

## **ATTACHMENTS EXCLUDED FROM AGENDA**

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### **Local Planning Panel**

**Thursday, 06 June 2024**

**4:00 PM**

**Council Chambers, Civic Centre, Hurstville**





## GEORGES RIVER LOCAL PLANNING PANEL MEETING

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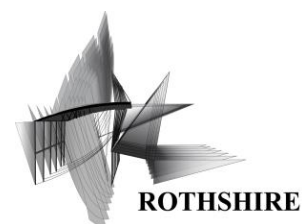
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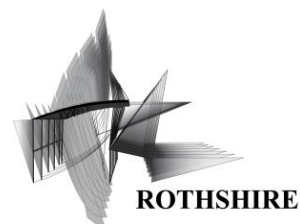
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DOCUMENT NO.: 2122301A-SEE-RPT-003-1

## STATEMENT OF ENVIRONMENTAL EFFECTS

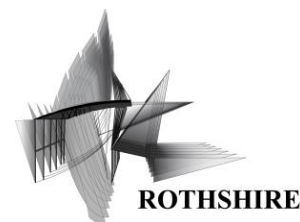
<b>ADDRESS:</b>	1174 FOREST ROAD LUGARNO NSW 2224 LOT A IN DP 328702
<b>CLIENT:</b>	GOLDEN KING ASSETS PTY LTD
<b>LOCAL GOVERNMENT AREA:</b>	GEORGES RIVER COUNCIL
<b>SCOPE</b>	RETENTION OF THE EXISTING PART CONSTRUCTED DWELLING, AND ALTERATIONS AND ADDITIONS TO ENABLE THE FINALISATION OF CONSTRUCTION AND OCCUPATION



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## 1. INTRODUCTION

This Statement of Environmental Effects (SEE) has been prepared on behalf of the property owners by Rothshire Pty Ltd (Rothshire) to accompany a Development Application (DA) to Georges River Council (Council) for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1174 Forest Road, Lugarno (the site).

The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals. These dwellings, including the subject site are known to Council.

The proposed development seeks to legitimise this ongoing matter with Council for site and is submitted concurrently with a Building Information Certificate (BC) to legitimise works undertaken to date. The subject DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

This report has been prepared with reference to the architectural plans and supporting documentation prepared by Rothshire accompanying this report. This report provides an overview of the site and its context, a detailed description of the proposed development, the planning framework and an environmental assessment of the proposed development.

Based on the conclusions of the comprehensive assessment undertaken, and in the absence of any significant adverse environmental impacts, Council's approval of the DA is sought.

### 1.1. REPORT AUTHOR

Author: Jonathan Archibald

Qualifications: Bachelor of Planning (MQ)

Business Address: Level 2, Suite 202, 845 Pacific Highway, Chatswood NSW 2067

### 1.2. DOCUMENT HISTORY

Table 1. Document revision & history

Rev.	Description	Author	Reviewer	Date
1	Issued for DA	JA	NRT	12/12/2022



## 2. THE SITE

### Site Context

The site and existing part constructed dwelling forms part of a group of three (3) dwellings, as outlined below.

- 1174 Forest Road, Lugarno. This northern allotment is regular in shape, with a total area of 626m<sup>2</sup> and is legally described as Lot A DP 328702. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (at grade) garage and swimming pool and is in the advanced stages of construction.
- 1176 Forest Road, Lugarno. This middle allotment is regular in shape, with a total area of 626m<sup>2</sup> and is legally described as Lot 2 DP 18873. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.
- 1178 Forest Road, Lugarno. This southern allotment is regular in shape, with a total area of 638.6m<sup>2</sup> and is legally described as Lot 3 DP 18873. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.

An aerial view of each of these three dwellings is provided at **Figure 1** below.

### Subject Site

The subject site is located at 1174 Forest Road, Lugarno (Lot A DP 328702). This is the northernmost allotment within the group as detailed at **Figure 2** below. The site is not subject to any existing easements or restrictions.

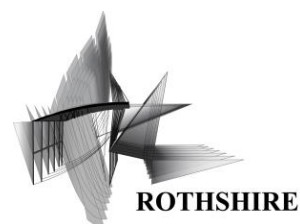
The site is located within an established residential area, with surrounding development comprising similar low scale (1-2 storey) single detached dwellings.

The site is located within the Georges River Local Government Area (LGA) and is zoned R2 - Low Density Residential under the Georges River Local Environmental Plan 2021 (LEP).

The site is not identified as, nor within proximity to any heritage items (or draft items) or Heritage Conservation Area (HCA) (or draft HCA).

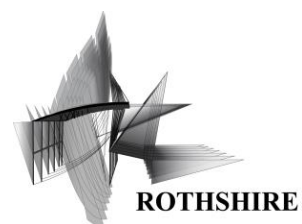
The site is not identified as bushfire nor flood prone and does not include any areas of terrestrial biodiversity or Environmentally Significant Lands (ESL). The site is located within the Foreshore Scenic Protection Area (FSPA).

An extract of the LEP 2021 site zoning is provided at **Figure 3** below.

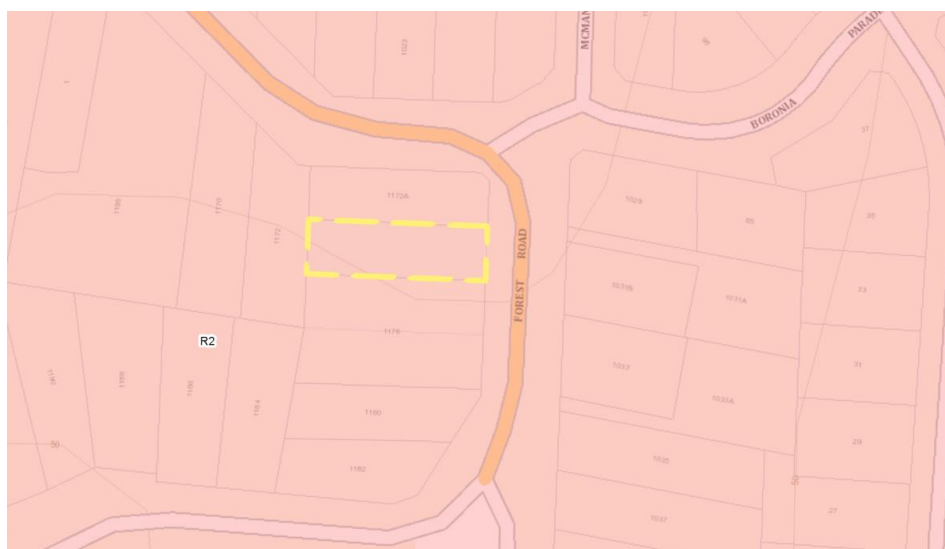


**Figure 1. Aerial photograph of the site context (Source Sixmaps.nsw.gov.au)**  
*Dwelling group outlined in red*





**Figure 2. Aerial photograph of the subject site (Source Sixmaps.nsw.gov.au)**  
*Site outlined in red*



**Figure 3. Extract of LEP 2021 Zoning Map**  
*Site outlined in yellow*





### 3. DEVELOPMENT HISTORY

#### Development Applications

A review of Council's DA tracker does not provide any development consent history for the subject site.

#### Complying Development Certificate

The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals.

These dwellings were initially approved, via separate Complying Development Certificates (CDCs), which were issued to enable the creation of allotments and construction of each property within the in approximately early 2015. Relevant to this site is CDC Ref. 701-1015 which provided initial approval for establishment of the dwelling at the site.

However, despite the legitimate issue of these CDCs and commencement of construction, that the design of each dwelling was subsequently revised, to the extent that the design of each dwelling departed from relevant guidance contained within the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (Codes SEPP). On this basis, each dwelling within the group, including the subject site, is unauthorised. Each CDC has since been surrendered.

These non-compliance matters resulted in the issue of stop work orders by Council in early 2017, with all dwellings in the advanced stages of construction unable to be completed (or regularised without further approval).

The construction of dwellings has not progressed since this time, which remains in an incomplete and unfinished state, with construction fencing remaining at the site. It is understood this compliance action was held in abeyance by Council, pending resolution of a number of design matters to obtain necessary approvals, including to regularise works undertaken to date, provide approval for remaining works required and to enable finalisation and occupation of the dwellings ongoing.

This DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling at 1174 Forest Road, Lugarno.



### Pre-Lodgement Consultation

Given the complex history regarding the subject site and dwelling group, extensive pre-lodgement consultation has been held with Council, including on 16 June 2022.

In relation to the subject site, the following comments were provided by Council and have been addressed in the revised design as detailed at Table 1.

**Table 1. Pre-DA Considerations**

<b>Council Comment</b>	<b>Response</b>
<i>Given the circumstances, following should be undertaken for Council to take any future application into consideration.</i>	A response to each item is provided below.
<i>Demolition of the retaining wall within the front setback and the land restored to its natural state.</i>	<p>The proposal maintains an at grade driveway accessible from Forest Road. Site circumstances and altered levels necessitate that boundary retaining walls behind the building line are maintained.</p> <p>The retaining wall located within the front setback and to the north boundary is proposed to be demolished and the land restored to its previous state. A new retaining wall is proposed to be constructed in front of the front lounge room to provide minor terracing to the front yard with additional landscaping proposed.</p>
<i>Reduce the width of the driveway to be maximum 4.0m.</i>	The design has been revised to provide a driveway width of 4.0m.
<i>The sliding door of study at ground level to be replaced with window.</i>	This item has been retained. As there is no development on the adjoining allotment to the north, this element will not present any visual privacy impacts. Further, the presentation of this element from the public domain will be shielded by proposed boundary fencing, up to 1.8m in height along this northern boundary.
<i>External access to bedroom along the southern boundary at ground should be deleted. External access to the ground floor bedroom will not be supported.</i>	This item has been removed from the proposal.
<i>The first floor balcony to the rear should be deleted as it compromises amenity of the development to the west.</i>	<p>Whilst this balcony is maintained, additional privacy screening up to 1500mm in height is provided to the northern (side) boundary, and western (rear) elevation to maintain amenity to surrounding properties.</p> <p>The view toward the neighbouring property at 1172 Forest Road is limited by existing trees located within this adjoining property to the west. Further, this existing neighbouring dwelling at</p>



	1172 Forest Road does not hold any window openings with privacy screening provided along its eastern elevation (addressing the development site). The proposal is therefore considered suitable under the circumstances and will not present any visual privacy impacts arising from this balcony element.
<i>The balconies on the eastern (front) façade should have a minimum 1.5m side boundary setback and comply with the front setback requirements.</i>	The balustrades for the front balconies are proposed to be adjusted to achieve a 1.5m setback to the side boundaries.

All matters raised by Council have been taken into consideration in the design of the proposed development, including alterations from the existing circumstance to bring the existing dwelling into compliance with the applicable planning framework.

Please refer to further details contained at Section 5 of this report.

#### 4. THE PROPOSED DEVELOPMENT

##### Overview

The proposed development seeks the retention of the existing part constructed dwelling, including alterations and additions to enable finalisation of construction and occupation.

A detailed breakdown of the proposed works is provided below. Please refer to a full outline of proposed works within the architectural plans, prepared by Rothshire accompanying this report.

##### Detailed Scope of Works

A detailed scope of proposed works is provided below.

- Associated internal works required to finalise construction of the existing part-constructed dwelling, including bathrooms, kitchen, fixtures and finishings.
- Provision for front fencing and completion of existing part constructed boundary fencing, swimming pool fencing, as well as the provision (completion) of balustrades to balconies and internal open edges and stairs. Upper level balustrades are to be setback 1.5m from the property boundary.

##### Landscaping

In addition to the above, associated landscaping is proposed as follows:

- Revised retaining wall arrangement within the front setback, to be reconstructed perpendicular to the property boundary and supported by extensive landscape planting.
- Provision of planting within the front setback.



- Provision of perimeter planting within the rear setback of the dwelling, including to the northern and southern (side) boundaries, and western (rear) boundary.
- Additional areas of turfing within the front and rear setbacks as nominated on the submitted plans.

No tree removal is proposed, nor considered to be required, to facilitate the proposed development.

#### Stormwater Management

A 13,000 litre OSD tank is proposed to be constructed within the driveway of the adjoining property to the south at 1176 Forest Road and will service the properties within the group (at 1174, 1176 and 1178 Forest Road), via a proposed easement and pipe system which will discharge by gravity to a new stormwater pit located within Forest Road.

Note: works within the property at 1176 Forest Road are proposed under the concurrent DA for that property.

#### Waste Management

A Waste Management Plan has been prepared by Rothshire and is submitted with this application. The plan provides details of how waste will be managed during works. Recycling and re-use has been considered and will be applied during works where possible.

#### Resolution of Matters Towards Occupation

Rothshire, on behalf of the property owners are committed to resolving ongoing issues at the site with Council. As noted within this report, the proposed development seeks to legitimise this ongoing matter with Council for site.

The subject DA seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

The proposal will maintain the use of the site as a single dwelling for private residential occupation.



## 5. STATUTORY PLANNING FRAMEWORK

In accordance with Section 4.15(1)(a) of the Environmental Planning and Assessment Act 1979 (as amended) the following section provides an appraisal of the proposed development having regard to the statutory planning instruments that apply to this site, including:

- The Environmental Planning and Assessment Act 1979;
- State Environmental Planning Policy (Resilience and Hazards) 2021;
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004;
- Georges River Local Environmental Plan 2021; and
- Georges River Development Control Plan 2021.

An assessment against relevant provisions of the planning framework is provided below.

### State Environmental Planning Policy (Resilience and Hazards) 2021

Clause 4.6 of the State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) states that Council cannot consent to development on the land unless:

*"(a) it has considered whether the land is contaminated, and*

*(b) If the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*

*(c) If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose."*

The site holds a long-standing residential history and therefore there is no evidence to suggest that the site is contaminated. The site is not identified on the NSW EPA contaminated sites register and historical documentation provided by Council does not indicate any reason to suspect there is contamination at the site.

All fill introduced to the site to enable the filling of the existing driveway will be VENM, with suitably qualified contractors and appropriate material certification provided in accordance with the conditions of any consent and through the course of construction.

On this basis, the proposed development is considered acceptable with regard to Clause 4.6 of the Resilience and Hazards SEPP.

### State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004



State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (SEPP BASIX) ensures consistency in the implementation of BASIX throughout the State by overriding competing provisions in other environmental planning instruments and development control plans.

In accordance with SEPP BASIX, a BASIX Certificate for the site has been prepared by a qualified consultant in relation to the proposal. This certificate confirms that the proposed development will meet the NSW government's requirements for sustainability, having particular regard to water, thermal comfort and energy. Please refer to the BASIX Certificate accompanying this report.

#### Georges River Local Environmental Plan 2021

##### *Zoning and Permissibility*

The site is zoned R2 -Low Density Residential pursuant to the LEP 2021.

Development for the purposes of dwelling houses (including alterations and additions) is permitted within the R2 – Low Density Residential Zone, as per the Land Use Table of the LEP 2021, however requires development consent.

##### *Principal Development Standards*

An assessment of the proposal against the Principal Development Standards and key built form controls under the LEP 2021 as they apply to the proposed development are provided at **Table 2** below.

**Table 2. LEP 2021 Key Provisions**

Clause	Control	Proposal	Complies
Clause 4.3 – Height of Buildings	Max. 9m	8.935m	Yes
Clause 4.4 – Floor Space Ratio	0.55 (Area 1)	N/A – Refer Cl.4.4A below.	
Clause 4.4A – Exceptions to Floor Space Ratio - Certain Residential Accommodation	For lots <650m <sup>2</sup> : [site area × 0.55] ÷ site area:1  (626m <sup>2</sup> × 0.55)/626m <sup>2</sup> :1  344.3m <sup>2</sup> /626m <sup>2</sup> =0.55:1	(367m <sup>2</sup> - 33m <sup>2</sup> ) = 334m <sup>2</sup> = 0.533:1	Yes

*Clause 4.6 - Exceptions to Development Standards*

The proposed development does not seek any exceptions to development standards pursuant to Clause 4.6 of the LEP 2021. There are no other provisions of the LEP 2021 relevant to the proposal.

*Clause 5.10 – Heritage Conservation*

The site is not identified as, nor located within proximity to, any local or state (or draft) heritage items. The site is not located within, nor within proximity to, any HCA.

*Clause 6.1 - Acid Sulfate Soils*

The site is identified as containing Class 5 Acid Sulfate Soils (ASS). The proposed development is not within 500m of adjacent Class 1, 2, 3 or 4 land that is below 5m AHD and by which the water table is likely to be lowered below 1m AHD on adjacent Class 1, 2, 3 or 4 land.

The proposed development is therefore considered suitable with regard to Clause 6.1 of the LEP 2021.

*Clause 6.3 - Stormwater Management*

The proposal is accompanied by a detailed stormwater plan, detailing drainage via an interlot system to Forest Road. The proposed development is therefore considered suitable with regard to Clause 6.3 of the LEP 2021.

*Clause 6.12 - Landscaped Areas in Certain Residential and Environment Protection Zone*

The site is located within the R2 – Low Density Residential Zone and therefore requires a minimum 25% of the site to be landscaped, pursuant to Clause 6.12(5)(a) of the LEP 2021.

The proposal maintains a landscaped area of 192m<sup>2</sup> (30.7%) and therefore complies with this clause.



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Georges River Development Control Plan 2021

The Georges River Development Control Plan 2021 (DCP) outlines development requirements, controls and guidelines within the LGA. The key relevant parts of the DCP 2021 in relation to the proposed development have been outlined below, including:

- Part 3 – General Planning Considerations;
- Part 5 – Residential Locality Statements;
- Part 6.1 – Low Density Residential Controls; and
- Part 6.4 – Ancillary Development.

An assessment of the development against relevant parts of the DCP 2021 is provided below.





Table 4. DCP 2021 Chapter 3 Key Provisions

Clause	Proposal		Complies
<b>3.11 Ecologically Sustainable Development</b>			
<b>3.11.1 Energy and Water Efficiency</b>			
(1)	All BASIX affected development must comply with SEPP (Building Sustainability Index: BASIX) 2004.	The proposal is submitted with a valid BASIX certificate accompanying this report.	Yes
(15)	The use, location and placement of photovoltaic solar panels are to consider the potential permissible building form on adjacent properties	The proposal does not include any photovoltaic panels.	Yes
(16)	Where possible proposals for new buildings, alterations and additions and major tree plantings are to maintain solar access to existing photovoltaic solar panels having regard to the performance, efficiency, economic viability and reasonableness of their location	The proposal does not include, nor will inhibit solar access to, any photovoltaic panels.	Yes
<b>3.12 Waste Management</b>			
(1)	Development must comply with Council's Waste Management requirements regarding construction waste and ongoing management of waste materials	The proposal is accompanied by a Waste Management Plan (WMP), prepared in accordance with Council's requirements.	Yes
<b>3.13 Parking Access and Transport</b>			
(1)	<p>The car parking rate for development types are outlined in Table 1 – Parking Requirements. In the event of a discrepancy between the parking rates specified in this Part of the DCP and any another, the specific requirements identified within the detailed controls for a locality/area shall prevail.</p> <p>Dwelling House: -1 space per 1 and 2 beds -2 spaces per 3 beds or more</p>	The proposal maintains 2 car parking spaces within the integrated garage and therefore complies.	Yes
(20)	Car parking areas may be designed as ground level parking provided that the design results in building frontages level with the street.	The proposal maintains 2 car parking spaces within the integrated garage, with the dwelling maintaining a level frontage.	Yes
(32)	Design driveways to minimise visual impact on the street and maximise pedestrian safety.	The proposed driveway arrangement has been revised to be at grade, with 2 car parking spaces provided within the integrated garage, to minimise visual impact on the street and maximise pedestrian safety.	Yes
<b>3.14 Utilities</b>			
(1)	Applicants should consult service providers for energy, electricity, gas, water, telephone, national broadband network (NBN) fibre cables and fire requirements.	Adequate services are provided to support the proposed development.	Yes



(2)	<i>Any services and structures required by the providers should be located within the basement, or concealed within the facade, with appropriate access. Where this is not possible, an alternative method of minimising street impact should be demonstrated, such as screening with landscape or built elements.</i>	Adequate services are provided to support the proposed development.	Yes
(4)	<i>Air conditioning units and mechanical plant located on the roof should be well screened and integrated into the building form.</i>	The proposal does not include any air conditioning units within the roof form.	Yes
<b>3.19 Crime Prevention / Safety and Security</b>			
(1)	<i>Active spaces and windows of habitable rooms within buildings are to be located to maximise casual surveillance of streets, laneways, parking areas, public spaces and communal courtyard space.</i>	Windows have been suitably located to maintain a balance of visual privacy and passive surveillance.	Yes
(4)	<i>Building entries are to be clearly visible, unobstructed and easily identifiable from the street, other public areas and other development. Where practicable lift lobbies, stairwells, hallways and corridors should be visible from the public domain.</i>	The dwelling entrance is clearly visible, unobstructed and is easily visible from the street.	Yes

**Table 5. DCP 2021 Chapter 5 Key Provisions**

Clause		Proposal	Complies
5.7 Lugarno Locality Statement - Future Desired Character			
-	<i>Retain and enhance the prominence of the bushland landscaped character in new development through tree planting and landscaping.</i>	The proposed development provides for significant additional landscaping, which has been selected to suitably integrate within the local bushland character.	Yes
-	<i>Encourage consistent setbacks of buildings from the street and the provision of landscaping within the front setback.</i>	The proposal maintains a consistent alignment with adjoining dwellings, to the west of Forest Road, with landscaping provided within the front setback.	Yes
-	<i>Encourage the retention of trees and sharing of water views wherever possible, including screening via vegetation rather than solid walls.</i>	Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views.	Yes
-	<i>Public views to waterways should be retained from streets and public places.</i>	The surrounding public domain does not benefit from any significant views or vistas. In this regard, the proposal will not affect any views.	Yes

**Table 6. DCP 2021 Chapter 6.1 Key Provisions**

Clause	Proposal	Complies
<b>6.1.2 Single Dwellings</b>		
<b>1. Streetscape Character and Built Form</b>		



(1)	<i>New buildings and additions are to consider the Desired Future Character statement in Part 5 of this DCP.</i>	The proposed development has considered the desired future	Yes
(2)	<i>New buildings and additions are to be designed with an articulated front façade.</i>	The proposal provides for an articulated front façade, including a staggered built form with cantilevered roof above.	Yes
(3)	<i>Developments on sites with two (2) or more frontages are to address all frontages.</i>	The subject site holds a single frontage to Forest Road.	Yes
(4)	<i>Dwelling houses are to have windows presenting to the street from a habitable room to encourage passive surveillance.</i>	Windows have been suitably located to maintain a balance of visual privacy and passive surveillance.	Yes
(5)	<i>Development must be sensitively designed so as to minimise adverse impacts on the amenity and view corridors of neighbouring public and private property while maintaining reasonable amenity for the proposed development and is to balance this requirement with the amenity afforded to the new development.</i>	The proposal has been sensitively designed to address Forest Road. As noted, neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views.  All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(6)	<i>The maximum size of voids at the first floor level should be a cumulative total of 15m<sup>2</sup> (excluding voids associated with internal stairs).</i>	The proposal does not include any void space.	N/A
<b>2. Building Scale and Height</b>			
(1)	<i>New buildings are to consider and respond to the predominant and desired future scale of buildings within the neighbourhood, and consider the topography and form of the site.</i>	The proposed dwelling has been designed with consideration to the existing and desired future character of the locality.	Yes
(2)	<i>On sites with a gradient or cross fall greater than 1:10, dwellings are to adopt a splitlevel approach to minimise excavation and fill. The overall design of the dwelling should respond to the topography of the site.</i>	The design of the development is considered to appropriately respond to the landform.	Yes
(3)	<i>A maximum of two (2) storeys plus basement is permissible at any point above ground level (existing). Basements are to protrude no more than 1m above existing ground level.</i>	The proposal provides for two (2) habitable storeys and does not include any basement.	Yes
(4)	<i>Where topography conditions require a basement, the area of the basement should not exceed the area required to meet the car parking requirements for the development, access ramp to the parking and a maximum 10m<sup>2</sup> for storage and 20m<sup>2</sup> for plant rooms. Additional</i>	This item is not applicable to the proposed development.	N/A



	<i>basement area to that required to satisfy these requirements may be included as floor space area when calculating floor space ratio</i>		
(5)	<i>Where the entry to the basement carpark is visible from the street, the entry should be recessed a minimum of 1m (from the edge of the external wall or balcony) from the levels above and the external walls of the garage differentiated from the walls above through articulation and external materials.</i>	This item is not applicable to the proposed development.	N/A
<b>3. Setbacks</b>			
<b>Front Setback</b>			
(1)	<i>The minimum setback from the primary street boundary is: i. 4.5m to the main building wall / facade; ii. 5.5m to the front facade of a garage or carport; or iii. Where the prevailing street setback is greater than the minimum, the average setback of dwellings on adjoining lots is to be applied.</i>	The proposal maintains a setback of 7.295m to the primary building line and therefore complies.	Yes
<b>Side and Rear Setbacks</b>			
(1)	<i>Buildings are to have a minimum rear setback of 15% of the average site length, or 6m, whichever is the greater (excluding detached secondary dwellings – see Point 12 in Section 6.1.2.12-Secondary Dwellings of this DCP).</i>	The site has a depth of 45.72m and therefore requires a minimum setback of 6.86m.  The proposal maintains a rear setback of 16.848m and therefore complies.	Yes
(2)	<i>The minimum side setbacks for ground and first floor are: i. 900mm for lots up to 12.5m in width measured at the front building line for the length of the development. ii. 1.2m for lots greater than 12.5m in width measured at the front building line for the length of the development. iii. 1.5m for all lots within the Foreshore Scenic Protection Area measured at the front building line for the length of the development.</i>	The proposal maintains a side setback of 935mm to the northern (side) boundary and 900mm to the southern (side) boundary at the ground floor, and 1542mm to the northern (side) boundary and 1540mm to the southern (side) boundary at upper levels.  It is acknowledged this represents a variation to the minimum required 1.5m at (2)(iii), however is compliant with the BCA (including associated fire rating requirements) and is not considered to result in any amenity impacts to surrounding properties, noting that there is no development immediately to the north of the site, whilst the dwelling to the rear has been constructed as part of the subject group, with consideration given to maintaining suitable visual	Refer Comment



		privacy and solar access between dwellings.  Given the existence of the dwelling, it is not practicable to increase this setback at the site.	
(3)	<i>Where alterations and additions (ground and first floor) to an existing dwelling are proposed, an existing side setback less than the setback required in Control 3 can be maintained, provided the reduced setback does not adversely affect compliance with the solar access and landscaped area controls or adversely impact upon the visual and acoustic amenity of neighbouring dwellings.</i>	This item is not applicable to the proposed development.	N/A
(4)	<i>For battle-axe lots, minimum side and rear boundary setbacks apply, except the front setback of the battle-axe lot without a street frontage, where a minimum setback of 4.0m is to be provided as illustrated in Figure 1.</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Any garages or parking structures fronting rear lanes may encroach upon the rear setback areas but are still to provide a minimum setback of 1m from the lane.</i>	This item is not applicable to the proposed development.	N/A
<b>4. Private Open Space</b>			
(1)	<i>Private open space is to be located at the rear of the property and/or behind the building line and is to have a minimum area of 60m<sup>2</sup> with minimum dimensions of 6m and located on the same level (not terraced or over rock outcrops).</i>	The proposal provides for 60m <sup>2</sup> private open space within the rear setback and therefore complies.	Yes
(2)	<i>Private open space is to be provided for all dwellings, (with the exception of secondary dwellings, which are able to share the private open space of the principal dwelling).</i>	This item is acknowledged.	Yes
(3)	<i>Private open space is to be located so as to maximise solar access.</i>	Private open space has been located to maximise solar access.	Yes
(4)	<i>Private open space is to be designed to minimise adverse impacts upon the privacy of the occupants of adjacent buildings.</i>	Private open space has been suitably located so as to not result in any unreasonable adverse impacts to surrounding properties. The orientation of the subject site, being in an east-west arrangement, further mitigates any potential impacts to adjoining properties to the west, which hold a north-south orientation.	Yes
<b>5. Landscaping</b>			
(1)	<i>Landscaped area (has the same meaning as GRLEP 2021) is to be provided in accordance with the table</i>	The site is located within the R2 – Low Density Residential Zone and therefore requires a minimum 25%	Yes



	contained within Clause 6.12 Landscaped areas in certain residential and environmental protection zones of GRLEP 2021.	of the site to be landscaped, pursuant to Clause 6.12(5)(a) of the LEP 2021.  The proposal maintains a landscaped area of 192m <sup>2</sup> (30.6%) and therefore complies with this clause.	
(2)	Provide a landscape setting within the primary and secondary street frontages, where hard paved areas are minimised. At a maximum, impervious areas, including hard paving, gravel, concrete or other material that does not permit landscaping, are to occupy no more than 40% of the street setback area.	The proposal provides for a total of 44m <sup>2</sup> (45.1%) landscaping within the front setback and therefore complies.	Yes
(3)	The front setback area is to have an area where at least one (1) tree capable of achieving a minimum mature height of 10m with a spreading canopy can be accommodated. A schedule of appropriate species to consider is provided in Council's Tree Management Policy.	The proposal includes provision for one (1) <i>Elaeocarpus Reticulatus</i> "Blueberry Ash" tree within the front setback, capable of achieving a mature height of 10m and therefore complies.	Yes
<b>6. Excavation (Cut and Fill)</b>			
(1)	Any excavation must not extend beyond the building footprint, including for any basement car park.	This item is acknowledged. All excavation is maintained within the building envelope.	Yes
(2)	The depth of cut or fill must not exceed 1.0m from existing ground level, except where the excavation is for a basement car park.	The proposal includes up to 1.2m fill above natural ground level, which is limited to the rear portion of the building envelope.  This fill does not alter the topography within the locality outside of the building envelope and is therefore considered to be reasonable under the circumstances.	Refer Comment
(3)	Developments should avoid unnecessary earthworks by designing and siting buildings that respond to the natural slope of the land. The building footprint must be designed to minimise cut and fill by allowing the building mass to step in accordance with the slope of the land.	This item is acknowledged.	Yes
<b>7. Vehicular Access, Parking and Circulation</b>			
(1)	Car parking is to be provided in accordance with the requirements in Part 3 of this DCP.	The proposal provides two car spaces within the integrated garage.	Yes
(2)	A dwelling is to provide one (1) garage and one (1) tandem driveway parking space forward of the garage (unless	The proposal provides two car spaces within the integrated garage.	Yes





	<i>otherwise accommodated within the building envelope).</i>		
(3)	<i>Driveways, garages and basements should be accessed from a secondary street or rear lane where this is available.</i>	This item is not applicable to the proposed development.	N/A
(4)	<i>Entry to parking facilities off the rear lane must be setback a minimum of 1m from the lane.</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Driveway crossings are to be positioned so that on-street parking and landscaping on the site are maximised, and removal or damage to existing street trees is avoided.</i>	The driveway crossing from Forest Road has been suitably located to maximise pedestrian safety and landscaping within the front setback.	Yes
(6)	<i>The maximum driveway width between the street boundary and the primary building setback alignment of the garage is 4.0m.</i>	The proposal provides for a maximum driveway width of 4.0m at the boundary and therefore complies.	Yes
(7)	<i>Basements are permitted where the LEP height development standard is not exceeded, and it is demonstrated that there will be no adverse environmental impacts (e.g. affectation of watercourses and geological structure). (i) Basements on land where the average grade is less than 12.5% are permitted only where they are not considered a storey (see definition in the LEP) and the overall development presents as two (2) storeys to the street.</i>	The proposal does not include basement car parking.	N/A
(8)	<i>Car parking layout and vehicular access requirements and design are to be in accordance with the Australian Standards, in particular AS 2890.1 (latest edition).</i>	All car parking and access complies with Australian Standards.	Yes
(9)	<i>The maximum width of a garage opening is 6m.</i>	The garage opening has a width of 5.116m and therefore complies.	Yes
<b>8. Visual Privacy</b>			
(1)	<i>Windows from active rooms are to be offset with windows in adjacent dwellings, or appropriately treated so as to avoid direct overlooking onto neighbouring windows.</i>	All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(2)	<i>For active rooms or balconies on an upper level, the design should incorporate placement of room windows or screening devices to only allow oblique views to adjoining properties.</i>	As detailed within this report, upper level balconies include privacy screening to maintain amenity to surrounding properties.	Yes
(3)	<i>Upper level balconies should not project more than 1500mm beyond the main rear wall alignment so as to minimise adverse visual privacy impacts to adjoining properties.</i>	Upper level balconies include privacy screening to maintain amenity to surrounding properties. Balconies are contained within the overall building envelope and do not extend beyond primary building walls.	Yes



(4)	<i>Windows for primary living rooms must be designed so that they reasonably maintain the privacy of adjoining main living rooms and private open space areas.</i>	All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(5)	<i>Development applications are to be accompanied by a survey plan or site analysis plan (to AHD) of the proposed dwelling showing the location of adjoining property windows, floors levels, window sill levels and ridge and gutter line levels</i>	The proposal is accompanied by both a survey and site analysis plan detailing levels and the location of windows.	Yes
<b>9. Noise</b>			
(1)	<i>Noise generators such as plant and machinery including air conditioning units and pool pumps are located away from windows or other openings in habitable rooms; they are to be screened to reduce noise or acoustically treated.</i>	All plant (including air conditioning and pool pump) is located within the building envelope of the dwelling and is not considered to result in any unreasonable acoustic impact to surrounding properties.	Yes
<b>10. Solar Access</b>			
(1)	<i>New buildings and additions are sited and designed to facilitate a minimum of 3 hours direct sunlight between 9am and 3pm on 21 June onto living room windows and at least 50% of the minimum amount of private open space.</i>	The proposal is accompanied by detailed solar diagrams demonstrating compliance with this requirement.	Yes
(2)	<i>To facilitate sunlight penetration to adjoining development, building bulk may be required to be articulated to achieve the required sunlight access.</i>	The built form has been suitably articulated to maintain solar access to the subject site and adjoining properties.	Yes
(3)	<i>Direct sunlight to north-facing windows of habitable rooms and 50% of the principal private open space area of adjacent dwellings should not be reduced to less than 3 hours between 9.00am and 3.00pm on 21 June.</i>	The proposal is accompanied by detailed solar access diagrams demonstrating compliance with these provisions.	Yes
(4)	<i>Note: Variations will be considered for developments that comply with all other requirements but are located on sites with an east-west orientation or steeply sloping sites with a southerly orientation away from the street.</i>		Yes
(5)	<i>Shadow diagrams are required to show the impact of the proposal on solar access to the principal private open space and living rooms of neighbouring properties. Existing overshadowing by fences, roof overhangs and changes in level should also be reflected in the diagrams. It may also be necessary to provide elevations or views from sun diagrams to demonstrate appropriate solar access provision to adjoining development.</i>		Yes
<b>11. Materials, Colour Schemes and Details</b>			





(1)	<i>Large expansive surfaces of predominantly white, light or primary colours which would dominate the streetscape or other vistas should not be used.</i>	The proposal is submitted with a detailed schedule of colours and finishes, having been selected with regard to the broader bushland setting of the locality. Buildings are suitably articulated, with material and finishes not considered to dominate the streetscape.  The proposal will be further supported by significant landscaping proposed within the front setback, noting there is also a strong prevalence of white houses within the locality. The proposal is therefore considered acceptable in this regard.	Yes
(2)	<i>New development should incorporate colour schemes that have a hue and tonal relationship with the predominant colour schemes found in the street.</i>	This item is acknowledged.	Yes
(3)	<i>Matching buildings in a row should be finished in the same colour or have a tonal relationship.</i>	Proposed colours and finishes are considered to be consistent with surrounding properties.	Yes
(4)	<i>All materials and finishes utilised should have low reflectivity.</i>	All colours and finishes are of low reflectivity.	Yes
<b>12. Secondary Dwellings</b>			
The proposed development does not include any secondary dwellings.			
<b>13. Site Facilities</b>			
(1)	<i>All dwellings are to be provided with adequate and practical internal and external storage (garage, garden sheds, etc.).</i>	The dwelling provides for adequate and practical storage.	Yes
(2)	<i>Provision for water, sewerage and stormwater drainage for the site shall be nominated on the plans to Council's satisfaction.</i>	Services are available to the site and are nominated on the supporting plans.	Yes
(3)	<i>Each dwelling must provide adequate space for the storage of garbage and recycling bins (a space of at least 3m by 1m must be provided) and this space is not to be located within the front setback.</i>	The proposal provides for adequate waste storage as nominated on the supporting plans.	Yes
(4)	<i>Letterboxes are to be located on the frontage where the address has been allocated in accordance with Australia Post requirements.</i>	The letterbox will be oriented towards the street.	Yes

**Table 7. DCP 2021 Chapter 6.4 Key Provisions**

Clause		Proposal	Complies
6.4.4 Swimming Pools/Spas			
(1)	Swimming pools/spas are to be located to the rear of properties.	The proposal includes a swimming pool located within the rear setback.	Yes



(2)	<i>For corner allotments or where the property has two street frontages, swimming pools/spas are not to be located in the primary frontage.</i>	This item is not applicable to the proposed development.	N/A
(3)	<i>Swimming pools/spas must be positioned a minimum of 900mm from the property boundary with the water line being a minimum of 1500mm from the property boundary</i>	The swimming pool maintains the following setbacks: <ul style="list-style-type: none"> <li>– Coping: 1761mm to the southern (side) boundary.</li> <li>– Water Line 1846mm to the southern (side) boundary.</li> <li>– Coping: 6649mm to the western (rear) boundary.</li> <li>– Water Line 6949mm to the western (rear) boundary.</li> </ul>	Yes
(4)	<i>In-ground swimming pools shall be built so that the top of the swimming pool coping is as close to the existing ground level as possible. On sloping sites this will often require excavation of the site on the high side to obtain the minimum out of ground exposure of the swimming pool consistent with the low side</i>	This item is acknowledged.	Yes
(5)	<i>Swimming pools/spas are to be no more than 500mm above existing ground level.</i>	The proposed pool maintains a maximum height of 1530mm above existing ground level, noting the site is sloping, with a fall to the south and therefore compliance with this provision is not able to be achieved.	Refer Comment
(6)	<i>On steeply sloping sites, Council may consider allowing the top of the swimming pool at one point or along one side to extend up to 1m above existing ground level, provided that the exposed face of the swimming pool wall is treated to minimise impact. The materials and design of the retaining wall should be integrated with and complement the style of the swimming pool</i>	This item is acknowledged.	Yes
(7)	<i>Decking around a swimming pool must not be more than 600mm above existing ground level.</i>	The proposed pool edging is constructed on retained earth, maintaining a height of 540mm above existing ground level.	Refer Comment
(8)	<i>Filling is not permitted between the swimming pool and the property boundary. The position of the swimming pool, in relation to neighbours and other residents, must be considered to minimise noise associated with activities carried out in the swimming pool or from the swimming pool</i>	This item is acknowledged.	Yes



	<i>equipment, such as cleaning equipment.</i>		
(9)	<i>Council may require mechanical equipment to be suitably acoustically treated so that noise to adjoining properties is reduced.</i>	This item is acknowledged.	Yes
(10)	<i>A pool fence complying with the legislation is to separate access from the residential dwelling on the site to the pool.</i>	This item is acknowledged.	Yes
(11)	<i>Safety and security measures for swimming pools must comply with the relevant requirements of the Swimming Pools Act 1992 and any relevant Australian Standards.</i>	This item is acknowledged.	Yes
(12)	<i>A spa is not required to be surrounded by a child resistant barrier provided that the spa is covered or secured by a child-safe structure (e.g. door, lid or mesh) that is fastened to the spa pool by a child-resistant device at all times when the spa pool is not in actual use and complies with Swimming Pools Act 1992 and any relevant Australian Standards.</i>	This item is acknowledged.	Yes

There are no other provisions of the DCP 2021 applicable to the proposal.

Having regard to the above, the proposed development is consistent with the applicable provisions of the DCP 2021.



## 6. ENVIRONMENTAL ASSESSMENT

Section 4.15 of the Environmental Planning and Assessment Act 1979 requires the following matters to be considered in the assessment of the proposed development.

### Impact of the Development on Both the Natural and Built Environments, and Social and Economic Impacts in the Locality

The proposed development is not considered to result in any unreasonable environmental impact. As detailed within this report, the proposed development has been designed with regard to the local context, is considered to suitably integrate within the streetscape and will provide for improved housing stock and high-quality design outcomes within the locality.

Subject to minor variations relating setbacks discussed within this report, the proposal is generally consistent with the applicable planning framework and is not anticipated to result in any loss of solar access nor visual privacy or acoustic impacts to surrounding properties. The proposal does not involve the removal of any trees and suitable landscaping is provided in accordance with the DCP 2021 to ensure integration within the bushland setting of the Lugarno locality. Whilst it is acknowledged there is a departure from the DCP 2021 in relation to building side setbacks, setbacks are consistent with those approved within the initial CDC, are compliant with relevant provisions of the BCA and will not result in any solar access or visual privacy impacts to surrounding properties.

The proposal to legitimise existing works undertaken and to provide for single private residential accommodation. This is an efficient use of the site and provides for an orderly development of the land in accordance with the planning framework. The proposal is considered to present suitably within the streetscape, will not reduce the development capability of surrounding sites and will not detract from the character of the locality.

All necessary services are available to the site, and both waste and stormwater can be appropriately managed in accordance with the provisions of the DCP 2021.

Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views in the locality.

The proposal is not considered to have any adverse social or economic impact on the locality.



#### Suitability of the Site for the Development

The proposal is permissible within the zone and is consistent with the objectives of the R2 – Low Density Residential zone to provide for the housing needs of the community, including through a variety of housing types within a low-density residential environment.

Subject to minor variations relating to setbacks discussed within this report, the proposal is generally consistent with the applicable planning framework and by virtue of the lot orientation, siting of the dwelling and development patterns within the locality, the site is capable of accommodating the proposed development without any unreasonable amenity impact to the existing dwelling nor neighbouring dwellings on surrounding properties.

The proposal to legitimise existing works undertaken and resolve this long running matter with Council to provide for single private residential accommodation. This application seeks to resolve existing uncertainties surrounding the site, including for the owner, Council and neighbouring residents, to provide for certainty and a clear and legitimate approval pathway for the completion of the dwelling.

In this regard, the proposal is considered to be an efficient use of the site and provides for an orderly development of the land in accordance with the planning framework. As detailed above, the proposal is considered to maintain a suitable presentation within the streetscape. The proposed development is therefore considered to be suitable for the site.

#### Any Submissions Made in Accordance with the Act or Regulation

The development application will be publicly notified in accordance with Council's notification policy. The proponent will prepare a response to any submissions received by Council during the exhibition period.

#### The Public Interest

For the reasons discussed within this report, and in the absence of any unreasonable social, economic or environmental impact, the proposed development is considered to be in the public interest.



## 7. CONCLUSION

The proposal seeks development consent for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1174 Forest Road, Lugarno (Lot A DP 328702).

The proposed development seeks to legitimise existing unauthorised works at the site, which are currently subject to compliance action by Council. Whilst works were initially approved and commenced by way of a Complying Development Certificate (CDC), through the course of construction the design of the dwelling has departed from this approved design, meaning this process was not able to be finalised and Occupation Certificates unable to be issued.

The proposal therefore seeks to rectify matters raised by Council, whilst providing for additional alterations to bring into consistency (where practicable) with applicable planning framework. Accordingly, the proposed development seeks to legitimise these works with Council through concurrent Development Application (DA) and Building Certificate (BC) processes. A supporting BC has been submitted under separate cover.

The proposal is a permissible use and is consistent with the objectives of the R2 – Low Density Residential zone. The proposal is generally consistent with the development standards, relevant provisions and built form guidelines contained within the LEP 2021 and DCP 2021.

The proposed works do not detract from the presentation of dwelling within the streetscape and are not considered to result in any unreasonable amenity impact to the locality.

Based on the conclusions of the comprehensive assessment undertaken, and in the absence of any significant adverse environmental, social, heritage or economic impacts Council's approval of the development application is sought.





# DEVELOPMENT APPLICATION

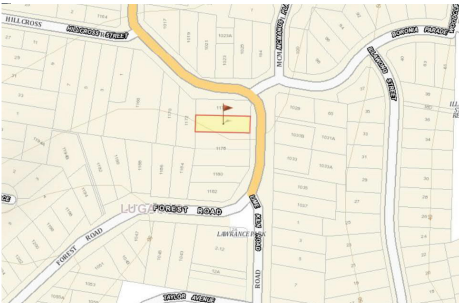
LOT A DP 328702  
NO. 1174 FOREST RD LUGARNO NSW 2210

## ARCHITECTURAL PACKAGE

AERIAL IMAGE



LOCATION PLAN



### GENERAL NOTES

#### PRIOR TO COMMENCEMENT

1. ALL DIMENSIONS AND FLOOR AREAS TO BE VERIFIED PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
2. ANY DISCREPANCIES ARE TO BE CONFIRMED BY THE DESIGNER.
3. LEVELS SHOWN ARE APPROXIMATE UNLESS ACCOMPANIED BY REDUCED LEVELS BY A REGISTERED SURVEYOR.
4. FIGURED DIMENSIONS ARE TO BE TAKEN IN PREFERENCE TO SCALING.
5. ALL BOUNDARY CLEARANCES MUST BE VERIFIED BY THE SURVEYOR PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
6. THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS DRAWINGS & SPECIFICATIONS INCLUDING STRUCTURAL, MECHANICAL & HYDRAULICS.
7. WHERE ENGINEERING OR HYDRAULIC DRAWINGS ARE REQUIRED, SUCH DRAWINGS MUST TAKE PREFERENCE TO THESE DRAWINGS.
8. FAILURE TO COMPLY WITH DRAWINGS & SPECIFICATIONS COULD RESULT IN ALTERATIONS BEING MADE AT THE COST TO THE CONTRACTOR.
9. ALL SERVICES AND UTILITIES TO BE LOCATED AND VERIFIED BY THE CONTRACTOR WITH THE RELEVANT AUTHORITIES PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORKS.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM ALL SITE CONDITIONS & REQUIREMENTS.

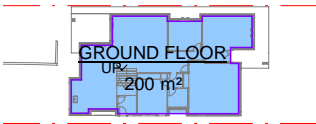
#### SITE PREPARATION:

11. BEFORE COMMENCEMENT OF DEMOLITION WORKS THE CONTRACTOR MUST CONTACT THE CONSULTANT ENGINEER TO ESTABLISH WHICH WALLS ETC ARE ABLE TO BE SAFELY REMOVED.
12. ALL DEMOLITION WORK TO BE CARRIED OUT IN ACCORDANCE WITH AS2601.
13. REMOVAL OF ASBESTOS CEMENT SHEETING MUST BE CARRIED OUT BY A LICENSED CONTRACTOR IN COMPLIANCE WITH THE REQUIREMENTS OF THE NSW WORKCOVER AUTHORITY IN RELATION TO THE REMOVAL, HANDLING AND DISPOSAL OF ALL MATERIAL CONTAINING ASBESTOS AND THE WORKSAFE AUSTRALIA ASBESTOS CODE OF PRACTICE & GUIDANCE NOTES.
14. EARTHWORKS - TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1919, CONDITIONS OF DEVELOPMENT CONSENT AND THE RELEVANT REQUIREMENTS OF PART 3.1.1 OF THE NCC 2019 (VOLUME 2).
15. STORMWATER DRAINAGE - PART 3.1.3.5 OF NCC 2019 (VOLUME 2); AND
16. AS/NZS 3500 (2003) PART 3 - STORMWATER DRAINAGE.
17. AS/NZS 3500 (2000) PART 5 - DOMESTIC INSTALLATIONS - SECTION 5 - STORMWATER DRAINAGE.
18. TERMITE PROTECTION - PART 3.1.4.3 OF NCC 2019 (VOLUME 2); AND AS 3660.1(2000) - PROTECTION OF BUILDINGS FROM SUBTERRANEAN TERMITES.
19. SILT/ SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO ANY EXCAVATION OR CONSTRUCTION WORK.

20. STORMWATER DRAINAGE - PART 3.1.3.5 OF NCC 2019 (VOLUME 2); AND
21. AS/NZS 3500 (2003) PART 3 - STORMWATER DRAINAGE.
22. AS/NZS 3500 (2000) PART 5 - DOMESTIC INSTALLATIONS - SECTION 5 - STORMWATER DRAINAGE.
23. TERMITE PROTECTION - PART 3.1.4.3 OF NCC 2019 (VOLUME 2); AND AS 3660.1(2000) - PROTECTION OF BUILDINGS FROM SUBTERRANEAN TERMITES.
24. SILT/ SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO ANY EXCAVATION OR CONSTRUCTION WORK.

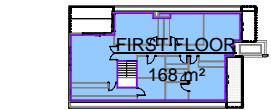
#### BUILDING WORKS

25. CONTRACTOR TO COMPLY WITH CURRENT HEALTH & SAFETY REGULATIONS AT ALL TIMES.
26. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE PRINCIPAL CERTIFYING AUTHORITY (PCA) AND THE BUILDING CODE OF AUSTRALIA (BCA) - AS AMENDED.
27. PEDESTRIAN TRAFFIC AND USE OF PUBLIC FOOTPATHS TO REMAIN UNCONSTRICTED, INCLUDING PRAM ACCESS - TO BE MAINTAINED IN ACCORDANCE WITH AS1742.3.
28. ALL CONCRETE FOOTINGS FLOOR SLABS, COLUMNS AND TIMBER ROOF FRAMING TO STRUCTURAL ENGINEERS DETAILS.
29. ALL ASPECTS OF THE BUILDING WORK SHALL COMPLY WITH THE CURRENT PROVISIONS OF THE LOCAL GOVERNMENT REGULATIONS AND THE BCA.
30. ALL MATERIALS AND COMPONENTS SHALL COMPLY WITH THE EARLY HAZARD INDICES REQUIREMENTS OF THE BCA CLAUSE 1.10.
31. THE REFLECTIVITY INDEX OF ALL EXTERNAL GLASS MATERIALS IS NOT TO EXCEED 20%.
32. ALL STAIR TREADS TO COMPLY WITH BCA REQUIREMENTS.
33. SAFETY GLASS SHALL BE USED IN VERY GLASS DOOR OR PANEL ENCLOSING OR PARTLY ENCLOSING A SHOWER OR BATH.
34. ALL BATHROOMS AND WC WINDOWS ARE TO BE INSTALLED WITH OBSCURE GLASS.
35. UNLESS THE DOOR IN A SANITARY COMPARTMENT SWINGS OUTWARDS OR IS GREATER THAN 1.5M AWAY FROM THE TOILET SUITE, THE DOOR MUST BE INSTALLED WITH REMOVABLE LIFT OFF OF HINGES.
36. SMOKE ALARMS ARE TO BE INSTALLED IN ACCORDANCE WITH PART 3.7.2 OF THE BCA AND AS3786.
37. ALL WET AREAS TO BE WATERPROOFED IN ACCORDANCE WITH PART 3.8.1 AND AS3740.
38. STORMWATER TO BE CONNECTED AND SURCHARGED ACCORDING TO COUNCILS REQUIREMENTS AND TO AS 3500.3.
39. ALL LANDSCAPED AREAS, EXISTING TREES, DRIVEWAYS AND FENCING TO LANDSCAPE PLAN DETAILS.
40. CONTRACTOR SHALL MAKE GOOD ALL DISTURBED AREAS ADJACENT TO THE WORKS ON COUNCIL ROADS.
41. FOOTPATHS ARE TO BE RESTORED TO THE SATISFACTION OF THE PCA.



1 GROUND FLOOR

1 : 500

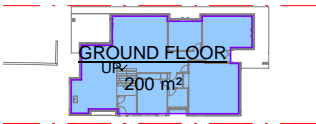


2 FIRST FLOOR

1 : 500

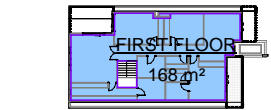
### ARCHITECTURAL DRAWING LIST

SHEET No.	SHEET NAME	SCALE	DATE	REV
DA-A-000	COVER SHEET	NA	03.11.2023	2
DA-A-050	EXISTING SITE PLAN	1:200	12.12.2022	1
DA-A-101	EXISTING GROUND FLOOR PLAN	1:100	12.12.2022	1
DA-A-102	EXISTING FIRST FLOOR PLAN	1:100	12.12.2022	1
DA-A-201	EAST AND WEST ELEVATIONS	1:100	12.12.2022	1
DA-A-202	SOUTH & NORTH ELEVATION	1:100	12.12.2022	1
DA-A-205	EXISTING LONG SECTION	1:100	12.12.2022	1
DA-A-206	EXISTING CROSS SECTION	1:100	12.12.2022	1
DA-A-302	GROUND FLOOR DEMOLITION	1:200	03.11.2023	2
DA-A-303	FIRST FLOOR DEMOLITION PLAN	1:200	03.11.2023	2
DA-A-350	PROPOSED SITE PLAN	1:200	03.11.2023	2
DA-A-351	SITE SETBACK PLAN	1:200	03.11.2023	2
DA-A-401	PROPOSED GROUND FLOOR PLAN	1:100	03.11.2023	2
DA-A-402	PROPOSED FIRST FLOOR PLAN	1:100	03.11.2023	2
DA-A-501	PROPOSED EAST AND WEST ELEVATIONS	1:100	03.11.2023	2
DA-A-502	PROPOSED NORTH AND SOUTH ELEVATIONS	1:100	03.11.2023	2
DA-A-505	PROPOSED LONG SECTION	1:100	03.11.2023	2
DA-A-506	PROPOSED CROSS SECTION	1:100	03.11.2023	2
DA-A-507	SHADOW DIAGRAM	1:500	03.11.2023	2
DA-A-600	PROPOSED LANDSCAPE PLAN	1:100	03.11.2023	2
DA-A-601	DOOR AND WINDOW SCHEDULE & BASIX	1:100	12.12.2022	1
DA-A-701	COLOUR & FINISHES SCHEDULE	NA	03.11.2023	2
DA-A-801	FRONTAGE ELEVATION	NA	03.11.2023	2
DA-A-900	EROSION & SEDIMENT CONTROL PLAN	1:200	03.11.2023	2



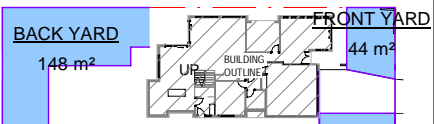
1 GROUND FLOOR

1 : 500



2 FIRST FLOOR

1 : 500



3 LANDSCAPE PLAN

1 : 500

AREA SCHEDULE	
LEVEL	AREA
GROUND FLOOR	200 m²
FIRST FLOOR	168 m²
GRAND TOTAL	367 m²

LOT A DP 328702  
NO. 1174 Forest Rd Lugarno  
NSW 2210

CLIENT	GOLDEN KING ASSETS PTY LTD
PROJECT STATUS	DEVELOPMENT APPLICATION
PROJECT TITLE	SINGLE DWELLING
REVISION	2
PROJECT No.	2122-301A

PROJECT CONSULTANTS	
ARCHITECTURE & DESIGN	
Alana Kowalczyk (NSW Arch No. 10308)	Rothshire
STORMWATER ENGINEERS	
Alexander Kameas	Rothshire
STRUCTURAL ENGINEERS	
Alexander Kameas	Rothshire
SURVEYING	
Peter Nancarrow	Summit Geomatics
TOWN PLANNING	
Jonathan Archibald	Rothshire

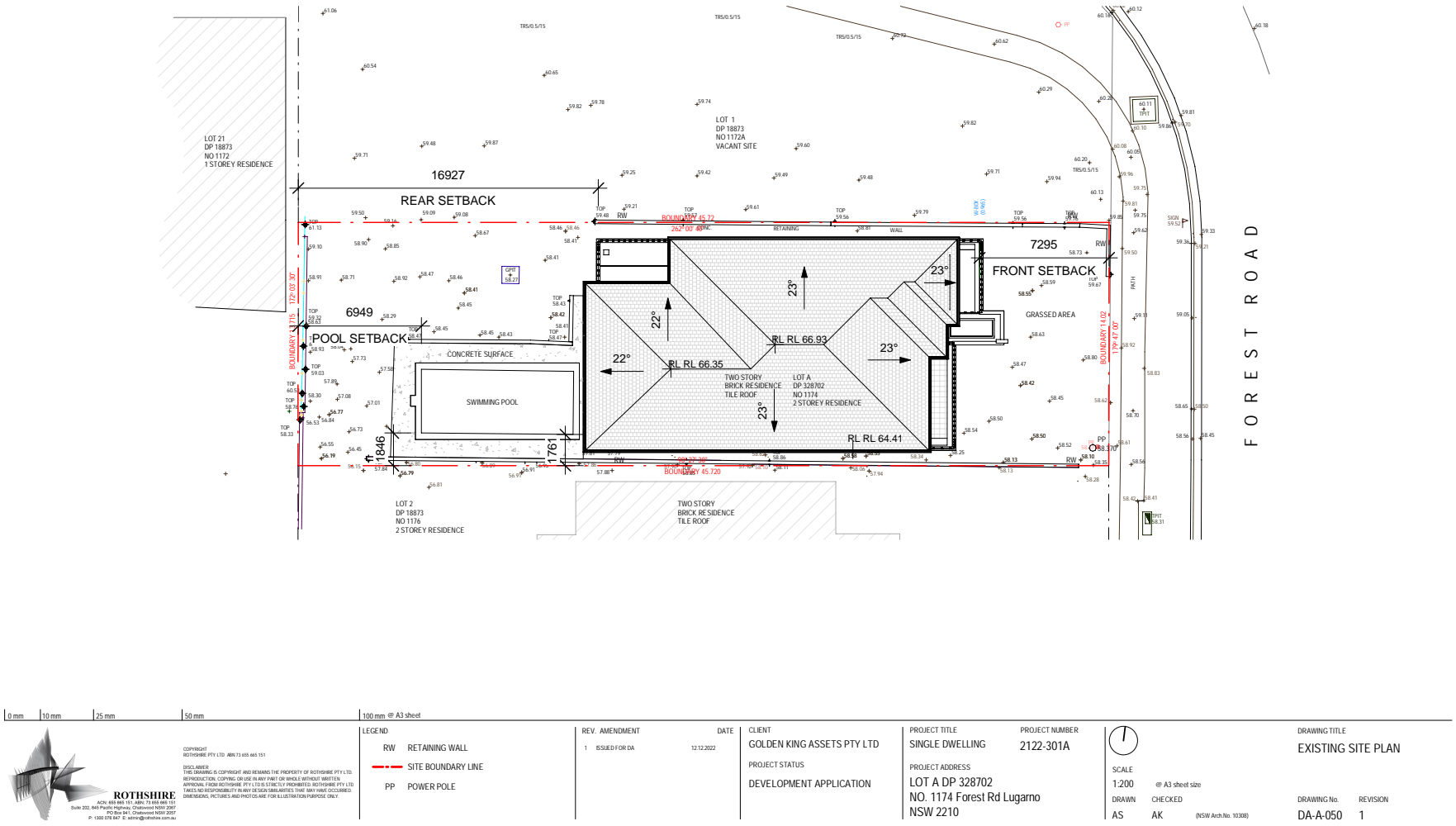
REVISION TABLE		
REV	AMENDMENT	DATE
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2	ISSUED FOR DA	03.11.2023

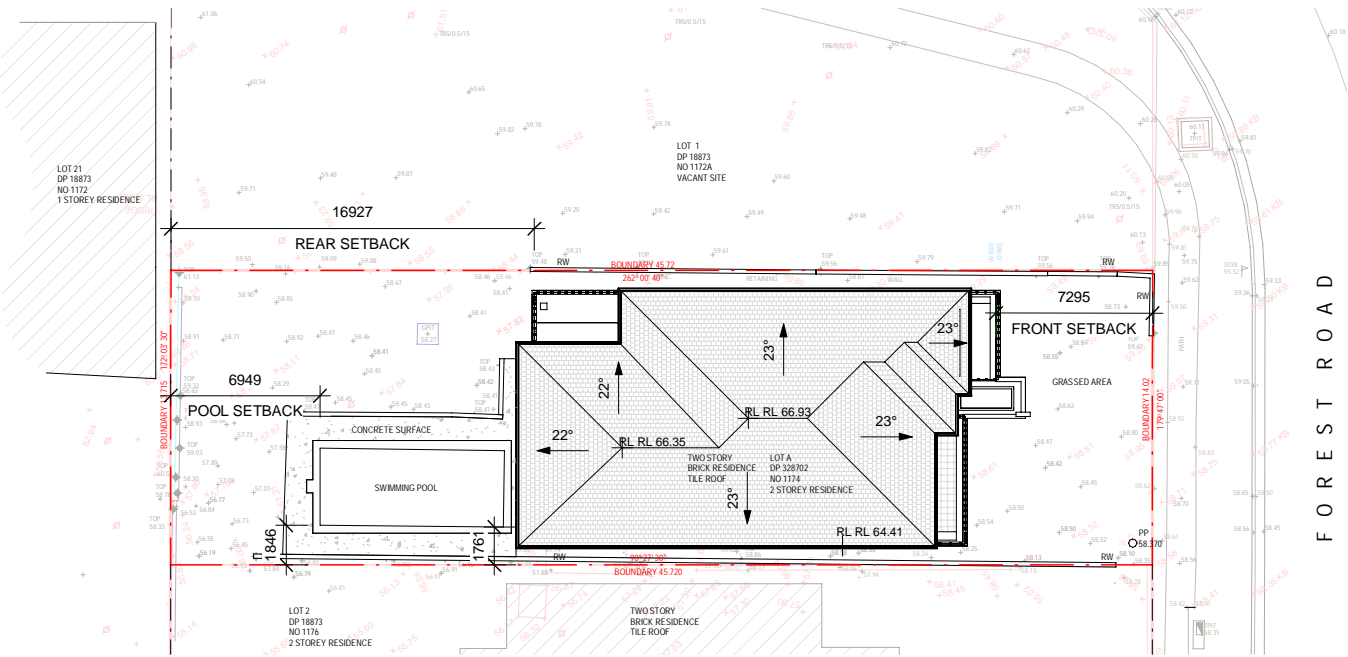




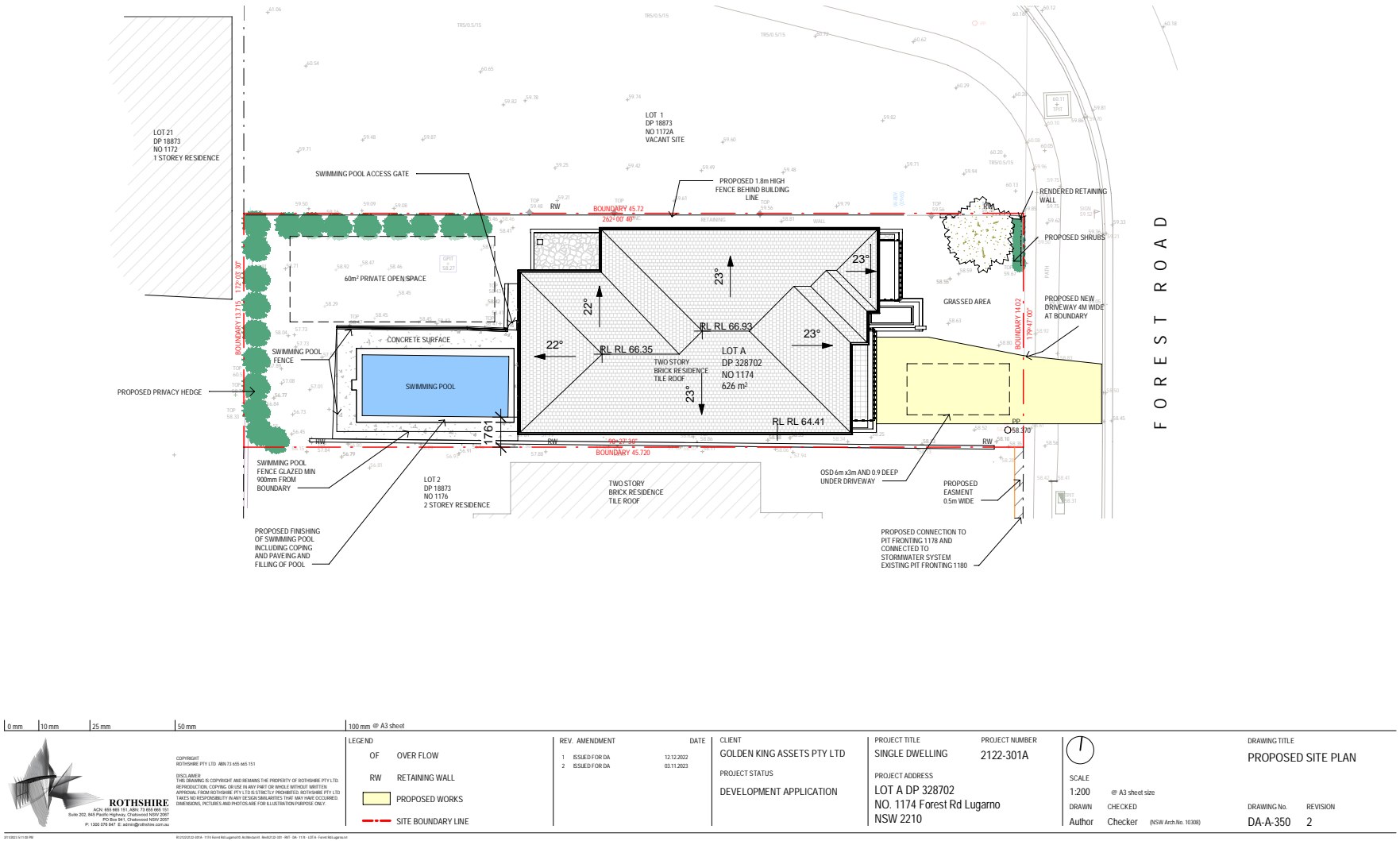


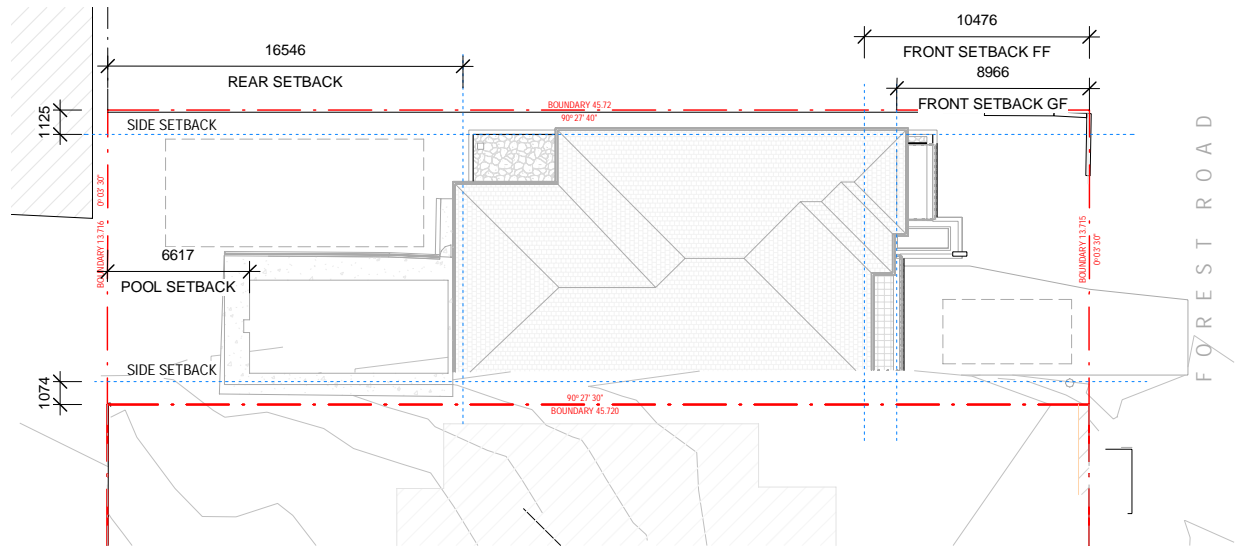
NOTES:  
1. TOPOGRAPHY IS BASED ON SURVEY PLAN BY SUMMIT  
GEOMATIC, DATED 28 NOVEMBER 2022



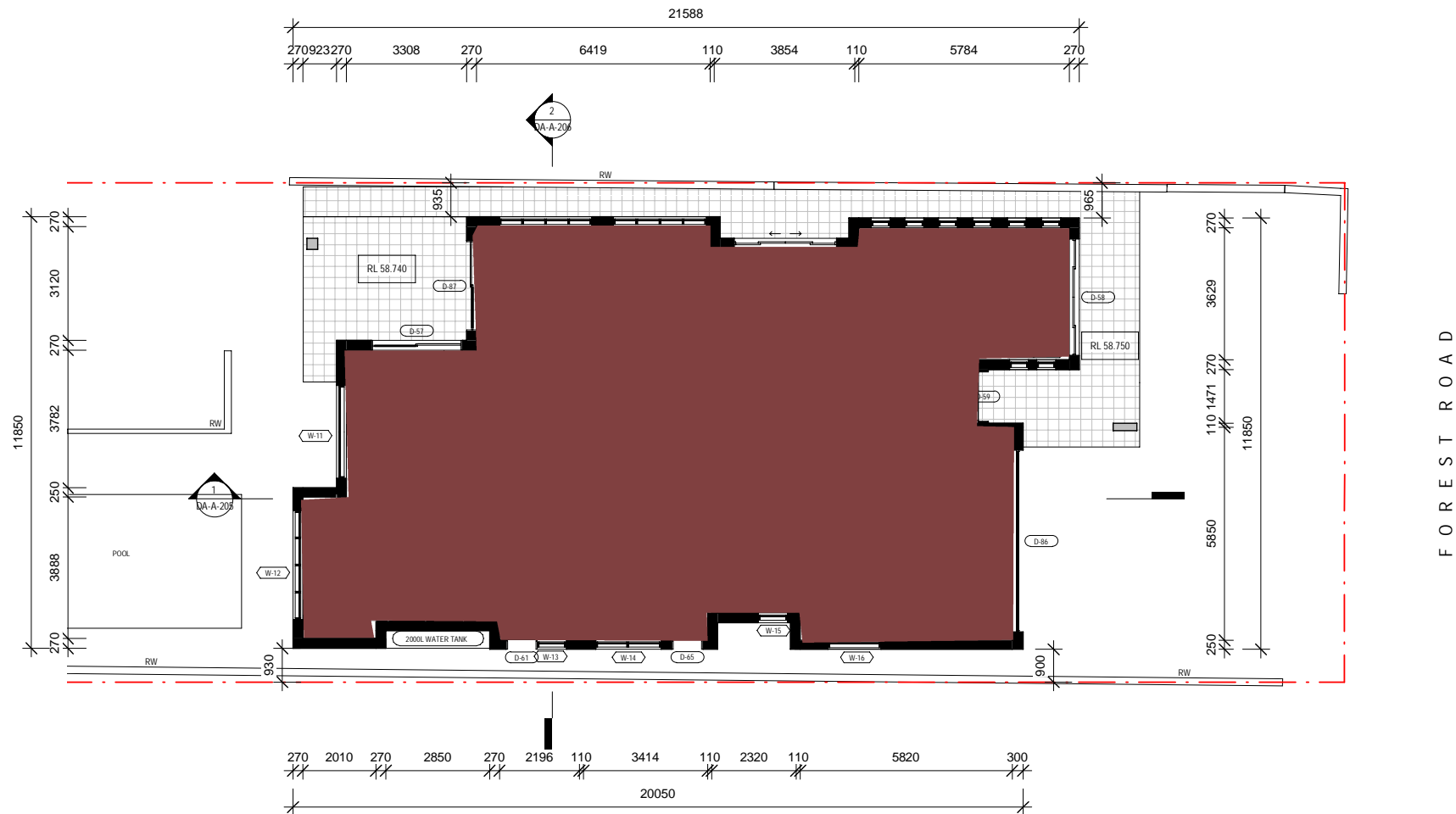


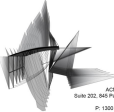
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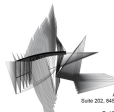




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ROTHSHIRE ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2067 PO Box 441, Chateau NSW 2067 P: 1300 578 847 E: info@rothshire.com.au								DEVELOPMENT APPLICATION		LOT A DP 328702 NO. 1174 Forest Rd Lugarno NSW 2210					
										SCALE 1:200 @ A3 sheet size					
										DRAWN AS		CHECKED AJK		DRAWING No. DA-A-351	
														REVISION 2	

