side transitions from timber fencing at the upper level to concrete block retaining walls up to 2.0 m in height on the mid to lower sections. Terracing is present adjacent to the dwelling, supported by timber retaining walls, with fill depths observed to be up to 1.75 m.

The rear yard was predominantly lawned with scattered garden beds and two mature trees.

Along the western boundary, the ground level more closely follows the natural slope, although minor retaining was present near the front of the existing dwelling. Sections of the lower ground floor were supported by brick walls and piers, with the natural slope clearly visible beneath the structure toward the rear.

The lower ground floor was not accessible at the time of inspection, and the full extent of excavation into the slope could not be confirmed. However, based on observed topography and construction methods, it is likely that this level was formed in cut, consistent with the alignment of the interpreted sandstone cliffline.

GEE notes the presence of a Sydney Water sewer main located beneath the rear yard. According to the BYDA search, this asset consists of a 250 mm vitreous clay (VC) pipe, with an approximate invert depth of 1.0 m. This pipeline is located outside the proposed dwelling and swimming pool footprint and is therefore unlikely to constrain or impact the proposed development.

Photographs taken during the field investigation are provided below in **Plates 1** to **10**.

Plate 1: Front of site viewed to the north.

Plate 2: Eastern site boundary viewed to north.

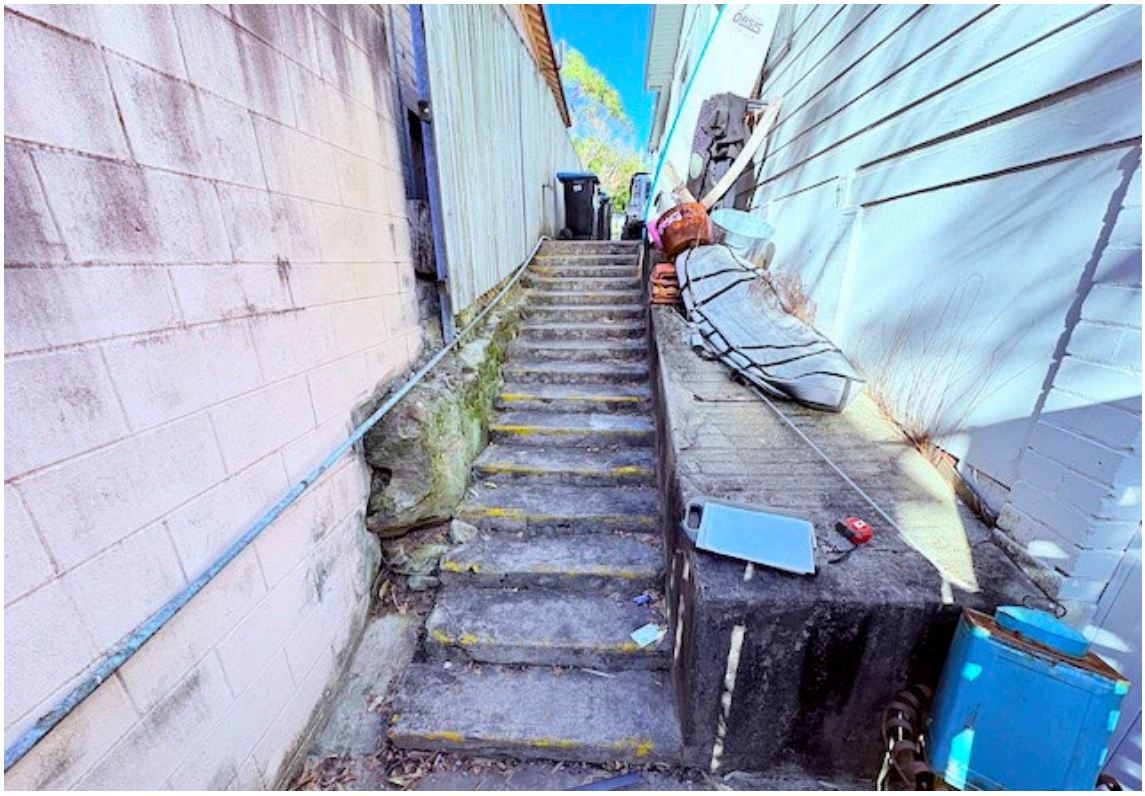

Plate 3: Sandstone outcrop along eastern site boundary.

Plate 4: Eastern site boundary with concrete block wall boundary fence.

Plate 5: Rear yard viewed to the south.

Plate 6: Sandstone outcrop downslope of rear, northern site boundary.

Plate 7: brick pier footings into natural slope below existing dwelling.

Plate 8: Retained slope, front southwest corner of existing dwelling.

Plate 9: Concrete retaining wall along front southwest corner of site.

Plate 10: Concrete retaining wall along front southwest boundary with No.40.

2.2 TOPOGRAPHY

The site is located on a northerly dipping hillslope. A review of the spot heights shown on the survey plan (**Appendix A**) indicates that the site elevation falls from approximately 58.5m above Australian Height Datum (AHD) along the front, southern site boundary to approximately 52.m AHD along the rear, northern site boundary.

2.3 GEOLOGY AND SOILS

A review of the regional geological map (reference 1) indicates that the site is underlain by the Triassic aged Hawkesbury Sandstone Formation which typically comprises "*…Medium to coarse-grained quartz sandstone, very minor shale and laminite lenses*".

A review of the regional soils map indicates that the site is located within the Lambert Soil Landscape, (reference 2). Soils of the Lambert group are characterised by undulating to rolling low hills developed on Hawkesbury Sandstone. Rock outcrop generally >50%. Shallow <0.50m deep yellow earths, Siliceous Sands/Lithosols on leading edges and grey earths and gleyed Podzolic soils in poorly drained areas and localised yellow podzolic soils associated with shale lenses. Limitations of Lambert Group Soils typically include, very high soil erosion hazard, rock outcrop, seasonally perched water tables, shallow highly permeable soil and very low soil fertility.

Rock outcrop and sub-surface soils identified during the fieldwork were consistent with the published mapping.

2.4 REGIONAL HYDROGEOLOGY

The regional and permanent groundwater in the vicinity of the site is expected to be confined or partly confined, discrete, water-bearing zones within the bedrock formation. However, GEE notes that intermittent 'perched' water seepage is likely to occur through the identified fill, colluvial soils, and at the residual soil / bedrock interface following rainfall events. Groundwater and seepages are expected to fluctuate with seasonal and climatic conditions.

2.5 ACID SULFATE SOIL POTENTIAL

Acid Sulfate Soil is naturally occurring sediments and soils containing iron sulfides (principally iron sulfide, iron disulfide or their precursors). Oxidation of these soils through exposure to the atmosphere or through lowering of groundwater levels results in the generation of sulfuric acid.

Land that may contain potential acid sulfate soils was mapped by the NSW Department of Land and Water Conservation (DLWC) and based on these maps local Councils produced their own acid sulfate soil maps to be used for planning purposes.

The regional DLWC Acid Sulfate Soil Risk Map (reference 3), indicates that the site lies within an area with no known occurrences of acid sulphate soil and land activities within this area are "...*not likely to be affected by acid sulphate soil materials*".

The Acid Sulfate Soils Map produced by the NSW Department of Planning and Environment, via interactive online mapping, indicates that the site lies outside areas defined as "Class 1" to "Class 5". In this regard, there is no need for an acid sulphate soil assessment or management plan.

3 FIELD INVESTIGATIONS AND RESULTS

Fieldwork was undertaken on the 9th of July 2025 by Matthew Kilham from GEE and the work comprised:

- ◊ A site inspection,
- ◊ Drilling and logging of seven boreholes (BH1 to BH7) at accessible locations across the site to assess the nature and consistency of subsurface soils and the depth of the underlying bedrock,
- ◊ Performance of DCP tests at boreholes BH2, BH3 and BH4 to assess the consistency and/or relative density of the soil profile and to assist with confirming the depth to bedrock, and
- ◊ The collection of representative soil samples for the preliminary analysis of soil salinity and aggressivity.

3.1 BOREHOLE DRILLING AND DCP TESTING

Prior to commencement of the fieldwork, an inspection for potential underground services and utilities was completed and cross-checked with the results of a Before you Dig Australia (BYDA) search.

The boreholes were drilled using an 85mm diameter hand operated auger, while the DCP tests were performed in accordance with Australian Standard Test Method AS1289.6.3.2-1997 (reference 4). During drilling, the encountered fill and natural soils were geologically logged by experienced geotechnical personnel, taking care to describe the presence and depth of any fill material / previously disturbed ground, the natural stratum, moisture, seepages or water bearing zones.

Boreholes were advanced through minor topsoil and/or fill materials (i.e. either imported material or previously disturbed ground) before refusing on the inferred sandstone bedrock at depths of between 0.38m and 2.05m below ground surface (bgs). The DCP tests carried out adjacent to BH2, BH3 and BH4 were terminated due to practical refusal at similar depths to the boreholes which support the conclusion that bedrock had been encountered.

The location of the boreholes was estimated using measurements from existing site features and are detailed on **Figure 1**. A copy of the borehole logs, including DCP test results, is provided in **Appendix C**.

3.2 SOIL SAMPLING

Soil samples were collected from regular intervals from each of the boreholes and placed in a sealed, plastic zip-lock bag immediately upon extraction from the ground. Select samples were then submitted to Eurofins Environmental Testing Pty Ltd laboratory for analysis as part of a preliminary assessment of soil salinity and soil aggressivity towards buried concrete and/or unprotected steel.

4 INVESTIGATION RESULTS

4.1 SUBSURFACE CONDITIONS

The site stratigraphy, as observed in most of our boreholes typically comprised sandy topsoils and fill/disturbed materials over natural sandy colluvial and residual soils and weathered sandstone bedrock which was typical of the Hawkesbury Sandstone Formation. Sandstone bedrock was also present at the surface in some isolated locations of the site.

Detailed descriptions of the subsurface conditions on site are provided in the borehole logs (including DCP test data) in **Appendix C**, while a summary of the soil profile is provided in **Table 1**.

Table 1: Summary of Subsurface Conditions (Boreholes BH1 to BH7)

Layer / Unit	Description	Depth to Base of Layer (m)[1]	Consistency / Relative Density[1]
TOPSOIL	SAND trace Silt: dark brown, fine to coarse grained, roots, moist.	0.15 – 1.75	Very loose
FILL	SAND trace fines: dark brown, brown, grey-brown, fine to coarse grained, fine to medium gravel, cobbles, (ironstone, quartz, sandstone, brick), moist.		Very loose to loose
NATURAL COLLUVIAL SOIL	SAND: grey brown, fine to coarse grained, fine to coarse gravel (ironstone), moist to wet.	0.38 – 2.05	Loose
NATURAL RESIDUAL SOIL	SAND and SAND with trace fines: grey, fine to coarse grained, roots moist to wet.		Loose
BEDROCK	SANDSTONE: orange red-yellow grey white, fine to coarse grained, extremely to highly weathered.	ND	-

Note 1: Determined from borehole observations.
ND = Not Determined

While the depth to bedrock and hand auger refusal ranged from 0.38 m to 2.05 m across the site, most boreholes (BH01, BH03, BH04, BH05, BH06, BH07) encountered bedrock at shallow depths of between 0.38 m and 0.7 m. The deepest refusal (BH02 at 2.05 m) occurred in the paved area on the higher eastern side of the site and outside the proposed building footprint. Given the existing dwelling floor levels are already more than a metre

below this point, the deeper refusal at BH02 is not considered representative of excavation conditions within the footprint of the new dwelling.

Finally, adverse aesthetics, specifically odours associated with potential contamination, were not noted during the fieldwork. Additionally, no potentially Asbestos Containing Materials (ACM), or indicators of acid sulfate soil, was observed in the bores during the drilling.

4.1.1 Groundwater

Permanent groundwater (i.e. the water table) was not encountered during the drilling of the boreholes. However, slight to moderate seepage water was encountered on the colluvial and residual soil /bedrock interfaces. This water is perched water that is typically recharged directly by rainfall and therefore its occurrence is generally intermittent, and rates of seepage are expected to vary significantly.

4.2 LABORATORY TEST RESULTS

Representative samples of soil were collected from each borehole and submitted to Australian Laboratory Services Pty Ltd (ALS) for selective testing which included:

- ◊ Electrical Conductivity (EC) to provide a detailed assessment of the salinity potential of the soil profile, and
- ◊ Sulphate, Chloride, resistivity and pH to determine the exposure classification of the soil with respect to buried structural concrete and unprotected steel.

The laboratory test results are presented in **Appendix D**, while a summary of the results is provided in the following sub-sections.

4.2.1 Soil Salinity Testing

An assessment of soil salinity conditions has been undertaken with reference to guidance published by the Department Land and Water Conservation NSW (Reference 5). In this regard, selected samples of natural soil were submitted to Eurofins for NATA accredited testing of Electrical Conductivity (EC), which is the primary indicator of salinity.

The raw EC results and the EC_e results[1], are provided in **Table 2**.

[1] EC_e results are EC data multiplied by a conversion factor which depends upon the soil texture / type.

Table 2: Electrical Conductivity Results

Sample ID	Location/ Depth (m)	Material Type	EC (dS/m)	Multiplication Factor[1]	EC_e (dS/m)
MK090725-01	BH1 / 0.1 – 0.2	SAND trace Silt	<0.01	17	<0.17
MK090725--02	BH1 / 0.2 – 0.3	SAND	<0.01	17	<0.17
MK090725--03	BH2 / 1.8 – 1.9	SAND	<0.01	17	<0.17
MK090725--04	BH2 / 1.95 – 2.05	SAND trace Silt and Clay	<0.01	17	<0.17

[1] EC_e results are EC data multiplied by a conversion factor which depends upon the soil texture / type.

According to the Department Land and Water Conservation NSW the soil salinity classes are as follows:

ECe (dS/m)	Class
<2	Non-Saline
2 – 4	Slightly Saline
4 – 8	Moderately Saline
8 – 16	Very Saline
>16	Highly Saline

The above test data indicate that the fill/natural soil profile is non-saline.

4.2.2 Aggressivity Testing

Selected soil samples were submitted to ALS for accredited testing of pH, sulfate, chloride and resistivity to provide a preliminary assessment of the exposure classification (or aggressiveness/corrosiveness potential) of the soil with respect to future buried steel and/or concrete (e.g. footings).

To determine the aggressiveness of the soil and water environment on concrete or steel, the chemical test results are compared to Tables 6.4.2(C) and 6.5.2(C) from Section 6 of the Australian Standard AS 2159 (Reference 6). This section provides assessment criteria to assess the 'exposure classification' for a concrete or steel pile. The Standard has two classes of soil conditions:

(A) high permeability soils below groundwater; and
(B) low permeability soils and all soils above groundwater.

For this site, all the soil samples are considered to be condition 'B'. Based on the chemical testing results, the standard provides a range of 'exposure classifications' from non-

aggressive to very severe. For the range of chemical conditions in the soil surrounding the structure, the condition leading to the most severe aggressive condition is adopted.

A summary of the soil results is provided in **Table 3**.

Table 3: Exposure classification (aggressivity) test results

Sample ID	Location/ Depth (m)	Soil Condition	pH	Sulphate (SO_4) mg/kg	Chloride (Cl) mg/kg	Resistivity Ohm cm
MK090725-01	BH1 / 0.1 – 0.2	B	6.5	<10	<10	110,000
MK090725--02	BH1 / 0.2 – 0.3	B	7.3	<10	<10	140,000
MK090725--03	BH2 / 1.8 – 1.9	B	7.8	<10	<10	300,000
MK090725--04	BH2 / 1.95 – 2.05	B	7.8	<10	<10	440,000

The aggressivity potential of an environment on concrete is dependent on the sulphate and pH levels of the soil. Based on the limited number of test results above and taking into account the 'worst-case' sample, the subsurface profile is non-aggressive towards concrete. According to Australian Standard AS 3600-2009 (reference 7), specifically Table 4.8.1, this equates to an exposure classification of 'A1'. This is also an appropriate classification for piles in fresh water.

The corrosive potential of an environment on unprotected steel is normally dependent on pH, chloride, and resistivity levels of the soil. Based on the limited number of test results above and taking into account the 'worst-case' sample, the subsurface profile is considered to be non-aggressive towards any unprotected steel. However, based on Table 6.5.2(a) from the Standard, it is prudent to adopt a moderately corrosive classification.

5 DISCUSSION

5.1 SITE PREPARATION

Following demolition works and prior to construction, all topsoil containing organic matter, as well as any existing pavement materials, should be stripped from the proposed building and pool/spa footprints. Stripped topsoil may be stockpiled on-site for future landscaping use, provided it is free of contaminants, or otherwise disposed of at an appropriately licensed facility.

5.2 DILAPIDATION REPORT

Given the proximity of existing structures, including adjacent dwellings and boundary retaining walls / gardens, and the depth and extent of excavation proposed for Level 1 of the dwelling, it is recommended that a pre-construction dilapidation survey be undertaken. This survey should document the existing condition of nearby buildings, fences, and other structures to minimise the risk of disputes arising from perceived or actual damage during works. Ideally, the survey should be:

- ◊ Undertaken by an independent suitably qualified consultant,
- ◊ Provided to neighbouring property owners for review, and
- ◊ Signed by all relevant parties prior to construction commencement.

5.3 SITE CLASSIFICATION

With consideration of the fact that all the foundations for the dwelling and associated structures will be founded on the underlying sandstone bedrock, and in accordance with AS 2870–2011 (Reference 8), the geotechnical site classification is Class A which equates to "*little or no ground movement from moisture changes*".

5.4 EARTHWORKS

The actual depth and composition of the natural slope beneath the existing dwelling could not be accurately determined due to restricted access and limitations in the available survey detail. It is anticipated that once the existing dwelling has been demolished, the character of the natural slope across the site will become more readily observable.

Based on the architectural drawings (**Appendix A**), the lower ground floor (Level 1) of the proposed dwelling will extend back into the existing slope, with a finished floor level (FFL) of 55.35 m AHD. Allowing 0.30 m for floor slab construction, excavation of up to 3.0 m into the slope will be required. The proposed excavation will be offset

approximately 1.5 m from the eastern boundary, 2.0 m from the western boundary, and approximately 18.0 m from both the front and rear boundaries.

The in-ground swimming pool will have an FFL of 54.60 m AHD and a maximum excavation depth of approximately 1.80 m. Accounting for a 0.30 m structural allowance, excavation of approximately 1.0 to 1.5 m into the natural slope is anticipated. The pool will be set back approximately 2.5 m from the eastern boundary and 3.5 m from the western boundary.

Earthworks will involve the removal of topsoil, fill, colluvial and residual soils, and are expected to extend into weathered sandstone bedrock consistent with conditions observed during the site investigation (refer to Section 4.1 and **Appendix C**).

5.4.1 Expected Excavation Conditions

Based on the fieldwork completed by GEE, excavation across the site is expected to encounter a very loose to loose sandy and colluvial soil profile over a weathered sandstone bedrock formation, with some potential for cropping sandstone related to stepped sandstone clifflines which would be expected to occur in the southeast corner of the proposed excavation.

The strength of the bedrock has not been accurately assessed as part of this investigation and was not part of the scope of works. However, GEE anticipates that the sandstone within the depth of the proposed excavation will be low to medium strength becoming medium to high strength shortly thereafter. To confirm the strength of the bedrock within the depth of proposed excavation would require more detailed investigations including the coring and strength testing of the bedrock formation. Such additional work is only considered to be necessary if the earthworks contractor requires this information.

Excavation of the overlying soil profile, as well as any extremely low to very low strength sandstone, is expected to be achievable using standard earthmoving equipment, such as tracked excavators. However, where more competent sandstone is encountered, the use of an impact hammer is likely to be required, particularly in the presence of unfavourable rock defect geometry. To minimise vibration impacts on adjoining structures, it is preferable that rock excavation be undertaken using a hydraulic hammer in combination with a rock saw (refer to Section 5.4.4).

To ensure the structural integrity of the existing and adjoining buildings, all excavation works should proceed in a controlled and staged manner. It is likely that the dwellings

and associated structures on both No.36 and No.40 have been founded on/into the underlying sandstone bedrock profile. Although where practical, it is recommended to inspect the adjacent footing systems for confirmation.

Following demolition, it may be beneficial, though not strictly required, to undertake a geotechnical inspection to better assess the presence of potential clifflines and detached rock boulders, particularly about excavation support and foundation design.

All spoil generated from excavation must be classified, managed, and disposed of in accordance with the NSW EPA (2014) Waste Classification Guidelines (reference 9).

5.4.2 Groundwater / Seepage Water Inflow

Permanent groundwater was not encountered during the field investigation and is not anticipated to be intercepted during the proposed earthworks. However, perched seepage water was observed in boreholes at several locations across the site on the soil–bedrock interfaces. The seepage water is considered to be recharged by rainfall and is generally intermittent and variable in quantity.

During excavation, seepage water is expected to be manageable using conventional construction dewatering techniques, including:

- The installation of a sump pit at the lowest point of the excavation, and
- Pumping to manage localised inflows during active earthworks.

Attention should be paid to flow paths and the design of temporary drainage to avoid water accumulation against exposed cut faces.

For long-term subsurface water management, particularly where subsurface walls or basement walls are proposed, GEE recommends the following design considerations:

- All below-ground structural walls should be designed to be watertight or treated to prevent moisture ingress where appropriate.
- Incorporation of strip drains and perforated ag-drains (ag-lines) behind retaining structures to intercept and redirect seepage water.
- Inclusion of accessible drainage cavities or serviceable voids behind permanent walls to isolate wet sandstone batters, facilitate drainage, and allow for ongoing maintenance access.

These measures will help ensure that hydrostatic pressures do not develop behind walls, and that moisture ingress into internal spaces is avoided.

During the investigation, saturated sandy soils were observed in zones coinciding with seepage. In such conditions, where piered footing systems are adopted to extend into the underlying sandstone bedrock, the surrounding colluvial or residual soils may be prone to collapse during installation. Accordingly, temporary casing or support systems should be employed during pier construction in these zones to maintain borehole stability and ensure structural integrity.

5.4.3 Batters and Excavation Support

The fill layer, natural soil profile and any weak rock (i.e. overburden material which can be readily excavated without the assistance of a hydraulic hammer), may be temporarily battered to no steeper than 2 Horizontal to 1 Vertical and this batter slope assumes that the ground surface beyond the crest of the slope is horizontal and surcharge loads are not placed within a distance from the crest equal to the vertical height of the cut. Considering the shallow depth to bedrock across much of the site and the fact that the existing retaining wall on the southern boundary will remain, this batter slope is expected to be feasible on all sides.

The sandstone formation is likely to be self-supporting subject to verification by a geotechnical professional during excavation. In this regard, GEE recommends that an inspection of the rock is undertaken in 1m height intervals by an experienced engineering geologist or geotechnical engineer to ensure that the excavation stability is not affected by unsuitable defects or detached boulders.

Where defects or detached boulders that affect the batter stability are encountered conventional stabilisation techniques such as rock bolting or shotcrete may be required. GEE notes that removal of some boulders may be required where stabilisation is not considered safe.

5.4.4 Construction / Excavation Induced Vibration

Structures and utilities adjacent to the excavation area are potentially sensitive to vibrations above certain threshold levels (regarding potential for cracking). From site observations these would be expected to include the dwellings on No.36 and No.40 located to the east and west of the site. While the primary engineering concern is avoiding structural damage, neighbour perception and amenity are also critical to maintaining good community relations and avoiding delays from complaints or inspections.

Where possible, rock excavation should avoid high-impact techniques. For example, using a rock saw instead of a hydraulic hammer will significantly reduce vibration, over-break, and loosening of the rock mass. When vibration-intensive methods such as hydraulic hammering are required, contractors should:

- ◊ Assess potential impacts using borehole data and local experience,
- ◊ Monitor vibration from the start of works at the nearest sensitive location, and
- ◊ Adjust methods if excessive levels are recorded.

GEE recommends a conservative Peak Particle Velocity (PPV) limit of 5 mm/s for adjacent residential structures, consistent with AS 2187.2 (Reference 11). Isolated exceedances of this limit are unlikely to cause structural damage, but if they occur the following measures should be considered:

- ◊ The use of smaller excavation plant and hydraulic hammers,
- ◊ The use of a rock sawing or grinder adjacent to the site boundaries. GEE notes that this equipment also reduces the possibility of over-break and loosening of the rock mass.
- ◊ Hammering at 50% capacity in short bursts to prevent the buildup of resonant frequencies,
- ◊ The use of low vibration techniques such as rotary grinders or chemical rock splitting,
- ◊ Progressive breakage from open excavated faces,
- ◊ Selective breakage along open joints, where present, and
- ◊ Orientation of the rock hammer pick away from property boundaries and into the existing open excavation.

Human discomfort can occur at vibration levels well below structural damage thresholds. On sites such as this, visible monitoring, pre-start dilapidation surveys, and clear communication with neighbours can be as important as technical compliance in preventing disputes. Vibration monitoring provides objective reassurance and evidence of compliance, helping manage both engineering risk and community perception.

5.5 FOUNDATIONS

Upon completion of the proposed bulk excavations, the anticipated Bulk Excavation Level (BEL) is expected to expose the underlying sandstone bedrock, which is considered geotechnically suitable for direct founding. To achieve consistent and reliable bearing

conditions across the entire development, all structural footings should be founded entirely within this bedrock horizon.

The Hawkesbury Sandstone bedrock is assessed to provide a minimum serviceability bearing capacity of 500 kPa. However, in areas where footings are positioned near or on the crest of a sandstone cliffline, this bearing capacity should be conservatively reduced by 50% to account for potential edge effects and slope instability risk. Where design loads exceed these values, additional site-specific geotechnical investigation and strength testing will be required to verify the quality and capacity of the bedrock stratum.

All footing and slab systems must be designed by a qualified structural engineer, considering the site's Class P classification and proposed loading regime. It is noted that the Hawkesbury Sandstone Formation is locally heterogeneous with the potential for floaters and isolated sandstone boulders within the soil–rock transition zone. These inclusions can result in variable founding levels and may compromise load distribution if not properly identified and managed. Where encountered, floaters should either be fully removed or adequately bridged during foundation construction.

For foundations constructed using bored piers or piles extended to bedrock, temporary casing may be required. This is particularly important in zones where perched water seepage has been observed, as seepage can lead to localised collapse or softening of the surrounding colluvial or residual soil during drilling.

Finally, GEE recommends that a geotechnical inspection be carried out during footing excavation to:

- ◊ Confirm that the design founding stratum (bedrock) has been fully exposed and is of adequate strength and quality,
- ◊ Verify that the intended founding conditions and design depths have been achieved across the site, and
- ◊ Provide guidance on any required localised treatments, such as bridging of floaters, trimming of soft zones, or other remedial adjustments in response to irregularities in the excavation profile.

5.6 POTENTIAL GEOTECHNICAL RISK

While no significant instability is anticipated, several site-specific geotechnical risks warrant targeted assessment during excavation.

Interpretation of the 1943 aerial photograph of the site, along with surface outcrop and existing retaining structures, suggests the presence of stepped and partially buried sandstone clifflines, including within the footprint of the proposed dwelling. The approximate alignment of these features is shown on the Site Plan (**Figure 1**).

As the geometry and depth of these clifflines remain uncertain, post-demolition inspections and geotechnical oversight during excavation are recommended to:

- ◊ Confirm the suitability and quality of founding materials,
- ◊ Identify and treat any floaters or soft zones, and
- ◊ Advise on any localised variations or treatment measures as necessary.

6 CONCLUSION AND RECOMMENDATIONS

GEE has undertaken a geotechnical investigation at 38 Hilltop Crescent, Fairlight NSW, to support the development application for a new residential dwelling with an in-ground swimming pool. The investigation was conducted to assist with the design and construction process and to address relevant planning requirements of the Manly Local Environmental Plan 2013, the Manly Development Control Plan 2013, and the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

Based on the results of the fieldwork and laboratory testing, GEE concludes that the proposed development is geotechnically feasible, with the underlying soil and rock strata capable of supporting the proposed structure, subject to implementation of the recommendations outlined in this report. Specifically:

- In accordance with Part 6, Clause 6.2 of the Manly LEP 2013, the proposed excavation works are not expected to result in instability or adverse impact on adjoining developments, provided that footing systems are appropriately designed and verified through geotechnical inspection.
- With reference to Part 4, Clause 4.4.5 of the Manly DCP 2013, the proposed excavation and earthworks are considered appropriate to the site context and can be safely carried out using standard construction methods, with consideration for slope stability, drainage, and management of retained fill.
- In accordance with Clause 3B.58(3)(a) of Division 6 from the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008, this report provides a geotechnical assessment confirming that:
  - No groundwater was encountered within the proposed depth of excavation; and
  - Subsurface conditions are suitable for the planned excavation works.

While sufficient data has been obtained to support development feasibility and foundation design, further geotechnical investigation is recommended following demolition, to verify bedrock conditions across the proposed building footprint and to assist with finalisation of structural footing design. This would also minimise uncertainty during construction and reduce the potential for delays due to unforeseen ground conditions.

GEE recommends that geotechnical inspection and advice be sought during excavation and footing construction to:

- Confirm the suitability and quality of founding materials,
- Identify and treat any floaters or soft zones, and

◊ Advise on any localised variations or treatment measures as necessary.

GEE remains available to provide additional advice and inspection services as required during the design and construction phases of the project.

7 GENERAL LIMITATIONS

Soil and rock formations are variable. The logs or other information presented as part of this report indicate the approximate subsurface conditions only at the specific test locations. Boundaries between zones on the logs or stratigraphic sections are often not distinct, but rather are transitional and have been interpreted.

The precision with which subsurface conditions are indicated depends largely on the frequency and method of sampling, and on the uniformity of subsurface conditions. The spacing of test sites also usually reflects budget and schedule constraints. Groundwater conditions described in this report refer only to those observed at the place and under circumstances noted in the report. The conditions may vary seasonally or as a consequence of construction activities on the site or adjacent sites.

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEE be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of changed soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

The comments given in this report are intended only for the guidance of the design engineer, or for other purposes specifically noted in the report. The number of boreholes or test excavations necessary to determine all relevant underground conditions which may affect construction costs, techniques and equipment choice, scheduling, and sequence of operations would normally be greater than has been carried out for design purposes. Contractors should therefore rely on their own additional investigations, as well as their own interpretations of the borehole data in this report, as to how subsurface conditions may affect their work.

8 REFERENCES

1. Department of Mineral Resources, 1983: Sydney 1:100,000 Geological Series Map Sheet 9130 (Edition 1).
2. Department of Environment, Climate Change and Water, 2009: Sydney 1:100,000 Soil Landscape Series Sheet 9130 (fourth edition).
3. DLWC, 1997: Department of Land and Water Conservation of NSW, 1997: Sydney Heads Acid Sulfate Soil Risk Map – Edition Two.
4. Australian Standards, 1997. AS1289.6.3.2 Determination of the penetration resistance of a soil – 9kg dynamic cone penetrometer test.
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6. Australian Standard (AS) 2159 -2009: Piling Design and Installation.
7. Australian Standard (AS) 3600 -2009: Concrete Structures.
8. Australian Standard: AS2870-2011. Residential slabs and footings.
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10. Australian Standard AS4678-2002: Australian Standard, 2002: Earth Retaining Structures.
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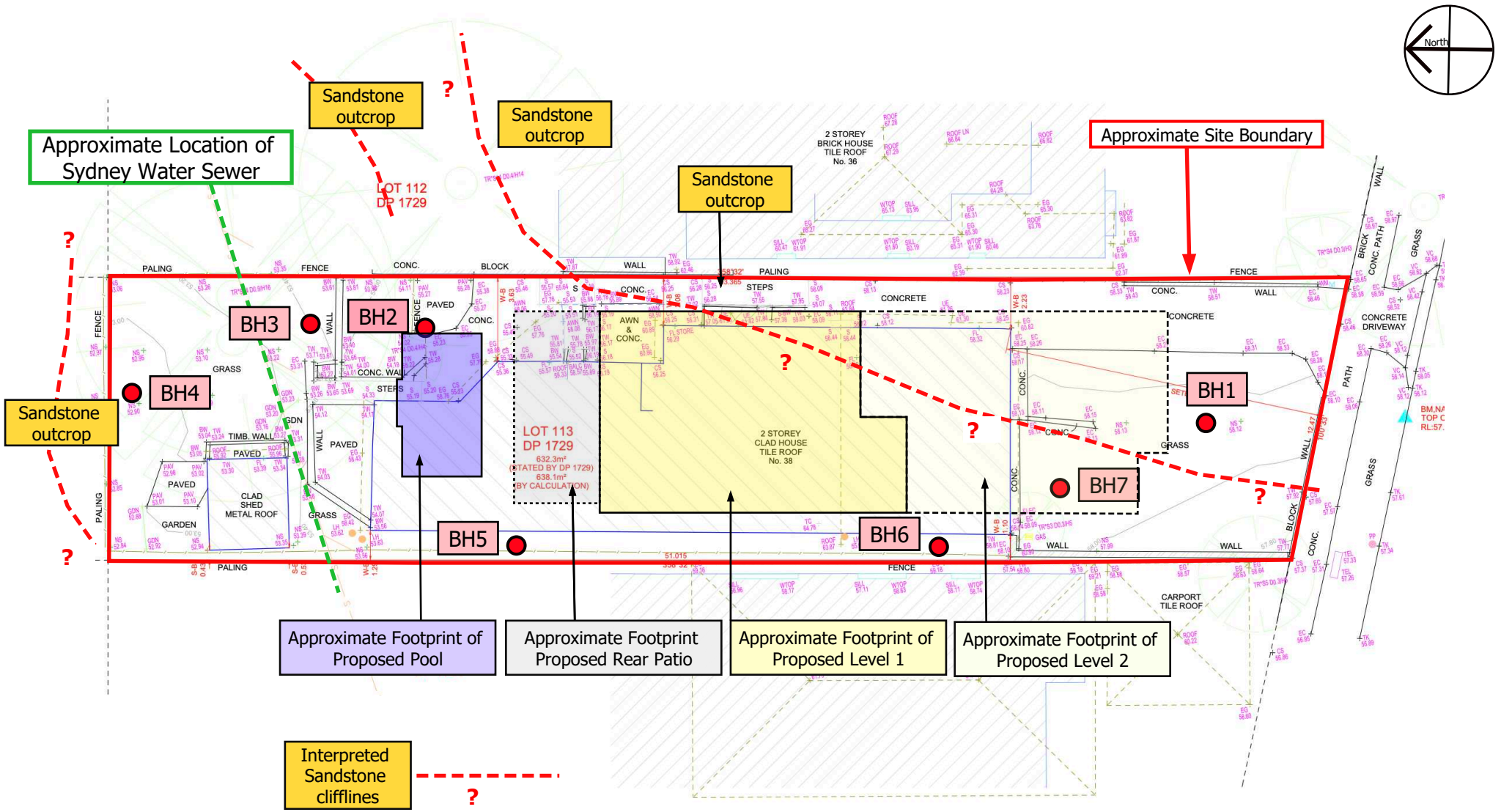
12. Department of Environment and Conservation NSW, 2006. Assessing Vibration: a technical guideline.