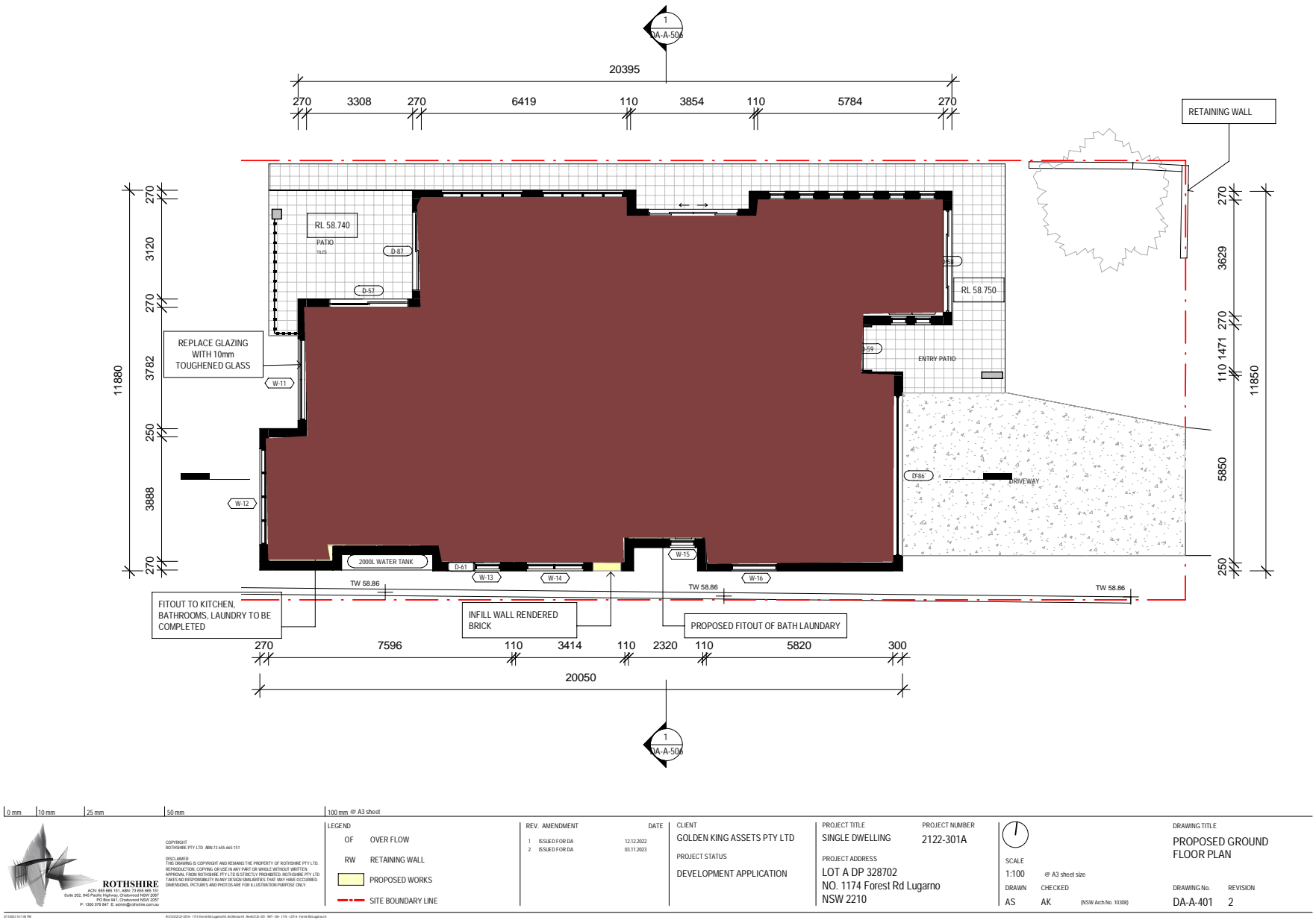


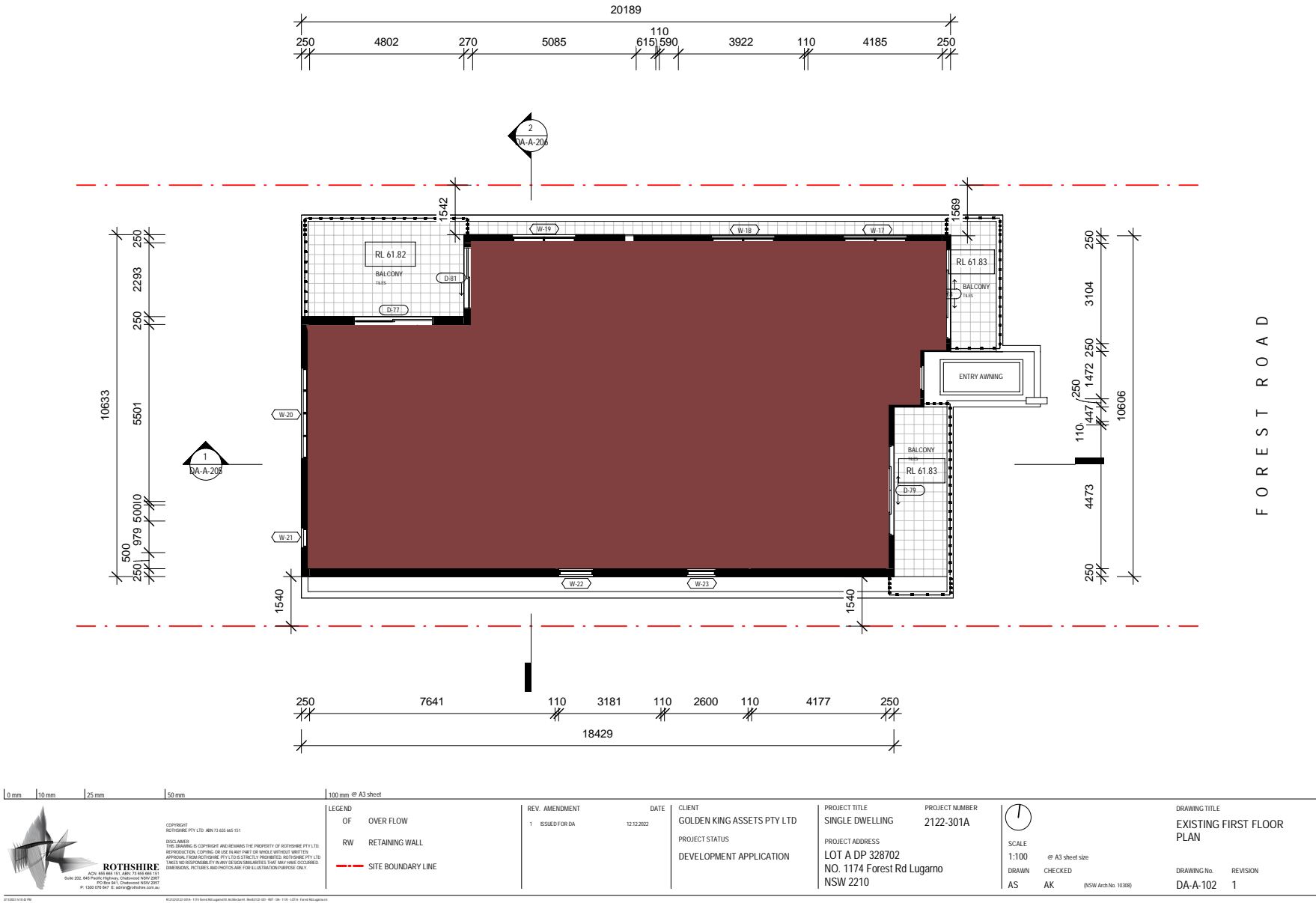
 <div>0 mm10 mm25 mm50 mm100 mm @ A3 sheet</div>		<div>LEGEND</div> <div>OF OVER FLOW</div> <div>RW RETAINING WALL</div> <div>--- SITE BOUNDARY LINE</div>		<div>REV. AMENDMENT</div> <div>1 ISSUED FOR DA</div> <div>DATE</div> <div>12.12.2022</div>	<div>CLIENT</div> <div>GOLDEN KING ASSETS PTY LTD</div> <div>PROJECT STATUS</div> <div>DEVELOPMENT APPLICATION</div>	<div>PROJECT TITLE</div> <div>SINGLE DWELLING</div> <div>PROJECT ADDRESS</div> <div>LOT A DP 328702</div> <div>NO. 1174 Forest Rd Lugarno</div> <div>NSW 2210</div>	<div>PROJECT NUMBER</div> <div>2122-301A</div> <div>SCALE</div> <div>1:100</div> <div>@ A3 sheet size</div> <div>DRAWN</div> <div>AS</div> <div>CHECKED</div> <div>AK</div> <div>(NSW Arch.No. 10388)</div>	<div>DRAWING TITLE</div> <div>EXISTING GROUND FLOOR PLAN</div> <div>DRAWING No.</div> <div>DA-A-101</div> <div>REVISION</div> <div>1</div>
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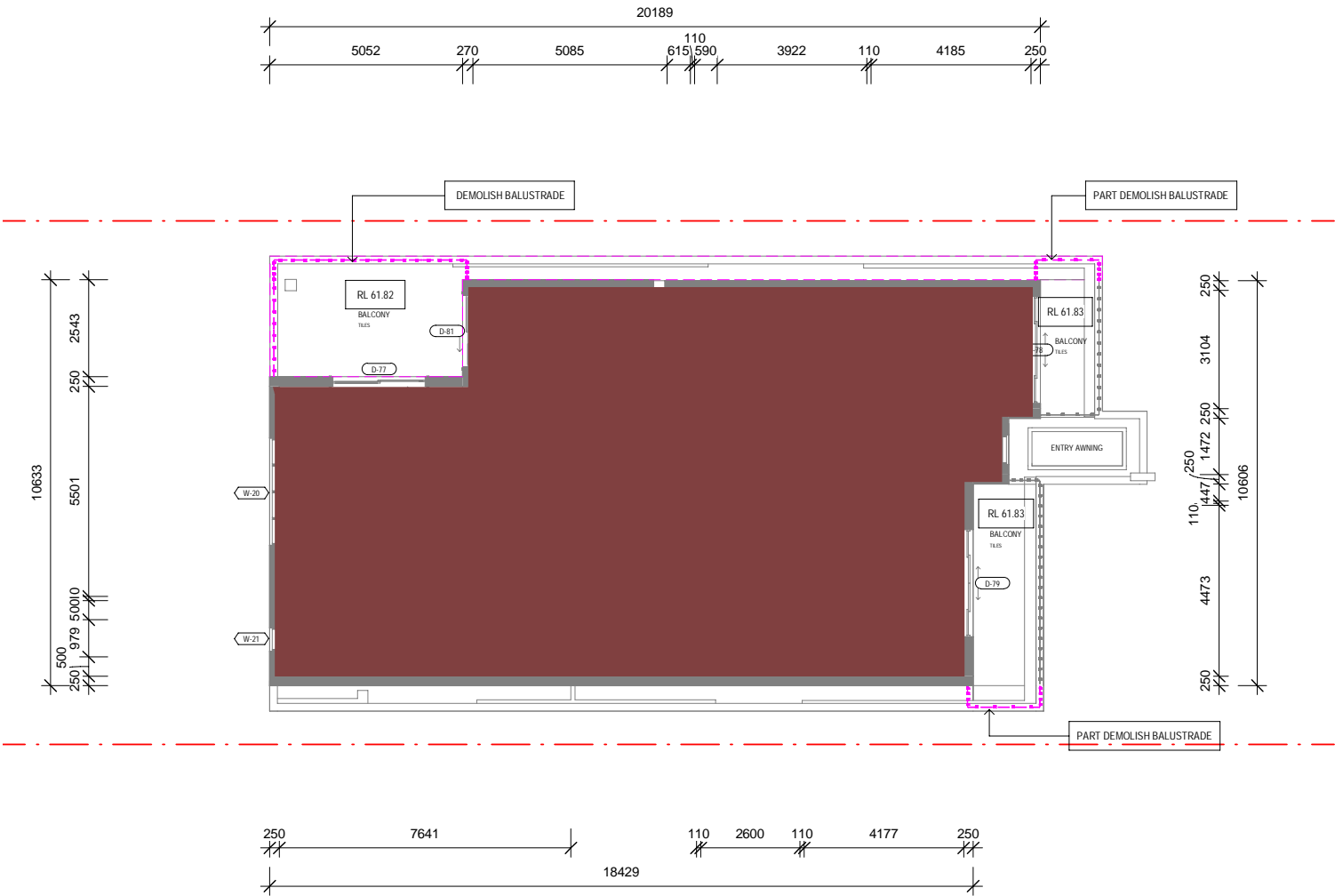




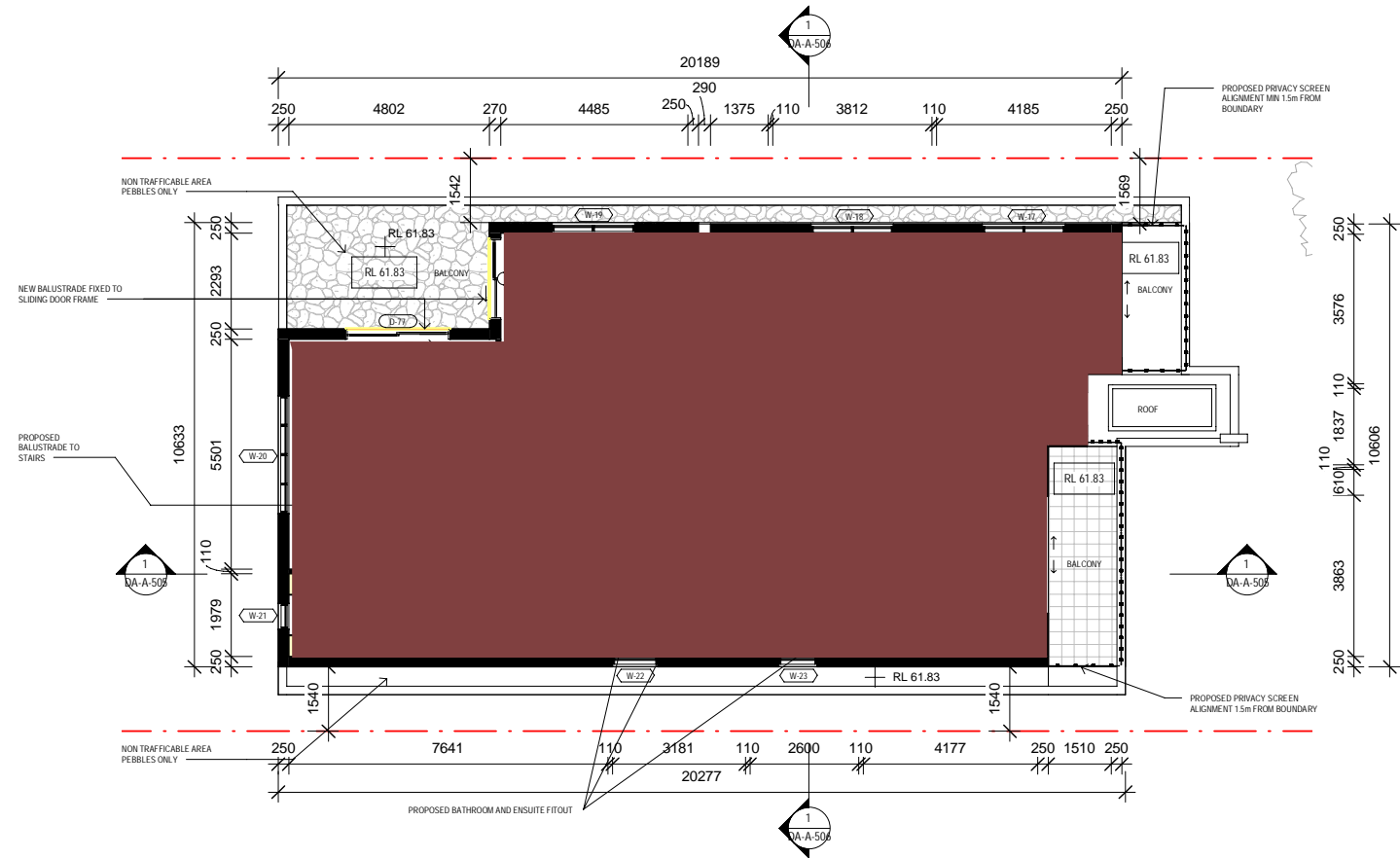
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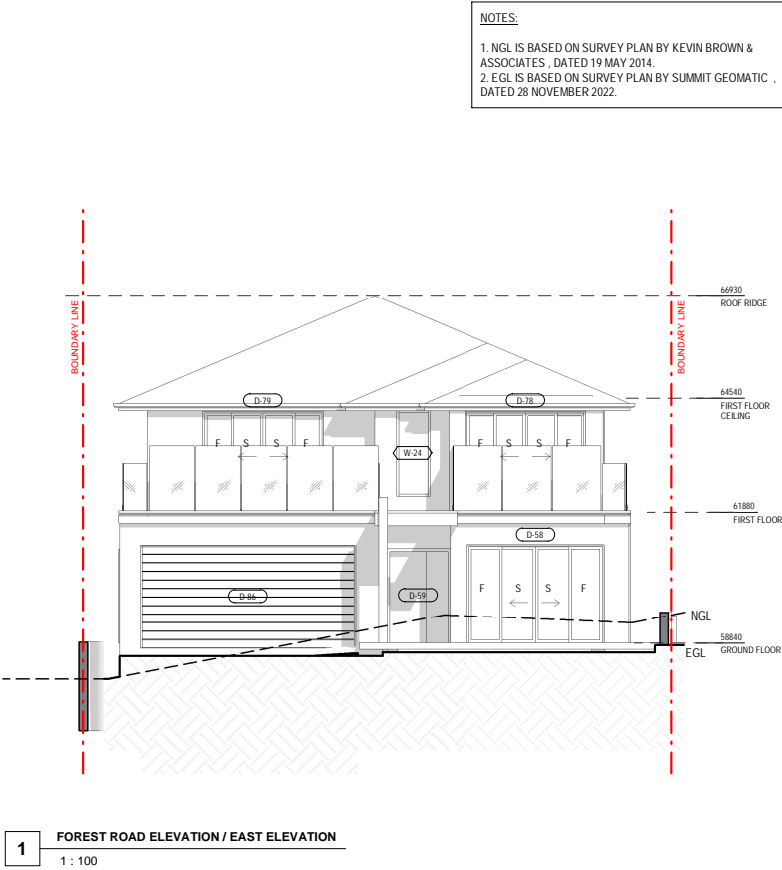
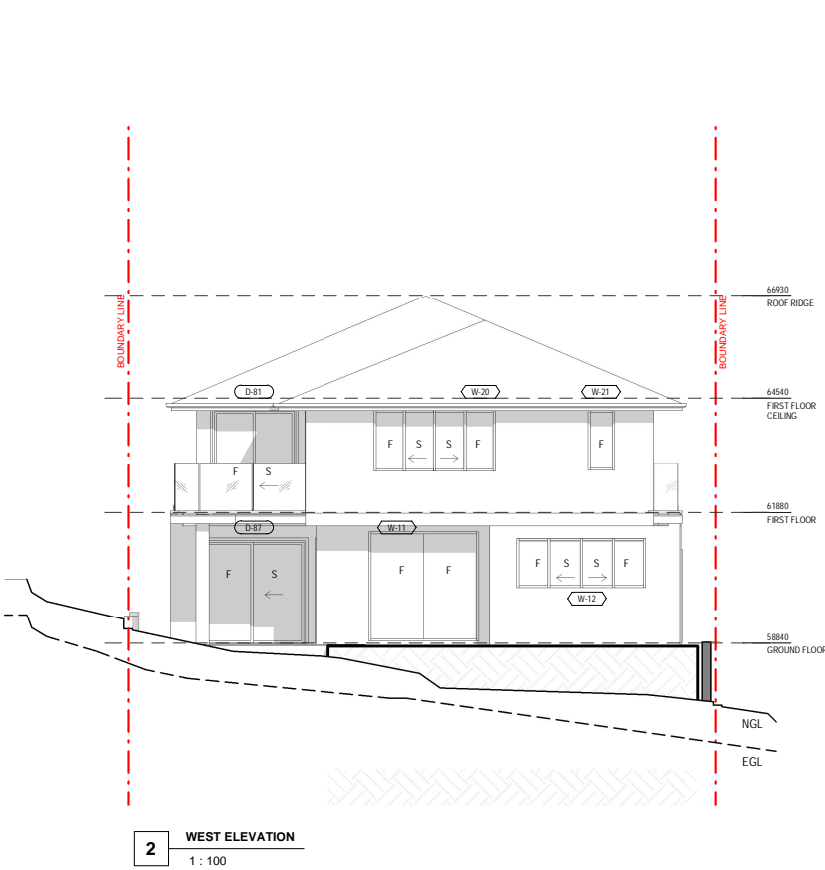




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ROTHSHIRE ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2067 PO Box 441, Chateau NSW 2067 P: 1300 578 847 E: info@rothshire.com.au		DRAWN		CHECKED		Author		Checker		(NSW Arch.No. 10388)		DA-A-303 2			



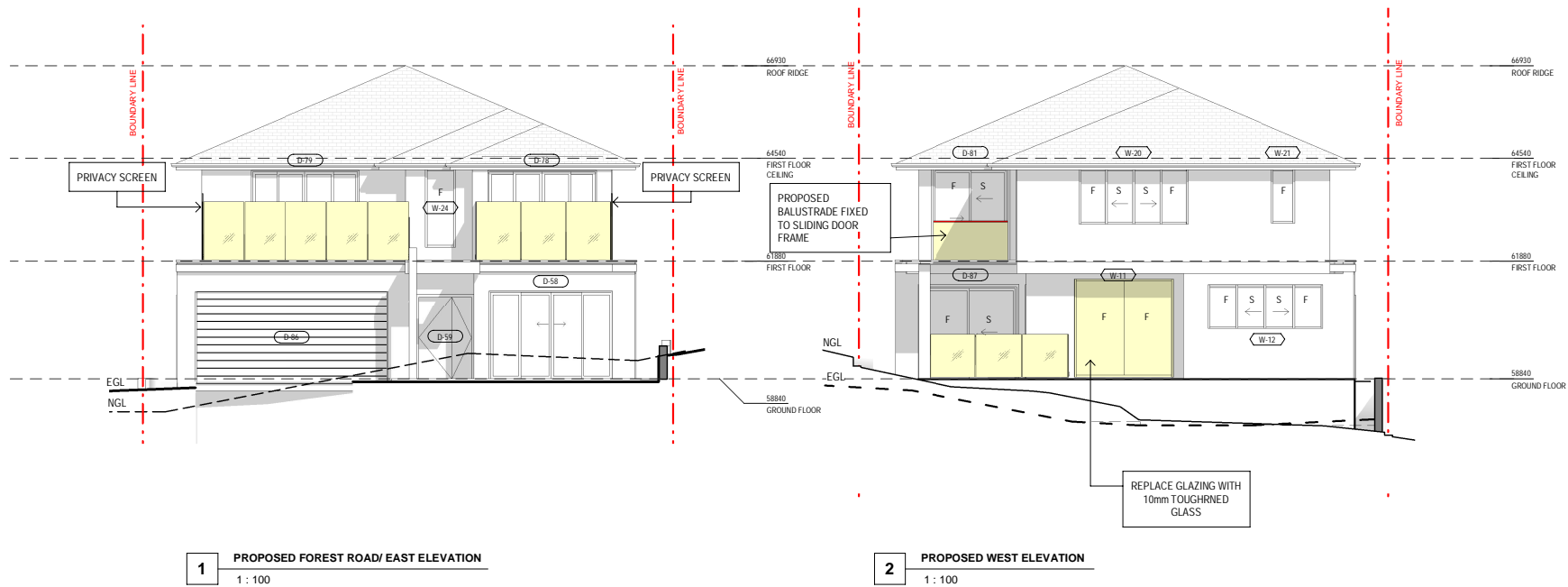
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RW		RETAINING WALL	2	03.11.2023	PROJECT STATUS	PROJECT ADDRESS		PROPOSED FIRST FLOOR PLAN
PROPOSED WORKS					DEVELOPMENT APPLICATION	LOT A DP 328702		
SITE BOUNDARY LINE						NO. 1174 Forest Rd Lugarno		
						NSW 2210		
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DRAWN								
AS								
CHECKED								
AK								
DRAWING No.								
DA-A-402								
REVISION								
2								

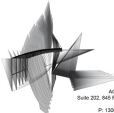






NOTES:  
1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES, DATED 19 MAY 2014.  
2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATIC, DATED 28 NOVEMBER 2022.

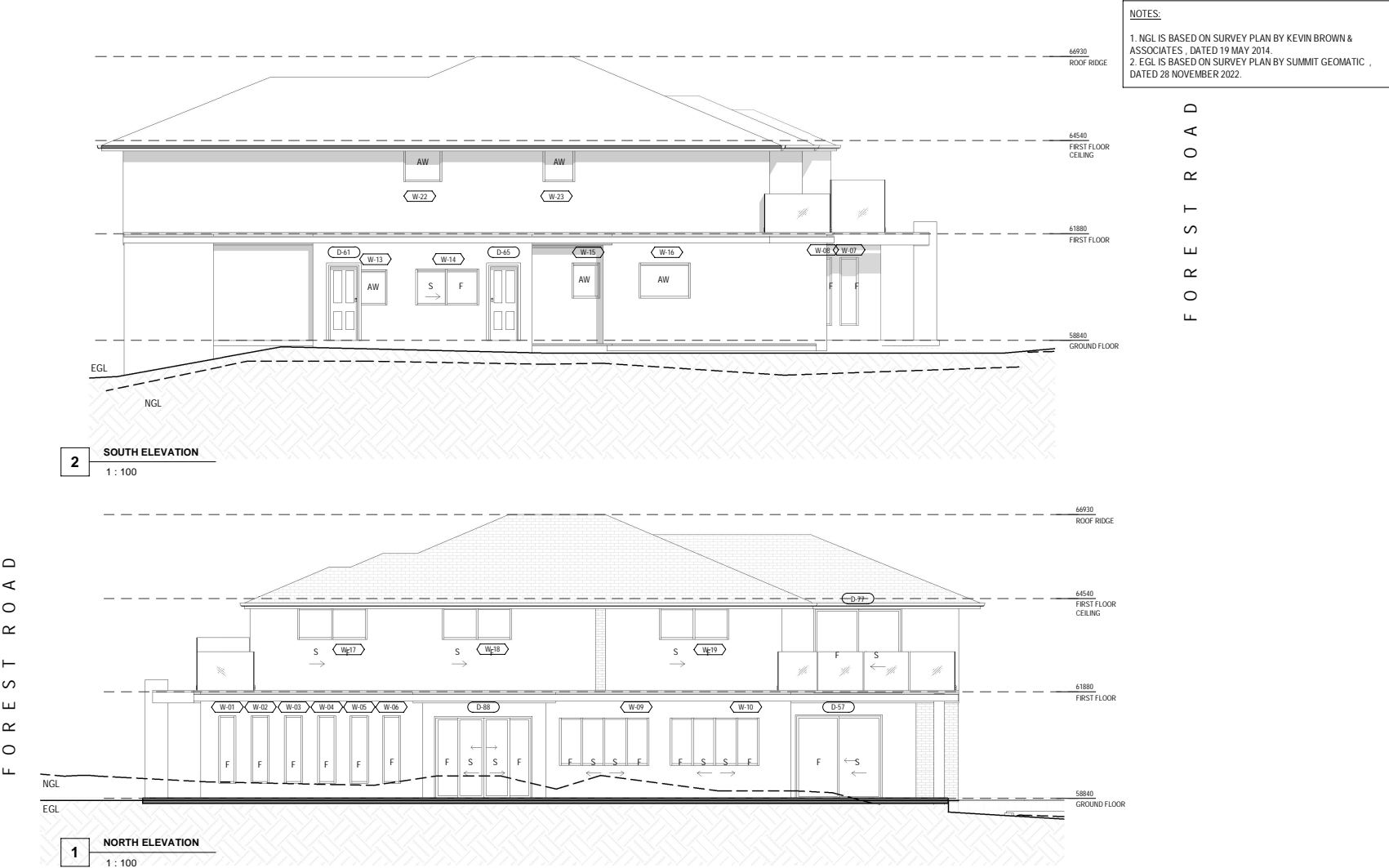
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LEGEND		1 ISSUED FOR DA 12.12.2022		PROJECT STATUS DEVELOPMENT APPLICATION		PROJECT ADDRESS LOT A DP 328702 NO. 1174 Forest Rd Lugarno NSW 2210		DRAWING No. DA-A-201 REVISION 1	
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EGL EXISTING GROUND LINE									
SITE BOUNDARY LINE									
SCALE 1:100 @ A3 sheet size									
DRAWN AS		CHECKED AK							

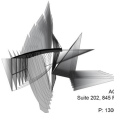
NOTES:  
1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES, DATED 19 MAY 2014.  
2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATIC, DATED 28 NOVEMBER 2022.



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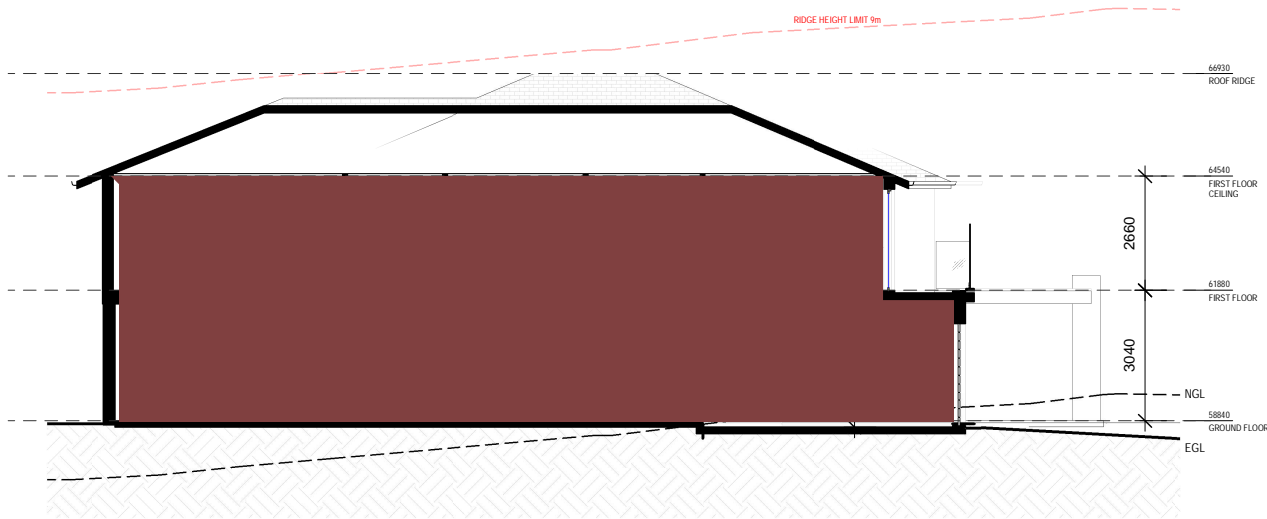


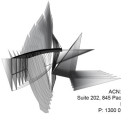


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 <div><b>ROTHSHIRE</b> ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2087 PO Box 841, Chateau NSW 2087 P: 1300 578 847 E: info@rothshire.com.au</div>		LEGEND			GOLDEN KING ASSETS PTY LTD	SINGLE DWELLING	2122-301A	SOUTH & NORTH ELEVATION	
COPYRIGHT ROTHSHIRE PTY LTD. ABN 73 455 445 751		1 ISSUED FOR DA		12.12.2022	PROJECT STATUS	PROJECT ADDRESS		SCALE	
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		EGL EXISTING GROUND LINE						DRAWN	CHECKED
		SITE BOUNDARY LINE						AS	AK
								(NSW Arch.No. 10.388)	
								DRAWING No.	REVISION
								DA-A-202	1

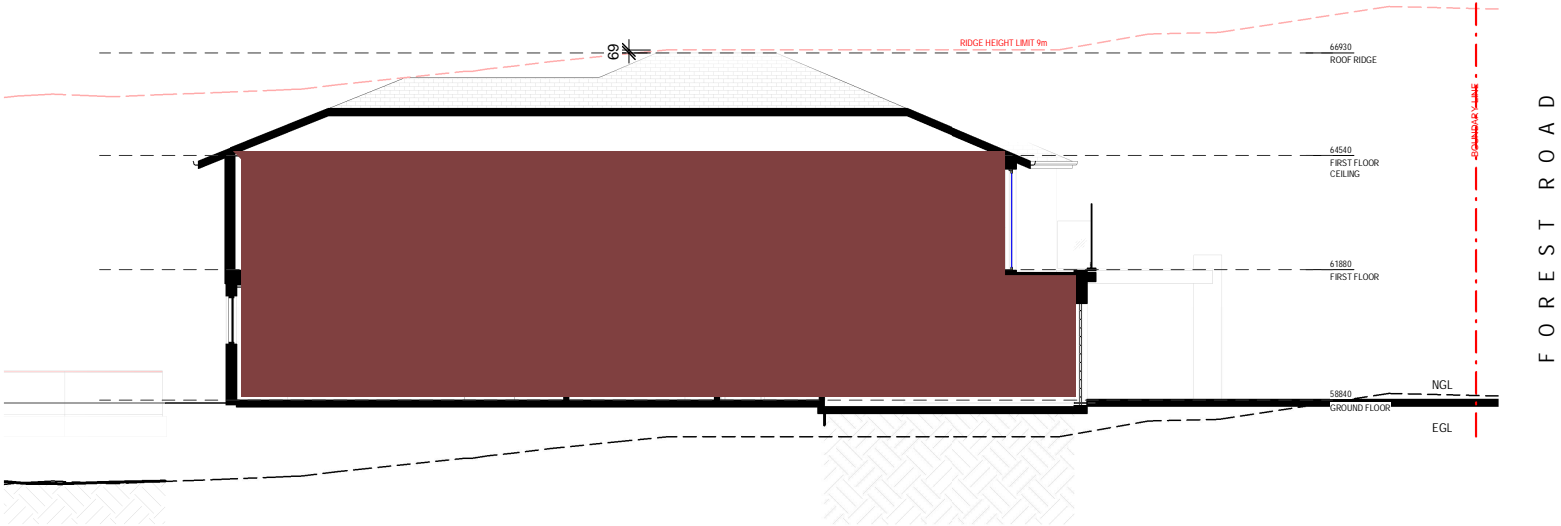


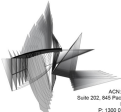
NOTES:  
1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES , DATED 19 MAY 2014.  
2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATIC , DATED 28 NOVEMBER 2022.



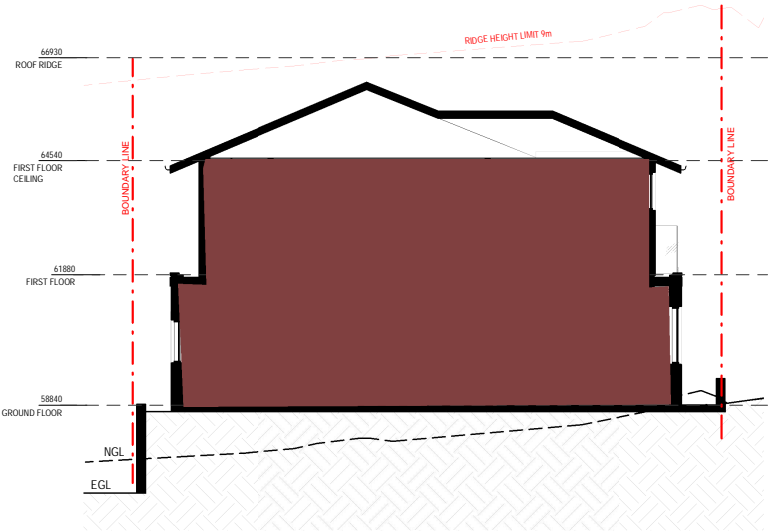
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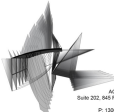
NOTES:  
1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES, DATED 19 MAY 2014.  
2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATIC, DATED 28 NOVEMBER 2022.



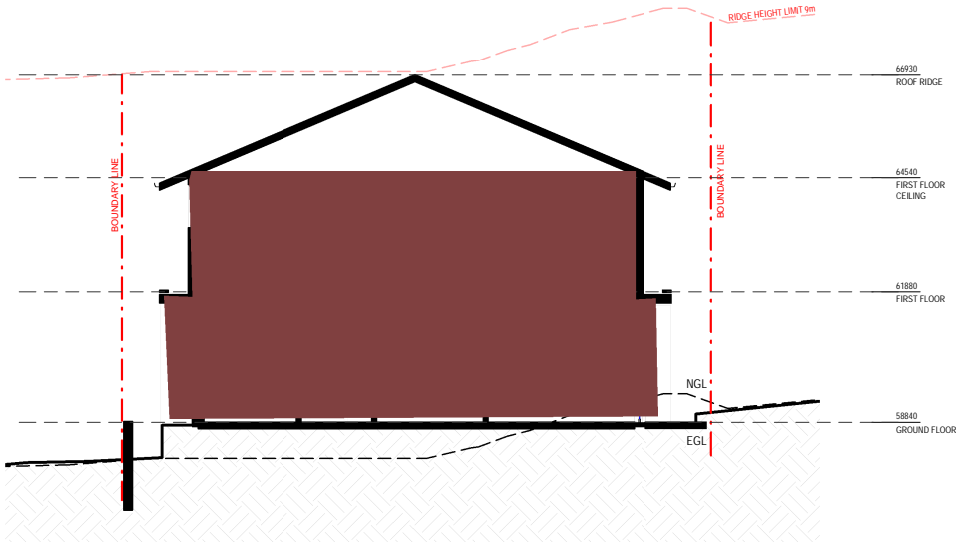
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 <b>ROTHSHIRRE</b> ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2087 PO Box 841, Chateau NSW 2087 P: 1300 578 847 E: info@rothshirre.com.au		LEGEND			GOLDEN KING ASSETS PTY LTD	SINGLE DWELLING	2122-301A	PROPOSED LONG SECTION	
COPYRIGHT ROTHSHIRRE PTY LTD. ABN 73 455 465 751		PROPOSED WORKS		1 ISSUED FOR DA	12.12.2022	PROJECT STATUS		SCALE	
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		NGL NATURAL GROUND LINE				PROJECT ADDRESS		DRAWN	
		EGL EXISTING GROUND LINE				LOT A DP 328702		CHECKED	
						NO. 1174 Forest Rd Lugarno		AS AK (NSW Arch.No. 10388)	
						NSW 2210		DRAWING No. DA-A-505	
								REVISION	
								2	

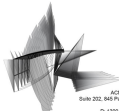
NOTES:  
1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES , DATED 19 MAY 2014.  
2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATIC , DATED 28 NOVEMBER 2022.

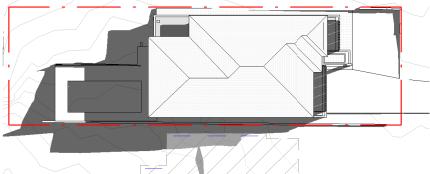


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 <b>ROTHSHIR</b> ARCHITECTS Suite 202, 245 Pacific Highway, Chateau NSW 2067 PO Box 841, Chateau NSW 2067 P: 1300 578 847 E: info@rothshir.com.au		LEGEND			GOLDEN KING ASSETS PTY LTD	SINGLE DWELLING	2122-301A	EXISTING CROSS SECTION	
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		EGL EXISTING GROUND LINE						AS AK	
		SITE BOUNDARY LINE						(NSW Arch.No. 10388)	
								DRAWING No. DA-A-206	
								REVISION 1	

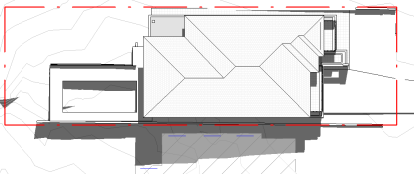
NOTES:  
1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES , DATED 19 MAY 2014.  
2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATIC , DATED 28 NOVEMBER 2022.



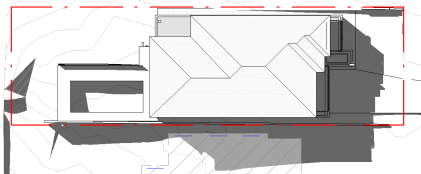
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 ROTHSHIRRE ARCHITECTS Suite 202, 245 Pacific Highway, Chateau NSW 2067 PO Box 841, Chateau NSW 2067 P: 1300 578 847 E: info@rothshirre.com.au		LEGEND			GOLDEN KING ASSETS PTY LTD	SINGLE DWELLING	2122-301A	PROPOSED CROSS SECTION	
COPYRIGHT ROTHSHIRRE PTY LTD. ABN 73 455 465 751		1 ISSUED FOR DA		12.12.2022	PROJECT STATUS DEVELOPMENT APPLICATION	PROJECT ADDRESS LOT A DP 328702 NO. 1174 Forest Rd Lugarno NSW 2210	SCALE 1:100 @ A3 sheet size	DRAWN AS	REVISION 2
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		PROPOSED WORKS						CHECKED AK (NSW Arch.No. 10388)	
		SITE BOUNDARY LINE							
		NGL NATURAL GROUND LINE							
		EGL EXISTING GROUND LINE							



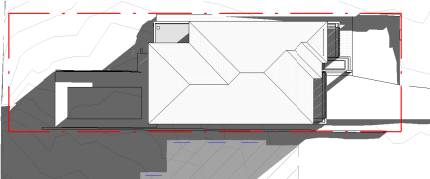
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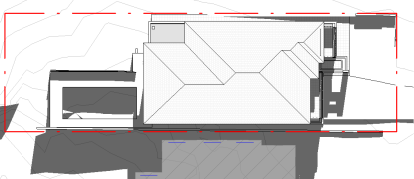
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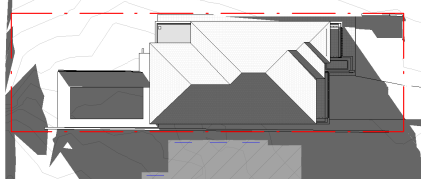
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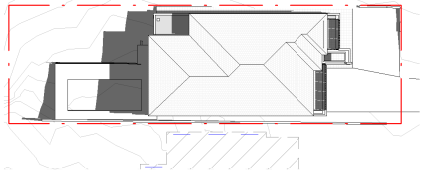
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1 : 500



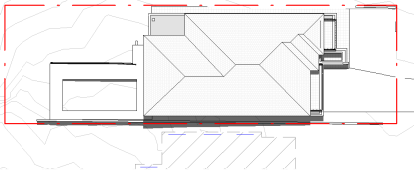
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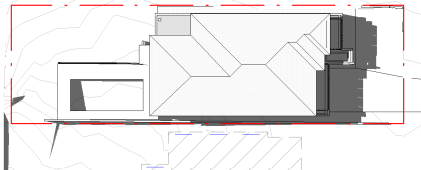
6 JUNE 21ST 3PM  
1 : 500



7 DECEMBER 21ST 9AM  
1 : 500



8 DECEMBER 21ST 12 NOON  
1 : 500



9 DECEMBER 21ST 3PM  
1 : 500

0 mm

10 mm

25 mm

50 mm

100 mm @ A3 sheet



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FOR MORE INFORMATION, CONTACT ROTHSHIRD PTY LTD.

1174 Forest Road, Lugarno NSW 2210

PO Box 441, Chesham NSW 2217

TEL: 02 957 847 847 E: info@rothshird.com.au

LEGEND

REV. AMENDMENT

DATE

CLIENT

GOLDEN KING ASSETS PTY LTD

PROJECT STATUS

DEVELOPMENT APPLICATION

PROJECT TITLE

SINGLE DWELLING

PROJECT NUMBER

2122-301A

PROJECT ADDRESS

LOT A DP 328702

NO. 1174 Forest Rd Lugarno  
NSW 2210

SCALE

1:500

DRAWN

AS

CHECKED

AK

(NSW Arch.No. 10388)

DRAWING TITLE

SHADOW DIAGRAM

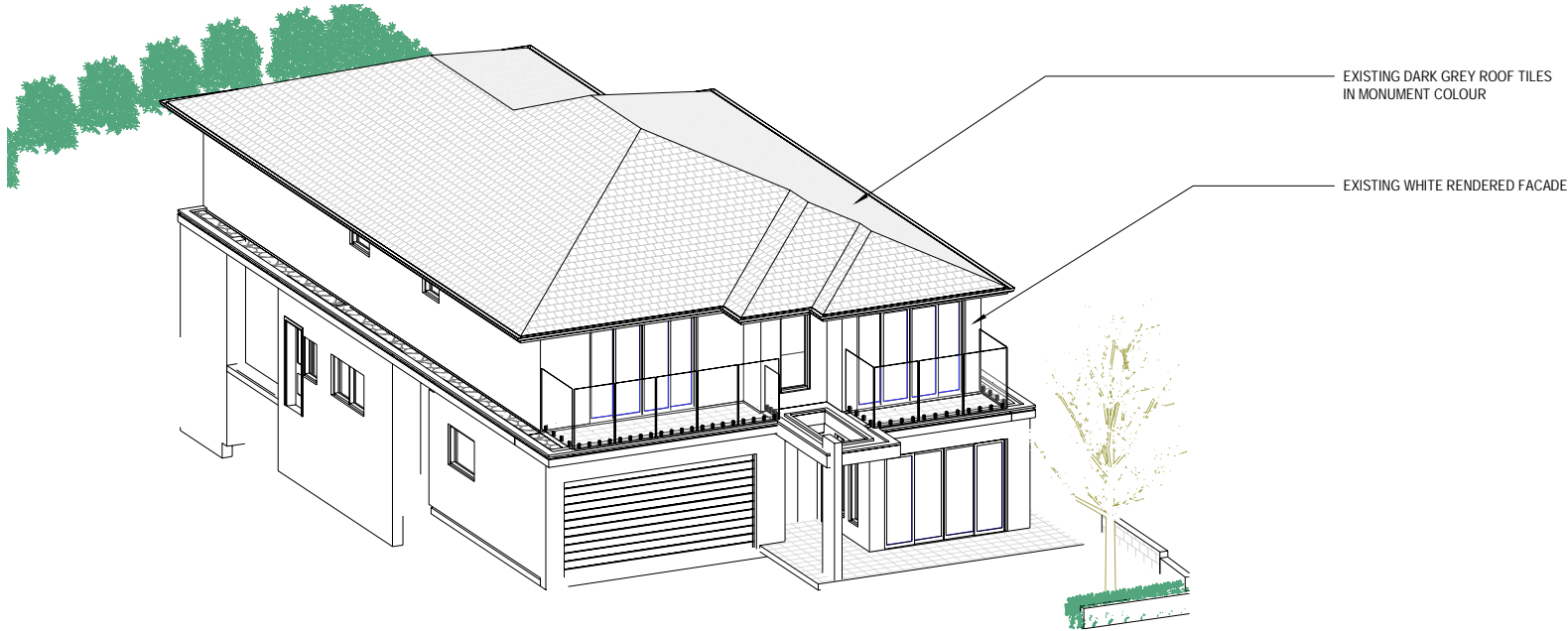
DRAWING No.

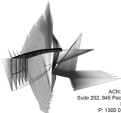
DA-A-507

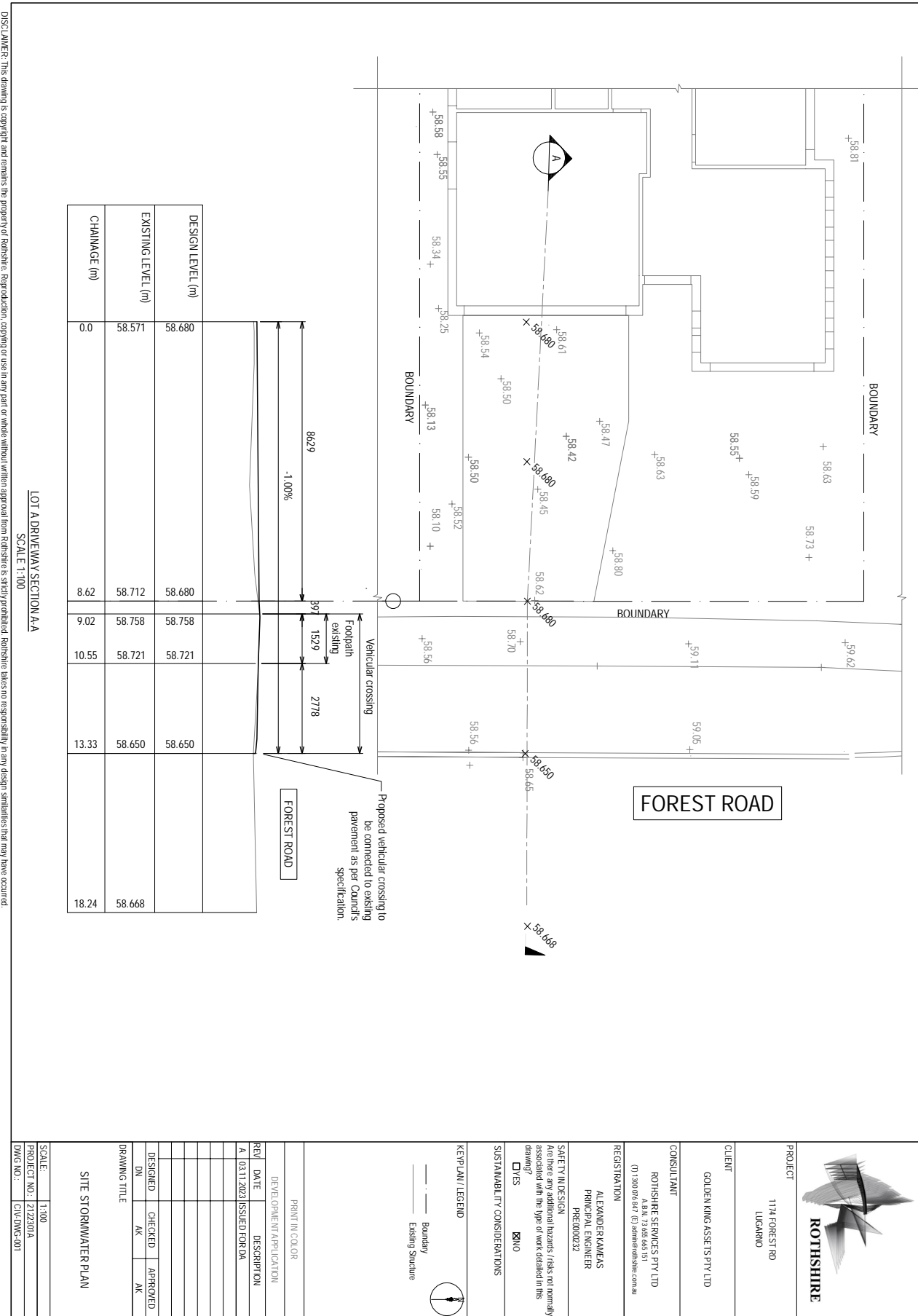
REVISION

2



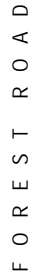


0 mm10 mm25 mm50 mm100 mm @ A3 sheet		LEGEND		REV. AMENDMENT	DATE	CLIENT	PROJECT TITLE	PROJECT NUMBER	DRAWING TITLE	
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				PROJECT STATUS		DEVELOPMENT APPLICATION	PROJECT ADDRESS		SCALE	
							LOT A DP 328702		NA @ A3 sheet size	
							NO. 1174 Forest Rd Lugarno		DRAWN CHECKED	
							NSW 2210		AS AK (NSW Arch.No. 10388)	
									DRAWING No. REVISION	
									DA-A-701 2	



Do not scale from drawings. Use only figured dimensions

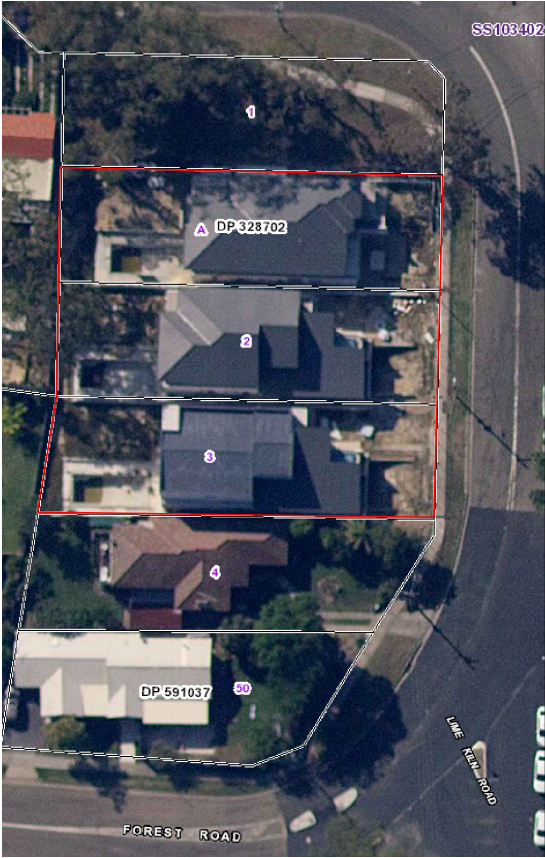
RECEIVED 2014-11-14; REVISED 2015-01-20; ACCEPTED 2015-02-03. DOI: 10.1111/1365-3113.12274



TOTAL SITE AREA  
TOTAL LANDSCAPE AREA  
SITE LANDSCAPE (MIN %)  
FRONT SETBACK AREA  
FRONT SETBACK LANDSCAPE AREA  
FRONT SETBACK LANDSCAPE % (MIN %)

GENERAL NOTES:

- All work is to be performed in accordance with AS3500.3 and council codes where applicable.
- The Plumber/ Drainer shall inspect the site and confirm the existing site structures, services and conditions prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
- All pipes shall be sewer grade P.V.C. laid at min. 1:100, unless noted otherwise.
- All connections to P.V.C. pipes are to be solvent welded to manufacturers specification
- All prefabricated pits, drains etc. are to be of heavy duty concrete construction unless noted other.
- Precise location of down pipes shall be nominated by others. Locations shown are for hydraulic design purposes only.
- Precise location of pits shall be nominated by others. Locations shown are for hydraulic design purposes only.
- All eaves gutters shall be of minimum cross sectional area of 8500mm<sup>2</sup> unless noted otherwise.
- This design covers the collection and disposal of rainwater from ROOF AREAS ONLY. Any paved areas not noted on the supplied architectural drawings are not included, unless shown.
- This design does not cover sub surface hydraulic flows.
- The installer is encouraged to use the 'Dial Before You Dig' service prior to excavation. No underground services have been noted or surveyed in this design. Dig at your own risk.
- IF IN DOUBT ASK. Consult the design engineer for any changes, omissions and discrepancies.
- System design has been produced to reflect reduced levels shown on architect supplied drawings.
- Pipe cover for uPVC pipes:
  - Single dwellings, no vehicular loading- 100mm
  - Single dwellings, vehicular loading on concrete- 450mm
  - Single dwellings, vehicular loading, un-reinforced concrete-100mm below underside of concreteSilt arrestor pit and rain guards must be regularly inspected and cleaned.
- Location of Stormwater Systems, including downpipes, pipes,pits and rainwater tank are indicative only. Exact locations shall be determined on site to suit site conditions.
- Sub-soil drains for retaining wall shall be installed by the builder and connected to Stormwater lines. All Agg Lines shall be 100mm DIA, unless noted otherwise.
- Levels are approximate only. The plumber/drainer shall confirm the levels prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
- Inspection and certification, if required, shall be done prior to backfilling, allow 24 hour notice for the engineer to carry out the inspection.
- Any damage to services during construction shall be repaired immediately at the plumber/drainers own expense.
- Areas & Geometry calculated are approximate and dependent on Surveyors & Architects drawings.
- It is essential that areas calculated are within plus/minus 5% range.
- Provide adequate access and overland flow routes out of property and not into adjoining properties
- Provide minimum 75mm clearance under all gates and operable external doors as to not impede overland flow
- Water entry and backflow into buildings should be prevented at all times
- All finished ground surfaces should fall away from structures
- Charged lines are to be flushed regularly and flush/arrestor pits are to be regularly inspected and cleaned
- All pipes entering a water tank shall have a first flush device installed
- All water tanks will be insect proofed by other
- If tanked water is being reused for drinking or sanitary purposes, appropriate disinfecting by others should be considered.
- Schedule of calculations is based on plan areas



LOCALITY PLAN  
NOT TO SCALE



PROJECT	
1176-1178 FOREST RD LUGARNO	
CLIENT	
LUGARNO DEVELOPMENTS PTY LTD	
CONSULTANT	
ROTHSHIRE SERVICES PTY LTD A.B.N. 73 655 665 151 (T) 1300 076 847 (E) admin@rothshire.com.au	
REGISTRATION	
Alexander Kameas Principal Structural Engineer	
SAFETY IN DESIGN	
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
SUSTAINABILITY CONSIDERATIONS	
KEYPLAN / LEGEND	

ISSUED FOR DA		
REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
DESIGNED	CHECKED	APPROVED
DN	AK	AK
DRAWING TITLE		
GENERAL NOTES & STANDARD PRACTICES		
PROJECT NO.:	2122301	
DWG NO.:	GEN-DWG-001	

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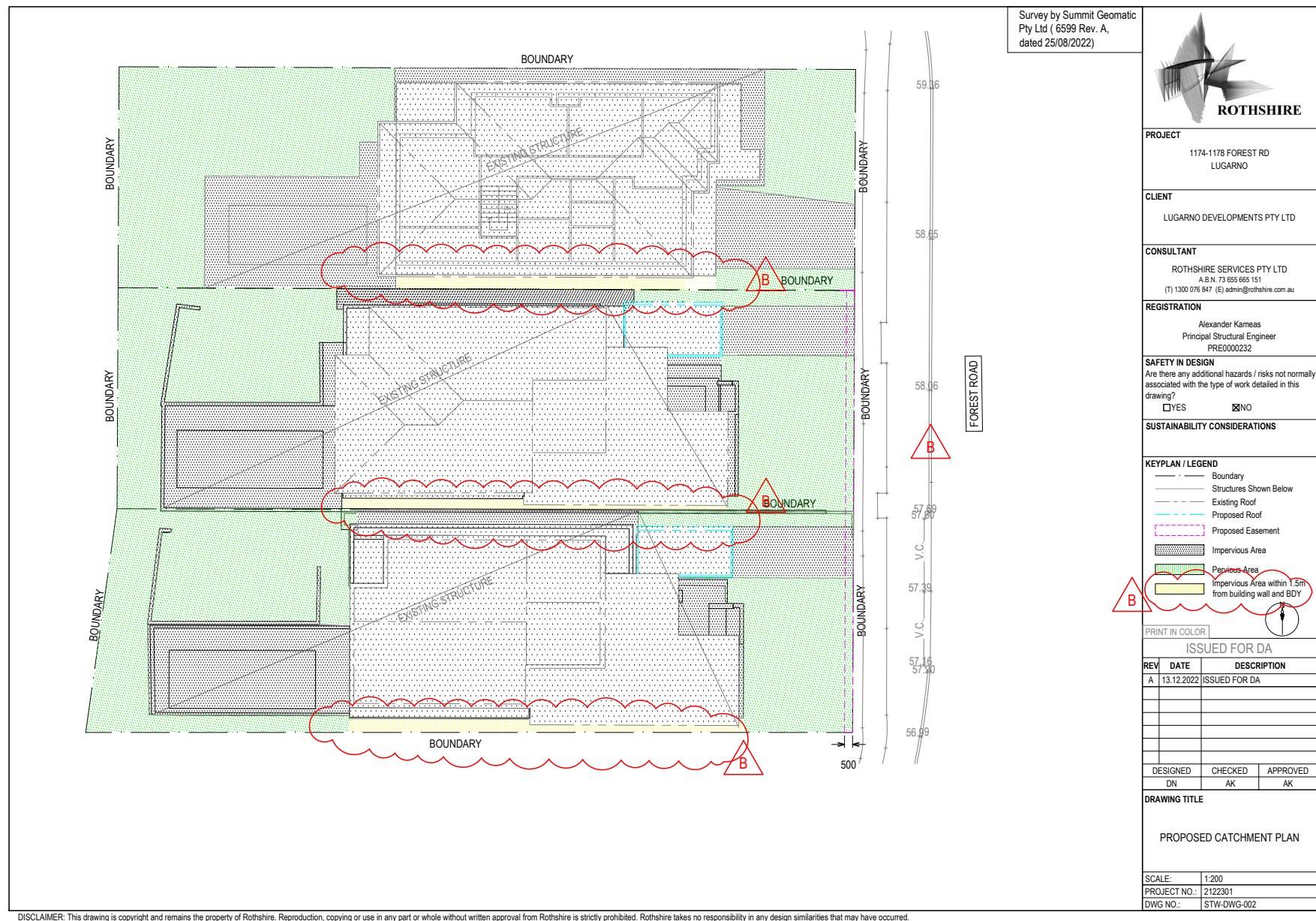




TABLE OF COMPLIANCE			
ITEM			
1. Stormwater design is in accordance to AS/NZ 3500.3.2003 & Georges River Council Stormwater Management Policy April 2021.			
2. As per Georges River Council Stormwater Management Policy April 2021 Table 3: OSD is required for Site with 55% - 65% impervious area. Max PSD 182 L/s/ha; Min. SSR: 206000 L/ha.			
3. As per Georges River Council Stormwater Management Policy April 2021: Up to a maximum of 20% of the OSD storage volume required may be offset by rainwater tank storage for reuse. One third of the provided rainwater tank storage can be used to offset the OSD up to this maximum 20% limit.			
4. As per Georges River Council Stormwater Management Policy April 2021: Maximum discharge rate to existing kerb and gutter is 25L/s.			
5. As per BASIX. Rainwater Tank is to be connected to toilets and at least one outdoor water tap.			
Impervious Area Calculation (Appendix A7 - SMP2021)			
Surface Type	Impermeability Factor	Calculated Area (m2)	Factored Area (m2)
All areas of less than 1.5 metres clearance between the outer wall of a building and the nearest adjacent property boundary (excludes the area under a roof eave overhang that is to be included as a roof surface)	0.5	15.614	7.807
Roof Surface	1	280.381	280.381
	0.5	0	0
Ground Surface	1	63.494	63.494
	0.75	0	0
Timber Deck	0.5	0	0
	1	0	0
Swimming Pools	0.5	32.788	16.394
	1	31.185	31.185
sum			
Total Site Area (m2)		643.983	
Total Impervious Area (m2)		399.261	
Impervious Area (%)		61.9986863	
Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations			
Impervious Area (%)	PSD (L/s/ha)	SSR (m3/ha)	
Less than 55%	Not Required		
55%-65%	182	206	
65%-75%	166	240	
75%-85%	152	270	
>>85%	132	295	
Catchment PSD (L/s/m2)		0.0182	
Catchment SSR (L)		20.6	
Site PSD (L/s)		11.7204906	
Site SSR (L)		13266.0498	
Rainwater Tank		2000	
Rainwater Tank offset (20%)		666	
Offsetted SSR (L)		12600	

CRITICAL RAINFALL INTENSITY BOM 06/10/2022			
100 <sub>5</sub> Rainfall Intensity	239mm/h		
20 <sub>5</sub> Rainfall Intensity	182 mm/h		
5 <sub>5</sub> Rainfall Intensity	136 mm/h		

		AREA	(%)	RUNOFF coeff
Proposed		627.066		
Roof		236.218	37.67035687	1
Impervious		158.831	25.32923169	0.9
Pervious		232.017	37.00041144	0.493912
OSD Size	Length	6.5	Width	2.5
	Depth	0.8	Volume Check	13

OSD Levels	
Top of OSD (AHD)	58
Invert of OSD	57.2
Orifice CL	57.3

pi	3.141592654
Orifice Calc.	
h	0.7
g	9.8
Q20	22.63075286
Cd	0.6
A (m2)	0.003081113
d (m)	0.080859905
Max. d (mm)	80.85990506
d (mm)	66
Q20 (orifice) (L/s)	7.603368838

Survey by Summit Geomatic Pty Ltd ( 6599 Rev. A, dated 25/08/2022)

**ROTHSHIRE**

**PROJECT**  
1174-1178 FOREST RD  
LUGARNO

**CLIENT**  
LUGARNO DEVELOPMENTS PTY LTD

**CONSULTANT**  
ROTHSHIRE SERVICES PTY LTD  
A.B.N. 73 655 665 151  
(T) 1300 076 847 (E) admin@rothshire.com.au

**REGISTRATION**  
Alexander Kameas  
Principal Structural Engineer  
PRE0000232

**SAFETY IN DESIGN**  
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?  
☐ YES ☒ NO

**SUSTAINABILITY CONSIDERATIONS**

**KEYPLAN / LEGEND**

PRINT IN COLOR

**ISSUED FOR DA**

REV	DATE	DESCRIPTION
A	13.12.2022	ISSUED FOR DA
B	06.02.2023	ISSUED FOR DA

DESIGNED: DN CHECKED: AK APPROVED: AK

**DRAWING TITLE**  
1174 OSD CALCULATION SHEET

SCALE: 1:200  
PROJECT NO.: 2122301  
DWG NO.: STW-DWG-003

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3. As per Georges River Council Stormwater Management Policy April 2021: Up to a maximum of 20% of the OSD storage volume required may be offset by rainwater tank storage for reuse. One third of the provided rainwater tank storage can be used to offset the OSD up to this maximum 20% limit.			
4. As per Georges River Council Stormwater Management Policy April 2021: Maximum discharge rate to existing kerb and gutter is 25L/s.			
5. As per BASIX. Rainwater Tank is to be connected to toilets and at least one outdoor water tap.			

CRITICAL RAINFALL INTENSITY BOM 06/10/2022	
100 <sub>5</sub> Rainfall Intensity	239mm/h
20 <sub>5</sub> Rainfall Intensity	182 mm/h
5 <sub>5</sub> Rainfall Intensity	136 mm/h

Impervious Area Calculation (Appendix A7 - SMP 2021)			
Surface Type	Impermeability Factor	Calculated Area (m2)	Factored Area (m2)
All areas of less than 1.5 metres clearance between the outer wall of a building and the nearest adjacent property boundary (excludes the area under a roof eave overhang that is to be included as a roof surface)	0.5	12.324	6.162
Roof Surface	1	283.094	283.094
	0.5	0	0
Ground Surface	1	70.516	70.516
	0.75	0	0
Timber Deck	0.5	0	0
	1	0	0
Swimming Pools	0.5	32.317	16.1585
	1	35.004	35.004

OSD Levels	
Top of OSD (AHD)	57.95
Invert of OSD	57.05
Orifice CL	57.15

OSD Size	
Length	6.5
Width	2.5
Depth	0.9
Volume Check	14.625

Proposed	
Q100	29.83849334
Q20	23.55670527
Q10	20.84411497
Q5	18.13152466

Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations		
Impervious Area (%)	PSD (L/s/ha)	SSR (m3/ha)
Less than 55%	Not Required	
55%-65%	182	206
65%-75%	166	240
75%-85%	152	270
>>85%	132	295

Catchment PSD (L/s/m2)	
Catchment SSR (L)	24

Site PSD (L/s)	
Site SSR (L)	15049.584

Rainwater Tank	
Rainwater Tank offset (20%)	666

Offsetted SSR (L)	
	14384

Proposed	
Q100	29.83849334
Q20	23.55670527
Q10	20.84411497
Q5	18.13152466

OSD Levels	
Top of OSD (AHD)	57.95
Invert of OSD	57.05
Orifice CL	57.15

OSD Size	
Length	6.5
Width	2.5
Depth	0.9
Volume Check	14.625

pi	
Orifice Calc.	3.141592654
h	0.8
g	9.8
Q20	23.55670527
Cd	0.6
A (m2)	0.002628744
d (m)	0.074688475
Max. d (mm)	74.68847471
d (mm)	66
Q20 (orifice) (L/s)	8.128343193

Total Site Area (m2)	
Total Impervious Area (m2)	410.9345
Impervious Area (%)	65.53289446

Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations		
Impervious Area (%)	PSD (L/s/ha)	SSR (m3/ha)
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Rainwater Tank offset (20%)	666

Offsetted SSR (L)	
	14384

Proposed	
Q100	29.83849334
Q20	23.55670527
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OSD Size	
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Depth	0.9
Volume Check	14.625

pi	
Orifice Calc.	3.141592654
h	0.8
g	9.8
Q20	23.55670527
Cd	0.6
A (m2)	0.002628744
d (m)	0.074688475
Max. d (mm)	74.68847471
d (mm)	66
Q20 (orifice) (L/s)	8.128343193

Total Site Area (m2)	
Total Impervious Area (m2)	410.9345
Impervious Area (%)	65.53289446

Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations		
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75%-85%	152	270
>>85%	132	295

Catchment PSD (L/s/m2)	
Catchment SSR (L)	24

Site PSD (L/s)	
Site SSR (L)	15049.584

Rainwater Tank	
Rainwater Tank offset (20%)	666

Offsetted SSR (L)	
	14384

Proposed	
Q100	29.83849334
Q20	23.55670527
Q10	20.84411497
Q5	18.13152466

OSD Levels	
Top of OSD (AHD)	57.95
Invert of OSD	57.05
Orifice CL	57.15

OSD Size	
Length	6.5
Width	2.5
Depth	0.9
Volume Check	14.625

pi	
Orifice Calc.	3.141592654
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g	9.8
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Cd	0.6
A (m2)	0.002628744
d (m)	0.074688475
Max. d (mm)	74.68847471
d (mm)	66
Q20 (orifice) (L/s)	8.128343193

Total Site Area (m2)	
Total Impervious Area (m2)	410.9345
Impervious Area (%)	65.53289446

Table 3 Georges River Council SMP 2021 - SSR & PSD Calculations		
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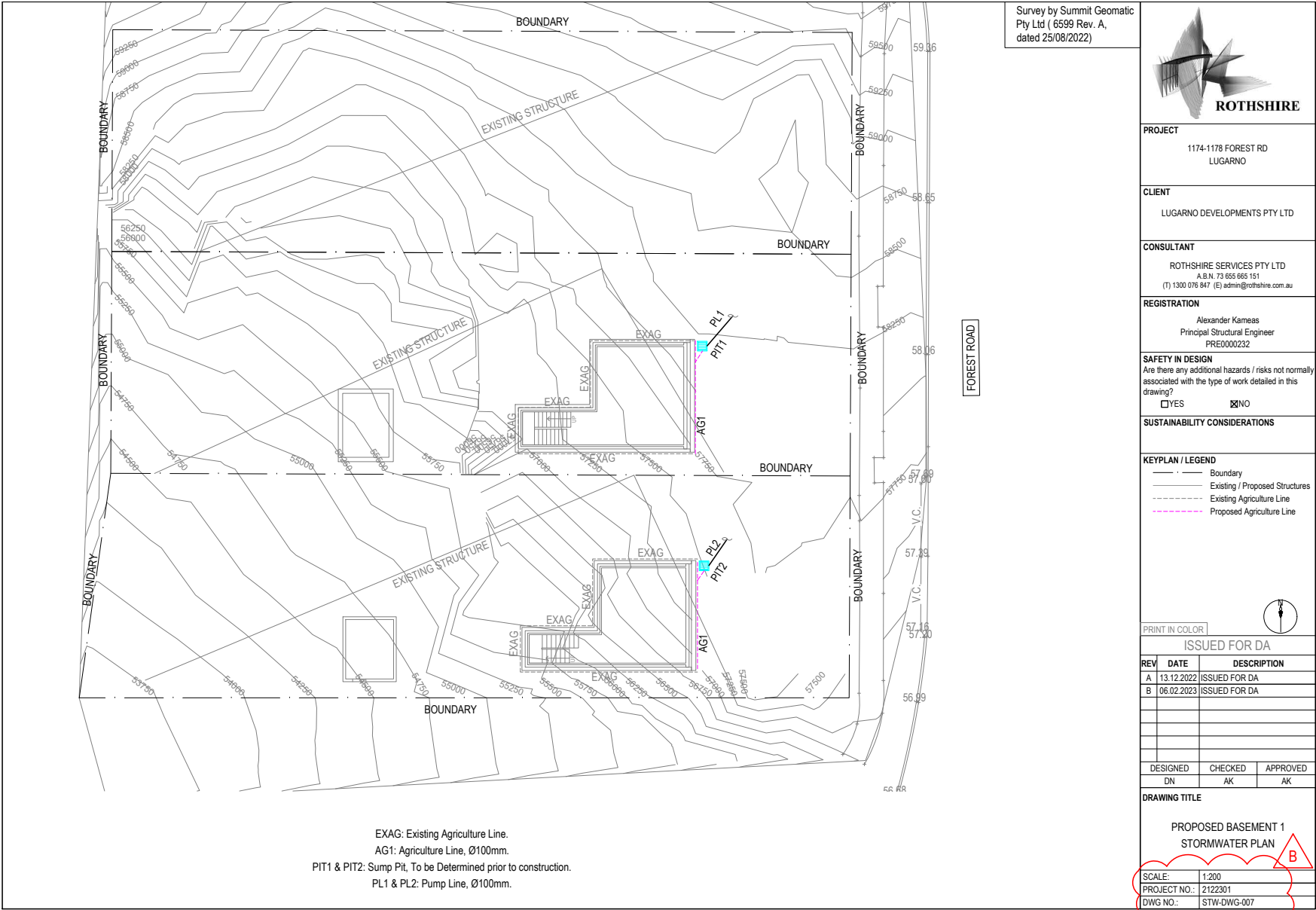
Catchment PSD (L/s/m2)	
Catchment SSR (L)	24

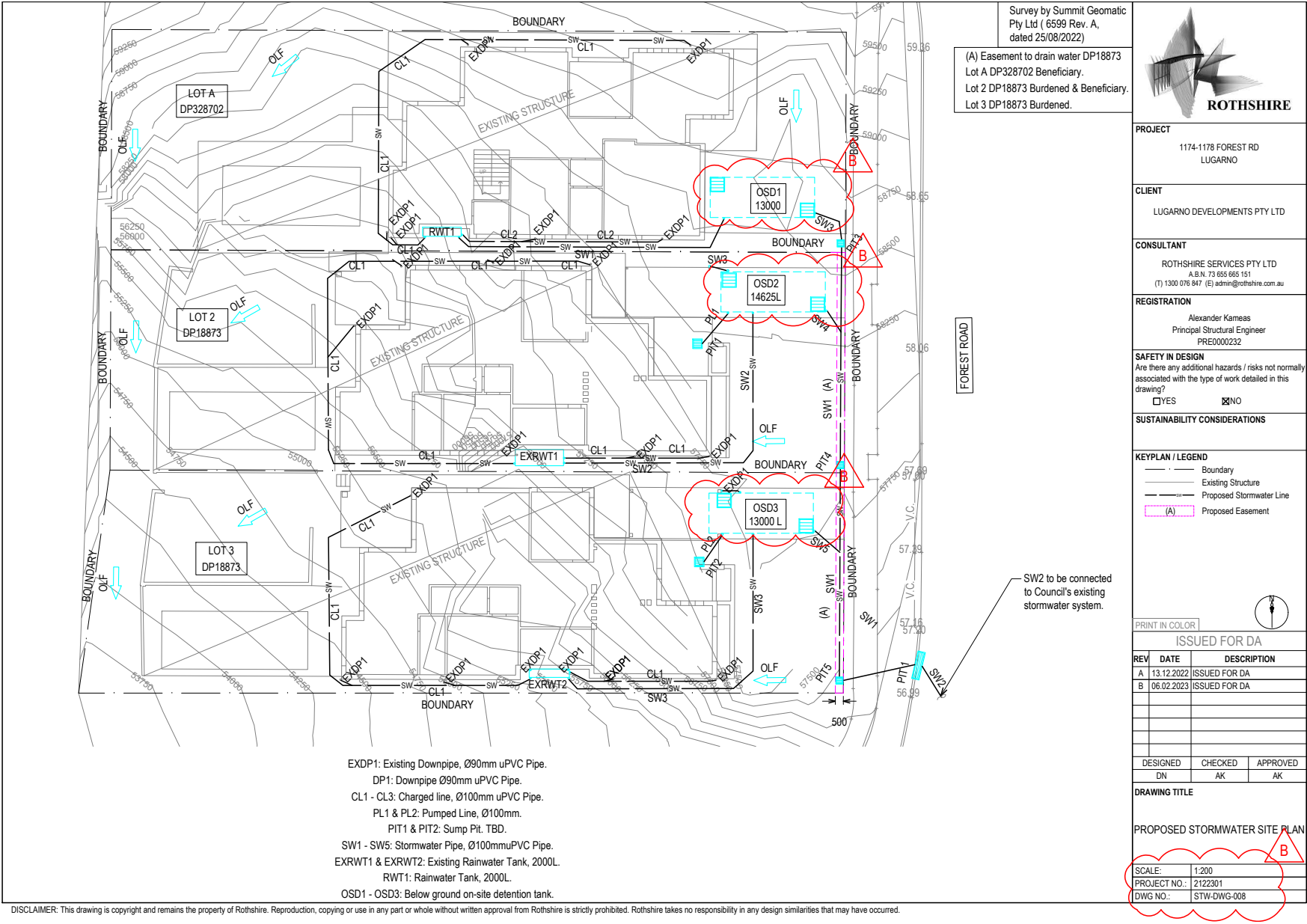
Site PSD (L/s)	
Site SSR (L)	15049.584



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### PIT 2 DETAIL

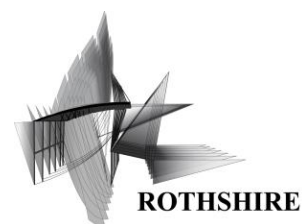
NOT TO SCALE



SCALE:	1:200
PROJECT NO.:	2122301
DWG NO.:	STW-DWG-008

S	D
Do not scale from drawings. Use only finished dimensions	

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DOCUMENT NO.: 2122301-BCA-RPT-001-V1

## BCA COMPLIANCE REPORT

<b>ADDRESS:</b>	1174 FOREST ROAD LUGARNO NSW 2224 LOT A IN DP 328702
<b>CLIENT:</b>	ASTOR HOMES
<b>LOCAL GOVERNMENT AREA:</b>	GEORGES RIVER COUNCIL
<b>SCOPE:</b>	EXISTING DWELLING & FITOUT



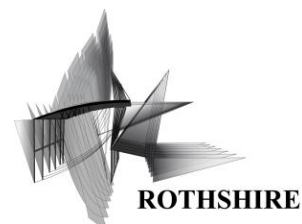


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## LIST OF APPENDICES

- APPENDIX A – SITE CLASSIFICATION REPORT
- APPENDIX B – ENGINEERING CERTIFICATE – RETAINING WALL
- APPENDIX C – SITE PHOTOS
- APPENDIX D – WATERPROOFING COMPLIANCE CERTIFICATE
- APPENDIX E – ARCHITECTURAL PLANS



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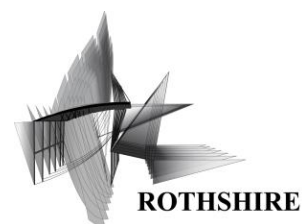
## EXECUTIVE SUMMARY

A Building Code of Australia (**BCA**) assessment to the BCA 2019 Amdt 1 has been undertaken for an existing dwelling at 1174 Forest Rd, Lugarno NSW 2210 (**Site**) which was built without Division 4.3 or Division 4.5 certification pursuant to the Environmental Planning and Assessment Act 1979 (**EP&A Act**).

This report is to be read in conjunction with the plans listed in **Section 4**, the structural report undertaken by Rothshire reference 2122301-LET-010-V1 and the documents listed in the Appendices to this report.

Where compliance with the Deemed-to-Satisfy (**DtS**) provisions of the BCA 2019 Amdt 1 has not been confirmed or is not sufficiently clear to deem compliance with the BCA, a Performance Solution has been undertaken (see below), or alternatively a rectification performance criterion has been specified (refer **Sections 6 and 8** of this report).

Any rectification performance criterion has been document within **Section 6** of this report and summarised in **Section 8**.



## NOMENCLATURE

The nomenclature relevant to this report is detailed in **Table 1**.

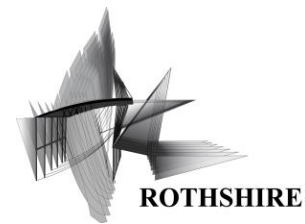
**Table 1. Abbreviations and definitions**

Abbreviation	Definition
BCA	Building Code of Australia
Client	Astor Homes
DtS	Deemed to Satisfy
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Reg	Environmental Planning and Assessment Regulation 2021
FFL	Finished floor level
FGL	Finished ground level
NGL	Natural ground level
NCC	National Construction Code
Site	1174 Forest Rd Lugarno NSW

## DOCUMENT HISTORY

**Table 2. Document revision & history**

Rev.	Description	Author	Reviewer	Date
1	Issued for DA	NRT	SM	03/11/2023



## 1. INTRODUCTION

This report provides a BCA 2019 Amdt 1 compliance assessment of an existing residential building at the Site to support a Building Information Certificate application made to Georges River Council.

The development involves the assessment of an existing Class 1a detached dwelling without appropriate Division 4.3 or Division 4.5 building approval pursuant to the EPA Act. The purpose of this report is to inform Council whether this development complies with the BCA 2019 Amdt 1 prior to the issue of a Building Certificate. The building construction and fit out is complete.

Where unable to confirm compliance via a visual inspection we have recommended that certification be provided to support the application prior to the issue of the Construction Certificate.

## 2. REPORT AUTHOR

Author: Naomi Roberts-Thomson

Qualifications: B.Eng (Civil) Hons.; MBA; Certification Short Course; Cert IV (Building & Construction); Juris Doctor (currently completing).

Business Address: Level 2, Suite 202, 845 Pacific Highway, Chatswood NSW 2067

Review: Samy Mikhail

Qualifications: BDC2277 - Building Surveyor - Unrestricted

Business Address: 49/2 O'Connell St, Parramatta NSW 2150

## 3. BASIS OF REPORT

The key objective of the report is to make an:

1. Assessment under the current Building Code of Australia 2019 (BCA) Volume Two and list any non-compliances and information applicable from the BCA that will need to be addressed prior to the issue of the Building Certificate.
2. Provide BCA compliance advice and information where non-compliances are identified.



#### 4. REFERENCE DOCUMENTS

The documents that were used to prepare this BCA compliance report are provided in Table 3 – Architectural Plans, Table 4 – Structural Plans, Table 5 – Stormwater Plans,

Table 6 – Swimming Pool Plans & Table 7 – Other Reference Documents

**Table 3 – Architectural Plans**

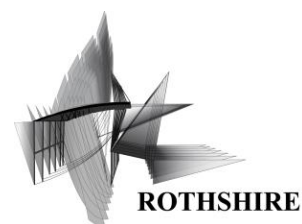
Drawing No.	Drawing Title	Revision	Revision Date
BRP-A-000	COVER SHEET	1	24/10/2023
BRP-A-050	SITE PLAN	1	24/10/2023
BRP-A-101	GROUND FLOOR PLAN	1	24/10/2023
BRP-A-103	FIRST FLOOR PLAN	1	24/10/2023
BRP-A-201	EAST AND WEST ELEVATIONS	1	24/10/2023
BRP-A-202	SOUTH & NORTH ELEVATION	1	24/10/2023
BRP-A-205	LONG SECTION PLAN	1	24/10/2023
BRP-A-206	CROSS SECTION PLAN	1	24/10/2023

**Table 4 – Structural Plans**

Drawing No.	Drawing Title	Revision	Revision Date
0156-000	DRAWING REGISTER & LOCATION PLAN	-	17/11/15
0156-001	STORMWATER MANAGEMENT PLAN	-	17/11/15
0156-002	STORMWATER MANAGEMENT NOTES	-	18/11/15
0156-003	STRUCTURAL NOTES	-	17/11/15
0156-004	STRUCTURAL NOTES 2	-	17/11/15
0156-005	STRUCTURAL PLAN – GROUND FLOOR	-	24/11/15
0156-006	STRUCTURAL PLAN – FIRST FLOOR	-	24/11/15

**Table 5 – Stormwater Plans**

Drawing No.	Drawing Title	Revision	Revision Date
STW-DWG-000	GENERAL NOTES & STANDARD PRACTICES	A	03/11/2023
STW1-DWG-001	PROPOSED CATCHMENT & CALCULATION	A	03/11/2023
STW1-DWG-002	ROOF STORMWATER PLAN	A	03/11/2023
STW1-DWG-003	LEVEL 1 STORMWATER PLAN	A	03/11/2023
STW1-DWG-004	GROUND FLOOR STORMWATER PLAN	A	03/11/2023
STW1-DWG-005	SECTION AND DETAILS	A	03/11/2023

**Table 6 – Swimming Pool Plans**

Drawing No.	Drawing Title	Revision	Revision Date
HCT-9171-ST-000	GENERAL NOTES	A	24/11/2015
HCT-9171-ST-001	SWIMMING POOL PLAN & SECTIONS	A	24/11/2015
HCT-9171-ST-002	TYPICAL DETAILS	A	24/11/2015

**Table 7 – Other Reference Documents**

Document No.	Document Title	Revision	Revision Date
1363175S	BASIX Certificate	03	15/12/2022
2122301-LET-010-V1	Certificate of Structural Adequacy and recommendations	V1	09/12/2022
2122301A-COHD-001-R1	Certificate of Hydraulic Adequacy	R1	07/02/2023
2122301A-SEE-RPT-003-1	Statement of Environmental effects	V1	12/12/2022

## 5. BUILDING CHARACTERISTICS

A summary of the building characteristics is provided in Table 8 – Building characteristics below.