FIGURES

1 – SITE PLAN



Survey Plan Prepared by C & A Surveyors: Reference Number: 34002-24, Date of Survey 06.12.2024

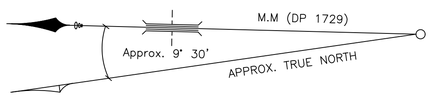
geo-environmental ENGINEERING
Unit 2 / 5 - 7 Malta Street
FAIRFIELD EAST NSW 2165
P - 0431480980
E - info@geoenvironmental.com.au
www.geoenvironmental.com.au

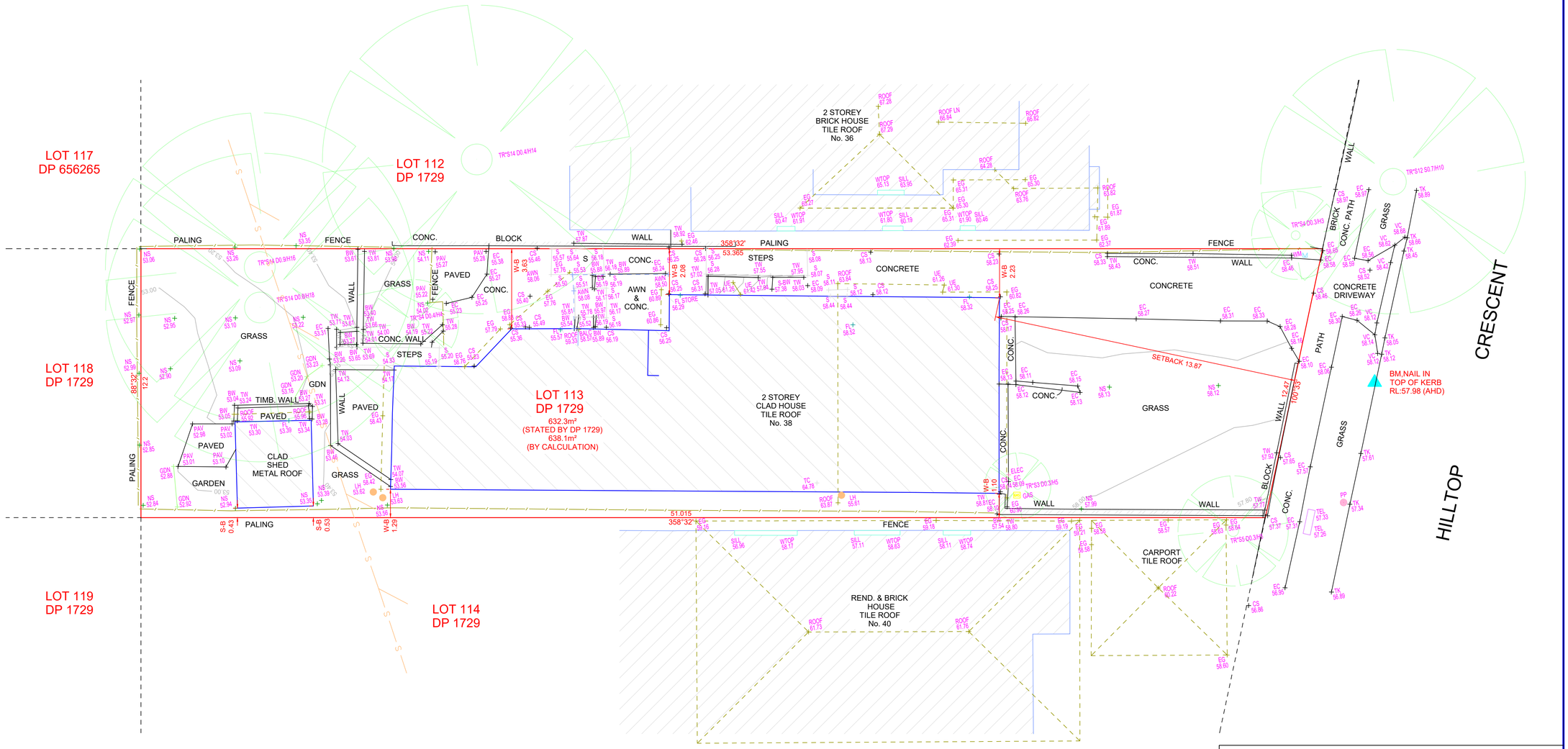
TITLE:	SCALE:	DATE:	FIGURE No.:
SITE PLAN 38 Hilltop Crescent, Fairlight NSW	N.T.S	16 July 25	1
	DRAWN: M.Kilham	JOB No.: G25045FAI	REVISION: A

APPENDIX A

SURVEY AND ARCHITECTURAL PLANS (20 SHEETS)

A1





BEFORE YOU DIG www.byda.com.au
Zero Damage - Zero Harm

LEGEND:

AHD	AUSTRALIAN HEIGHT DATUM
AWN	AWNING
BM	BENCH MARK
BOW/BW	BOTTOM OF WALL
BRW	BOTTOM OF RETAINING WALL
CONC	CONCRETE
CS	CONCRETE SURFACE
D/H/S	DIAMETER/HEIGHT/SPREAD
D	DOOR
EC	EDGE OF CONCRETE
EG	EAVE & GUTTER
EP	ELECTRICAL BOX
FL	FLOOR LEVEL
GDN	GARDEN
HYD	HYDRANT
IC	INSPECTION COVER
INV	INVERT LEVEL
KO	KERB OUTLET
LH	LAMP HOLE
NS	NATURAL SURFACE
PAV	PAVERS
PP	POWER POLE
RL	REDUCED LEVEL
RTK	ROLLING TOP OF KERB
S	STEPS
S-B	SHED TO BOUNDARY
SL	SURFACE LEVEL
SILL	WINDOW SILL
SIP	SEWER INSPECTION POINT
SMH	SEWER MAN HOLE
SV	STOP VALE
TEL	TELSTRA PIT
TK	TOP OF KERB
TOW/TW	TOP OF WALL
UE	UNDER SIDE OF EAVES
TRW	TOP OF RETAINING WALL
VC	VEHICLE CROSSING
W-B	WALL TO BOUNDARY
WM	WATER METER
WTOP	TOP OF WINDOW

THE SUBJECT TITLE NOTES : AS AT 30/11/2024

1) RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTES:

A) BOUNDARIES OF THE SITE HAVE BEEN IDENTIFIED BY SURVEY
B) SERVICES SHOWN HAVE BEEN DERIVED FROM VISUAL EVIDENCE APPARENT AT THE TIME OF SURVEY. SERVICES MAY EXIST WHICH ARE NOT SHOWN. THE RELEVANT SERVICE AUTHORITY SHOULD BE CONTACTED TO VERIFY THE EXISTENCE AND POSITION OF SERVICES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION OR EXCAVATION.
C) DIAMETER, HEIGHT & SPREAD OF TREES ARE APPROXIMATE ONLY.
D) LEVELS SHOWN ARE OF AUSTRALIAN HEIGHT DATUM. ORIGIN OF LEVELS : PM 925, RL 59.925 (AHD), CLASS LB.
E) USE STATED DIMENSIONS. DO NOT SCALE.
F) THESE NOTES FORM PART OF THIS PLAN AND CANNOT BE REMOVED.
G) NO COVENANTS AND/OR RESTRICTIONS HAVE BEEN INVESTIGATED BY C & A SURVEYORS PTY LTD.

REVISION No	DESCRIPTION	DATE
V1	PLAN ISSUED	6/12/2024
V2	.....	../../..
V3	.....	../../..
V4	.....	../../..

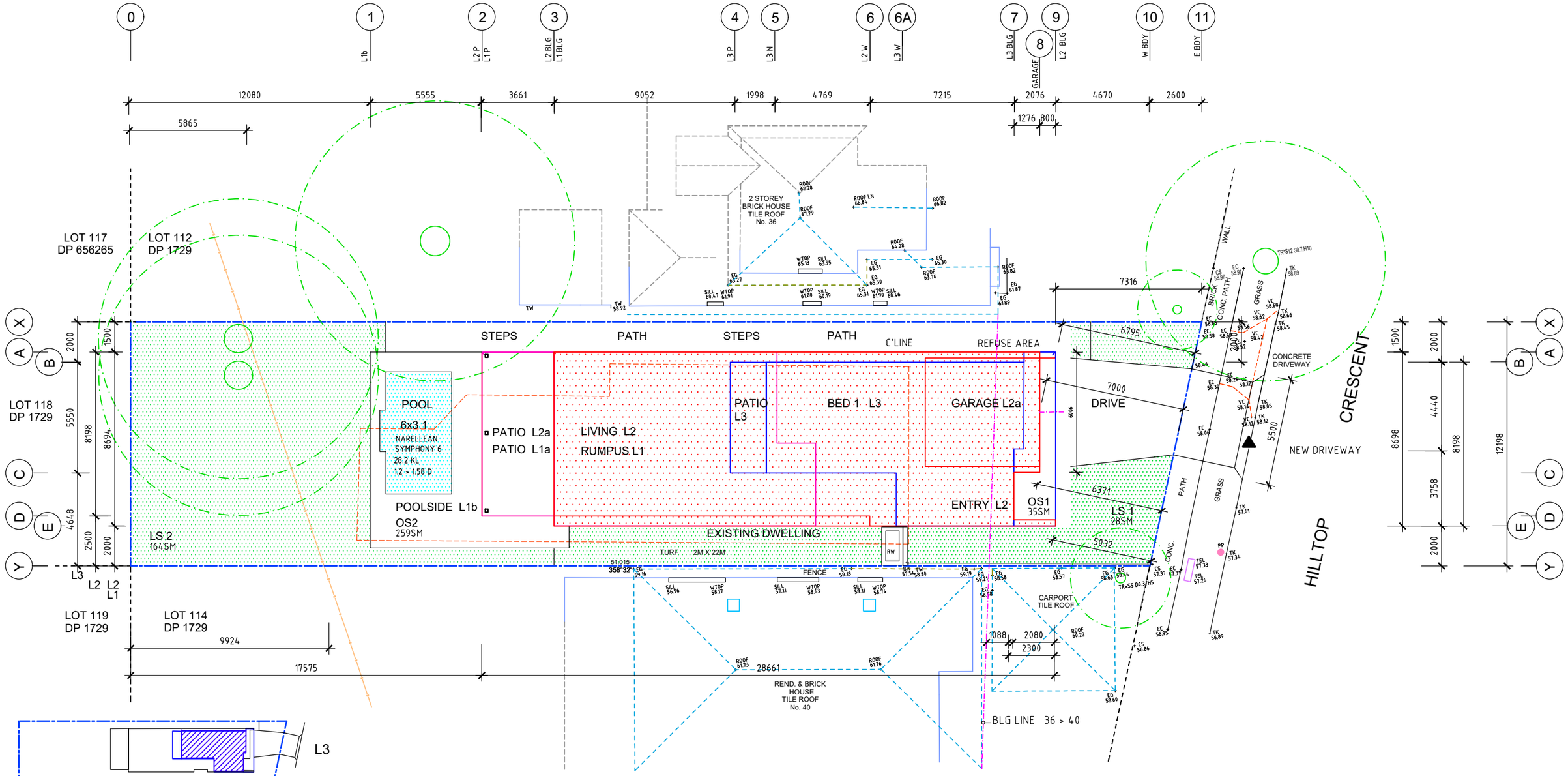
DAVID ARMSTRONG
(REGISTERED SURVEYOR)
SURVEYOR ID No. 8909

C&A SURVEYORS
30 Grose Street, Parramatta, NSW 2150
Ph: 96309299 email: Operations@candasurveyors.com.au
www.candasurveyors.com.au

DETAIL & BOUNDARY IDENTIFICATION SURVEY OF LOT 113 IN DP 1729, LOCATED AT No. 38, HILLTOP CRESCENT, FAIRLIGHT.

S —— S —— APPROXIMATE LOCATION OF BURIED SEWER MAIN BY SYDNEY WATER DBYD RECORDS
W —— W —— APPROXIMATE LOCATION OF BURIED WATER MAIN (WM) BY SYDNEY WATER DBYD RECORDS
E —— E —— ELECTRIC LINE
TELSTRA PIT · STOP VALVE · POWER POLE
WATER METER · HYDRANT
TREE
D/H/S DIAMETER/HEIGHT/SPREAD

INSTRUCTING PARTY:	JASON JUNGBLUT	SURVEYED BY:	LF
LGA: NORTHERN BEACHES	AREA BDY DP: 632.3 m²	DRAWN BY:	SU
SURVEY DATE: 5/12/2024	AREA BY CALC: 638.1 m²	SCALE:	1:100@A1
DATE DRAWN: 6/12/2024	CONTOUR INTERVAL: 0.2 m	REV No:	V1
DATUM:	AHD	CHECKED BY:	KO
REF.NO:	34002-24 DET/ID	SHEET:	1 OF 1



CALCULATIONS

LAND	638 sm
DENSITY	1/250
MAX HEIGHT HOB	8.5RM

LANDSCAPE

OPEN SPACE / LANDSCAPE
55% 351SM 35% 123SM

FRONT	OS1	35	LS1	28
REAR	OS2	268	LS2	165
L2 PATIO	OS3	30		
		333		123
		52.2%		35%
		-2.8%		complies

PERMEABLE AREA

FRONT	LS1	28
	EAST	13
REAR	LS2	165
	WEST	44
PROPOSED		250
EXISTING		250

FLOOR AREA

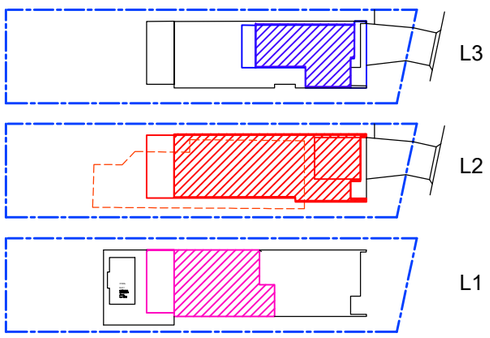
FSR 60% 382.8

LEVEL 3	66.7
LEVEL 2	154.8
LEVEL 1	94.8
	316.3
	complies

EXC. GARAGE, STAIR VOIDS

BUILD AREA

LEVEL 3	112
LEVEL 2	240
LEVEL 1	134
	486



LEGEND

- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:200 @ A3

project no.
1128
revision
A

project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
SITE PLAN

DRAFT
X1

sheet
02

SITE PLAN

L1

1 | 2 | 3 | 4 | 5 | 6 | 6A | 7 | 8 | 9

L2 P | L1 P | L2 BLG | L1 BLG | L3 P | L3 N | L2 W | L3 W | L3 BLG | GARAGE | L2 BLG

3600 | 8660

3600 | 5220 | 3300 | 2110 | 7310

16450

55.5

CABANA | TERRACE | SUB FLOOR

TW 58.92

EX. MASONRY WALL

PAV 55.28 | CS 55.46 | S 55.57 | S 56.16 | EC 56.24 | CS 56.28 | CS 58.13 | CS 58.23

56 | 57 | 58

PATH

WALL TYPE 2 3500

DOG WASH 4950

BATH

BAR

CONCRETE TILE
RUMPUS
55.4

PATIO
55.3
CONCRETE TILE
29.5SM

D16 | D15

F-S 2328 | S-F 2328

POOL
6x3.1
NARELLEAN
SYMPHONY 6
28.2 KL
1.2 > 1.58 D.

TILED CONCOURSE

54.60

CABANA AWNING

SCREENING HEDGE

1.8M PALING FENCE

EX. WALL

BED 4 | BED 5

55.0

3850 | 4150

FOUNDATIONS
SUB FLOOR

GARAGE
FOUNDATION AREA

CONCRETE SLAB OVER

CONCRETE PORTAL

270 MASONRY WALL
WALL TYPE 3

L1 | L2
BDY WALL OVER

W14 | WALL TYPE 1 | W13 | W12 | D11

TURF 2M X 22M

AGL 55.54 | LH 55.61 | AGL 55.54 | RW

LH 53.63 | NS 53.56

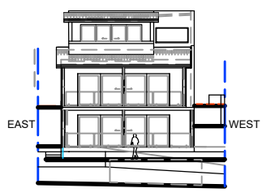
8198 | 8008 | 3355 | 2933 | 1100 | 3815 | 2000 | 1500 | 950 | 1000 | 700 | 900

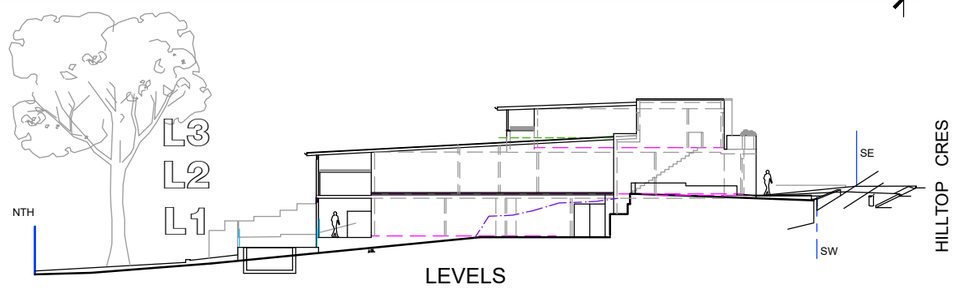
2243 | 1043 | 3000 | 1528 | 3600 | 4544 | 3850 | 4150 | 12780 | 16700 | 2080

FLOOR AREA 94.8SM
BUILD AREA 134.6SM

LED SOLAR 'SKYLIGHT'

LEGEND
- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS





LEVELS

WALL TYPES

WALL 1 220 THK
10 RENDER
100 POLY PANEL - NRG GREENBOARD OR LIKE
90 STUD
10 GYPROCK

WALL 2 400 THK L1
240 MASONRY
70 CAVITY DRAIN
90 STUD
10 GYPROCK

WALL 3 270 CAVITY BK. L1

DRAFT
X1

LEVEL 1 FLOOR PLAN

LOT 113
DP1729
638 sm

PAUL CARRICK ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

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project no. 1128
revision A

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38 HILLTOP CRESCENT, FAIRLIGHT

title
FLOOR PLAN
LEVEL 1 - RUMPUS, POOL

sheet 03

L2

2 3 4 5 6 6A 7 8 9 10 11

L2 P L1 P | L2 BLG L1 BLG | L3 P | L3 N | L2 W | L3 W | L3 BLG | GARAGE | L2 BLG | W BDY | E BDY

3600 5444 8610 3166 2110 3600 65.13 63.95 3600 5730 800 7316

36 WINDOW LEVELS

CABANA

MASONRY WALL

TW 58.92

61.91 60.47 | 61.80 60.19 | 61.90 60.46

CS 55.46 | S 55.57 | S 56.18 | EC 56.24 | CS 56.25 | CS 56.28 | 57 | S 58.08 | CS 58.13 | CLOTHES LINE | CS 58.23 | REFUSE | CS 58.33

W28 W29 1515 W30 W31 W32

LEDGE

PATIO
58.0
TILES
TIMBER FRAME
29.5SM

D27

2460 F-S-S-F

LIVING
58.1

2x1

3600

BED 2

3440

4040

BED 3

GARAGE
58.0

3166 2325 840 3950

SCREEN OVER 1400 WALL

650

1350

PIVOT DOOR 1075

1150

1200

3.0x1.1

DW BINS

800

1200

1850

F

400 SHELVING
600 UNDER

700

PANTRY

2300

LDY

DR WM

WC

BATH

FOYER
58.1

D21

ENTRY

W22

UP

BBQ

3280 1565 1300

ICT 650 WO BR 700 600 1850 CPBD

900 900 900 600 900 600 600 700 600

W26 500W LEDGE C'BOND ROOF W25 W24 W23

GUTTER

GRATED CATCH DRAIN

1500 1500

58.46

6976 4401 6026

6402

5032

TK 57.61

TK 57.34

2000 L1 BDY INSET

6116 1849 TURF

L1

55.4 56.78

EG 60.90

EX. WALL

TW 58.80

L2

TURF

EX. WALL

2000 L2 BDY INSET

TW 57.77

CS 57.37 EC 57.31

TEL 57.33

TEL 57.26

1088 2080 2300

5444 2521 2400 1700 3200 6775

27954

EAST WEST

NTH

L3
L2
L1

SE SW

HILLTOP CRES

LEVELS

ILLUME
LED SKYLIGHT

LEGEND

- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

WALL TYPES

WALL 1 220 THK
10 RENDER
100 POLY PANEL - NRG GREENBOARD OR LIKE
90 STUD
10 GYPROCK

WALL 2 400 THK L1
240 MASONRY
70 CAVITY DRAIN
90 STUD
10 GYPROCK

WALL 3 270 CAVITY 1BK. L1

FLOOR AREA 154.8 SM
BUILD AREA 240.0 SM

DRAFT
X1

LEVEL 2 FLOOR PLAN

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
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revision
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project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
FLOOR PLAN
LEVEL 2 - ENTRY, GARAGE

sheet
04

2 L2 P L1 P
3 L2 BLG L1 BLG
4 L3 P
5 L3 N
6 L2 W
6A L3 W
7 L3 BLG
8 GARAGE
9 L2 BLG
10 W BDY
11 E BDY

14202
1800 4100 2400 2632 3000
9396
8906
L3 BLG SETBACK
690 900 7316
L3 PLANTER SETBACK
L2 PORTICO SETBACK
500
1416
1649
805
1325

CABANA
PAVED TERRACE
MASONRY WALL
65.13
63.95
36 WINDOW LEVELS
61.91
60.47
61.80
60.19
61.90
60.46

CS 56.25
CS 58.13
CS 58.23
CS 58.33
58.46
6843
1500
2000

2000 57 1200
800
300 EAVES
ROOF
W47 W48 W49 W50

PATIO
61.2
DECKING
F-S-S-F 2140
+ 100 HOB
5110
D46
BED 1
61.1
K
3920
WIR
ENSUITE
1100
1500
1700
810
STUDY
3920
PLANTER
W41
W42
F-C 2.45
7360
L3 BLG LINE
7067
L3 BLG LINE
5032
L3 PLANTER
CONC.
61.0
W43
SOLAR SCREENS
50x40 RHS
BLG LINE

5550
5110
2148
4648
2500
2200
W45
COLORBOND
ROOF
W44
VOID
61.1
L3
L1
L2
55.4
56.78
EG
60.90
TW
58.81
EX. WALL
EX. WALL
3920
4440
12198
3758
2000

1180 900
1326
5595
6799
13802
HILLTOP CRES
DRAFT

L3
L2
L1
SE
SW
NTH
EAST
WEST
LEVELS

FLOOR AREA 66.7 SM
BUILD AREA 112 SM

V10

LEVEL 3 FLOOR PLAN

LEGEND
DEMOLISH
EXISTING
PROPOSED
UNDER NEW
UNDER EX.
OVER
EX. ROOF LINE
NEW ROOF LINE
GLASS

PAUL CARRICK ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

date MAR 2025
scale 1:100 @ A3
project no. 1128
revision A

project
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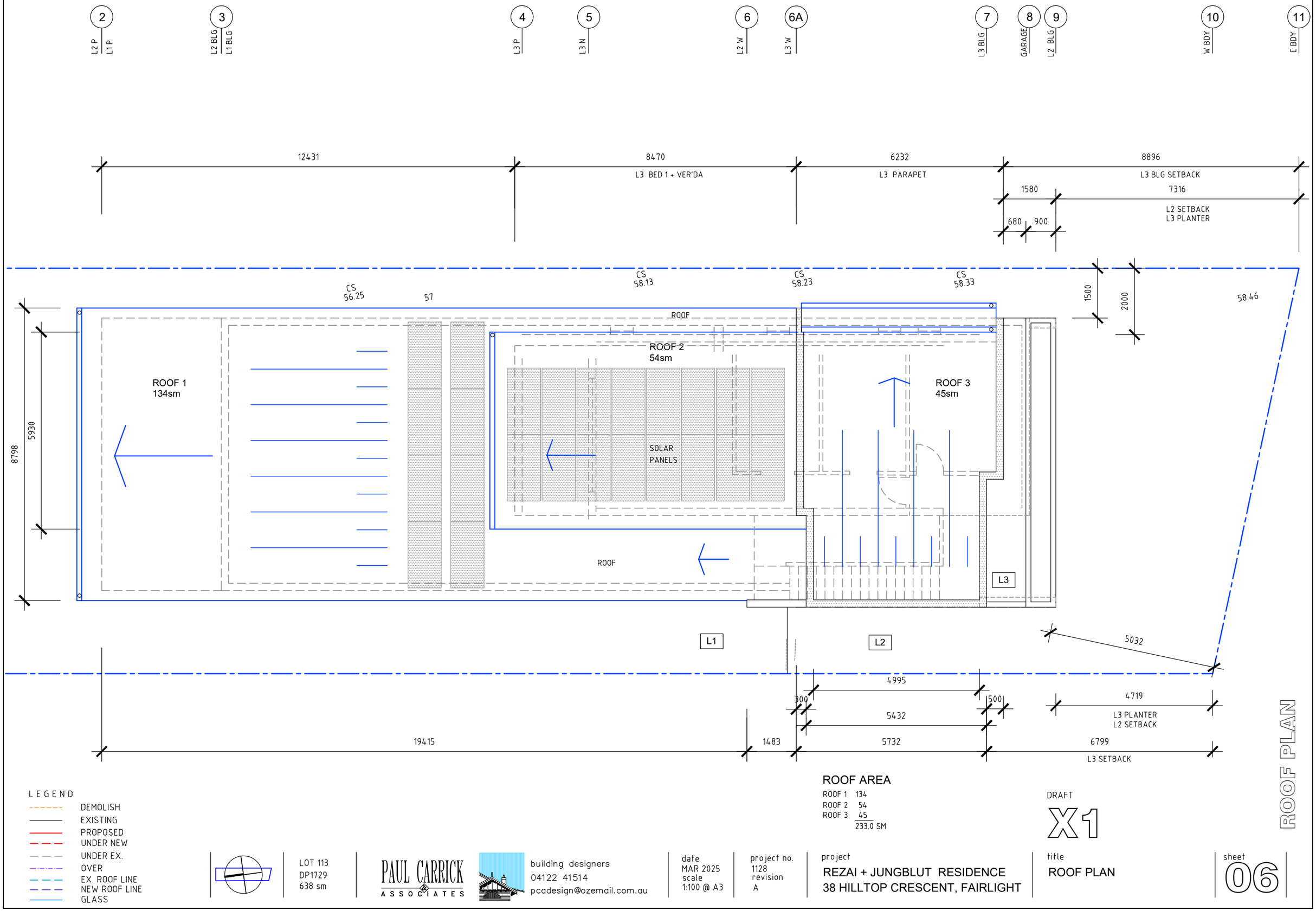
38 HILLTOP CRESCENT, FAIRLIGHT

title
FLOOR PLAN
LEVEL 3 - BED 1, STUDY

sheet 05



LEGEND

- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

ROOF AREA

ROOF 1	134
ROOF 2	54
ROOF 3	45
	233.0 SM

DRAFT

X1

ROOF PLAN

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

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MAR 2025
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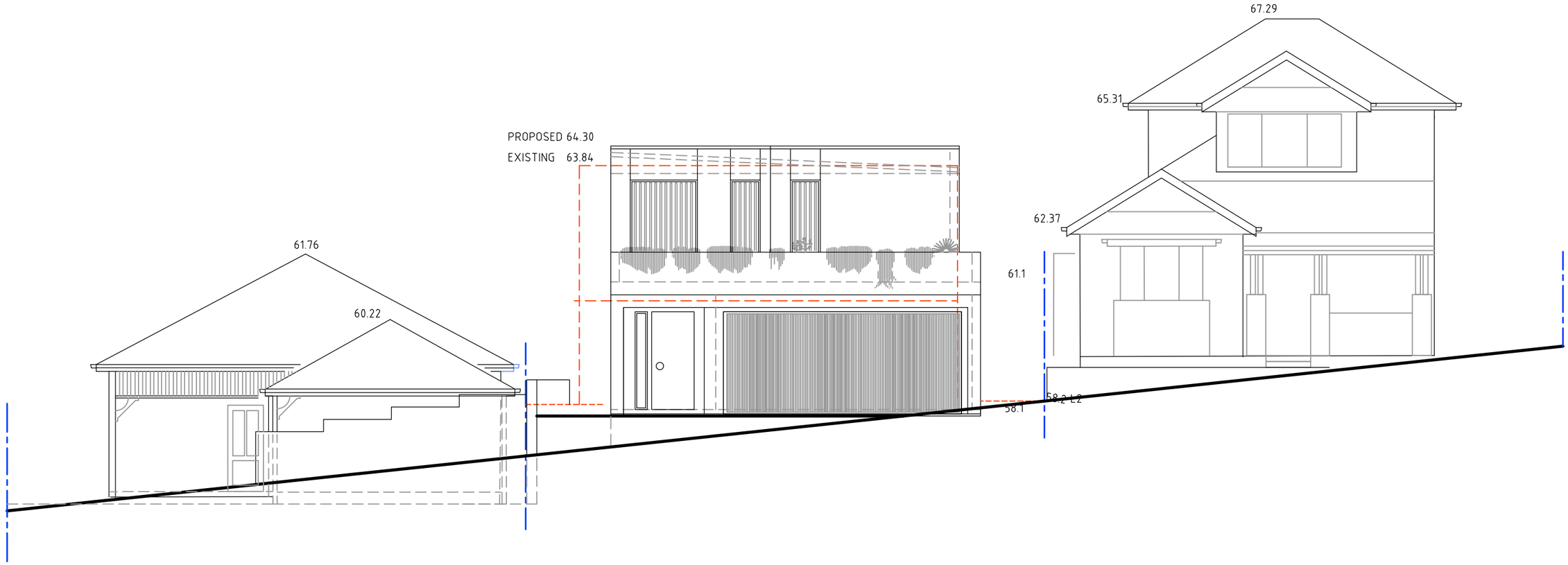
38 HILLTOP CRESCENT, FAIRLIGHT

title
ROOF PLAN

sheet
06



STREETSCAPE

STREETSCAPE

DRAFT

X1

LEGEND

DEMOLISH

PROPOSED

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:200 @ A3

project no.
1128
revision
A

project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
STREETSCAPE

sheet
07

65.13
63.95

61.90
60.46

61.80
60.19

61.91
60.47

36 WINDOW LEVELS

10 | 9 L2 BLG | 8 GARAGE | 7 L3 BLG | 6A L3 W | 6 L2 W | 5 L3 N | 4 L3 P | 3 L1 BLG L2 BLG | 2 L1P L2 P | 1

36 PROFILE

64.15 L4

61.1 L3

61.0 L3a

58.1 L2

58.0 L2a

55.35 L1

2550 | 300 | 3000 | 2700 | 300 | 2750 | 2450 | 300

W50 | W49 | W48 | 2200 | W47 | 1500

LEDGE 500D.

GUTTER

2400 | 2400 HEAD | W32 | 1500 | W31 | W30 | 1700 SILL | CL | F W29 | W28 F

36 PROFILE

38 PROFILE

REFUSE | AC | EAST EGL | 58.13 | 58.08 | EX. BDY STEPS | BDY ROCK | EX. FNDTN PROFILE | 56.25 | 55.35 L1

WEST EGL

57.90 | 57.80 | 57.60 | 57.50 | 57.30 | 57.10 | 57.00 | 56.70 | WEST EGL | 56.18 | 55.57 | CS 55.46

EXISTING FOUNDATION AREA PROFILE

8.5 HT EAST

7.2 HT EAST

36 GAZEBO

38 EXISTING

EASTERN BDY WALL

BDY WALL

L1a

55.27

54.6 L1b

POOL 4x3 | AGL 53.76 | NS 54.11

40 CARPORT BEYOND

WESTERN BDY

L3	STUDY	ENSUITE	WIR	BED 1	BALCONY						
L2	GARAGE	BED 2	BED 3	STAIRS	KITCHEN	MEALS	LIVING	BALCONY	L2		
L1	STAIRS	BED 4	RUMPUS	PATIO	L1						

WALL HEIGHT ALLOWABLE 7.2 EAST
28.7M LONG 2.8M VERTI CAL 1:10.25

WALL HEIGHT ALLOWABLE 7.4 WEST
28.7M LONG 4.2M VERTI CAL 1:6.84

LEGEND
- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

EAST ELEVATION

DRAFT
V10

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

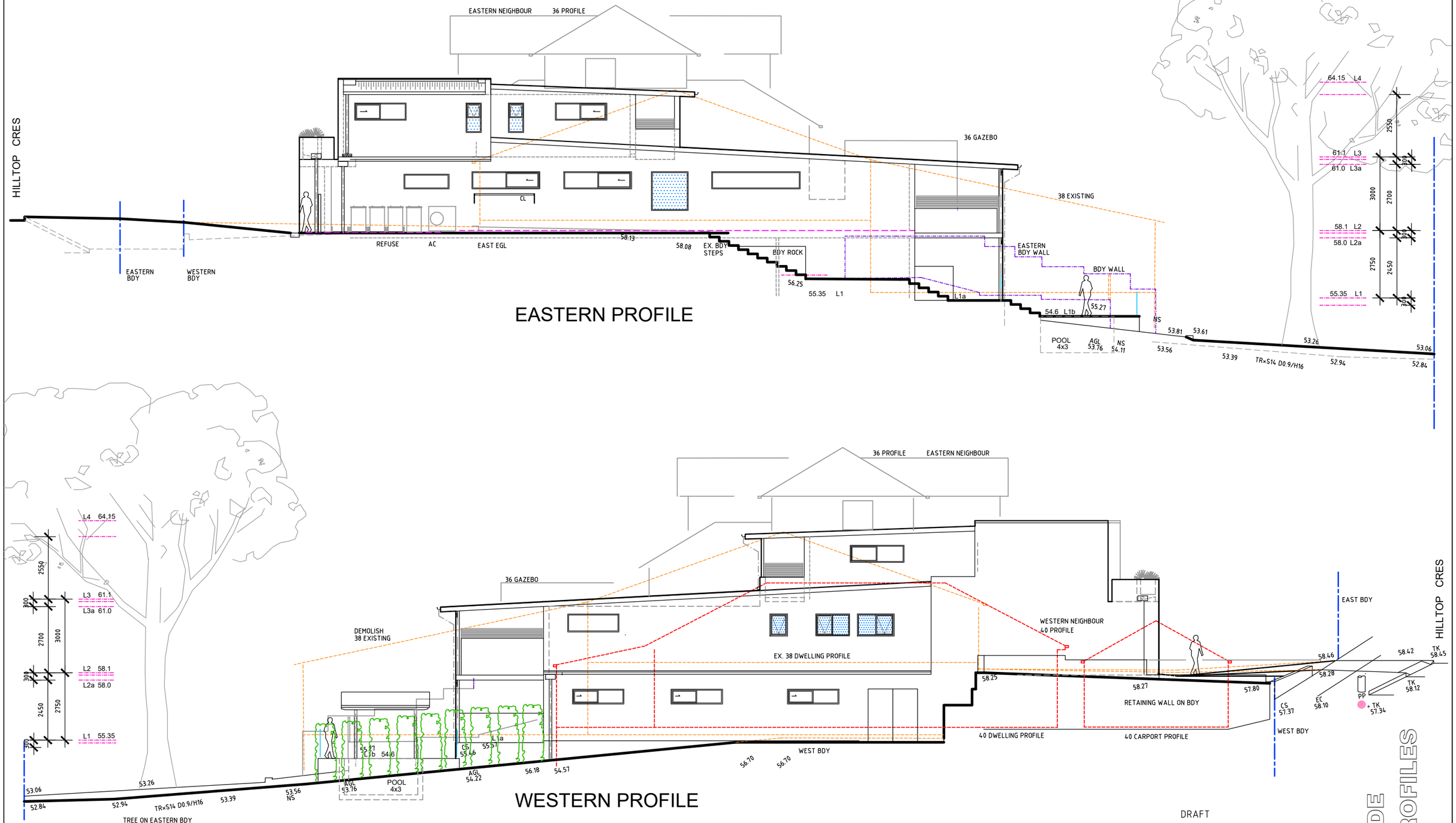
date
MAR 2025
scale
1:100SC @ A3

project no.
1128
revision
A

project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
SIDE - EAST ELEVATION