**Table 8 – Building characteristics**

Classification of Building	Class 1a
Rise in Storeys	2 storeys
Subject to flooding	N/A
Bushfire	N/A
Rainfall	20 5 182mm/hr
Climate zone	Zone 5
Soil classification	Class A (referenced by Geotechnical Report <b>Appendix A</b> )
Cladding	Double brick (ground floor & first floor).



6. BCA 2019 - VOLUME 2 ASSESSMENT

The BCA assessment has been made to Building Code of Australia 2019 Amdt 1 (BCA) Volume Two. Where this report has been unable to confirm compliance (based on the information attached or discussed in this report) the non-compliances have been identified and remedial work has been recommended to bring the building up to compliance.

Where unable to confirm compliance via visual inspection we have recommended that certification be provided to support the application prior to the issue of the Construction Certificate. Any additional work or additional inspections have been indicated the information applicable will need to be addressed prior to the issue of the Building Certificate.

Table 9 – BCA Compliance Assessment

PART 3.0 STRUCTURAL PROVISIONS

Line number	BCA Clause	Title	Assessment	Recommendation	
1.	Part 3.0	Structural provisions	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.

PART 3.1 SITE PREPARATION

Line number	BCA Clause	Title	Assessment	Recommendation	
2.	Part 3.1	Site Preparation	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.1.1 Earthworks					
3.	3.1.1.1	Earthworks	N/A – All fill on site is retained. Cut and fill undertaken at the site. Cut embankment of 2.5:1 is consistent with Table 3.1.1.1.	Complies	
4.	3.1.1.2	Earthworks	N/A – All fill on site is retained. Compacted fill has been levelled and retained.	Complies	
Part 3.1.2 Earth Retaining Structures					
5.	Part 3.1.2	Earth retaining structures	Retaining structure inspected by Professional Engineer.	Complies	Refer to certificate by CJS Flora dated 14 June 2017 ( <b>Appendix B</b> ).
Part 3.1.3 Drainage					
6.	3.1.3.0	Acceptable Construction Manual	Drainage provisions inspected by Professional Engineer.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.
7.	3.1.3.1	Acceptable Construction Practice	Refer to assessment BCA clause 3.1.3.3.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.
AS3500.3:2018					
8.		Stormwater drainage	Drainage provisions inspected by Professional Engineer.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.





Line number	BCA Clause	Title	Assessment	Recommendation	
Acceptable Construction Practice					
9.	3.1.3.2	Drainage requirements	Refer to assessment BCA clause 3.1.3.3.	Remedial	The alfresco will be graded 1% with a linear drain in accordance with AS3500.3.
10.	3.1.3.3(a)	Surface water drainage systems – design	Adequate falls (0.050:1) have not been observed in all locations at the external finished surface adjacent to the building.  All finished ground level external to building is reasonably impermeable.	Remedial	The alfresco will be graded 1% with a linear drain in accordance with AS3500.3.
11.	3.1.3.3(b)	Surface water drainage systems – design	The building has been constructed adjacent to impermeable finished surfaces only.  The FFL to external finished ground level achieves a height of one brick course or a concrete setdown, with clearance of greater than 50mm in all observed cases.	Complies	Refer to architectural plans sheet no. DA-101.  Refer to site photos in <b>Appendix C</b> .
12.	3.1.3.4	Subsoil drainage	Subsoil drainage required to the retaining walls as constructed.	Remedial	Subsoil drainage for the retaining wall ag-line to be connected to the stormwater system via sump pit, refer to Stormwater plans.
13.	3.1.3.5	Stormwater drainage	Drainage provisions inspected by Professional Engineer. Assessment has been made to AS3500.3.	Refer assessment	Refer to stormwater plans referenced in Section 4 of this report.



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.1.4 Termite risk management					
14.	3.1.4.3	Termite management systems	Concrete and masonry construction is considered not subjected to termite attack.  Timber preservative treatment has been observed during site inspection.	Complies	N/A.
15.	3.1.4.4	Durable notice	No durable notice required.	N/A	Not applicable

PART 3.2 FOOTINGS AND SLABS

Line number	BCA Clause	Title	Assessment	Recommendation	
16.	Part 3.2.1	Footings and Slabs	Footings and slabs inspected by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
17.	Part 3.2.2.6	Footings and Slabs	Suitable vapour barrier has been observed on site by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.

**PART 3.3 MASONRY**

Line number	BCA Clause	Title	Assessment	Recommendation	
18.	Part 3.3.1	Masonry Accessories	Masonry inspected by Professional Engineer. Construction is in accordance with AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
19.	Part 3.3.3	Masonry Accessories	Masonry inspected by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
<b>Part 3.3.4 Weatherproofing of masonry</b>					
20.	3.3.4.0	Acceptable Construction Manuals	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	Not inspected	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.
<b>Part 3.3.5 Masonry veneer</b>					
21.	3.3.5.0	Acceptable Construction Manuals	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	N/A	The cavity brick walls have been assessed against both AS 4773.1, AS4773.2 and Part 3.3.5 – this part should be read in conjunction with the engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
22.	3.3.5.1	Acceptable Construction Practice	Part 3.3.5 – refer assessment below 3.3.5.1-3.3.5.9.	N/A	The cavity brick walls have been assessed against both AS 4773.1, AS4773.2 and Part 3.3.5 – this part should be read in conjunction with the engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
<b>Acceptable Construction Manuals - AS4773.2:2015</b>					



Line number	BCA Clause	Title	Assessment	Recommendation	
23.	Section 3	Mortar	Refer to engineers Certificate of Structural Adequacy 2122301-COSA-001-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
24.	Section 5	Built-in Components	DPC not observed due to render however location of weep holes observed to be in a suitable level.	Acceptable	Refer to site photos in <b>Appendix C</b> .
25.	Section 7	Control joints	Refer to engineers Certificate of Structural Adequacy 2122301-COSA-001-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
26.	Section 8	Steel lintels	Lintels not observed due to enclosed walls and render.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
27.	Section 9	Masonry veneer walls	<p>External brick walls measured on site as 285mm to the ground floor, and 270mm to the first floor.</p> <p>Brick leaf size is 110mm thick brick.</p> <p>The brick cavity was not able to be measured on site, however a 40mm minimum brick cavity can be inferred by the wall thickness, when taking into consideration an allowance for render.</p> <p>DPC not observed due to render, however location of weep holes observed to be in a suitable level.</p>	Acceptable	The brick cavity was not able to be measured on site, however a 40mm minimum brick cavity can be inferred by the wall thickness, when taking into consideration an allowance for render.
28.	10.5.3.2	Sill flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
29.	10.5.3.3	Head flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder



Line number	BCA Clause	Title	Assessment	Recommendation	
30.	10.5.3.4	Flashing at roof abutment	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
<b>3.3.5.1 Acceptable Construction Practice</b>					
31.	3.3.5.2	Height of wall limitation	Masonry veneer walls are not to be greater than 8.5m.	Complies	N/A
32.	3.3.5.3	Masonry units	Masonry existing, leaf size 110mm thick and are cored units.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
33.	3.3.5.4	Mortar mixes	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
34.	3.3.5.5	Mortar joints	Nominal thickness of 10mm.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.  Refer to site photos in <b>Appendix C</b> .
35.	3.3.5.6	Cavities	40mm min. cavity inferred from measured wall thickness, with allowance for render.	Complies	N/A
36.	3.3.5.7	Damp-proof courses and flashings — material	DPC or flashing not observed due to render finish to the external.	Not observed	To be inspected and certified by a licensed builder
37.	3.3.5.8	Damp-proof courses and	DPC was not observed due to render finish to the external, DPC expected to be encountered at the level of weepholes visible on	Complies	To be inspected and certified by a licenced builder.



Line number	BCA Clause	Title	Assessment	Recommendation	
		flashings — installation	the external walls, it is noted that the location indicates acceptable construction.  Window head and sill flashings were observed in some locations, unable to inspect some locations.	Not inspected	To be inspected and certified by a licenced builder.
38.	3.3.5.9	Weep holes	Weep holes inspected and visible at suitable spans at the base of the ground floor and at the inter-story junction.	Complies	Refer to site photos in <b>Appendix C</b> .
39.	3.3.5.10	Wall ties	Wall ties were not observed on site.	Not observed	To be inspected and certified by a licenced builder.
40.	3.3.5.11	Openings in masonry veneer	Window lintels inspected by structural engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
41.	3.3.5.12	Lintels	Steel lintels have not been inspected.	Not inspected	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.
<b>Part 3.3.6 Isolated Masonry Piers</b>					
42.	3.3.6.0	Acceptable Construction Manuals	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.



Line number	BCA Clause	Title	Assessment	Recommendation	
43.	3.3.6.1	Acceptable Construction Practice	Assessment to AS 4773.1:2015, AS4773.2:2015.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.

PART 3.4 FRAMING

Line number	BCA Clause	Title	Assessment	Recommendation	
44.	Part 3.4.0	Framing	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.  Refer to structural plans listed in Section 4 of this report.	Complies/ Remedial	Refer to structural plans for remedial work.
45.	Part 3.4.1	Subfloor ventilation	N/A - no subfloor.	N/A	N/A
46.	Part 3.4.2	Steel framing	N/A – timber framed.	N/A	N/A
47.	Part 3.4.3	Timber Framing	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.  Refer to structural plans listed in Section 4 of this report.	Complies/ Remedial	Refer to structural plans for remedial work.
48.	Part 3.4.4	Structural steel members	Steel beam located to stairs.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.

**PART 3.5 ROOF AND WALL CLADDING**

<b>Part 3.5.2 Roof tiles and shingles</b>					
49.	3.5.2.0	Acceptable Construction Manual	N/A	N/A	N/A
50.	3.5.2.1	Acceptable Construction Practice	Refer to assessment below 3.5.2.2-3.5.2.6.	N/A	N/A
51.	3.5.2.2	Fixing of roof tiles and ancillaries	Fixing of concrete roof tiles have not been inspected.	Not inspected	Roof tile fixings to be inspected and certified by a licensed builder.
52.	3.5.2.3	Flashing	Flashing to be provided in accordance with this clause.	Not inspected	Wall, step, ridge, penetration flashings to be inspected and certified by a licensed builder.
53.	3.5.2.4	Sarking	The roof pitch is 20-23 degrees and sarking has been observed on site.	Acceptable	
54.	3.5.2.5	Anti-ponding device/board	N/A – Roof pitch is 20-23 degrees and has eaves.	N/A	N/A
55.	3.5.2.6	Water discharge	35mm min. roofing overlap to gutter to be confirmed on site by licensed builder.	Not inspected	To be inspected and certified by a licensed builder.
<b>Part 3.5.3 Gutters and downpipes</b>					
56.	3.5.3.0	Acceptable Construction Manual	Gutter and Downpipe sizing to AS3500.3	Complies	Refer to stormwater plans listed in Section 4 of this report.





					Gutters and Downpipes have been assessed against both AS3500.3 and part 3.5.3.
57.	3.5.3.1	Acceptable Construction Practice	Overflow to Part 3.5.3	Complies	Refer to stormwater plans listed in Section 4 of this report.
<b>Acceptable Construction Manual</b>					
58.	Section 2	Materials and products	UPVC downpipes and metal gutter	Complies	N/A
59.	Section 3	Roof drainage systems - Design	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
<b>Acceptable Construction Practice</b>					
60.	3.5.3.1	Application	Refer assessment below	Complies	N/A
61.	3.5.3.2	Materials	UPVC downpipes and metal gutter	Complies	N/A
62.	3.5.3.3	Selection of guttering	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
63.	3.5.3.4	Installation of gutters	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
64.	Table 3.5.3.4a	Acceptable continuous overflow measure	Slot openings can be seen on the gutters to the alfresco and first floor.	Complies	Refer to site photos in <b>Appendix C</b> .
			Overflows are required to be installed to the entry portal.	Remedial	



			Overflow slot openings have not been observed to balconies.		
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**PART 3.6 GLAZING**

Line number	BCA Clause	Title	Assessment	Recommendation	
65.	3.6.0	Acceptable construction manual	N/A	N/A	N/A
66.	3.6.1	Acceptable construction practice	Refer assessment under 3.6.3 and 3.6.4.	N/A	N/A
67.	3.6.2	Glazing sizes and installation	Refer assessment under 3.6.3 and 3.6.4.	N/A	N/A
68.	3.6.3	Fully framed glazing installed in perimeter of buildings	With the exception of windows to the dining area, all windows meet the requirements of Table 3.6.2.  Window to the dining area is to be replaced with 2-leaf 10mm toughened or 3-leaf 8mm toughened glazing to meet the requirements of AS 1288.	Complies	Refer to site photos in <b>Appendix C</b> .
<b>3.6.4 Human impact safety requirements</b>					
69.	3.6.4.1	Doors	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix C</b> .  Refer to Architectural plans door and window schedule.



Line number	BCA Clause	Title	Assessment	Recommendation	
70.	3.6.4.2	Door side panels	N/A	N/A	N/A
71.	3.6.4.3	Full height framed glazed panels	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix C</b> . Refer to Architectural plans door and window schedule.
72.	3.6.4.4	Glazed panels, other than doors or side panels, on the perimeter of rooms	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix C</b> . Refer to Architectural plans door and window schedule.
73.	3.6.4.5	Bathroom, ensuite and spa room glazing	Grade A toughened glass 5mm.	Complies	Refer to site photos in <b>Appendix C</b> . Refer to Architectural plans door and window schedule.
74.	3.6.4.6	Visibility of glazing	Banding required on all glazed door panels in compliance with clause 3.6.4.6.	Remedial	Banding to be applied, inspection of compliance required.



PART 3.7 FIRE SAFETY

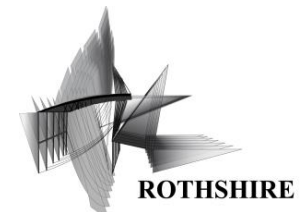
Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.7.1 Fire properties for materials and construction					
75.	3.7.1.2	Fire hazard properties	Refer assessment below 3.7.2.2-3.7.2.8	N/A	N/A
Part 3.7.2 Fire separation of external walls					
76.	3.7.2.2	External walls of Class 1 buildings	Walls are located less than 900mm from the boundary.  The southern boundary wall is required to be fire rated.	Remedial	Windows to be replaced with non-openable fireproof windows in accordance with clause 3.7.2.4.
77.	3.7.2.4	Construction of external walls	N/A – as per 3.7.2.2 and 3.7.2.5.	N/A	N/A
78.	3.7.2.5	Class 10a buildings	N/A – no class 10a building.	N/A	N/A
79.	3.7.2.6	Open carports	N/A	N/A	N/A
80.	3.7.2.7	Allowable encroachments	Eave is within the 900mm of the boundary on the north and south elevation.	Acceptable	N/A
81.	3.7.2.8	Roof lights	Not used	N/A	N/A
82.	Part 3.7.3	Fire protection of separating walls and floors	N/A	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
83.	Part 3.7.4	Fire separation of garage top dwellings	N/A	N/A	N/A
<b>Part 3.7.5 Smoke alarms and evacuation lighting</b>					
84.	3.7.5.2	Smoke alarm requirements	Smoke alarms required in class 1a buildings. Electrical work is incomplete.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.
85.	3.7.5.3	Location — Class 1a buildings	Smoke alarms to be located between bedrooms and the remainder of the building.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.
86.	3.7.5.5	Installation of smoke alarms	N/A – no smoke alarms installed.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.

**PART 3.8 HEALTH AND AMENITY**

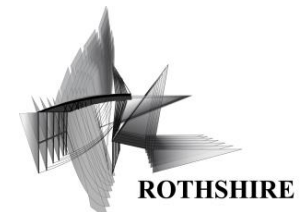
Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.8.1 Wet areas and external waterproofing					
87.	3.8.1.2	Wet Areas	All wet areas completed at time of inspection; floor wastes have been installed in accordance with this clause.	Complies	Refer to Waterproofing Compliance Certificate dated 6 June 2019, see <b>Appendix D</b> .



Line number	BCA Clause	Title	Assessment	Recommendation	
88.	3.8.1.3	External above ground membranes	All wet areas completed at time of inspection; floor wastes have been installed in accordance with this clause.	Complies	Refer to Waterproofing Compliance Certificate dated 6 June 2019, see <b>Appendix D</b> .
<b>Part 3.8.2 Room heights</b>					
89.	3.8.2.2	Height of rooms and other spaces	Minimum FFL to finished ceiling height identified at time of inspection was greater than 2600mm for ground floor & greater than 2600mm for upper floor, compliant with this clause.	Complies	N/A
<b>Part 3.8.3 Facilities</b>					
90.	3.8.3.2	Required facilities	At time of inspection, no facilities were installed due to the stage of construction.	Remedial	Facilities to be completed.
91.	3.8.3.3	Construction of sanitary compartments	<p>The door to the ground floor bathroom achieves the required clear space of 1200mm, refer to Figure 3.8.3.3.</p> <p>First floor ensuite and bathroom doors currently show 1200mm clear space, any future fit out of the bathroom is to maintain the 1200mm clear space as per Figure 3.8.3.3.</p>	Complies	Refer to existing floor plans, drawing no. DA-101 & DA-102.
<b>Part 3.8.4 Light</b>					
92.	3.8.4.2	Natural light	All habitable rooms provided with natural light and achieve 10% of the floor area.	Complies	
93.	3.8.4.3	Artificial lighting	Bathroom, ensuite, laundry and WC have natural light provided as required by 3.8.4.2.	Complies	



Line number	BCA Clause	Title	Assessment	Recommendation	
			Internal bathrooms and laundries are provided with artificial light at not less than a rate of one light per 16m <sup>2</sup> .		
<b>Part 3.8.5 Ventilation</b>					
94.	3.8.5.2	Ventilation requirements	All habitable rooms provided with natural ventilation via openable doors and windows.	Complies / Remedial	For the guest bedroom on the south elevation that is to have non-openable fireproof windows, mechanical ventilation is to be provided.
95.	3.8.5.3	Location of sanitary compartments	N/A - Sanitary compartment does not open on to kitchen or pantry, mechanical ventilation provided.	N/A	N/A
96.	Part 3.8.6	Sound insulation	N/A	N/A	N/A
<b>Part 3.8.7 Condensation management</b>					
97.	3.8.7.2	Pliable building membrane	Drained cavity provided in external walls.  A pliable building membrane was not observed on site due to the stage of construction.	Not observed	N/A
98.	3.8.7.3	Flow rate and discharge of exhaust systems	Exhaust fans >25 L/s for sanitary compartments.  No exhaust system for kitchen areas where kitchen has not yet been installed.	Capable of compliance	N/A
99.	3.8.7.4	Ventilation of roof spaces		Remedial	Roof ventilation to be provided via eave vents.

**PART 3.9 SAFE MOVEMENT AND ACCESS**

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.9.1 Stairway and Ramp construction					
100.	3.9.1.2	Stairway construction	Riser height is within the min and max of Table 3.9.1.1.	Acceptable	N/A
101.	3.9.1.3	Ramps	N/A	N/A	N/A
102.	3.9.1.4	Slip-resistance	Stairs are unfinished concrete (non-slip).	Acceptable	N/A
103.	3.9.1.5	Landings	Landing at top and bottom of stairs.	Acceptable	N/A
104.	3.9.1.6	Thresholds	Threshold is less than 230mm to the entrance.	Acceptable	N/A
Part 3.9.2 Barriers and handrails					
105.	3.9.2.2	Barriers to prevent falls	Refer to 3.9.2.3, 3.9.2.6	Remedial	Handrails to be constructed.
106.	3.9.2.3	Construction of barriers to prevent falls	No barriers have been constructed to the landing or the stairway due to the stage of construction.	Remedial	Barrier and handrail to be constructed.
			One glass pane was observed to be missing from the glazed balustrade in the north-west corner balcony on the first floor.	Remedial	Glass balustrade glass to be replaced.
107.	3.9.2.4	Handrails	Handrails to be installed.	Remedial	Handrails to be installed
108.	3.9.2.5	Construction of wire barriers	N/A	N/A	N/A





Line number	BCA Clause	Title	Assessment	Recommendation	
109.	3.9.2.6	Protection of openable windows — bedrooms	All windows to be fitted with opening protection.	Remedial	All windows to be fitted with opening protection.
110.	3.9.2.7	Protection of openable windows — rooms other than bedrooms	All windows to be fitted with opening protection.	Remedial	All windows to be fitted with opening protection.

PART 3.10 ANCILLARY PROVISIONS AND ADDITIONAL CONSTRUCTION REQUIREMENTS

Line number	BCA Clause	Title	Assessment	Recommendation	
111.	Part 3.10.1	Swimming Pools	Site has outdoor swimming pool.  Water depth and reticulation system not assessable during site visit.	N/A	N/A
112.	Part 3.10.1.0	Swimming Pools	No safety barrier constructed around swimming pool.	Remedial	Safety barriers to be constructed in accordance with AS 1926.1 & AS 1926.2.
113.	Part 3.10.2	Earthquake areas	N/A – not in earthquake area	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
114.	Part 3.10.3	Flood hazard areas	N/A – not in flood area	N/A	N/A
115.	Part 3.10.4	Construction in alpine areas	N/A – not located in alpine area	N/A	N/A
Part 3.10.5 Construction in bushfire prone areas					
116.	Part 3.10.5.0	Application	Refer to Bushfire report submitted with application.	Refer Bushfire report	Refer to bushfire report submitted with application.
117.	Part 3.10.6	Attachment of decks and balconies to external walls of buildings	N/A	N/A	N/A
118.	Part 3.10.7	Boilers, pressure vessels, heating appliances, fireplaces, chimneys and flues	N/A	N/A	N/A

**PART 3.12 ENERGY EFFICIENCY**

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.12 Energy Efficiency					
119.	3.12.0.1	Heating and cooling loads	BASIX prepared and existing structure determined suitable.	Remedial	Refer BASIX Certificate number: 1363175S
Part 3.12.1 Building fabric					
120.	3.12.1.1	Building fabric thermal insulation	BASIX prepared;	Remedial	Insulation to be installed in compliance with BASIX Certificate
121.	3.12.1.2	Roofs	BASIX prepared;	Remedial	Insulation to be installed in compliance with BASIX Certificate
122.	3.12.1.3	Roof lights	N/A – no roof lights	N/A	N/A
123.	3.12.1.4	External walls	BASIX prepared;	Remedial	Insulation to be installed in compliance with BASIX Certificate
124.	3.12.1.5	Floors	Not used, concrete slab	N/A	N/A
Part 3.12.2 External glazing					
125.	3.12.2	External glazing	The national BCA Part 3.12.2 does not apply in NSW as the subject matter is dealt with by BASIX.	Complies	Refer BASIX Certificate number: 1363175S
Part 3.12.3 Building sealing					



Line number	BCA Clause	Title	Assessment	Recommendation	
126.	3.12.3.1	Chimneys and flues	N/A	N/A	N/A
127.	3.12.3.2	Roof lights	N/A	N/A	N/A
128.	3.12.3.3	External windows and doors	Sealing visible at time of inspection.	Complies	N/A
129.	3.12.3.4	Exhaust fans	Sealing visible at time of inspection.	Complies	N/A
130.	3.12.3.5	Construction of ceilings, walls and floors	Sealing visible at time of inspection, with exception to parts of the building which remain incomplete.	Remedial	Complete works to all external walls.
131.	NSW 3.12.3.1	Compliance with BCA provisions	The sealing of a building must comply with the national BCA provisions 3.12.3.1 to 3.12.3.6.	Refer assessment	Refer BASIX Certificate number: 1363175S
<b>Part 3.12.4 Air movement</b>					
132.	3.12.4	Air movement	The national BCA Part 3.12.4 does not apply in NSW as the subject matter is dealt with by BASIX.	Acceptable	
<b>NSW 3.12.5 Application of NSW Part 3.12.5</b>					
133.	3.12.5.0	Acceptable Construction Manual	BCA volume three.	Not inspected	Refer to assessment below.



Line number	BCA Clause	Title	Assessment	Recommendation	
134.	3.12.5.1	Insulation of services	Heated water systems to be insulated in accordance with this clause, visually inspected.	Not yet constructed	Works to be completed.
135.	3.12.5.2	Central heating water piping	Not used	Not inspected	N/A
136.	3.12.5.3a	Heating and cooling ductwork	Ductwork sealed and insulated in accordance with this clause, visually inspected.	Not inspected	Mechanical contractor to inspect and provide certification of compliance of ductwork sealing and insulation to be carried out concurrently with remedial works.



## 7. CONCLUSION

The primary purpose of this report is to identify review to building compliance in comparison to the current Deemed-to-Satisfy provisions of the BCA Amdt 1 Volume Two 2019.

Where a non-compliance has been identified performance requirements for rectification work has been proposed to achieve compliance to the BCA 2019 Amdt 1 in **Section 8** below.

## 8. REMEDIAL WORKS SUMMARY

Additional building works are required to bring the building up to compliance with the BCA 2019 Volume two, the works are summarised below.

1. All windows and doors to the southern boundary wall will be removed and replaced with non-openable fire-proof windows in accordance with AS2047 and BCA Clause 3.7.2.4. Hinge doors are to be replaced with minimum 35mm thick self-closing solid core doors.
2. Smoke alarms are to be installed in the upstairs corridor between bedrooms in accordance with BCA Clause 3.7.5.2, 3.7.5.3 & 3.7.5.5. Electrical wiring for the smoke alarm on the ground floor is to be completed.
3. Visible banding will be installed to all glazed door panels in accordance with BCA Clause 3.6.4.6.
4. All required facilities are to be provided in accordance with BCA Clause 3.8.3.2.
5. Door hinges to the ground floor WC are to be replaced to achieve compliance with BCA Clause 3.8.3.3 such that the door can be readily removable from the outside of the compartment.
6. A barrier and handrail is to be constructed to the landing and the staircase, compliant to BCA Clause 3.9.2.4.
7. The missing glass pane in the first-floor balustrade, located on the north-west balcony, is to be replaced with glazing compliant with AS1288.
8. All windows to bedrooms and non-bedroom areas are required to be fitted with opening protection in accordance with BCA Clause 3.9.2.6 & 3.9.2.7.
9. A safety barrier will be constructed around the swimming pool in accordance with AS1926.1 & AS1926.2.
10. Installation of insulation to the upper floor external walls compliant to the BASIX Certificate reference 1363175S\_03.
11. Installation of insulation to the ceiling and roof compliant to the BASIX Certificate reference 1363175S\_03.
12. Installation of insulated plaster board to be applied to the underside of the first floor in the garage min. R-value 0.3 compliant to the BASIX Certificate reference 1363175S\_03.
13. Structural works to be undertaken in accordance with the structural plans referenced in Section 4 of this report.



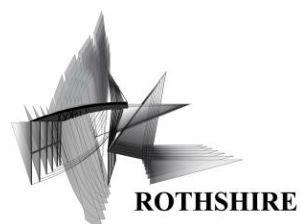
## LIMITATIONS

The explicit purpose of this report and the associated services undertaken by Rothshire Services Pty Ltd is to provide an assessment in accordance with the scope of services set out in the agreement between Rothshire Services Pty Ltd & the property owners ('the client'). The scope of services was defined by the client or their representative and in lieu of existing physical documentation.

Rothshire Services Pty Ltd concluded on information represented in this assessment from visual inspections and a survey of existing physical conditions. The passage of time, manifestation of latent conditions or impact of future events may require exploration in-situ, subsequent data analysis, and re-evaluation of the findings, observations and conclusions either implied or expressed in this assessment.

In preparing this assessment, Rothshire Services Pty Ltd has relied upon presumed accuracy of certain information (or absence thereof) relative to 1174 Forest Road, Lugarno NSW 2210, provided by the client, architect, Council, geotechnical engineer, surveyor, diagnostic technician and other identified herein. Except as otherwise stated in this assessment, Rothshire Services Pty Ltd has not attempted to verify the accuracy or completeness of any such information.

The findings, observations, examinations and conclusion expressed or implied by Rothshire Services Pty Ltd in this assessment are not, and should not be considered, an assessment concerning the physical condition or the proposed treatment of the existing conditions. No warranty or guarantee, whether expressed or implied, is made with respect to the data reported or to the findings, observations, and conclusions are based solely upon information in existence at the time of examination.



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## APPENDIX A – SITE CLASSIFICATION REPORT





GCA Report No.

G18206-1

Date:

19<sup>th</sup> December 2018

**Geotechnical Inspection Letter at:**

Nos. 1174-1178 Forest Road Lugarno NSW 2210

**Prepared for:**

Astor Homes

Kirill Charonov

kirill@astorhomes.com.au

**Attachment 1:** Important Information About Your Geotechnical Report

**1. INTRODUCTION**

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Mr. Kirill Charonov of Astor Homes to carry out an inspection on the stagnant water currently present within the existing basement levels of the residential dwellings at the properties nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site). The site inspection was carried out on the 27<sup>th</sup> November 2018, for the purpose of providing geotechnical advice of any potential issues which may have been caused to the structural adequacy of existing dwellings foundations due to the presence of stagnant water.

This inspection letter presents the results of our observations, along with our assessment and any recommendations which may be necessary.

For your review, **Attachment 1** contains a document prepared by GCA entitled "Important Information About Your Geotechnical Report", which summarises the general limitations, responsibilities, and use of geotechnical reports.

**2. PROVIDED INFORMATION**

The following relevant information was provided to GCA prior to the site investigation:

- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 2", referenced project No. 1718, and included drawing nos. BC005, BC100, BC101, and BC200 to BC203 inclusive.
- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 2", referenced project No. 1718, and included drawing nos. BC005, BC100, BC101, and BC200 to BC203 inclusive.
- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 3", referenced project No. 1718, and included drawing nos. BC005, BC100 to BC102 inclusive, and BC200 to BC203 inclusive.
- Site survey plan prepared by Total Surveying Solutions, titled "Plan Showing Detail & Levels Over Lots 2 & 3 in DP11873 & Lot A in DP328702", referenced job No. 170832, plan No. 170832\_A, and dated 12<sup>th</sup> September 2017.

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1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



### 3. REGIONAL GEOLOGY

Information obtained on the local regional subsurface conditions, referenced from the Department of Mineral Resources, Sydney 1:100,000 Geological Series Sheet 9130 First Edition, dated 1983, by the Geological Survey of New South Wales, indicates the site is located within an area underlain by Triassic Aged Hawkesbury Sandstone (Rh). The Hawkesbury Sandstone typically comprises "medium to coarse grained quartz sandstone, very minor shale and laminite lenses".

### 4. SITE INSPECTION

During the site inspection, stagnant water was observed within the basement levels of the properties within the site. Groundwater which was present within the basement levels is expected to be associated within surface runoff within the site, and incomplete drainage control measures within the basement levels of each property.

Observations made on the existing foundations within the basement levels indicated the presence of sandstone bedrock underlying the basement walls (where observable and accessible). Information provided by the client also indicates the foundations of the proposed development construction of each dwelling within the site were founded onto the underlying sandstone bedrock throughout. The conditions of the existing dwellings were also visually assessed to be of generally good condition, with no obvious signs of cracking or structural distress.

It is noted that sandstone outcrops were also observed in areas of the site, and within the region surrounding the site, as outlined in Section 3 above.

No groundwater seepage was observed through the basement walls of each dwelling, within the underlying exposed sandstone bedrock or throughout the site.

### 5. PRELIMINARY SITE LOT CLASSIFICATION

AS 2870-2011 indicates the site may be classified as a "Class A" site, for design and construction of the foundation system founded below any topsoil, slopewash, fill or other deleterious material, being on the inferred sandstone bedrock underlying the proposed development area of each dwelling within the site.

Classification by characteristic surface movement ( $Y_s$ ) as outlined in Table 2.3 of AS 2870-2011 is presented in Table 1 below.

**Table 1. Classification by Characteristic Surface Movement ( $Y_s$ ) AS 2870-2011**

Characteristic Surface Movement ( $Y_s$ ) mm	Site Classification in Accordance with Table 2.1
Most sand and rock sites with little or no ground movement from moisture changes	A
$0 < Y_s \leq 20$	S
$20 < Y_s \leq 40$	M
$40 < Y_s \leq 60$	H1
$60 < Y_s \leq 75$	H2
$Y_s > 75$	E

Reactive sites are sites which consist of clayey soils that are prone to swell on wetting and shrink on drying, which results in ground movements that can damage to structures. The amount of ground movement is related to the physical properties of the clay and environmental factors such as climate, vegetation and watering. A higher probability of

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damage can occur on reactive sites where abnormal moisture conditions occur, as defined in AS 2870-2011, due to factors such as:

- Failure to provide adequate site drainage or lack of maintenance of site drainage.

## 6. GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

Based on our observations during our site inspection, along with the subsurface conditions within the site (where observable and accessible) and information provided by the client on the construction of the dwellings within the site, it is assessed that the stagnant water currently present within the basement levels of the properties within the site should not compromise the structural adequacy of the foundations for the dwellings.

AS2870-2011 further indicates that foundations sufficiently constructed on consistent and competent rock throughout are expected to have little or no ground movement from moisture changes. Thus, as discussed in Section 5 above, we do not expect the site to be affected by reactive clayey soils prone to swell on wetting and shrink on drying, which results in ground movements that may damage to structures.

Surface drainage within the area should be maintained to avoid flooding of the site and saturation of the foundation materials during footing construction. Stagnant water currently present within the basement levels should be removed, and appropriate drainage be implemented for each dwelling to help minimise and avoid any further water runoff into the basement levels.

It should also be noted that ground conditions within the site are expected to differ from those encountered and inferred in this letter report, since no geotechnical or geological exploration programme, no matter how comprehensive, can reveal and identify all subsurface conditions underlying the site.

## 7. LIMITATIONS

Geotechnical Consultants Australia Pty Ltd (GCA) has based its geotechnical assessment on available information obtained prior and during the site inspection/investigation. The geotechnical assessment and recommendations provided in this report, along with the surface, subsurface and geotechnical conditions are limited to the inspection and test areas during the site inspection/investigation, and then only to the depths investigated at the time the work was carried out. Subsurface conditions can change abruptly, and may occur after GCA's field testing has been completed.

It is recommended that if for any reason, the site surface, subsurface and geotechnical conditions (including groundwater conditions) encountered during the site inspection/investigation vary substantially during construction, and from GCA's recommendations and conclusions, GCA should be contacted immediately for further testing and advice. This may be carried out as necessary, and a review of recommendations and conclusions may be provided at additional fees. GCA's advice and accuracy may be limited by undetected variations in ground conditions between sampling locations.

GCA does not accept any liability for any varying site conditions which have not been observed, and were out of the inspection or test areas, or accessible during the time of the investigation. This report and any associated information and documentations have been prepared solely for **Astor Homes**, and any misinterpretations or reliances by third parties of this report shall be at their own risk. Any legal or other liabilities resulting from the use of this report by other parties can not be religated to GCA.

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1174-1178 Forest Road Lugarno NSW 2210  
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This report should be read in full, including all conclusions and recommendations.  
Consultation should be made to GCA for any misunderstandings or misinterpretations of this report.

For and behalf of

**Geotechnical Consultants Australia Pty Ltd (GCA)**

A handwritten signature in black ink, appearing to read 'Joe Nader', is written over a light blue horizontal line.

Joe Nader  
BE (Civil – Construction), Dip.Eng.Prac., MIEAust., AGS, ISSMGE  
Cert. IV in Building and Construction  
Geotechnical Engineer  
Director

Geotechnical Inspection Letter  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



## 8. REFERENCES

Pells P.J.N, Mostyn, G. & Walker B.F., "Foundations on Sandstone and Shale in the Sydney Region", Australian Geomechanics Journal, 1998.

AS 1726-2017 Geotechnical Site Investigation. Standards Australia.

AS 2870-2011 Residential slabs and footings. Standards Australia.

NSW Department of Mineral Resources (1983) Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1) Geological Survey of New South Wales. Department of Mineral Resources.

NSW Planning Portal.

NSW Six Maps.



## Important Information About Your Geotechnical Report

This geotechnical report has been prepared based on the scopes outlined in the project proposal. The works carried out by Geotechnical Consultants Australia Pty Ltd (GCA), have limitations during the site investigation, and may be affected by a number of factors. Please read the geotechnical investigation report in conjunction with this "Important Information About Your Geotechnical Report".

### Geotechnical Services Are Performed for Specific Projects, Clients and Purposes.

Due to the fact that each geotechnical investigation is unique and varies from sites, each geotechnical report is unique, and is prepared solely for the client. A geotechnical report may satisfy the needs of structural engineer, where it will not for a civil engineer or construction contractor. No one except the client should rely on the geotechnical report without first conferring with the specific geotechnical consultant who prepared the report. The report is prepared for the contemplated project or original purpose of the investigation. No one should apply this report to any other or similar project.

### Reading The Full Report.

Do not read selected elements of the report or tables/figures only. Serious problems have occurred because those relying on the specially prepared geotechnical investigation report did not read it all in full context.

### The Geotechnical Report is Based on a Unique Set of Project And Specific Factors.

When preparing a geotechnical report, the geotechnical engineering consultant considers a number of unique factors for the specific project. These typically include:

- Clients objectives, goals and risk management preferences;
- The general proposed development or nature of the structure involved (size, location, etc.); and
- Future planned or existing site improvements (parking lots, roads, underground services, etc.);

Care should be taken into identifying the reason of the geotechnical report, where you should not rely on a geotechnical engineering report that was:

- Not prepared for your project;
- Not prepared for the specific site;
- Not prepared for you;
- Does not take into consideration any important changes made to the project; or
- Was carried out prior to any new infrastructure on your subject site.

Typical changes that can affect the reliability if an existing geotechnical investigation report include those that affect:

- The function of the proposed structure, where it may change from one basement level to two basement levels, or from a light structure to a heavy loaded structure;
- Location, size, elevation or configuration of the proposed development;
- Changes in the structural design occur; or
- The owner of the proposed development/project has changed.

The geotechnical engineer of the project should always be notified of any changes – even minor – and be asked to evaluate if this has any impact. GCA does not accept responsibility or liability for problems that occur because its report did not consider developments which it was not informed of.

### Subsurface Conditions Can Change

This report is based on conditions that existed at the time of the investigation, at the locations of the subsurface tests (i.e. boreholes) carried out during the site investigation. Subsurface conditions can be affected and modified by a number of factors including, but not limited to, the passage of time, man-made influences such as construction on or adjacent to the site, by natural forces such as floods, groundwater fluctuations or earthquakes. GCA should be contacted prior to submitting its report to determine if any further testing may be required. A minor amount of additional testing may prevent any major problems.

### Geotechnical Findings Are Professional Opinions

Results of subsurface conditions are limited only to the points where the subsurface tests were carried out, or where samples were collected. The field and laboratory data is analysed and reviewed by a geotechnical engineer, who then applies their professional experience and recommendations about the site's subsurface conditions. Despite investigation, the actual subsurface conditions may differ – in some cases significantly – from the results presented in the geotechnical investigation report, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface anomalies and details.



Therefore, the recommendations in this report can only be used as preliminary. Retaining GCA as your geotechnical consultants on your project to provide construction observations is the most effective method of managing the risks associated with unanticipated subsurface conditions.

**Geotechnical Report's Recommendations Are Not Final**

Because geotechnical engineers provide recommendations based on experience and judgement, you should not overly rely on the recommendations provided – they are not final. Only by observing the actual subsurface conditions revealed during construction may a geotechnical engineer finalise their recommendations. GCA does not assume responsibility or liability for the report's recommendations if no additional observations or testing is carried out.

**Geotechnical Report's Are Subject to Misinterpretations**

The project geotechnical engineer should consult with appropriate members of the design team following submission of the report. You should review your design teams plans and drawings, in conjunction with the geotechnical report to ensure they have all be incorporated. Due to many issues arising from misinterpretation of geotechnical reports between design teams and building contractors, GCA should participate in pre-construction meetings, and provide adequate construction observations.

**Engineering Borehole Logs And Data Should Not be Redrawn**

Geotechnical engineers prepare final borehole and testing logs, figure, etc. based on results and interpretation of field logs and laboratory data following the site investigation. The logs, figure, etc. provided in the geotechnical report should never be redrawn or altered for inclusion in any other documents from this report, included architectural or other design drawings.

**Providing The Full Geotechnical Report For Guidance**

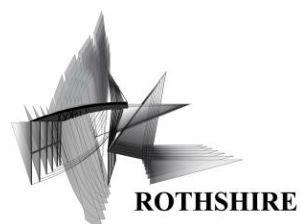
The project design teams, subcontractors and building contractors should have a copy of the full geotechnical investigation report to help prevent any costly issues. This should be prefaced with a clearly written letter of transmittal. The letter should clearly advise the aforementioned that the report was prepared for proposed development/project requirements, and the report accuracy is limited. The letter should also encourage them to confer with GCA, and/or carry out further testing as may be required. Providing the report to your project team will help share the financial responsibilities stemming from any unanticipated issues or conditions in the site.

**Understanding Limitation Provisions**

As some clients, contractors and design professionals do not recognise geotechnical engineering is much broader and less exact than other engineering disciplines, this creates unrealistic expectations that lead to claims, disputes and other disappointments. As part of the geotechnical report, (in most cases) a 'limitations' explanatory provision is included, outlining the geotechnical engineers' limitations for your project – with the geotechnical engineers responsibilities to help other reduce their own. This should be read closely as part of your report.

**Other Limitations**

GCA will not be liable to revise or update the report to take into account any events or circumstances (seen or unforeseen), or any fact occurring or becoming apparent after the date of the report. This report is the subject of copyright and shall not be reproduced either totally or in part without the express permission of GCA. The report should not be used if there have been changes to the project, without first consulting with GCA to assess if the report's recommendations are still valid. GCA does not accept any responsibility for problems that occur due to project changes which have not been consulted.



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**APPENDIX B – ENGINEERING CERTIFICATE – RETAINING WALL**



CJS Flora T/A

## CJS Flora & Partners

Chartered Engineers & Project Managers

ABN 57 669 771 477

Job Number: 1601

Date: 14 June 2017

### STRUCTURAL ADEQUACY CERTIFICATE

**LOCATION:** Double storey residence 1174 Forest Road Lugarno NSW.

**ELEMENT:** Concrete Piers, Concrete Retaining Walls, Lower Ground Floor Slab, Ground Floor Footings, Ground Floor Slab, Swimming Pool, First Floor Slab, Timber Frames and Trusses.

Structural Inspections have been carried out in accordance with accepted engineering practice and principles at the above mentioned properties. I Charan Flora hereby certify that the newly constructed elements mentioned above have been adequately constructed in accordance with the following design codes:

AS1170, AS2870, AS3600, AS1684, AS4100, AS2159

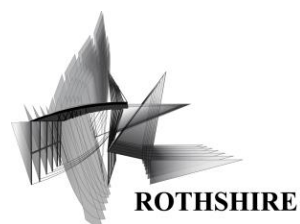
Based on site inspections and with reference to the above Australian Standard Codes it is my opinion that the structure located at the above address is structurally adequate.

Yours Sincerely,

CJS Flora and Partners



Charan Flora  
BE MIEAust



## APPENDIX C – SITE PHOTOS



Image 1 – Glazed balcony balustrade (typical).

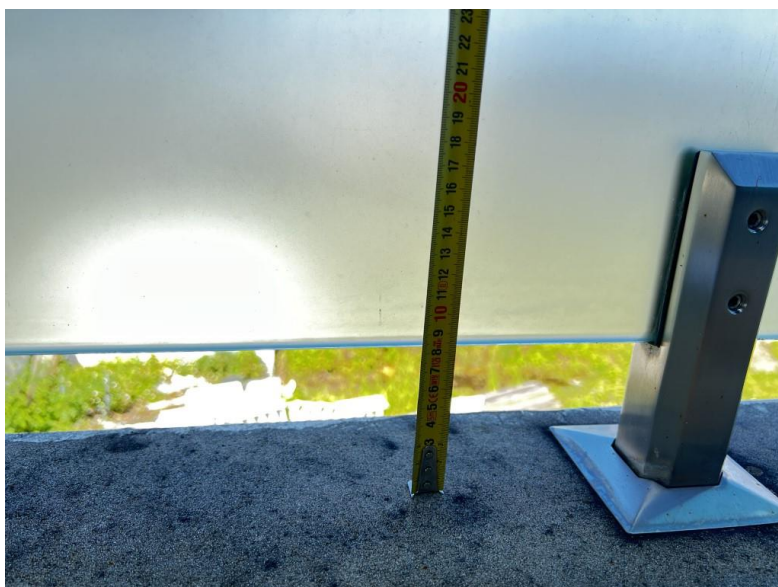


Image 2 – Balustrade compliance

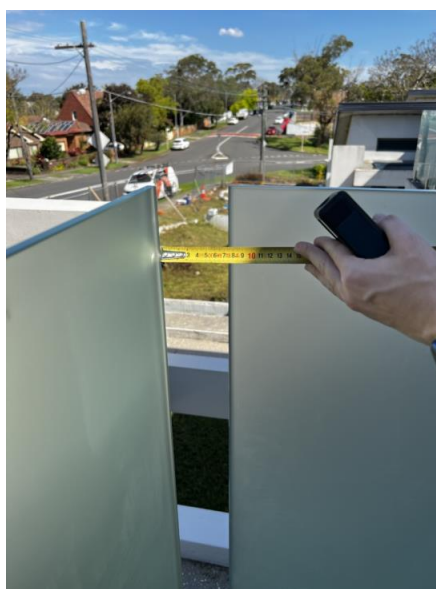
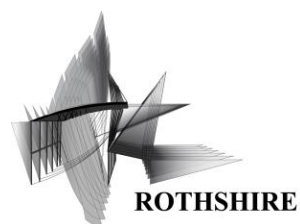


Image 3 & Image 4 – BCA compliance

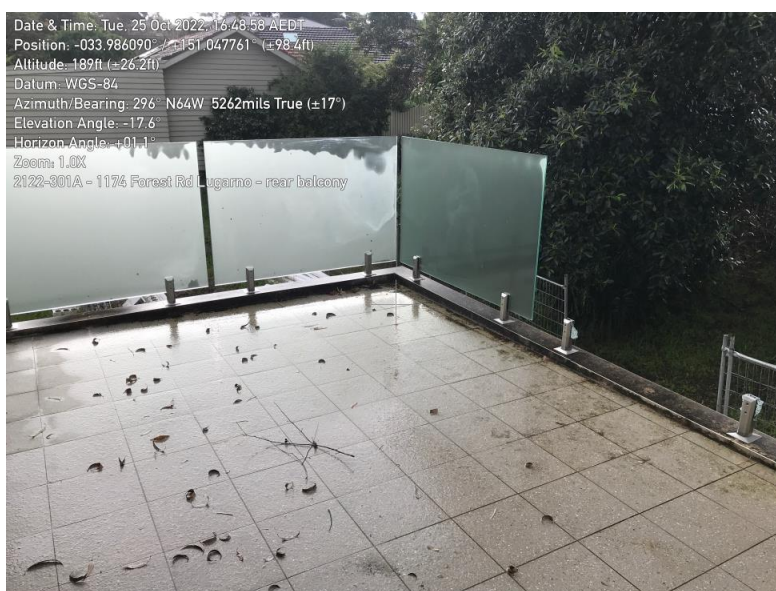


Image 5 – Missing balustrade pane to be installed.



Image 6 – Internal staircase – existing condition.



Image 7 – Water damage to bathroom ceiling.





Image 8 – Door threshold D-88 to study – existing condition.



Image 9 – Dining room window (W11) – existing condition.



Image 10 – Dining room window (W11) – existing condition.



Image 11 – Damp Proof Course to underside of brick wall.





**Image 12 – Rear balcony slab with pliable membrane underside.**



**Image 13 – Front balcony slab with pliable membrane underside.**

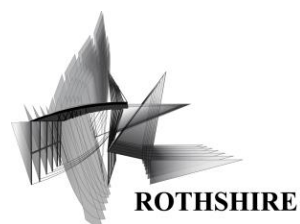


Image 14 – Steel framing & brickwork to stairwell.



Image 15 – Swimming pool.





Image 16 – Weepholes installed to interstory junction.



Image 17 – Weepholes installed to bottom of external wall.

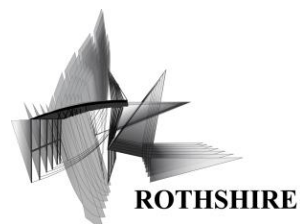


Image 18 – Window with head flashing (typical)

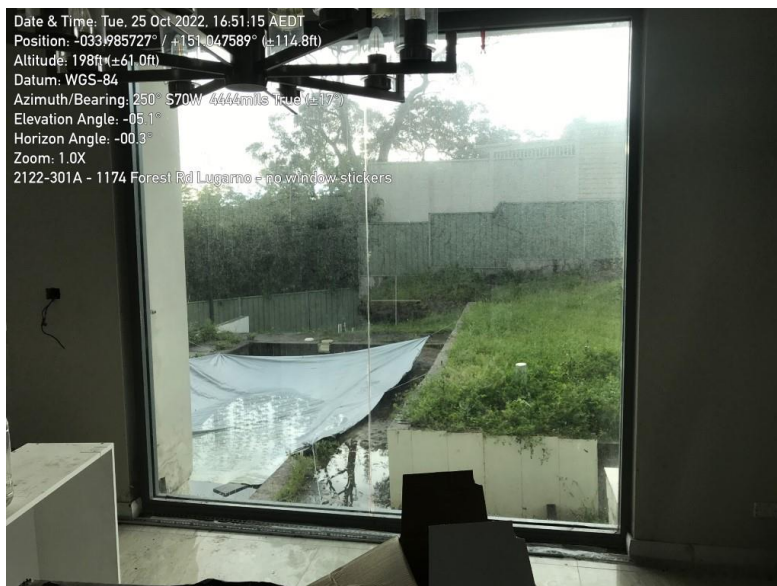


Image 19 – No visible banding to windows.



Image 20 – Eaves and metal guttering.



Image 21 – Door threshold external to internal FFL (ground floor).



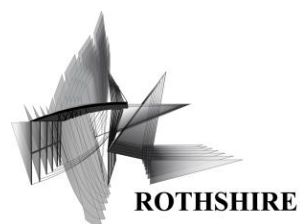
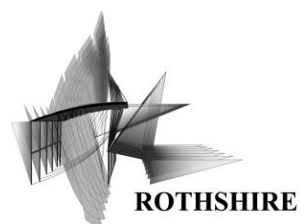


Image 22 – Door threshold external to internal FFL (first floor).



Image 23 – Australian standard glazing sticker.



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**APPENDIX D – WATERPROOFING COMPLIANCE CERTIFICATE**

# CERTIFICATE of WATERPROOFING WET AREAS ABN: 166 18924995

*This certifies  
Astor Homes  
Lot 1174, 1176, 1178 Forest Rd, Lugarno*

Essential waterproofing Pty Ltd is insured with Zurich Australia Insurance Ltd # 245100PZBI and also being licensed qualifications being: Waterproofing Technician #: 215239C, hereby certifies that the, **3 Houses, Bathrooms, En-suites, WC, Laundries, Balconies** has been waterproofed in Accordance with the BCA Volume 2, & 1-F 1.7 & Clause 3.8.1.3 AS3740 and AS4654 Parts 1 & 2-2012 External Balconies of the Code Australia Housesing Provisions and waterproofing wet areas with residential & Commercial building

I am appropriately qualified and experienced to provide the certificate for the component of this project.

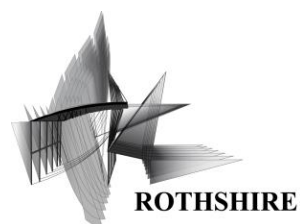
This job is guaranteed for 10 years from the day it was completed.

Product: **HPMMEGAFLEX , BOSTIC DAMPFIX PU, HPM EPOXY PRIMER, BOSTIC SEALN FLEX FC**

ESSENTIAL WATERPROOFING  
PTY LTD  
30 FUGGLES RD  
KENTHURST, 2156  
MOBILE 0409906913

TIGH WALTER

DATE

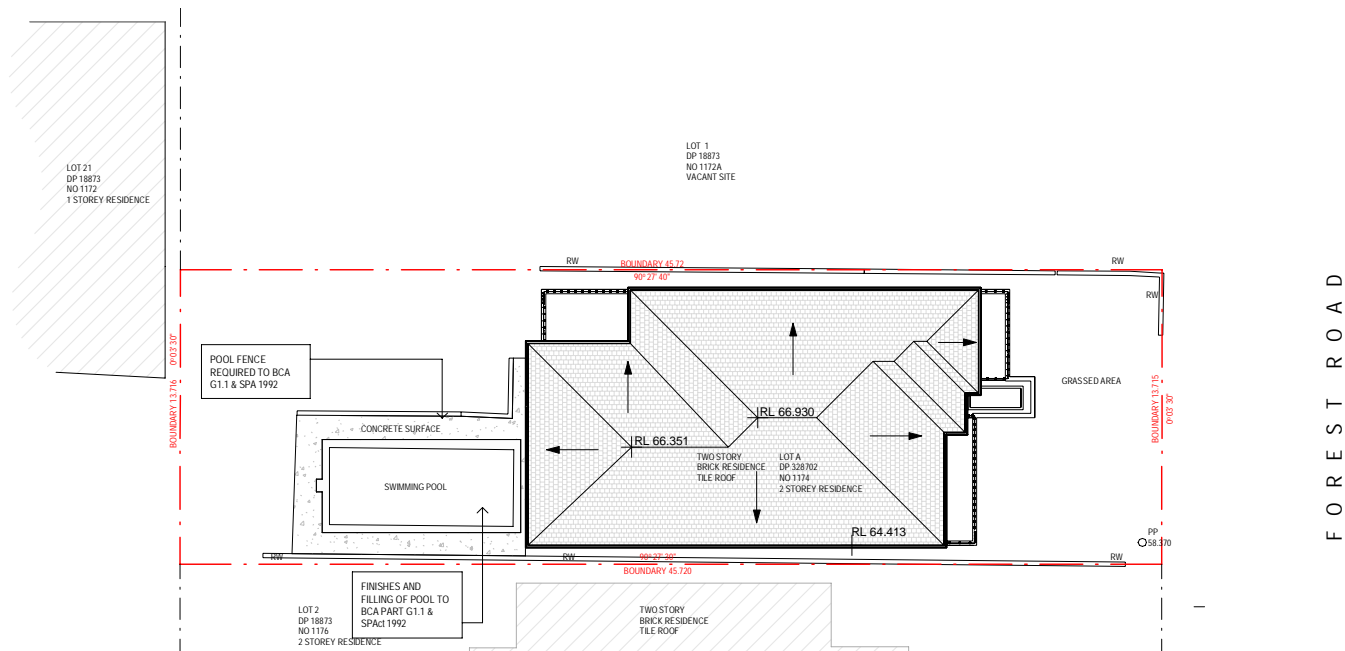


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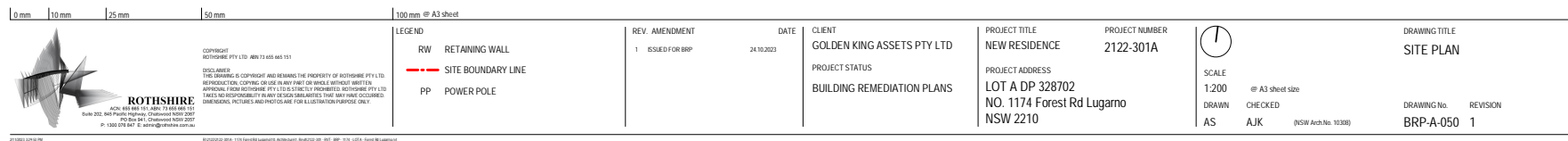
## APPENDIX E – ARCHITECTURAL PLANS

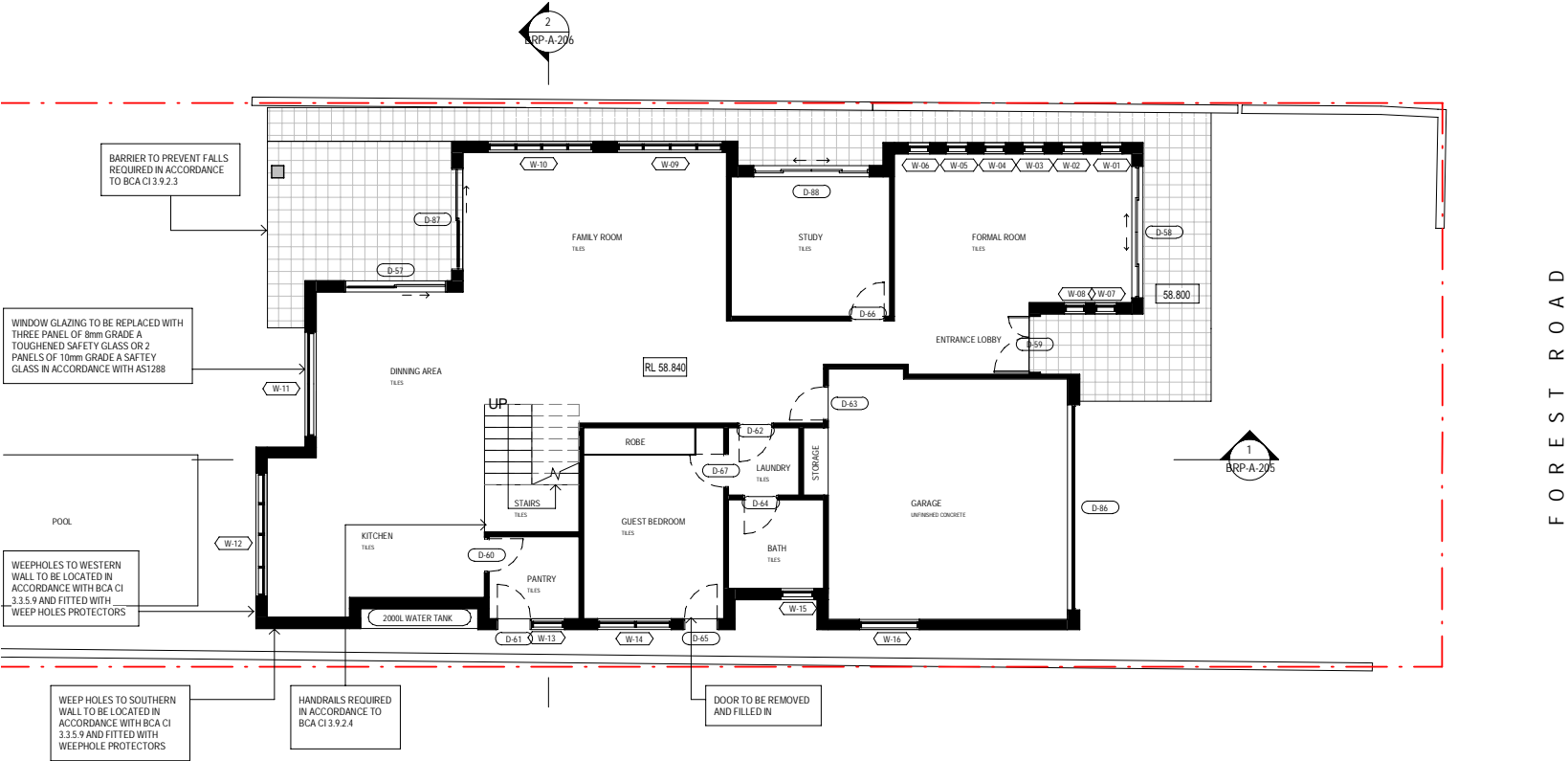


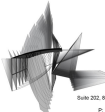



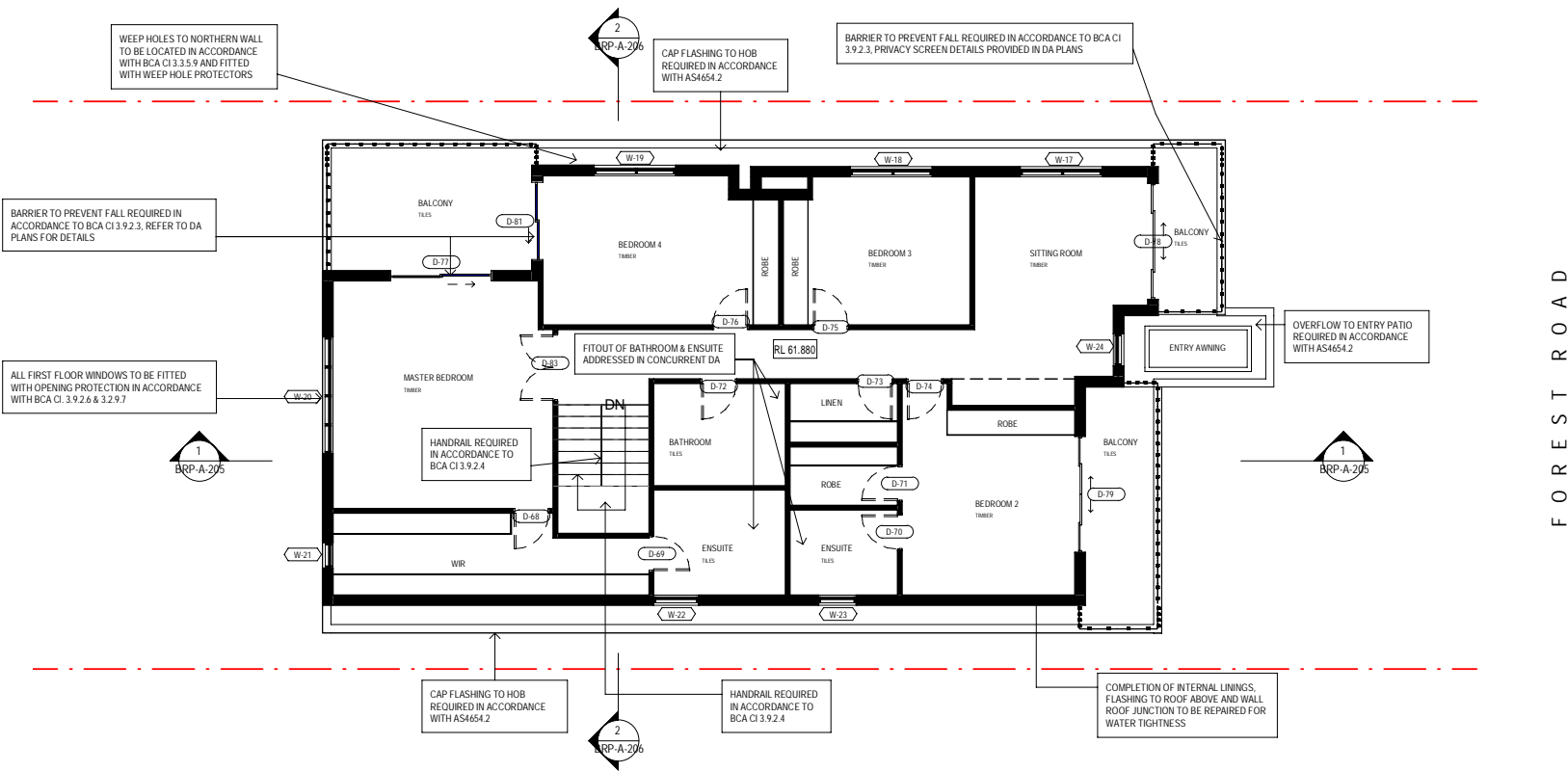


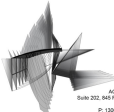

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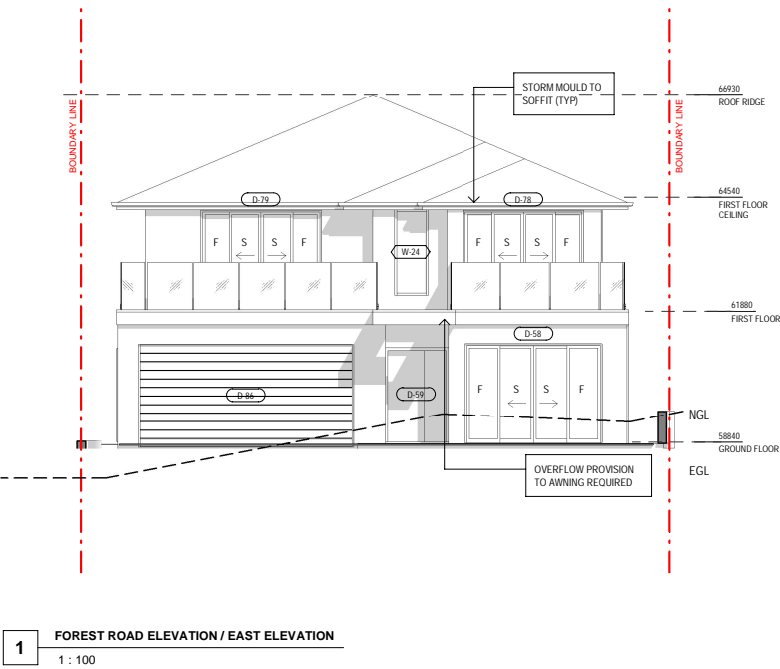
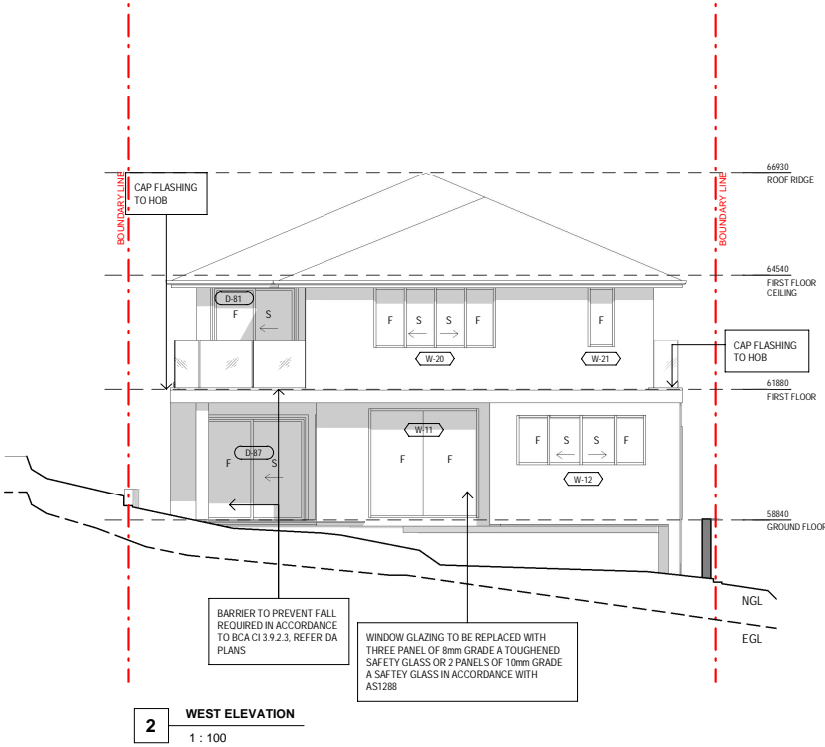




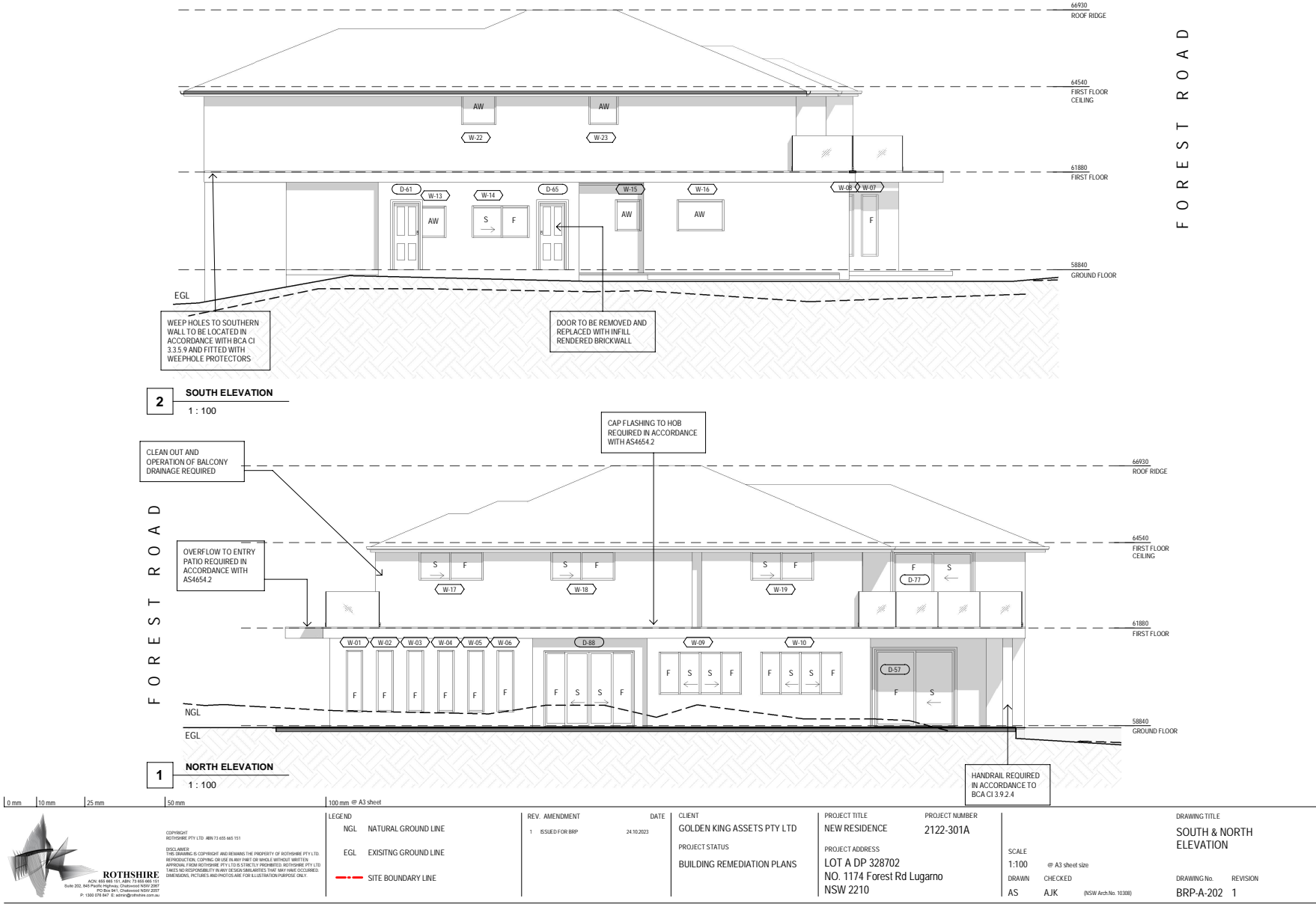
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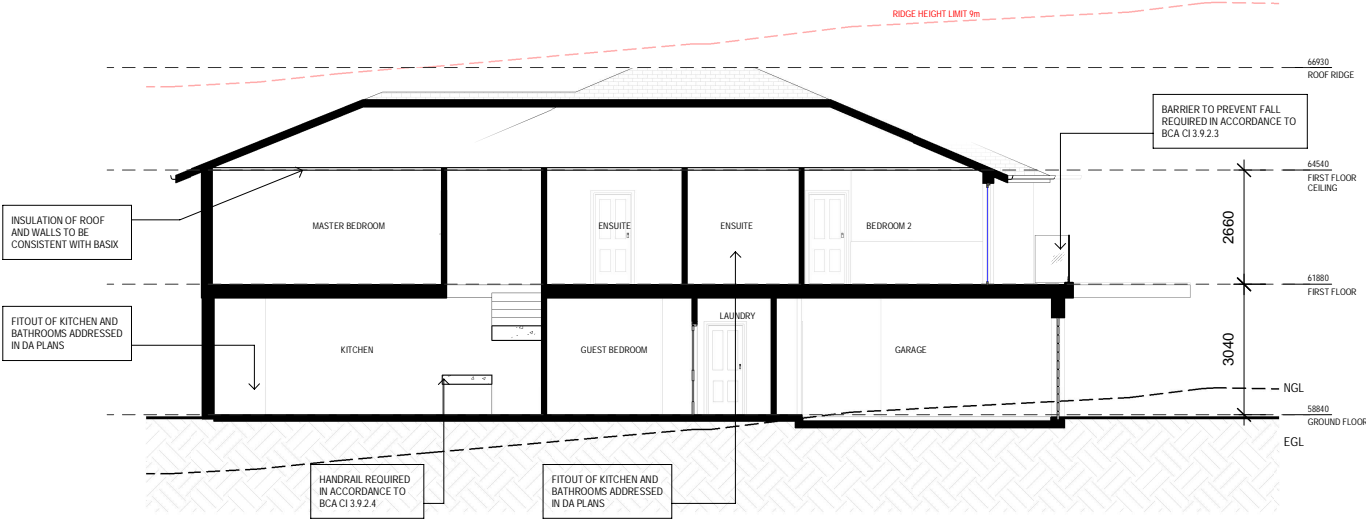


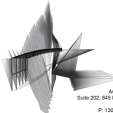
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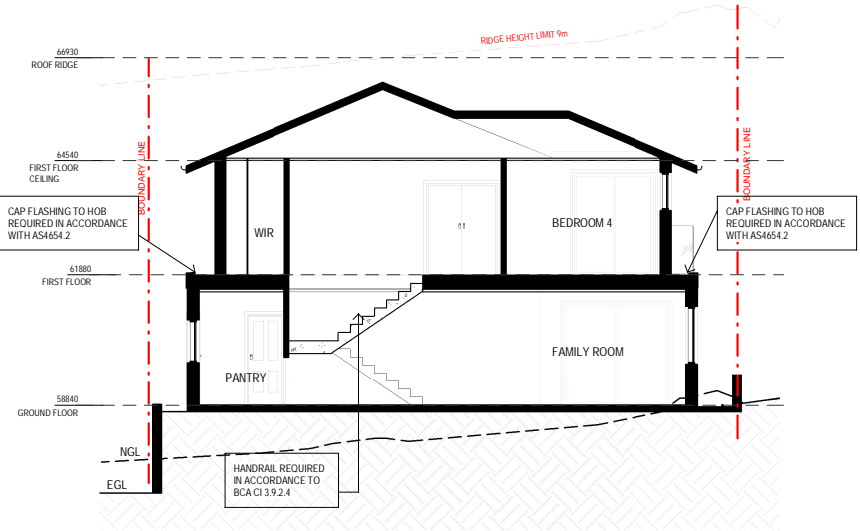


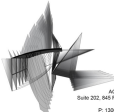
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EGL EXISTING GROUND LINE									
SITE BOUNDARY LINE									





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 <b>ROTHSHIRE</b> ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2067 PO Box 841, Chateau NSW 2067 P: 1300 578 847 E: info@rothshire.com.au				LEGEND			GOLDEN KING ASSETS PTY LTD	NEW RESIDENCE	2122-301A	LONG SECTION PLAN	
COPYRIGHT ROTHSHIRE PTY LTD. ABN 73 455 465 751				1		24.10.2023	PROJECT STATUS	PROJECT ADDRESS		DRAWING No. REVISION	
DISCLAIMER: THIS DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY OF ROTHSHIRE PTY LTD. NO PRODUCTION, COPYING OR USE IN ANY FORM OR MANNER WITHOUT WRITTEN APPROVAL FROM ROTHSHIRE PTY LTD IS STRICTLY PROHIBITED. ROTHSHIRE PTY LTD TAKES NO RESPONSIBILITY IN ANY DESIGN OR MATERIALS THAT MAY BE OCCURRED. DIMENSIONS, PICTURES AND PHOTOGRAPHS FOR ILLUSTRATION PURPOSE ONLY.				NGL NATURAL GROUND LINE			BUILDING REMEDIATION PLANS	LOT A DP 328702 NO. 1174 Forest Rd Lugarno NSW 2210		BRP-A-205 1	
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 <div><b>ROTHSHIR</b> ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2087 PO Box 841, Chateau NSW 2087 P: 1300 578 847 E: info@rothshir.com.au</div>		LEGEND			GOLDEN KING ASSETS PTY LTD	NEW RESIDENCE	2122-301A	CROSS SECTION PLAN	
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		--- SITE BOUNDARY LINE			BUILDING REMEDIATION PLANS	PROJECT ADDRESS LOT A DP 328702 NO. 1174 Forest Rd Lugarno NSW 2210		SCALE 1:100 @ A3 sheet size	
								DRAWN CHECKED AS AJK (NSW Arch.No. 10388)	



03 November 2023

The General Manager  
Georges River Council  
Locked Bag 205, Hurstville NSW 1481

**RE: 1174 FOREST ROAD, LUGARNO**  
**CERTIFICATE OF SWIMMING POOL COMPLIANCE**  
**PROPOSED TWO STOREY SINGLE DWELLING WITH SWIMMING POOL RETAINING**  
**WALLS AND ASSOICIATED LANDSCAPING**

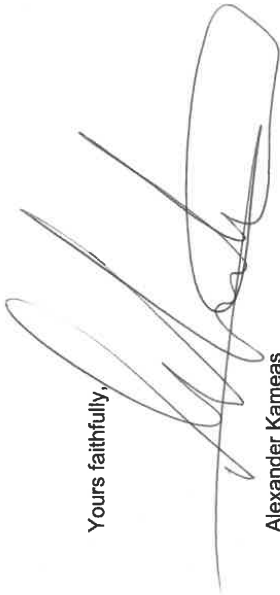
I, Alexander Kameas, hereby certify that that the swimming pool part constructed at Lot A 1174 Forest Road Lugarno is capable of compliance to the swimming pools act 1992 subject to completion of the following:

Completion of the pool finishes including surfaces and coping, paving around the pool.