sheet
08



DRAFT

V10

SIDE PROFILES

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES

building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:150 @ A3

project no.
1128
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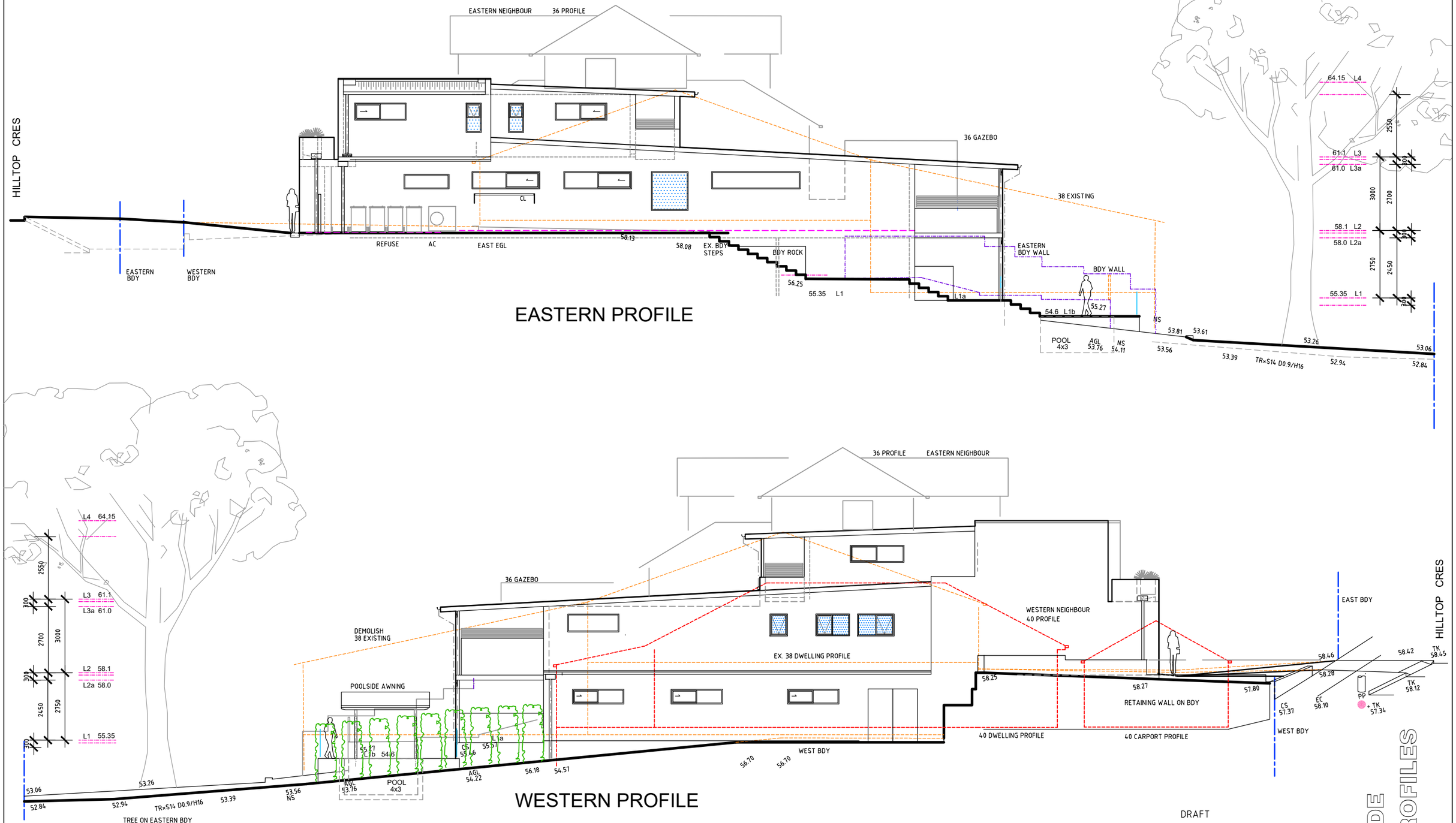
A

project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
SIDE PROFILES OVERVIEW

sheet
08



DRAFT

X1

SIDE PROFILES

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES

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04122 41514
pcadesign@ozemail.com.au

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project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
SIDE PROFILES OVERVIEW

sheet
08

1 | 2 L2 P L1 P | 3 L2 BLG L1 BLG | 4 L3 P | 5 L3 N | 6 L2 W | 6A L3 W | 7 L3 BLG | 8 GARAGE | 9 L2 BLG

L4 64.15

L3 CENTRE WEST
8.5 HT GRID C

COLORBOND ROOF
2.5° SLOPE

7.4 HT GRID C WEST
7.2 HT GRID C EAST

BONDOR SOLARSPAN
INSULATED PANEL
COLORBOND ROOF
3° SLOPE

+7.06

+6.15

2550

8.5 HT WEST

L3 61.1

7.4 HT WEST

300

L3a 61.0

+6.16

2200

W45

W44

W43

1500

+6.7

0

2400

W25

W24

W23

1500

W26 F

2700

3000

38 EXISTING

EX. 38 DWELLING PROFILE

LEDGE 500D.

GUTTER

58.25

58.27

RETAINING WALL ON BDY

40 DWELLING PROFILE

40 CARPORT PROFILE

L2 58.1

L2a 58.0

300

2450

2750

2100

1500

W14

W13

W12

L1 55.35

55.27

L1b 54.6

L1a

55.57

CS
55.46

EGL 55.54

WEST BDY

STAIRS L2-L3
17R x 176.5 = 3000
16T x 265 = 4240

300

NS

NS
54.11

53.81

AGL
53.76

POOL
4x3

AGL
54.22

56.18

AGL
54.57

53.56
NS

56.70 56.70 57.00 57.50 57.60 57.60 57.80

SUB FLOOR LEVELS ON GRID C > CTR

				BALCONY	BED 1	WIR	ENSUITE	STUDY	PLANTER			L3
L2	BALCONY	KITCHEN	PANTRY	LAUNDRY	POWDER	BATH	STAIRS TO L3	HALL	FOYER	ENTRY		L2
L1	PATIO	RUMPUS	BED 4	BED 5	SUB FLOOR							L1
L1b	POOL											

WALL HEIGHT ALLOWABLE 7.2 EAST
28.7M LONG 2.8M VERTI CAL 1:10.25

WALL HEIGHT ALLOWABLE 7.4 WEST
28.7M LONG 4.2M VERTI CAL 1:6.84

LEGEND
- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:100 @ A3

project no.
1128
revision
A

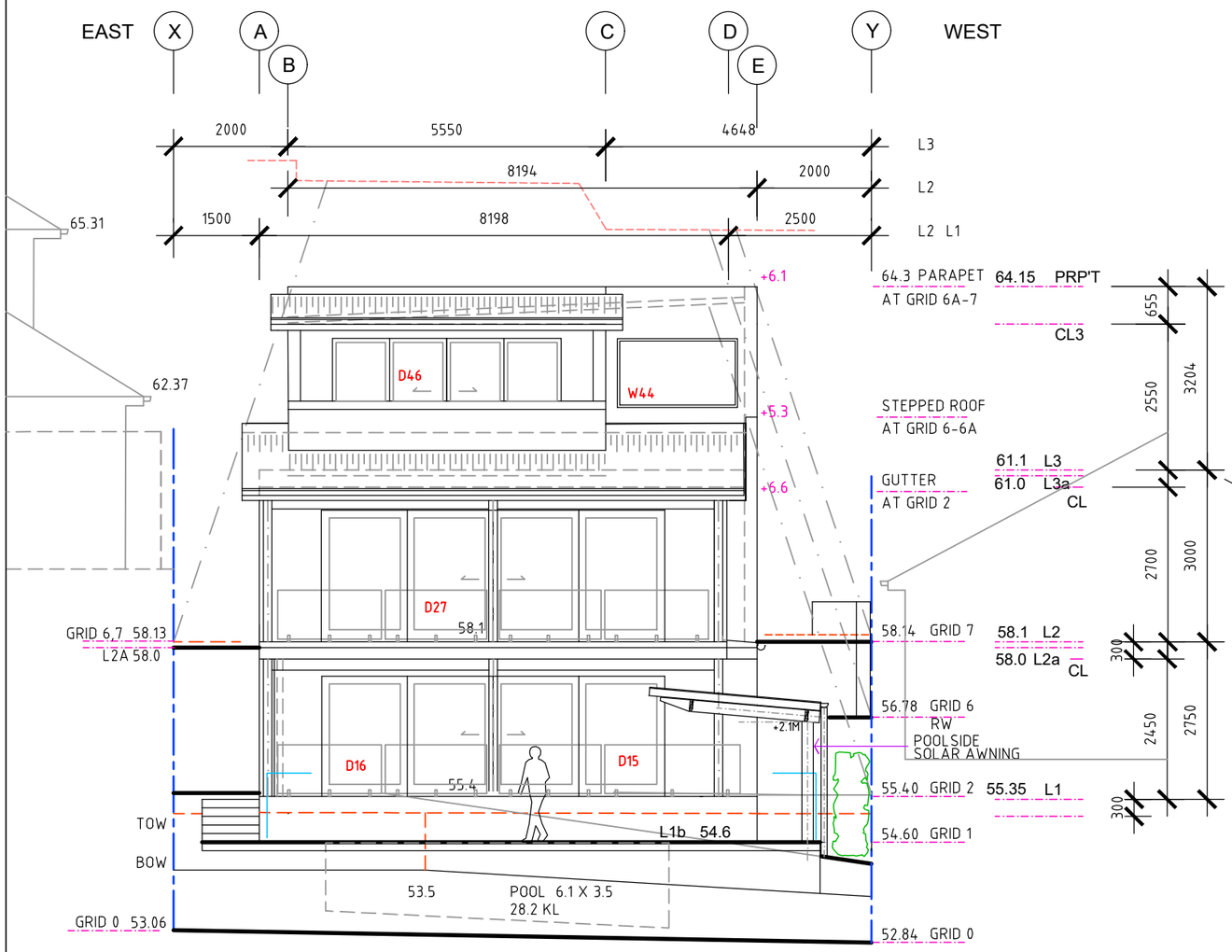
project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
SIDE - WEST ELEVATION

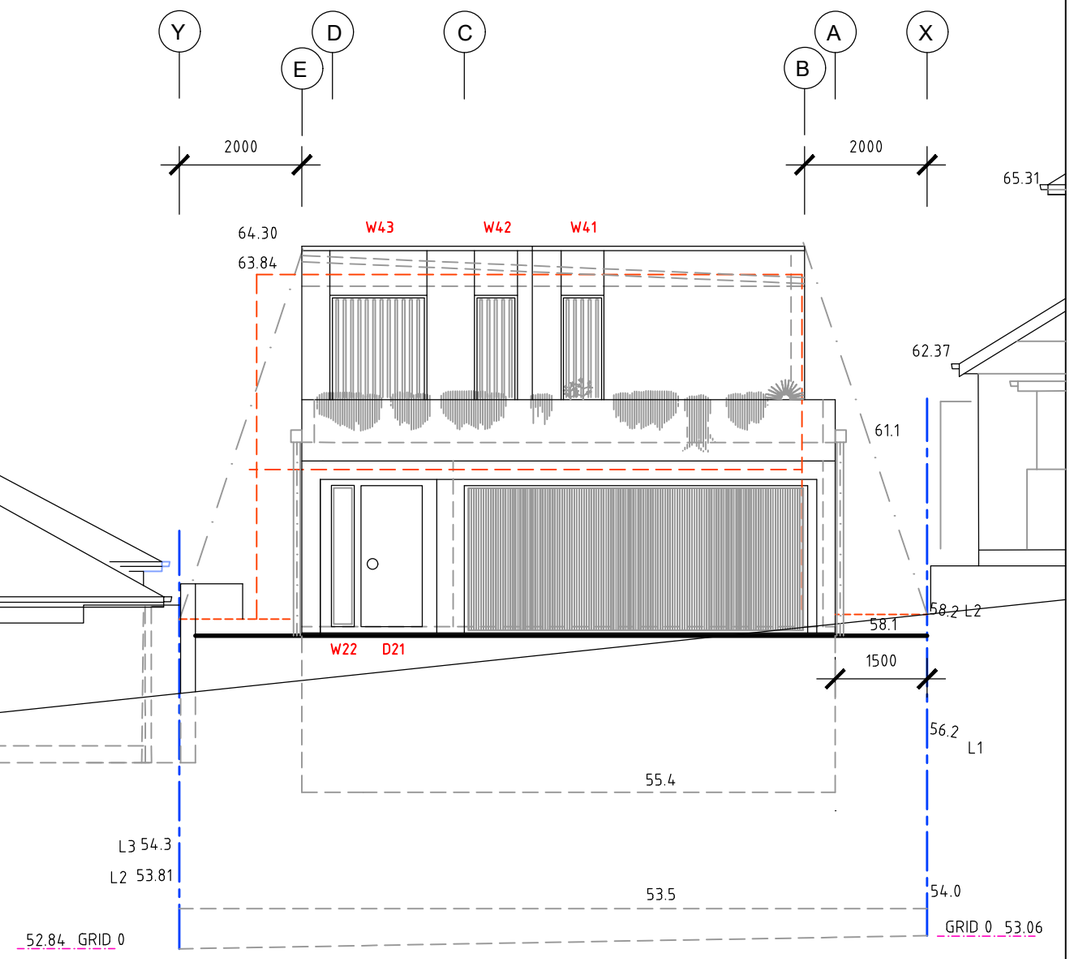
sheet
09

DRAFT
V10

EAST ELEVATION



REAR - NORTH ELEVATION



FRONT - SOUTH ELEVATION

LEGEND

- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:100 @ A3

project no.
1128
revision
A

project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
ELEVATIONS
FRONT-SOUTH + REAR - NORTH

sheet
09

DRAFT
X1

FRONT + REAR ELEVATIONS

65.13
63.95

61.90
60.46

61.80
60.19

61.91
60.47

36 WINDOW LEVELS

10 | 9 L2 BLG | 8 GARAGE | 7 L3 BLG | 6A L3 W | 6 L2 W | 5 L3 N | 4 L3 P | 3 L1 BLG L2 BLG | 2 L1 P L2 P | 1

36 PROFILE

64.15 L4

61.1 L3

61.0 L3a

58.1 L2

58.0 L2a

55.35 L1

2550 | 300 | 3000 | 2700 | 300 | 2750 | 2450 | 300

W50 | W49 | W48 | 2200 | W47 | 1500

LEDGE 500D.

GUTTER

W32 | 2400 | W31 | 2400 HEAD | W30 | W28 | F

1500 | CL | 1700 SILL | F W29

36 PROFILE

38 PROFILE

8.5 HT EAST

7.2 HT EAST

36 GAZEBO

38 EXISTING

REFUSE | AC | EAST EGL

58.13 | 58.08

EX. BDY STEPS | BDY ROCK

EX. FNDTN PROFILE

WEST EGL

56.25

55.35 L1

L1a

EASTERN BDY WALL

BDY WALL

55.27

54.6 L1b

POOL 4x3 | AGL 53.76 | NS 54.11

40 CARPORT BEYOND

WESTERN BDY

57.90 | 57.80 | 57.60 | 57.50 | 57.30 | 57.10 | 57.00 | 56.70 | WEST EGL | 56.18 | 55.57 | CS 55.46

EXISTING FOUNDATION AREA PROFILE

L3	STUDY	ENSUITE	WIR	BED 1	BALCONY	
L2	GARAGE	BED 2	BED 3	STAIRS	KITCHEN MEALS LIVING	BALCONY L2
L1	STAIRS	BED 4	RUMPUS	PATIO		L1

WALL HEIGHT ALLOWABLE 7.2 EAST
28.7M LONG 2.8M VERTI CAL 1:10.25

WALL HEIGHT ALLOWABLE 7.4 WEST
28.7M LONG 4.2M VERTI CAL 1:6.84

LEGEND
- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

LOT 113
DP1729
638 sm

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project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
SIDE - EAST ELEVATION

sheet
10

DRAFT
X1

EAST ELEVATION

1 | 2 L2 P L1 P | 3 L2 BLG L1 BLG | 4 L3 P | 5 L3 N | 6 L2 W | 6A L3 W | 7 L3 BLG | 8 GARAGE | 9 L2 BLG

L4 64.15

L3 CENTRE WEST
8.5 HT GRID C

COLORBOND ROOF
2.5° SLOPE

7.4 HT GRID C WEST
7.2 HT GRID C EAST

BONDOR SOLARSPAN
INSULATED PANEL
COLORBOND ROOF
3° SLOPE

+7.06

+6.15

2550

8.5 HT WEST

2200

W45

W44

W43

1500

+6.7

300

L3 61.1

7.4 HT WEST

L3a 61.0

+6.16

0

2400

W26 F

W25

W24

W23

1500

2700

3000

38 EXISTING

EX. 38 DWELLING PROFILE

LEDGE 500D.
GUTTER

58.25

58.27

RETAINING WALL ON BDY

300

L2 58.1

L2a 58.0

POOLSIDE AWNING

2100

W14

W13

W12

1500

40 DWELLING PROFILE

40 CARPORT PROFILE

2450

2750

EGL 55.54

L1 55.35

55.27

L1b 54.6

L1a

55.57

GS
55.46

WEST BDY

STAIRS L2-L3
17R x 176.5 = 3000
16T x 265 = 4240

300

NS

NS
54.11

53.81

AGL
53.76

POOL
4x3

AGL
54.22

56.18

AGL
54.57

56.70 56.70 57.00 57.50 57.60 57.60 57.80

SUB FLOOR LEVELS ON GRID C > CTR

53.56
NS

L3					BALCONY	BED 1	WIR	ENSUITE	STUDY	PLANTER		
L2	BALCONY	KITCHEN	PANTRY	LAUNDRY	POWDER	BATH	STAIRS TO L3	HALL		FOYER	ENTRY	L2
L1	PATIO	RUMPUS	BED 4	BED 5	SUB FLOOR							L1
L1b	POOL											

WALL HEIGHT ALLOWABLE 7.2 EAST
28.7M LONG 2.8M VERTI CAL 1:10.25

WALL HEIGHT ALLOWABLE 7.4 WEST
28.7M LONG 4.2M VERTI CAL 1:6.84

EAST ELEVATION

LEGEND
- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

DRAFT
X1

LOT 113
DP1729
638 sm

PAUL CARRICK & ASSOCIATES
building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:100 @ A3

project no.
1128
revision
A

project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
SIDE - WEST ELEVATION

sheet
11

65.13
63.95

61.91
60.47

61.80
60.19

61.90
60.46

36 WINDOW LEVELS

1 | 2 L2 P L1 P | 3 L2 BLG L1 BLG | 4 L3 P | 5 L3 N | 6 L2 W | 6A L3 W | 7 L3 BLG | 8 GARAGE | 9 L2 BLG | 10 W BDY

36 PROFILE

8.5 HT EAST

7.2 HT EAST

36 PROFILE

36 GAZEBO

PRIVACY SCREEN SLATS

2700
2400
1700
1500
885
0
2450
2100
1500
0

W BDY WALL

W28 F

W29 F

W47 2200 1500

W48

W49

W50

W41

+100 0

BED 1

WIR

ENSUITE

STUDY

2400

W30

1700

W31

W32 F

3599 BED 2

3601 BED 3

GARAGE

EAST EGL

58.13

MEALS

LOUNGE

EGL 58.08

RUMPUS

BATH

56.25

L1a

L1 55.35

55.27

L1b 54.6

NS 54.11

AGL 53.76

POOL 8x3

CS 55.46

55.57

56.18

WEST EGL

56.70

57.00

57.10

57.30

57.50

57.60

57.80

57.90

EX. FNDTN PROFILE
EAST EGL
CENTRE EGL
WEST EGL

EXISTING FOUNDATION AREA PROFILE

L4 64.15

2550

300

L3 61.1

L3a 61.0

2700

3000

300

L2 58.1

L2a 58.0

2450

2750

300

L1 55.35

WEST BDY

STAIRS L1-L2
16R x 171.5 = 2745
15T x 265

WALL HEIGHT ALLOWABLE 7.2 EAST
28.7M LONG 2.8M VERTI CAL 1:10.25

WALL HEIGHT ALLOWABLE 7.4 WEST
28.7M LONG 4.2M VERTI CAL 1:6.84

LEGEND
- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

LOT 113
DP1729
638 sm

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building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:100 @ A3

project no.
1128
revision
A

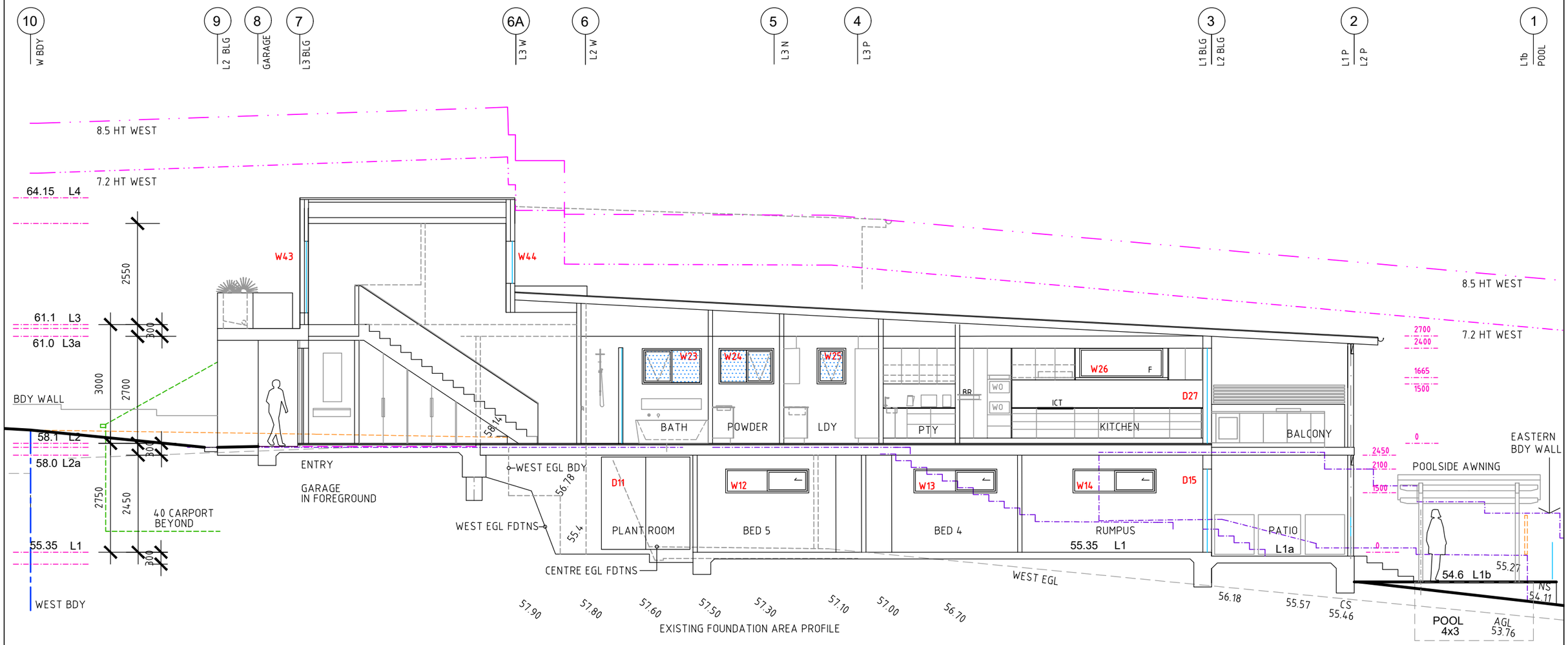
project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
LONG SECTION
LOOKING EAST

DRAFT
X1

LONG SECTION EAST

sheet
12



WALL HEIGHT ALLOWABLE 7.2 EAST
28.7M LONG 2.8M VERTI CAL 1:10.25

WALL HEIGHT ALLOWABLE 7.4 WEST
28.7M LONG 4.2M VERTI CAL 1:6.84

LEGEND
- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

LOT 113
DP1729
638 sm

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date
MAR 2025
scale
1:100 @ A3

project no.
1128
revision
A

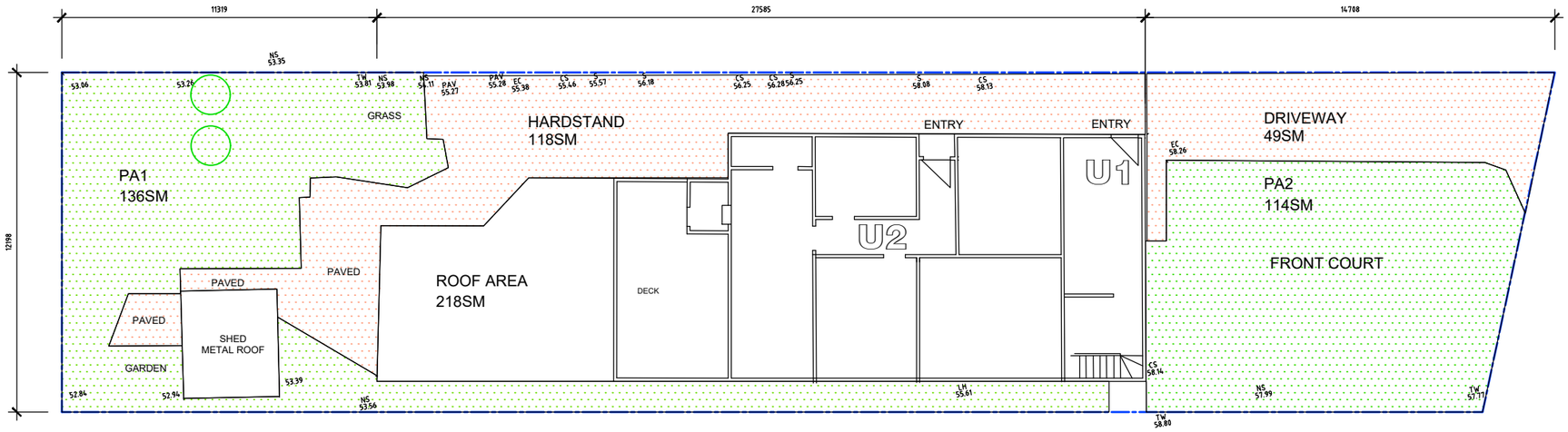
project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

title
LONG SECTION
LOOKING WEST

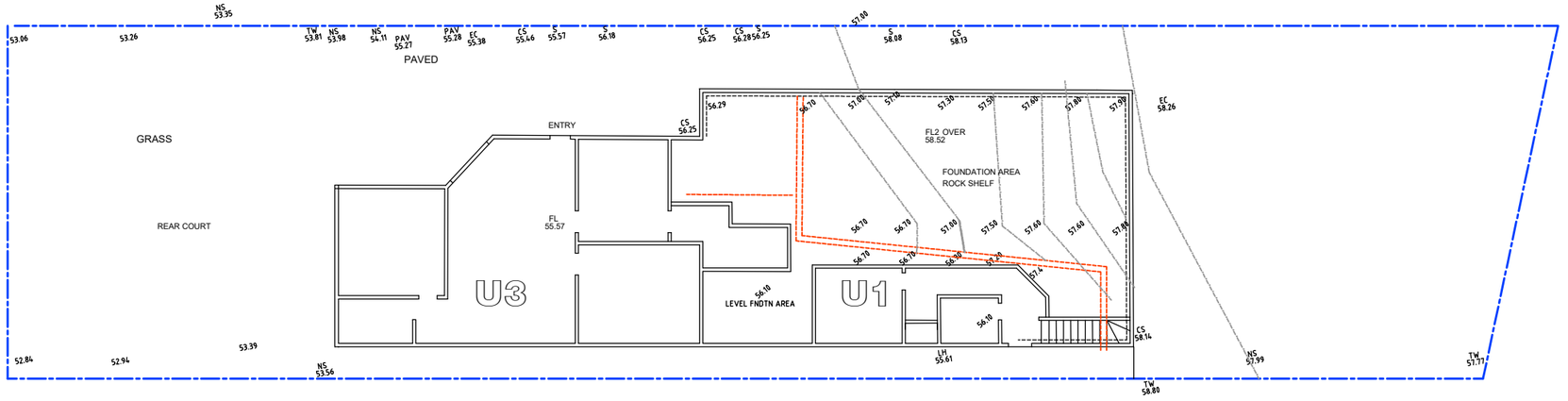
DRAFT
X1

LONG SECTION WEST

sheet
13



LEVEL 2



LEVEL 1

EXISTING DWELLING AREA

217SM

PERMEABLE AREAS

FRONT	PA2	114
REAR	PA1	136
		250SM

HARDSTAND AREAS

IMPERMEABLE

FRONT	HA2	49
REAR	HA1	118
ROOF		218
		385SM

BUILT UPON AREA

384SM

LEGEND

- DEMOLISH
- EXISTING
- PROPOSED
- UNDER NEW
- UNDER EX.
- OVER
- EX. ROOF LINE
- NEW ROOF LINE
- GLASS

LOT 113
DP1729
638 sm

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building designers
04122 41514
pcadesign@ozemail.com.au

date
MAR 2025
scale
1:200 @ A3

project no.
1128
revision
A

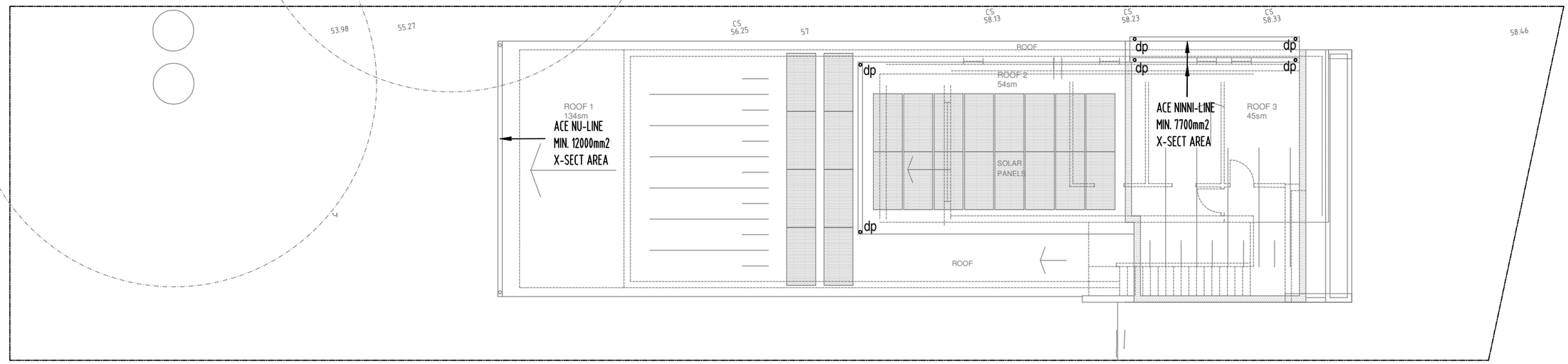
project
REZAI + JUNGBLUT RESIDENCE
38 HILLTOP CRESCENT, FAIRLIGHT

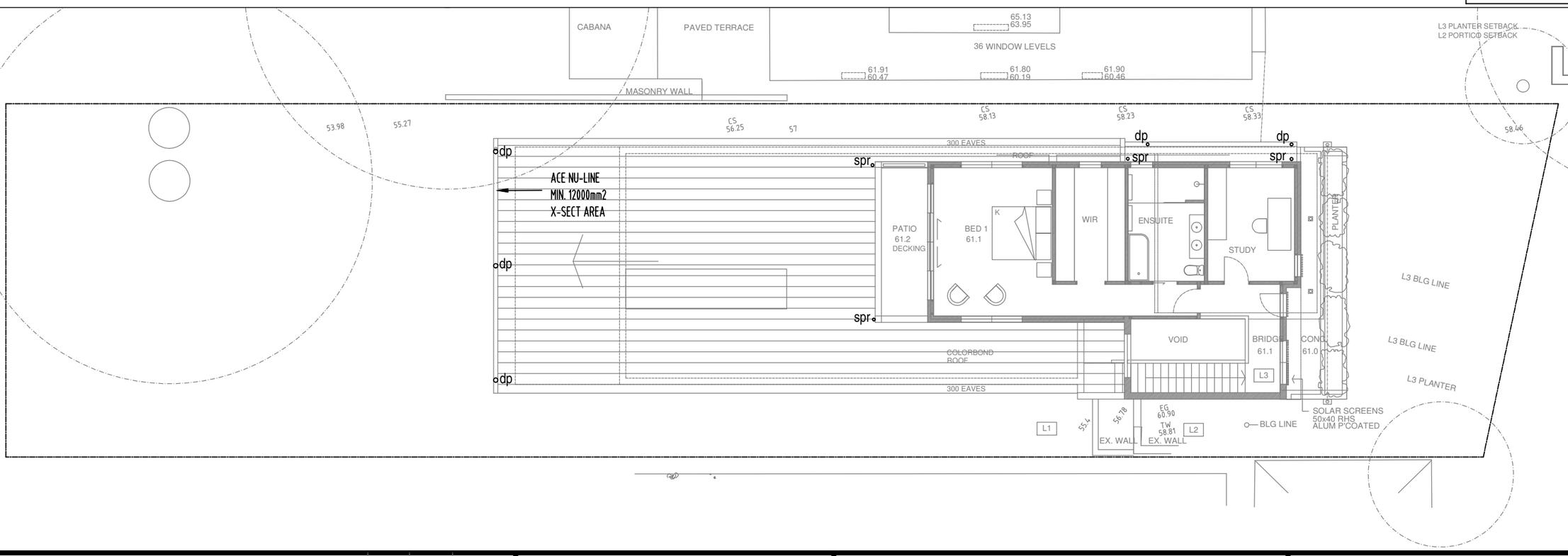
title
EXISTING DWELLING
SITE PLAN

sheet
17

DRAFT
X1

EXISTING DWELLING
FLOOR PLANS





Rev	Description	Eng	Draft	Date
A	FOR DA SUBMISSION	MN	MN	21.6.25

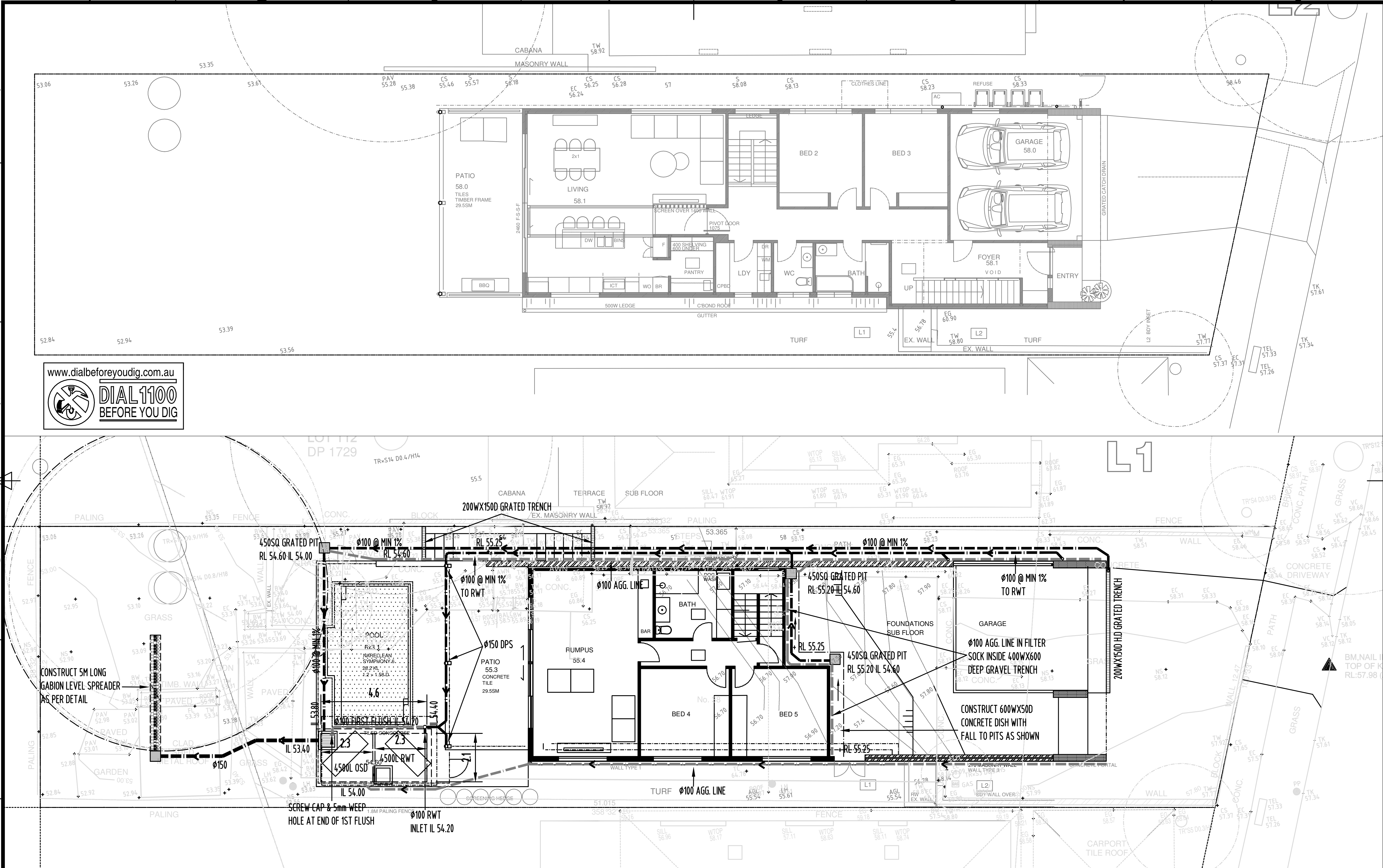
Client: Mr JungBlut

Drawn	Designed	Checked	Scale
MN	MN	MN	1:150
Prj No.	Drw No.	Issue	Date
240910	C01	A	5.6.25