Installation of appropriate fencing compliant to (NSW Pool Fencing Law) Swimming Pool Act 1992

Installation of pool pumping and filtration system compliant to (Plumbing and Drainage Act 2011 No 59)

Note, inspection and operation of plumbing has been undertaken by others.

Yours faithfully,  


Alexander Kameas  
**Principal Structural Engineer**  
B.E (Structures) Dip. Eng. Prac., M.E (Structural), Adv.Dip.Eng. (Structural), Builders License (NSW)  
No. 256377C, BSPL (TAS) 944877406, Juris Doctor (Current), MIEAust. 4227245; Professional  
Engineer Registration PRE0000232.





Geotechnical Consultants Australia

Astor Homes

## Detailed Site Investigation

Proposed Development at:

1174-1178 Forest Road

Lugarno NSW 2210

Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873

E1933-1

17<sup>th</sup> July 2019

Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-1, 17<sup>th</sup> July 2019



### Report Distribution

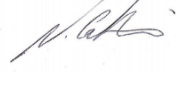

Detailed Site Investigation


Address: 1174-1178 Forest Road Lugarno NSW 2210

GCA Report No.: E1933-1

Date: 17<sup>th</sup> July 2019

Copies	Recipient/Custodian
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Draft	<b>Luke Brevia</b> Environmental Engineer 	<b>Nick Caltabiano</b> Project Manager 	10 <sup>th</sup> July 2019
FINAL	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	17 <sup>th</sup> July 2019

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1	FINAL Report	E1933-1	17 <sup>th</sup> July 2019	-
Issued By:			 Joe Nader	

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1174-1178 Forest Road Lugarno NSW 2210  
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## Executive Summary

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Kirill Charonov of Astor Homes (the client) to conduct a Detailed Site Investigation (DSI) for the properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site).

The objectives of this DSI were to provide an assessment of potential contaminating activities to have impacted the site. Thus, this report includes the following:

- Discussion of the site condition through a desktop review of neighbouring properties and ecological receptors;
- Review of all available environmental, architectural and/or engineering reports previously prepared for the site, including Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, 21<sup>st</sup> May 2018 (AG 2018) which provided a preliminary assessment for the potential of current and historical contaminating activities to have impacted the site;
- Conduct a site inspection to establish a thorough understanding of the current site condition;
- Implement a soil investigation program in accordance with the NSW Environment Protection Authority (NSW EPA) *Sampling Design Guidelines (1995)* to investigate the degree of contamination (if present) by means of intrusive soil sampling and laboratory analysis, for relevant contaminants including: Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), heavy metals and asbestos;
- Implement standard quality assurance (QA) and quality control (QC) measures including the collection of one blind duplicate sample;
- Laboratory analysis of samples collected from the site by a National Association of Testing Authorities (NATA) accredited laboratory;
- Assessment of laboratory analytical data; and
- Provide advice on suitability of land for its proposed residential land-use; and
- Provide an assessment of site contamination (if any) and recommendations for remediation and/or management.

The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an in-built double garage. Each dwelling has in-ground swimming pools constructed at the rear of each dwelling in the western portion of the property. GCA field staff conducted a site inspection on 25<sup>th</sup> June 2019 and a soil investigation program was undertaken with a systematic approach in accessible locations across the site to identify areas of contamination. Soil samples were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities.

During the site inspection fragments of suspected asbestos containing material (ACM) were discovered in the north-western portion of the property. Soil sampling established contamination at the site in the form of asbestos (refer to **Appendix C** for laboratory analytical results and **Figure 2** for locations of samples collected). The levels of this contamination exceeded Health Investigation Levels relevant to the site being residential A criteria (HILs A).

Given the type of onsite contamination identified through soil sampling, GCA recommended an Asbestos Removal Scope of Works (ARSW) in order to make the site suitable for its

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intended development as low-density residential land-use. This is further discussed in **Section 11**.

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## FIGURES

**Figure 1** Site Locality Plan

**Figure 2** Site Plan and Sampling Locations

## APPENDICES

**Appendix A** – Photographic Log

**Appendix B** - Previous Site Investigations

**Appendix C** – Laboratory Analytical Reports (NATA)

**Appendix D** – Supporting Documents

## LIST OF ABBREVIATIONS

A list of the common abbreviations used throughout this report is provided below.

ACM - Asbestos Containing Material

AEC - Area of Environmental Concern

AGST - Above Ground Storage Tank

AHD - Australian Height Datum

BGS - Below ground surface

CSM - Conceptual site model

BTEX - Benzene, toluene, ethylbenzene and xylenes

B(a)P - Benzo(a)pyrene

CCA - Copper Chromate Arsenate

COC - Contaminants of Concern

DEC - NSW Department of Environment and Conservation

DECCW - NSW Department of Environment, Climate Change and Water DQI - Data quality indicator

DQOs - Data Quality Objectives

DWE - NSW Department of Water and Energy

EPA - NSW Environment Protection Authority

ESA - Environmental Site Assessment

ha - Hectare

HIL - Health based investigation level

LOR - Limit of Reporting

OEH - Office of Environment and Heritage

PAHs - Polycyclic aromatic hydrocarbons

PID - Photo-ionisation Detector

PCB - Polychlorinated Biphenyl

PQL - Practical Quantitation Limit

QA/QC - Quality Assurance/Quality Control

RPD - Relative Percentage Difference

SAQP - Sampling, Analysis and Quality Plan

TRH - Total Recoverable Hydrocarbons (previously Total Petroleum Hydrocarbons)

TSS - Total Suspended Solids

UST - Underground Storage Tank

VOC - Volatile Organic Compound

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## 1. INTRODUCTION

### 1.1 BACKGROUND AND PURPOSE

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Kirill Charonov of Astor Homes (the client) to conduct a Detailed Site Investigation (DSI) for the properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site).

As shown in **Figure 1**, the site is located approximately 20 km south-west of the Sydney Central Business District, within the Local Government Area of Georges River Council. The site covers an approximate area of 1,920 m<sup>2</sup> (as shown in **Figure 2**) and is identified as Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873. The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an adjoining ground-level double garage. Each dwelling has in-ground swimming pools constructed at the rear of each dwelling in the western portion of the property and is currently zoned as low density residential.

This report is provided in support of a Development Application (DA) to Georges River Council and for the purpose of enabling the developer to meet its obligations under the Contaminated Land Management Act 1997 (CLM Act), for the assessment and management of contaminated land.

A Preliminary Site Investigation (PSI) (Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, dated 21<sup>st</sup> May 2018), was completed by Australian Geotechnical Pty Ltd (AG) for the site. This document should be read in conjunction with this report.

### 1.2 PROPOSED DEVELOPMENT

GCA understands the existing dwellings and infrastructures were recently constructed within the site, and are still under construction.

Site photographs are included in the photographic log in **Appendix A**.

### 1.3 REGULATORY FRAMEWORK

The following regulatory framework and guidelines were considered during the preparation of this report:

- ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality;
- DECCW (2009) Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008, (UPSS Guidelines);
- DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination;
- NSW EPA (1995) Sampling Design Guidelines;
- EPA (2014) Technical Note: Investigation of Service Station Sites;
- NEPC (2013) Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater;
- NEPC (2013) Schedule B(2) Guideline on Site Characterisation;
- Contaminated Land Management Act 1997;
- State Environment Protection Policy 55 (SEPP 55) – Remediation of Land, and
- Office of Environment and Heritage (2011) Guidelines for Consultants Reporting on Contaminated Sites.

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## 1.4 PROJECT OBJECTIVES

The objectives of this DSI were to provide an assessment of potential contaminating activities to have impacted the site by undertaking the following:

- Discussion of the site condition through a desktop review of neighbouring properties and ecological receptors;
- Review of all available environmental, architectural and/or engineering reports previously prepared for the site, including Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, 21<sup>st</sup> May 2018 (AG 2018) which provided a preliminary assessment for the potential of current and historical contaminating activities to have impacted the site;
- Conduct a site inspection to establish a thorough understanding of the current site condition;
- Implement a soil investigation program in accordance with the NSW Environment Protection Authority (NSW EPA) *Sampling Design Guidelines (1995)* to investigate the degree of contamination (if present) by means of intrusive soil sampling and laboratory analysis, for relevant contaminants including: Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPP), heavy metals and asbestos;
- Implement standard quality assurance (QA) and quality control (QC) measures including the collection of one blind duplicate sample;
- Laboratory analysis of samples collected from the site by a NATA accredited laboratory;
- Assessment of laboratory analytical data;
- Provide advice on suitability of land for its proposed residential land-use; and
- Provide an assessment of site contamination (if any) and recommendations for remediation and/or management.

## 1.5 SCOPE OF WORKS

To achieve the above listed project objectives, the following scope of works were undertaken to produce this DSI.

### 1.5.1 Desktop Study

Review of available environmental, architectural and/or engineering reports, including the previous PSI (AG, 2018) prepared for the site, which covered the following:

- A site inspection to identify potential sources of contamination;
- Historical investigations relating to the site (if any);
- Dial-Before-You-Dig enquiry for an evaluation into local underground services and assets;
- Review of local geological and hydrogeological information, including an evaluation of the WaterNSW registered groundwater bore database; and
- Limited sampling program focusing on the western portion of the site.
- Dial-Before-You-Dig enquiry for an evaluation into local underground services and assets; and
- Review of local geological and hydrogeological information, an evaluation of the WaterNSW registered groundwater bore database and Acid Sulphate Soil (ASS) data.



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### 1.5.2 Fieldwork & Laboratory Analysis

A site inspection and soil investigation program were undertaken on 25<sup>th</sup> June 2019 by GCA, and included:

- Hand auger excavation of twelve (12) boreholes (BH1 to BH12 inclusive) spread across accessible areas of the site in a systematic approach to identify areas of contamination; and
- Multiple level soil sampling within fill and natural soils which included the collection of fifteen (15) primary soil samples and 1 secondary blind duplicate soil sample, were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities, as determined from the site history survey and field observations made during the investigation program.

### 1.5.3 Data Analysis and Reporting

The objective of this DSI report is to document desktop study findings, the conceptual site model, data quality objectives, investigation methodologies and analytical results. In addition, a discussion of laboratory analytical results and recommendations for remediation of contamination are presented.

## 2. SITE INFORMATION

### 2.1 SITE IDENTIFICATION

The location of the site is shown in **Figure 1** with a detailed site plan shown in **Figure 2**.

**Table 1:** Site Details

<b>Address</b>	1174-1178 Forest Road Lugarno NSW 2210
<b>Deposited Plan</b>	Lot A DP 328702, Lot 2 DP 18873 & Lot 3 DP 18873
<b>Locality Map</b>	<b>Figure 1</b>
<b>Site Plan</b>	<b>Figure 2</b>
<b>Site Photographs</b>	<b>Appendix A</b>
<b>Total Area (approx.)</b>	1,920m <sup>2</sup>

### 2.2 SITE DESCRIPTION

A qualified environmental consultant inspected the site on 25<sup>th</sup> June 2019. Site photographs are provided in **Appendix A**. Observations noted during the inspection are summarised below.

At the time of the site inspection, the site contained the following structures and features:

- Three two-storey brick-rendered dwellings with tile roofs. All three dwellings appeared to be incomplete and still within the construction phase of their development;
- Two dwellings had basement level double-garages and one dwelling had an adjoining ground-level double garage;
- Three in-ground swimming pools were located in the western portion of the property. One swimming pool per dwelling;
- Construction materials and construction waste were located across the site including suspected asbestos containing materials (ACM);
- On-site vegetation showed no signs of decay and/or stress;
- Surface standing water was noticed at the site in all three swimming pools and the two basement garages; and

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- There were no indicators of underground storage tanks.

## 2.3 SURROUNDING LAND USE

**Table 2** below outlines the surrounding land-uses neighbouring the site.

**Table 2:** Surrounding Land-Use Adjacent to the Site.

Direction from Site	Land-Use
North	Vacant property fronting Forest Road and residential properties beyond.
East	Forest Road and residential properties beyond.
South	Residential properties, Forest Road and residential properties beyond.
West	Residential properties.

## 2.4 SURFACE WATER RECEPTORS

Based on regional topography and the nearest surface water source, Boggywell Creek approximately 470m east and the Georges River approximately 520m south from the site, groundwater is expected to flow towards the east and/or south. Given the distance to Boggywell Creek and Georges River, they are not considered to be receptors of groundwater contamination sourced from the site (if any).

## 2.5 GEOLOGY

The Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, Edition 1, 1983), published by the Department of Minerals and Energy indicates the residual soils within the site to be underlain by Hawkesbury Sandstone of the Wianamatta group comprising medium to coarse-grained quartz sandstone, very minor shale and laminite lenses.

## 2.6 HYDROLOGY

A groundwater bore search was conducted on 24 June 2019 and no registered groundwater bores were detected within 500m of the site.

## 2.7 ACID SULPHATE SOILS

To determine whether there is a potential for acid sulphate soils (ASS) to be present at the site, a review of available ASS risk maps was undertaken. The site is located within an area which suggests there is no known occurrence regarding the presence of ASS. This review is indicative only as a detailed investigation into ASS risk at the site was not included as part of the scope of this DSI.

## 3. PREVIOUS INVESTIGATIONS

Previous environmental investigations of the site were recorded under the following report:

- Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at: 1174 to 1178 Forest road, Lugarno, NSW, 2210*, dated 21<sup>st</sup> May 2018.

AG (2018) undertook a PSI of the site to assess whether the fill materials on site presented a risk to human health. A limited sampling program was undertaken on 6<sup>th</sup> May 2018 targeting fill materials in the western portion of the site. Soil sample analytical results found that the soils were considered suitable to remain on-site when compared to appropriate Health Investigation Levels (HIL) and Health Screening Levels (HSL) for the exposure setting of 'standard residential with garden/accessible soil'.

Refer to **Appendix B** for further details of these results.

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#### 4. CONCEPTUAL SITE MODEL

In accordance with NEPM (2013) Schedule B2 – Guideline on Site Characterisation, and to aid in the assessment of data collection for the site, a Conceptual Site Model (CSM) was created to assess the plausible pollutant linkages between potential contamination sources, migration pathways and receptors. The CSM provides a framework for the review of the reliability and useability of the data collected and to identify data gaps in the existing site characterisation. The CSM can be seen in **Table 3** in **Section 4.2**.

##### 4.1 POTENTIAL CONTAMINATION

Based on the findings of the previous site investigation by AG (2018), a desktop review of the site and neighbouring properties and nearby ecological receptors, the chemicals of potential concern (COPC) at the site are considered to be:

Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), heavy metals and asbestos.

##### 4.2 CONTAMINATION SOURCES, EXPOSURE PATHWAYS & RECEPTORS

Potential contamination sources, exposure pathways and human and environmental receptors that were considered relevant for this assessment are summarised along with a qualitative assessment of the potential risks posed by complete exposure pathways in **Table 3**.

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**Table 3: Conceptual Site Model**

Potential Sources	Potential Receptor	Potential Exposure Pathway	Complete connection	Risk	Justification
Contaminated soil from importation of uncontrolled fill across the site.  ACM  Use of OCPs	Site occupants, workers, general public	Dermal contact, inhalation/ingestion of particulates	Limited (current)	Low	Direct contact with potentially contaminated soils is limited.
			No (Future)	Negligible	If present, impacted soils are likely to be disposed of off-site.
	Ecosystem of Boggywell Creek and Georges River	Migration of impacted groundwater and surface water run-off.	Yes (current)	Low	No obvious sources of inorganic contamination were observed on site that could migrate off-site with surface water run-off.
			No (Future)	Negligible	If present, contaminated soils and groundwater are likely to be remediated. Unlikely contamination would reach Boggywell Creek and Georges River due to distance from site.
	Underlying aquifer	Leaching and migration of contaminants through groundwater infiltration.	Limited (current)	Low	Due to existing sealed surfaces, expected shallow bedrock, leachability of CoCs, migration of CoCs is likely to be limited.
			No (Future)	Low	If present, contaminated soil and/or groundwater is likely to be remediated.

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#### 4.3 ADDRESSED DATA GAPS

Based on information on the site history and the site investigation on 25<sup>th</sup> June 2019, a program of intrusive soil investigation was required to address the following data gaps:

- Previous environmental investigations targeted only the western portion of the site therefore, to gain an overall understanding of potential on-site contamination a systematic approach to soil sampling accessible areas was undertaken across the entirety of the site;
- Potential presence of onsite contamination (as listed in **Section 4.1**); and
- The degree and extent of onsite contamination, if present.

#### 5. DATA QUALITY OBJECTIVES

In accordance with the US EPA (2006) Data Quality Assessment and the DEC (2006) Guidelines for the NSW Site Auditor Scheme, the process of developing Data Quality Objectives (DQO) was used to determine the appropriate level of data quality needed for the specific data requirements of the project. The DQO process that was applied for this assessment is documented below.

- **Step 1:** State the problem.  
The subject site may be contaminated as a result of previous and current land use which may impact suitability of the site for use as the proposed childcare centre.
- **Step 2:** Identify the decision.  
The site is suitable for residential land use without the requirement for remediation and/or management.
- **Step 3:** Identify inputs into the decision.
  - Identification of issues of potential environmental concern;
  - Appropriate identification of COPC;
  - Systematic soil sampling and analysis programs of shallow soil across the site
  - Visual inspection of systematic shallow soil samples for presence of ACM;
  - Appropriate quality assurance / control to enable an evaluation of the reliability of the analytical data; and
  - Screening sample analytical results against appropriate assessment criteria for the intended land use.
- **Step 4:** Define the boundaries of the site. The project boundary is defined as the area within the site boundary of the proposed development.
- **Step 5:** Develop a decision rule.
  - To accept the assessment decision the following decision rules apply:  
For systematic grid based soil sampling the sampling data must meet the following qualifiers;
    - The 95% Upper Confidence Limit of COPC concentration data does not exceed the soil assessment criteria;
    - No single sample exceeds 250% of the soil COPC assessment criteria;
    - The standard deviation of COPC analytical results is less than 50% of the soil assessment criteria; and
    - There is no visible identification of ACM in soil samples or on the ground surface.
- **Step 6:** Specify acceptable limits on decision errors.  
The field sampling methodology, sample preservation techniques, and laboratory analytical procedures must be appropriate to provide confidence in data quality so

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any comparison against assessment criteria can be considered reliable. This is achieved by defining and comparing results against the Data Quality Indicators (DQIs).

- **Step 7:** Optimise the design for obtaining data.  
This is achieved by sampling plan design in consideration of the available site history information, area of investigation, contaminant behaviour in the environment, and likely spatial distribution of contamination.

## 6. INVESTIGATION METHODOLOGIES

GCA conducted a site inspection and soil sampling program on 25<sup>th</sup> June 2019. Sample locations for the site are presented on **Figure 2**. The investigation methodology is presented below.

### 6.1 SAMPLING ANALYSIS PLAN

To assess the potential for soil contamination at the site, GCA completed the following scope of works:

- Collection of fifteen (15) primary soil samples (BH1 0.1 to BH12 0.5), from twelve (12) locations (BH1 to BH12 inclusive) at depths ranging from approximately 0.1m to 0.8m. Refer to **Figure 2** for sample depths and locations;
- Quality Assurance (QA) and Quality Control (QC) sampling of one secondary blind duplicate sample (QS-1);
- Visual inspection of the ground surface and excavated soil for ACM; and
- Submission of fifteen (15) primary soil samples (BH1 0.1 to BH12 0.5) and one secondary blind duplicate soil sample (QS-1) to a NATA accredited laboratory for analysis of COPC comprising TRH, BTEX, PAHs, OCPs, OPPs, heavy metals and asbestos.

### 6.2 SOIL SAMPLING METHODOLOGY

Boreholes BH1 to BH12 inclusive were completed using a manual hand auger to a maximum depth of 0.8m below ground surface (bgl) or prior refusal.

Soil samples were collected directly from the auger, placed in laboratory prepared 250mL soil jars, labelled and placed on ice in an esky for transport under chain of custody (COC) to a NATA Accredited Laboratory for the analysis of the COPC. The hand auger was decontaminated between each borehole excavation with Decon90.

**Table 4** below summarises subsurface conditions across the site as observed during borehole excavations. Borehole locations are referenced in **Figure 2**.

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**Table 4:** Borehole Logs

Borehole	Depth Range (m)	Description	Moisture	Density	Plasticity
BH1	0.0 - 0.2	Grass cover.  Gravelly Clayey SAND, fine to coarse grain, brown, crushed sandstone cobbles.	Medium	Loose	Low
	0.2 - 0.3	Silty SAND, fine to medium grain, brown	Low	Loose	-
	0.3 - 0.5	Clayey SAND, fine to coarse grain, crushed sandstone, plastic fragments, red/ pale grey	Medium	Loose - Medium Dense	-
	0.5 - 0.6	Natural: Clayey SAND, fine to medium grain, pale brown/ orange/ pale grey.	Medium	Loose - Medium Dense	-
	Hand auger refusal at 0.6m				
BH2	0.0 - 0.4	Grass cover. Sandy CLAY, fine to coarse grain, brown, crushed sandstone cobbles.	High	Loose	Low
	Hand auger refusal at 0.4m				
BH3	0.0 - 0.3	Sandy CLAY, fine to medium grain, crushed bricks and sandstone, brown.	Medium	Loose	Low
	0.3 - 0.5	Natural: Clayey SAND, fine to medium grain, pale brown/ orange/ pale grey.	Medium	Loose - Medium Dense	-
	Hand auger refusal at 0.5m				
BH4	0.0 - 0.4	Sandy CLAY, fine to medium grain, crushed bricks and sandstone, brown.	High	Medium Dense	Low
	Hand auger refusal at 0.4m				
BH5	0.0 - 0.8	Grass cover.  Gravelly Clayey SAND, crushed sandstone.	Medium	Loose - Medium Dense	
	Hand auger refusal at 0.8m				
BH6	0.0 - 0.3	Grass cover.  Gravelly Clayey SAND, crushed sandstone.	Medium	Loose - Medium Dense	
	Hand auger refusal at 0.3m				
BH7	0.0 - 0.5	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone.	High	Loose - Medium Dense	

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	Hand auger refusal at 0.5m				
BH8	0.0 – 0.3	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, glass, brick, concrete, plastic.	High	Loose - Medium Dense	
	0.3 – 0.6	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Medium Dense	
	Hand auger refusal at 0.6m				
BH9	0.0 - 0.5	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.5m				
BH10	0.0 – 0.4	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.4m				
BH11	0.0 – 0.4	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.4m				
BH12	0.0 – 0.6	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.6m				

### 6.3 QUALITY ASSURANCE

Quality Assurance (QA) and Quality Control (QC) sampling was undertaken in general accordance with relevant Australian Standards and guidelines. Field QC samples collected are summarised in **Table 5**.

**Table 5:** Quality Control Duplicate Sample Summary

Sample Identification	Sample Type	Sample Matrix	Rate of Collection
QS-1	Field Duplicate of BH1 0.1	Soil	1 in 20 Samples

The laboratory internal QC procedures are consistent with NEPM policy on laboratory analysis of contaminated soils.



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## 7. ASSESSMENT CRITERIA

The following soil assessment criteria were adopted for the investigation.

### **NEPM Health Based Investigation Level A (HILs A)**

HILs are Tier 1 risk based generic assessment criteria used for the assessment of potential risks to human health from chronic exposure to contaminants in soil. They are intentionally conservative and based on a reasonable worst-case scenario for generic land use settings including Residential (HILs A/B), Open Space/Recreational (HILs C) and Commercial Industrial (HILs D). HILs A soil assessment criteria were adopted on the basis the proposed site use is a residential unit block.

### **NEPM Health Screening Levels A (HSLs A)**

HSLs are Tier 1 risk based generic soil assessment criteria used for the assessment of potential risks to human health from chronic inhalation exposure of petroleum vapour emanating off petroleum contaminated soils (Vapour Risk). They are intentionally conservative and based on a reasonable worst-case scenario for generic soil types, contamination depth and land use settings including Residential (HSLs A/B), Open Space/Recreational (HSLs C) and Commercial Industrial (HSLs D). HSLs A soil assessment criteria for sand soil from 0 to <1 m were adopted on the basis that the proposed site use is a residential unit block and onsite topsoil comprised sandy loam.

### **NEPM Management Limits – Residential, Parkland and Public Open Space**

Management Limits for petroleum have been developed for prevention of explosive vapour accumulation, prevention of the formation of observable Light Non-Aqueous Phase Liquids (LNAPL) and protection against effects on buried infrastructure. Residential, parkland and public open space limits have been adopted based on the proposed land use.

### **NEPM Soil Ecological Assessment Levels**

Soil ecological assessment was not considered warranted based on the following:

- There are no onsite or nearby off site sensitive ecological receptors.

## 8. INVESTIGATION RESULTS

### **8.1 SOIL ANALYTICAL RESULTS**

The soil analytical results are summarised below. Soil analytical results are presented in the laboratory reports in **Appendix C**.

#### **Total Recoverable Hydrocarbons**

No TRHs were detected at concentrations greater than laboratory limits of reporting (LOR) in any of the soil samples.

#### **Benzene Toluene Ethylbenzene Xylenes**

No BTEX compounds were detected at concentrations greater than laboratory LOR in any of the soil samples.

#### **Polycyclic Aromatic Hydrocarbons**

No PAHs were detected at concentrations greater than laboratory LOR in any of the soil samples.

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### Organochlorine Pesticides

No OCPs were detected at concentrations greater than laboratory LOR in any of the soil samples.

### Organophosphorus Pesticides

No OPPs were detected at concentrations greater than laboratory LOR in any of the soil samples.

### Heavy Metals

Heavy metals were detected at concentrations greater than laboratory limits of reporting (LOR) in all soil samples collected, however, no concentrations exceeded the Health Investigation Levels for Residential A criteria. Refer to **Table 6** below for a summary of these results. Laboratory analytical reports are presented in **Appendix C**.

**TABLE 6:** Summary of Soil Analytical Data Against Health Investigation Levels Residential A Criteria – Heavy Metals

Chemical	LOR	HIL A	Sample Name	BH1 0.1 (mg/kg)	BH2 0.2 (mg/kg)	BH3 0.2 (mg/kg)	BH3 0.5 (mg/kg)	BH4 0.1 (mg/kg)
			Sample Depth (m bgl)	0.1	0.2	0.2	0.5	0.1
Arsenic	2	100		28	6	<4	5	10
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	5	100		11	9	10	27	11
Copper	5	7000		6	9	3	<1	16
Lead	5	300		12	19	48	3	19
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		1	3	1	<1	3
Zinc	5	8000		29	43	12	5	94
Chemical	LOR	HIL A	Sample Name	BH5 0.2 (mg/kg)	BH6 0.2 (mg/kg)	BH7 0.1 (mg/kg)	BH8 0.1 (mg/kg)	BH9 0.1 (mg/kg)
			Sample Depth (m bgl)	0.2	0.2	0.1	0.1	0.1
Arsenic	2	100		<4	12	10	8	9
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	5	100		7	9	11	11	10
Copper	5	7000		6	4	5	5	5
Lead	5	300		16	12	11	10	10
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		2	2	<1	<1	<1
Zinc	5	8000		54	120	57	58	56
Chemical	LOR	HIL A	Sample Name	BH9 0.5 (mg/kg)	BH10 0.2 (mg/kg)	BH11 0.1 (mg/kg)	BH12 0.1 (mg/kg)	BH12 0.5 (mg/kg)
			Sample Depth (m bgl)	0.5	0.2	0.1	0.1	0.5
Arsenic	2	100		8	7	8	15	13
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4

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Chromium	5	100		11	9	11	17	10
Copper	5	7000		4	6	5	3	5
Lead	5	300		9	9	9	7	9
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		1	<1	<1	<1	<1
Zinc	5	8000		51	48	52	52	44

#### pH in Soil

**Table 7** below summarises the results for pH in the soil samples collected.

**Table 7:** pH Analytical Results

Analyte	Sample Name	BH1 0.1 (pH Units)	BH2 0.2 (pH Units)	BH5 0.2 (pH Units)	BH12 0.5 (pH Units)
	Sample Depth (m bgl)	0.1	0.2	0.2	0.5
pH 1:5 soil : water		7.1	8.9	9.0	6.6

#### Asbestos

Asbestos was detected in soil samples BH7 0.1, BH8 0.1 and BH11 0.1 exceeding applicable guidelines criteria for standard residential use as determined by NEPM (2013). **Table 8** provides a summary of these findings.

**Table 8:** Asbestos Detected in Soil Samples Compared with Adopted Criteria

Chemical	LOR	HIL A	Sample Name	BH7 0.1 (mg/kg)	BH8 0.1 (mg/kg)	BH11 0.1 (mg/kg)
			Sample Depth (mbgl)	0.5	0.2	0.1
Asbestos Detected				Yes	Yes	Yes
Asbestos Type				Chrysotile	Chrysotile, Amosite and Crocidolite	Chrysotile, Amosite and Crocidolite
Total Asbestos (%)	0.1	0.01%		1.58	0.39	0.14

#### 8.2 QA/QC RESULTS

Relative Percentage Difference (RPD) applies if results are at least 10 times the LOR, otherwise no acceptance criteria for RPD's applies. Soil duplicate results are within the adopted acceptance criteria of 30-50% (AS4482.1) RPD of values exceeding laboratory limits of reporting. **Table 9** summarises these results.

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**Table 9:** Summary of Primary Sample and Field Duplicate Sample with Results Exceeding LORs and Respective RPD Values.

Chemical	LOR	HIL A	Sample Name	BH1 0.1 (mg/kg)	QS-1 (mg/kg)	RPD (%)
			Sample Depth (m)	0.1	0.1	
Arsenic	2	100		28	27	3.6
Cadmium	0.4	20		<0.4	<0.4	0
Chromium	5	100		11	13	0
Copper	5	7000		6	7	16.7
Lead	5	300		12	14	15.4
Mercury	0.1	200		<0.1	<0.1	0
Nickel	5	400		1	2	66.7
Zinc	5	8000		28	31	10.2

## 9. DATA GAPS

The scope of works described in this DSI report are subject to restrictions and limitations. GCA did not perform a complete assessment of all possible conditions and locations at the site. This is due to the areas to be sampled were either outside the scope of works and/or inaccessible at the time of the site inspection and sampling program therefore, data gaps exist and are listed below.

- Due to the characteristics of fill material across the site consisting of bricks, concrete and sandstone, refusal of the hand auger to penetrate to fill material caused borehole excavations to be terminated at shallow depths. The depth of fill and natural soil material was established in few boreholes and is inferred to be relatively consistent across the site;
- The characteristics of groundwater and surface water onsite was outside the scope of works; and
- Characteristics of fill and natural soils in inaccessible areas and beneath all concrete surfaces (i.e.: beneath dwellings and in-ground pools).

## 10. CONCLUSIONS

The properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site) was the subject of a DSI to assess the presence of on-site contamination associated with current and historical uses of the property. The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an in-built double garage. Each dwelling has an in-ground swimming pool constructed at the rear, in the western portion of the property.

GCA field staff conducted a site inspection on 25<sup>th</sup> June 2019 and a soil investigation program was undertaken with a systematic approach in accessible locations across the site to identify areas of contamination. Soil samples were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities.

COPCs were not identified in soil samples collected at concentrations in excess of applicable guideline criteria, with the exception of heavy metals and asbestos. It is noted that, heavy metals were identified in soil samples collected above laboratory LOR, however these did not exceed applicable guideline criteria.

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During the site inspection fragments of suspected ACM were discovered in the north-western portion of the property. Soil sampling established contamination at the site in the form of asbestos (refer to **Appendix C** for laboratory analytical results and **Figure 2** for locations of samples collected). The levels of this contamination exceeded Health Investigation Levels relevant to the site being residential A criteria (HILs A).

Given the type of onsite contamination identified through soil sampling, GCA recommended an Asbestos Removal Scope of Works (ARSW) in order to make the site suitable for its intended development as low-density residential land-use. This is further discussed in **Section 11** below.

## 11. RECOMMENDATIONS

It is the opinion of GCA and in accordance with relevant Australian Standards and guidelines that the site can be made suitable for the proposed development as low-density residential dwellings subject to the implementation of the following recommendations.

The presence of asbestos in fill materials exceeding applicable guideline criteria in soil samples taken from BH7 0.1, BH8 0.1 and BH11 0.1 must be remediated according to the appropriate Australian Standards and guidelines.

An Asbestos Removal Scope of Works (ARSW) should be prepared prior to the remediation of the asbestos contaminated areas. This document will provide details of the methodology and procedures required for the appropriate excavation, stockpiling, handling, transport and disposal off-site at an appropriately licenced facility to accept such waste.

The ARSW will also provide the requirements and procedures for contaminated site soils to be excavated and disposed off-site to complete remedial works and must be done so in accordance with the appropriate Australian Standards and guidelines including, *Waste Classification Guidelines* (NSW EPA, 2014). Validation of soils will be done in accordance with the ARSW to ensure that any contamination is remediated or managed by assessing against the respective NSW EPA thresholds and guidelines.

Preparation of a final site validation report by GCA, concluding that the site has been remediated to allow the proposed development for residential purposes.

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1174-1178 Forest Road Lugarno NSW 2210  
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## 12. LIMITATIONS

The findings of this report are based on the Scope of Work outlined in Section 1.5. GCA performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of GCA personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, GCA assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of GCA, or developments resulting from situations outside the scope of this project.

The results of this assessment are based on the site conditions identified at the time of the site inspection and validation sampling. GCA will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report.

GCA is not engaged in environmental consulting and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

### Geotechnical Consultants Australia Pty Ltd (GCA)

**Prepared by:**

A handwritten signature in black ink, appearing to read 'LB', followed by a horizontal line.

**Luke Breva**  
Environmental Scientist

**Reviewed by:**

A handwritten signature in black ink, appearing to read 'N. Caltabiano', followed by a horizontal line.

**Nick Caltabiano**  
Project Manager

Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
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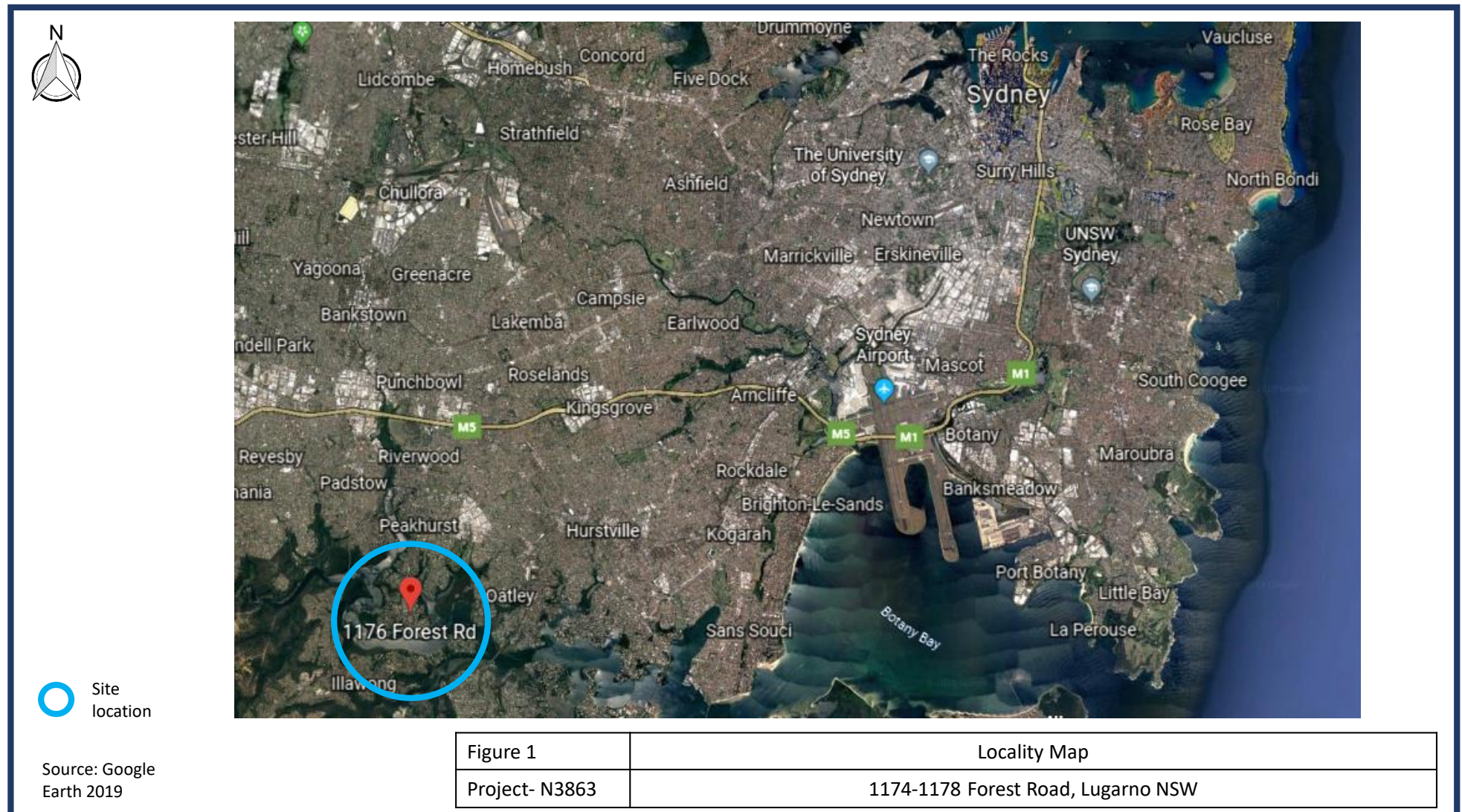


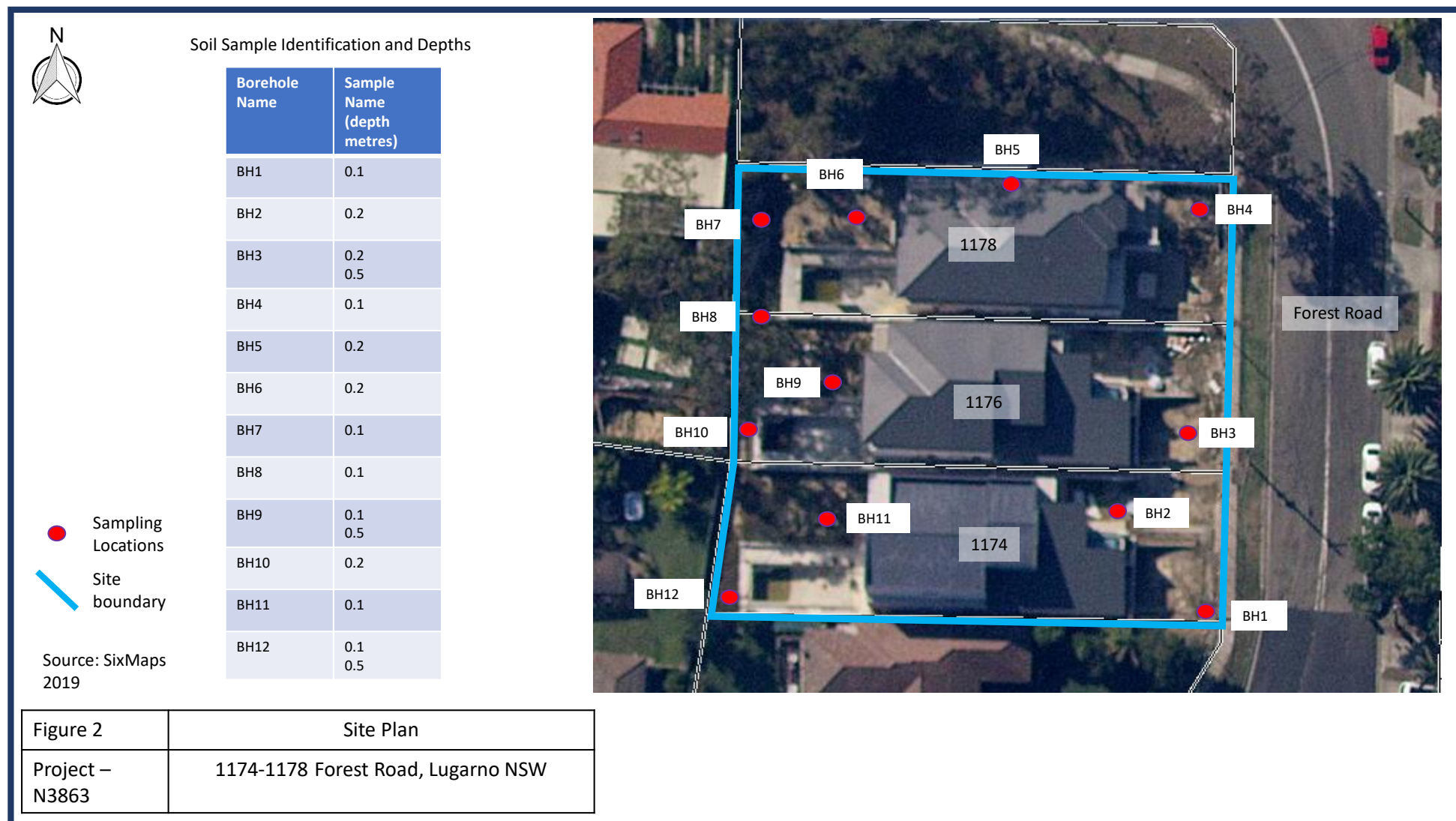
### 13. REFERENCES

- NSW Environmental Protection Authority, *Waste Classification Guidelines Part 1: Classifying Waste*, 2014.
- Google Earth, <https://www.google.com/earth>.
- National Environment Protection Measures (2013), *Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater*.
- National Environment Protection Measures (2013), *Schedule B2 – Guideline on Site Characterisation*.
- NSW Environmental Protection Authority, *Waste Classification Guidelines Part 1: Classifying Waste*, 2014.
- NSW Environmental Protection Authority, *Guidelines for Consultants Reporting on Contaminated Sites*, 2011.
- NSW Environmental Protection Authority, *Sampling Design Guidelines*, 1995
- Six Maps, <https://www.maps.six.nsw.gov.au>.
- State Environment Protection Policy 55 (SEPP 55). *Remediation of Land Under the Environmental Planning and Assessment Act*.
- WaterNSW, [water.nsw.gov.au](http://water.nsw.gov.au).

## FIGURES









# APPENDIX A

## Photographic log

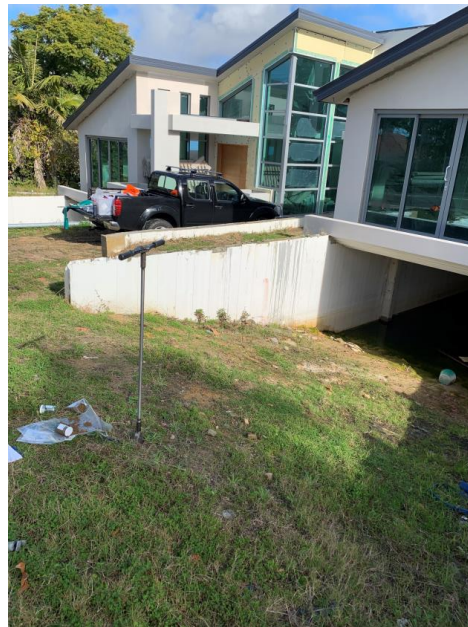
## APPENDIX A

# PHOTOGRAPHIC LOG





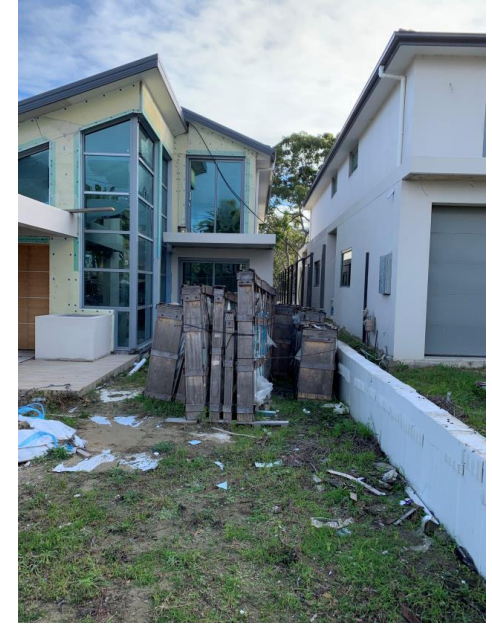
Photograph 1: Street view looking south-west at 1178 Forest Road, main dwelling and basement garage containing surface water.



Photograph 2: Street view looking south-west at 1176 Forest Road, main dwelling and basement garage containing surface water.



Photograph 3: View looking north from 1176 Forest Road, eastern portion of the site. Construction materials, waste and fill material with grass cover visible.



Photograph 4: View looking at 1176 Forest Road, from eastern portion of the site. Construction materials, waste and fill material with grass cover visible.

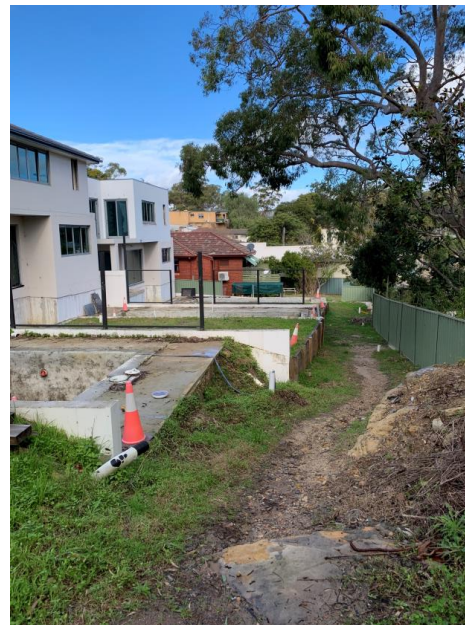




Photograph 5: Street view looking west at 1174 Forest Road, main dwelling and ground-level garage.



Photograph 6: Street view looking north at 1174 Forest Road, main dwelling and adjacent garage.



Photograph 7: View looking south from north-west corner of the site. Exposed fill material visible.



Photograph 8: View looking north from rear of 1178 Forest Road dwelling.





Photograph 9: Western portion of 1174 Forest Road. Image shows grass covered fill material.



Photograph 10: Western portion of 1174-1176 Forest Road. Image shows exposed fill material including crushed bricks, tiles concrete.



Photograph 11: Western portion of 1178 Forest Road. Image shows grass covered fill material and in-ground swimming pool with surface water.



Photograph 12: Western portion of 1178 Forest Road. Image shows grass covered fill material and green waste.





Photograph 13: Suspected Asbestos Containing Material (ACM) fragment on ground surface of fill material in north-western portion of the site .



Photograph 14: Typical fill material across the site consisting of gravelly, clayey sand with crushed sandstone, bricks and tiles.





# APPENDIX B

## Previous site investigation

## APPENDIX B

### PREVIOUS SITE

### INVESTIGATIONS



A U S T R A L I A N  
GEOTECHNICAL

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Our Ref: AG-372\_1  
21<sup>st</sup> May 2018

Astor Homes Pty Ltd

11 Tanglewood Place,  
WEST PENNANT HILLS  
New South Wales 2125

**RE: PRELIMINARY SITE INVESTIGATION AT  
1174 to 1178 FOREST ROAD LUGARNO, NSW, 2210**

### **1.0 Introduction**

As requested, Australian Geotechnical Pty Ltd (AG) undertook sampling and testing on the 6<sup>th</sup> May 2018 at the above site for the purpose of preliminary site investigation. This has been undertaken to assess whether the material placed within the western portion of site (Refer to Appendix A for approximate fill location) presents a risk to human health. Based on discussions with the client, it is understood that filling material has been placed behind retaining structures within the site to a maximum depth of 1.0m during construction of the residential dwellings.

### **2.0 Scope of Work**

AG carried out the following scope of works in order to complete the material classification;

- Site Inspection by a representative from AG to ascertain current activities, and any visible signs of contamination;
- Collection of soil samples according to a sampling plan.
- Transferring samples to a NATA accredited laboratory for analysis;

- Laboratory analysis of samples for Heavy Metals, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), OC and OP Pesticides, Polychlorinated Biphenyl (PCBs), Electrical Conductivity, pH and Asbestos;
- Preparation of a report detailing findings and recommendations in general accordance with the National Environment Protection Council (NEPC) National Environment Protection Measure (Assessment of Site Contamination) 2013 (NEMP ASC 2013) and NSW Office of Environment and Heritage Guidelines for Consultants Reporting on Contaminated Sites (OEH 2011); and
- Preparation of a report outlining investigation methodology, sampling rationale, interpretation of the test data and a conclusion.

### **3.0 Field Investigation, Site Inspection and Sampling**

Discrete sampling was undertaken in general accordance with AS1141.3.1-2014 methods for sampling and testing aggregates in accordance with Appendix 1 of the Waste Classification Guidelines (2014) published by the Environment Protection Authority NSW. Minimum Sampling densities were adopted from Table 1 of the '*The Excavated Natural Material Order 2014*', with six (6) samples (based on an total area of less than 1000m<sup>2</sup>).

Material was selected from hand auger excavations into the fill soil horizon, which generally comprised of Silty Gravelly Clay, medium to high plasticity, brown mottled grey red, moist, hard. Samples numbered E1-400mm, E2-300mm, E3-500mm, E4-600mm, E5-850mm and E6-200mm were selected from this soil horizon

It should be noted that paint chips, sulphidic ores, hydrocarbon odours, or foreign material such as brick and concrete were not observed at the time of our inspection. Furthermore, no visible asbestos contamination was observed.

The samples were placed in 250ml glass jars with Teflon lined lids, with asbestos samples placed in separate bags. The samples were then placed in a chilled container to maintain samples at a temperature below approximately 4°C then were then transported to SGS Pty Ltd (NATA accredited laboratory) under stringent chain of custody (COC) procedures. Each sample location was excavated utilizing hand equipment to a maximum depth of up to 850mm. The sample was collected directly from the auger using a stainless steel trowel, which had been decontaminated prior to use to prevent cross contamination occurring.

**Image 1: South-East view at rear of constructed dwellings**



**Image 2: North-East view of retaining structures**



#### 4.0 Test Results

Test results obtained from SGS Environmental (Certificate Reference number SE192497) are summarised in Table 1 with the relevant contaminant threshold values. The table compares the results of the fill material to The National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; 'standard residential with garden/accessible soil' ('A') which is considered suitable for children's day care centres, preschools and primary schools.

**Table 1: Analysis of the solid sample (NEPM, 2013)**

Contaminant	Assessment Criteria (mg/kg)		Maximum Concentration (mg/kg)	Acceptable comparing to Health Based Investigation Level (HIL'A')
	Health Based Investigation Level (HIL'A')	Health Screening Levels (HSL) mg/kg		
<b>Inorganics (Heavy Metals)</b>				
Arsenic (total)	100		11	Yes
Cadmium	20		<0.3	Yes
Chromium (VI)	100		8.8	Yes
Copper	6000		10	Yes
Lead	300		13	Yes
Mercury	40		<0.05	Yes
Nickel	400		0.9	Yes
Zinc	7400		45	Yes
<b>Organics</b>				
<b>TPH</b>				
C <sup>6</sup> -C <sup>10</sup>		50	<25	Yes
Benzene		10.6	<0.1	Yes
Toulene		190	<0.1	Yes
Ethylbenzene		390	<0.1	Yes
Xylene				
Phenol	3000			
<b>PAH</b>	300	45	<0.2	Yes
<b>OCP</b>		3	<1	Yes
Aldrin + Dieldrin	7			
Chlordane	50			
Heptachlor	6			
DDD+DDE+DDT	260			
<b>OPP</b>			<1	Yes
Diazinon				
Ethion				
Fenitrothion				
<b>PCB</b>	1		<1	Yes
Asbestos	0.01%	-	None Detected	Yes

## **5.0 Conclusion**

Test results analysed were compared against the Health Investigation Levels (HIL) and Health Screening Levels (HSL) for the exposure setting; 'standard residential with garden/accessible soil' ('A'). Results indicate that the material placed on-site behind retaining structures at 1174 to 1178 FOREST ROAD LUGARNO, NSW, 2210 (Refer to Appendix A for approximate fill location) does not present a risk to human health in a 'standard residential with garden/accessible soil' setting, therefore the material is considered suitable to remain on-site.

## **6.0 Limitations**

Australian Geotechnical (AG) has performed its services for this project in accordance with current industry codes and practices.

When assessing the nature and extent of contamination, this type of investigation (as per our commission) is not designed or capable of locating all ground conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall ground conditions. However, it should be noted that actual conditions in some parts of the site might differ from those found. If excavations reveal ground conditions significantly different from those shown in our findings, AG must be consulted. The actual presence of contaminated material at the site may potentially differ from that referred to or inferred herein, since no sampling program, no matter how complete, can reveal all anomalies and hot spots that may be present. Furthermore, our opinions and judgments expressed herein, which are based on our analysis of current industry codes and practices, should not be interpreted as legal opinions.

The scope and the period of AG services are described in the report and are subject to restrictions and limitations. AG did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by AG in regard to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by AG for incomplete or inaccurate data supplied by others.

Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

We trust that the information within and attached meets your present requirements. Should you have any queries, please do not hesitate to contact the undersigned.



**For and on behalf of AG**



**M. Tofler**

*Environmental Consultant*

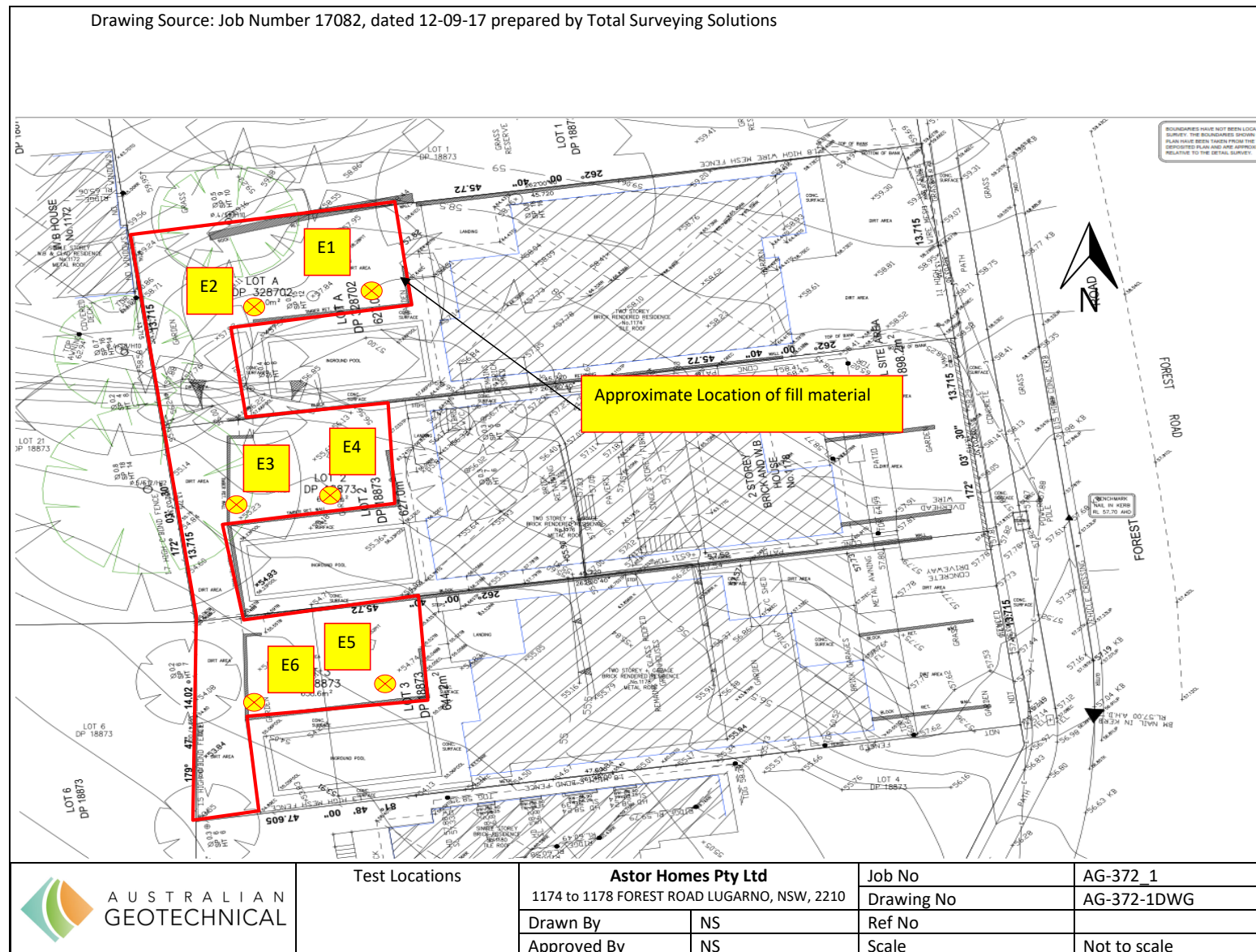
Appendices: A. Sampling location plan  
B. Certificate of Analysis – SE192497

## APPENDIX A

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### FIGURES

*Figure 1: Sampling Location Plan View*



## **APPENDIX B**

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### **LABORATORY TEST RESULTS**



## ANALYTICAL REPORT



Accreditation No. 2562

## CLIENT DETAILS

Contact Nathan Smith  
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 Project AG-372  
 Order Number AG-372  
 Samples 6

## LABORATORY DETAILS

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 Email au.environmental.sydney@sgs.com  
 SGS Reference SE192497 R0  
 Date Received 6/5/2019  
 Date Reported 15/5/2019

## COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

## SIGNATORIES

**Kamrul Ahsan**  
 Senior Chemist

**Ly Kim Ha**  
 Organic Section Head

**Ravee Sivasubramaniam**  
 Hygiene Team Leader

**Shane McDermott**  
 Inorganic/Metals Chemist



## ANALYTICAL RESULTS

SE192497 R0

VOC's in Soil [AN433] Tested: 14/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			6/5/2019 SE192497.001	6/5/2019 SE192497.002	6/5/2019 SE192497.003	6/5/2019 SE192497.004	6/5/2019 SE192497.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	E6
			SOIL
			6/5/2019 SE192497.006
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1



## ANALYTICAL RESULTS

SE192497 R0

### Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 14/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 6/5/2019 SE192497.001	- 6/5/2019 SE192497.002	- 6/5/2019 SE192497.003	- 6/5/2019 SE192497.004	- 6/5/2019 SE192497.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	E6
			SOIL
			- 6/5/2019 SE192497.006
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25





## ANALYTICAL RESULTS

SE192497 R0

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			6/5/2019 SE192497.001	6/5/2019 SE192497.002	6/5/2019 SE192497.003	6/5/2019 SE192497.004	6/5/2019 SE192497.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	E6
			SOIL
			6/5/2019 SE192497.006
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210



## ANALYTICAL RESULTS

SE192497 R0

## PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.002	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.004	SOIL - 6/5/2019 SE192497.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	E6
			SOIL - 6/5/2019 SE192497.006
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8



## ANALYTICAL RESULTS

SE192497 R0

OC Pesticides in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1



## ANALYTICAL RESULTS

SE192497 R0

OP Pesticides in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7



## ANALYTICAL RESULTS

SE192497 R0

PCBs in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1



## ANALYTICAL RESULTS

SE192497 R0

pH in soil (1:5) [AN101] Tested: 13/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
pH	pH Units	0.1	7.2	7.3	7.8	7.7	8.4

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
pH	pH Units	0.1	8.1



## ANALYTICAL RESULTS

SE192497 R0

Conductivity and TDS by Calculation - Soil [AN106] Tested: 13/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 6/5/2019 SE192497.001	- 6/5/2019 SE192497.002	- 6/5/2019 SE192497.003	- 6/5/2019 SE192497.004	- 6/5/2019 SE192497.005
Conductivity of Extract (1:5 as received)	µS/cm	1	<b>21</b>	<b>70</b>	<b>59</b>	<b>56</b>	<b>120</b>
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	<b>23</b>	<b>76</b>	<b>64</b>	<b>61</b>	<b>120</b>

PARAMETER	UOM	LOR	E6
			SOIL
			- 6/5/2019 SE192497.006
Conductivity of Extract (1:5 as received)	µS/cm	1	<b>45</b>
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	<b>49</b>





## ANALYTICAL RESULTS

SE192497 R0

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 10/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.002	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.004	SOIL - 6/5/2019 SE192497.005
Arsenic, As	mg/kg	1	<b>11</b>	<b>9</b>	<b>10</b>	<b>8</b>	<b>7</b>
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	<b>5.6</b>	<b>7.4</b>	<b>8.7</b>	<b>8.2</b>	<b>8.1</b>
Copper, Cu	mg/kg	0.5	<b>4.8</b>	<b>4.7</b>	<b>4.4</b>	<b>4.6</b>	<b>10</b>
Lead, Pb	mg/kg	1	<b>14</b>	<b>13</b>	<b>11</b>	<b>9</b>	<b>8</b>
Nickel, Ni	mg/kg	0.5	<b>0.9</b>	<b>0.6</b>	<0.5	<b>0.8</b>	<b>0.6</b>
Zinc, Zn	mg/kg	2	<b>83</b>	<b>48</b>	<b>44</b>	<b>41</b>	<b>39</b>

PARAMETER	UOM	LOR	E6
			SOIL - 6/5/2019 SE192497.006
Arsenic, As	mg/kg	1	<b>8</b>
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	<b>8.8</b>
Copper, Cu	mg/kg	0.5	<b>4.3</b>
Lead, Pb	mg/kg	1	<b>11</b>
Nickel, Ni	mg/kg	0.5	<0.5
Zinc, Zn	mg/kg	2	<b>45</b>



## ANALYTICAL RESULTS

SE192497 R0

Mercury in Soil [AN312] Tested: 10/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
Mercury	mg/kg	0.05	<0.05



## ANALYTICAL RESULTS

SE192497 R0

Moisture Content [AN002] Tested: 10/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
% Moisture	%w/w	0.5	8.6	7.5	7.0	8.7	7.8

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
% Moisture	%w/w	0.5	8.9



## ANALYTICAL RESULTS

SE192497 R0

Fibre Identification in soil [AN602] Tested: 14/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
			SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
PARAMETER	UOM	LOR					
Asbestos Detected	No unit	-	No	No	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

			E6
			SOIL
			-
			6/5/2019
			SE192497.006
PARAMETER	UOM	LOR	
Asbestos Detected	No unit	-	No
Estimated Fibres*	%w/w	0.01	<0.01



## METHOD SUMMARY

SE192497 R0

## METHOD

## METHODOLOGY SUMMARY

AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl <sub>2</sub> ) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H <sup>+</sup> .
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states: "Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."



## METHOD SUMMARY

SE192497 R0

## AN602

The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if-

- (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres);
- (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg; and
- (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

## FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: [www.sgs.com.au/pv/sgsvr/en-gb/environment](http://www.sgs.com.au/pv/sgsvr/en-gb/environment).

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## ANALYTICAL REPORT



Accreditation No. 2562

## CLIENT DETAILS

Contact Nathan Smith  
 Client AUSTRALIAN GEOTECHNICAL PTY LTD  
 Address 2 SHIRLEY STREET  
 ROSEHILL NSW 2144

Telephone (Not specified)  
 Facsimile (Not specified)  
 Email nathan@austgeo.com.au

Project **AG-372**  
 Order Number **AG-372**  
 Samples 6

## LABORATORY DETAILS

Manager Huong Crawford  
 Laboratory SGS Alexandria Environmental  
 Address Unit 16, 33 Maddox St  
 Alexandria NSW 2015

Telephone +61 2 8594 0400  
 Facsimile +61 2 8594 0499  
 Email au.environmental.sydney@sgs.com

SGS Reference **SE192497 R0**  
 Date Received 06 May 2019  
 Date Reported 15 May 2019

## COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

## SIGNATORIES

Kamrul Ahsan  
 Senior Chemist

Ly Kim Ha  
 Organic Section Head

Ravee Sivasubramaniam  
 Hygiene Team Leader

Shane McDermott  
 Inorganic/Metals Chemist



## ANALYTICAL REPORT

SE192497 R0

## RESULTS

## Fibre Identification in soil

Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE192497.001	E1	Soil	268g Sand,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.002	E2	Soil	172g Sand,Soil,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.003	E3	Soil	94g Sand,Soil,Rocks	06 May 2019	No Asbestos Found Organic Fibres Detected	<0.01
SE192497.004	E4	Soil	133g Sand,Soil,Rocks	06 May 2019	No Asbestos Found Organic Fibres Detected	<0.01
SE192497.005	E5	Soil	176g Clay,Sand,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.006	E6	Soil	193g Clay,Sand,Rocks	06 May 2019	No Asbestos Found	<0.01





## METHOD SUMMARY

SE192497 R0

## METHOD

## METHODOLOGY SUMMARY

AN602

Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.

AN602

Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf). The fibres detected may or may not be asbestos fibres.

AN602

AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states: "Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."

AN602

The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if-

- (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres);
- (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg; and
- (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

## FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service.
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.

Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.

Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: [www.sgs.com.au/py.sgsvr/en-gb/environment](http://www.sgs.com.au/py.sgsvr/en-gb/environment).

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source: [Untitled].pdf page: 1 SGS Ref: SE192497\_COC

E-MAILED  
8/5/19 04:02

SGS

SGS Environmental Services  
Unit 16, 33 Maddox Street  
Alexandria NSW 2015

Telephone No: (02) 85940400

Facsimile No: (02) 85940499

Email: au.samplerreceipt.sydney@sgs.com

## CHAIN OF CUSTODY & ANALYSIS REQUEST

Page \_\_\_\_ of \_\_\_\_

Company Name: Australian Geotechnical

Address: 2 Shirley Street, Rose Hill, NSW

Contact Name: Nathan Smith

Project Name/No: AG-372

Purchase Order No: AG-372\_1 quote MMG3TN

Results Required By: STD TAT

Telephone:

Facsimile:

Email Results: info@austgeo.com.au

Client Sample ID

Date  
Sampled

Lab  
Sample  
ID

WATER

SOIL

PRESERVATIVE

NO OF CONTAINERS

CL10

SV9

Asbestos ID

E1

06-05-19

1

x

2

X

x

x

E2

06-05-19

2

X

2

X

x

x

E3

06-05-19

3

X

2

X

x

x

E4

06-05-19

4

X

2

X

x

x

E5

06-05-19

5

x

2

X

x

x

E6

06-05-19

6

x

2

x

x

SGS EHS Alexandria Laboratory

SE192497 COC

Received: 08-May-2019

06

Relinquished By: NS

Date/Time: 06-05-19

Received By:

Date/Time

Relinquished By:

Date/Time:

Received By:

Date/Time

Samples Intact: Yes/ No

Temperature: Ambient / Chilled

Sample Cooler Sealed: Yes/ No

Laboratory Quotation No:

Comments:



# APPENDIX C

## Laboratory Analysis Reports

# APPENDIX C

## LABORATORY

## ANALYTICAL RESULTS



**Envirolab Services Pty Ltd**  
 ABN 37 112 535 645  
 12 Ashley St Chatswood NSW 2067  
 ph 02 9910 6200 fax 02 9910 6201  
 customerservice@envirolab.com.au  
 www.envirolab.com.au

### **CERTIFICATE OF ANALYSIS 220438**

<b>Client Details</b>	
<b>Client</b>	NEO Consulting Pty Ltd
<b>Attention</b>	Nick Caltabiano
<b>Address</b>	PO Box 279, Riverstone, NSW, 2765

<b>Sample Details</b>	
<b>Your Reference</b>	<b>N3863</b>
<b>Number of Samples</b>	19 Soil
<b>Date samples received</b>	26/06/2019
<b>Date completed instructions received</b>	26/06/2019

<b>Analysis Details</b>	
Please refer to the following pages for results, methodology summary and quality control data.	
Samples were analysed as received from the client. Results relate specifically to the samples as received.	
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.	
<b>Please refer to the last page of this report for any comments relating to the results.</b>	

<b>Report Details</b>	
<b>Date results requested by</b>	03/07/2019
<b>Date of Issue</b>	02/07/2019
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Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### **Asbestos Approved By**

Analysed by Asbestos Approved Identifier: Lucy Zhu  
 Authorised by Asbestos Approved Signatory: Lucy Zhu

#### **Results Approved By**

Hinoko Miyazaki, Senior Chemist  
 Jaimie Loa-Kum-Cheung, Metals Supervisor  
 Jeremy Faircloth, Operations Manager, Sydney  
 Lucy Zhu, Senior Asbestos Analyst  
 Priya Samarawickrama, Senior Chemist  
 Steven Luong, Organics Supervisor

#### **Authorised By**

Nancy Zhang, Laboratory Manager

## Client Reference: N3863

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	85	74	87	82	86

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	83	86	81	83	88

Client Reference: N3863

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	90	81	73	86	87

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	87

## Client Reference: N3863

svTRH (C10-C40) in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	87	87	89	88	85

svTRH (C10-C40) in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	85	85	84	85	85



**Client Reference: N3863**

svTRH (C10-C40) in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	86	84	84	85	83

svTRH (C10-C40) in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	84

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j,k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	98	83	90	86	92

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	87	86	91	86	85

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	86	84	87	85	90

## Client Reference: N3863

PAHs in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	93

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCb	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	90	89	89

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	85	87	90	86

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	89	87	86	87



## Client Reference: N3863

Organochlorine Pesticides in soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	88

## Client Reference: N3863

Organophosphorus Pesticides						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	90	89	89

Organophosphorus Pesticides						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	85	87	90	86

## Client Reference: N3863

Organophosphorus Pesticides						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	89	87	86	87

Organophosphorus Pesticides		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyrifos	mg/kg	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	88

## Client Reference: N3863

Acid Extractable metals in soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	28	6	<4	5	10
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	9	10	27	11
Copper	mg/kg	6	9	3	<1	16
Lead	mg/kg	12	19	6	3	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	3	1	<1	3
Zinc	mg/kg	29	43	12	5	94

Acid Extractable metals in soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	<4	12	10	8	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	7	9	11	11	10
Copper	mg/kg	6	4	5	5	5
Lead	mg/kg	16	12	11	10	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	<1	<1	<1
Zinc	mg/kg	54	120	57	58	56

## Client Reference: N3863

Acid Extractable metals in soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	8	7	8	15	13
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	9	11	17	10
Copper	mg/kg	4	6	5	3	5
Lead	mg/kg	9	9	9	7	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	<1	<1	<1	<1
Zinc	mg/kg	51	48	52	52	44

Acid Extractable metals in soil			
Our Reference		220438-19	220438-20
Your Reference	UNITS	QS-1	BH1 0.1 - [TRIPLICATE]
Type of sample		Soil	Soil
Date prepared	-	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019
Arsenic	mg/kg	27	23
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	13	11
Copper	mg/kg	7	8
Lead	mg/kg	14	14
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	2	1
Zinc	mg/kg	31	31

**Client Reference: N3863**

Moisture						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	16	16	15	15	17

Moisture						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	12	16	10	14	10

Moisture						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	9.0	10	12	12	15

Moisture		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date prepared	-	27/06/2019
Date analysed	-	28/06/2019
Moisture	%	16

## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001						
Our Reference		220438-1	220438-3	220438-4	220438-6	220438-7
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH4 0.1	BH5 0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Sample mass tested	g	713.1	567.76	521.6	616.05	599.57
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001						
Our Reference		220438-9	220438-10	220438-11	220438-13	220438-15
Your Reference	UNITS	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1	BH10 0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Sample mass tested	g	569.02	523.52	517.82	656.5	522.05
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	Chrysotile asbestos detected  Organic fibres detected	Chrysotile asbestos detected  Amosite asbestos detected  Crocidolite asbestos detected  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	<0.1	8.2932	2.0399	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	See Above	See Above	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	—	4.3416	1.0563	—	—
FA and AF Estimation*	g	—	—	—	—	—
ACM >7mm Estimation*	%(w/w)	<0.01	0.8293	0.2040	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001



## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001			
Our Reference		220438-16	220438-17
Your Reference	UNITS	BH11 0.1	BH12 0.1
Type of sample		Soil	Soil
Date analysed	-	27/06/2019	27/06/2019
Sample mass tested	g	582.31	599.55
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected Synthetic mineral fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	0.8087	<0.1
Asbestos ID in soil <0.1g/kg*	-	See Above	No visible asbestos detected
ACM >7mm Estimation*	g	0.4709	—
FA and AF Estimation*	g	—	—
ACM >7mm Estimation*	%(w/w)	0.0809	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001

**Client Reference: N3863**

Misc Inorg - Soil					
Our Reference		220438-1	220438-3	220438-7	220438-18
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH5 0.2	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Date analysed	-	01/07/2019	01/07/2019	01/07/2019	01/07/2019
pH 1:5 soil:water	pH Units	7.1	8.9	9.0	6.6

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CEC					
Our Reference		220438-1	220438-3	220438-7	220438-18
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH5 0.2	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Date analysed	-	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Exchangeable Ca	meq/100g	7.8	20	22	3.5
Exchangeable K	meq/100g	0.1	0.1	0.2	<0.1
Exchangeable Mg	meq/100g	0.80	0.24	0.31	0.28
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	8.8	21	22	3.9

## Client Reference: N3863

Method ID	Methodology Summary
<b>ASB-001</b>	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
<b>ASB-001</b>	<p>Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004.</p> <p>Results reported denoted with * are outside our scope of NATA accreditation.</p> <p><b>NOTE #1</b> Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM &gt;7mm, &lt;7mm and FA/AF)</p> <p><b>NOTE #2</b> The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.</p> <p>Estimation = Estimated asbestos weight</p> <p>Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.</p>
<b>Inorg-001</b>	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
<b>Inorg-008</b>	Moisture content determined by heating at 105±5 °C for a minimum of 12 hours.
<b>Metals-009</b>	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-021</b>	Determination of Mercury by Cold Vapour AAS.
<b>Org-003</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.

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Method ID	Methodology Summary
<b>Org-003</b>	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.</p> <p>F2 = (&gt;C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.</p> <p>Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (&gt;C10-C40).</p>
<b>Org-005</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
<b>Org-005</b>	<p>Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.</p> <p>Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.</p>
<b>Org-008</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
<b>Org-012</b>	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.</p> <p>For soil results:-</p> <ol style="list-style-type: none"> <li>1. 'EQ PQL' values are assuming all contributing PAHs reported as &lt;PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present.</li> <li>2. 'EQ zero' values are assuming all contributing PAHs reported as &lt;PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL.</li> <li>3. 'EQ half PQL' values are assuming all contributing PAHs reported as &lt;PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above.</li> </ol> <p>Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.</p>
<b>Org-014</b>	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
<b>Org-016</b>	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
<b>Org-016</b>	<p>Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.</p> <p>Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.</p>

## Client Reference: N3863

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			29/06/2019	1	29/06/2019	29/06/2019		29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	25	Org-016	<25	1	<25	<25	0	100	85
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	25	Org-016	<25	1	<25	<25	0	100	85
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	105	91
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	102	89
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	83
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	96	80
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	82
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	1	85	72	17	96	79

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	29/06/2019	29/06/2019		[NT]	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	25	Org-016	[NT]	14	<25	<25	0	[NT]	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	25	Org-016	[NT]	14	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	14	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	14	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	14	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	14	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	14	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	14	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	14	90	88	2	[NT]	[NT]

Client Reference: N3863

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	50	Org-003	<50	1	<50	<50	0	101	98
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	100	93
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	71	103
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	50	Org-003	<50	1	<50	<50	0	101	98
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	100	93
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	71	103
Surrogate o-Terphenyl	%		Org-003	89	1	87	88	1	112	108

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	50	Org-003	[NT]	14	<50	<50	0	[NT]	[NT]
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	50	Org-003	[NT]	14	<50	<50	0	[NT]	[NT]
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	14	86	84	2	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	108	108
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	98
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	96
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	96
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	98
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	96
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	96	94
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	86	1	98	90	9	93	90

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	[NT]	14	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	14	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	14	86	85	1	[NT]	[NT]



Client Reference: N3863

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	87	79
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	86
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	90	84
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	88
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	88
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	98	92
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	102	103
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	82
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	83	77
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	74
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	93	1	90	91	1	89	84

## Client Reference: N3863

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	14	87	90	3	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	101	96
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	89	100
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	90	87
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	110	96
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	106	91
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	112	106
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	99	89
Surrogate TCMX	%		Org-008	93	1	90	91	1	92	88

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	14	87	90	3	[NT]	[NT]

**Client Reference: N3863**

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date prepared	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Arsenic	mg/kg	4	Metals-020	<4	1	28	28	0	105	102
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	103	96
Chromium	mg/kg	1	Metals-020	<1	1	11	11	0	109	102
Copper	mg/kg	1	Metals-020	<1	1	6	10	50	109	111
Lead	mg/kg	1	Metals-020	<1	1	12	15	22	112	107
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	97	100
Nickel	mg/kg	1	Metals-020	<1	1	1	3	100	110	104
Zinc	mg/kg	1	Metals-020	<1	1	29	36	22	116	106

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	14	8	9	12	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	14	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	14	11	10	10	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	14	4	6	40	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	14	9	13	36	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	14	1	1	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	14	51	71	33	[NT]	[NT]

**Client Reference: N3863**

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			01/07/2019	[NT]	[NT]	[NT]	[NT]	01/07/2019	[NT]
Date analysed	-			01/07/2019	[NT]	[NT]	[NT]	[NT]	01/07/2019	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]

## Client Reference: N3863

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			02/07/2019	7	02/07/2019	02/07/2019		02/07/2019	[NT]
Date analysed	-			02/07/2019	7	02/07/2019	02/07/2019		02/07/2019	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	7	22	21	5	105	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	7	0.2	0.2	0	108	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	7	0.31	0.29	7	109	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	7	<0.1	<0.1	0	108	[NT]

Client Reference: N3863

Result Definitions	
<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

Quality Control Definitions	
<b>Blank</b>	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
<b>Matrix Spike</b>	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
<b>LCS (Laboratory Control Sample)</b>	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

**Client Reference: N3863**

### Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.