Title: ROOF & FIRST FLOOR DRAINAGE

Project: NEW DWELLING AT
38 HILLTOP CRS FAIRLIGHT

DEVELOPMENT ENGINEERING SOLUTIONS
21 GRAND AVE, WESTMEAD 2145 P 8898 9830 M 0411506738



CABANA
MASONRY WALL
PATIO
58.0
LIVING
58.1
BED 2
BED 3
GARAGE
58.0
FOYER
58.1
ENTRY
LDY
WC
BATH
UP
PANTRY
BBQ
500W LEDGE
C'BOND ROOF
GUTTER
TURF
EX. WALL
GRATED CATCH DRAIN
www.dialbeforeyoudig.com.au
DIAL 1100
BEFORE YOU DIG
LOT 112
DP 1729
L1
200WX150D GRATED TRENCH
450SQ GRATED PIT
RL 54.60 IL 54.00
ø100 @ MIN 1%
RL 55.25
RL 54.60
ø100 @ MIN 1%
TO RWT
ø100 AGG. LINE
450SQ GRATED PIT
RL 55.20 IL 54.60
ø100 @ MIN 1%
TO RWT
GARAGE
FOUNDATIONS
SUB FLOOR
ø100 AGG. LINE IN FILTER
SOCK INSIDE 400WX600
DEEP GRAVEL TRENCH
200WX150D H.D GRATED TRENCH
RL 55.25
450SQ GRATED PIT
RL 55.20 IL 54.60
CONSTRUCT 600WX50D
CONCRETE DISH WITH
FALL TO PITS AS SHOWN
RL 55.25
ø150 DPS
PATIO
55.3
CONCRETE TILE
RUMPUS
55.4
BATH
BED 4
BED 5
POOL
4.6
CONSTRUCT 5M LONG
GABION LEVEL SPREADER
AS PER DETAIL
ø100 FIRST FLUSH IL 54.20
2.3
2.3
4500L OSD
4500L RWT
IL 53.40
ø150
IL 54.00
SCREW CAP & 5mm WEEP
HOLE AT END OF 1ST FLUSH
ø100 RWT
INLET IL 54.20
TURF
ø100 AGG. LINE
FENCE
PALING
GRASS
CONCRETE DRIVEWAY
BM,NAIL IN TOP OF K
CARPORT
TILE ROOF

Rev	Description	Eng	Draft	Date
A	FOR DA SUBMISSION	MN	MN	21.6.25

Client: Mr JungBlut

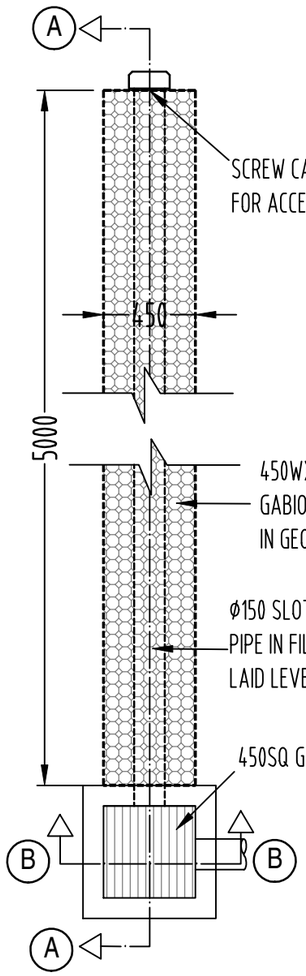
Drawn	Designed	Checked	Scale
MN	MN	MN	1:150
Prj No.	**Drw No.**	**Issue**	**Date**
240910	C02	A	5.6.25

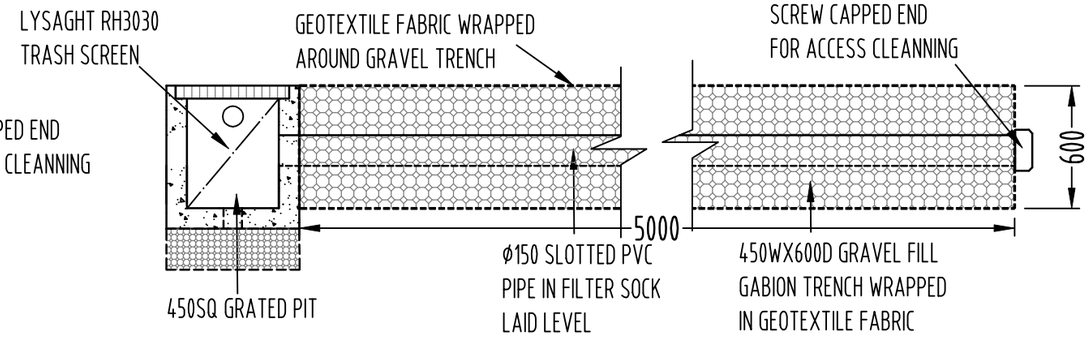
Title: GROUNND & LOWER GROUND FLOOR DRAINAGE

Project: NEW DWELLING AT 38 HILLTOP CRS FAIRLIGHT

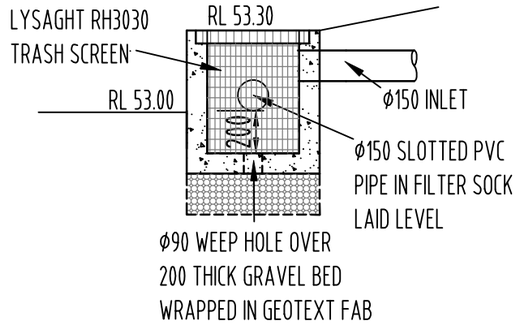
DEVELOPMENT ENGINEERING SOLUTIONS

21 GRAND AVE, WESTMEAD 2145 P 8898 9830 M 0411506738

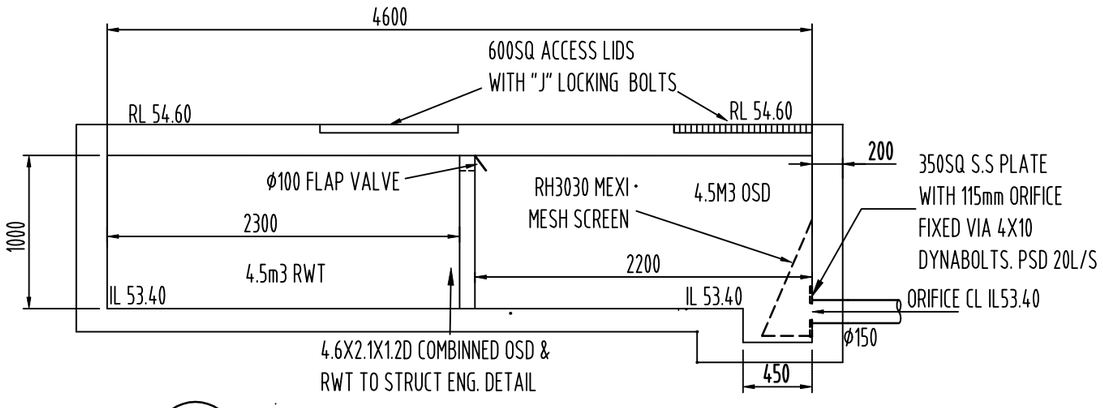




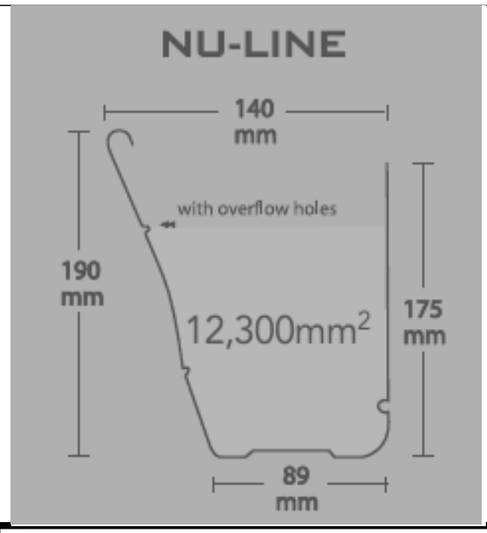
SECTION A-A
SCALE 1:30



SECTION B-B
SCALE 1:30



A / C01 SECTION - UNDERGROUND OSD TANK
SCALE 1: 40



STORMWATER NOTES

1. ALL PIPES AND WORKMANSHIP ARE TO BE SOLVENT WELDED AND INSTALLED IN ACCORDANCE WITH RELEVANT PARTS OF AS/NZS 3500.
2. ALL PIPES ARE MIN 100mm DIA U.N.O LAID AT MIN. 1% GRADE & 100 COVER.
3. ALL DOWN PIPES SHALL BE 100mm DIA SOLVENT WELDED
4. EAVE GUTTERS SHALL HAVE MIN CROSS SECT AREA 12000mm2 (ACE NU LINE OR EQUIVALENT
5. PLUMBER MUST INVESTIGATE ALL UNDERGROUND SERVICES LOCATIONS AND LEVELS BY CONTACTING "DIAL BEFORE YOU DIG" PRIOR TO WORKS COMMENCING. ANY CONFLICT OR DISCREPENCIES WITH DESIGN, THE ENGINEER SHALL BE CONSULTED FOR RESOLUTION.
6. THE LOCATION OF PIPELINE AND D.P SHOWN ARE NOT RESTRICTIVE. THEY CAN BE VARIED TO SUIT SITE CONDITIONS AS LONG AS THE TOTAL AREA DRAINING TO EACH PIPE/D.P REMAINS ESSENTIALLY THE SAME AND MINIMUM GRADIENT IS MAINTAINED.
7. THE DESIGN COVERS THE COLLECTION & DISPOSAL OF SURFACE WATER ONLY, ANY SUBSURFACE SYSTEM SHOWN ARE INDICATIVE ONLY. BUILDER SHALL CONSULT OTHER PROFESSIONALS FOR THE COLLECTION & DISPOSAL OF SEEPAGE & SUBSURFACE WATER FLOWS WHERE REQUIRED, FOLLOWING DETAILED SITE INVESTIGATION.
8. ALL GUTTERS AND ROOF FLASHING INSTALLATION SHALL BE IN ACCORDANCE WITH RELEVANT SECTIONS OF AS3500.3 REGARDING OVERFLOW PROTECTION.

RAIN WATER TANKS

1. ONLY ROOF RUNOFF IS TO BE DIRECTED TO RAINWATER TANK
2. SYDNEY WATER SUPPLY TO TOP UP TANKS SHALL BE INSTALLED TO SYDNEY WATER REQUIREMENTS.
3 CONNECTION FOR INTERNAL REUSE SHALL BE AS PER D.A CONSENT OR BASIX REQUIREMENTS.
4. ALL RAINWATER TANKS AND ASSOCIATED PIPE WORKS ARE TO BE LABEL LED NON-POTABLE - NOT FOR DRINKING.
5. PROVIDE A PROPRIETOR CONTROLLER BOX TO REGULATE WATER SUPPLY FROM RAINWATER TANKS FOR INTERNAL REUSE.
6.PROVIDE LEAF GUARD TO ALL GUTTERS & MOSQUITOES NETTING TO R/W TANKS INLET, WITH APPROPRIATE AIR GAP.
7. RAINWATER TANK INSTALLATION & THEIR ASSOCIATED FITTINGS & FIXTURES SHALL COMPLY WITH RELEVANT SECTIONS OF AS/NZS 2179-1994 & AS 2180-1986.

Rev	Description	Eng	Draft	Date
A	FOR DA SUBMISSION	MN	MN	21.6.25

Client: Mr JungBlut

Title: SECTIONS & NOTES

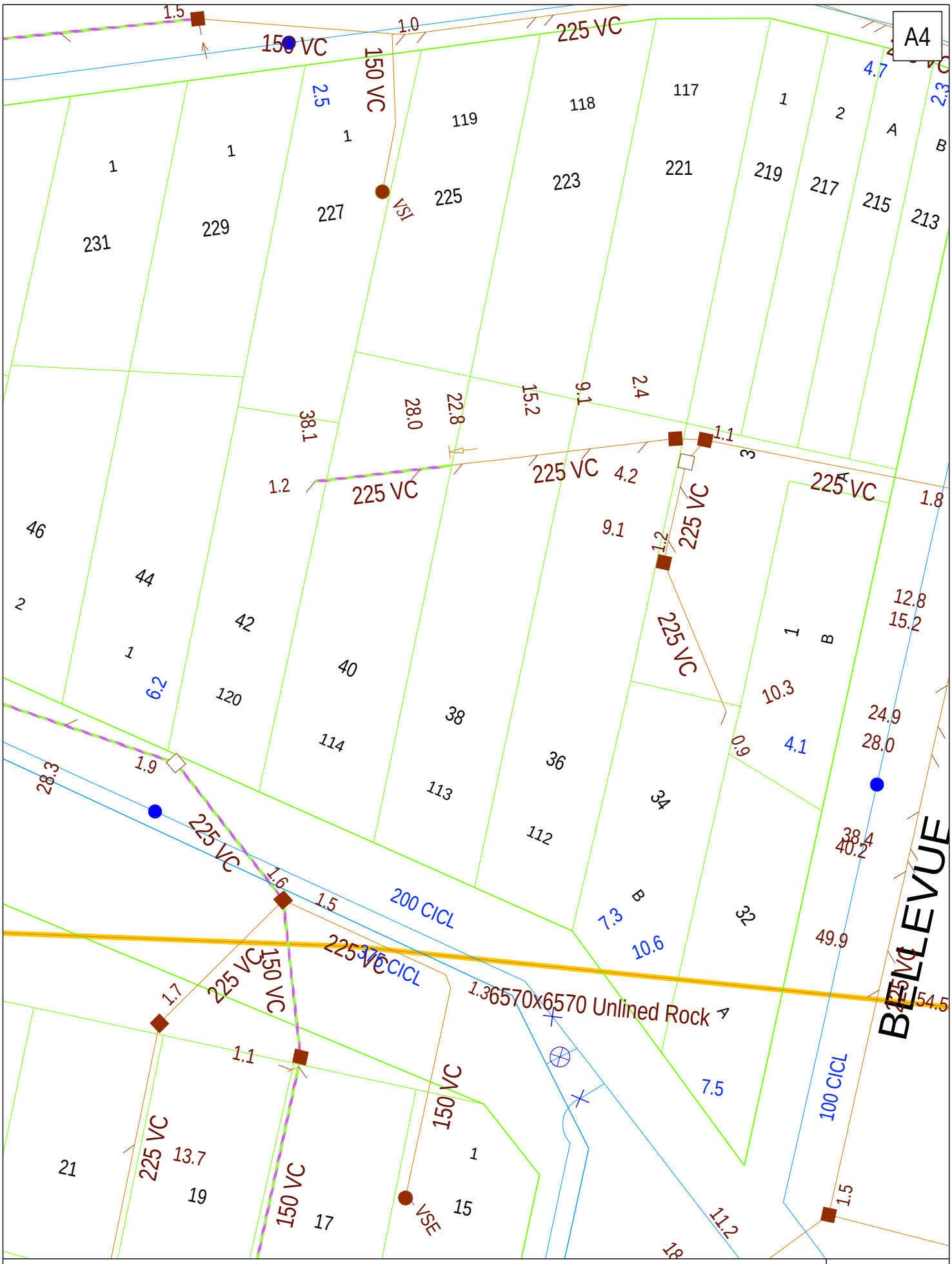
Drawn	Designed	Checked	Scale
MN	MN	MN	1:30
Prj No.	Drw No.	Issue	Date
240910	C03	A	5.6.25

Project: NEW DWELLING AT 38 HILLTOP CRS FAIRLIGHT

DEVELOPMENT ENGINEERING SOLUTIONS
21 GRAND AVE, WESTMEAD 2145 P 8898 9830 M 0411506738

APPENDIX B

SYDNEY WATER SEWER PLAN (1 SHEET)



DBYD Address:
38 Hilltop Cr
Fairlight NSW 2094

DBYD Job No: 50621987
DBYD Sequence No: 257732714

No warranty is given that the information shown is complete or accurate.

SYDNEY WATER CORPORATION

Scale: 1:500

Date of Production: 09/07/2025

Plan 1 of 1

N

0m 2m 4m 6m 8m 10m

APPENDIX C

BOREHOLE LOGS INCLUDING DCP TEST DATA (8 SHEETS)

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

Hole ID. **BH1**
Hole Depth: **0.38 m**
Sheet: **1 of 1**

Project Name: **Geotechnical Investigation**
Project Number: **G25045FAI**
Location / Site: **38 Hilltop Crescent, Fairlight NSW**
Client: **Balgowlah Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering**
Date Started: **9/07/2025**
Ground Level: **RL58.13m** (approx)
Drill Method: **Hand Auger**
Date Completed: **9/07/2025**
Easting: ----------
Equipment: **Manual**
Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Front lawn				
Hand Auger		0.1	58.0		SP	Topsoil	Topsoil: Sand Trace Silt, dark brown, fine to medium grained, roots.	loose	m	MK090725-01 0.1 -0.2m	
		0.3	57.8		SP	Natural	**SAND**- grey brown red, fine to coarse grained, fine to medium Gravel (ironstone), roots.	loose	m to w	MK090725-02 0.2 -0.3m	
		0.4					**Refusal at 0.38m** interpreted weathered sandstone bedrock				Slight seepage on bedrock contact
		0.5	57.6								
		0.7	57.4								
		0.9	57.2								
		1.1	57.0								
		1.3	56.8								
		1.5	56.6								
		1.7	56.4								
		1.9	56.2								
		2.1	56.0								
		2.2									

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Matthew Kilham** Date: **9/07/2025**
Checked By: **Stephen McCormack** Date: **20/07/2025**

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

Hole ID. **BH2**
Hole Depth: **2.05 m**
Sheet: **1 of 1**

Project Name: **Geotechnical Investigation**
Project Number: **G25045FAI**
Location / Site: **38 Hilltop Crescent, Fairlight NSW**
Client: **Balgowlah Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering**
Date Started: **9/07/2025**
Ground Level: **RL55.22m** (approx)
Drill Method: **Hand Auger**
Date Completed: **9/07/2025**
Easting: ----------
Equipment: **Manual**
Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Samples / Tests DCP blows/100mm	Observations / Comments
							Surface: Paved patio, eastern boundary				5 10 15	
Handauger		0.0	55.2				Paver.					
		0.1			SP	Fill	Sand Trace Fines, brown, fine to coarse grained, trace fine to medium Gravel (ironstone), roots.	very loose to loose	m			
		0.2	55.0									
		0.3										
		0.4	54.8									
		0.5										
		0.6	54.6				Sand Trace Fines, grey brown, fine to coarse grained, trace fine to medium Gravel (ironstone), roots.	very loose to loose	m			
		0.7										
		0.8	54.4									
		0.9										
		1.0	54.2		SP							
		1.1										
		1.2	54.0									
		1.3										
		1.4	53.8									
		1.5										
		1.6	53.6									
		1.7										
	▼ 1.9m seepage on residual / bedrock contact 7/09/2025	1.8	53.4		SP	Residual Soil	**SAND**- grey, fine to coarse grained.	loose	m to w	MK090725-03 1.8 -1.9m		
		1.9										
		2.0	53.2		SP-SC		**SAND trace Silt and Clay**- grey, fine to coarse grained.	loose	w	MK090725-04 1.95 -2.05m		2.05m DCP bouncing refusal
		2.1					**Refusal at 2.05m** interpreted weathered sandstone bedrock					
		2.2										

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Matthew Kilham** Date: **9/07/2025**
Checked By: **Stephen McCormack** Date: **20/07/2025**

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

geo-environmental ENGINEERING

Hole ID. **BH3**
Hole Depth: **0.40 m**
Sheet: **1 of 1**

Project Name: **Geotechnical Investigation**
Project Number: **G25045FAI**
Location / Site: **38 Hilltop Crescent, Fairlight NSW**
Client: **Balgowlah Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering**
Date Started: **9/07/2025**
Ground Level: **RL53.3m** (approx)
Drill Method: **Hand Auger**
Date Completed: **9/07/2025**
Easting: ----------
Equipment: **Manual**
Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests: DCP blows/100mm	Observations / Comments
							Surface: Rear lawn			5 10 15	
Hand Auger	0.38m seepage bedrock level 9/07/2025	0.1	53.2		SP	Fill	Topsoil: Sand Trace Silt, dark brown, fine to coarse grained, fine to medium Gravel, (quartz, sandstone), roots.	very loose	m		
		0.2									
		0.3	53.0		SP	Nat	**SAND**- grey brown, fine to coarse grained, roots.	loose	m		
		0.4			SP-SC	RS	**SAND trace Silt and Clay**- orange brown, fine to coarse grained, roots.	loose	m to w	>>	DCP bouncing at 0.40m
							Refusal at 0.40m				0.40m seepage on bedrock level
		0.5	52.8				interpreted weathered sandstone bedrock				
		0.6									
		0.7	52.6								
		0.8									
		0.9	52.4								
		1.0									
		1.1	52.2								
		1.2									
		1.3	52.0								
		1.4									
		1.5	51.8								
		1.6									
		1.7	51.6								
		1.8									
		1.9	51.4								
		2.0									
		2.1	51.2								
		2.2									

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Matthew Kilham** Date: **9/07/2025**
Checked By: **Stephen McCormack** Date: **20/07/2025**

drawn by: laurie.white@reumad.com.au
GEE BH LOG 2 G25045FAI.GPJ WITH UCS.GDT 4/8/25 8:23:43 AM

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

geo-environmental ENGINEERING

Hole ID. **BH4**
Hole Depth: **0.45 m**
Sheet: **1 of 1**

Project Name: **Geotechnical Investigation**
Project Number: **G25045FAI**
Location / Site: **38 Hilltop Crescent, Fairlight NSW**
Client: **Balgowlah Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering**
Date Started: **9/07/2025**
Ground Level: **RL52.90m** (approx)
Drill Method: **Hand Auger**
Date Completed: **9/07/2025**
Easting: ----------
Equipment: **Manual**
Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests: DCP blows/100mm	Observations / Comments
							Surface: Rear lawn			5 10 15	
Hand Auger		0.1	52.8		SP	Topsoil	Topsoil: Sand Trace Silt, dark brown, fine to coarse grained, roots.	very loose	m		
		0.2									
		0.3	52.6		SP	Nat	**SAND**- grey brown, fine to coarse grained, fine to coarse Gravel (ironstone), roots.	loose	m		
		0.4			SP-SC	RS	**SAND trace Silt and Clay**- grey brown, fine to coarse grained, roots.	loose	m to w		0.40m seepage on bedrock level 0.45 DCP bouncing refusal
		0.5	52.4				**SANDSTONE**- grey yellow, fine to coarse grained, extremely weathered, estimated very low strength.				
		0.6					**Refusal at 0.45m** interpreted weathered sandstone bedrock				
		0.7	52.2								
		0.8									
		0.9	52.0								
		1.0									
		1.1	51.8								
		1.2									
		1.3	51.6								
		1.4									
		1.5	51.4								
		1.6									
		1.7	51.2								
		1.8									
		1.9	51.0								
		2.0									
		2.1	50.8								
		2.2									

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Matthew Kilham** Date: **9/07/2025**
Checked By: **Stephen McCormack** Date: **20/07/2025**

drawn by: laurie.white@reumad.com.au
GEE BH LOG 2 G25045FAI.GPJ WITH UCS.GDT 4/8/25 8:23:43 AM

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

Hole ID. **BH5**
Hole Depth: **0.45 m**
Sheet: **1 of 1**

Project Name: **Geotechnical Investigation**
Project Number: **G25045FAI**
Location / Site: **38 Hilltop Crescent, Fairlight NSW**
Client: **Balgowlah Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering**
Date Started: **9/07/2025**
Ground Level: **RL54.00m** (approx)
Drill Method: **Hand Auger**
Date Completed: **9/07/2025**
Easting: ----------
Equipment: **Manual**
Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Observations / Comments
							Surface: Adjacent western boundary			
Hand Auger		0.1			SP	Fill	Sand Tarce Fines, black, fine to coarse grained, fine to coarse Gravel, cobbles (sandstone), bricks, roots.	loose	m	Borehole level approximated, no survey
		0.2	53.8							
		0.3								
		0.4	53.6							
					SP	RS	**SAND**- Grey Brown, fine to coarse grained.	loose	m to w	0.45m seepage on bedrock level
		0.5					**Refusal at 0.45m** interpreted weathered sandstone bedrock			
		0.6	53.4							
		0.7								
		0.8	53.2							
		0.9								
		1.0	53.0							
		1.1								
		1.2	52.8							
		1.3								
		1.4	52.6							
		1.5								
		1.6	52.4							
		1.7								
		1.8	52.2							
		1.9								
		2.0	52.0							
		2.1								
		2.2	51.8							

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Matthew Kilham** Date: **9/07/2025**
Checked By: **Stephen McCormack** Date: **20/07/2025**

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

Hole ID. **BH6**
Hole Depth: **0.40 m**
Sheet: **1 of 1**

Project Name: **Geotechnical Investigation** Project Number: **G25045FAI**
Location / Site: **38 Hilltop Crescent, Fairlight NSW** Client: **Balgowlah Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering** Date Started: **9/07/2025** Ground Level: **RL56.00m** (approx)
Drill Method: **Hand Auger** Date Completed: **9/07/2025** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Observations / Comments
							Surface: Adjacent western boundary			
Hand Auger		0.1			SP	Topsoil	**TOPSOIL: SAND trace fines**- black, fine to coarse grained, roots.	loose	m	Borehole level approximated, no survey
		0.2	55.8		SP-SC	Residual Soil	**SAND trace fines**- grey brown orange, fine to coarse grained, roots.	loose	m to w	
		0.4	55.6							0.40m seepage on bedrock level
		0.5					**Refusal at 0.40m** interpreted weathered sandstone bedrock			
		0.6	55.4							
		0.7								
		0.8	55.2							
		0.9								
		1.0	55.0							
		1.1								
		1.2	54.8							
		1.3								
		1.4	54.6							
		1.5								
		1.6	54.4							
		1.7								
		1.8	54.2							
		1.9								
		2.0	54.0							
		2.1								
		2.2	53.8							

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Matthew Kilham** Date: **9/07/2025** Checked By: **Stephen McCormack** Date: **20/07/2025**

Borehole Log Report

Geo Environmental Engineering
2 / 5-7 Malta Street
Fairfield East NSW 2165
T +61 2 9420 3361

geo-environmental ENGINEERING

Hole ID. **BH7**
Hole Depth: **0.70 m**
Sheet: **1 of 1**

Project Name: **Geotechnical Investigation**
Project Number: **G25045FAI**
Location / Site: **38 Hilltop Crescent, Fairlight NSW**
Client: **Balgowlah Building Pty Ltd**

Drilling Company: **Geo Environmental Engineering**
Date Started: **9/07/2025**
Ground Level: **RL58.13m** (approx)
Drill Method: **Hand Auger**
Date Completed: **9/07/2025**
Easting: ----------
Equipment: **Manual**
Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Observations / Comments
							Surface: Front lawn			
Hand Auger		0.1	58.0		SP	Fill	Topsoil: Sand Trace Silt, dark brown, fine to medium grained, roots.	loose	m	
		0.2								
		0.3	57.8							
		0.4								
		0.5	57.6		SP	Fill	Sand, grey brown, fine to coarse grained, with fine to coarse Gravel, cobbles (sandstone), roots.	loose	m	
		0.6								
		0.7	57.4				**Refusal at 0.70m** interpreted weathered sandstone bedrock			0.70m hand auger refusal on hard flat surface
		0.8								
		0.9	57.2							
		1.0								
		1.1	57.0							
		1.2								
		1.3	56.8							
		1.4								
		1.5	56.6							
		1.6								
		1.7	56.4							
		1.8								
		1.9	56.2							
		2.0								
		2.1	56.0							
		2.2								

Moisture

D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

Logged By: **Matthew Kilham** Date: **9/07/2025**
Checked By: **Stephen McCormack** Date: **20/07/2025**

drawn by: laurie.white@reumad.com.au
GEE BH LOG 2 G25045FAI.GPJ WITH UCS.GDT 4/8/25 8:23:45 AM

Geo Environmental Engineering
82 Bridge Street
Lane Cove NSW 2066
E info@geoenvironmental.com.au

Log Report Legend

MATERIAL SYMBOL

FILL	CONCRETE	ASPHALT	TOPSOIL
ORGANICS	ESTUARINE MUD		

CLAY	SAND	SILT	GRAVEL
Sandy CLAY	Clayey SAND	Clayey SILT	Clayey GRAVEL
Silty CLAY	Silty SAND	Sandy SILT	Sandy GRAVEL
Gravelly CLAY	Gravelly SAND	Gravelly SILT	Silty GRAVEL
CLAY & SAND	SAND & CLAY	SILT & CLAY	GRAVEL & CLAY
CLAY & SILT	SAND & SILT	SILT & SAND	GRAVEL & SAND
CLAY & GRAVEL	SAND & GRAVEL	SILT & GRAVEL	GRAVEL & SILT
Sandy Silty CLAY	Clayey Silty SAND	Sandy Clayey SILT	Sandy Clayey GRAVEL
Silty Sandy CLAY	Silty Clayey SAND	Clayey Sandy SILT	Clayey Sandy GRAVEL
Sandy Gravelly CLAY	Clayey Gravelly SAND	Sandy Gravelly SILT	Silty Clayey GRAVEL
Silty Gravelly CLAY	Silty Gravelly SAND	Clayey Gravelly SILT	Clayey Silty GRAVEL
Gravelly Silty CLAY	Gravelly Silty SAND	Gravelly Clayey SILT	Sandy Silty GRAVEL
Gravelly Sandy CLAY	Gravelly Clayey SAND	Gravelly Sandy SILT	Silty Sandy GRAVEL

SANDSTONE	SHALE	GRANITE	BASALT	SHALE / SANDSTONE
PORCELLANITE	GNEISS	SHALE / CLAYSTONE	MUDSTONE	
CLAYSTONE	MUDSTONE / CLAYSTONE	SHALE / SILTSTONE	IRONSTONE	

WATER LEVELS

Encountered Water

Standing Water

ABBREVIATIONS

PT	Pushtube
SFA	Solid Flight Auger
PWS	Percussion Window Sampler
HA	Hand Auger
HFA	Hollow Flight Auger

WELL GRAPHICS

Cuttings	Bentonite	Screen
Gravel Pack	Grout	Cave-in

GEE LEGEND * * 29/10/09 5:04:07 PM

APPENDIX D

LABORATORY REPORT (6 SHEETS)

Geo-Environmental Engineering Pty Ltd
2 / 5-7 Malta Street
Fairfield East
NSW 2165

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **ALL INVOICES Stephen McCormack**

Report **1243604-S**
Project name 38 HILLTOP CRESCENT FAIRLIGHT
Project ID G25045FAI
Received Date Jul 11, 2025

Client Sample ID			**MK090725-01**	**MK090725-02**	**MK090725-03**	**MK090725-04**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S25-JI0034293**	**S25-JI0034294**	**S25-JI0034295**	**S25-JI0034296**
Date Sampled			**Jul 09, 2025**	**Jul 09, 2025**	**Jul 09, 2025**	**Jul 09, 2025**
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	< 10	< 10	< 10	< 10
Conductivity (1:5 aqueous extract at 25 °C as rec.)	10	uS/cm	< 10	< 10	< 10	< 10
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	6.5	7.3	7.8	7.8
Resistivity*	0.5	ohm.m	1100	1400	3000	4400
Sulphate (as SO4)	10	mg/kg	< 10	< 10	< 10	< 10
Sample Properties						
% Moisture	1	%	16	11	13	11

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chloride	Sydney	Jul 11, 2025	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (1:5 aqueous extract at 25 °C as rec.)	Sydney	Jul 11, 2025	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25 °C as rec.)	Sydney	Jul 11, 2025	7 Days
- Method: LTM-GEN-7090 pH by ISE			
Sulphate (as SO4)	Sydney	Jul 11, 2025	28 Days
- Method: In-house method LTM-INO-4270 Sulphate by Ion Chromatograph			
% Moisture	Sydney	Jul 11, 2025	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofinsanz.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	+61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794 & 2780	Site# 25079

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
+61 8 6253 4444
NATA# 2377
Site# 2370 & 2554

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Auckland (Focus)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise	43 Detroit Drive	1277 Cameron Road
Penrose	Mount Wellington	Rolleston	Gate Pa
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: Geo-Environmental Engineering P/L
Address: 2 / 5-7 Malta Street
Fairfield East
NSW 2165

Order No.:
Report #: 1243604
Phone: 02 9592 0218
Fax: 02 9519 9140

Received: Jul 11, 2025 4:15 PM
Due: Jul 18, 2025
Priority: 5 Day
Contact Name: ALL INVOICES Stephen McCormack

Project Name: 38 HILLTOP CRESCENT FAIRLIGHT
Project ID: G25045FAI

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Aggressivity Soil Set	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	MK090725-01	Jul 09, 2025		Soil	S25-Jl0034293	X	X
2	MK090725-02	Jul 09, 2025		Soil	S25-Jl0034294	X	X
3	MK090725-03	Jul 09, 2025		Soil	S25-Jl0034295	X	X
4	MK090725-04	Jul 09, 2025		Soil	S25-Jl0034296	X	X
Test Counts						4	4

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Chloride			mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)			uS/cm	< 10			10	Pass	
Sulphate (as SO4)			mg/kg	< 10			10	Pass	
LCS - % Recovery									
Chloride			%	94			70-130	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)			%	103			70-130	Pass	
Sulphate (as SO4)			%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Chloride	S25-Jl0034293	CP	%	97			70-130	Pass	
Sulphate (as SO4)	S25-Jl0034293	CP	%	97			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S25-Jl0030857	NCP	mg/kg	100	100	1.0	30%	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)	S25-Jl0034293	CP	uS/cm	< 10	< 10	<1	30%	Pass	
pH (1:5 Aqueous extract at 25 °C as rec.)	S25-Jl0034293	CP	pH Units	6.5	6.5	pass	30%	Pass	
Resistivity*	S25-Jl0034293	CP	ohm.m	1100	1100	3.0	30%	Pass	
Sulphate (as SO4)	S25-Jl0030857	NCP	mg/kg	16	14	8.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S25-Jl0034295	CP	%	13	13	3.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Nileshni Goundar	Analytical Services Manager
Ryan Phillips	Senior Analyst-Sample Properties
Ryan Phillips	Senior Analyst-Inorganic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.