**Client Reference: N3863**

### Report Comments

Asbestos-ID in soil: NEPM

This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 220438-1 for Cu. Therefore a triplicate result has been issued as laboratory sample number 220438-20.

Sample information					Tests Required												Comments				
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	BTEX	TRH	PAH	TOTAL METALS	OC/OP	ASBESTOS (QUANTIFICATION)	PH	CEC									Provide as much information about the sample as you can
	BH1 0.1				X	X	X	X	X	X	X	X									
	BH1 0.5																				HOLD
	BH2 0.2				X	X	X	X	X	X	X	X									
	BH3 0.2				X	X	X	X	X	X											
	BH3 0.5				X	X	X	X	X												
	BH4 0.1				X	X	X	X	X	X											
	BH5 0.2				X	X	X	X	X	X	X	X									
	BH5 0.7																				HOLD
	BH6 0.2				X	X	X	X	X	X											
	BH7 0.1				X	X	X	X	X	X											
	BH8 0.1				X	X	X	X	X	X											
	BH8 0.5																				HOLD
	BH9 0.1				X	X	X	X	X	X											
<input type="checkbox"/> Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis																					
Relinquished by (Company):					Received by (Company):					Lab Use Only											
Print Name: D TAYLOR					Print Name:					Job number:					Cooling: Ice / Ice pack / None						
Date & Time 26.6.19					Date & Time:					Temperature:					Security seal: Intact / Broken / None						
Signature:					Signature:					TAT Req - SAME day / 1 / 2 / 3 / 4 / STD											





# APPENDIX D

## Supporting Documents

## APPENDIX D

# SUPPORTING DOCUMENTS



Job No 16517804

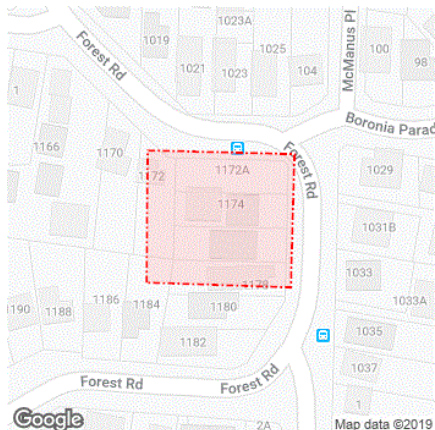
Phone: 1100  
www.1100.com.au**Caller Details**

**Contact:** Mr Daniel Taylor  
**Company:** Not Supplied  
**Address:** 76/20 Illawong Avenue  
 Sydney NSW 2026

**Caller Id:** 1941922 **Phone:** 0409492988  
**Mobile:** Not Supplied **Fax:** Not Supplied  
**Email:** dataylor88@outlook.com

**Dig Site and Enquiry Details**

**WARNING:** The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



**User Reference:** DSI  
**Working on Behalf of:** Private  
**Enquiry Date:** 24/06/2019 **Start Date:** 26/06/2019 **End Date:** 26/06/2019  
**Address:** 1174 Forest Road  
 Lugarno NSW 2210  
**Job Purpose:** Design  
**Location of Workplace:** Private Property  
**Onsite Activity:** Planning & Design  
**Location in Road:** Not Supplied

- Check the location of the dig site is correct. If not submit a new enquiry.
- If the scope of works change, or plan validity dates expire, resubmit your enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

**Notes/Description of Works:**  
 Not Supplied

**Your Responsibilities and Duty of Care**

- The lodgement of an enquiry does not authorise the project to commence. You must obtain all necessary information from any and all likely impacted asset owners prior to excavation.
- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at [www.1100.com.au](http://www.1100.com.au)
- For more information on safe excavation practices, visit [www.1100.com.au](http://www.1100.com.au)

**Asset Owner Details**

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days. Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.

\*\* Asset owners highlighted by asterisks \*\* require that you visit their offices to collect plans.

# Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

Seq. No.	Authority Name	Phone	Status
84785210	Ausgrid	0249510899	NOTIFIED
84785208	Georges River Council	0293306400	NOTIFIED
84785214	Jemena Gas South	1300880906	NOTIFIED
84785215	Sydney Water	132092	NOTIFIED
84785212	Telstra NSW, Central	1800653935	NOTIFIED

END OF UTILITIES LIST

**Lodge Your Free Enquiry Online – 24 Hours a Day, Seven Days a Week**



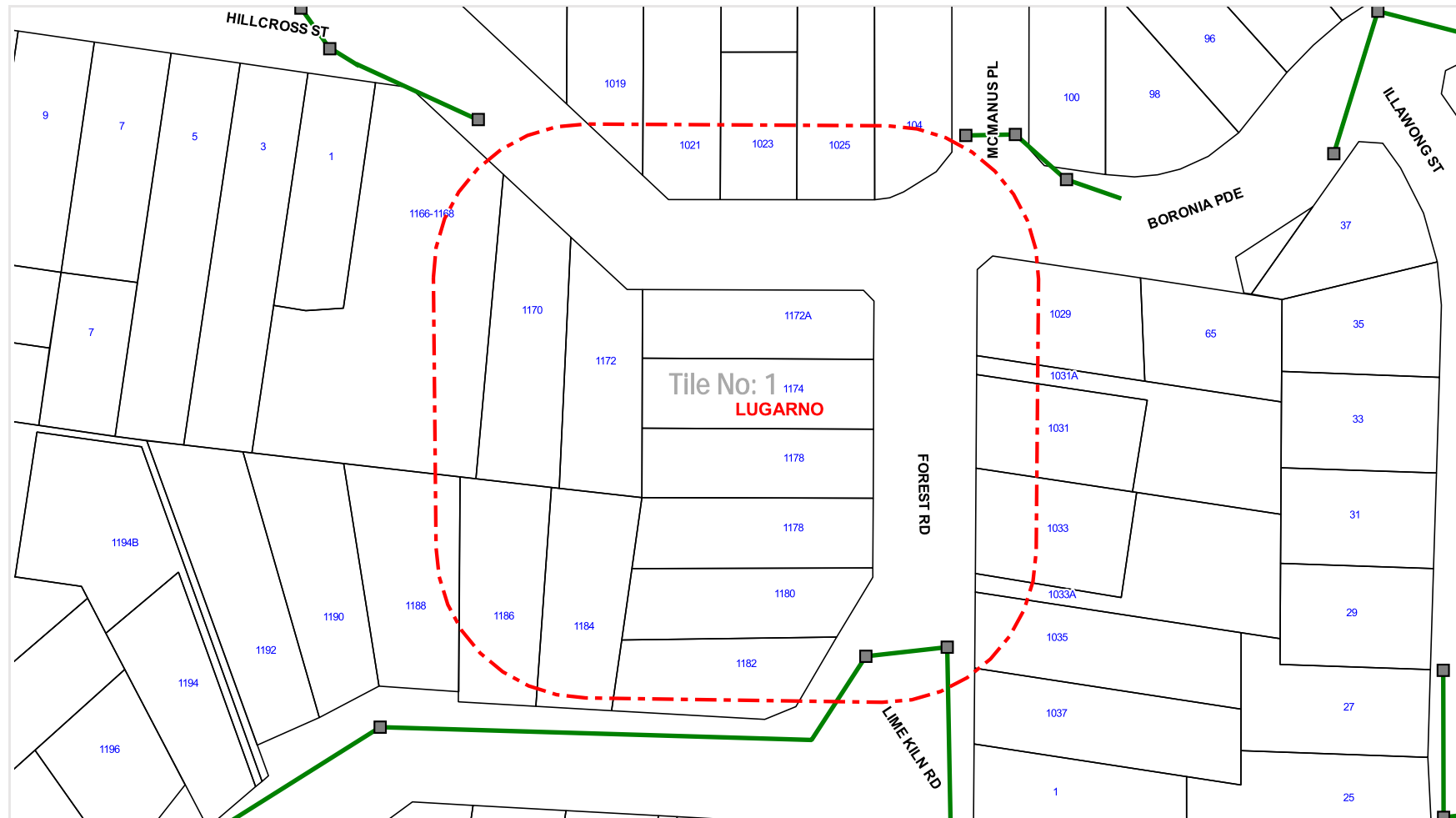
Sequence No: 84785208

Job No: 16517804

Location: 1174 Forest Road, Lugarno, NSW 2210



The Essential First Step.



Legend | Scale: 1:1000



Please refer to attached Georges River Council Map Legend

**DISCLAIMER:** While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither Georges River Council or PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

If further information is required, please contact:

Ausgrid DBYD

Phone: (02) 4951 0899

Fax: (02) 4951 0729

Emergency Phone Number 131388



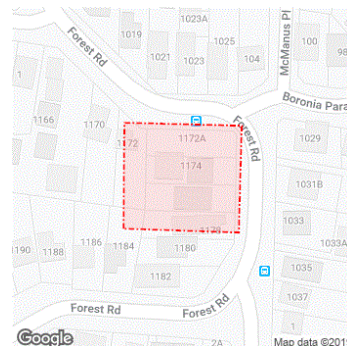
## Underground Cable Location Search Advice -- Ausgrid Assets Affected --

To:	Mr Daniel Taylor Not Supplied 76/20 Illawong Avenue Sydney NSW 2026	Phone No:	0409492988
		Issue Date:	24/06/2019

In response to your enquiry, Sequence No: 84785210 the records of Ausgrid disclose that there **are** Ausgrid underground cables in the defined search location and relevant Ausgrid plans have been provided.

This search is based on the geographical position of the dig site as denoted in the Dial Before You Dig caller confirmation sheet and an overview is provided:

Address:	1174 Forest Road Lugarno NSW 2210
Job #:	16517804



### \*\*Important\*\*

- All information provided to you is **ONLY VALID FOR 30 DAYS** from the date of issue
- You must keep Ausgrid plans on site during excavation works. If the people actually performing the excavation works do not know how to read and interpret Ausgrid's plans, then the work must be directed by a person who knows how to read and interpret plans.
- If you require a full size print of A0 plans and don't have the resources to do so please contact our office on 49510899 to request a hard copy to be posted. **Please allow 3 working days for delivery.**
- Please note you will ONLY receive portions of your search area that contain Ausgrid Underground Assets

### YOU MUST READ AND UNDERSTAND THE **SUPPLEMENTARY MATERIAL** CONTAINED IN THIS ADVICE **BEFORE** PROCEEDING WITH ANY WORKS.

#### Summary of Supplementary Information:

Material	Purpose	Location
<b>URGENT SAFETY ALERT</b>	Safety precautions when working on or near low voltage stranded aluminium cable	Web Link <a href="#">[Click Here]</a>
Important Information.pdf	Details important information	Attached
Working near Ausgrid Cables.pdf	Summary of NS156	Attached
COMN0119 How To Read Ausgrid Plans.pdf	Details how to read Ausgrid plans	Attached
SafeWork NSW "Work near underground assets: Guide"	To assist you in deciding appropriate measures to eliminate or control risks when working near underground assets.	Web Link <a href="#">[Click Here]</a>
Ausgrid's Network Standard NS156	For important information for work near or around underground cables	Web Link <a href="#">[Click Here]</a>
Working in Confined Spaces	For important information when working in confined spaces	Web Link <a href="#">[Click Here]</a>





## Network Protection

### High Pressure - Assets Affected

In reply to your enquiry, there are **High Pressure Gas Mains** in the vicinity of your intended work, as generally illustrated on the attached map. There may also be other mains or services at the location, as discussed in the warning below. For an explanation of the map, please see the key below.

The following excavations guidelines apply:

#### Excavation Guidelines:

Prior to **any** excavations in this area, you **must** contact the High Pressure Response Coordinator on **1300 665 380**. **(Appointments will be coordinated with availability of a Jemena Representative)** to arrange a survey. For all works in the vicinity of High Pressure Gas Mains you must arrange for a Jemena Representative to attend and supervise all excavations. Charges apply for attendance of any works outside the hours of 7am to 4pm, Monday to Friday ("**Standard Business Hours**") and for any attendance during Standard Business Hours that is longer than 2 hours.

In accordance with clause 34(5) of the Gas Supply (Safety and Network Management) Regulation 2013 (NSW), you should be informed that all excavation, (including pot-holing by hand to confirm the location of pipes) should be performed in accordance with "**Work Near Underground Assets Guideline**" published in 2007 by the Work Cover Authority.

A copy of this Guideline is available at: [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)

KEY					
Main	In Service	Proposed	High Pressure Main & Pipeline		Fittings, Valves & Regulators
Unknown Pressure	—	----	Secondary - 1050 kPa	—	Regulator Set
Distribution - 2 kPa	—	----	Secondary Service - 1050kPa	—	Regulator Station
Distribution - 7 kPa	—	----	Primary - 3500 kPa	—	Automatic Line Break Valve
Distribution - 30 kPa	—	----	JGN Trunk - 4000 to 14500 kPa	—	Valve
Distribution - 100 kPa	—	----	Transmission	—	Siphon
Distribution - 210 kPa	—	----	50mm Nylon main inserted into 6 inch (Nominal Bore) Cast Iron Main	⑥NB 50MM NY	
Distribution - 300 kPa	—	----	32mm Nylon main inserted into 50mm Steel Main	⑤0MM 32MM NY	
Distribution - 400 kPa	—	----	MBK = Metres Back of Kerb MFL = Metres from Fence Line		
Critical Main - Treat as High Pressure Main	—	----			

**Warning:** The enclosed plans show the position of Jemena Gas Networks (NSW) Ltd's underground gas mains and installations in public gazetted roads only. **Individual customers' services and services belonging to other third parties are not included** on these plans. These plans have been prepared solely for the use of Jemena Gas Networks (NSW) Ltd and Jemena Asset Management Pty Ltd (together "**Jemena**") and any reliance placed on these plans by you is entirely at your own risk. The plans may show the position of underground mains and installations relative to fences, buildings etc., as they existed at the time the mains etc were installed. The plans may not have been updated to take account of any subsequent change in the location or style of those features since the time at which the plans were initially prepared. Jemena makes no warranty as to the accuracy or completeness of the enclosed plans and does not assume any duty of care to you nor any responsibility for the accuracy, adequacy, suitability or completeness of the plans or for any error, omission, lack of detail, transmission failure or corruption in the information provided. Jemena does not accept any responsibility for any loss that you or anyone else may suffer in connection with the provision of these plans, however that loss may arise (including whether or not arising from the negligence of Jemena, its employees, agents, officers or contractors). The recipient of these plans must use their own care and diligence in carrying out their works and must carry out further surveys to locate services at their work site. Persons excavating or carrying out other earthworks will be held responsible for any damage caused to Jemena's underground mains and equipment. Jemena advises that you may be required to carry out potholing by hand if required by a Jemena Representative to confirm the location of Jemena's main and installations. This must also be performed by you under the supervision of a Jemena Representative and be carried out in accordance with the Working Near Underground Assets Guideline published in 2007 by Work Cover Authority

**In case of Emergency Phone 131 909 (24 hours)**

Admin  
1300 880 906

Jemena Asset Management Pty Ltd ABN 53 086 013 461  
for and on behalf of Jemena Gas Networks (NSW) Ltd ABN 87 003 004 322



## IMPORTANT INFORMATION - DIAL BEFORE YOU DIG

### Attention: You must read the information below

The material provided or made available to you by Sydney Water (including on the Sydney Water website) in relation to your Dial Before You Dig enquiry (**Information**) is provided on each of the following conditions, which you are taken to have accepted by using the Information:

- 1 The Information has been generated by an automated system based on the area highlighted in the "Locality Indication Only" window on your Caller Confirmation. It is your responsibility to ensure that the dig site is properly defined when submitting your Dial Before You Dig enquiry and, if the Information does not match the dig site, to resubmit your enquiry for the correct dig site.
- 2 Neither Sydney Water nor Dial Before You Dig make any representation or give any guarantee, warranty or undertaking (express or implied) as to the currency, accuracy, completeness, effectiveness or reliability of the Information. The Information, including Sydney Water plans and work-as-executed diagrams, amongst other things:
  - (a) may not show all existing structures, including Sydney Water's pipelines, particularly in relation to newer developments and in relation to structures owned by parties who do not participate in the Dial Before You Dig service;
  - (b) may be out of date and not show changes to surface levels, road alignments, fences, buildings and the like;
  - (c) is approximate only and is therefore not suitable for scaling purposes; and
  - (d) does not show locations of property services (often called house service lines) belonging to or servicing individual customers, which are usually connected to Sydney Water's structures.
- 3 You are responsible for, amongst other things:
  - (a) exposing underground structures, including Sydney Water's pipelines, by pot-holing using hand-held tools or vacuum techniques so as to determine the precise location and extent of structures before any mechanical means of excavation are used;
  - (b) the safe and proper excavation of and for underground works and structures, including having regard to the fact that asbestos cement pipelines, which can pose a risk to health, may form part of Sydney Water's water and sewerage reticulation systems;
  - (c) protecting underground structures, including Sydney Water's pipelines, from damage and interference;
  - (d) maintaining minimum clearances between Sydney Water's structures and structures belonging to others;
  - (e) ensuring that backfilling of excavation work in the vicinity of Sydney Water's structures complies with Sydney Water's standards contained on its website or otherwise communicated to you;
  - (f) notifying Sydney Water immediately of any damage caused or threat of damage to Sydney Water's structures;
  - (g) ensuring that plans are approved by Sydney Water (usually signified by stamping) prior to landscaping or building over or in the vicinity of any Sydney Water structure; and
  - (h) ensuring that the Information is used only for the purposes for which Sydney Water and Dial Before You Dig intended.

- 4 You acknowledge that you use the Information at your own risk. In consideration for the provision of the Dial Before You Dig service and the Information by Sydney Water and Dial Before You Dig, to the fullest extent permitted by law:
- (a) all conditions and guarantees concerning the Information (whether as to quality, outcome, fitness, care, skill or otherwise) expressed or implied by statute, common law, equity, trade, custom or usage or otherwise are expressly excluded and to the extent that those statutory guarantees cannot be excluded, the liability of Sydney Water and Dial Before You Dig to you is limited to either of the following as nominated by Sydney Water in its discretion, which you agree is your only remedy:
    - (i) the supplying of the Information again; or
    - (ii) payment of the cost of having the Information supplied again;
  - (b) in no event will Sydney Water or Dial Before You Dig be liable for, and you release Sydney Water and Dial Before You Dig from, any Loss arising from or in connection with the Information, including the use of or inability to use the Information and delay in the provision of the Information:
    - (i) whether arising under statute or in contract, tort or any other legal doctrine, including any negligent act, omission or default (including wilful default) by Sydney Water or Dial Before You Dig; and
    - (ii) regardless of whether Sydney Water or Dial Before You Dig are or ought to have been aware of, or advised of, the possibility of such loss, costs or damages;
  - (c) you will indemnify Sydney Water and Dial Before You Dig against any Loss arising from or in connection with Sydney Water providing incorrect or incomplete information to you in connection with the Dial Before You Dig service; and
  - (d) you assume all risks associated with the use of the Dial Before You Dig and Sydney Water websites, including risk to your computer, software or data being damaged by any virus, and you release and discharge Sydney Water and Dial Before You Dig from all Loss which might arise in respect of your use of the websites.
- 5 “**Sydney Water**” means Sydney Water Corporation and its employees, agents, representatives and contractors. “**Dial Before You Dig**” means Dial Before You Dig Incorporated and its employees, agents, representatives and contractors. References to “**you**” include references to your employees, agents, representatives, contractors and anyone else using the Information. References to “**Loss**” include any loss, cost, expense, claim, liability or damage (including arising in connection with personal injury, death or any damage to or loss of property and economic or consequential loss, lost profits, loss of revenue, loss of management time, opportunity costs or special damages). To the extent of any inconsistency, the conditions in this document will prevail over any other information provided to you by Sydney Water and Dial Before You Dig.

**In an emergency, or to notify Sydney Water of damage or threats to its structures, call 13 20 90 (24 hours, 7 days)**

Further information and guidance is available in the Building Development and Plumbing section of Sydney Water's website at [www.sydneywater.com.au](http://www.sydneywater.com.au), where you will find the following documents under 'Dial Before You Dig':

- Avoid Damaging Water and Sewer Pipelines
- Water Main Symbols
- Depths of Mains
- Guidelines for Building Over/Adjacent to Sydney Water Assets
- Clearances Between Underground Services

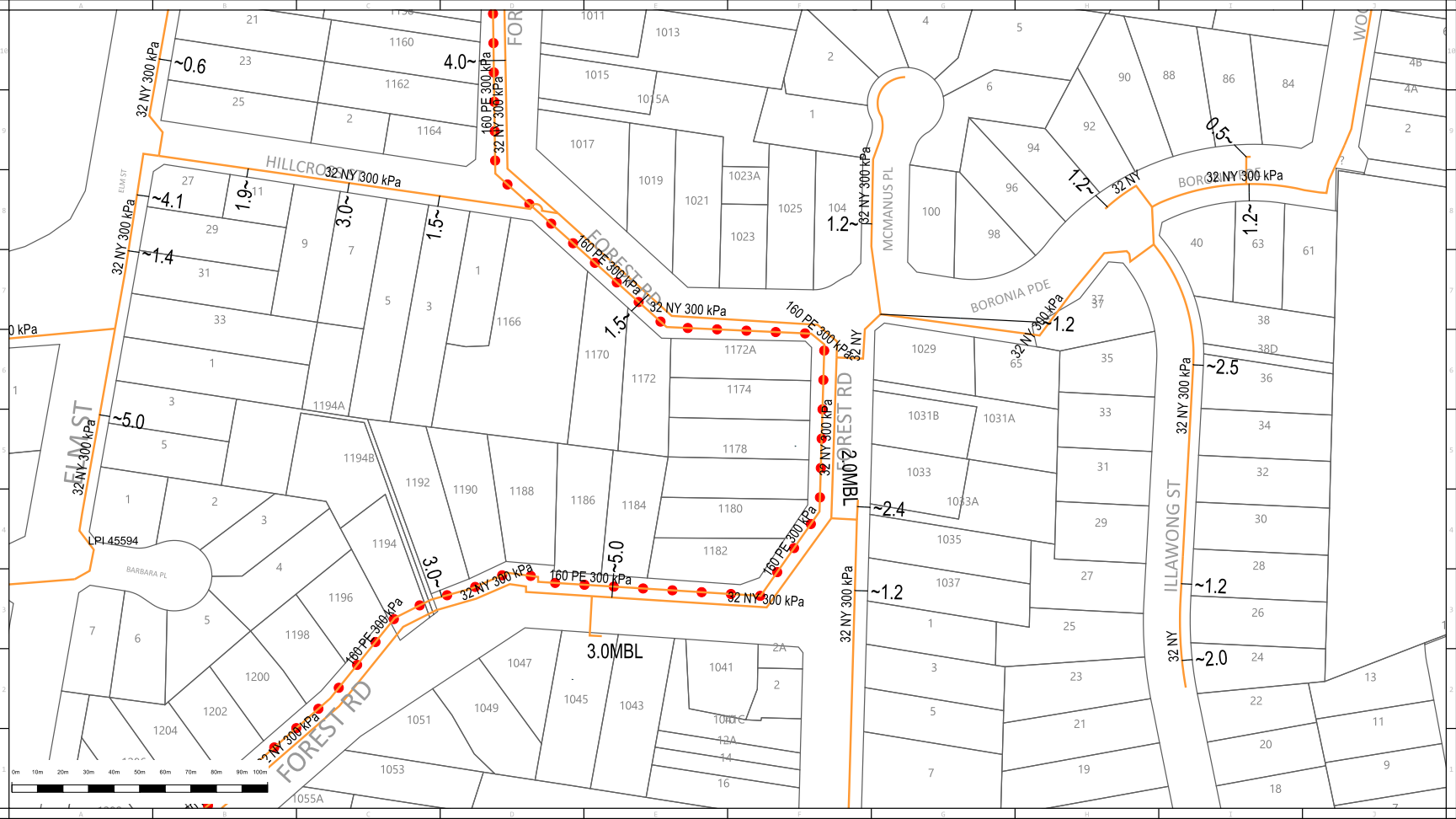
Or call **13 20 92** for Customer Enquires.


Note: The lodging of enquiries via [www.1100.com.au](http://www.1100.com.au) will enable you to receive colour plans in PDF format 24 hours a day, 7 days a week via email.

**This communication is confidential. If you are not the intended recipient, please destroy all copies immediately. Sydney Water Corporation prohibits unauthorised copying or distribution of this communication.**

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 1174 Forest Road Lugarno NSW, 2210





ABN 87 003 004 322

Main	In Service	Proposed
Unknown Pressure	—	---
Distribution - 2 kPa	—	---
Distribution - 7 kPa	—	---
Distribution - 30 kPa	—	---
Distribution - 100 kPa	—	---
Distribution - 210 kPa	—	---

Main	In Service	Proposed
Distribution - 300 kPa	—	---
Distribution - 400 kPa	—	---
Critical Main - Treat as High Pressure Main	—	---

High Pressure Main & Pipeline	In Service	Proposed
Secondary - 1050 kPa	—	---
Secondary Service	—	---
Primary - 3500 kPa	—	---
JGN Trunk - 7000 kPa	—	---
Transmission	—	---

Fittings, Valves & Regulators	
Siphon	—
Valve	—
Distance in metres of Main from Boundary Line	~ 1.5
MBK = Metres Back of Kerb	
MFL = Metres from Fence Line	

Regulator Set	
Regulator Station	—
Automatic Line Break Valve	—



Scale: 1:2000

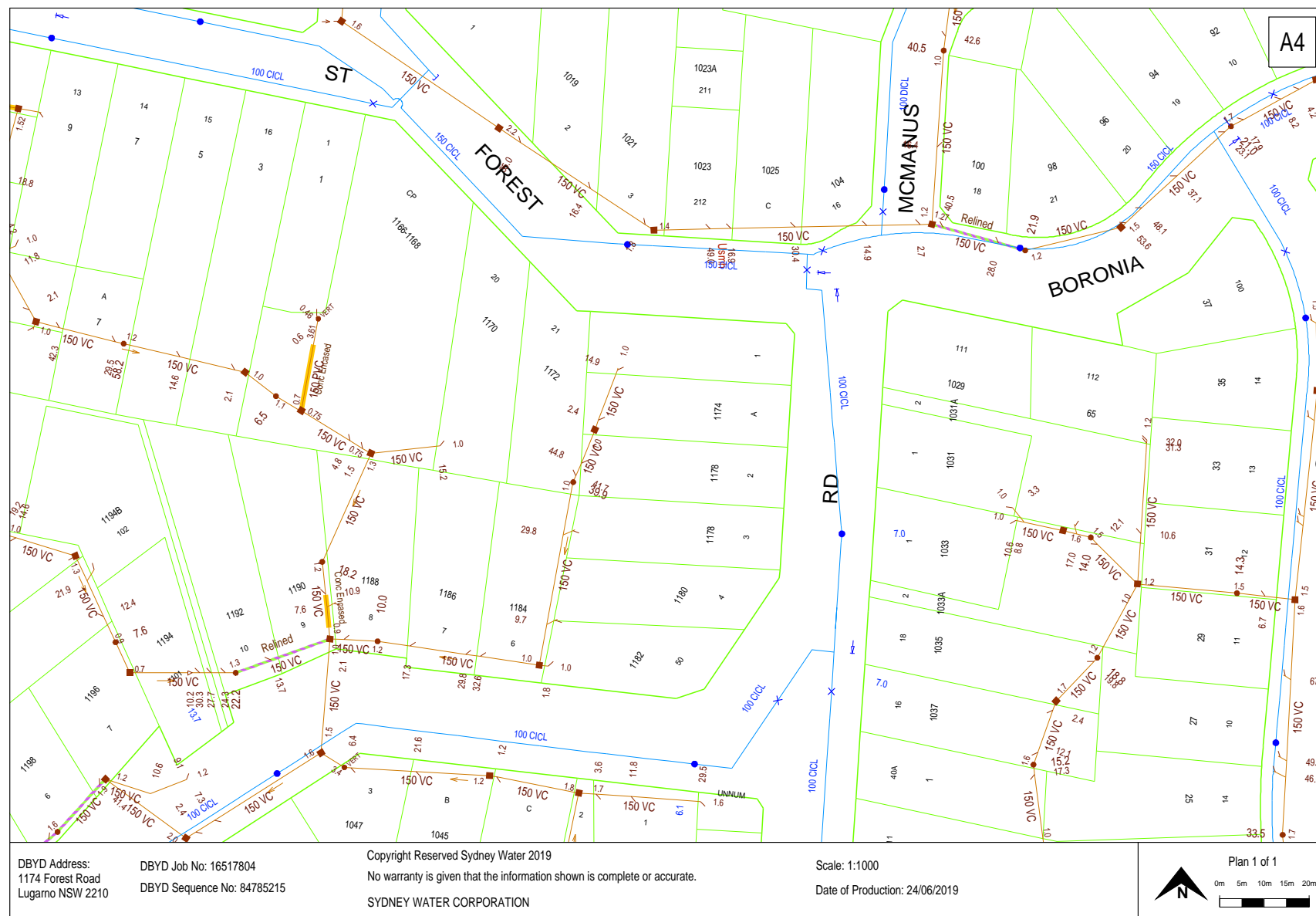
**Issue Date:** 24/06/2019

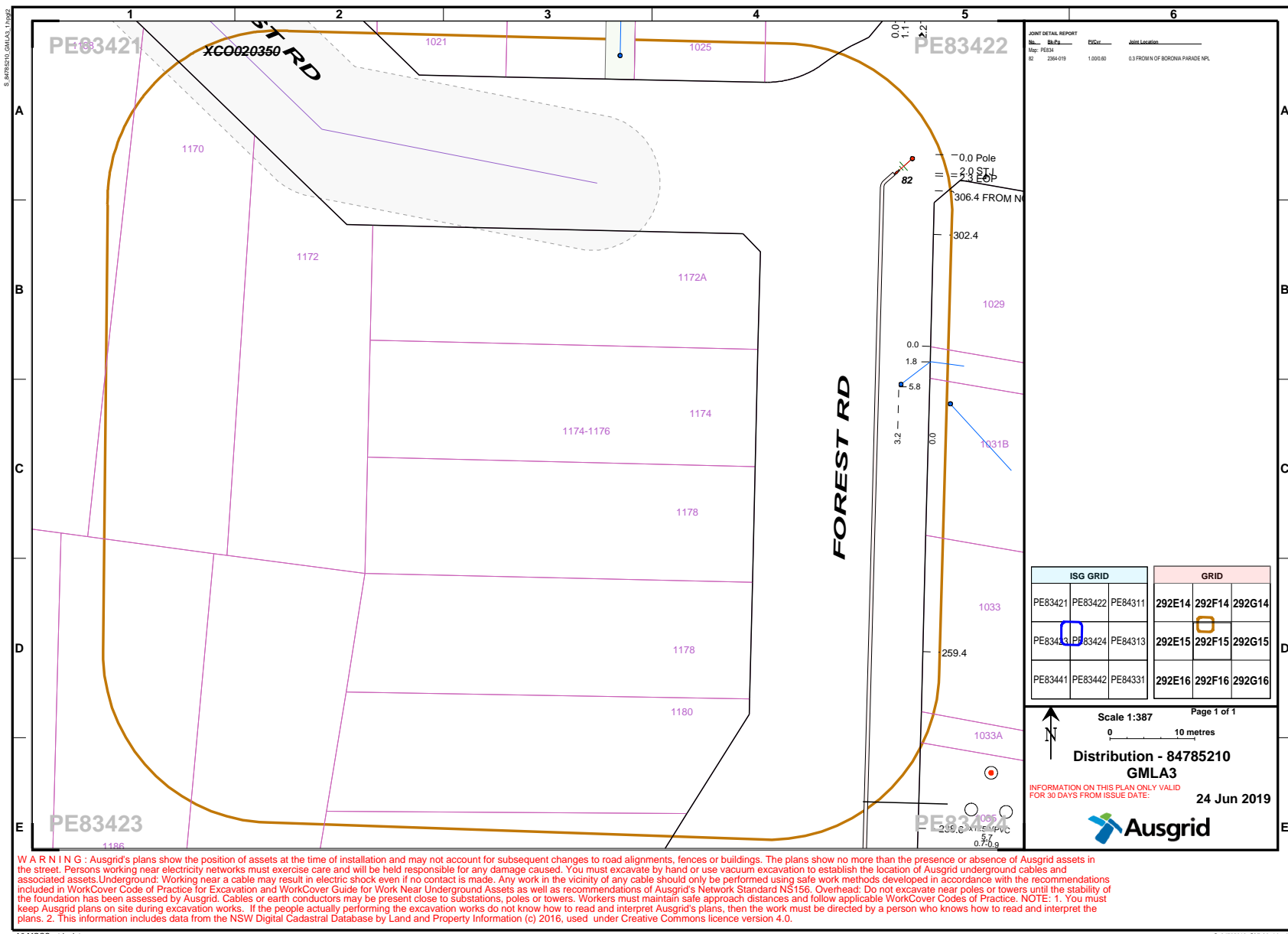
**DBYD Seq No:** 84785214

**DBYD Job No:** 16517804

**WARNING:** This is a representation of Jemena Gas Networks underground assets only and may not indicate all assets in the area. It must not be used for the purpose of exact asset location in order to undertake any type of excavation. This plan is diagrammatic only, and distances scaled from this plan may not be accurate. Please read all conditions and information on the attached information sheet. This extract is subject to those conditions. The information contained on this plan is only valid for 28 days from the date of issue.









## Spatial Services

### Works likely to impact survey marks

Penalties apply for unauthorised removal, damage, destruction, displacement, obliteration or defacing of survey marks

ISSN 2203-9384

Information Sheet

July 2018

### Legislation

Survey marks are protected under the *Surveying and Spatial Information Act 2002 (NSW) Section 24*. The following penalties and orders apply for unauthorised removal, damage or disturbance of survey marks:

- Maximum penalty of 25 units, currently **\$2,750** per mark; and
- up to **\$10,000** per mark in compensation to the Surveyor-General towards the cost of reinstatement of each survey mark; and
- up to **\$10,000** per mark in compensation to any other person towards any loss or damage suffered by that person as a consequence of the offence.

If works are likely to impact a survey mark, an application under the *Surveying and Spatial Information Regulation 2017 Clause 90* must be lodged with the Surveyor-General.

### Why are survey marks important?

Survey marks are a State asset and provide a wealth of important information to a wide range of people in the community. They are used to support the surveying of property boundaries and easements, and are important for engineering, road building, mapping and other land surveys.

The loss of survey marks can significantly degrade the integrity of the legal property boundaries and impact on the costs of development projects that depend upon position and height.

### How do I preserve survey marks?

*Surveyor-General's Direction No.11 – Preservation of Survey Infrastructure* provides directions on how to comply with the Legislation.

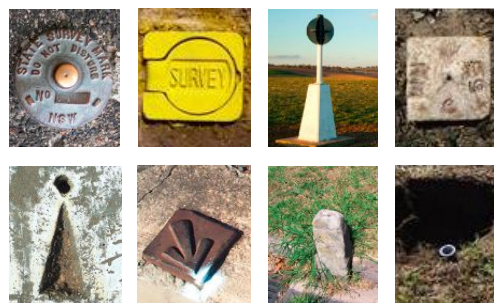
You can find the Direction on the following link: [http://spatialservices.finance.nsw.gov.au/\\_data/assets/pdf\\_file/0005/217094/SG\\_Direction\\_11.pdf](http://spatialservices.finance.nsw.gov.au/_data/assets/pdf_file/0005/217094/SG_Direction_11.pdf)

A Registered Land Surveyor will be able to provide advice about the preservation of survey infrastructure. A list of Registered Land Surveyors is available from the Board of Surveying and Spatial Information website: [http://www.bossi.nsw.gov.au/about/find\\_a\\_registered\\_surveyor](http://www.bossi.nsw.gov.au/about/find_a_registered_surveyor)

Additional information to assist with best practice guidelines for road infrastructure development can be found in Roads and Maritime Services QA Specification G71 – *Construction Surveys* by following the link: <http://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/specifications/g071.pdf>

### Types of survey marks

There are many types of survey marks used for various purposes. Many are buried and may only be identified by a Registered Land Surveyor. Some examples of common survey marks can be seen below.



### More information

For more information or to obtain advice on compliance with Legislation, please forward your enquiry to:

[Surveyor-General-Approvals@finance.nsw.gov.au](mailto:Surveyor-General-Approvals@finance.nsw.gov.au)

Applications to remove a Survey Mark can be lodged here: [http://spatialservices.finance.nsw.gov.au/surveying/surveying\\_services/forms\\_and\\_applications/survey\\_marks\\_removal](http://spatialservices.finance.nsw.gov.au/surveying/surveying_services/forms_and_applications/survey_marks_removal)





Geotechnical Consultants Australia

Astor Homes

**ASBESTOS CONTROL PLAN  
REMOVAL SCOPE OF WORKS**

1174-1178 Forest Road  
Lugarno NSW 2210

Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873

E1933-2

12<sup>th</sup> August 2019

Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



### Report Distribution

Asbestos Control Plan Removal Scope of Works

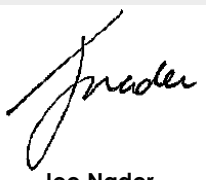
Address: 1174-1178 Forest Road Lugarno NSW 2210

GCA Report No.: E1933-2

Date: 12<sup>th</sup> August 2019

Copies	Recipient/Custodian
1 Soft Copy (PDF) – Secured and issued by email	Astor Homes Kirill Charonov kirill@astorhomes.com.au
1 Original – Saved to GCA Archives	Secured and Saved by GCA on Register

Version	Prepared By	Reviewed By	Date Issue
Draft	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	6 <sup>th</sup> August 2019
FINAL	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	12 <sup>th</sup> August 2019

Report Revision	Details	Report No.	Date	Amended By
1	FINAL Report	E1933-2	12 <sup>th</sup> August 2019	-
Issued By:			 <b>Joe Nader</b>	

### Geotechnical Consultants Australia Pty Ltd

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Parramatta NSW 2151

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Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



## EXECUTIVE SUMMARY

**Note: This Executive Summary must not be read in isolation, but should be read in conjunction with all sections of this report.**

### Asbestos Removal Scope of Works:

All work is to be undertaken in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011).

The scope of work described within this document is considered non friable asbestos and not requiring a licenced assessor due to the small localised areas.

### Prior to Removal Works Commencement:

- Restrict access to the removal area.
- Install 'Asbestos Warning' signs on all boundaries of the exclusion zone and on all places where anyone may gain access to the impacted area.

### Removal of asbestos contaminated soil as Non-Friable Asbestos:

- All asbestos removal works are to be undertaken with the exclusion of all non-asbestos workers during a time when the area is not occupied.
- Ensure water is available for misting / dust suppression and power is available for lighting and HEPA vacuuming prior to commencing.
- Emu pick all ACM fragments from the ground surface within the entire contaminated area
- Remove any asbestos contaminated soil/fill material (approximately 2m x 2m) within the identified area to a depth of 400mm or until a clean soil profile is achieved or no visible ACM is observed
- Soil contaminated with ACM must be appropriately wetted down to minimise dust prior to disturbance/removal
- Following removal of all ACM from the property, obtain clearance certification from GCA.

Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



## INTRODUCTION

### Assessment:

The scope of work described within this document is considered Non-Friable asbestos removal work.

### Site Description:

The site consists of a residential dwelling with ACM identified within three site locations. This report should be read in conjunction with the Detail Site Investigation report (Report No: E1933-1, Date: 17<sup>th</sup> July 2019).

### Removal Area:

The removal area includes a section (approximately 2m x 2m) located at three sites. From the Detail Site Investigation report (Report No: E1933-1, Date: 17<sup>th</sup> July 2019), asbestos was detected within borehole 11 (BH11), borehole 8 (BH8) and borehole 7 (BH7). It is within these three boreholes where soil removal is required.

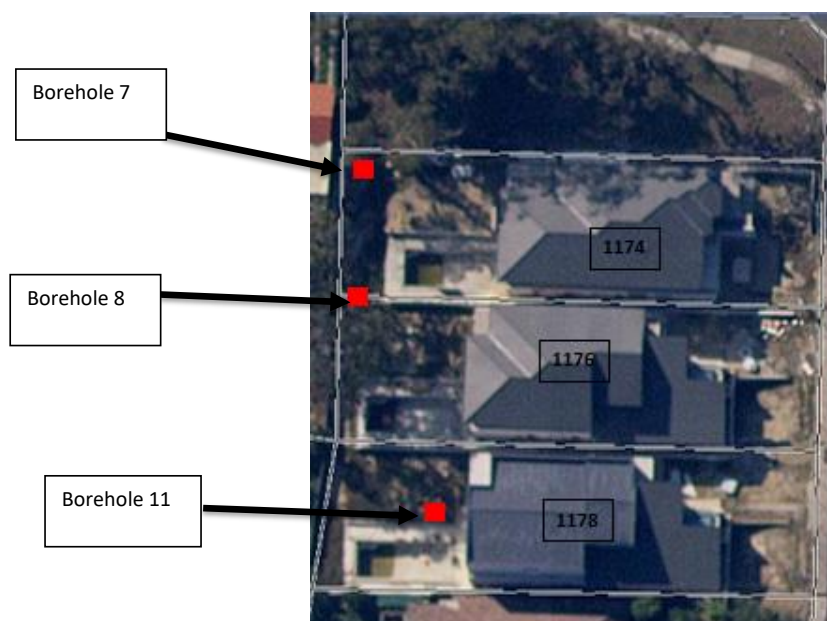


Figure 1: Soil removal occurred at Borehole 7, Borehole 8 and Borehole 11

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## ABBREVIATIONS

- AIB - Asbestos Insulating Board (also referred to as LDB)
- ACM - Asbestos Containing Material
- ACD - Asbestos Contaminated Dust
- AC - Asbestos Cement (commonly known as fibro)
- EDB - Electrical Distribution Board
- FCS - Fibrous Cement Sheeting
- LDB - Low Density Board (a Friable ACM that appears similar to Asbestos Cement)
- NATA - National Association of Testing Authorities
- NES - National Exposure Standard
- NOHSC - National Occupational Health and Safety Commission
- Pb - Lead
- PCB - Polychlorinated Biphenyls
- PPE - Personal Protective Equipment
- QA/QC - Quality Assurance / Quality Control
- SMF - Synthetic Mineral Fibre
- SWA - Safe Work Australia
- TWA - Time Weighted Average
- VFT - Vinyl Floor Tile
- WHS - Work Health and Safety

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## ASBESTOS REMOVAL PLAN

### 1.0 GENERAL

- The Removal Contractor is to ensure that all work is undertaken in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011), and the Work Health and Safety Act 2011 (WHS 2011);
- The Removal Contractor is required at all times to strictly adhere to all relevant Acts, Regulations and Codes of Practice;
- The Removal Contractor shall obtain all necessary permits and approvals and give required notices (e.g. WorkCover permit to undertake removal works and any site specific approvals from the Local Council Authority);
- The Removal Contractor shall ensure that site access is restricted and unauthorised access into the site is prevented. Install barricades and/or hoardings, and appropriate signs, including asbestos removal signs, before beginning any work;
- All non-essential persons are to be separated from the removal area by at least 10 metres as a general guide. If a shorter boundary is required then a Licensed Asbestos Assessor (friable) or Competent Person (nonfriable) should determine the new boundary based on a risk assessment;
- Access for other persons to within any asbestos removal control boundary is not permissible without the supervision of the asbestos removal contractor and whilst wearing the correct PPE;
- The Removal Contractor shall ensure that the site is secure and safe;
- The Removal Contractor shall establish procedures for dealing with emergencies. Fully inform all site personnel of work plan and safety procedures;
- Where an asbestos removal exclusion zone is established in the vicinity of a fire exit or emergency egress route, procedures should be implemented such that emergency evacuation may occur unhindered;
- No asbestos removal work is to be undertaken during any period of high wind or within the period of effect of any high wind warning, gale warning or other storm warning;
- Where removal works extend beyond 1 day, the Removal Contractor shall ensure that the removal site and any associated asbestos removal equipment is made weather / storm proof prior to leaving site each day;
- The Removal Contractor shall seal all penetrations, holes, vents, air plenums, HVAC ducting and the like prior to the commencement of work;
- The Removal Contractor shall cover all vegetation, shrubs, grassed surfaces, gardens and the like with 0.2mm plastic sheeting with taped joints prior to the commencement of work;
- The Removal Contractor shall remove or seal all soft furnishings, floor coverings, window coverings, fly screens, and other porous or perforated materials prior to the commencement of work;
- The Removal Contractor shall ensure that all drains etc. are fitted with an appropriate filter medium in order to remove contaminants from any water leaving the site. The condition of the filters shall be checked regularly and filters replaced when necessary;
- The Removal Contractor will decide if electrical services etc. are to remain in operation during remedial works and ensure all other services are assessed prior to commencement. Arrange service alternatives as required;

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- The Removal Contractor shall ensure that fire extinguisher(s) suitable for the area of work are present and accessible at all times during the removal program.
- To ensure that dust generation is minimised, the Removal Contractor shall ensure that all sources of dust are suppressed with low-pressure water sprays. The sprays will apply minimal amounts of water to the work areas in a fine mist to minimise or eliminate water run-off and free water;
- The Removal Contractor shall ensure that all confined spaces are adequately designated, and that all works within any identified confined spaces are conducted in accordance with the relevant legislative requirements;
- The Removal Contractor is responsible for the proper disposal of all wastes in accordance with all statutory requirements. Waste disposal receipts and/or tipping documentation is to be supplied to the Principal. Refuse arising from the execution of work (including food scraps and the like) shall be removed from the site;
- Any ancillary workers (tradesman / machinery operators / specialist technicians and the like) required to be present during the asbestos removal must undergo Asbestos awareness training prior to the commencement of work;
- The Removal Contractor shall ensure that all workers have received appropriate instruction in the health hazards associated with asbestos the use of PPE and that all workers wear their PPE in accordance with the manufacturer's specifications;
- The Removal Contractor shall ensure that all workers required to wear respiratory protective equipment have undergone a qualitative fit testing assessment to ascertain that they are able to maintain an adequate facial seal while wearing the chosen RPE.
- The Removal Contractor shall establish an area for decontamination of equipment/plant/vehicles and wetting down and disposal of PPE. Decontamination facilities must be appropriate for the nature of the planned removal;
- No disposable coveralls or PPE is to be worn outside of the removal area;
- No vehicle or container shall leave the site unless it is loaded appropriately, within the safe working limit of the vehicle/container and is adequately covered;
- All material which may contain asbestos should be assumed to contain asbestos unless NATA accredited analysis indicates otherwise;
- Asbestos containing materials should not be broken in any way and are to be disposed of as whole components;
- All tools and equipment that has entered the contaminated areas is to undergo decontamination in the decontamination area prior to leaving the contaminated area;
- The Removal Contractor is advised that the WorkCover Authority may be called upon by the Consultant to give advice on current work procedures and practices at any stage throughout the Project without prior notice to the Principal Contractor.

## 2.0 CONDUCT OF WORK

- Undertake a detailed and site specific risk assessment in consultation with all workers involved;
- Hold a tool box meeting to ensure that all workers are fully informed of works involved;
- Demarcate an Asbestos removal exclusion zone at greater than 10m from the worksite, or where practical;
- Install barricades and signage on all potential points of entry to the exclusion zone;
- Designate a decontamination area for the removal and disposal of all used PPE;

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- Designate an Asbestos waste storage area for the temporary storage of waste;
- As a dust minimisation measure, spray all asbestos contaminated/potentially contaminated material with a low pressure water mist or PVA emulsion prior to, and during the removal. The sprays are not to generate free water/water runoff;
- Undertake ALL asbestos removal works detailed in the Executive Summary of this report in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011);
- At the completion of the scheduled asbestos removal work, undertake a walk-over inspection to ascertain the complete removal of all ACM within the current scope of work;
- Undertake a general site clean-up and restore the worksite condition in a tradesman-like manner;
- Request for the Licensed Asbestos Assessor (friable) or Competent Person (non-friable) to conduct a final visual clearance inspection and issue a clearance certificate upon satisfactory clearance results;
- Subsequent to satisfactory inspection by the Hygienist, all surfaces within the work area are to be sprayed with a dilute PVA emulsion;
- Subsequent to a satisfactory Clearance Inspection, remove non-essential containment and associated equipment. Any contaminated/potentially contaminated containment materials (e.g. plastic sheeting) are to be disposed of as asbestos contaminated waste;
- Conduct a final walk-over inspection to ascertain the complete make-good of the worksite.

### 3.0 PERSONAL PROTECTIVE EQUIPMENT AND WORK PRACTICES

During all Asbestos removal work, the Removal Contractor is to ensure that the following precautions and safety measures are implemented:

- The exclusion of non-workers;
- Use of appropriate respiratory protection;
- The correct and proper wearing of disposable suits with hood;
- The wearing of non-porous gloves;
- The wearing of non-lace-up boots;
- Eye protection (e.g. goggles), steel capped boots, and hard hat as per general requirements for site work;
- Use of decontamination units/facilities to include washing of face, hands, and all skin thoroughly before leaving the removal area, eating, drinking or smoking;
- No food consumption or smoking inside the treatment area;
- Showering and changing before leaving the site each day (friable work);
- Cleaning of boots before leaving the treatment area;
- New disposable suits and face masks to be used for each entry to the exclusion zone;
- No disposable coveralls or PPE is to be worn outside of the removal area.



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#### 4.0 CONTAMINATED WASTE

The Removal Contractor is to ensure that the transportation and disposal of contaminated waste meets the requirements of the NSW EPA as outlined in Waste Disposal Guidelines.

The Removal Contractor is responsible for controlling all waste generated. This may include determining that all testing, handling, storage, transport and disposal requirement have been met.

Copies of the waste disposal receipts are to be supplied by the Removal Contractor to the Principal. A log detailing the dates and quantities of waste removed and the disposal site is to be kept.

##### 4.1 SITE SUPERVISION AND INSPECTION

Site Supervision shall be undertaken by a qualified employee of the Removal Contractor (the Site Supervisor). The Supervisors duties include all those set out in the relevant rules and regulations as well as any other duties required by this document.

The Site Supervisor shall be fully trained, have at least 2 years experience, and a thorough knowledge of the work procedures and safety standards.

No Asbestos removal work is to be undertaken without the presence in the Asbestos Work Area of a Site Supervisor of the Removal Contractor.

##### 4.2 WASTE REMOVAL

It is the responsibility of the Removal Contractor to ensure that all waste is managed in accordance with the relevant legislation and in the following manner:

- All Asbestos waste is to be placed immediately into approved polyethylene bags or lined bins and sealed in an appropriate manner to render it safe for handling and disposal;
- Bags shall be filled to no more than 20 kg and should be no more than half full. Bins should not be overfilled;
- Bags shall be tied with wire rod ties fixed in position with a rod-tying tool and/or sealed by tape. When tying the bag, surplus air should be excluded from the bag without discharging contaminated dust;
- Loaded bags shall be carried carefully and not thrown, dropped, or roughly handled;
- Any damaged or punctured bag shall be placed into a second bag, which is then re-sealed;
- The bagged waste shall not be allowed to accumulate. It shall be removed from the site at regular intervals at the completion of decontamination in each Asbestos Work Area;
- All waste must be available for inspection;
- The external surface of the bag is to be wet wiped in the decontamination area to remove any dust adhering to the surface immediately before being shifted from the Asbestos Work Area;
- The bags shall be placed into approved storage containers/bins. The containers shall be lined with 0.2mm plastic. When the bins/containers are full they shall be sealed and removed from site; Any contamination of the work area shall be cleaned up immediately.

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#### 4.3 CLEAN-UP AND AREA RESTORATION

On completion of the asbestos remediation the Removal Contractor shall ensure the clean-up of the removal area. All surfaces shall be thoroughly cleaned and prepared for final inspection by the Hygienist. If the remediation area is not cleaned satisfactorily, the Removal Contractor shall repeat the clean up as directed by the Hygienist. Clearance air monitoring may be conducted following a satisfactory visual inspection by the Hygienist.

#### 4.4 CLEARANCE CERTIFICATION

At the completion of the Asbestos removal works, and following satisfactory clean-up and area restoration by the Removal Contractor, the Hygienist will attend the site to undertake a visual clearance inspection. Clearance sampling of settled dust may be considered necessary by the Hygienist in order to identify any residual micro-fibre Asbestos particularly if the removal area is not able to be sprayed with a dilute PVA emulsion subsequent to the removal works.

If during the Clearance Inspection:

- No further evidence of asbestos contamination is visually identified;
- Any encapsulation work is found to be complete and adequate;
- All asbestos air monitoring results are <0.01 fibres/mL;
- All sample analysis results report 'No Asbestos Detected';

Then the consultant will issue a clearance certificate with words to the effect:

The consultant considers that as far as reasonably practicable all visible and accessible Asbestos containing materials within the current scope of work have been removed to a satisfactory industry standard. It is the opinion of the Consultant, that with regard to Asbestos, the above-mentioned areas inspected are considered safe for normal activities to proceed.

Included will be a limitation clause(s) to cover any possible or actual remaining contamination/issues of concern.

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## LIMITATIONS

GCA performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of GCA personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, GCA assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of GCA, or developments resulting from situations outside the scope of this project.

The results of this assessment are based on the site conditions identified at the time of the site inspection and validation sampling. GCA will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report.

GCA is not engaged in environmental consulting and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

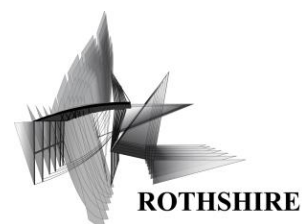
### Geotechnical Consultants Australia Pty Ltd (GCA)

#### Prepared by:

**Luke Brevia**  
Environmental Scientist

#### Reviewed by:

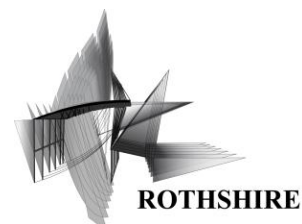
**Nick Caltabiano**  
Project Manager



DOCUMENT NO.: 2122301-SEE-RPT-001-1

## STATEMENT OF ENVIRONMENTAL EFFECTS

<b>ADDRESS:</b>	1176 FOREST ROAD LUGARNO NSW 2224 LOT 2 IN DP 18873
<b>CLIENT:</b>	LUGARNO DEVELOPMENTS PTY LTD
<b>LOCAL GOVERNMENT AREA:</b>	GEORGES RIVER COUNCIL
<b>SCOPE</b>	RETENTION OF THE EXISTING PART CONSTRUCTED DWELLING, AND ALTERATIONS AND ADDITIONS TO ENABLE THE FINALISATION OF CONSTRUCTION AND OCCUPATION



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## 1. INTRODUCTION

This Statement of Environmental Effects (SEE) has been prepared on behalf of the property owners by Rothshire Pty Ltd (Rothshire) to accompany a Development Application (DA) to Georges River Council (Council) for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1176 Forest Road, Lugarno (the site).

The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals. These dwellings, including the subject site are known to Council.

The proposed development seeks to legitimise this ongoing matter with Council for site and is submitted concurrently with a Building Information Certificate (BC) to legitimise works undertaken to date. The subject DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

This report has been prepared with reference to the architectural plans and supporting documentation prepared by Rothshire accompanying this report. This report provides an overview of the site and its context, a detailed description of the proposed development, the planning framework and an environmental assessment of the proposed development.

Based on the conclusions of the comprehensive assessment undertaken, and in the absence of any significant adverse environmental impacts, Council's approval of the DA is sought..

### 1.1. REPORT AUTHOR

Author: Jonathan Archibald

Qualifications: Bachelor of Planning (MQ)

Business Address: Level 2, Suite 202, 845 Pacific Highway, Chatswood NSW 2067

### 1.2. DOCUMENT HISTORY

Table 1. Document revision & history

Rev.	Description	Author	Reviewer	Date
1	Issued for DA	JA	NRT	24/11/2022



## 2. THE SITE

### Site Context

The site and existing part constructed dwelling forms part of a group of three (3) dwellings, as outlined below.

- 1174 Forest Road, Lugarno. This northern allotment is regular in shape, with a total area of 626m<sup>2</sup> and is legally described as Lot A DP 328702. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (at grade) garage and swimming pool and is in the advanced stages of construction.
- 1176 Forest Road, Lugarno. This middle allotment is regular in shape, with a total area of 626m<sup>2</sup> and is legally described as Lot 2 DP 18873. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.
- 1178 Forest Road, Lugarno. This southern allotment is regular in shape, with a total area of 638.6m<sup>2</sup> and is legally described as Lot 3 DP 18873. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.

An aerial view of each of these three dwellings is provided at **Figure 1** below.

### Subject Site

The subject site is located at 1176 Forest Road, Lugarno (Lot 2 DP 18873). This is the middle allotment within the group as detailed at **Figure 2** below. The site is not subject to any easements or restrictions.

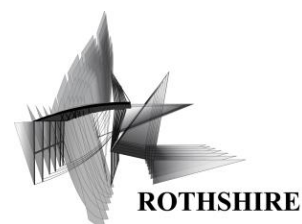
The site is located within an established residential area, with surrounding development comprising similar low scale (1-2 storey) single detached dwellings.

The site is located within the Georges River Local Government Area (LGA) and is zoned R2 Low Density Residential under the Georges River Local Environmental Plan 2021 (LEP).

The site is not identified as, nor within proximity to any heritage items (or draft items) or Heritage Conservation Area (HCA) (or draft HCA).

The site is not identified as bushfire nor flood prone and does not include any areas of terrestrial biodiversity or Environmentally Significant Lands (ESL). The site is located within the Foreshore Scenic Protection Area.

An extract of the LEP 2021 site zoning is provided at **Figure 3** below.

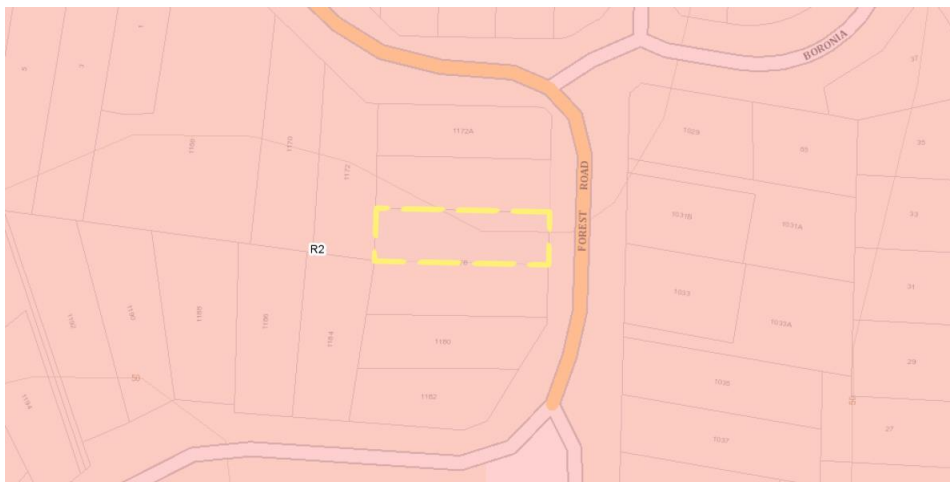


**Figure 1. Aerial photograph of the site context (Source Sixmaps.nsw.gov.au)**  
 Dwelling group outlined in red

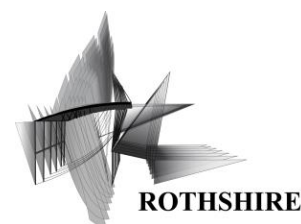




**Figure 2. Aerial photograph of the subject site (Source Sixmaps.nsw.gov.au)**  
Site outlined in red



**Figure 2. Extract of LEP 2021 Zoning Map**  
Site outlined in yellow



### 3. DEVELOPMENT HISTORY

#### Development Applications

A review of Council's DA tracker does not provide any development consent history for the subject site.

#### Complying Development Certificate

The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals.

These dwellings were initially approved, via separate Complying Development Certificates (CDCs), which were issued to enable the creation of allotments and construction of each property within the in approximately early 2015. Relevant to this site is CDC Ref. 703/1015, which provided initial approval for establishment of the dwelling at the site.

However, despite the legitimate issue of these CDCs and commencement of construction, that the design of each dwelling was subsequently revised, to the extent that the design of each dwelling departed from relevant guidance contained within the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (Codes SEPP). On this basis, each dwelling within the group, including the subject site, is unauthorised. Each CDC has since been surrendered.

These non-compliance matters resulted in the issue of stop work orders by Council in early 2017, with all dwellings in the advanced stages of construction unable to be completed (or regularised without further approval).

The construction of dwellings has not progressed since this time, which remains in an incomplete and unfinished state, with construction fencing remaining at the site. It is understood this compliance action was held in abeyance by Council, pending resolution of a number of design matters to obtain necessary approvals, including to regularise works undertaken to date, provide approval for remaining works required and to enable finalisation and occupation of the dwellings ongoing.

This DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling at 1176 Forest Road, Lugarno.

#### Pre-Lodgement Consultation

Given the complex history regarding the subject site and dwelling group, extensive pre-lodgement consultation has been held with Council, including on 16 June 2022.

In relation to the subject site, the following comments were provided by Council and have been addressed in the revised design as detailed at Table 1.

**Table 1. Pre-DA Considerations**

Council Comment	Response
<i>The current basement is not supported give the significant flooding issues. Majority of the basement should be backfilled except for potentially 10m<sup>2</sup>, which could be used as storage as prescribed under Part 6.1.2.2.</i>	The design has been revised to backfill this basement, whilst maintaining an area of storage.



<i>A single carport within the front setback opposite the study maybe taken into consideration subject to the following:</i>	The design has been revised to provide a carport within the front setback.
<i>Minimum 1.5m setback from the northern boundary with no encroachment within the side setback. This may require demolition of the Piano Room.</i>	
<i>Demolition of the retaining wall within the front setback and the land restored to its natural state.</i>	Site circumstances and altered levels necessitate this boundary retaining wall is maintained.
<i>Reduction in the width of the driveway to be maximum 4.0m</i>	The design has been revised to provide a driveway width of 3.1m.
<i>Combine the driveway and pedestrian path to maximise deep soil area</i>	This has been accommodated within the revised design.
<i>External access to guest bedroom along the southern boundary at ground should be deleted. External access to the ground floor guest bedroom will not be supported</i>	The design had been revised to remove this access.
<i>The first floor balcony to the rear should be deleted as it compromises amenity of the development to the west;</i>	<p>Whilst this balcony is maintained, additional privacy screening up to 1800mm in height is provided to the northern (side) boundary, with a further opaque balustrade up to 1100mm in height is provided to the western (rear) elevation to maintain amenity to surrounding properties.</p> <p>The view toward the neighbouring property is limited by existing trees located within the adjoining property to the west. Further, it is proposed to plant additional trees within the south western corner of the site, capable of achieving a mature height greater than 6m which will further mitigate any potential privacy impacts.</p>
<i>The balconies on the eastern (front) façade should have a minimum 1.5m side boundary setback and should not protrude beyond the main building wall.</i>	This balcony has been revised to maintain alignment with the primary building line, with provision of privacy screening up to 1800mm in height to the northern (side) boundary, to maintain amenity to surrounding properties.
<i>The void area on first floor in excess of 15m² should be included in the FSR calculations (Refer Part 6.1.2 GRDCP 2021)</i>	This void has a maximum area 12.23m² and has been excluded from Floor Space Ratio (FSR) calculation, in accordance with the LEP 2012 definition for Gross Floor Area (GFA).
<i>External wall to the south of the stairs (southern façade) should be demolished to allow for some access to sunlight to the bedroom and also minimise bulk and scale. However, that space should be non-trafficable roof and not a balcony</i>	All bedrooms receive are considered to receive adequate day light and ventilation and will provide a high level of amenity to occupants.

All matters raised by Council have been taken into consideration in the design of the proposed development, including alterations from the existing circumstance to bring the existing dwelling into compliance with the applicable planning framework. Please refer to further details contained at Section 5 of this report.



#### 4. THE PROPOSED DEVELOPMENT

##### Overview

The proposed development seeks the retention of the existing part constructed dwelling, including alterations and additions to enable finalisation of construction and occupation.

A detailed breakdown of the proposed works is provided below. Please refer to a full outline of proposed works within the architectural plans, prepared by Rothshire accompanying this report.

##### Detailed Scope of Works

A detailed scope of proposed works is provided below.

- Removal of the existing retaining walls for the existing basement ramp, including the filling of land, to create a level arrangement.
- Enclosure of the existing basement garage, including construction of an eastern perimeter wall, repurposing this garage space to create a basement storage area (which is not visible from Forest Road).
- Provision of a new driveway to the northern boundary of the site, including construction of a carport constructed behind the primary building line.
- Associated internal works required to finalise construction of the existing part-constructed dwelling, including bathrooms, kitchen, fixtures and finishings.
- Provision for an On Site Detention (OSD) tank to be constructed under the proposed driveway, including a new stormwater pit located on Forest Road. An easement is also proposed servicing dwellings within the group (numbered 1174, 1176 and 1178 Forest Road) to the new pit and associated pipework.
- Provision for front fencing and completion of existing part constructed boundary fencing, as well as the provision (completion) of balustrades to balconies and internal open edges and stairs.
- Replacement of various windows.

##### Landscaping

In addition to the above, associated landscaping is proposed as follows:

- Provision of planting within the front setback, in place of the existing ramp excavation which is proposed to be removed (refer above).
- Provision of perimeter planting within the rear setback of the dwelling, including to the northern and southern (side) boundaries, and western (rear) boundary.
- Additional areas of turfing within the front and rear setbacks as nominated on the submitted plans.

No tree removal is proposed, nor considered to be required, to facilitate the proposed development.



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#### Stormwater Management

The proposal is accompanied by a detailed stormwater plan, detailing drainage by gravity from the dwelling to Forest Road. As noted above, a 13,000 litre OSD tank to be constructed under the proposed driveway and will service the subject side and adjoining properties (at 1174 and 1176 Forest Road), via a proposed easement and pipe system.

#### Waste Management

A Waste Management Plan has been prepared by Rothshire and is submitted with this application. The plan provides details of how waste will be managed during works. Recycling and re-use has been considered and will be applied during works where possible.

#### Resolution of Matters Towards Occupation

Rothshire, on behalf of the property owners are committed to resolving ongoing issues at the site with Council. As noted within this report, the proposed development seeks to legitimise this ongoing matter with Council for site. The subject DA seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

The proposal will maintain the use of the site as a single dwelling for private residential occupation.



## 5. STATUTORY PLANNING FRAMEWORK

In accordance with Section 4.15(1)(a) of the Environmental Planning and Assessment Act 1979 (as amended) the following section provides an appraisal of the proposed development having regard to the statutory planning instruments that apply to this site, including:

- The Environmental Planning and Assessment Act 1979;
- State Environmental Planning Policy (Resilience and Hazards) 2021;
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004;
- Georges River Local Environmental Plan 2021; and
- Georges River Development Control Plan 2021.

An assessment against relevant provisions of the planning framework is provided below.

### State Environmental Planning Policy (Resilience and Hazards) 2021

Clause 4.6 of the State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) states that Council cannot consent to development on the land unless:

*"(a) it has considered whether the land is contaminated, and*

*(b) If the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*

*(c) If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose."*

The site holds a long-standing residential history and therefore there is no evidence to suggest that the site is contaminated. The site is not identified on the NSW EPA contaminated sites register and historical documentation provided by Council does not indicate any reason to suspect there is contamination at the site.

All fill introduced to the site to enable the filling of the existing driveway will be VENM, with suitably qualified contractors and appropriate material certification provided in accordance with the conditions of any consent and through the course of construction.

On this basis, the proposed development is considered acceptable with regard to Clause 4.6 of the Resilience and Hazards SEPP.

### State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (SEPP BASIX) ensures consistency in the implementation of BASIX throughout the State by overriding competing provisions in other environmental planning instruments and development control plans.

In accordance with SEPP BASIX, BASIX Certificates for each proposed dwelling has been prepared by a qualified consultant in relation to the proposal. These certificates confirm that the proposed development will meet the NSW government's requirements for sustainability, having particular regard to water, thermal comfort and energy. Please refer to the BASIX Certificates accompanying this report.





### Georges River Local Environmental Plan 2021

#### *Zoning and Permissibility*

The site is zoned R2 -Low Density Residential pursuant to the LEP 2021.

Development for the purposes of dwelling houses (including alterations and additions) is permitted within the R2 Zone, as per the Land Use Table of the LEP 2021, however requires development consent.

#### *Principal Development Standards*

An assessment of the proposal against the Principal Development Standards and key built form controls under the LEP 2021 as they apply to the proposed development are provided at **Table 2** below.

**Table 2. LEP 2021 Key Provisions**

Clause	Control	Proposal	Complies
Clause 4.3 – Height of Buildings	Max. 9m	9.716m	No
Clause 4.4 – Floor Space Ratio	0.55 (Area 1)	N/A – Refer Cl.4.4A below.	
Clause 4.4A – Exceptions to Floor Space Ratio - Certain Residential Accommodation	For lots <650m <sup>2</sup> : [site area × 0.55] ÷ site area:1  (626m <sup>2</sup> × 0.55)/626m <sup>2</sup> :1  344.3m <sup>2</sup> /626m <sup>2</sup> =0.55:1	326m <sup>2</sup> = 0.52:1	Yes

#### *Clause 4.6 - Exceptions to Development Standards*

It is noted the proposed development represents a minor exceedance to the height of buildings control under Clause 4.4 of the LEP 2021. A separate request is made to vary this development standard, made pursuant to Clause 4.6 of the LEP 2021 accompanying this report.

As detailed at Section 1, the site is not within proximity to a heritage item, does not hold any other environmental restrictions and there are no other provisions of the LEP 2021 which apply to the proposed development.

#### *Clause 5.10 – Heritage Conservation*

The site is not identified as, nor located within proximity to, any local or state (or draft) heritage items. The site is not located within, nor within proximity to, any Heritage Conservation Area.

#### *Clause 6.1 - Acid Sulfate Soils*

The site is identified as containing Class 5 Acid Sulfate Soils (ASS). The proposed development is not within 500m of adjacent Class 1, 2, 3 or 4 land that is below 5m AHD and by which the water table is likely to be lowered below 1m AHD on adjacent Class 1, 2, 3 or 4 land. The proposed development is therefore considered suitable with regard to Clause 6.1 of the LEP 2021.

#### *Clause 6.3 - Stormwater Management*



The proposal is accompanied by a detailed stormwater plan, detailing drainage by gravity from the dwelling to Forest Road. An absorption pit is also proposed within the rear setback. The proposed development is therefore considered suitable with regard to Clause 6.3 of the LEP 2021.

*Clause 6.12 - Landscaped Areas in Certain Residential and Environment Protection Zone*

The site is located within the R2 – Low Density Residential Zone and therefore requires a minimum 25% of the site to be landscaped, pursuant to Clause 6.12(5)(a) of the LEP 2021.

The proposal maintains a landscaped area of 194m<sup>2</sup> (31%) and therefore complies with this clause.

*Georges River Development Control Plan 2021*

The Georges River Development Control Plan 2021 (DCP) outlines development requirements, controls and guidelines within the LGA. The key relevant parts of the DCP 2021 in relation to the proposed development have been outlined below, including:

- Part 3 – General Planning Considerations;
- Part 5 – Residential Locality Statements;
- Part 6.1 – Low Density Residential Controls.
- Part 6.4 – Ancillary Development.

An assessment of the development against relevant parts of the DCP 2021 is provided below.

**Table 4. DCP 2021 Chapter 3 Key Provisions**

Clause	Proposal	Complies
<b>3.11 Ecologically Sustainable Development</b>		
<b>3.11.1 Energy and Water Efficiency</b>		
(1) All BASIX affected development must comply with SEPP (Building Sustainability Index: BASIX) 2004.	The proposal is submitted with a valid BASIX certificate accompanying this report.	Yes
(15) The use, location and placement of photovoltaic solar panels are to consider the potential permissible building form on adjacent properties	The proposal does not include any photovoltaic panels.	Yes
(16) Where possible proposals for new buildings, alterations and additions and major tree plantings are to maintain solar access to existing photovoltaic solar panels having regard to the performance, efficiency, economic viability and reasonableness of their location	The proposal does not include, not will inhibit solar access to, any photovoltaic panels.	Yes
<b>3.12 Waste Management</b>		
(1) Development must comply with Council's Waste Management requirements regarding construction waste and ongoing management of waste materials	The proposal is accompanied by a Waste Management Plan (WMP), prepared in accordance with Council's requirements.	Yes
<b>3.13 Parking Access and Transport</b>		
(1) The car parking rate for development types are outlined in Table 1 – Parking Requirements. In the event of a	The proposal maintains 2 car parking spaces and therefore complies.	Yes





	discrepancy between the parking rates specified in this Part of the DCP and any another, the specific requirements identified within the detailed controls for a locality/area shall prevail.  Dwelling House: -1 space per 1 and 2 beds -2 spaces per 3 beds or more		
(20)	Car parking areas may be designed as ground level parking provided that the design results in building frontages level with the street.	The proposal maintains 2 car parking spaces at ground level within the front setback.	Yes
(32)	Design driveways to minimise visual impact on the street and maximise pedestrian safety.	The proposed driveway arrangement has been revised to be at grade, with 2 car parking spaces within the front setback, to minimise visual impact on the street and maximise pedestrian safety.	Yes
<b>3.14 Utilities</b>			
(1)	Applicants should consult service providers for energy, electricity, gas, water, telephone, national broadband network (NBN) fibre cables and fire requirements.	Adequate services are provided to support the proposed development.	Yes
(2)	Any services and structures required by the providers should be located within the basement, or concealed within the facade, with appropriate access. Where this is not possible, an alternative method of minimising street impact should be demonstrated, such as screening with landscape or built elements.	Adequate services are provided to support the proposed development.	Yes
(4)	Air conditioning units and mechanical plant located on the roof should be well screened and integrated into the building form.	The proposal does not include any air conditioning units within the roof form.	Yes
<b>3.19 Crime Prevention / Safety and Security</b>			
(1)	Active spaces and windows of habitable rooms within buildings are to be located to maximise casual surveillance of streets, laneways, parking areas, public spaces and communal courtyard space.	Windows have been suitably located to maintain a balance of visual privacy and passive surveillance.	Yes
(4)	Building entries are to be clearly visible, unobstructed and easily identifiable from the street, other public areas and other development. Where practicable lift lobbies, stairwells, hallways and corridors should be visible from the public domain.	The dwelling entrance is clearly visible, unobstructed and is easily visible from the street.	Yes

Table 5. DCP 2021 Chapter 5 Key Provisions

Clause	Proposal	Complies
<b>5.7 Lugarno Locality Statement - Future Desired Character</b>		



-	<i>Retain and enhance the prominence of the bushland landscaped character in new development through tree planting and landscaping.</i>	The proposed development provides for significant additional landscaping, which has been selected to suitably integrate within the local bushland character.	Yes
-	<i>Encourage consistent setbacks of buildings from the street and the provision of landscaping within the front setback.</i>	The proposal maintains a consistent alignment with adjoining dwellings, to the west of Forest Road, with landscaping provided within the front setback.	Yes
-	<i>Encourage the retention of trees and sharing of water views wherever possible, including screening via vegetation rather than solid walls.</i>	Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views.	Yes
-	<i>Public views to waterways should be retained from streets and public places.</i>	The surrounding public domain does not benefit from any significant views or vistas. In this regard, the proposal will not affect any views.	Yes

**Table 6. DCP 2021 Chapter 6.1 Key Provisions**

<b>Clause</b>		<b>Proposal</b>	<b>Complies</b>
<b>6.1.2 Single Dwellings</b>			
<b>1. Streetscape Character and Built Form</b>			
(1)	<i>New buildings and additions are to consider the Desired Future Character statement in Part 5 of this DCP.</i>	The proposed development has considered the desired future	Yes
(2)	<i>New buildings and additions are to be designed with an articulated front façade.</i>	The proposal provides for an articulated front façade, including a staggered built form with cantilevered roof above.	Yes
(3)	<i>Developments on sites with two (2) or more frontages are to address all frontages.</i>	The subject site holds a single frontage to Forest Road.	Yes
(4)	<i>Dwelling houses are to have windows presenting to the street from a habitable room to encourage passive surveillance.</i>	Windows have been suitably located to maintain a balance of visual privacy and passive surveillance.	Yes
(5)	<i>Development must be sensitively designed so as to minimise adverse impacts on the amenity and view corridors of neighbouring public and private property while maintaining reasonable amenity for the proposed development and is to balance this requirement with the amenity afforded to the new development.</i>	The proposal has been sensitively designed to address Forest Road. As noted, neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views.  All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(6)	<i>The maximum size of voids at the first floor level should be a cumulative total of 15m<sup>2</sup> (excluding voids associated with internal stairs).</i>	The proposal include a void space within the front of the dwelling totaling 12.23m <sup>2</sup> .	Yes



<b>2. Building Scale and Height</b>			
(1)	<i>New buildings are to consider and respond to the predominant and desired future scale of buildings within the neighbourhood, and consider the topography and form of the site.</i>	The proposed dwelling has been designed with consideration to the existing and desired future character of the locality.	Yes
(2)	<i>On sites with a gradient or cross fall greater than 1:10, dwellings are to adopt a splitlevel approach to minimise excavation and fill. The overall design of the dwelling should respond to the topography of the site.</i>	The design of the development is considered to appropriately respond to the landform.	Yes
(3)	<i>A maximum of two (2) storeys plus basement is permissible at any point above ground level (existing). Basements are to protrude no more than 1m above existing ground level.</i>	The proposal provides for two (2) habitable storeys with basement storage.	Yes
(4)	<i>Where topography conditions require a basement, the area of the basement should not exceed the area required to meet the car parking requirements for the development, access ramp to the parking and a maximum 10m<sup>2</sup> for storage and 20m<sup>2</sup> for plant rooms. Additional basement area to that required to satisfy these requirements may be included as floor space area when calculating floor space ratio</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Where the entry to the basement carpark is visible from the street, the entry should be recessed a minimum of 1m (from the edge of the external wall or balcony) from the levels above and the external walls of the garage differentiated from the walls above through articulation and external materials.</i>	This item is not applicable to the proposed development.	N/A
<b>3. Setbacks</b>			
<b>Front Setback</b>			
(1)	<i>The minimum setback from the primary street boundary is: i. 4.5m to the main building wall / facade; ii. 5.5m to the front facade of a garage or carport; or iii. Where the prevailing street setback is greater than the minimum, the average setback of dwellings on adjoining lots is to be applied.</i>	The proposal maintains a setback of 8.29m to the primary building line and therefore complies.	Yes
<b>Side and Rear Setbacks</b>			
(1)	<i>Buildings are to have a minimum rear setback of 15% of the average site length, or 6m, whichever is the greater (excluding detached secondary dwellings – see Point 12 in Section 6.1.2.12- Secondary Dwellings of this DCP).</i>	The site has a depth of 45.72m and therefore requires a minimum setback of 6.89m.	Yes



		The proposal maintains a rear setback of 14.017m and therefore complies.	
(2)	<i>The minimum side setbacks for ground and first floor are:</i> <i>i. 900mm for lots up to 12.5m in width measured at the front building line for the length of the development.</i> <i>ii. 1.2m for lots greater than 12.5m in width measured at the front building line for the length of the development.</i> <i>iii. 1.5m for all lots within the Foreshore Scenic Protection Area measured at the front building line for the length of the development.</i>	The proposal maintains a side setback of 885mm to the northern (side) boundary and 995mm to the southern (side) boundary at the ground floor, and 1509mm to the northern (side) boundary and 1610mm to the southern (side) boundary at upper levels.  It is acknowledged this represents a variation to the minimum required 1.5m at (2)(iii), however is compliant with the BCA (including associated fire rating requirements) and is not considered to result in any amenity impacts to surrounding properties. Given the existence of the dwelling, it is not practicable to increase this setback at the site.	Refer Comment
(3)	<i>Where alterations and additions (ground and first floor) to an existing dwelling are proposed, an existing side setback less than the setback required in Control 3 can be maintained, provided the reduced setback does not adversely affect compliance with the solar access and landscaped area controls or adversely impact upon the visual and acoustic amenity of neighbouring dwellings.</i>	This item is not applicable to the proposed development.	N/A
(4)	<i>For battle-axe lots, minimum side and rear boundary setbacks apply, except the front setback of the battle-axe lot without a street frontage, where a minimum setback of 4.0m is to be provided as illustrated in Figure 1.</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Any garages or parking structures fronting rear lanes may encroach upon the rear setback areas but are still to provide a minimum setback of 1m from the lane.</i>	This item is not applicable to the proposed development.	N/A
<b>4. Private Open Space</b>			
(1)	<i>Private open space is to be located at the rear of the property and/or behind the building line and is to have a minimum area of 60m<sup>2</sup> with minimum dimensions of 6m and located on the same level (not terraced or over rock outcrops).</i>	The proposal provides for 60m <sup>2</sup> private open space within the rear setback and therefore complies.	Yes
(2)	<i>Private open space is to be provided for all dwellings, (with the exception of secondary dwellings, which are able to</i>	This item is acknowledged.	Yes



	<i>share the private open space of the principal dwelling).</i>		
(3)	<i>Private open space is to be located so as to maximise solar access.</i>	Private open space has been located to maximise solar access.	Yes
(4)	<i>Private open space is to be designed to minimise adverse impacts upon the privacy of the occupants of adjacent buildings.</i>	Private open space has been suitably located so as to not result in any unreasonable adverse impacts to surrounding properties. The orientation of the subject site, being in an east-west arrangement, further mitigates any potential impacts to adjoining properties to the west, which hold a north-south orientation.	Yes
<b>5. Landscaping</b>			
(1)	<i>Landscaped area (has the same meaning as GRLEP 2021) is to be provided in accordance with the table contained within Clause 6.12 Landscaped areas in certain residential and environmental protection zones of GRLEP 2021.</i>	The site is located within the R2 – Low Density Residential Zone and therefore requires a minimum 25% of the site to be landscaped, pursuant to Clause 6.12(5)(a) of the LEP 2021.  The proposal maintains a landscaped area of 194m <sup>2</sup> (31%) and therefore complies with this clause.	Yes
(2)	<i>Provide a landscape setting within the primary and secondary street frontages, where hard paved areas are minimised. At a maximum, impervious areas, including hard paving, gravel, concrete or other material that does not permit landscaping, are to occupy no more than 40% of the street setback area.</i>	The proposal provides for a total of 69.9m <sup>2</sup> (61.5%) landscaping within the front setback and therefore complies.	Yes
(3)	<i>The front setback area is to have an area where at least one (1) tree capable of achieving a minimum mature height of 10m with a spreading canopy can be accommodated. A schedule of appropriate species to consider is provided in Council's Tree Management Policy.</i>	The proposal includes provision for one (1) <i>Elaeocarpus Reticulatus</i> "Blueberry Ash" tree within the front setback, capable of achieving a mature height of 10m and therefore complies.	Yes
<b>6. Excavation (Cut and Fill)</b>			
(1)	<i>Any excavation must not extend beyond the building footprint, including for any basement car park.</i>	This item is acknowledged. All excavation is maintained within the building envelope.	Yes
(2)	<i>The depth of cut or fill must not exceed 1.0m from existing ground level, except where the excavation is for a basement car park.</i>	The proposal includes up to 1.53m fill above natural ground level, which is limited to the rear portion of the dwelling and is contained within the envelope of the swimming pool and associated decking.  All fill is contained within 2.74m of the rear boundary, noting there is a	Refer Comment



		retaining wall located to the at the side boundary shared with the property at 1178 Forest Road (noting both properties form part of the group and are under common ownership).  This fill does not alter the topography within the locality outside of the building envelope and is therefore considered to be reasonable under the circumstances.	
(3)	<i>Developments should avoid unnecessary earthworks by designing and siting buildings that respond to the natural slope of the land. The building footprint must be designed to minimise cut and fill by allowing the building mass to step in accordance with the slope of the land.</i>	This item is acknowledged.	Yes
<b>7. Vehicular Access, Parking and Circulation</b>			
(1)	<i>Car parking is to be provided in accordance with the requirements in Part 3 of this DCP.</i>	The proposed driveway arrangement has been revised to be at grade, with 2 car parking spaces within the front setback, to minimise visual impact on the street and maximise pedestrian safety.	Yes
(2)	<i>A dwelling is to provide one (1) garage and one (1) tandem driveway parking space forward of the garage (unless otherwise accommodated within the building envelope).</i>	Given previous discussions with Council to remove basement car parking from the site, the proposed parking arrangement within the front setback is considered to be suitable for the site.	Refer Comment
(3)	<i>Driveways, garages and basements should be accessed from a secondary street or rear lane where this is available.</i>	This item is not applicable to the proposed development.	N/A
(4)	<i>Entry to parking facilities off the rear lane must be setback a minimum of 1m from the lane.</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Driveway crossings are to be positioned so that on-street parking and landscaping on the site are maximised, and removal or damage to existing street trees is avoided.</i>	The driveway crossing from Forest Road has been suitably located to maximise pedestrian safety and landscaping within the front setback.	Yes
(6)	<i>The maximum driveway width between the street boundary and the primary building setback alignment of the garage is 4.0m.</i>	The proposal provides for a maximum driveway width of 3.1m and therefore complies.	Yes
(7)	<i>Basements are permitted where the LEP height development standard is not exceeded, and it is demonstrated that there will be no adverse environmental</i>	The proposal no longer includes basement car parking.	N/A





	<i>impacts (e.g. affectation of watercourses and geological structure). (i) Basements on land where the average grade is less than 12.5% are permitted only where they are not considered a storey (see definition in the LEP) and the overall development presents as two (2) storeys to the street.</i>		
(8)	<i>Car parking layout and vehicular access requirements and design are to be in accordance with the Australian Standards, in particular AS 2890.1 (latest edition).</i>	All car parking and access complies with Australian Standards.	Yes
(9)	<i>The maximum width of a garage opening is 6m.</i>	The proposal no longer includes a garage.	N/A
<b>8. Visual Privacy</b>			
(1)	<i>Windows from active rooms are to be offset with windows in adjacent dwellings, or appropriately treated so as to avoid direct overlooking onto neighbouring windows.</i>	All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(2)	<i>For active rooms or balconies on an upper level, the design should incorporate placement of room windows or screening devices to only allow oblique views to adjoining properties.</i>	As detailed within this report, upper level balconies include privacy screening to maintain amenity to surrounding properties.	Yes
(3)	<i>Upper level balconies should not project more than 1500mm beyond the main rear wall alignment so as to minimise adverse visual privacy impacts to adjoining properties.</i>	Upper level balconies include privacy screening to maintain amenity to surrounding properties. Balconies are contained within the overall building envelope and do not extend beyond primary building walls.	Yes
(4)	<i>Windows for primary living rooms must be designed so that they reasonably maintain the privacy of adjoining main living rooms and private open space areas.</i>	All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(5)	<i>Development applications are to be accompanied by a survey plan or site analysis plan (to AHD) of the proposed dwelling showing the location of adjoining property windows, floors levels, window sill levels and ridge and gutter line levels</i>	The proposal is accompanied by both a survey and site analysis plan detailing levels and the location of windows.	Yes
<b>9. Noise</b>			
(1)	<i>Noise generators such as plant and machinery including air conditioning units and pool pumps are located away from windows or other openings in habitable rooms; they are to be screened to reduce noise or acoustically treated.</i>	All plant (including air conditioning and pool pump) is located within the building envelope of the dwelling and is not considered to result in any unreasonable acoustic impact to surrounding properties.	Yes
<b>10. Solar Access</b>			
(1)	<i>New buildings and additions are sited and designed to facilitate a minimum of 3</i>	The proposal is accompanied by detailed solar diagrams	Yes



	<i>hours direct sunlight between 9am and 3pm on 21 June onto living room windows and at least 50% of the minimum amount of private open space.</i>	demonstrating compliance with this requirement.	
(2)	<i>To facilitate sunlight penetration to adjoining development, building bulk may be required to be articulated to achieve the required sunlight access.</i>	The built form has been suitably articulated to maintain solar access to the subject site and adjoining properties.	Yes
(3)	<i>Direct sunlight to north-facing windows of habitable rooms and 50% of the principal private open space area of adjacent dwellings should not be reduced to less than 3 hours between 9.00am and 3.00pm on 21 June.</i>	The proposal is accompanied by detailed solar diagrams demonstrating compliance with this requirement in relation to PPOS.  It is noted there is a minor non-compliance relating to the lower lounge room of the adjoining property at 1178 Forest Road on the winter solstice. However, as these dwellings have been constructed as a group under similar circumstances (Refer Section 4), and are under common ownership, this is considered to be reasonable under the circumstances.	Refer Comment
(4)	<i>Note: Variations will be considered for developments that comply with all other requirements but are located on sites with an east-west orientation or steeply sloping sites with a southerly orientation away from the street.</i>	This item is acknowledged.	Yes
(5)	<i>Shadow diagrams are required to show the impact of the proposal on solar access to the principal private open space and living rooms of neighbouring properties. Existing overshadowing by fences, roof overhangs and changes in level should also be reflected in the diagrams. It may also be necessary to provide elevations or views from sun diagrams to demonstrate appropriate solar access provision to adjoining development.</i>	The proposal is accompanied by detailed solar access diagrams demonstrating compliance with the above provisions.	Yes
<b>11. Materials, Colour Schemes and Details</b>			
(1)	<i>Large expansive surfaces of predominantly white, light or primary colours which would dominate the streetscape or other vistas should not be used.</i>	The proposal is submitted with a detailed schedule of colours and finishes, having been selected with regard to the broader bushland setting of the locality. Buildings are suitably articulated, with material and finishes not considered to dominate the streetscape.  The proposal will be further supported by significant landscaping	Yes





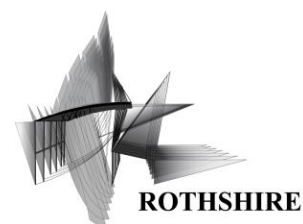
		proposed within the front setback, noting there is also a strong prevalence of white houses within the locality. The proposal is therefore considered acceptable in this regard.	
(2)	<i>New development should incorporate colour schemes that have a hue and tonal relationship with the predominant colour schemes found in the street.</i>	This item is acknowledged.	Yes
(3)	<i>Matching buildings in a row should be finished in the same colour or have a tonal relationship.</i>	Proposed colours and finishes are considered to be consistent with surrounding properties.	Yes
(4)	<i>All materials and finishes utilised should have low reflectivity.</i>	All colours and finishes are of low reflectivity.	Yes
<b>12. Secondary Dwellings</b>			
The proposed development does not include any secondary dwellings.			
<b>13. Site Facilities</b>			
(1)	<i>All dwellings are to be provided with adequate and practical internal and external storage (garage, garden sheds, etc.).</i>	The dwelling provides for adequate and practical storage.	Yes
(2)	<i>Provision for water, sewerage and stormwater drainage for the site shall be nominated on the plans to Council's satisfaction.</i>	Services are available to the site and are nominated on the supporting plans.	Yes
(3)	<i>Each dwelling must provide adequate space for the storage of garbage and recycling bins (a space of at least 3m by 1m must be provided) and this space is not to be located within the front setback.</i>	The proposal provides for adequate waste storage as nominated on the supporting plans.	Yes
(4)	<i>Letterboxes are to be located on the frontage where the address has been allocated in accordance with Australia Post requirements.</i>	The letterbox will be oriented towards the street.	Yes

**Table 7. DCP 2021 Chapter 6.4 Key Provisions**

Clause		Proposal	Complies
6.4.4 Swimming Pools/Spas			
(1)	Swimming pools/spas are to be located to the rear of properties.	The proposal includes a swimming pool located within the rear setback.	Yes
(2)	For corner allotments or where the property has two street frontages, swimming pools/spas are not to be located in the primary frontage.	This item is not applicable to the proposed development.	N/A
(3)	Swimming pools/spas must be positioned a minimum of 900mm from the property boundary with the water line being a minimum of 1500mm from the property boundary	The swimming pool maintains the following setbacks: <ul style="list-style-type: none"><li>– Coping: 927mm to the southern (side) boundary.</li><li>– Water Line 1327mm to the southern (side) boundary.</li></ul>	Yes



		<ul style="list-style-type: none"> <li>- Coping: 3306mm to the western (rear) boundary.</li> <li>- Water Line 3706mm to the western (rear) boundary.</li> </ul>	
(4)	<i>In-ground swimming pools shall be built so that the top of the swimming pool coping is as close to the existing ground level as possible. On sloping sites this will often require excavation of the site on the high side to obtain the minimum out of ground exposure of the swimming pool consistent with the low side</i>	This item is acknowledged.	Yes
(5)	<i>Swimming pools/spas are to be no more than 500mm above existing ground level.</i>	The proposed pool maintains a maximum height of 1530mm above existing ground level, noting the site is sloping, with a fall to the south and therefore compliance with this provision is not able to be achieved.	Refer Comment
(6)	<i>On steeply sloping sites, Council may consider allowing the top of the swimming pool at one point or along one side to extend up to 1m above existing ground level, provided that the exposed face of the swimming pool wall is treated to minimise impact. The materials and design of the retaining wall should be integrated with and complement the style of the swimming pool</i>	This item is acknowledged.	Yes
(7)	<i>Decking around a swimming pool must not be more than 600mm above existing ground level.</i>	The proposed pool edging is constructed on retained earth, maintaining a height of 1530mm above existing ground level.	Refer Comment
(8)	<i>Filling is not permitted between the swimming pool and the property boundary. The position of the swimming pool, in relation to neighbours and other residents, must be considered to minimise noise associated with activities carried out in the swimming pool or from the swimming pool equipment, such as cleaning equipment.</i>	This item is acknowledged.	Yes
(9)	<i>Council may require mechanical equipment to be suitably acoustically treated so that noise to adjoining properties is reduced.</i>	This item is acknowledged.	Yes
(10)	<i>A pool fence complying with the legislation is to separate access from the residential dwelling on the site to the pool.</i>	This item is acknowledged.	Yes
(11)	<i>Safety and security measures for swimming pools must comply with the</i>	This item is acknowledged.	Yes



	<i>relevant requirements of the Swimming Pools Act 1992 and any relevant Australian Standards.</i>		
(12)	<i>A spa is not required to be surrounded by a child resistant barrier provided that the spa is covered or secured by a child-safe structure (e.g. door, lid or mesh) that is fastened to the spa pool by a child-resistant device at all times when the spa pool is not in actual use and complies with Swimming Pools Act 1992 and any relevant Australian Standards.</i>	This item is acknowledged.	Yes

There are no other provisions of the DCP 2021 applicable to the proposal.

Having regard to the above, the proposed development is consistent with the applicable provisions of the DCP 2021.



## 6. ENVIRONMENTAL ASSESSMENT

Section 4.15 of the Environmental Planning and Assessment Act 1979 requires the following matters to be considered in the assessment of the proposed development.

### Impact of the Development on Both the Natural and Built Environments, and Social and Economic Impacts in the Locality

The proposed development is not considered to result in any unreasonable environmental impact. As detailed within this report, the proposed development has been designed with regard to the local context, is considered to suitably integrate within the streetscape and will provide for improved housing stock and high-quality design outcomes within the locality.

The proposal consistent with the applicable planning policy and is not anticipated to result in any loss of solar access nor visual privacy or acoustic impacts to surrounding properties. The proposal does not involve the removal of any trees and suitable landscaping is provided in accordance with the DCP 2021 to ensure integration within the bushland setting of the Lugarno locality. Whilst it is acknowledged there is a departure from the DCP 2021 in relation to building side setbacks, setbacks are consistent with those approved within the initial CDC, are compliant with relevant provisions of the BCA and will not result in any solar access or visual privacy impacts to surrounding properties.

The proposal to legitimise existing works undertaken and to provide for single private residential accommodation. This is an efficient use of the site and provides for an orderly development of the land in accordance with the planning framework. The proposal is considered to present suitably within the streetscape, will not reduce the development capability of surrounding sites and will not detract from the character of the locality.

All necessary services are available to the site, and both waste and stormwater can be appropriately managed in accordance with the provisions of the DCP 2021.

Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views in the locality.

The proposal is not considered to have any adverse social or economic impact on the locality.

### Suitability of the Site for the Development

The proposal is permissible within the zone and is consistent with the objectives of the R2 – Low Density Residential zone to provide for the housing needs of the community, including through a variety of housing types within a low-density residential environment.

Subject to minor variations relating to height and setbacks within this report, the proposal is generally consistent with the applicable planning framework and by virtue of the lot orientation, siting of the dwelling and development patterns within the locality, the site is capable of accommodating the proposed development without any unreasonable amenity impact to the existing dwelling nor neighbouring dwellings on surrounding properties.

The proposal to legitimise existing works undertaken and resolve this long running matter with Council to provide for single private residential accommodation. This application seeks to resolve existing uncertainties surrounding the site, including for the owner, Council and neighbouring residents, to provide for certainty and a clear and legitimate approval pathway for the completion of the dwelling.



In this regard, the proposal is considered to be an efficient use of the site and provides for an orderly development of the land in accordance with the planning framework. As detailed above, the proposal is considered to maintain a suitable presentation within the streetscape. The proposed development is therefore considered to be suitable for the site.

Any Submissions Made in Accordance with the Act or Regulation

The development application will be publicly notified in accordance with Council's notification policy. The proponent will prepare a response to any submissions received by Council during the exhibition period.

The Public Interest

For the reasons discussed within this report, and in the absence of any unreasonable social, economic or environmental impact, the proposed development is considered to be in the public interest.



## 7. CONCLUSION

The proposal seeks development consent for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1176 Forest Road, Lugarno (Lot 2 DP 18873).

The proposed development seeks to legitimise existing unauthorised works at the site, which are currently subject to compliance action by Council. Whilst works were initially approved and commenced by way of a Complying Development Certificate (CDC), through the course of construction the design of the dwelling has departed from this approved design, meaning this process was not able to be finalised and Occupation Certificates unable to be issued.

The proposal therefore seeks to rectify matters raised by Council, whilst providing for additional alterations to bring into consistency (where practicable) with applicable planning framework. Accordingly, the proposed development seeks to legitimise these works with Council through concurrent Development Application (DA) and Building Certificate (BC) processes. A supporting BC has been submitted under separate cover.

The proposal is a permissible use and is consistent with the objectives of the R2 – Low Density Residential zone. The proposal is generally consistent with the development standards, relevant provisions and built form guidelines contained within the LEP 2021 and DCP 2021.

The proposed works do not detract from the presentation of dwelling within the streetscape and are not considered to result in any unreasonable amenity impact to the locality.

Based on the conclusions of the comprehensive assessment undertaken, and in the absence of any significant adverse environmental, social, heritage or economic impacts Council's approval of the development application is sought.



Ref: 2122301-LET-012-R1

17 November 2022

The General Manager  
Georges River Council  
PO Box 205  
Hurstville BC  
NSW 1481

**RE: Request to Vary the Height of Buildings Development Standard for the Property Located at 1176 Forest Road, Lugarno**

Dear Sir/Madam,

This request is made pursuant to Clause 4.6 of the Georges River Local Environmental Plan 2021 (LEP) to accompany a Development Application (DA) to Georges River Council (Council) for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1176 Forest Road, Lugarno (the site). This request seeks a variation to the maximum building height limit pursuant to Clause 4.3 of the LEP 2021.

Clause 4.6 of the LEP 2021 aims to provide an appropriate degree of flexibility in applying certain development standards to achieve better outcomes for and from development by allowing flexibility in particular circumstances, and enables the consent authority to grant consent for development even though the development contravenes the maximum height of building development standard.

Clauses 4.6(3)&(4) require the consent authority to consider a written request from the applicant that seeks to justify the contravention of the development standard. Clause 4.6(4)(a) states that development consent must not be granted for development that contravenes a development standard unless the consent authority is satisfied:

- That the applicant's written request has adequately demonstrated that compliance with the development standard is unreasonable or unnecessary in the circumstances of the case;
- That the applicant's written request has adequately demonstrated that there are sufficient environmental planning grounds to justify contravening the development standard; and
- That the proposed development will be in the public interest because it is consistent with the objectives of the particular standard and the objectives for development within the zone in which the development is proposed to be carried out.

Accordingly, this request provides an overview of the site and proposed development, details the extent of the proposed variation and why compliance with the development standard is unreasonable or unnecessary in the circumstances of the case, including sufficient environmental planning grounds to justify the contravention, having regard for the matters contained within Clause 4.6(4)(a).



### 1. The Site

The subject site is located at 1176 Forest Road, Lugarno (Lot 2 DP 18873). The site accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.

Please also refer to a detailed description of the site within the supporting Statement of Environments (SEE).

### 2. Proposed Development

The proposal seeks the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation. The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals. These dwellings, including the subject site are known to Council.

The proposed development seeks to legitimise this ongoing matter with Council for site and is submitted concurrently with a Building Information Certificate (BC) to legitimise works undertaken to date. The subject DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

Please also refer to a detailed description of the proposed development within the supporting SEE.

### 3. Land Zoning

The site is zoned R2 – Low Density Residential Pursuant to the LEP 2021. The objectives of the R2 zone are:

- *“To provide for the housing needs of the community within a low density residential environment.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*
- *To promote a high standard of urban design and built form that enhances the local character of the suburb and achieves a high level of residential amenity.*
- *To provide for housing within a landscaped setting that enhances the existing environmental character of the Georges River local government area.”*

### 4. Development Standard to be Varied

This request seeks a variation to Clause 4.3 (Height of Buildings) of the LEP 2021. The objectives of this development standard are:

- *“(a) to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of the locality,*
- *(b) to minimise the impact of overshadowing, visual impact, disruption of views and loss of privacy on adjoining properties and open space areas,*
- *(c) to ensure an appropriate height transition between new buildings and—*





- (i) adjoining land uses, or
- (ii) heritage items, heritage conservation areas or Aboriginal places of heritage significance.”

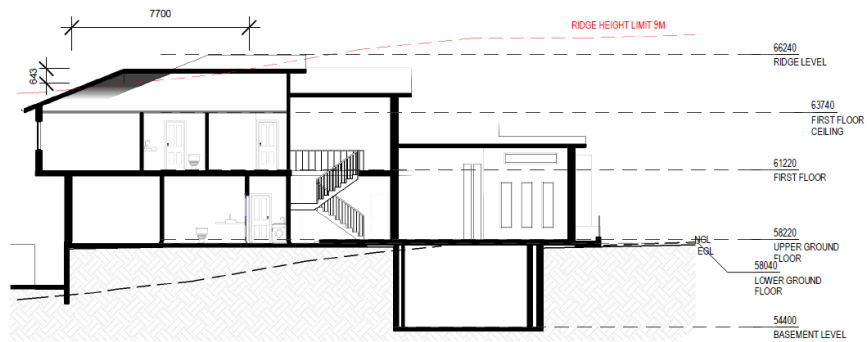
Pursuant to Clause 4.3(2), the site is subject to a maximum permitted building height of 9.0m.

#### **5. Nature of Variation Sought**

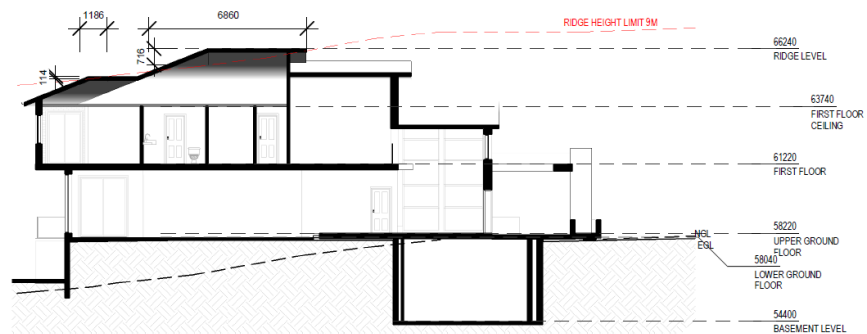
The proposed development has a maximum height of 9.716m and therefore represents a variation to Clause 4.3 of the LEP 2021 by 716mm (7.96%).

The extent of this variation is limited to a small element of the rear (western) portion of the roof form, as detailed at Figures 1 and 2 below.

The reason for this request to vary the height of building development standard is that it is not practicable to undertake alterations to the existing built form to bring the dwelling into compliance. To do so would significantly compromise the design of the roof form and require alterations to the building structure, to the extent where it would not be possible to retain the existing dwelling.

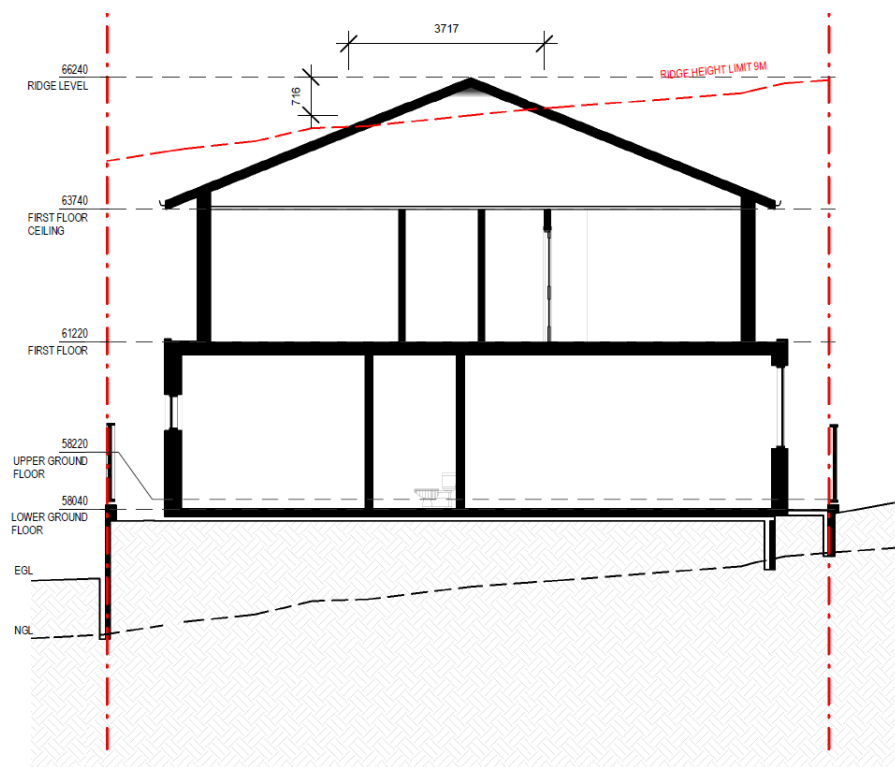
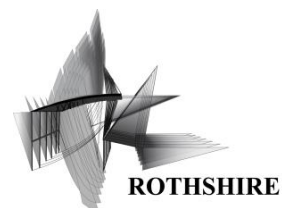


**1** LONG SECTION RIDGE 1  
1 : 200



**2** LONG SECTION RIDGE 2  
1 : 200

**Figure 1. Extract of proposed section (Drawing No. DA-802) showing extent of proposed variation.**



**3** CROSS SECTION RIDGE 1  
1 : 100

**Figure 2. Extract of proposed short section (Drawing No. DA-802) showing extent of proposed variation.**

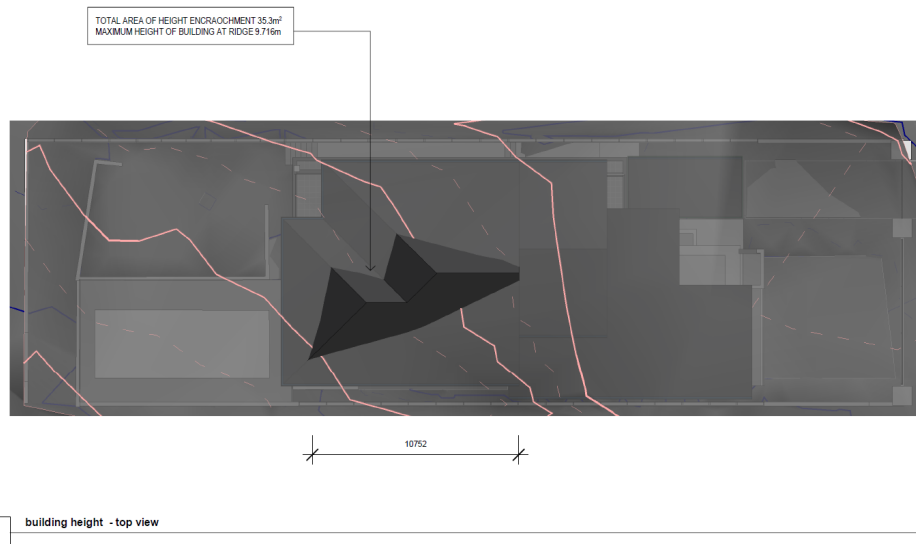


Figure 3. Extract of Drawing No. DA-801 showing 3D extent of proposed variation.

**6. Clause 4.6(3)(a): Compliance with the Development Standard is Unreasonable or Unnecessary in the Circumstances of the Case**

Clause 4.6(3)(a) of the LEP 2021 requires the applicant to provide justification that strict compliance with the maximum building height development standard is unreasonable or unnecessary in the circumstances of the case.

Assistance on the approach to justifying a contravention to a development standard is also to be taken from the applicable decisions of the NSW Land and Environment Court (LEC) and the NSW Court of Appeal in:

- *Wehbe v Pittwater Council [2007] NSW LEC 827 (Wehbe); and*
- *Four2Five Pty Ltd v Ashfield Council [2015] NSWLEC 1009 (Four2Five).*

The relevant matters contained in Clause 4.6 of the LEP 2021, with respect to the maximum building height development standard, are each addressed below, including with regard to these decisions.

In *Wehbe* (at 43-48), Preston CJ established five potential ways for determining whether a development standard could be considered to be unreasonable or unnecessary and that approval of the objection may be consistent with the aims of the policy. These include the following methods:

1. *“The objectives of the standard are achieved notwithstanding non-compliance with the standard;*
2. *The underlying objective or purpose of the standard is not relevant to the development and therefore compliance is unnecessary;*
3. *The underlying object or purpose would be defeated or thwarted if compliance was required and therefore compliance is unreasonable;*



4. *The development standard has been virtually abandoned or destroyed by the Council's own actions in granting consents departing from the standard and hence compliance with the standard is unnecessary and unreasonable.*
5. *The zoning of the particular land is unreasonable or inappropriate so that a development standard appropriate for that zoning is also unreasonable and unnecessary as it applies to the land and compliance with the standard would be unreasonable or unnecessary. That is, the particular parcel of land should not have been included in the particular zone."*

In the matter of *Four2Five*, Commissioner C Pearson, at 62 stated within the judgement the following, in reference to a variation:

*"The case law developed in relation to the application of SEPP1 may be of assistance in applying cl 4.6. While Wehbe concerned an objection under SEPP 1, in my view the analysis is equally applicable to a variation under cl 4.6 where cl 4.6(3)(a) uses the same language as cl 6 of SEPP1."*

Relevant to the proposed development, the first method is considered to be appropriate in establishing that compliance with a development standard is unreasonable or unnecessary. Given the proposed development and this variation request relates to the retention of an existing dwelling, having been established without necessary planning approvals, there are practical impediments to modifying the structure into compliance with the development standard. Therefore, methods two through five are not considered applicable.

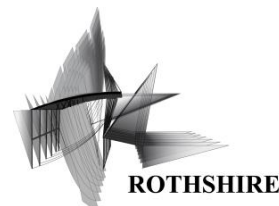
An assessment of proposed development against the objectives of the height of building development standard are provided at Table 1 below.

**Table 1. Assessment of the Objectives of the Height of Buildings Development Standard**

Objective		Proposal
Cl.4.3(1)	<i>The objectives of this clause are as follows—</i>	Refer below.
Cl.4.3(1)(a)	<i>to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of the locality,</i>	<p>The proposed development is considered to be compatible with the height, bulk and scale of the existing and desired future character of the Lugarno locality.</p> <p>The proposal complies with the applicable Floor Space Ratio (FSR) development standard and presents as a well-designed, articulated two (2) storey form, comparable to surrounding developments within the streetscape and with suitable landscaping to integrate with the bushland setting of the locality.</p> <p>The proposed variation is limited to the Western (rear) element of the roof form, which due to site levels, will be visible from nor alter the presentation of the dwelling from Forest Road. In this regard, the proposed variation is not considered to increase the overall bulk of the building, which is further mitigated by the pitched roof form (for instance when considered against a flat roof form).</p>



Cl.4.3(1)(b)	<i>to minimise the impact of overshadowing, visual impact, disruption of views and loss of privacy on adjoining properties and open space areas,</i>	<p>As detailed in the supporting solar access diagrams, the proposal maintains compliant solar access to the subject and surrounding properties (including areas of private open space) in accordance with the Georges River Development Control Plan 2021 (DCP).</p> <p>Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views in the locality.</p> <p>The proposal is considered to maintain residential amenity and visual privacy in accordance with the provisions of the DCP 2021. The proposal maintains a compliant rear setback of 14.017m, with windows having been offset from those on adjoining properties, as well as privacy screening (up to 1800mm) and an opaque balustrade installed on the rear balcony, to mitigate potential privacy impacts.</p> <p>The orientation of the subject site, being in an east-west arrangement, further mitigates any potential impacts to adjoining properties to the west, which hold a north-south orientation.</p> <p>Further, the extent of the variation is limited to the roof form only, resulting in an increased void space only and does not result in any additional Gross Floor Area (GFA).</p>
Cl.4.3(1)(c)	<i>to ensure an appropriate height transition between new buildings and—</i>	Refer below.
Cl.4.3(1)(c)(i)	<i>adjoining land uses, or</i>	<p>The proposal is considered to result in an appropriate transition to adjoining properties. The site sits within a group of three dwellings fronting Forest Road, each have been designed and constructed concurrently and in a similar manner.</p> <p>As noted above, given the orientation of the subject and significant rear setbacks, the proposed development is considered to maintain an appropriate transition to adjoining properties to the west of the site and will not result in any unreasonable visual imposition, loss of solar access or loss of visual privacy.</p>
Cl.4.3(1)(c)(ii)	<i>heritage items, heritage conservation areas or Aboriginal places of heritage significance.</i>	The site is not identified as, nor within proximity to any heritage items (or draft items) or Heritage Conservation Area (HCA) (or draft HCA). The site is



		not located within close proximity to any Aboriginal places of heritage significance.
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Having regard to the above, it is considered that compliance with the height of buildings development standard is unreasonable and unnecessary in the circumstances, as the objectives of the standard are achieved notwithstanding the non-compliance with the standard.

It is not practicable to undertake alterations to the existing built form to bring the dwelling into compliance. To do so would significantly compromise the design of the roof form and require alterations to the building structure, to the extent where it would not be possible to retain the existing dwelling.

#### 7. Clause 4.6(3)(b): Environmental Planning Grounds to Justify Contravening the Development Standard

It is considered there are sufficient environmental planning grounds to justify the proposed contravention of the maximum height of building development standard as follows:

- The extent of the variation is limited to a small element of the roof form only, being the western (rear) portion of the roof form and is located behind the main ridge form. The majority of the dwelling form is within the maximum permitted building height, and the extent of the proposed variation is further mitigated by the pitched roof form, particularly when considered against a flat roof redesign.
- The extent of the proposed variation is not visible from Forest Road and does not alter the presentation of the dwelling within the streetscape. The extent of the proposed variation is not visible from any other public place.
- Due to the topography of the site, the extent of the proposed variation does not increase the overall maximum RL of the roof form and is not considered to alter the visual bulk of the dwelling when viewed from surrounding properties.
- The extent of the proposed variation comprises the roof structure only and does not contribute to any additional GFA at the site, noting the proposal complies with the maximum FSR for the site.
- The extent of the proposed variation does not result in any additional storeys or accessible areas (that are not GFA, such as attic storage or a roof terrace). The proposal maintains a two (2) storey built form, consistent with surrounding development patterns and the built form intended by the planning framework.
- Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views in the locality.
- The proposal does not result in any unreasonable visual impact to surrounding properties. Suitable design measures have been incorporated within the design of the dwelling, including window positioning and the provision of privacy screening, to ensure a suitable relationship to neighbouring properties.
- The proposal maintains compliance solar access to the subject site and surrounding properties, in accordance with the provisions of the DCP 2021.

For the reasons nominated above, it is considered there are sufficient environmental planning grounds to support the proposed variation to the height of buildings development standard.



**8. Clause 4.6(4)(a)(ii): In the Public Interest Because it is Consistent with the Objectives of the Zone and Development Standard**

The proposal is considered to be in the public interest because it is consistent with the objectives of the zone and the height of buildings development standard.

An assessment of proposed development against the objectives of the height of building development standard are provided at Table 1 above.

An assessment of proposed development against the objectives of R2 – Low Density Zone are provided at Table 2 below.

**Table 2. Assessment of the Objectives of the R2 – Low Density Residential Zone**

Objective	Proposal
<i>To provide for the housing needs of the community within a low density residential environment.</i>	The proposal seeks to legitimise the existing single detached dwelling for private single residential occupation.  The proposal complies with the applicable FSR for the site and is therefore considered to provide for the housing needs of the community within a low density residential environment.
<i>To enable other land uses that provide facilities or services to meet the day to day needs of residents.</i>	This item is not applicable to the proposed development.
<i>To promote a high standard of urban design and built form that enhances the local character of the suburb and achieves a high level of residential amenity.</i>	The proposal is considered to be of a high design standard and built form. The scale of the proposal is consistent with surrounding development patterns, complies with applicable solar access, private open space and residential amenity provisions within the DCP 2021 and is considered to maintain a high level of amenity within the locality.
<i>To provide for housing within a landscaped setting that enhances the existing environmental character of the Georges River local government area.</i>	As detailed in the supporting SEE, the proposal provides for compliant landscaped areas and landscaping in accordance with the DCP 2021, and is therefore considered to maintain and enhance the existing environmental character of the locality.

For the reasons nominated above, the proposed variation to the height of buildings development standard is considered to be in the public interest as it would allow for the retention and legitimisation of the existing part completed dwelling, consistent with the objectives of the R2 – Low Density Residential Zone and the height of buildings development standard, without unreasonable impact to surrounding properties, the character of the locality or the broader environment.





## 9. Other Matters For Consideration

Pursuant to Clause 4.6(5) of the LEP 2012, in deciding whether to grant concurrence, the Planning Secretary must consider

- (a) whether contravention of the development standard raises any matter of significance for State or regional environmental planning, and
- (b) the public benefit of maintaining the development standard, and
- (c) any other matters required to be taken into consideration by the Secretary before granting concurrence.

It is understood that concurrence to the proposed variation is not required by the Planning Secretary pursuant to clause 4.6(4)(b), as we understand that the relevant consent authority has the necessary delegation as set out in the Assumed Concurrence Notice issued by the Secretary of the Department of Planning and Environment dated 21 February 2018 (attached to DPE Planning Circular PS 20-002 dated 5 May 2020).

Notwithstanding, a response to these matters is provided below.

## 10. Whether Contravention of the Development Standard Raises any Matter of Significance for State or Regional Environmental Planning

The variation of the maximum height development standard is not considered to not raise any matter of significance for State or regional planning.

## 11. The Public Benefit of Maintaining the Development Standard

For the reasons discussed within this letter, in the circumstances of the proposed development, it is considered there is no public benefit in maintaining the development standard.

If the development standard were to be maintained, this would further prolong this long running compliance matter with Council, meaning the dwelling would continue to remain in an unsightly and uninhabitable part completed state and continue the existing state of uncertainty for Council, the property owner and the local community.

## 12. Any Other Matters Required to be Taken into Consideration by the Secretary Before Granting Concurrence

There are no other relevant matters requiring consideration.

## 13. Conclusion

This request is made pursuant to Clause 4.6 of the LEP 2021 to accompany a DA to Council for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1176 Forest Road, Lugarno.

This request seeks a variation to the maximum building height limit pursuant to Clause 4.3 of the LEP 2021.



Pursuant to Clause 4.3(2), the site is subject to a maximum permitted building height of 9.0m. The proposed development has a maximum height of 9.716m and therefore represents a variation to Clause 4.3 of the LEP 2021 by 716mm (7.96%).

For the reasons discussed within this letter, despite the minor variation to the height of buildings control, the proposal is considered to be of high architectural merit, having been sensitively designed and incorporate modulation, articulation and high-quality finishes. The proposed variation does not increase the height of the dwelling in storeys and does not result in any additional GFA at the site.

The proposed design is considerate in ensuring compatibility with adjacent and surrounding dwellings and is presented appropriately when viewed from the surrounding areas. The appropriate design ensures no unreasonable adverse environmental impacts will result from the proposed works, including in terms of privacy, view sharing, visual intrusion and overshadowing.

Consequently, strict compliance with the height of buildings development standard is considered to be unreasonable and unnecessary in the circumstances and the use of Clause 4.6 of the LEP 2021 to vary this development standard is appropriate in this instance.

Based on the above, it is sensible to conclude that strict compliance with the maximum building height control is not necessary and that a better outcome is achieved for this development by allowing flexibility in the application.





# DEVELOPMENT APPLICATION

LOT 2 DP 18873  
NO.1176 FOREST ROAD LUGARNO NSW 2210

## ARCHITECTURAL PACKAGE

AERIAL IMAGE



LOCATION PLAN



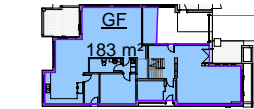
### GENERAL NOTES

#### PRIOR TO COMMENCEMENT

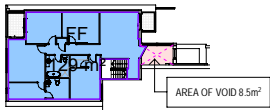
1. ALL DIMENSIONS AND FLOOR AREAS TO BE VERIFIED PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
2. ANY DISCREPANCIES ARE TO BE CONFIRMED BY THE DESIGNER.
3. LEVELS SHOWN ARE APPROXIMATE UNLESS ACCOMPANIED BY REDUCED LEVELS BY A REGISTERED SURVEYOR.
4. FIGURED DIMENSIONS ARE TO BE TAKEN IN PREFERENCE TO SCALING.
5. ALL BOUNDARY CLEARANCES MUST BE VERIFIED BY THE SURVEYOR PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
6. THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS DRAWINGS & SPECIFICATIONS INCLUDING STRUCTURAL, MECHANICAL & HYDRAULICS.
7. WHERE ENGINEERING OR HYDRAULIC DRAWINGS ARE REQUIRED, SUCH DRAWINGS MUST TAKE PREFERENCE TO THESE DRAWINGS.
8. FAILURE TO COMPLY WITH DRAWINGS & SPECIFICATIONS COULD RESULT IN ALTERATIONS BEING MADE AT THE COST TO THE CONTRACTOR.
9. ALL SERVICES AND UTILITIES TO BE LOCATED AND VERIFIED BY THE CONTRACTOR WITH THE RELEVANT AUTHORITIES PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORKS.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM ALL SITE CONDITIONS & REQUIREMENTS.

#### DEMOLITION & SITE PREPARATION

11. BEFORE COMMENCEMENT OF DEMOLITION WORKS THE CONTRACTOR MUST CONTACT THE CONSULTANT ENGINEER TO ESTABLISH WHICH WALLS ETC ARE ABLE TO BE SAFELY REMOVED.
12. ALL DEMOLITION WORK TO BE CARRIED OUT IN ACCORDANCE WITH AS2601.
13. REMOVAL OF ASBESTOS CEMENT SHEETING MUST BE CARRIED OUT BY A LICENSED CONTRACTOR IN COMPLIANCE WITH THE REQUIREMENTS OF THE NSW WORKCOVER AUTHORITY IN RELATION TO THE REMOVAL, HANDLING AND DISPOSAL OF ALL MATERIAL CONTAINING ASBESTOS, AND THE WORKSAFE AUSTRALIA ASBESTOS CODE OF PRACTICE & GUIDANCE NOTES.
14. PROTECTIVE MEASURES ARE REQUIRED FOR EACH TREE BEING RETAINED ON SITE AND SHALL BE ESTABLISHED BEFORE ANY BUILDING WORKS COMMENCE AND SHALL BE CONSTRUCTED AND MAINTAINED AS PER COUNCILS REQUIREMENTS.
15. SILT/SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO ANY EXCAVATION OR CONSTRUCTION WORK.



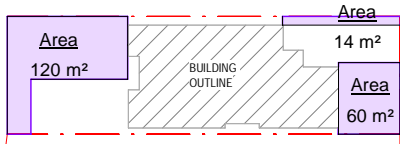
1 GROUND FLOOR GFA  
1 : 500



2 FIRST FLOOR GFA  
1 : 500

### ARCHITECTURAL DRAWING LIST

SHEET No.	SHEET NAME	SCALE	DATE	REV
DA-2-000	COVER SHEET	N/A	03.11.2023	2
DA-2-050	EXISTING SITE PLAN	1:200	03.11.2023	2
DA-2-100	EXISTING UNDERCROFT PLAN	1:100	24.11.2022	1
DA-2-101	EXISTING GROUND FLOOR PLAN	1:100	24.11.2022	1
DA-2-103	EXISTING FIRST FLOOR PLAN	1:100	24.11.2022	1
DA-2-201	EXISTING EAST & WEST ELEVATIONS	1:100	24.11.2022	1
DA-2-202	EXISTING NORTH & SOUTH ELEVATIONS	1:100	24.11.2022	1
DA-2-205	EXISTING LONG SECTION	1:100	24.11.2022	1
DA-2-206	EXISTING CROSS SECTIONS	1:100	24.11.2022	1
DA-2-302	GROUND FLOOR DEMOLITION PLAN	1:100	03.11.2023	2
DA-2-303	FIRST FLOOR DEMOLITION PLAN	1:100	03.11.2023	2
DA-2-350	PROPOSED SITE PLAN	1:200	03.11.2023	2
DA-2-351	SITE SETBACK PLAN	1:200	03.11.2023	2
DA-2-400	PROPOSED UNDERCROFT PLAN	1:100	03.11.2023	2
DA-2-401	PROPOSED GROUND FLOOR PLAN	1:100	03.11.2023	2
DA-2-402	PROPOSED FIRST FLOOR PLAN	1:100	03.11.2023	2
DA-2-501	PROPOSED EAST & WEST ELEVATIONS	1:100	03.11.2023	2
DA-2-502	PROPOSED SOUTH ELEVATION	1:100	03.11.2023	2
DA-2-504	PROPOSED NORTH ELEVATION	1:100	03.11.2023	2
DA-2-505	PROPOSED LONG SECTION	1:100	03.11.2023	2
DA-2-506	PROPOSED CROSS SECTION	1:100	03.11.2023	2
DA-2-507	SHADOW DIAGRAM	1:500	03.11.2023	2
DA-2-600	PROPOSED LANDSCAPE PLAN	N/A	03.11.2023	2
DA-2-601	DOOR & WINDOW SCHEDULE AND BASIX	N/A	03.11.2023	2
DA-2-701	PROPOSED FINISHES SCHEDULE	N/A	03.11.2023	2
DA-2-702	PHOTO MONTAGE	N/A	24.11.2022	1
DA-2-801	3D HEIGHT LIMIT ENCROACHMENT EXTENT	1:200	24.11.2022	1
DA-2-802	HEIGHT LIMIT ENCROACHMENT SECTIONS	1:200	24.11.2022	1
DA-2-803	FRONTAGE ELEVATION	N/A	03.11.2023	2



3 LANDSCAPE PLAN  
1 : 500

Area Schedule	
Level	Area
FIRST FLOOR	129 m²
UPPER GROUND FLOOR	183 m²
Grand Total	312 m²

LOT 2 DP 18873  
NO.1176 Forest Rd Lugarno NSW  
2210

CLIENT	LUGARNO DEVELOPMENTS PTY LTD
PROJECT STATUS	DEVELOPMENT APPLICATION
PROJECT TITLE	SINGLE DWELLING
REVISION	2
PROJECT No.	2122-301

PROJECT CONSULTANTS	
ARCHITECTURE & DESIGN	
Alana Kowalczyk (NSW Arch No. 10308)	Rothshire
STORMWATER ENGINEERS	
Alexander Kameas	Rothshire
STRUCTURAL ENGINEERS	
Alexander Kameas	Rothshire
SURVEYING	
Peter Nancarrow	Summit Geomatics
TOWN PLANNING	
Jonathan Archibald	Rothshire

REV	AMENDMENT	DATE
1	ISSUED FOR DA	24.11.2022
2	ISSUED FOR DA	03.11.2023

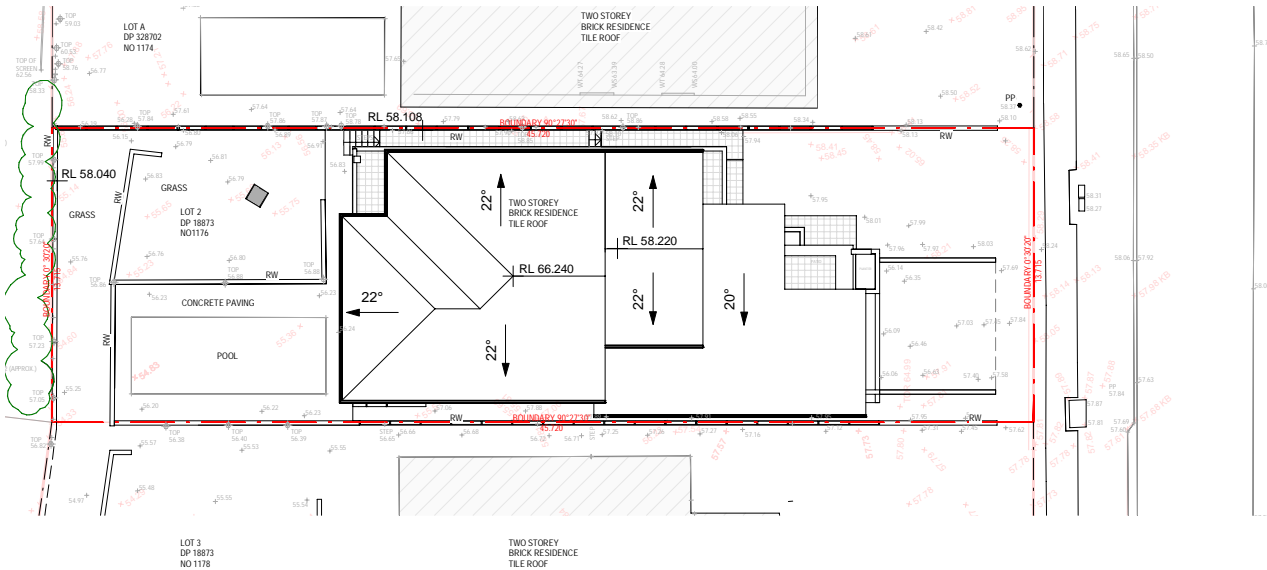








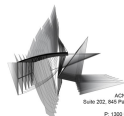
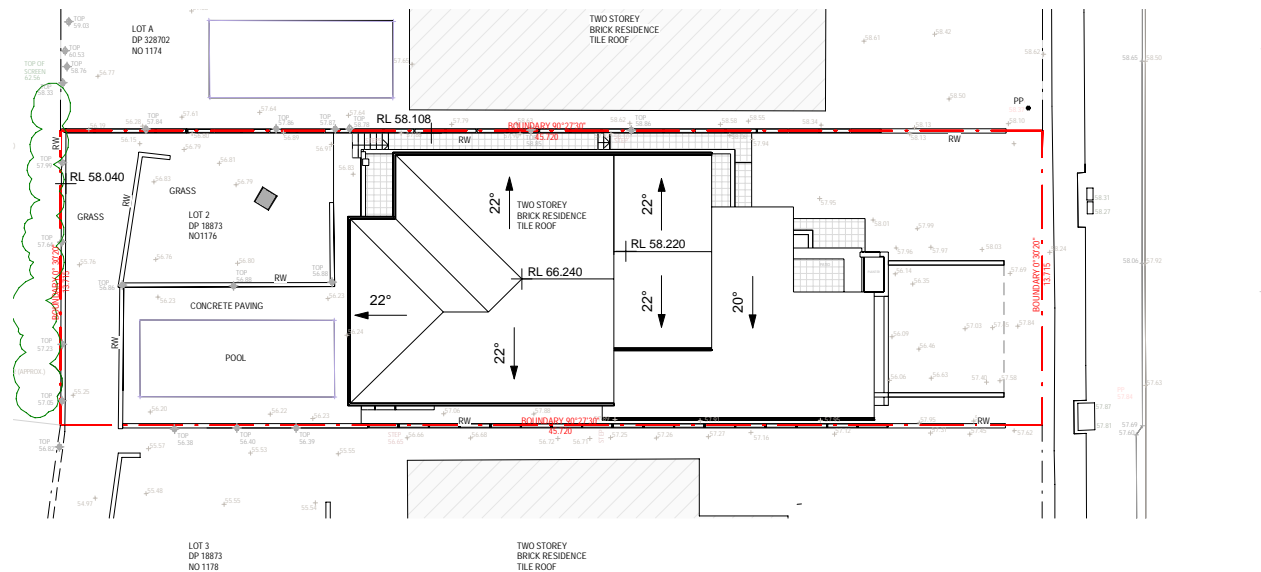
NOTES:  
1. TOPOGRAPHY & SITE PLAN IS BASED ON SURVEY PLAN BY SUMMIT GEOMATICS, DATED 17 AUGUST 2022.



<div>0 mm10 mm25 mm50 mm100 mm @ A3 sheet</div>				<div>LEGEND</div> <div>PPPOWER POLE</div> <div>RWRETAINING WALL</div>		<div>REV. AMENDMENT</div> <div>1 ISSUED FOR DA</div> <div>2 ISSUED FOR DA</div>	<div>DATE</div> <div>24.11.2022</div> <div>03.11.2023</div>	<div>CLIENT</div> <div>LUGARNO DEVELOPMENTS PTY LTD</div> <div>PROJECT STATUS</div> <div>DEVELOPMENT APPLICATION</div>	<div>PROJECT TITLE</div> <div>SINGLE DWELLING</div> <div>PROJECT ADDRESS</div> <div>LOT 2 DP 18873</div> <div>NO.1176 Forest Rd Lugarno</div> <div>NSW 2210</div>	<div>PROJECT NUMBER</div> <div>2122-301</div>	<div>SCALE</div> <div>1:200</div> <div>AS</div>	<div>DRAWN</div> <div>AJK</div>	<div>CHECKED</div> <div>(NSW Arch.No. 10388)</div>	<div>DRAWING TITLE</div> <div>SITE PLAN</div> <div>DRAWING No.</div> <div>INFO-2-02</div>	<div>REVISION</div> <div>2</div>
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1. TOPOGRAPHY & SITE PLAN IS BASED ON SURVEY PLAN BY SUMMIT GEOMATICS, DATED 17 AUGUST 2022.



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POWER POLE  
RETAINING WALL

REV. AMENDMENT	
1	ISSUED FOR DA
2	ISSUED FOR DA

24.11.2022  
03.11.2023

CLIENT  
LUGARNO DEVELOPMENTS PTY LTD

PROJECT STATUS  
DEVELOPMENT APPLICATION

PROJECT TITLE	PROJECT NUMBER
SINGLE DWELLING	2122-301
PROJECT ADDRESS	
LOT 2 DP 18873	
NO.1176 Forest Rd Lugarno	
NSW 2210	

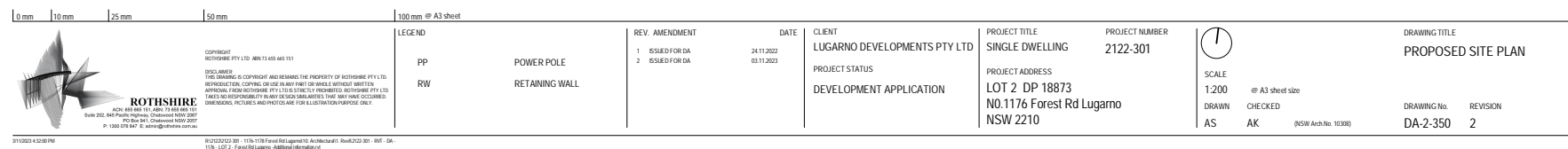
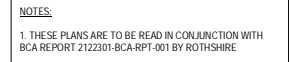


SCALE  
1:200 @ A3 sheet size  
DRAWN  
AS  
CHECKED  
AK (N/SW Arch.No. 10308)

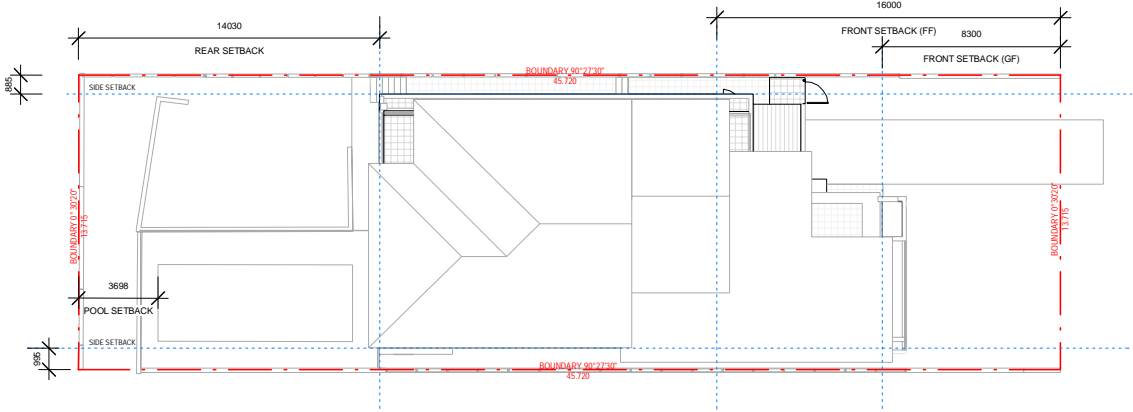
DRAWING TITLE

EXISTING SITE PLAN

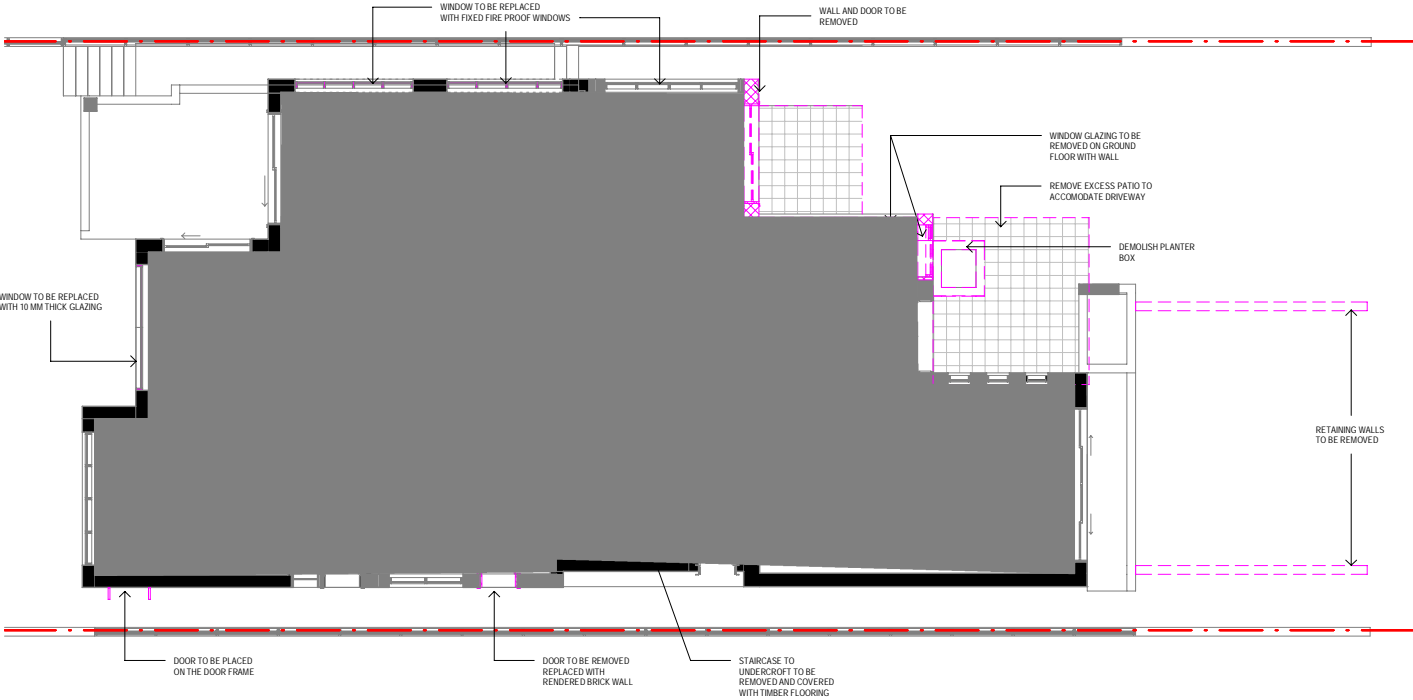
DRAWING No.	REVISION
DA-2-050	2



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1. THESE PLANS ARE TO BE READ IN CONJUNCTION WITH  
BCA REPORT 2122301-BCA-RPT-001 BY ROTHSHIRE



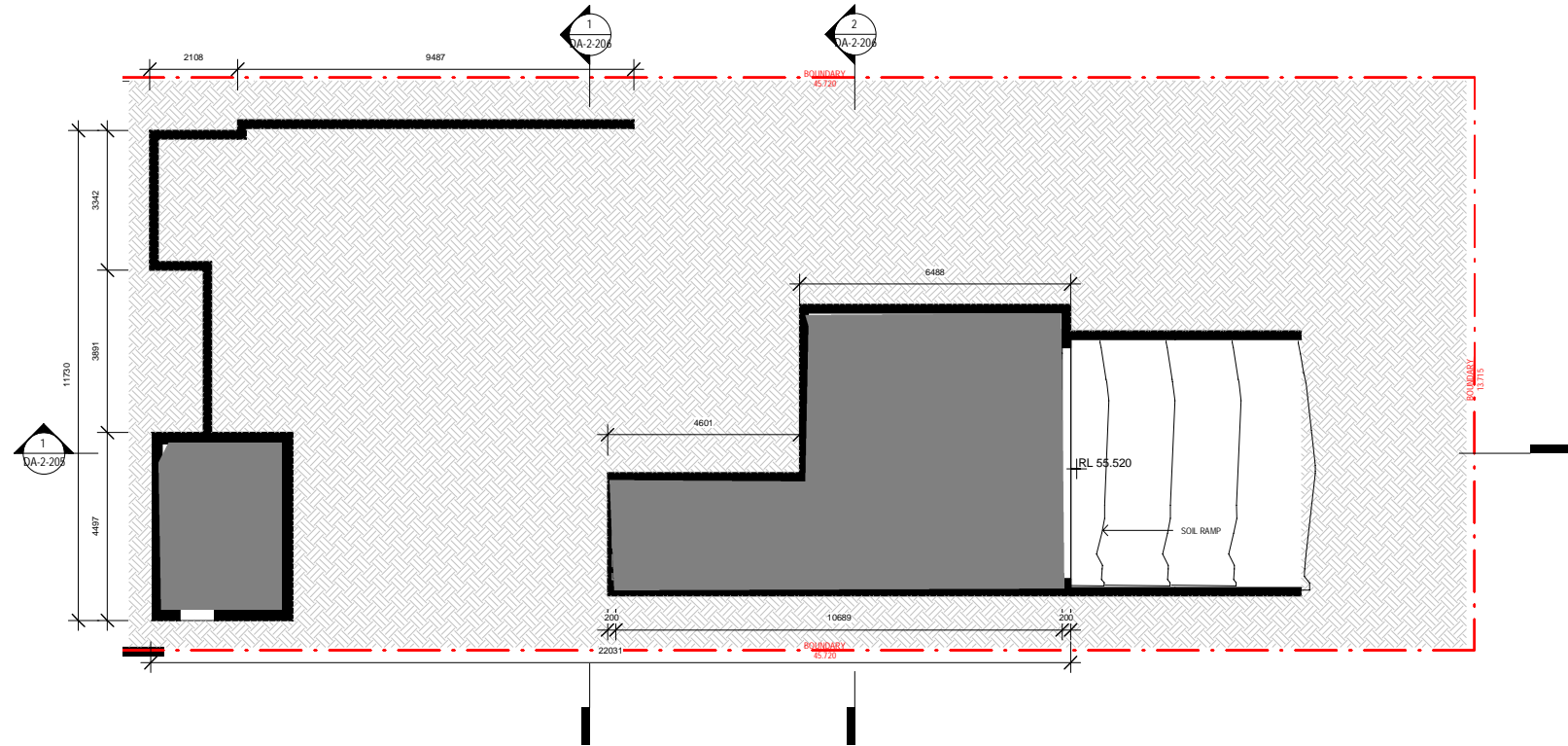
0 mm10 mm25 mm50 mm100 mm @ A3 sheet		LEGEND		REV. AMENDMENT		DATE		CLIENT		PROJECT TITLE		PROJECT NUMBER		DRAWING TITLE	
 <div>ROTHSHIRE ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2067 PO Box 841, Chateau NSW 2067 P: 1300 578 847 E: info@rothshire.com.au</div>		COPYRIGHT ROTHSHIRE PTY LTD ABN 13 455 445 151  DISCLAIMER: THIS DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY OF ROTHSHIRE PTY LTD. REPRODUCTION, COPYING OR USE IN ANY FORM OR BY ANY MEANS WITHOUT WRITTEN AUTHORISATION FROM ROTHSHIRE PTY LTD IS STRICTLY PROHIBITED. ROTHSHIRE PTY LTD TAKES NO RESPONSIBILITY IN ANY DESIGN AMBIGUITIES THAT MAY HAVE OCCURRED. DIMENSIONS, PICTURES AND PROFILES ARE FOR ILLUSTRATION PURPOSES ONLY.		2 ISSUED FOR DA		03.11.2023		LUGARNO DEVELOPMENTS PTY LTD		SINGLE DWELLING		2122-301		SITE SETBACK PLAN	
								PROJECT STATUS		PROJECT ADDRESS		SCALE 1:200 @ A3 sheet size		DRAWING No. REVISION	
								DEVELOPMENT APPLICATION		LOT 2 DP 18873 NO.1176 Forest Rd Lugarno NSW 2210		DRAWN AS		CHECKED AJK (NSW Arch No. 16388) DA-2-351 2	
31/10/2023 4:12:08 PM		6/10/2023 2:02:30 - 1176-1178 Forest Rd Lugarno Architectural - Rev. 01 - DA - 1176-1178 Forest Rd Lugarno Architectural													



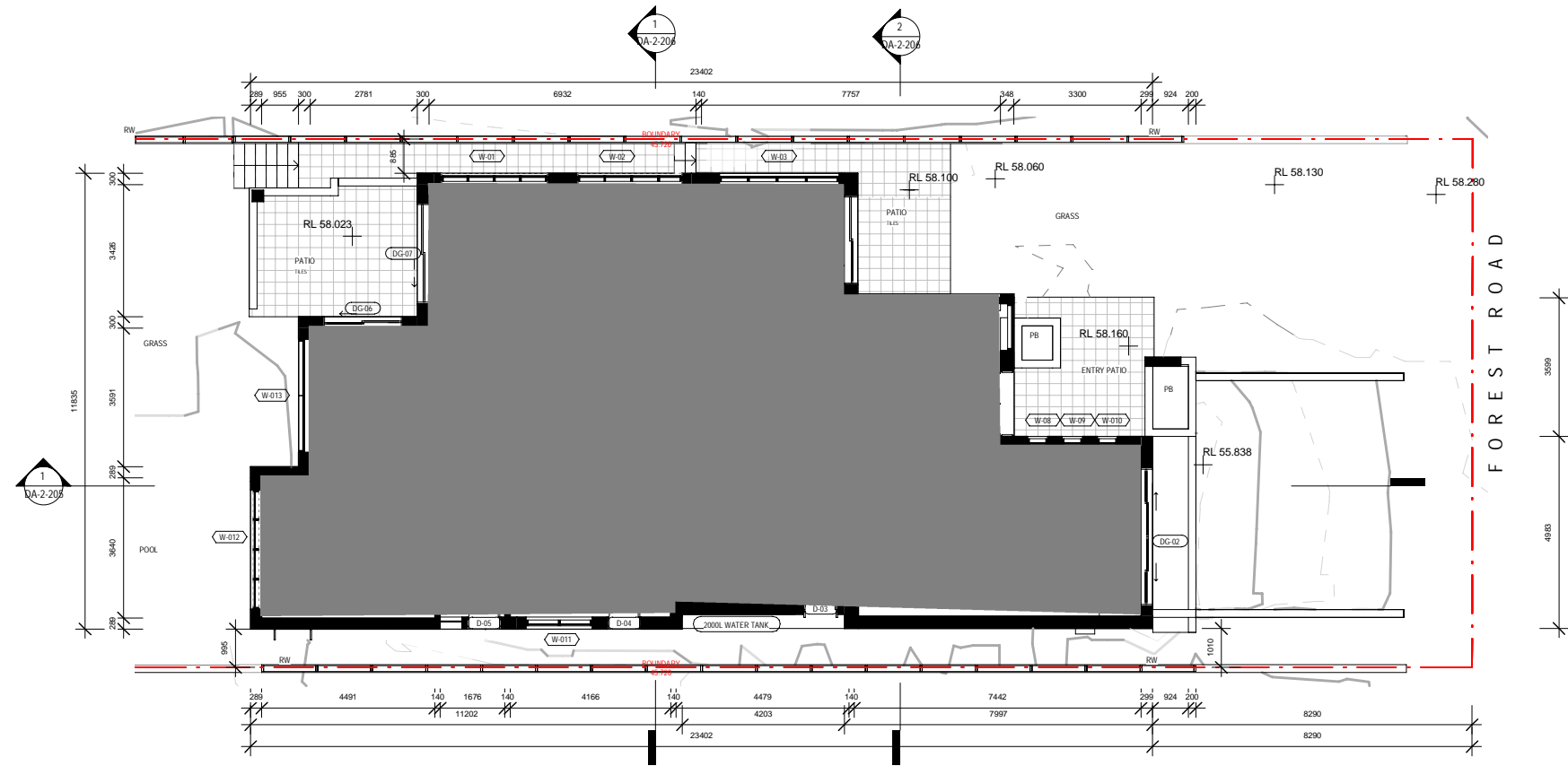
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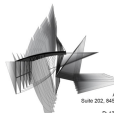

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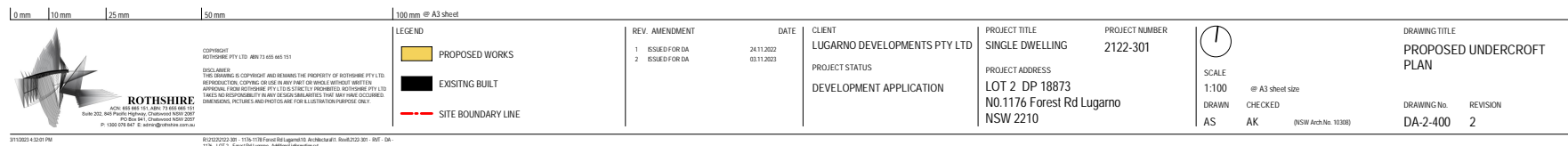
<p>0 mm 10 mm 25 mm 50 mm 100 mm @ A3 sheet</p> <p><b>LEGEND</b></p> <p>--- SITE BOUNDARY LINE</p> <p>O/F OVER FLOW</p> <p>RW RETAINING WALL</p> <p><b>ROTHSHIRE</b> ARCHITECTS 1176 Forest Rd Lugarno NSW 2220 P: 1300 078 847 E: info@rothshire.com.au</p>	<p><b>REV. AMENDMENT</b></p> <p>1 ISSUED FOR DA</p> <p><b>DATE</b></p> <p>24.11.2022</p>	<p><b>CLIENT</b></p> <p>LUGARNO DEVELOPMENTS PTY LTD</p> <p><b>PROJECT STATUS</b></p> <p>DEVELOPMENT APPLICATION</p>	<p><b>PROJECT TITLE</b></p> <p>SINGLE DWELLING</p> <p><b>PROJECT ADDRESS</b></p> <p>LOT 2 DP 18873 NO.1176 Forest Rd Lugarno NSW 2210</p>	<p><b>PROJECT NUMBER</b></p> <p>2122-301</p> <p><b>SCALE</b></p> <p>1:100</p> <p><b>DRAWN</b></p> <p>AS</p>	<p><b>CHECKED</b></p> <p>AK</p> <p>(NSW Arch.No. 10388)</p>	<p><b>DRAWING TITLE</b></p> <p>EXISTING UNDERCROFT PLAN</p> <p><b>DRAWING No.</b></p> <p>DA-2-100</p> <p><b>REVISION</b></p> <p>1</p>
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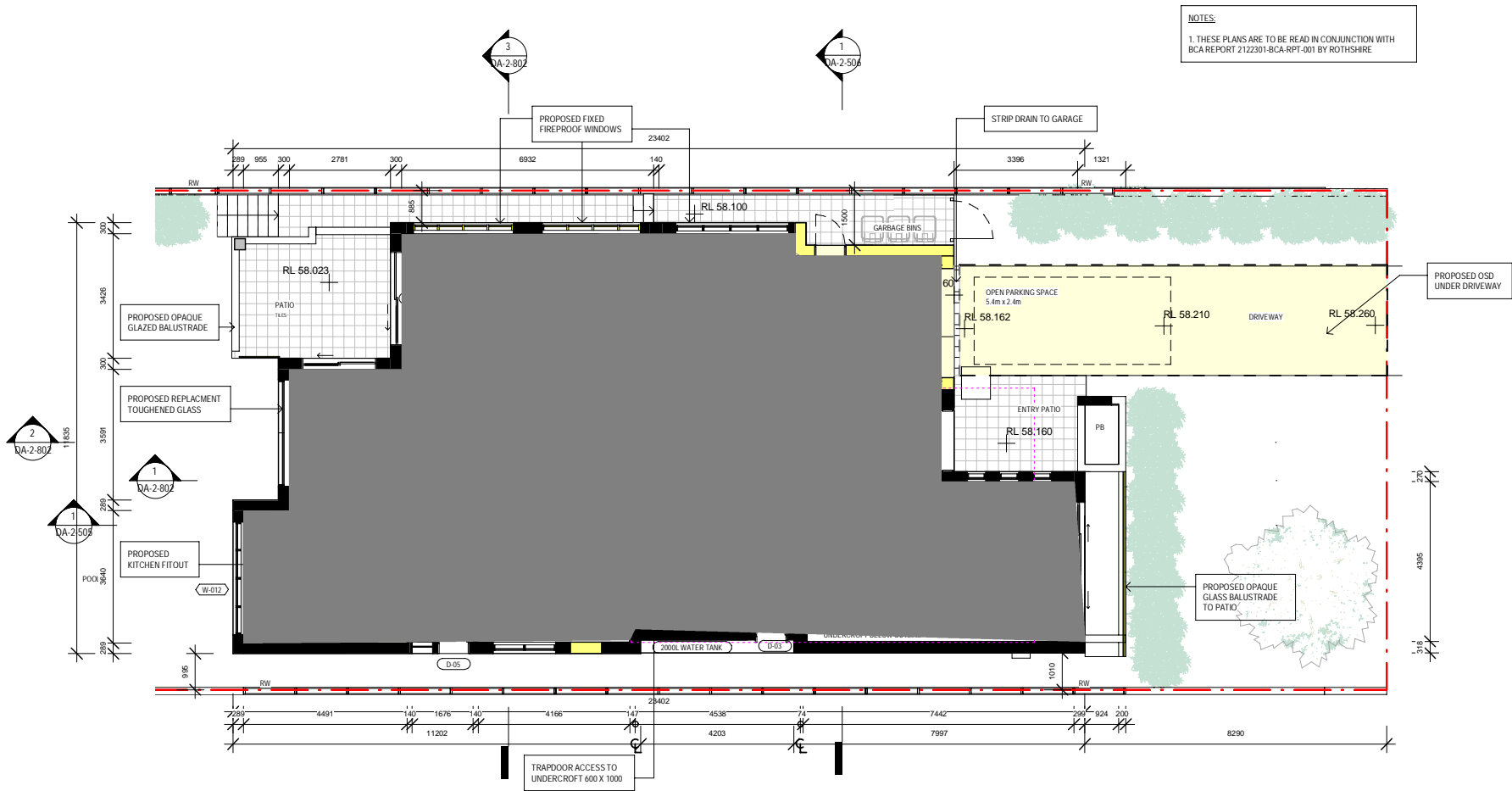
<div>0 mm10 mm25 mm50 mm100 mm @ A3 sheet</div> <div><div><b>ROTHSHIRE</b> ARCHITECTS Suite 302, 845 Pacific Highway, Chateau Road, New 2007 PO Box 841, Chateau Road, New 2007 P: 1300 078 847 E: info@rothshire.com.au</div></div>				<div>LEGEND</div> <div><div><div></div><div>SITE BOUNDARY LINE</div></div><div><div></div><div>OVER FLOW</div></div><div><div></div><div>RETAINING WALL</div></div></div>		<div>REV. AMENDMENT</div> <div>1 ISSUED FOR DA</div>	<div>DATE</div> <div>24.11.2022</div>	<div>CLIENT</div> <div>LUGARNO DEVELOPMENTS PTY LTD</div> <div>PROJECT STATUS</div> <div>DEVELOPMENT APPLICATION</div>	<div>PROJECT TITLE</div> <div>SINGLE DWELLING</div> <div>PROJECT ADDRESS</div> <div>LOT 2 DP 18873 NO.1176 Forest Rd Lugarno NSW 2210</div>	<div>PROJECT NUMBER</div> <div>2122-301</div>	<div></div> <div>SCALE</div> <div>1:100</div> <div>DRAWN</div> <div>AS</div> <div>CHECKED</div> <div>AK</div> <div>(NSW Arch.No. 10388)</div>	<div>DRAWING TITLE</div> <div>EXISTING GROUND FLOOR PLAN</div> <div>DRAWING No.</div> <div>DA-2-101</div> <div>REVISION</div> <div>1</div>
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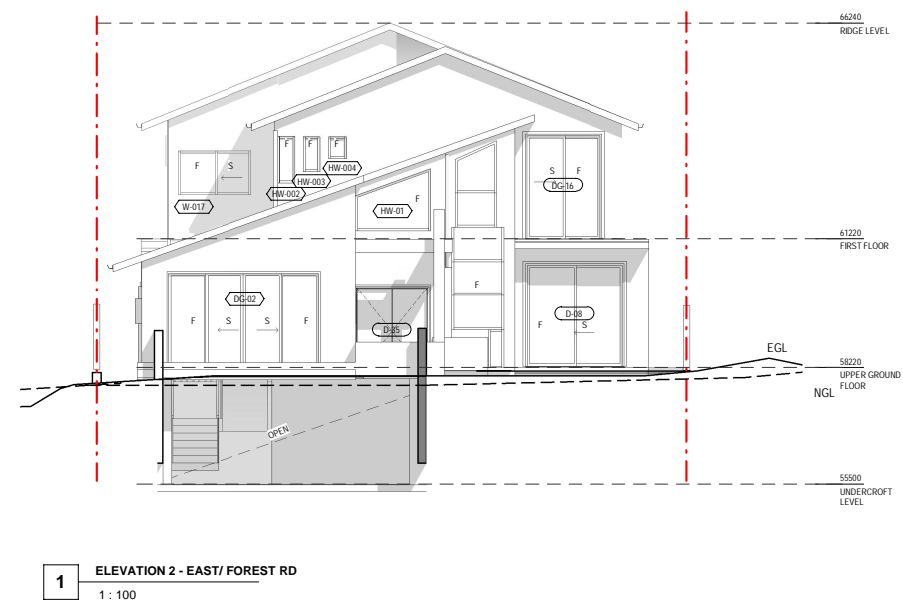




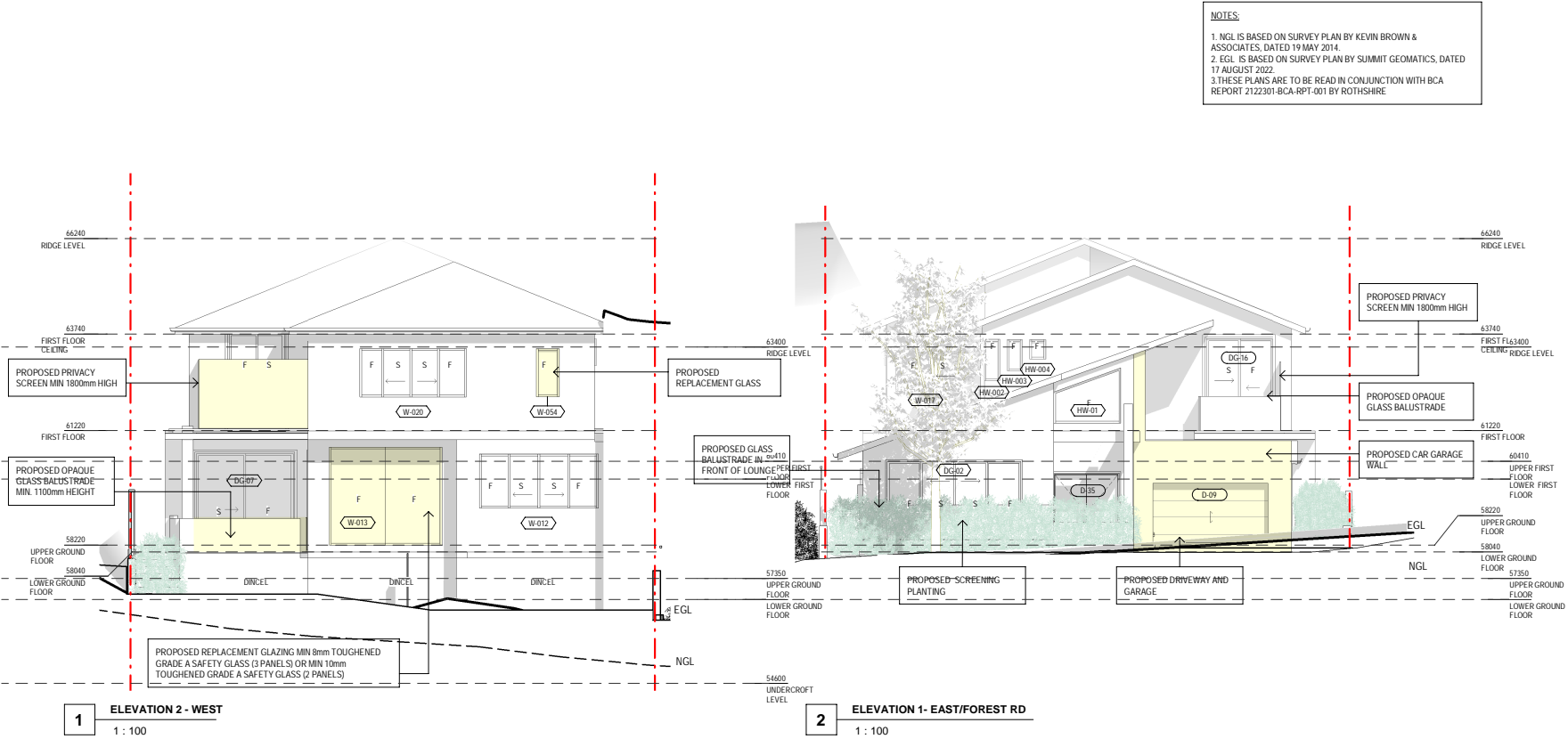


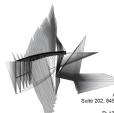




NOTES:  
1. THESE PLANS ARE TO BE READ IN CONJUNCTION WITH  
BCA REPORT 2122301-BCA-RPT-001 BY ROTHSHIRE

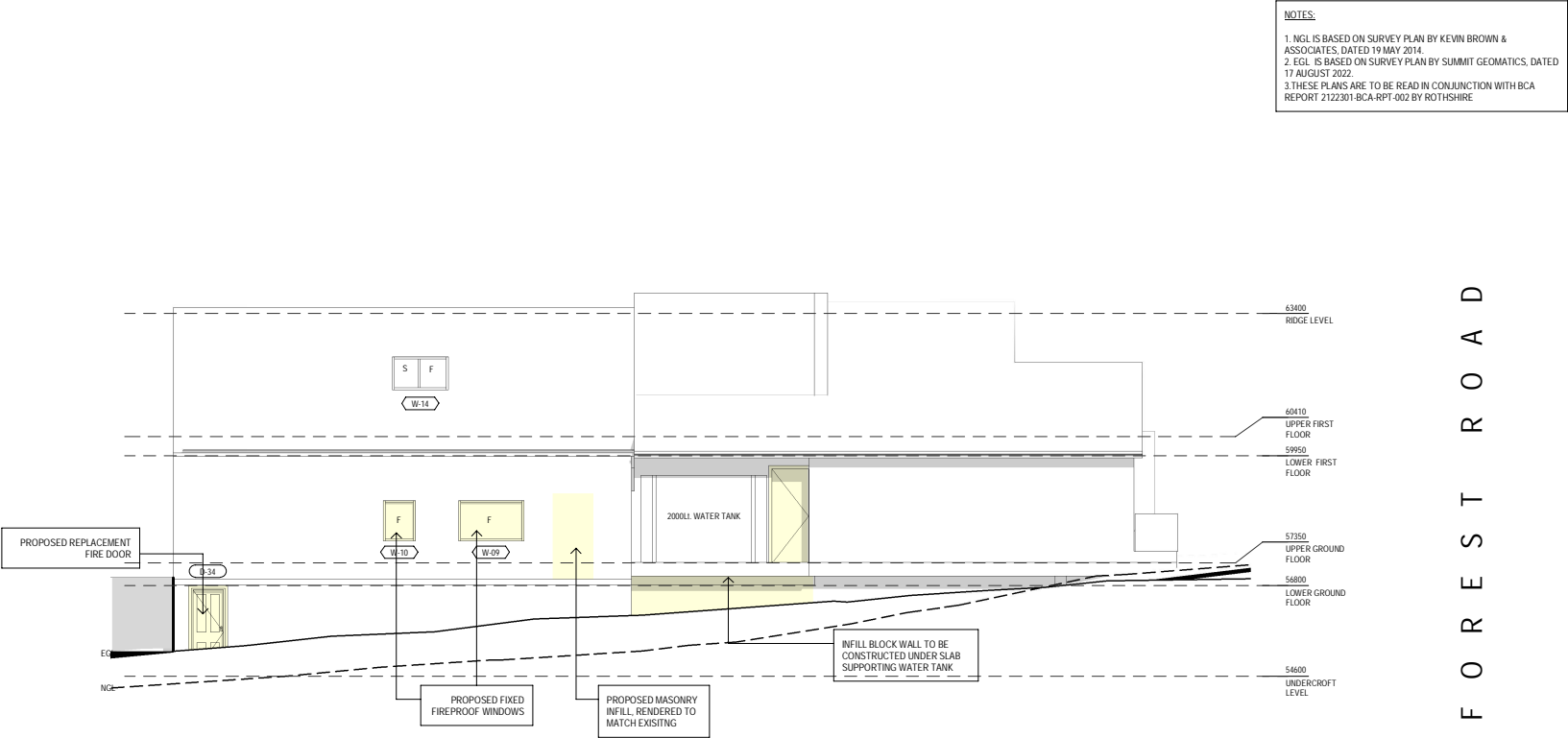
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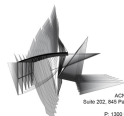
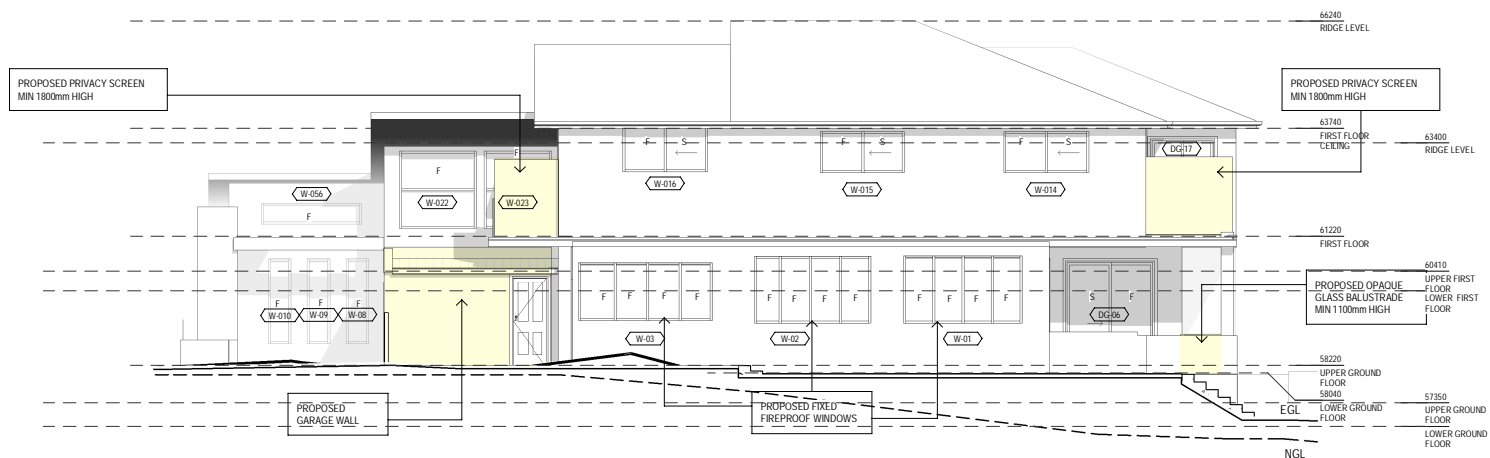


 <b>ROTHSHIRE</b> Architects Suite 202, 845 Pacific Highway, Chateau NSW 2067 PO Box 841, Chateau NSW 2067 P: 1300 678 847 E: info@rothshire.com.au		<b>LEGEND</b>  PROPOSED WORKS  SITE BOUNDARY LINE  NGL NATURAL GROUND LINE  EGL EXISTING GROUND LINE		<b>REV. AMENDMENT</b> 1 ISSUED FOR DA 2 ISSUED FOR DA <b>DATE</b> 24.11.2022 03.11.2023		<b>CLIENT</b> LUGARNO DEVELOPMENTS PTY LTD <b>PROJECT STATUS</b> DEVELOPMENT APPLICATION		<b>PROJECT TITLE</b> SINGLE DWELLING <b>PROJECT ADDRESS</b> LOT 2 DP 18873 NO. 1176 Forest Rd Lugarno NSW 2210		<b>PROJECT NUMBER</b> 2122-301		<b>DRAWING TITLE</b> PROPOSED EAST & WEST ELEVATIONS <b>DRAWING No.</b> DA-2-501 <b>REVISION</b> 2		<b>SCALE</b> 1:100 <b>DRAWN</b> AS <b>CHECKED</b> AK (NSW Arch.No. 10388)	
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0 mm 10 mm 25 mm 50 mm 100 mm @ A3 sheet		REV. AMENDMENT		DATE	CLIENT	PROJECT TITLE	PROJECT NUMBER	DRAWING TITLE	
		1 ISSUED FOR DA		24.11.2022	LUGARNO DEVELOPMENTS PTY LTD	SINGLE DWELLING	2122-301	PROPOSED SOUTH ELEVATION	
		2 ISSUED FOR DA		03.11.2023	PROJECT STATUS	PROJECT ADDRESS	SCALE	DRAWING No. REVISION	
ROTHSHIRE ARCHITECTURE 1176 Forest Rd Lugarno NSW 2122 P: 1300 078 847 E: info@rothshire.com.au		DEVELOPMENT APPLICATION		LOT 3 DP 18873 1178 Forest Rd Lugarno NSW 2210	1:100 @ A3 sheet size	DA-3-502 2			
31/10/2023 3:20:17 PM							AS	AJK	(NSW Arch.No. 10388)



1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES, DATED 19 MAY 2014.  
2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATICS, DATED 17 AUGUST 2022.  
3.THESE PLANS ARE TO BE READ IN CONJUNCTION WITH BCA REPORT 2122301-BCA-RPT-001 BY ROTHSHIRE



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LEGEND

	PROPOSED WORKS
	SITE BOUNDARY LINE
NGL	NATURAL GROUND LINE
EGL	EXISTING GROUND LINE

REV. AMENDMENT
1 ISSUED FOR DA
2 ISSUED FOR DA

	D
24.11.2022	
03.11.2023	

CLIENT	LUGARNO DEVELOPMENTS PTY LTD
PROJECT STATUS	
DEVELOPMENT APPLICATION	

PROJECT TITLE	PROJECT NUMBER
SINGLE DWELLING	2122-301
PROJECT ADDRESS	
LOT 2 DP 18873	
NO.1176 Forest Rd Lugarno	
NSW 2210	

SCALE  
1:100 @ A3 sheet size  
DRAWN  
AS  
CHECKED  
AK (NSW Arch.No. 10308)

DRAWING TITLE

PROPOSED NORTH  
ELEVATION

DRAWING No.	REVISION
DA-2-504	2







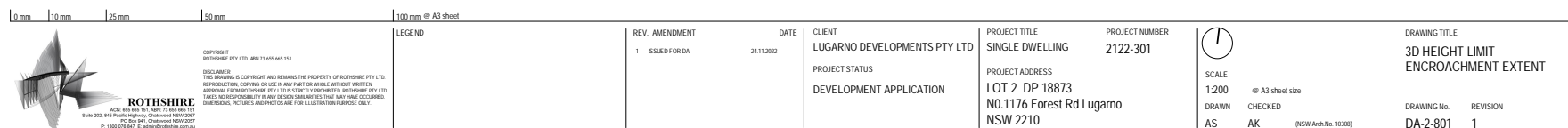
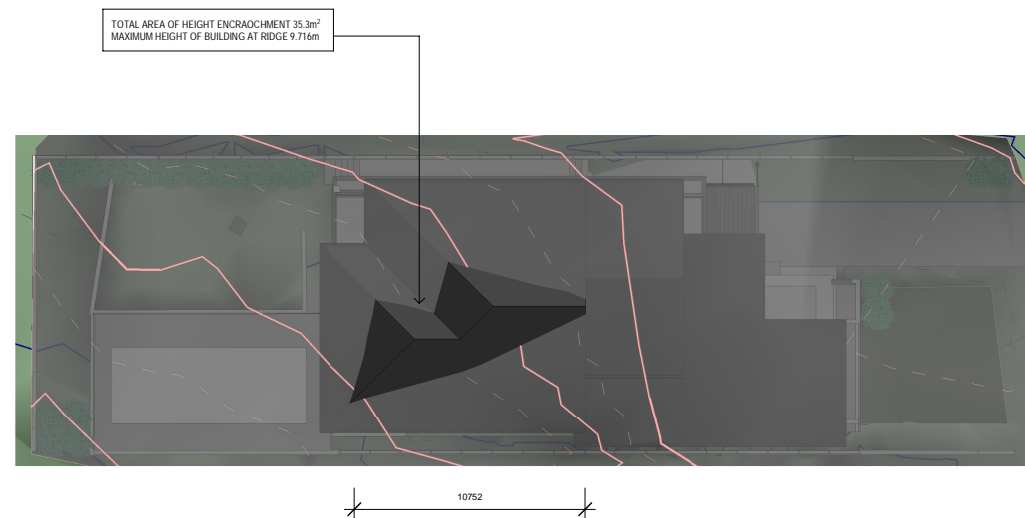


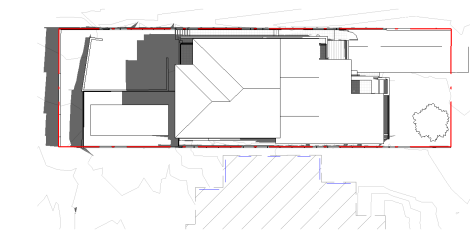




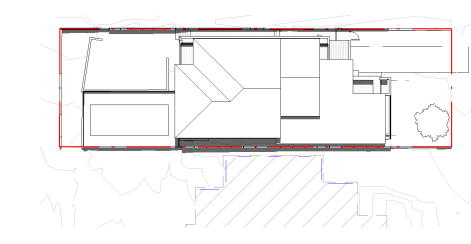
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2. BUILDING HEIGHT IS BASED ON SURVEY PLAN BY SUMMIT GEOMATICS, DATED 17 AUGUST 2022.

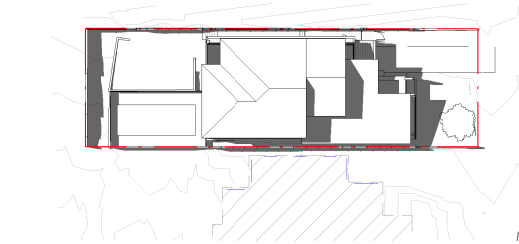




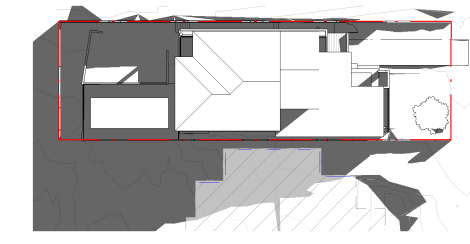
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1 : 500



**B** DECEMBER 21ST 12 NOON  
1 : 500



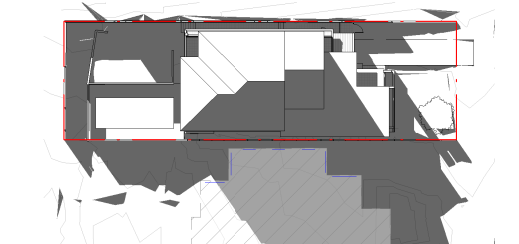
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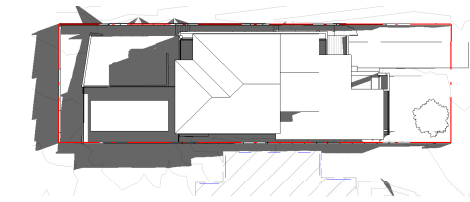
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1 : 500



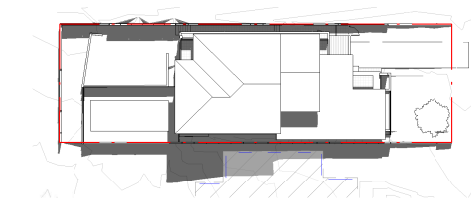
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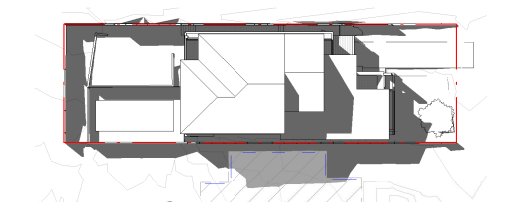
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1 : 500




**H** MARCH 21ST 9AM  
1 : 500

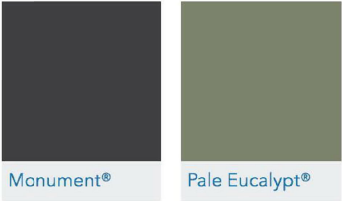
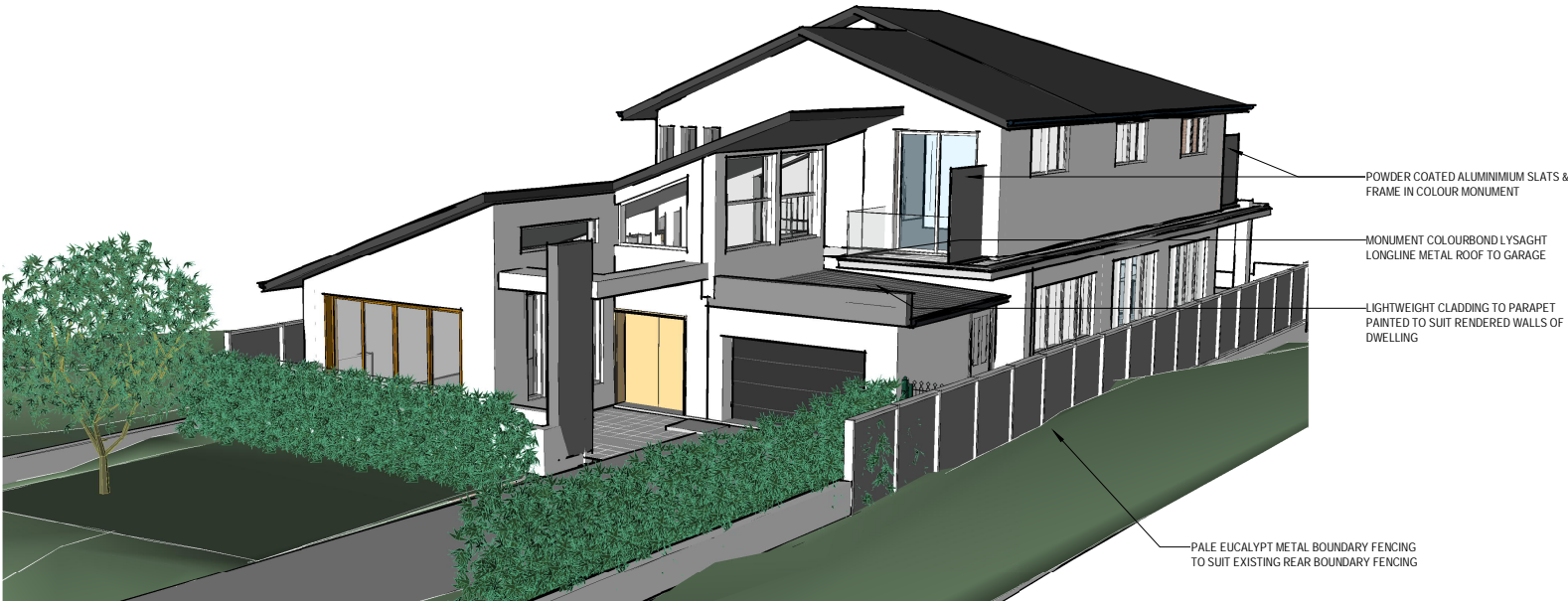


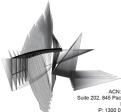
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1 : 500



**J** MARCH 21ST 3PM  
1 : 500

0 mm 10 mm 25 mm 50 mm 100 mm @ A3 sheet		LEGEND		REV. AMENDMENT		DATE	CLIENT		PROJECT TITLE		PROJECT NUMBER		<div><div></div><div>SCALE</div></div>		DRAWING TITLE	
<div><div></div><div><b>ROTHSHIRE</b> 4/24 ALEXANDRIA RD, ALEXANDRIA NSW 1513 Suite 202, 845 Pacific Highway, Chateau NSW 2007 PO Box 841, Chateau NSW 2007 P: 1300 578 847 E: info@rothshire.com.au</div></div>		COPYRIGHT ROTHSHIRE PTY LTD. ABN 13 455 445 151		1 ISSUED FOR DA		24.11.2022	LUGARNO DEVELOPMENTS PTY LTD		SINGLE DWELLING		2122-301		<div><div>1:500</div><div>AS</div></div> <div><div>@ A3 sheet size</div><div>CHECKED</div><div>AK</div><div>(NSW Arch.No. 10388)</div></div>		SHADOW DIAGRAM	
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31/10/2023 4:02:23 PM																



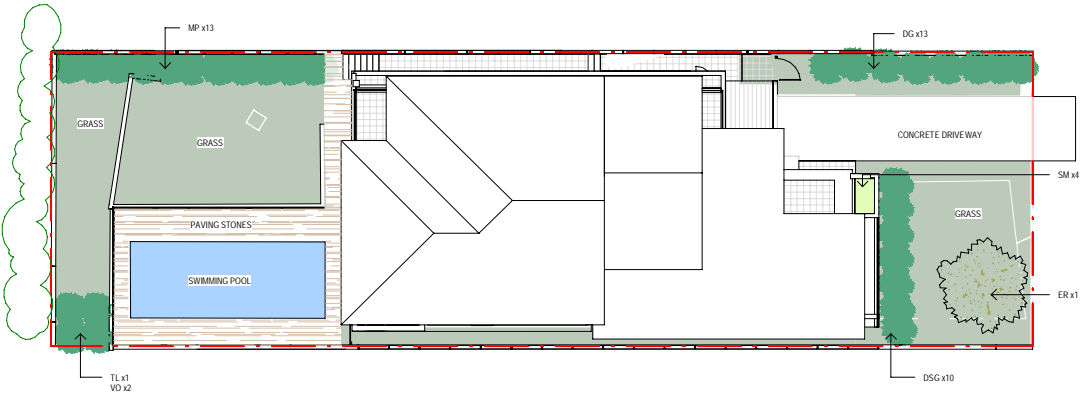
0 mm10 mm25 mm50 mm100 mm @ A3 sheet		LEGEND		REV. AMENDMENT		DATE	CLIENT	PROJECT TITLE	PROJECT NUMBER	DRAWING TITLE	
 <b>ROTHSHIRE</b> ARCHITECTS Suite 202, 245 Pacific Highway, Chateau NSW 2067 PO Box 841, Chateau NSW 2067 P: 1300 678 847 E: info@rothshire.com.au		COPYRIGHT ROTHSHIRE PTY LTD. ABN 73 455 465 751  DISCLAIMER: THIS DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY OF ROTHSHIRE PTY LTD. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF ROTHSHIRE PTY LTD. ANY UNAUTHORIZED REPRODUCTION OR TRANSMISSION OF THIS DRAWING IS STRICTLY PROHIBITED. ROTHSHIRE PTY LTD. ACCEPTS NO RESPONSIBILITY FOR ANY LOSSES OR DAMAGES THAT MAY BE INCURRED. DIMENSIONS, PICTURES AND PROFILES ARE FOR ILLUSTRATION PURPOSE ONLY.		1 ISSUED FOR DA 2 ISSUED FOR DA		24.11.2022 03.11.2023	LUGARNO DEVELOPMENTS PTY LTD	SINGLE DWELLING	2122-301	PROPOSED FINISHES SCHEDULE	
							PROJECT STATUS	PROJECT ADDRESS		SCALE	
							DEVELOPMENT APPLICATION	LOT 2 DP 18873 NO.1176 Forest Rd Lugarno NSW 2210		N/A @ A3 sheet size	
										DRAWN CHECKED	
										AS AK (NSW Arch.No. 10388)	
										DRAWING No. REVISION	
										DA-2-701 2	



SURFACE TREATMENT LEGEND	
STF	SYNTHETIC TURF
TF	TURF
GE	GARDEN EDGE
CL	CLOTHES LINE
CB/T/P	COLORBOND / TIMBER PAILING (1.8 HIGH)
T	TILE
RWT	RAINWATER TANK
PV	PAVERS
PP	WATER PERMEABLE UNIT PAVER
SC	STENCILED CONCRETE (CHARCOAL/GUNMETAL)
DGR	DECOMPOSED GRANITE FINISH
TFP	TEMPORARY PROTECTION FENCE
GVL	GRAVEL SURFACE / PATH (NEPEAN RIVER PEBBLE)
TD	TIMBER DECK
PLTR	PLANTER
CP	CONCRETE PATH
B	BENCH SEAT
BT	TABLE BENCH SEATING

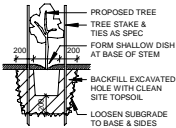
GENERAL NOTES AND SPECIFICATIONS

1. EXCAVATIONS  
Prior to carrying out any excavations, the contractor is to confirm the locations of all services. Service pits and lids are not to be covered by any materials. Trim and grade to form a smooth even finish.
2. EXISTING TREES TO BE RETAINED  
The existing trees indicated for retention shall be protected for the duration of the construction period. Install a 1.8m high temporary protective fence (TPF) to the locations as indicated on the plan. Do not store or otherwise place bulk or harmful materials under or near a tree which is to be retained. Do not attach slays, guys and the like to a tree which is to be retained. Where it is absolutely necessary to prune tree roots / limbs contractor to ensure all Council approvals have been obtained. All tree work is to be carried out by a qualified and insured arborist. Where an arborist report has been prepared for the existing tree on site: the landscape plan shall be read in conjunction with this report. All trees identified for retention shall be protected and managed in accordance with recommendations of this report. These recommendations will take precedence over any measures outlined in the landscape plan.
3. FALLS  
All pavement, planting & turf areas to be graded evenly. Ponding is unacceptable.
4. SURFACE LEVELS  
Final surface levels to be verified on site after Civil Constructor spoil spread. All adjacent surfaces are to be level and flush unless started or documented otherwise.
5. TURFING AREA  
Remove existing grass. Cultivate subgrade to depth of 150mm and place site topsoil to areas to be turfed to a depth of 100mm. Landscape Contractor is to prepare the insitu topsoil, removing rocks and clods etc., and make good for the placing of turf. Place 25mm turf as specified.
6. PLANTING AREAS  
Remove existing grass. Cultivate to a depth of 150mm, place 300mm imported topsoil and 100mm of mulch as specified. Mound all planting areas min. 200mm above adjacent hard surfaces to allow positive drainage. Soil blends to comply with AS 4419.
7. GARDEN BED / MULCH  
The topsoil to all garden bed areas shall be four (4) parts site topsoil to one (1) part organic compost thoroughly blended together prior to placing into position. Where the site topsoil is considered not suitable, an imported topsoil blend meeting the requirements of AS4419 (1998) shall be used. Garden bed subgrades are to be cultivated to a depth of 150mm. Topsoil depths to all garden bed areas in deep soil to be 300mm (min). At the completion of all planting operations apply a 75mm layer of mulch over entire garden bed taking care not to smother plants. Reduce depth of mulch around base of plants to form "watering dish". Mulch used shall be Pine Bark Nuggets as supplied by ANL or similar. All proposed planting is subject to suitable topsoil depths on site. Where there is insufficient depth due to presence of bedrock or other structures, the proposed planting is to be modified to suit in accordance with instructions from landscape architect.
8. PLANT MATERIAL  
The plants are to be healthy nursery stock, free from disease injury, insects all weed or roots of weeds. All plants are to be thoroughly soaked 1 hour prior to planting. All plants delivered for use on site shall be fully acclimatised to prevailing local Sydney conditions.
9. MAINTENANCE & ESTABLISHMENT  
All landscape works are to be maintained for the period of three months from the date of practical completion. This includes all watering, weeding, spraying and re-mulching necessary to achieve vigorous growth. Any defects which arise during this period are to be rectified immediately. Any plants or areas of turf which fail during this period are to be replaced at no additional cost.
10. DISCREPANCIES  
Should there be any discrepancies on the drawings with existing site conditions; contractor is to notify the landscape architect prior to proceeding with the works.

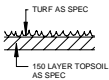


PLANT SCHEDULE

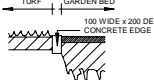
CODE	PLANT NAME	SIZE	MATURE SIZE	QTY
DG	Dietses Grandiflora	100 mm	1.0 m	13
DSG	Duranta "Sheenas Gold"	200 mm	Trim to 1.0 m	10
ER	Elaeocarpus Reticulatus "Blueberry Ash"	75 Litres	10.0 m	1
MP	Murraya Paniculata	200 mm	Trim to 2.0 m	13
SM	Raphiolepis "Snow Maiden"	200 mm	Trim to 1.0 m	4
TL	Tristania laurina	75 Litres	6.0 m	1
VO	Viburnum Odoratissimum	200 mm	Trim to 2.0 m	2



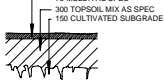
TREE PLANTING DETAIL



TURF DETAIL

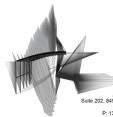


GARDEN EDGE



GARDEN BED

0 mm 10 mm 25 mm 50 mm 100 mm @ A3 sheet



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LEGEND	
	OUTLINE OF BUILDING
	LANDSCAPE AREA
	CONCRETE AREA
	SITE BOUNDARY LINE

REV.	AMENDMENT
1	ISSUED FOR DA
2	ISSUED FOR DA

DATE
24.11.2022
03.11.2023

CLIENT LUGARNO DEVELOPMENTS PTY LTD
PROJECT STATUS DEVELOPMENT APPLICATION

PROJECT TITLE SINGLE DWELLING	PROJECT NUMBER 2122-301
PROJECT ADDRESS LOT 2 DP 18873 NO.1176 Forest Rd Lugarno NSW 2210	

SCALE N/A	@ A3 sheet size
DRAWN AS	CHECKED AK
	(NSW Arch.No. 10388)

DRAWING TITLE PROPOSED LANDSCAPE PLAN	DRAWING No. DA-2-600
	REVISION 2

GENERAL NOTES:

1. All work is to be performed in accordance with AS3500.3 and council codes where applicable.
2. The Plumber/ Drainer shall inspect the site and confirm the existing site structures, services and conditions prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
3. All pipes shall be sewer grade P.V.C. laid at min. 1:100, unless noted otherwise.
4. All connections to P.V.C. pipes are to be solvent welded to manufacturers specification
5. All prefabricated pits, drains etc. are to be of heavy duty concrete construction unless noted other.
6. Precise location of down pipes shall be nominated by others. Locations shown are for hydraulic design purposes only.
7. Precise location of pits shall be nominated by others. Locations shown are for hydraulic design purposes only.
8. All eaves gutters shall be of minimum cross sectional area of 8500mm<sup>2</sup> unless noted otherwise.
9. This design covers the collection and disposal of rainwater from ROOF AREAS ONLY. Any paved areas not noted on the supplied architectural drawings are not included, unless shown.
10. This design does not cover sub surface hydraulic flows.
11. The installer is encouraged to use the 'Dial Before You Dig' service prior to excavation. No underground services have been noted or surveyed in this design. Dig at your own risk.
12. IF IN DOUBT ASK. Consult the design engineer for any changes, omissions and discrepancies.
13. System design has been produced to reflect reduced levels shown on architect supplied drawings.
14. Pipe cover for uPVC pipes:
  - a. Single dwellings, no vehicular loading- 100mm
  - b. Single dwellings, vehicular loading on concrete- 450mm
  - c. Single dwellings, vehicular loading, un-reinforced concrete-100mm below underside of concreteSilt arrestor pit and rain guards must be regularly inspected and cleaned.
15. Location of Stormwater Systems, including downpipes, pipes,pits and rainwater tank are indicative only. Exact locations shall be determined on site to suit site conditions.
16. Sub-soil drains for retaining wall shall be installed by the builder and connected to Stormwater lines. All Agg Lines shall be 100mm DIA, unless noted otherwise.
17. Levels are approximate only. The plumber/drainer shall confirm the levels prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
18. Inspection and certification, if required, shall be done prior to backfilling, allow 24 hour notice for the engineer to carry out the inspection.
19. Any damage to services during construction shall be repaired immediately at the plumber/drainers own expense.
20. Areas & Geometry calculated are approximate and dependent on Surveyors & Architects drawings.
21. It is essential that areas calculated are within plus/minus 5% range.
22. Provide adequate access and overland flow routes out of property and not into adjoining properties
23. Provide minimum 75mm clearance under all gates and operable external doors as to not impede overland flow
24. Water entry and backflow into buildings should be prevented at all times
25. All finished ground surfaces should fall away from structures
26. Charged lines are to be flushed regularly and flush/arrestor pits are to be regularly inspected and cleaned
27. All pipes entering a water tank shall have a first flush device installed
28. All water tanks will be insect proofed by other
29. If tanked water is being reused for drinking or sanitary purposes, appropriate disinfecting by others should be considered.
30. Schedule of calculations is based on plan areas



LOCALITY PLAN  
NOT TO SCALE



PROJECT		
1176 FOREST RD LUGARNO		
CLIENT		
LUGARNO DEVELOPMENTS PTY LTD		
CONSULTANT		
ROTHSHIRE SERVICES PTY LTD A.B.N. 73 655 665 151 (T) 1300 076 847 (E) admin@rothshire.com.au		
REGISTRATION		
Alexander Kameas Principal Engineer		
SAFETY IN DESIGN		
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?		
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
SUSTAINABILITY CONSIDERATIONS		
KEYPLAN / LEGEND		
ISSUED FOR DA		
REV	DATE	DESCRIPTION
A	03.11.2023	ISSUED FOR DA
DESIGNED	CHECKED	APPROVED
DN	AK	AK
DRAWING TITLE		
GENERAL NOTES & STANDARD PRACTICES		
PROJECT NO.:	2122301	
DWG NO.:	STW1-DWG-000	

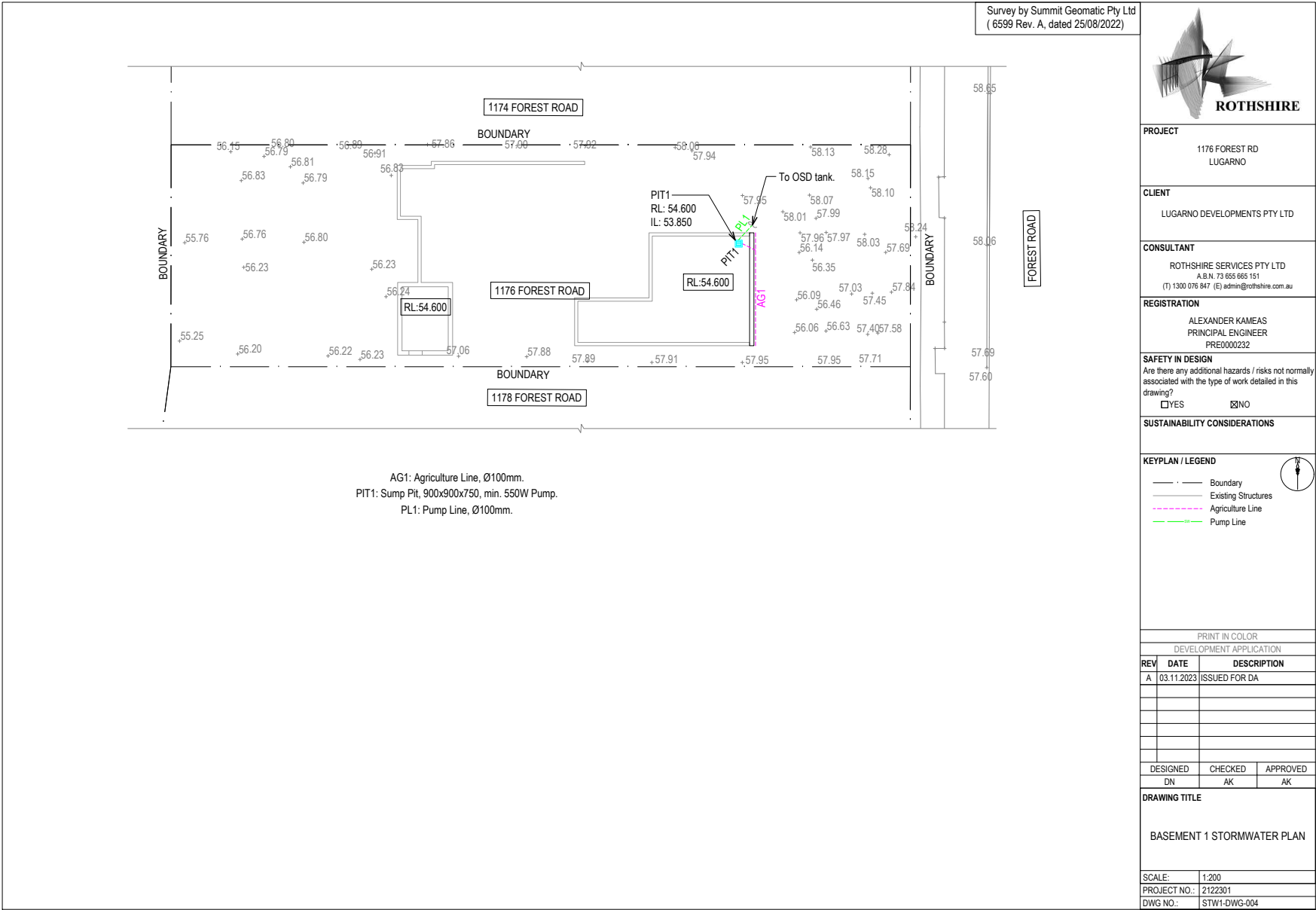
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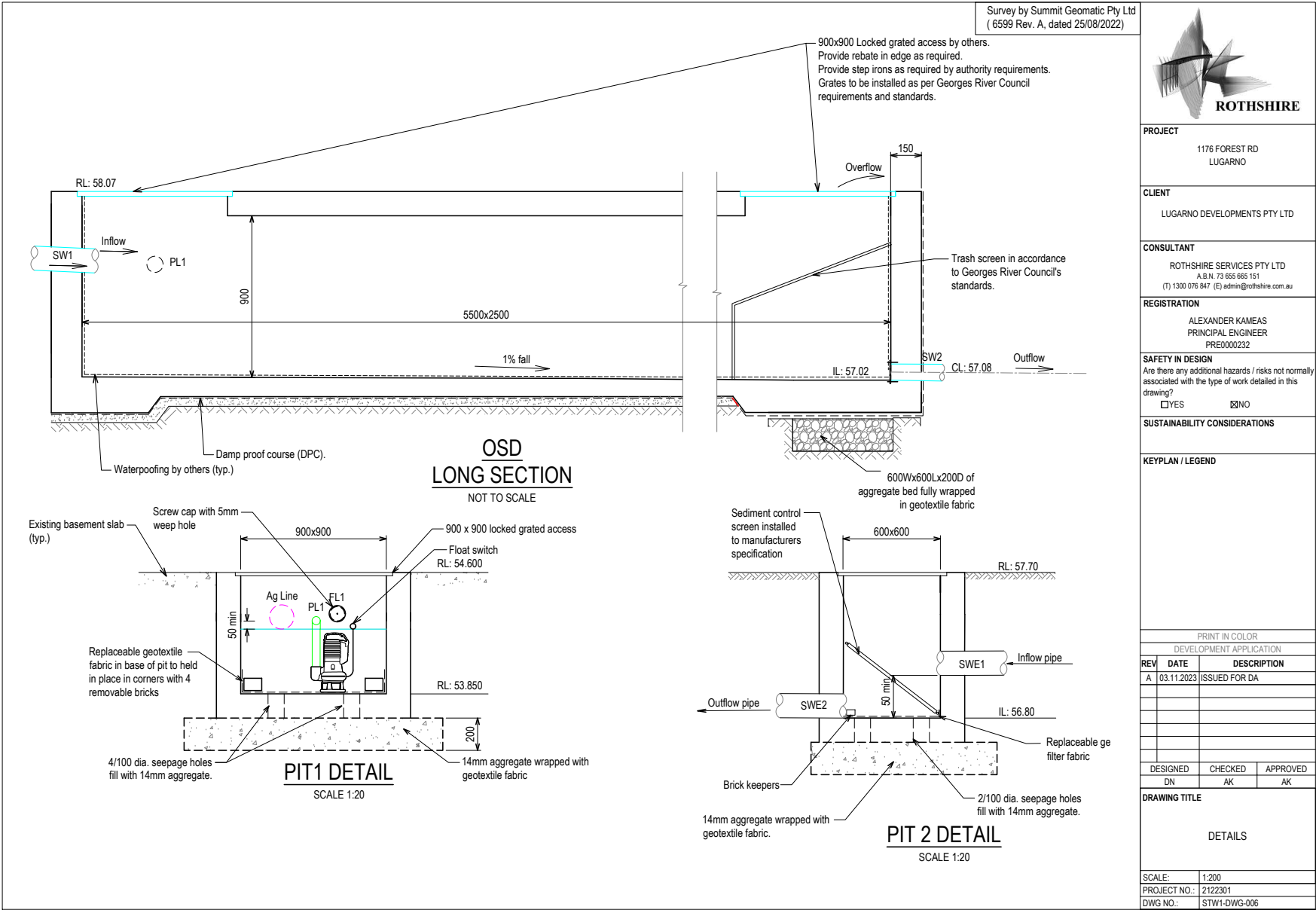
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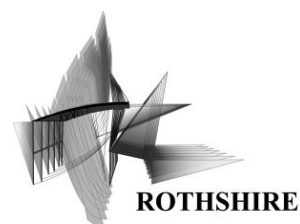
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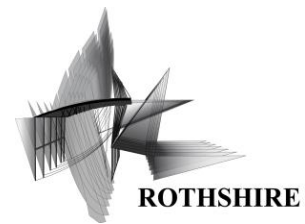




DOCUMENT NO.: 2122301-BCA-RPT-003-1

## BCA COMPLIANCE REPORT

<b>ADDRESS:</b>	1176 FOREST ROAD LUGARNO NSW 2224 LOT 2 IN DP 18873
<b>CLIENT:</b>	ASTOR HOMES
<b>LOCAL GOVERNMENT AREA:</b>	GEORGES RIVER COUNCIL
<b>SCOPE</b>	EXISTING DWELLING & FITOUT



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- APPENDIX A – ARCHITECTURAL PLANS
- APPENDIX B – SITE CLASSIFICATION REPORT
- APPENDIX C – ENGINEERING CERTIFICATE – RETAINING WALL
- APPENDIX D – SITE PHOTOS
- APPENDIX E – WATERPROOFING CERTIFICATE
- APPENDIX F – CERTIFICATE OF STRUCTURAL ADEQUACY



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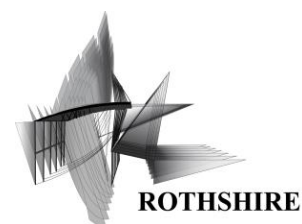
## EXECUTIVE SUMMARY

A Building Code of Australia (**BCA**) assessment to the BCA 2019 Amdt 1 has been undertaken for an existing dwelling at 1176 Forest Rd, Lugarno NSW 2210 (**Site**) which was built without Division 4.3 or Division 4.5 certification pursuant to the Environmental Planning and Assessment Act 1979 (**EP&A Act**).

This report is to be read in conjunction with the plans listed in **Section 4**, the structural report undertaken by Rothshire reference 2122301-LET-011-V1 and the documents listed in the Appendices to this report.

Where compliance with the Deemed-to-Satisfy (**DtS**) provisions of the BCA 2019 Amdt 1 has not been confirmed or is not sufficiently clear to deem compliance with the BCA, a Performance Solution has been undertaken (see below), or alternatively a rectification performance criterion has been specified (refer **Sections 6 and 8** of this report).

Any rectification performance criterion has been document within **Section 6** of this report and summarised in **Section 8**.



## NOMENCLATURE

The nomenclature relevant to this report is detailed in **Table 1**.

**Table 1. Abbreviations and definitions**

Abbreviation	Definition
BCA	Building Code of Australia
Client	Astor Homes
DtS	Deemed to Satisfy
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Reg	Environmental Planning and Assessment Regulation 2021
FFL	Finished floor level
FGL	Finished ground level
NGL	Natural ground level
NCC	National Construction Code
Site	1176 Forest Rd Lugarno NSW

## DOCUMENT HISTORY

**Table 2. Document revision & history**

Rev.	Description	Author	Reviewer	Date
1	Issued for DA	NRT	SM	13/12/2022



## 1. INTRODUCTION

This report provides a BCA 2019 Amdt 1 compliance assessment of an existing partially complete residential building at the Site to support a Development Application made to Georges River Council.

The development involves the assessment of an existing partially complete Class 1a detached dwelling without appropriate Division 4.3 or Division 4.5 building approval pursuant to the EPA Act. The purpose of this report is to provide a summary of the building compliance with the BCA 2019 Amdt 1 including any unfinished or remedial works to be undertaken.

## 2. REPORT AUTHOR

Author: Naomi Roberts-Thomson

Qualifications: B.Eng (Civil) Hons.; MBA; Certification Short Course; Cert IV (Building & Construction); Juris Doctor (currently completing).

Business Address: Level 2, Suite 202, 845 Pacific Highway, Chatswood NSW 2067

Review: Samy Mikhail

Qualifications: BDC2277 - Building Surveyor - Unrestricted

Business Address: 49/2 O'Connell St, Parramatta NSW 2150

## 3. BASIS OF REPORT

The key objective of the report is to make an:

1. Assessment under the current Building Code of Australia 2019 Amdt 1 (BCA) Volume Two and list any non-compliances and information applicable from the BCA that will need to be addressed.
2. Provide BCA compliance advice and information where non-compliances are identified.



#### 4. REFERENCE DOCUMENTS

The documents that were used to prepare this BCA compliance report are provided in **Table 3 - Architectural Plans** (refer **Appendix A**), **Table 4 - Stormwater Plans** and **Table 5**.

**Table 3 – Architectural Plans**

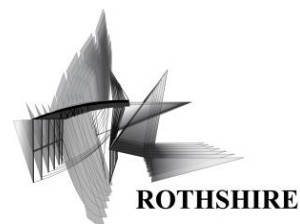
Drawing No.	Drawing Title	Revision	Revision Date
PL-2-000	COVER SHEET	1	24/11/2022
PL-2-010	BASIX COMMITMENTS	1	24/11/2022
PL-2-050	SITE PLAN	1	24/11/2022
PL-2-100	BASEMENT PLAN	1	24/11/2022
PL-2-101	GROUND FLOOR PLAN	1	24/11/2022
PL-2-103	FIRST FLOOR PLAN	1	24/11/2022
PL-2-201	EAST & WEST ELEVATION PLAN	1	24/11/2022
PL-2-202	NORTH ELEVATION PLAN	1	24/11/2022
PL-2-203	SOUTH ELEVATION PLAN	1	24/11/2022
PL-2-205	LONG SECTION PLAN	1	24/11/2022
PL-2-206	CROSS SECTION PLAN	1	24/11/2022

**Table 4 – Stormwater Plans**

Drawing No.	Drawing Title	Revision	Revision Date
2122301-GEN-DWG-000	GENERAL NOTES	1	13/12/2022
2122301-STW-DWG-001	EXISTING CATCHMENT PLAN	1	13/12/2022
2122301-STW-DWG-002	PROPOSED CATCHMENT PLAN	1	13/12/2022
2122301-STW-DWG-003	TABLE OF COMPLIANCE AND CALCULATION	1	13/12/2022
2122301-STW-DWG-004	PROPOSED ROOF STORMWATER PLAN	1	13/12/2022
2122301-STW-DWG-005	PROPOSED LEVEL 1 STORMWATER PLAN	1	13/12/2022
2122301-STW-DWG-006	PROPOSED GROUND FLOOR STORMWATER PLAN	1	13/12/2022
2122301-STW-DWG-007	OSD DETAILS	1	13/12/2022
2122301-STW-DWG-008	DETAILS	1	13/12/2022

**Table 5 – Other Reference Documents**

Document No.	Document Title	Revision	Revision Date
1334736S_02	BASIX Certificate	02	02/12/2022
2122301-LET-011-V1	Certificate of Structural Adequacy	V1	09/12/2022



## 5. BUILDING CHARACTERISTICS

A summary of the building characteristics is provided in **Table 6** below.

**Table 6 – Building characteristics**

Classification of Building	Class 1a
Rise in Storeys	2 storeys with a non-habitable basement level
Subject to flooding	N/A
Bushfire	N/A
Rainfall	<sup>2015</sup> 182mm/hr
Climate zone	Zone 5
Soil classification	Class A (referenced by Geotechnical Report <b>Appendix B</b> )
Cladding	Double brick (ground floor); Brick veneer (first floor); NRG Greenboard™ Polystyrene Cladding (minor walls around doors and windows identified on the plans); HardieTex Blueboard (minor walls around roof articulations and identified on the plans).



6. BCA 2019 AMDT 1 - VOLUME 2 ASSESSMENT

The BCA assessment has been made to Building Code of Australia 2019 Amdt 1 (BCA) Volume Two. Where this report has been unable to confirm compliance (based on the information attached or discussed in this report) the non-compliances have been identified and remedial work has been recommended to bring the building up to compliance.

Where unable to confirm compliance via visual inspection we have recommended that certification be provided to support the application prior to the issue of the Construction Certificate. Any additional work or additional inspections have been indicated the information applicable will need to be addressed prior to the issue of the Building Certificate.

Table 7 – BCA Compliance Assessment

PART 3.0 STRUCTURAL PROVISIONS

Line number	BCA Clause	Title	Assessment	Recommendation	
1.	Part 3.0	Structural provisions	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.

PART 3.1 SITE PREPARATION

Line number	BCA Clause	Title	Assessment	Recommendation	
2.	Part 3.1	Site Preparation	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.





Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.1.1 Earthworks					
3.	3.1.1.1	Earthworks	N/A – All fill on site is retained. Cut and fill undertaken at the site. Cut embankment of 2.5:1 is consistent with Table 3.1.1.1.	Complies	Note that a concurrent DA for the subject site proposes to back fill the existing ramp the basement.
4.	3.1.1.2	Earthworks	N/A – All fill on site is retained. Compacted fill has been levelled and retained.	Complies	
Part 3.1.2 Earth Retaining Structures					
5.	Part 3.1.2	Earth retaining structures	Retaining structure inspected by Professional Engineer.	Complies	Refer to certificate by CJS Flora dated 14 June 2017 ( <b>Appendix C</b> ).
Part 3.1.3 Drainage					
6.	3.1.3.0	Acceptable Construction Manual	Drainage provisions inspected by Professional Engineer.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.
7.	3.1.3.1	Acceptable Construction Practice	Refer to assessment BCA clause 3.1.3.3.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.
AS3500.3:2018					
8.		Stormwater drainage	Drainage provisions inspected by Professional Engineer.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.



Line number	BCA Clause	Title	Assessment	Recommendation	
Acceptable Construction Practice					
9.	3.1.3.2	Drainage requirements	Refer to assessment BCA clause 3.1.3.3.	Remedial	The alfresco is to be graded 1% with a linear drain in accordance with AS3500.3.
10.	3.1.3.3(a)	Surface water drainage systems – design	Adequate falls (0.050:1) have not been observed in all locations at the external finished surface adjacent to the building.  All finished ground level external to building is reasonably impermeable.	Remedial	The alfresco is to be graded 1% with a linear drain in accordance with AS3500.3.
11.	3.1.3.3(b)	Surface water drainage systems – design	The building has been constructed adjacent to impermeable finished surfaces only.  The FFL to surrounding ground level achieves a height of one brick course or a concrete setdown, with clearance of greater than 50mm observed in all cases.	Complies	Refer to Architectural plans.  Refer to site photos in <b>Appendix D</b> .
12.	3.1.3.4	Subsoil drainage	Subsoil drainage required to the basement and retaining walls as constructed.	Remedial	Subsoil drainage to the basement level to be connected to the stormwater system via sump pit, refer to Stormwater Plans.
13.	3.1.3.5	Stormwater drainage	Drainage provisions inspected by Professional Engineer. Assessment has been made to AS3500.3.  Drainage from the first-floor roof to the ground floor non trafficable roof area in two locations to be redirected due to breaches of waterproofing and internal damage.	Remedial  Remedial	Refer to stormwater plans referenced in Section 4 of this report.  Refer to site photos in <b>Appendix D</b> . For remedial works, refer to stormwater plans referenced in Section 4 of this report.



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.1.4 Termite risk management					
14.	3.1.4.3	Termite management systems	Concrete and masonry construction is considered not subjected to termite attack.  Timber preservative treatment has been observed during site inspection.	Complies	N/A.
15.	3.1.4.4	Durable notice	No durable notice required.	N/A	Not applicable

**PART 3.2 FOOTINGS AND SLABS**

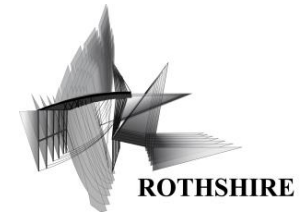
Line number	BCA Clause	Title	Assessment	Recommendation	
16.	Part 3.2.1	Footings and Slabs	Footings and slabs inspected by Professional Engineer.	Remedial	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.  Additional block wall required to support slab at location of water tank.
17.	Part 3.2.2.6	Footings and Slabs	Suitable vapour barrier has been observed on site by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.

**PART 3.3 MASONRY**

Line number	BCA Clause	Title	Assessment	Recommendation	
18.	Part 3.3.1	Masonry Accessories	Masonry inspected by Professional Engineer. Construction is in accordance with AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
19.	Part 3.3.3	Masonry Accessories	Masonry inspected by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
<b>Part 3.3.4 Weatherproofing of masonry</b>					
20.	3.3.4.0	Acceptable Construction Manuals	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	Not inspected	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.
<b>Part 3.3.5 Masonry veneer</b>					
21.	3.3.5.0	Acceptable Construction Manuals	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	N/A	The brick veneer has been assessed against both AS 4773.1, AS4773.2 and Part 3.3.5 – this part should be read in conjunction with the engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
22.	<b>3.3.5.1</b>	Acceptable Construction Practice	Part 3.3.5 – refer assessment below 3.3.5.1-3.3.5.9.	N/A	The brick veneer has been assessed against both AS 4773.1, AS4773.2 and Part 3.3.5 – this part should be read in conjunction with the engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
<b>Acceptable Construction Manuals - AS4773.2:2015</b>					



Line number	BCA Clause	Title	Assessment	Recommendation	
23.	Section 3	Mortar	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
24.	Section 5	Built-in Components	DPC not observed due to render however location of weep holes observed to be in a suitable level.	Acceptable	Refer to site photos in <b>Appendix D</b> .
25.	Section 7	Control joints	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
26.	Section 8	Steel lintels	Lintels not observed due to enclosed walls and render.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
27.	Section 9	Masonry veneer walls	40mm min. cavity as measured on site.  Brick leaf size is 110mm thick brick.  DPC not observed due to render however location of weep holes observed to be in a suitable level.	Acceptable	Refer to site photos in <b>Appendix D</b> .
28.	9.6.2.2	Sill flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
29.	9.6.2.3	Head flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
30.	9.6.2.4	Flashing at roof abutment	Flashings were not inspected to the roof, some leaks identified during inspections, all roof and roof junction flashings to be confirmed as complete and sealed.	Not inspected	To be inspected and certified by a licensed builder.



Line number	BCA Clause	Title	Assessment	Recommendation	
31.	Section 10	Cavity masonry walls	40mm min. cavity as measured on site.  Brick leaf size is 110mm thick brick.  DPC not observed due to render however location of weep holes observed to be in a suitable level.	Acceptable	Refer to site photos in <b>Appendix D</b>
32.	10.5.3.2	Sill flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
33.	10.5.3.3	Head flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
34.	10.5.3.4	Flashing at roof abutment	N/A – Double brick walls were not observed to extend higher than ground level.	Complies	N/A
<b>3.3.5.1 Acceptable Construction Practice</b>					
35.	3.3.5.2	Height of wall limitation	Masonry veneer walls are not to be greater than 8.5m.	Complies	N/A
36.	3.3.5.3	Masonry units	Masonry existing, leaf size 110mm thick and are cored units.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
37.	3.3.5.4	Mortar mixes	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
38.	3.3.5.5	Mortar joints	Nominal thickness of 10mm.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.



Line number	BCA Clause	Title	Assessment	Recommendation	
					Refer to site photos in <b>Appendix D</b> .
39.	3.3.5.6	Cavities	40mm min. cavity as measured on site.	Complies	N/A
40.	3.3.5.7	Damp-proof courses and flashings — material	DPC was not observed due to render finish to the external.	Not inspected	To be inspected and certified by a licensed builder
41.	3.3.5.8	Damp-proof courses and flashings — installation	DPC was not observed due to render finish to the external, DPC expected to be encountered at the level of weepholes visible on the external walls, it is noted that the location indicates acceptable construction.  Window head and sill flashings were observed in some locations, unable to inspect some locations.	Not inspected  Not inspected	Refer to site photos in <b>Appendix D</b> .  To be inspected and certified by a licenced builder.
42.	3.3.5.9	Weep holes	Weep holes inspected and visible at suitable spans at the base of the ground floor and at the interstory junction.  Weepholes are not exposed or visible through the render in some locations, weepholes to be opened through render.	Remedial	Refer to Building Information Certificate Plans.
43.	3.3.5.10	Wall ties	Wall ties were visible and identified, galvanised material.	Complies	N/A
44.	3.3.5.11	Openings in masonry veneer	Window lintels inspected by structural engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.



Line number	BCA Clause	Title	Assessment	Recommendation	
45.	3.3.5.12	Lintels	Steel lintels have not been inspected.	Not inspected	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
<b>Part 3.3.6 Isolated Masonry Piers</b>					
46.	3.3.6.0	Acceptable Construction Manuals	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.
47.	3.3.6.1	Acceptable Construction Practice	Assessment to AS 4773.1:2015, AS4773.2:2015.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.

**PART 3.4 FRAMING**

Line number	BCA Clause	Title	Assessment	Recommendation	
48.	Part 3.4.0	Framing	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.  Refer to structural plans listed in Section 4 of this report.	Complies/ Remedial	Refer to structural plans for remedial work.
49.	Part 3.4.1	Subfloor ventilation	N/A - no subfloor.	N/A	N/A
50.	Part 3.4.2	Steel framing	N/A – timber framed.	N/A	N/A





Line number	BCA Clause	Title	Assessment	Recommendation	
51.	Part 3.4.3	Timber Framing	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.  Refer to structural plans listed in Section 4 of this report.	Complies/ Remedial	Refer to structural plans for remedial work.
52.	Part 3.4.4	Structural steel members	Steel beam located to stairs.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-011-V1.

PART 3.5 ROOF AND WALL CLADDING

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.5.1 Sheet roofing					
53.	Part 3.5.1	Sheet roofing	Not applicable, tiled roofs only.	N/A	N/A
54.	3.5.1.1	Acceptable Construction Practice	Not applicable	N/A	N/A
55.	3.5.1.2	Corrosion protection	Not applicable	N/A	N/A
56.	3.5.1.3	Roof pitch	Not applicable	N/A	N/A



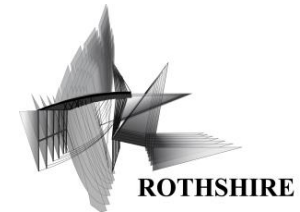
Line number	BCA Clause	Title	Assessment	Recommendation	
57.	3.5.1.4	Maximum spans	Not applicable	N/A	N/A
58.	3.5.1.5	Fixing of metal sheet roofing	Not applicable	N/A	N/A
59.	3.5.1.6	Installation of sheet roofing	Not applicable	N/A	N/A
60.	3.5.1.7	Flashings and cappings	Not applicable	N/A	N/A
61.	3.5.1.8	Water discharge	Not applicable	N/A	N/A
<b>Part 3.5.2 Roof tiles and shingles</b>					
62.	3.5.2.0	Acceptable Construction Manual	N/A	N/A	N/A
63.	3.5.2.1	Acceptable Construction Practice	Refer to assessment below 3.5.2.2-3.5.2.6.	N/A	N/A
64.	3.5.2.2	Fixing of roof tiles and ancillaries	Fixing of concrete roof tiles have not been inspected.	Not inspected	Roof tile fixings to be inspected and certified by a licensed builder.



Line number	BCA Clause	Title	Assessment	Recommendation	
			Tiles are cracked or missing in some areas.	Remedial	Cracked or missing tiles to be replaced.
65.	3.5.2.3	Flashing	Flashing to be provided in accordance with this clause.	Not inspected	Wall, step, ridge, penetration flashings to be inspected and certified by a licensed builder.
66.	3.5.2.4	Sarking	The roof pitch is 20-23 degrees and sarking has been observed on site.	Acceptable	Refer to site photos in <b>Appendix D</b> .
67.	3.5.2.5	Anti-ponding device/board	N/A – Roof pitch is 20-23 degrees and has eaves.	N/A	N/A
68.	3.5.2.6	Water discharge	35mm min. roofing overlap to gutter to be confirmed on site by licensed builder.	Not inspected	To be inspected and certified by a licensed builder.
<b>Part 3.5.3 Gutters and downpipes</b>					
69.	3.5.3.0	Acceptable Construction Manual	Gutter and Downpipe sizing to AS3500.3	Complies	Refer to stormwater plans listed in Section 4 of this report.  Gutters and Downpipes have been assessed against both AS3500.3 and part 3.5.3.
70.	3.5.3.1	Acceptable Construction Practice	Overflow to Part 3.5.3	Complies	Refer to stormwater plans listed in Section 4 of this report.
<b>Acceptable Construction Manual</b>					



Line number	BCA Clause	Title	Assessment	Recommendation	
71.	Section 2	Materials and products	UPVC downpipes and metal gutter	Complies	N/A
72.	Section 3	Roof drainage systems - Design	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
Acceptable Construction Practice					
73.	3.5.3.1	Application	Refer assessment below	Complies	N/A
74.	3.5.3.2	Materials	UPVC downpipes and Metal gutter	Complies	N/A
75.	3.5.3.3	Selection of guttering	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
76.	3.5.3.4	Installation of gutters	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
77.	Table 3.5.3.4a	Acceptable continuous overflow measure	Slot openings can be seen on the gutters to the alfresco and first floor.	Complies	Refer to site photos in <b>Appendix D</b> .
			Overflows are required to be installed to the entry portal.	Remedial	
Part 3.5.4 Timber and composite wall cladding					
78.	3.5.4.0	Acceptable Construction Manual	N/A	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
79.	3.5.4.1	Acceptable Construction Practice	<p>Lightweight cladding is constructed with James Hardie HardieTex Blueboard 7.5mm, complaint with AS 2908.2.</p> <p>Cladding assessment for other cladding types will be based on observations made on site, and where a need for further clarification has been identified.</p> <p>Refer assessment below 3.5.4.3-3.5.4.8.</p>	Complies	Refer to site photos in <b>Appendix D</b> .
80.	3.5.4.2	Timber Wall cladding	N/A – Cladding is not a timber cladding.	N/A	N/A
81.	3.5.4.3	Wall cladding boards	Wall cladding incomplete in various locations including the eastern façade on the first floor	Remedial	To be repaired and completed.
82.	3.5.4.4	Sheet wall cladding	Nail spacing for cladding appears to be suitable. Wall cladding incomplete in various locations.	Complies / remedial	To be inspected and certified by a licensed builder.
83.	3.5.4.5	Eaves and Soffit linings	<p>Eaves are lined with a soffit lining.</p> <p>Some bowing of the eaves has been observed, possibly due to water damage and penetration to the eaves.</p> <p>Storm moulds have not been observed between the soffit and cladding.</p>	<p>Complies</p> <p>Remedial</p> <p>Remedial</p>	<p>Refer to site photos in <b>Appendix D</b>.</p> <p>Soffit to be repaired at the location of the water tank.</p> <p>To be completed after finishing of the cladding.</p>



Line number	BCA Clause	Title	Assessment	Recommendation	
84.	3.5.4.6	Flashings to wall openings	<p>The window head to the first floor are all to the soffit with a storm mould and do not require a flashing in this location. Refer 3.5.4.6 (d).</p> <p>Sill flaps can be seen to the windowsills and in some locations a sill flashing appears to be visible.</p> <p>Windows to be fixed or replaced in some locations, including to the bedroom and walk-in-wardrobe.</p>	Acceptable	Windows to be installed in accordance to AS2047.
				Remedial	
85.	3.5.4.7	Clearance between cladding and ground	N/A - cladding to first floor only.	N/A	N/A
86.	3.5.4.8	Parapet capping	Parapet capping to be undertaken to front wall.	Remedial	Parapet capping to be undertaken to front wall.
87.	Part 3.5.5	Metal wall cladding	N/A - Not used.	N/A	N/A

PART 3.6 GLAZING

Line number	BCA Clause	Title	Assessment	Recommendation	
88.	3.6.0	Acceptable construction manual	N/A	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
89.	3.6.1	Acceptable construction practice	Refer assessment under 3.6.3 and 3.6.4.	N/A	N/A
90.	3.6.2	Glazing sizes and installation	Refer assessment under 3.6.3 and 3.6.4	N/A	N/A
91.	3.6.3	Fully framed glazing installed in perimeter of buildings	With the exception of windows to the dining area, all windows meet the requirements of Table 3.6.2.  Window to the dining area is to be replaced with 2-leaf 10mm toughened or 3-leaf 8mm toughened glazing to meet the requirements of AS 1288:2006.	Complies	Refer to site photos in <b>Appendix D</b> .
<b>3.6.4 Human impact safety requirements</b>					
92.	3.6.4.1	Doors	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix D</b> .
93.	3.6.4.2	Door side panels	N/A	N/A	N/A
94.	3.6.4.3	Full height framed glazed panels	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix D</b> .
95.	3.6.4.4	Glazed panels, other than doors or side panels, on the perimeter of rooms	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix D</b> .



Line number	BCA Clause	Title	Assessment	Recommendation	
96.	3.6.4.5	Bathroom, ensuite and spa room glazing	Grade A toughened glass 5mm.	Complies	Refer to site photos in <b>Appendix D</b> .
97.	3.6.4.6	Visibility of glazing	Banding required on all glazed door panels in compliance with clause 3.6.4.6.	Remedial	Banding to be applied, inspection of compliance required.

### PART 3.7 FIRE SAFETY

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.7.1 Fire properties for materials and construction					
98.	3.7.1.2	Fire hazard properties	Refer assessment below 3.7.2.2-3.7.2.8	N/A	N/A
Part 3.7.2 Fire separation of external walls					
99.	3.7.2.2	External walls of Class 1 buildings	Walls are located less than 900mm from the boundary.  The northern boundary wall is required to be fire rated.	Remedial	Windows to be replaced with non-openable fire proof windows in accordance with clause 3.7.2.4.
100.	3.7.2.4	Construction of external walls	N/A as per 3.7.2.2 and 3.7.2.5	N/A	N/A
101.	3.7.2.5	Class 10a buildings	N/A – no class 10a building.	N/A	N/A





Line number	BCA Clause	Title	Assessment	Recommendation	
102.	3.7.2.6	Open carports	N/A	N/A	N/A
103.	3.7.2.7	Allowable encroachments	Eave is within the 900mm of the boundary on the north and south elevation.	Acceptable	N/A
104.	3.7.2.8	Roof lights	Not used	N/A	N/A
105.	Part 3.7.3	Fire protection of separating walls and floors	N/A	N/A	N/A
106.	Part 3.7.4	Fire separation of garage top dwellings	N/A	N/A	N/A
<b>Part 3.7.5 Smoke alarms and evacuation lighting</b>					
107.	3.7.5.2	Smoke alarm requirements	Smoke alarms required in class 1a buildings. Electrical work is incomplete.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.
108.	3.7.5.3	Location — Class 1a buildings	Smoke alarms to be located between bedrooms and the remainder of the building.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.
109.	3.7.5.5	Installation of smoke alarms	N/A – no smoke alarms installed.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.

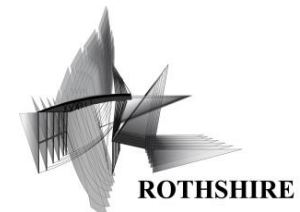
**PART 3.8 HEALTH AND AMENITY**



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.8.1 Wet areas and external waterproofing					
110.	3.8.1.2	Wet Areas	All wet areas completed at time of inspection; floor wastes have been installed in accordance with this clause.	Complies	Refer to Waterproofing Compliance Certificate dated 6 June 2019, see <b>Appendix E</b> .
111.	3.8.1.3	External above ground membranes	All wet areas completed at time of inspection; floor wastes have been installed in accordance with this clause.	Complies	Refer to Waterproofing Compliance Certificate dated 6 June 2019, see <b>Appendix E</b> .
Part 3.8.2 Room heights					
112.	3.8.2.2	Height of rooms and other spaces	Minimum FFL to finished ceiling height identified at time of inspection was greater than 2700mm for ground floor & greater than 2400mm for upper floor, compliant with this clause.  Basement storage minimum FFL to finished ceiling height observed as 2.2m.	Complies	N/A
Part 3.8.3 Facilities					
113.	3.8.3.2	Required facilities	At time of inspection, no facilities were installed due to the stage of construction.	Remedial	Facilities to be completed.
114.	3.8.3.3	Construction of sanitary compartments	Ensuite and bathroom upstairs achieve the required clear space of 1200mm, refer to Figure 3.8.3.3.  Door shown opening in WC downstairs currently shows 1200mm clear space, any future fit out of the bathroom to maintain the 1200mm clear space.	Complies	Refer to existing floor plans, drawing no. BIC-101 & BIC-102.



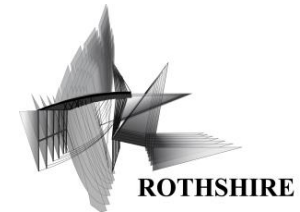
Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.8.4 Light					
115.	3.8.4.2	Natural light	All habitable rooms provided with natural light and achieve 10% of the floor area.	Complies	
116.	3.8.4.3	Artificial lighting	Ensuite has natural light.  Bathroom, laundry and downstairs WC/bathroom have artificial light in accordance with 3.8.4.3.	Complies	
Part 3.8.5 Ventilation					
117.	3.8.5.2	Ventilation requirements	All habitable rooms provided with natural ventilation via openable doors and windows.	Complies	
118.	3.8.5.3	Location of sanitary compartments	N/A - Sanitary compartment does not open on to kitchen or pantry, mechanical ventilation provided.	N/A	N/A
119.	Part 3.8.6	Sound insulation	N/A	N/A	N/A
Part 3.8.7 Condensation management					
120.	3.8.7.2	Pliable building membrane	Drained cavity provided in external walls.  A pliable building membrane (CSR Bradford ResiWrap) to the lightweight cladding was observed on site.	Complies	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
121.	3.8.7.3	Flow rate and discharge of exhaust systems	Exhaust fans >25 L/s for sanitary compartments.  No exhaust system for kitchen areas where kitchen has not yet been installed.	Capable of compliance	N/A
122.	3.8.7.4	Ventilation of roof spaces		Remedial	Roof ventilation to be provided via eave vents.

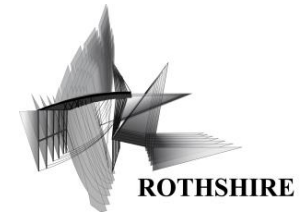
**PART 3.9 SAFE MOVEMENT AND ACCESS**

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.9.1 Stairway and Ramp construction					
123.	3.9.1.2	Stairway construction	Riser height is within the min and max of Table 3.9.1.1.	Acceptable	N/A
124.	3.9.1.3	Ramps	N/A	N/A	N/A
125.	3.9.1.4	Slip-resistance	Stairs are unfinished concrete (non-slip).	Acceptable	N/A
126.	3.9.1.5	Landings	Landing at top and bottom of stairs.	Acceptable	N/A
127.	3.9.1.6	Thresholds	Threshold is less than 230mm to the entrance.	Acceptable	N/A
Part 3.9.2 Barriers and handrails					



Line number	BCA Clause	Title	Assessment	Recommendation	
128.	3.9.2.2	Barriers to prevent falls	Refer to 3.9.2.3, 3.9.2.6	Remedial	Handrails to be constructed.
129.	3.9.2.3	Construction of barriers to prevent falls	Temporary barriers are provided to the landing.  The barrier appears to be proprietary balustrade product and top fixed to the floor structure.	Remedial	Refer to site photos in <b>Appendix D</b> .
130.	3.9.2.4	Handrails	Handrails to be installed	Remedial	Handrails to be installed
131.	3.9.2.5	Construction of wire barriers	N/A	N/A	N/A
132.	3.9.2.6	Protection of openable windows — bedrooms	All windows to be fitted with opening protection.	Remedial	All windows to be fitted with opening protection.
133.	3.9.2.7	Protection of openable windows — rooms other than bedrooms	All windows to be fitted with opening protection.	Remedial	All windows to be fitted with opening protection.

### PART 3.10 ANCILLARY PROVISIONS AND ADDITIONAL CONSTRUCTION REQUIREMENTS



Line number	BCA Clause	Title	Assessment	Recommendation	
134.	Part 3.10.1	Swimming Pools	Site has outdoor swimming pool.  Water depth and reticulation system not assessable during site visit.	Remedial	Swimming pool construction to be completed in accordance with this clause.
135.	Part 3.10.1.0	Swimming Pools	No safety barrier constructed around swimming pool.	Remedial	Safety barriers to be constructed in accordance with AS 1926.1 & AS 1926.2.
136.	Part 3.10.2	Earthquake areas	N/A – not in earthquake area	N/A	N/A
137.	Part 3.10.3	Flood hazard areas	N/A – not in flood area	N/A	N/A
138.	Part 3.10.4	Construction in alpine areas	N/A – not located in alpine area	N/A	N/A
<b>Part 3.10.5 Construction in bushfire prone areas</b>					
139.	Part 3.10.5.0	Application	Not in a bushfire area.	N/A	N/A
140.	Part 3.10.6	Attachment of decks and balconies to external walls of buildings	N/A	N/A	N/A
141.	Part 3.10.7	Boilers, pressure vessels, heating	N/A	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
		appliances, fireplaces, chimneys and flues			

PART 3.12 ENERGY EFFICIENCY

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.12 Energy Efficiency					
142.	3.12.0.1	Heating and cooling loads	BASIX prepared and existing structure determined suitable.	Remedial	Refer BASIX Certificate number: 1334736S_02
Part 3.12.1 Building fabric					
143.	3.12.1.1	Building fabric thermal insulation	Insulation that was inspected was compliant with 3.12.1.1.	Acceptable	Note that insulation incomplete in some locations where wall cladding incomplete.
144.	3.12.1.2	Roofs	BASIX prepared; current insulation determined insufficient.	Remedial	Insulation to be installed in compliance with BASIX Certificate
145.	3.12.1.3	Roof lights	N/A – no roof lights	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
146.	3.12.1.4	External walls	BASIX prepared; current insulation determined insufficient for ground floor walls, additional Rw 0.5 required.	Remedial	Insulation to be installed in compliance with BASIX Certificate, internal wall linings to be provided, similar to Kingspan Kooltherm.
147.	3.12.1.5	Floors	Not used, concrete slab	N/A	N/A
<b>Part 3.12.2 External glazing</b>					
148.	3.12.2	External glazing	The national BCA Part 3.12.2 does not apply in NSW as the subject matter is dealt with by BASIX.	Acceptable	Refer BASIX Certificate number: 1334736S_02
<b>Part 3.12.3 Building sealing</b>					
149.	3.12.3.1	Chimneys and flues	N/A	N/A	N/A
150.	3.12.3.2	Roof lights	N/A	N/A	N/A
151.	3.12.3.3	External windows and doors	Sealing visible at time of inspection.	Acceptable	N/A
152.	3.12.3.4	Exhaust fans	Sealing visible at time of inspection.	Acceptable	N/A
153.	3.12.3.5	Construction of ceilings, walls and floors	Sealing visible at time of inspection, with exception to parts of the building which remain incomplete.	Remedial	Complete works to all external walls.
154.	NSW 3.12.3.1	Compliance with BCA provisions	The sealing of a building must comply with the national BCA provisions 3.12.3.1 to 3.12.3.6.	Refer assessment	





Line number	BCA Clause	Title	Assessment	Recommendation	
<b>Part 3.12.4 Air movement</b>					
155.	3.12.4	Air movement	Ventilation available to all habitable spaces in accordance with Table 3.12.4.1.	Acceptable	
<b>NSW 3.12.5 Application of NSW Part 3.12.5</b>					
156.	3.12.5.0	Acceptable Construction Manual	BCA volume three.	Not inspected	Refer to assessment below.
157.	3.12.5.1	Insulation of services	Heated water systems to be insulated in accordance with this clause, visually inspected.	Not yet constructed	Works to be completed.
158.	3.12.5.2	Central heating water piping	Not used	Not inspected	N/A
159.	3.12.5.3a	Heating and cooling ductwork	Ductwork sealed and insulated in accordance with this clause, visually inspected.	Not inspected	Mechanical contractor to inspect and provide certification of compliance of ductwork sealing and insulation to be carried out concurrently with remedial works.





## 7. CONCLUSION

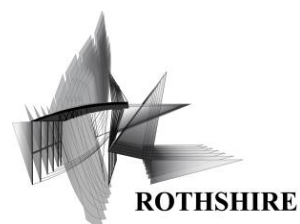
The primary purpose of this report is to identify review to building compliance in comparison to the current Deemed-to-Satisfy provisions of the BCA Amdt 1 Volume Two 2019.

Where a non-compliance has been identified performance requirements for rectification work has been proposed to achieve compliance to the BCA 2019 Amdt 1 in **Section 8** below.

## 8. REMEDIAL WORKS SUMMARY

Additional building works are required to bring the building up to compliance with the BCA 2019 Amdt 1 Volume Two, the works are summarised below.

1. Drainage from the first-floor roof to the ground floor non-trafficable area is to be redirected due to breaches of the waterproofing and internal damage. Completion of internal linings and flashing to roof & roof-to-wall junction to be undertaken.
2. Windows to some locations, including to the bedroom and walk-in-wardrobe, must be replaced and installed in accordance with AS2047. The flashings of the bedroom windows must be replaced or repaired.
3. Weepholes in some areas are to be exposed through the render.
4. Cracked or missing roof tiles are to be replaced and fixed in accordance with BCA Clause 3.5.2.2.
5. Overflow slots will be provided to the entry portal in accordance with BCA Table 3.5.3.4a and AS3500.3.
6. Remediation is to be undertaken to correct bowing of the eaves and soffit linings.
7. Visible banding will be installed to all glazed door panels in accordance with BCA Clause 3.6.4.6.
8. All windows and doors to the southern boundary wall will be removed and replaced with non-openable fire-proof windows in accordance with AS2047 and BCA Clause 3.7.2.4.
9. Smoke alarms are to be installed in the upstairs corridor between bedrooms in accordance with BCA Clause 3.7.5.2, 3.7.5.3 & 3.7.5.5. Electrical wiring for the smoke alarm on the ground floor is to be completed.
10. All required facilities are to be provided in accordance with BCA Clause 3.8.3.2.
11. Handrail is to be added to the stairs, compliant to BCA Clause 3.9.2.4.
12. All windows to bedrooms and non-bedroom areas are required to be fitted with opening protection in accordance with BCA Clause 3.9.2.6 & 3.9.2.7.
13. A safety barrier will be constructed around the swimming pool in accordance with AS1926.1 & AS1926.2.
14. Installation of insulation to the ground floor external walls compliant to the BASIX Certificate reference 1334736S\_02, internal linings to be provided to achieve Rw 0.5.
15. Installation of additional insulation to the ceiling and roof compliant to the BASIX Certificate reference 1334736S\_02.



- 
16. Structural works to be undertaken in accordance with the structural plans referenced in Section 4 of this report.



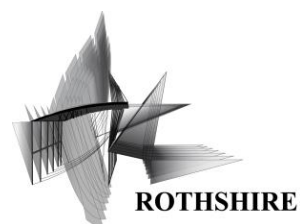
## LIMITATIONS

The explicit purpose of this report and the associated services undertaken by Rothshire Services Pty Ltd is to provide an assessment in accordance with the scope of services set out in the agreement between Rothshire Services Pty Ltd & the property owners ('the client'). The scope of services was defined by the client or their representative and in lieu of existing physical documentation.

Rothshire Services Pty Ltd concluded on information represented in this assessment from visual inspections and a survey of existing physical conditions. The passage of time, manifestation of latent conditions or impact of future events may require exploration in-situ, subsequent data analysis, and re-evaluation of the findings, observations and conclusions either implied or expressed in this assessment.

In preparing this assessment, Rothshire Services Pty Ltd has relied upon presumed accuracy of certain information (or absence thereof) relative to 1176 Forest Road, Lugarno NSW 2210, provided by the client, architect, Council, geotechnical engineer, surveyor, diagnostic technician and other identified herein. Except as otherwise stated in this assessment, Rothshire Services Pty Ltd has not attempted to verify the accuracy or completeness of any such information.

The findings, observations, examinations and conclusion expressed or implied by Rothshire Services Pty Ltd in this assessment are not, and should not be considered, an assessment concerning the physical condition or the proposed treatment of the existing conditions. No warranty or guarantee, whether expressed or implied, is made with respect to the data reported or to the findings, observations, and conclusions are based solely upon information in existence at the time of examination.



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## APPENDIX A – ARCHITECTURAL PLANS

BUILDING REMEDIATION PLANS

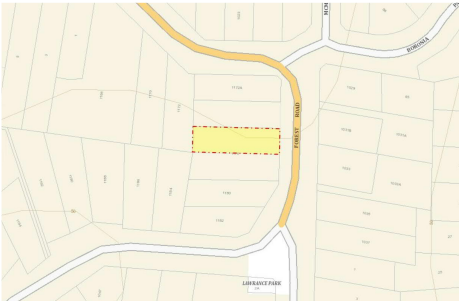
LOT 2 DP 18873  
NO.1176 FOREST ROAD LUGARNO NSW 2210

ARCHITECTURAL PACKAGE

AERIAL IMAGE



LOCATION PLAN



ARCHITECTURAL DRAWING LIST

SHEET No.	SHEET NAME	SCALE	DATE	REV
PL-2-000	COVER SHEET	N/A	24.11.2022	1
PL-2-050	SITE PLAN	1:200	24.11.2022	1
PL-2-100	BASEMENT PLAN	1:100	24.11.2022	1
PL-2-101	GROUND FLOOR PLAN	1:100	24.11.2022	1
PL-2-103	FIRST FLOOR PLAN	1:100	24.11.2022	1
PL-2-201	EAST & WEST ELEVATION PLAN	1:100	24.11.2022	1
PL-2-202	NORTH ELEVATION PLAN	1:100	24.11.2022	1
PL-2-203	SOUTH ELEVATION PLAN	1:100	24.11.2022	1
PL-2-205	LONG SECTION PLAN	1:100	24.11.2022	1
PL-2-206	CROSS SECTION PLAN	1:100	24.11.2022	1

GENERAL NOTES

PRIOR TO COMMENCEMENT

1. ALL DIMENSIONS AND FLOOR AREAS TO BE VERIFIED PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
2. ANY DISCREPANCIES ARE TO BE CONFIRMED BY THE DESIGNER.
3. LEVELS SHOWN ARE APPROXIMATE UNLESS ACCOMPANIED BY REDUCED LEVELS BY A REGISTERED SURVEYOR.
4. FIGURED DIMENSIONS ARE TO BE TAKEN IN PREFERENCE TO SCALING.
5. ALL BOUNDARY CLEARANCES MUST BE VERIFIED BY THE SURVEYOR PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
6. THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS DRAWINGS & SPECIFICATIONS INCLUDING STRUCTURAL, MECHANICAL & HYDRAULICS.
7. WHERE ENGINEERING OR HYDRAULIC DRAWINGS ARE REQUIRED, SUCH DRAWINGS MUST TAKE PREFERENCE TO THESE DRAWINGS.
8. FAILURE TO COMPLY WITH DRAWINGS & SPECIFICATIONS COULD RESULT IN ALTERATIONS BEING MADE AT THE COST TO THE CONTRACTOR.
9. ALL SERVICES AND UTILITIES TO BE LOCATED AND VERIFIED BY THE CONTRACTOR WITH THE RELEVANT AUTHORITIES PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORKS.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM ALL SITE CONDITIONS & REQUIREMENTS.

DEMOLITION & SITE PREPARATION

11. BEFORE COMMENCEMENT OF DEMOLITION WORKS THE CONTRACTOR MUST CONTACT THE CONSULTANT ENGINEER TO ESTABLISH WHICH WALLS ETC ARE ABLE TO BE SAFELY REMOVED.
12. ALL DEMOLITION WORK TO BE CARRIED OUT IN ACCORDANCE WITH AS2601.
13. REMOVAL OF ASBESTOS CEMENT SHEETING MUST BE CARRIED OUT BY A LICENSED CONTRACTOR IN COMPLIANCE WITH THE REQUIREMENTS OF THE NSW WORKCOVER AUTHORITY IN RELATION TO THE REMOVAL, HANDLING AND DISPOSAL OF ALL MATERIAL CONTAINING ASBESTOS, AND THE WORKSAFE AUSTRALIA ASBESTOS CODE OF PRACTICE & GUIDANCE NOTES.
14. PROTECTIVE MEASURES ARE REQUIRED FOR EACH TREE BEING RETAINED ON SITE AND SHALL BE ESTABLISHED BEFORE ANY BUILDING WORKS COMMENCE AND SHALL BE CONSTRUCTED AND MAINTAINED AS PER COUNCILS REQUIREMENTS.
15. SILT/SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO ANY EXCAVATION OR CONSTRUCTION WORK.

AUSTRALIAN STANDARDS COMPLIANCE

THE BUILDING WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH, BUT NOT LIMITED TO, THE FOLLOWING AUSTRALIAN STANDARDS:  
AS/NZS 1664 ALUMINIUM STRUCTURES  
AS/NZS 1905 COMPONENTS FOR THE PROTECTION OF OPENINGS IN FIRE RESISTANT WALLS  
AS 2050 INSTALLATION OF ROOF TILES  
AS 2047 WINDOWS IN BUILDINGS SELECTION & INSTALLATION  
AS 2327 COMPOSITE STRUCTURES  
AS 2870 RESIDENTIAL SLABS AND FOOTING CONSTRUCTION  
AS 1684 RESIDENTIAL TIMBER FRAMED CONSTRUCTION  
AS 3700 MASONRY STRUCTURES  
AS 3013 ELECTRICAL INSTALLATIONS  
AS 1668 THE USE OF MECHANICAL VENTILATION & AIR-CONDITIONING IN BUILDINGS  
AS 2441 INSTALLATION OF HOSE REELS  
AS 3786 SMOKE ALARMS  
AS 1288 GLASS IN BUILDINGS - SELECTION & INSTALLATION  
AS 2107 ACOUSTICS - RECOMMENDED DESIGN SOUND LEVELS & REVERBERATION TIMES FOR BUILDING INTERIORS  
AS 3660.1 TERMITE MANAGEMENT - NEW BUILDING WORK  
AS/NZS 2890.1 OFF-STREET PARKING  
AS 3740 WATERPROOFING OF DOMESTIC WET AREAS

LOT 2 DP 18873  
NO.1176 Forest Rd Lugarno NSW  
2210

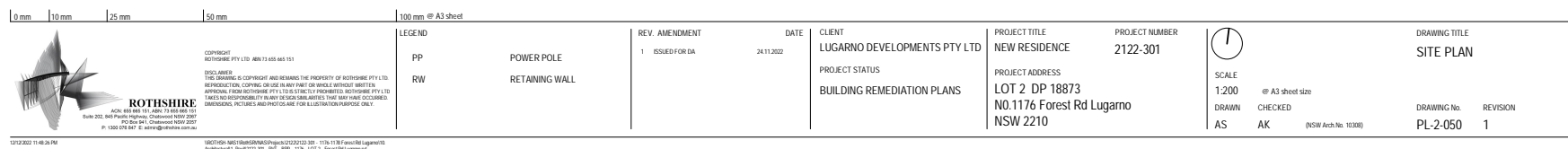
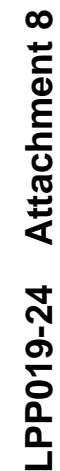
CLIENT	LUGARNO DEVELOPMENTS PTY LTD
PROJECT STATUS	BUILDING REMEDIATION PLANS
PROJECT TITLE	NEW RESIDENCE
REVISION	1
PROJECT No.	2122-301

PROJECT CONSULTANTS

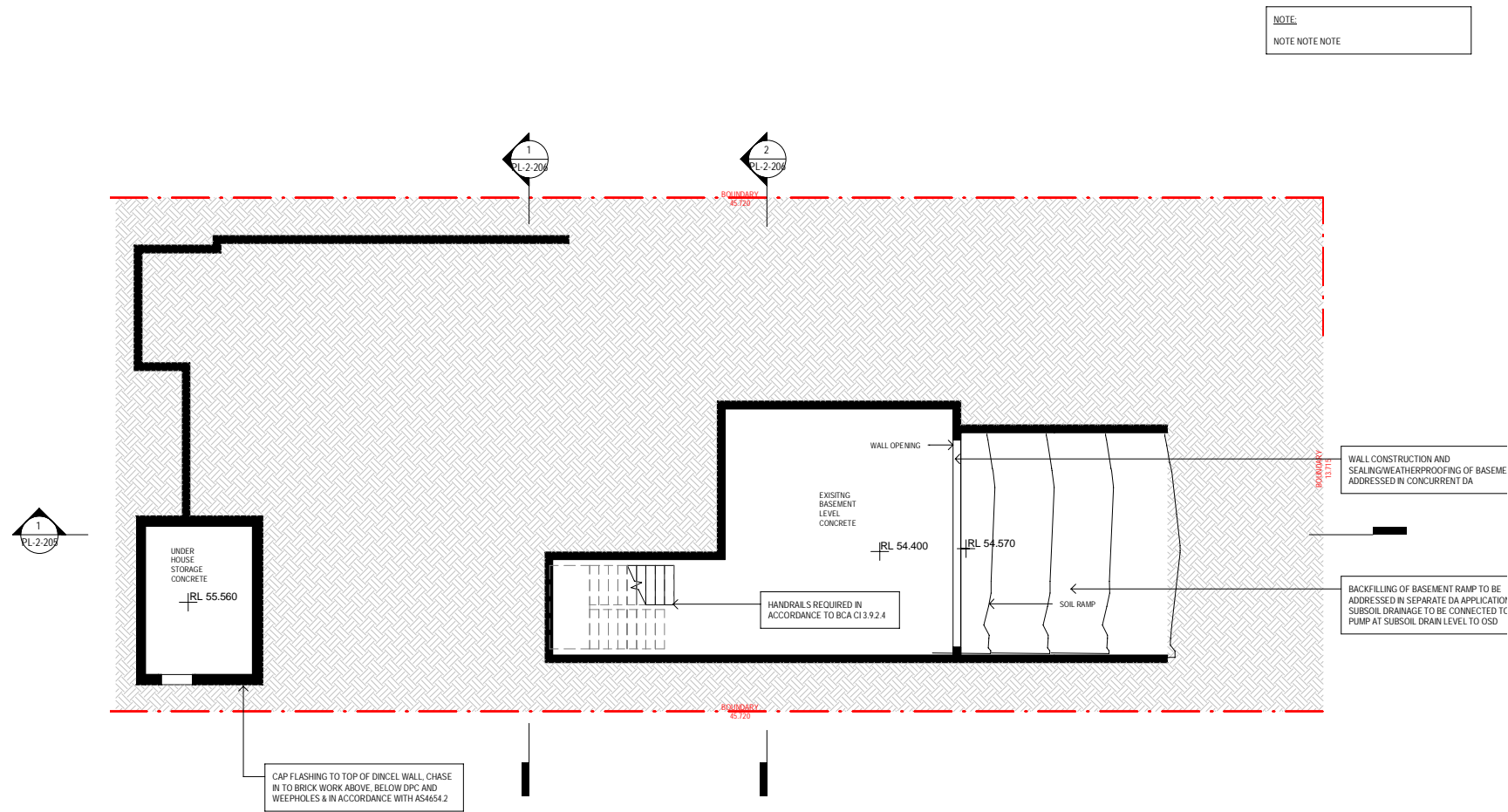
ARCHITECTURE & DESIGN	
Alana Kowalczyk (NSW Arch No. 10308)	Rothshire
STORMWATER ENGINEERS	
Alexander Kameas	Rothshire
STRUCTURAL ENGINEERS	
Alexander Kameas	Rothshire
SURVEYING	
Peter Nancarrow	Summit Geomatics
TOWN PLANNING	
Jonathan Archibald	Rothshire

REV	AMENDMENT	DATE
1	ISSUED FOR DA	24.11.2022



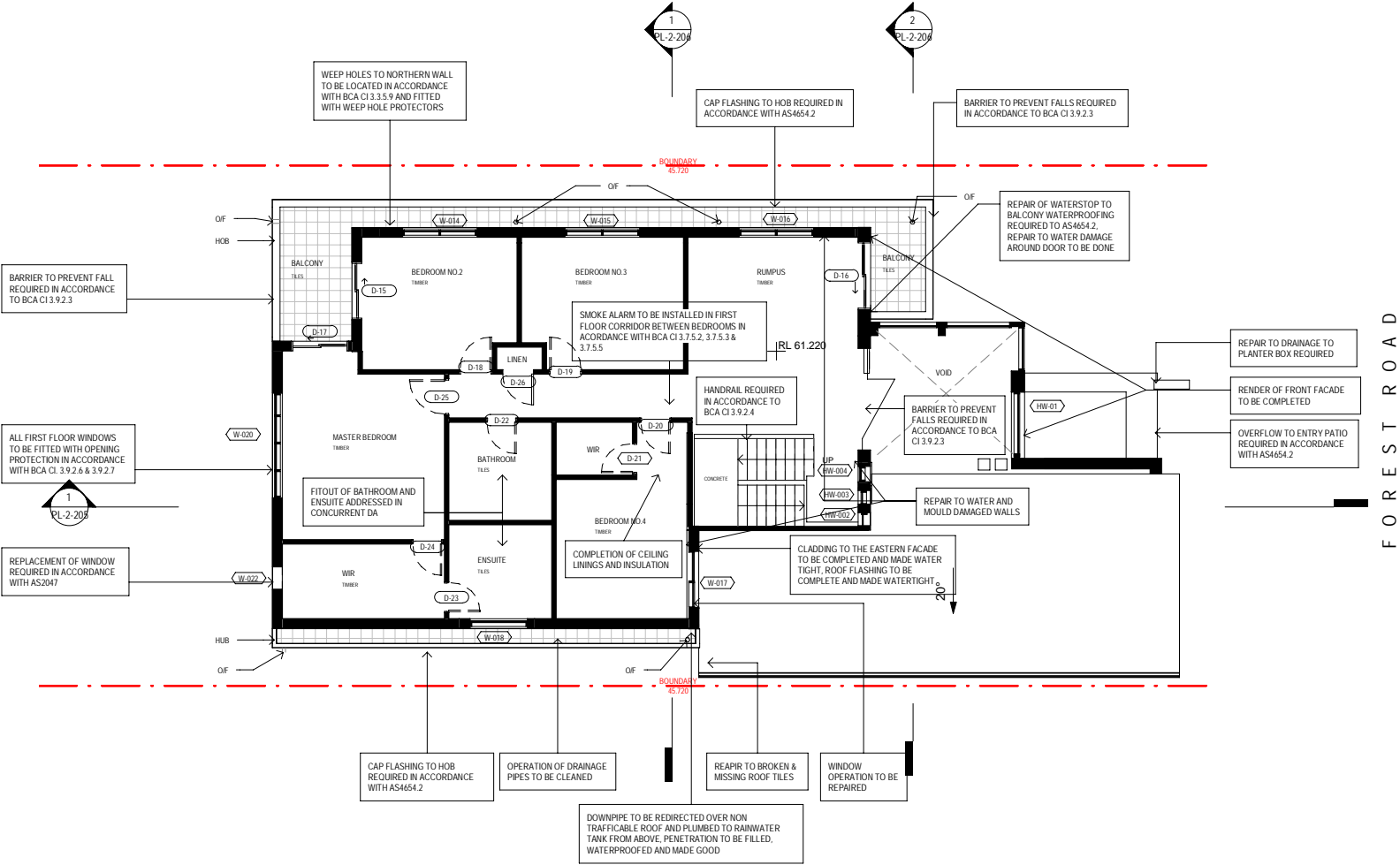




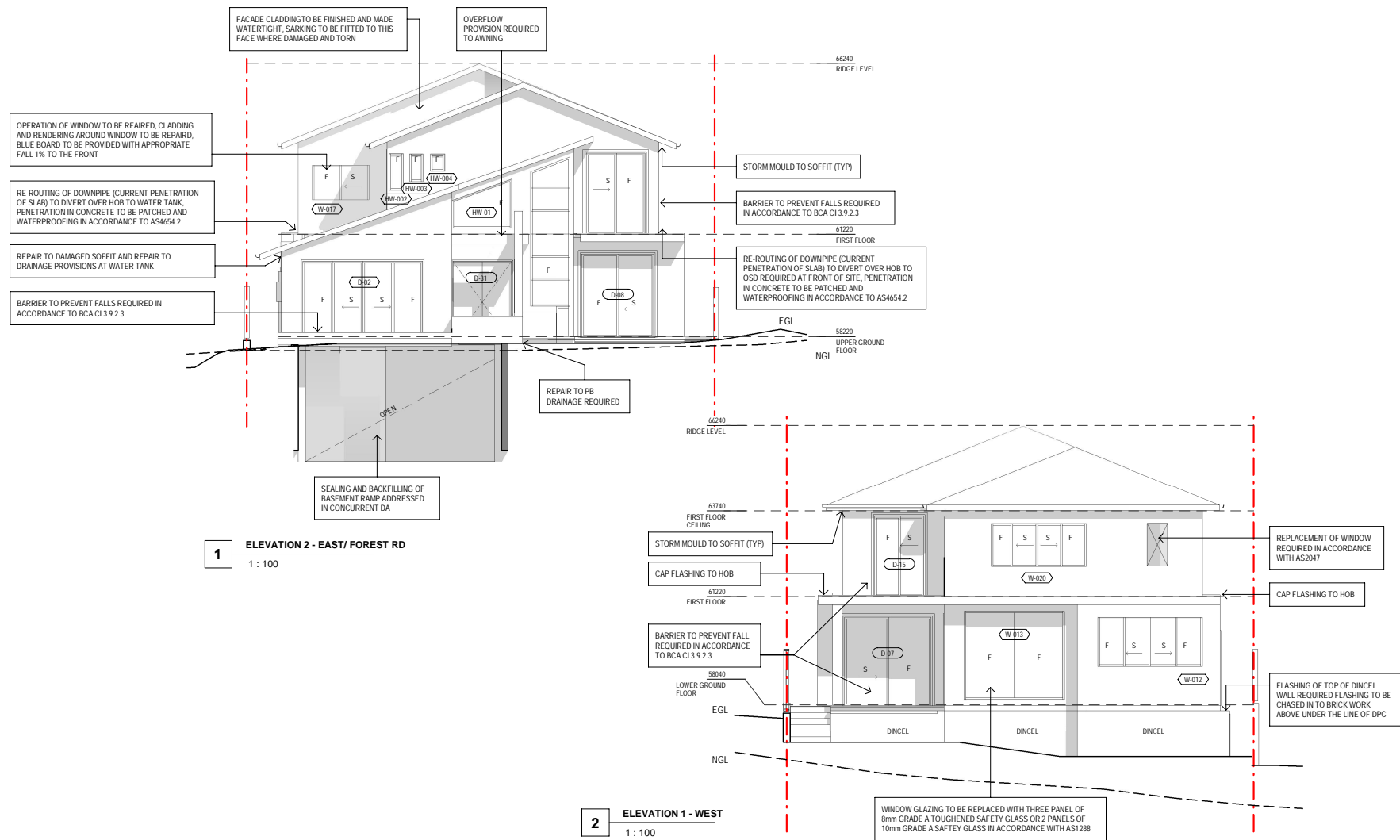





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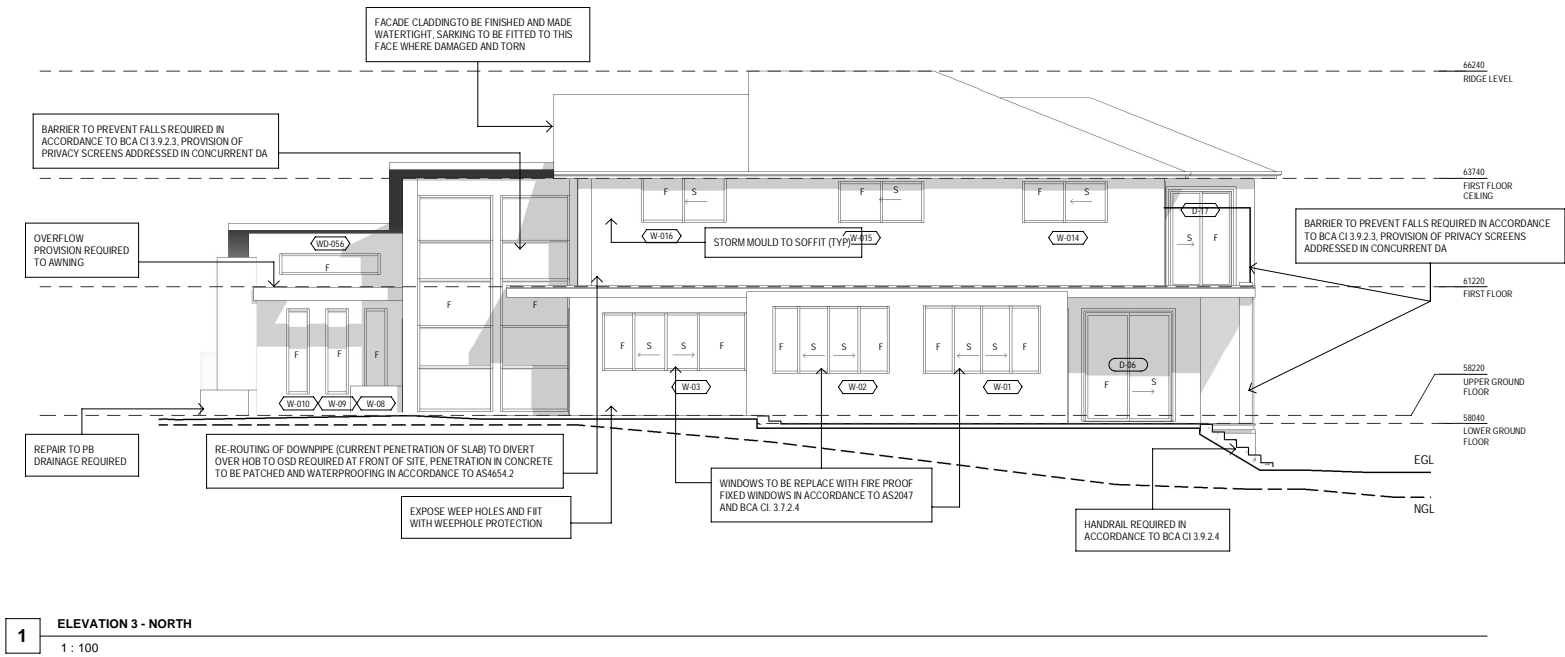


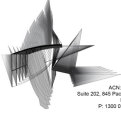


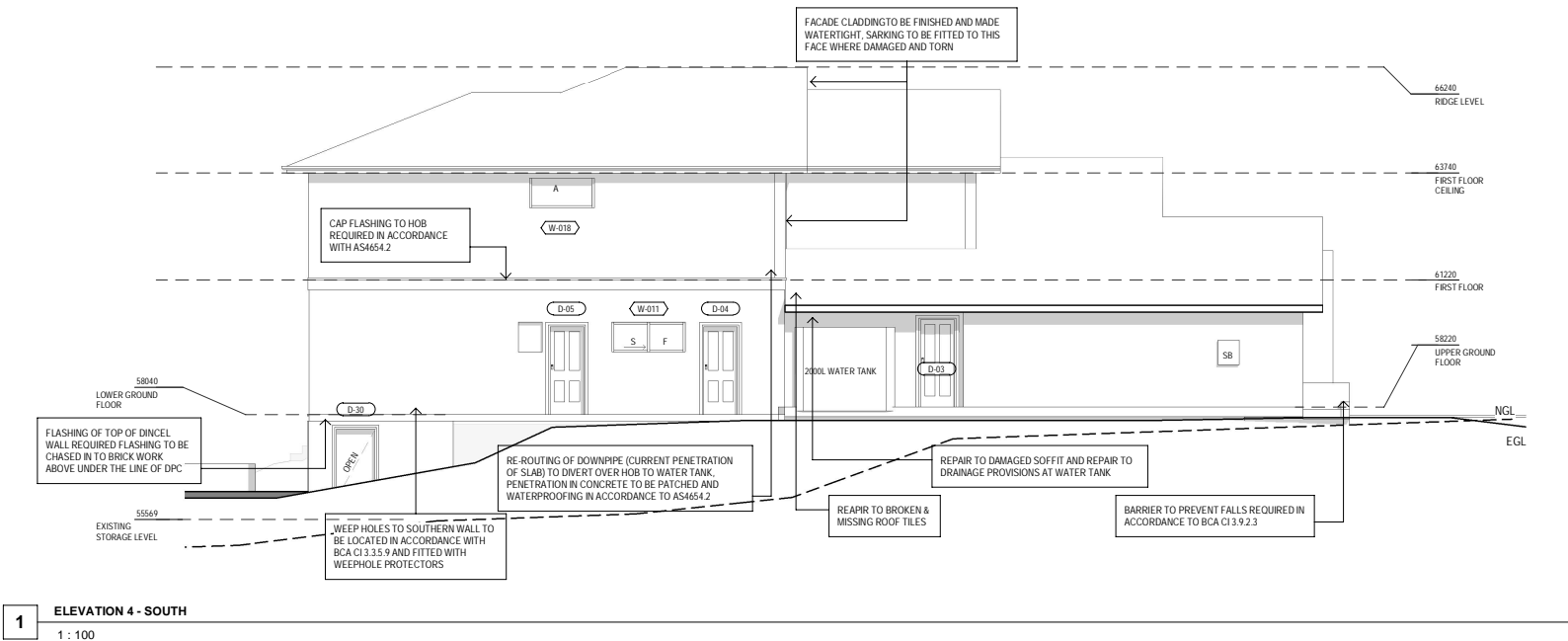
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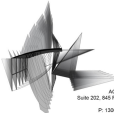



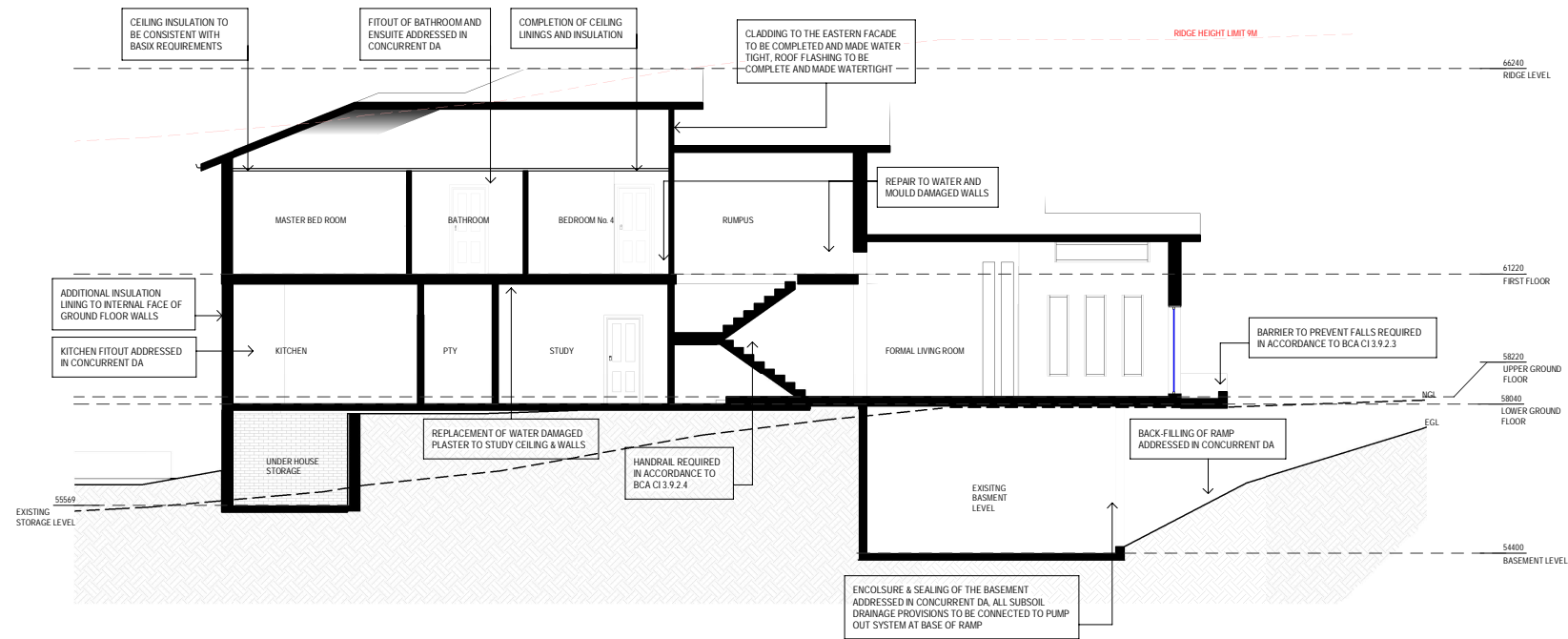
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DISCLAIMER THE DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY OF ROTHSHIRE PTY LTD. REPRODUCING, COPYING OR USE IN ANY PRINT OR DIGITAL MEDIUM WITHOUT THE APPROVAL FROM ROTHSHIRE PTY LTD IS STRICTLY PROHIBITED. ROTHSHIRE PTY LTD TAKES NO RESPONSIBILITY IF ANY DESIGN ELEMENTS THAT MAY HAVE OCCURRED UNWITTINGLY, INACCURATELY AND/OR INADEQUATE FOR THE INTENTIONED PURPOSE ONLY.		NGL NATURAL GROUND LEVEL				BUILDING REMEDIATION PLANS		LOT 2 DP 18873 NO.1176 Forest Rd Lugarno NSW 2210		1:100 @ A3 sheet size		PL-2-201 1	
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13/12/2023 11:46:41 AM		NOTES: THIS DRAWING IS THE PROPERTY OF ROTHSHIRE PTY LTD. IT IS TO BE USED FOR THE PURPOSES OF THE PROJECT ONLY. ANY REUSE OR MODIFICATION OF THIS DRAWING WITHOUT THE WRITTEN PERMISSION OF ROTHSHIRE PTY LTD IS STRICTLY PROHIBITED. ROTHSHIRE PTY LTD TAKES NO RESPONSIBILITY FOR ANY DESIGN ELEMENTS THAT MAY HAVE OCCURRED UNWITTINGLY, INACCURATELY AND/OR INADEQUATE FOR THE INTENTIONED PURPOSE ONLY.											



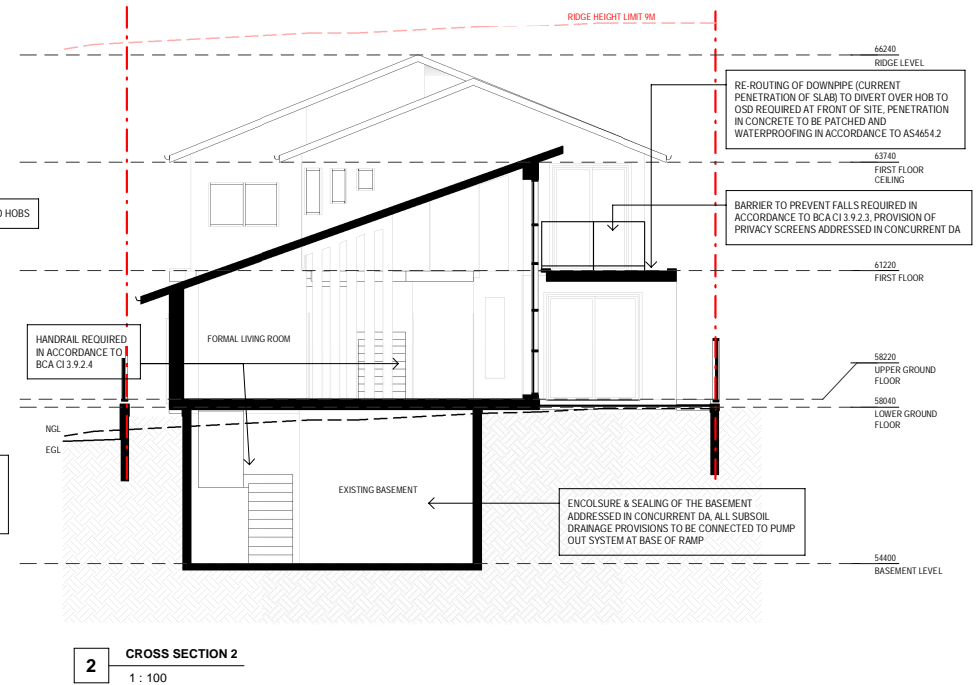
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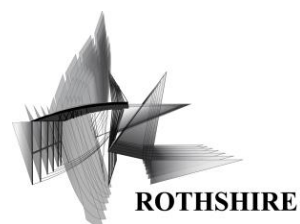
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LEGEND		PROJECT STATUS			BUILDING REMEDIATION PLANS			DRAWING No. REVISION	
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NGL NATURAL GROUND LEVEL		NO. 1176 Forest Rd Lugarno			NSW 2210				
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		(NSW Arch No. 10388)							







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## APPENDIX B – SITE CLASSIFICATION REPORT



GCA Report No.

G18206-1

Date:

19<sup>th</sup> December 2018

**Geotechnical Inspection Letter at:**

Nos. 1174-1178 Forest Road Lugarno NSW 2210

**Prepared for:**

Astor Homes

Kirill Charonov

kirill@astorhomes.com.au

**Attachment 1: Important Information About Your Geotechnical Report**

**1. INTRODUCTION**

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Mr. Kirill Charonov of Astor Homes to carry out an inspection on the stagnant water currently present within the existing basement levels of the residential dwellings at the properties nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site). The site inspection was carried out on the 27<sup>th</sup> November 2018, for the purpose of providing geotechnical advice of any potential issues which may have been caused to the structural adequacy of existing dwellings foundations due to the presence of stagnant water.

This inspection letter presents the results of our observations, along with our assessment and any recommendations which may be necessary.

For your review, **Attachment 1** contains a document prepared by GCA entitled "Important Information About Your Geotechnical Report", which summarises the general limitations, responsibilities, and use of geotechnical reports.

**2. PROVIDED INFORMATION**

The following relevant information was provided to GCA prior to the site investigation:

- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 2", referenced project No. 1718, and included drawing nos. BC005, BC100, BC101, and BC200 to BC203 inclusive.
- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 2", referenced project No. 1718, and included drawing nos. BC005, BC100, BC101, and BC200 to BC203 inclusive.
- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 3", referenced project No. 1718, and included drawing nos. BC005, BC100 to BC102 inclusive, and BC200 to BC203 inclusive.
- Site survey plan prepared by Total Surveying Solutions, titled "Plan Showing Detail & Levels Over Lots 2 & 3 in DP11873 & Lot A in DP328702", referenced job No. 170832, plan No. 170832\_A, and dated 12<sup>th</sup> September 2017.

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### 3. REGIONAL GEOLOGY

Information obtained on the local regional subsurface conditions, referenced from the Department of Mineral Resources, Sydney 1:100,000 Geological Series Sheet 9130 First Edition, dated 1983, by the Geological Survey of New South Wales, indicates the site is located within an area underlain by Triassic Aged Hawkesbury Sandstone (Rh). The Hawkesbury Sandstone typically comprises "medium to coarse grained quartz sandstone, very minor shale and laminite lenses".

### 4. SITE INSPECTION

During the site inspection, stagnant water was observed within the basement levels of the properties within the site. Groundwater which was present within the basement levels is expected to be associated within surface runoff within the site, and incomplete drainage control measures within the basement levels of each property.

Observations made on the existing foundations within the basement levels indicated the presence of sandstone bedrock underlying the basement walls (where observable and accessible). Information provided by the client also indicates the foundations of the proposed development construction of each dwelling within the site were founded onto the underlying sandstone bedrock throughout. The conditions of the existing dwellings were also visually assessed to be of generally good condition, with no obvious signs of cracking or structural distress.

It is noted that sandstone outcrops were also observed in areas of the site, and within the region surrounding the site, as outlined in Section 3 above.

No groundwater seepage was observed through the basement walls of each dwelling, within the underlying exposed sandstone bedrock or throughout the site.

### 5. PRELIMINARY SITE LOT CLASSIFICATION

AS 2870-2011 indicates the site may be classified as a "Class A" site, for design and construction of the foundation system founded below any topsoil, slopewash, fill or other deleterious material, being on the inferred sandstone bedrock underlying the proposed development area of each dwelling within the site.

Classification by characteristic surface movement ( $Y_s$ ) as outlined in Table 2.3 of AS 2870-2011 is presented in Table 1 below.

**Table 1. Classification by Characteristic Surface Movement ( $Y_s$ ) AS 2870-2011**

Characteristic Surface Movement ( $Y_s$ ) mm	Site Classification in Accordance with Table 2.1
Most sand and rock sites with little or no ground movement from moisture changes	A
$0 < Y_s \leq 20$	S
$20 < Y_s \leq 40$	M
$40 < Y_s \leq 60$	H1
$60 < Y_s \leq 75$	H2
$Y_s > 75$	E

Reactive sites are sites which consist of clayey soils that are prone to swell on wetting and shrink on drying, which results in ground movements that can damage to structures. The amount of ground movement is related to the physical properties of the clay and environmental factors such as climate, vegetation and watering. A higher probability of

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damage can occur on reactive sites where abnormal moisture conditions occur, as defined in AS 2870-2011, due to factors such as:

- Failure to provide adequate site drainage or lack of maintenance of site drainage.

## 6. GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

Based on our observations during our site inspection, along with the subsurface conditions within the site (where observable and accessible) and information provided by the client on the construction of the dwellings within the site, it is assessed that the stagnant water currently present within the basement levels of the properties within the site should not compromise the structural adequacy of the foundations for the dwellings.

AS2870-2011 further indicates that foundations sufficiently constructed on consistent and competent rock throughout are expected to have little or no ground movement from moisture changes. Thus, as discussed in Section 5 above, we do not expect the site to be affected by reactive clayey soils prone to swell on wetting and shrink on drying, which results in ground movements that may damage to structures.

Surface drainage within the area should be maintained to avoid flooding of the site and saturation of the foundation materials during footing construction. Stagnant water currently present within the basement levels should be removed, and appropriate drainage be implemented for each dwelling to help minimise and avoid any further water runoff into the basement levels.

It should also be noted that ground conditions within the site are expected to differ from those encountered and inferred in this letter report, since no geotechnical or geological exploration programme, no matter how comprehensive, can reveal and identify all subsurface conditions underlying the site.

## 7. LIMITATIONS

Geotechnical Consultants Australia Pty Ltd (GCA) has based its geotechnical assessment on available information obtained prior and during the site inspection/investigation. The geotechnical assessment and recommendations provided in this report, along with the surface, subsurface and geotechnical conditions are limited to the inspection and test areas during the site inspection/investigation, and then only to the depths investigated at the time the work was carried out. Subsurface conditions can change abruptly, and may occur after GCA's field testing has been completed.

It is recommended that if for any reason, the site surface, subsurface and geotechnical conditions (including groundwater conditions) encountered during the site inspection/investigation vary substantially during construction, and from GCA's recommendations and conclusions, GCA should be contacted immediately for further testing and advice. This may be carried out as necessary, and a review of recommendations and conclusions may be provided at additional fees. GCA's advice and accuracy may be limited by undetected variations in ground conditions between sampling locations.

GCA does not accept any liability for any varying site conditions which have not been observed, and were out of the inspection or test areas, or accessible during the time of the investigation. This report and any associated information and documentations have been prepared solely for **Astor Homes**, and any misinterpretations or reliances by third parties of this report shall be at their own risk. Any legal or other liabilities resulting from the use of this report by other parties can not be religated to GCA.

Geotechnical Inspection Letter  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



This report should be read in full, including all conclusions and recommendations.  
Consultation should be made to GCA for any misunderstandings or misinterpretations of this report.

For and behalf of

**Geotechnical Consultants Australia Pty Ltd (GCA)**

A handwritten signature in black ink, appearing to read 'Joe Nader', is written over a light blue horizontal line.

Joe Nader  
BE (Civil – Construction), Dip.Eng.Prac., MIEAust., AGS, ISSMGE  
Cert. IV in Building and Construction  
Geotechnical Engineer  
Director

Geotechnical Inspection Letter  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



## 8. REFERENCES

Pells P.J.N, Mostyn, G. & Walker B.F., "Foundations on Sandstone and Shale in the Sydney Region", Australian Geomechanics Journal, 1998.

AS 1726-2017 Geotechnical Site Investigation. Standards Australia.

AS 2870-2011 Residential slabs and footings. Standards Australia.

NSW Department of Mineral Resources (1983) Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1) Geological Survey of New South Wales. Department of Mineral Resources.

NSW Planning Portal.

NSW Six Maps.



## Important Information About Your Geotechnical Report

This geotechnical report has been prepared based on the scopes outlined in the project proposal. The works carried out by Geotechnical Consultants Australia Pty Ltd (GCA), have limitations during the site investigation, and may be affected by a number of factors. Please read the geotechnical investigation report in conjunction with this "Important Information About Your Geotechnical Report".

### Geotechnical Services Are Performed for Specific Projects, Clients and Purposes.

Due to the fact that each geotechnical investigation is unique and varies from sites, each geotechnical report is unique, and is prepared solely for the client. A geotechnical report may satisfy the needs of structural engineer, where it will not for a civil engineer or construction contractor. No one except the client should rely on the geotechnical report without first conferring with the specific geotechnical consultant who prepared the report. The report is prepared for the contemplated project or original purpose of the investigation. No one should apply this report to any other or similar project.

### Reading The Full Report.

Do not read selected elements of the report or tables/figures only. Serious problems have occurred because those relying on the specially prepared geotechnical investigation report did not read it all in full context.

### The Geotechnical Report is Based on a Unique Set of Project And Specific Factors.

When preparing a geotechnical report, the geotechnical engineering consultant considers a number of unique factors for the specific project. These typically include:

- Clients objectives, goals and risk management preferences;
- The general proposed development or nature of the structure involved (size, location, etc.); and
- Future planned or existing site improvements (parking lots, roads, underground services, etc.);

Care should be taken into identifying the reason of the geotechnical report, where you should not rely on a geotechnical engineering report that was:

- Not prepared for your project;
- Not prepared for the specific site;
- Not prepared for you;
- Does not take into consideration any important changes made to the project; or
- Was carried out prior to any new infrastructure on your subject site.

Typical changes that can affect the reliability if an existing geotechnical investigation report include those that affect:

- The function of the proposed structure, where it may change from one basement level to two basement levels, or from a light structure to a heavy loaded structure;
- Location, size, elevation or configuration of the proposed development;
- Changes in the structural design occur; or
- The owner of the proposed development/project has changed.

The geotechnical engineer of the project should always be notified of any changes – even minor – and be asked to evaluate if this has any impact. GCA does not accept responsibility or liability for problems that occur because its report did not consider developments which it was not informed of.

### Subsurface Conditions Can Change

This report is based on conditions that existed at the time of the investigation, at the locations of the subsurface tests (i.e. boreholes) carried out during the site investigation. Subsurface conditions can be affected and modified by a number of factors including, but not limited to, the passage of time, man-made influences such as construction on or adjacent to the site, by natural forces such as floods, groundwater fluctuations or earthquakes. GCA should be contacted prior to submitting its report to determine if any further testing may be required. A minor amount of additional testing may prevent any major problems.

### Geotechnical Findings Are Professional Opinions

Results of subsurface conditions are limited only to the points where the subsurface tests were carried out, or where samples were collected. The field and laboratory data is analysed and reviewed by a geotechnical engineer, who then applies their professional experience and recommendations about the site's subsurface conditions. Despite investigation, the actual subsurface conditions may differ – in some cases significantly – from the results presented in the geotechnical investigation report, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface anomalies and details.



Therefore, the recommendations in this report can only be used as preliminary. Retaining GCA as your geotechnical consultants on your project to provide construction observations is the most effective method of managing the risks associated with unanticipated subsurface conditions.

**Geotechnical Report's Recommendations Are Not Final**

Because geotechnical engineers provide recommendations based on experience and judgement, you should not overly rely on the recommendations provided – they are not final. Only by observing the actual subsurface conditions revealed during construction may a geotechnical engineer finalise their recommendations. GCA does not assume responsibility or liability for the report's recommendations if no additional observations or testing is carried out.

**Geotechnical Report's Are Subject to Misinterpretations**

The project geotechnical engineer should consult with appropriate members of the design team following submission of the report. You should review your design teams plans and drawings, in conjunction with the geotechnical report to ensure they have all be incorporated. Due to many issues arising from misinterpretation of geotechnical reports between design teams and building contractors, GCA should participate in pre-construction meetings, and provide adequate construction observations.

**Engineering Borehole Logs And Data Should Not be Redrawn**

Geotechnical engineers prepare final borehole and testing logs, figure, etc. based on results and interpretation of field logs and laboratory data following the site investigation. The logs, figure, etc. provided in the geotechnical report should never be redrawn or altered for inclusion in any other documents from this report, included architectural or other design drawings.

**Providing The Full Geotechnical Report For Guidance**

The project design teams, subcontractors and building contractors should have a copy of the full geotechnical investigation report to help prevent any costly issues. This should be prefaced with a clearly written letter of transmittal. The letter should clearly advise the aforementioned that the report was prepared for proposed development/project requirements, and the report accuracy is limited. The letter should also encourage them to confer with GCA, and/or carry out further testing as may be required. Providing the report to your project team will help share the financial responsibilities stemming from any unanticipated issues or conditions in the site.

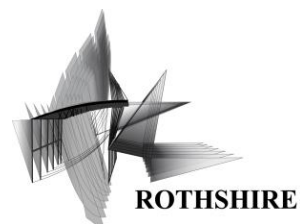
**Understanding Limitation Provisions**

As some clients, contractors and design professionals do not recognise geotechnical engineering is much broader and less exact than other engineering disciplines, this creates unrealistic expectations that lead to claims, disputes and other disappointments. As part of the geotechnical report, (in most cases) a 'limitations' explanatory provision is included, outlining the geotechnical engineers' limitations for your project – with the geotechnical engineers responsibilities to help other reduce their own. This should be read closely as part of your report.

**Other Limitations**

GCA will not be liable to revise or update the report to take into account any events or circumstances (seen or unforeseen), or any fact occurring or becoming apparent after the date of the report. This report is the subject of copyright and shall not be reproduced either totally or in part without the express permission of GCA. The report should not be used if there have been changes to the project, without first consulting with GCA to assess if the report's recommendations are still valid. GCA does not accept any responsibility for problems that occur due to project changes which have not been consulted.





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## APPENDIX C – ENGINEERING CERTIFICATE – RETAINING WALL

CJS Flora T/A

## CJS Flora & Partners

Chartered Engineers & Project Managers

ABN 57 669 771 477

Job Number: 1601

Date: 14 June 2017

### STRUCTURAL ADEQUACY CERTIFICATE

**LOCATION:** Double storey residence 1176 Forest Road Lugarno NSW.

**ELEMENT:** Concrete Piers, Concrete Retaining Walls, Lower Ground Floor Slab, Ground Floor Footings, Ground Floor Slab, Swimming Pool, First Floor Slab, Timber Frames and Trusses.


Structural Inspections have been carried out in accordance with accepted engineering practice and principles at the above mentioned properties. I Charan Flora hereby certify that the newly constructed elements mentioned above have been adequately constructed in accordance with the following design codes:

AS1170, AS2870, AS3600, AS1684, AS4100, AS2159

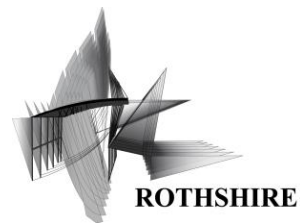
Based on site inspections and with reference to the above Australian Standard Codes it is my opinion that the structure located at the above address is structurally adequate.

Yours Sincerely,

CJS Flora and Partners



Charan Flora  
BE MIEAust



## APPENDIX D – SITE PHOTOS



Image 1 – Lightweight wall at entry portal.



Image 2 – East elevation balcony threshold.

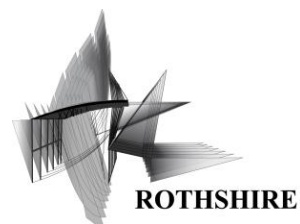


Image 3 – Sheet membrane on balcony slab typical.



Image 4 – Dining room glazing damage.





Image 5 – Landing and stairway temporary barrier.

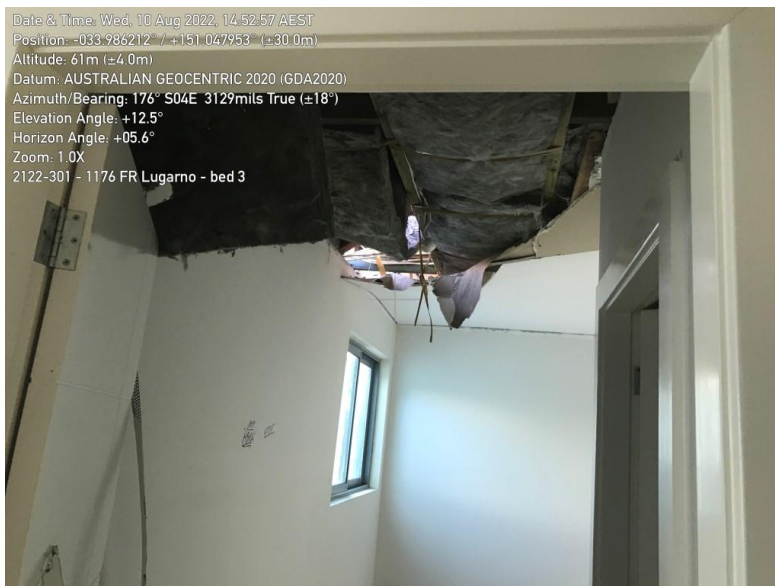


Image 6 – Bedroom 3 ceiling damage.

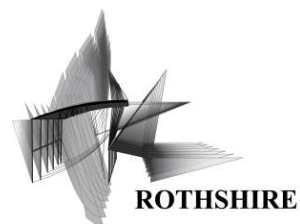


Image 7 – Bedroom 3 ceiling damage.



Image 8 – Cavity brick wall cavity width.

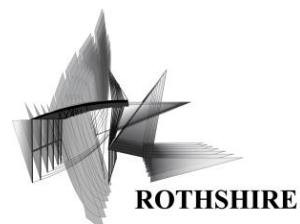


Image 9 – Timber roof framing system.



Image 10 – Timber roof framing system.



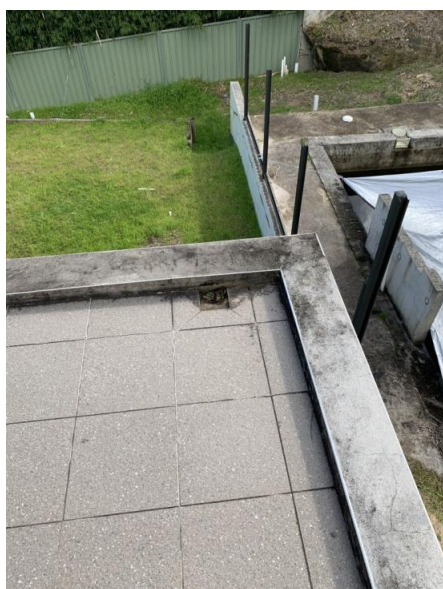
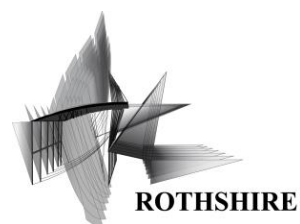
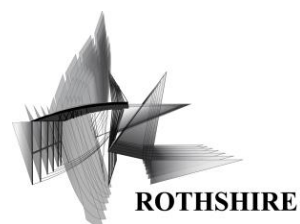


Image 11 – Overflow provision to rear balcony.



Image 12 & Image 13 – Brick veneer wall insulation & brick ties.





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## APPENDIX E – WATERPROOFING CERTIFICATE

# CERTIFICATE of WATERPROOFING WET AREAS ABN: 166 18924995

*This certifies  
Astor Homes  
Lot 1174, 1176, 1178 Forest Rd, Lugarno*

Essential waterproofing Pty Ltd is insured with Zurich Australia Insurance Ltd # 245100PZBI and also being licensed qualifications being: Waterproofing Technician #: 215239C, hereby certifies that the, **3 Houses, Bathrooms, En-suites, WC, Laundries, Balconies** has been waterproofed in Accordance with the BCA Volume 2, & 1-F 1.7 & Clause 3.8.1.3 AS3740 and AS4654 Parts 1 & 2-2012 External Balconies of the Code Australia Housesing Provisions and waterproofing wet areas with residential & Commercial building

I am appropriately qualified and experienced to provide the certificate for the component of this project.

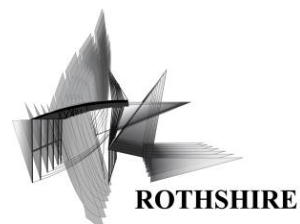
This job is guaranteed for 10 years from the day it was completed.

Product: **HPMMEGAFLEX , BOSTIC DAMPFIX PU, HPM EPOXY PRIMER, BOSTIC SEALN FLEX FC**

ESSENTIAL WATERPROOFING  
PTY LTD  
30 FUGGLES RD  
KENTHURST, 2156  
MOBILE 0409906913

TIGH WALTER

DATE



---

## APPENDIX F – CERTIFICATE OF STRUCTURAL ADEQUACY



Ref: 2122301-LET-011-V1

9 December 2022

Mr. K. Charonov  
Lugarno Developments  
1174 - 1178 Forest Rd  
Lugarno NSW 2210

Dear Kirill,

**RE: 1176 FOREST RD, LUGARNO, NSW 2210**  
**CERTIFICATE OF STRUCTURAL ADEQUACY AND RECOMMENDATIONS**

#### INTRODUCTION

1. Rothshire was engaged by Kirill Charonov of Lugarno Developments on 7/7/2022 to provide an assessment of the structural adequacy for the existing structure under loading conditions expected to be imposed onto the structure during its design life, to provide a letter of any recommended works, and to provide a certificate of structural adequacy.
2. 1176 Forest Road, Lugarno, is a detached two storey house plus one subterranean basement level accessible by driveway off Forest Road. The structure comprises a reinforced concrete ground floor slab and reinforced concrete first floor slab, hand cut timber roof structure, AFS/Dintel basement walls, external brick and brick cavity walls at ground floor, external brick veneer cavity walls at first floor, internal brick walls at ground floor and internal timber stud walls at first floor.

#### SITE INVESTIGATION

3. Structural inspections were carried out on 16/09/2022 and 24/11/2022 to inspect the structure generally, observe any deviations from the proposed structural design drawings prepared by Urbancorp Consulting, and carry out non-destructive structural investigations including taking measurements using a combination of a tape measure, laser measurer, stud finder, Ground Penetrating Radar (GPR) scanner, covermeter, and Schmidt Hammer.
4. An additional structural inspection was carried out on 8/12/2022 to inspect first floor timber wall framing and confirm extents of metal strap bracing and plywood sheeting fixed to the walls.
5. The ground floor structure appears to comprise a combination of reinforced concrete slab on ground, and reinforced concrete suspended slab over the basement.



6. At the time of the inspections, the basement was flooded with water. Therefore, measurements to the soffit (underside) of the suspended Ground Floor slab were limited to the slab zone accessible by the stairs from basement to ground floor.
7. A water tank was found to be supported on a reinforced concrete slab about halfway along the south wall of the building. The slab appeared to be supported along one edge only, by the AFS/Dintel wall.
8. At the time of the inspections, timber flooring had been applied to the top side of the first floor. Therefore, measurements to the top of the suspended First Floor slab were limited to the rear external balcony and internal cantilever slab above the ground floor entry.

#### ASSUMPTIONS

9. We assume that the material and geometrical properties of the concrete slab and reinforcement bars are consistent throughout the suspended slabs based on measurements taken at points accessible at the time of the inspections.
10. We assume that the footings and basement raft slab designed by the structural designer have been installed to the specification, were inspected by a qualified geotechnical engineer and are capable to transfer all applied loading into the ground.
11. We assume that roof tie down strapping has been applied in accordance with our sketch 20221209-2122301-SK01.

#### ANALYSIS

12. Based on our site measurements and scans, the structure was modelled using Inducta RCB and SLB.

#### STRUCTURAL RECOMMENDATIONS

13. We recommend vertical support is provided at the end of the existing cantilever slab in accordance with the sketch enclosed with this letter, in order to justify the load imposed by the external water tank at maximum capacity.

#### CERTIFICATE OF STRUCTURAL ADEQUACY

14. I herewith certify that this office has administered checks and analyses to the following standards and the National Construction Code (NCC);
  - AS 1170.0-2002 Structural design actions – Part 0: General Principles
  - AS 1170.1-2016 Structural design actions – Part 1: Permanent, imposed and other actions
  - AS 1170.2-2016 Structural design actions – Part 2: Wind actions
  - AS3700 2018 Masonry Structures
  - AS1684.2 2010 Residential Timber Framing Code (Non-Cyclonic).
  - AS1720.1 2010 Timber Structures Design Methods
  - AS3600 2018 Concrete Structures



And certify that based on our assumptions and based upon completion of the works described in Structural Recommendations above, the structure will generally appear to have been designed and constructed in conformance with the aforementioned Australian Standards.

#### LIMITATIONS AND EXCLUSIONS

15. The explicit purpose of this certificate of structural adequacy and the associated services undertaken by Rothshire Services is to provide a certificate in accordance with the scope of services set out in the agreement between Rothshire Services & Lugarno Developments. The scope of services was defined by the client or their representative and in lieu of existing physical documentation.
16. Rothshire Services concluded on information represented in this assessment from third party information. The passage of time, manifestation of latent conditions or impact of future events may require exploration in-situ subsequent data analysis, and re-evaluation of the findings, observations and conclusions either implied or expressed in this assessment.
17. In preparing this certificate of structural adequacy, Rothshire Services has relied upon presumed accuracy of certain information (or absence thereof) relative to 1176 Forest Road, Lugarno, NSW 2210, provided by the client. Except as otherwise stated in this assessment, Rothshire Services has not attempted to verify the accuracy or completeness of any such information.
18. The findings, observations, examinations and conclusion expressed or implied by Rothshire Services in this assessment are not, and should not be considered, an assessment concerning the physical condition or the proposed treatment of the existing conditions. No warranty or guarantee, whether expressed or implied, is made with respect to the data reported or to the findings, observations, and conclusions which are based solely upon information in existence at the time of this certificate.

Please do not hesitate to contact me if you wish to discuss this matter in further detail.

Yours faithfully,

Alexander Kameas

**Principal Structural Engineer**

B.E (Structures) Dip. Eng. Prac., M.E (Structural), Adv.Dip.Eng. (Structural), Builders License No. 256377C, Juris Doctor (Current), MIEAust. 4227245, Design Practitioner Registration: DEP0000258

#### ENCLOSED

2122301-STR-DWG-001-A  
2122301-STR-GEN-001-A



**ROTHSHIRE**

REF: 2122301A-COSP1-001

03 November 2023

The General Manager  
Georges River Council  
Locked Bag 205, Hurstville NSW 1481

**RE: LOT 2 1176 FOREST ROAD, LUGARNO**  
**CERTIFICATE OF SWIMMING POOL COMPLIANCE**  
**PROPOSED TWO STOREY SINGLE DWELLING WITH SWIMMING POOL RETAINING**  
**WALLS AND ASSOCIATED LANDSCAPING**

I, Alexander Kameas, hereby certify that that the swimming pool part constructed at Lot 2 1176 Forest Road Lugarno is capable of compliance to the swimming pools act 1992 subject to completion of the following:

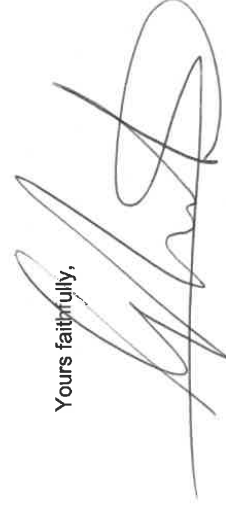
Completion of the pool finishes including surfaces and coping, paving around the pool.

Installation of appropriate fencing compliant to (NSW Pool Fencing Law) Swimming Pool Act 1992

Installation of pool pumping and filtration system compliant to (Plumbing and Drainage Act 2011 No 59)

Note, inspection and operation of plumbing has been undertaken by others.

Yours faithfully,



Alexander Kameas  
**Principal Structural Engineer**  
B.E (Structures) Dip. Eng. Prac., M.E (Structural), Adv.Dip.Eng. (Structural), Builders License (NSW)  
No. 256377C, BSPL (TAS) 944877406, Juris Doctor (Current), MIEAust. 4227245; Professional  
Engineer Registration PRE0000232.

2122301A-COSP1-001

Page 1 of 1



Geotechnical Consultants Australia

Astor Homes

## Detailed Site Investigation

Proposed Development at:

1174-1178 Forest Road

Lugarno NSW 2210

Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873

E1933-1

17<sup>th</sup> July 2019



Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-1, 17<sup>th</sup> July 2019



### Report Distribution

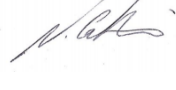


Detailed Site Investigation


Address: 1174-1178 Forest Road Lugarno NSW 2210

GCA Report No.: E1933-1

Date: 17<sup>th</sup> July 2019

Copies	Recipient/Custodian
1 Soft Copy (PDF) – Secured and issued by email	Astor Homes Kirill Charonov kirill@astorhomes.com.au
1 Original – Saved to GCA Archives	Secured and Saved by GCA on Register

Version	Prepared By	Reviewed By	Date Issue
Draft	<b>Luke Brevia</b> Environmental Engineer 	<b>Nick Caltabiano</b> Project Manager 	10 <sup>th</sup> July 2019
FINAL	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	17 <sup>th</sup> July 2019

Report Revision	Details	Report No.	Date	Amended By
1	FINAL Report	E1933-1	17 <sup>th</sup> July 2019	-
Issued By:			 Joe Nader	

### Geotechnical Consultants Australia Pty Ltd

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Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-1, 17<sup>th</sup> July 2019



## Executive Summary

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Kirill Charonov of Astor Homes (the client) to conduct a Detailed Site Investigation (DSI) for the properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site).

The objectives of this DSI were to provide an assessment of potential contaminating activities to have impacted the site. Thus, this report includes the following:

- Discussion of the site condition through a desktop review of neighbouring properties and ecological receptors;
- Review of all available environmental, architectural and/or engineering reports previously prepared for the site, including Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, 21<sup>st</sup> May 2018 (AG 2018) which provided a preliminary assessment for the potential of current and historical contaminating activities to have impacted the site;
- Conduct a site inspection to establish a thorough understanding of the current site condition;
- Implement a soil investigation program in accordance with the NSW Environment Protection Authority (NSW EPA) *Sampling Design Guidelines (1995)* to investigate the degree of contamination (if present) by means of intrusive soil sampling and laboratory analysis, for relevant contaminants including: Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), heavy metals and asbestos;
- Implement standard quality assurance (QA) and quality control (QC) measures including the collection of one blind duplicate sample;
- Laboratory analysis of samples collected from the site by a National Association of Testing Authorities (NATA) accredited laboratory;
- Assessment of laboratory analytical data; and
- Provide advice on suitability of land for its proposed residential land-use; and
- Provide an assessment of site contamination (if any) and recommendations for remediation and/or management.

The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an in-built double garage. Each dwelling has in-ground swimming pools constructed at the rear of each dwelling in the western portion of the property. GCA field staff conducted a site inspection on 25<sup>th</sup> June 2019 and a soil investigation program was undertaken with a systematic approach in accessible locations across the site to identify areas of contamination. Soil samples were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities.

During the site inspection fragments of suspected asbestos containing material (ACM) were discovered in the north-western portion of the property. Soil sampling established contamination at the site in the form of asbestos (refer to **Appendix C** for laboratory analytical results and **Figure 2** for locations of samples collected). The levels of this contamination exceeded Health Investigation Levels relevant to the site being residential A criteria (HILs A).

Given the type of onsite contamination identified through soil sampling, GCA recommended an Asbestos Removal Scope of Works (ARSW) in order to make the site suitable for its

Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
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intended development as low-density residential land-use. This is further discussed in **Section 11**.

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1174-1178 Forest Road Lugarno NSW 2210  
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## FIGURES

**Figure 1** Site Locality Plan

**Figure 2** Site Plan and Sampling Locations

## APPENDICES

**Appendix A** – Photographic Log

**Appendix B** - Previous Site Investigations

**Appendix C** – Laboratory Analytical Reports (NATA)

**Appendix D** – Supporting Documents

## LIST OF ABBREVIATIONS

A list of the common abbreviations used throughout this report is provided below.

ACM - Asbestos Containing Material

AEC - Area of Environmental Concern

AGST - Above Ground Storage Tank

AHD - Australian Height Datum

BGS - Below ground surface

CSM - Conceptual site model

BTEX - Benzene, toluene, ethylbenzene and xylenes

B(a)P - Benzo(a)pyrene

CCA - Copper Chromate Arsenate

COC - Contaminants of Concern

DEC - NSW Department of Environment and Conservation

DECCW - NSW Department of Environment, Climate Change and Water DQI - Data quality indicator

DQOs - Data Quality Objectives

DWE - NSW Department of Water and Energy

EPA - NSW Environment Protection Authority

ESA - Environmental Site Assessment

ha - Hectare

HIL - Health based investigation level

LOR - Limit of Reporting

OEH - Office of Environment and Heritage

PAHs - Polycyclic aromatic hydrocarbons

PID - Photo-ionisation Detector

PCB - Polychlorinated Biphenyl

PQL - Practical Quantitation Limit

QA/QC - Quality Assurance/Quality Control

RPD - Relative Percentage Difference

SAQP - Sampling, Analysis and Quality Plan

TRH - Total Recoverable Hydrocarbons (previously Total Petroleum Hydrocarbons)

TSS - Total Suspended Solids

UST - Underground Storage Tank

VOC - Volatile Organic Compound

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## 1. INTRODUCTION

### 1.1 BACKGROUND AND PURPOSE

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Kirill Charonov of Astor Homes (the client) to conduct a Detailed Site Investigation (DSI) for the properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site).

As shown in **Figure 1**, the site is located approximately 20 km south-west of the Sydney Central Business District, within the Local Government Area of Georges River Council. The site covers an approximate area of 1,920 m<sup>2</sup> (as shown in **Figure 2**) and is identified as Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873. The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an adjoining ground-level double garage. Each dwelling has in-ground swimming pools constructed at the rear of each dwelling in the western portion of the property and is currently zoned as low density residential.

This report is provided in support of a Development Application (DA) to Georges River Council and for the purpose of enabling the developer to meet its obligations under the Contaminated Land Management Act 1997 (CLM Act), for the assessment and management of contaminated land.

A Preliminary Site Investigation (PSI) (Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, dated 21<sup>st</sup> May 2018), was completed by Australian Geotechnical Pty Ltd (AG) for the site. This document should be read in conjunction with this report.

### 1.2 PROPOSED DEVELOPMENT

GCA understands the existing dwellings and infrastructures were recently constructed within the site, and are still under construction.

Site photographs are included in the photographic log in **Appendix A**.

### 1.3 REGULATORY FRAMEWORK

The following regulatory framework and guidelines were considered during the preparation of this report:

- ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality;
- DECCW (2009) Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008, (UPSS Guidelines);
- DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination;
- NSW EPA (1995) Sampling Design Guidelines;
- EPA (2014) Technical Note: Investigation of Service Station Sites;
- NEPC (2013) Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater;
- NEPC (2013) Schedule B(2) Guideline on Site Characterisation;
- Contaminated Land Management Act 1997;
- State Environment Protection Policy 55 (SEPP 55) – Remediation of Land, and
- Office of Environment and Heritage (2011) Guidelines for Consultants Reporting on Contaminated Sites.

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## 1.4 PROJECT OBJECTIVES

The objectives of this DSI were to provide an assessment of potential contaminating activities to have impacted the site by undertaking the following:

- Discussion of the site condition through a desktop review of neighbouring properties and ecological receptors;
- Review of all available environmental, architectural and/or engineering reports previously prepared for the site, including Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, 21<sup>st</sup> May 2018 (AG 2018) which provided a preliminary assessment for the potential of current and historical contaminating activities to have impacted the site;
- Conduct a site inspection to establish a thorough understanding of the current site condition;
- Implement a soil investigation program in accordance with the NSW Environment Protection Authority (NSW EPA) *Sampling Design Guidelines (1995)* to investigate the degree of contamination (if present) by means of intrusive soil sampling and laboratory analysis, for relevant contaminants including: Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPP), heavy metals and asbestos;
- Implement standard quality assurance (QA) and quality control (QC) measures including the collection of one blind duplicate sample;
- Laboratory analysis of samples collected from the site by a NATA accredited laboratory;
- Assessment of laboratory analytical data;
- Provide advice on suitability of land for its proposed residential land-use; and
- Provide an assessment of site contamination (if any) and recommendations for remediation and/or management.

## 1.5 SCOPE OF WORKS

To achieve the above listed project objectives, the following scope of works were undertaken to produce this DSI.

### 1.5.1 Desktop Study

Review of available environmental, architectural and/or engineering reports, including the previous PSI (AG, 2018) prepared for the site, which covered the following:

- A site inspection to identify potential sources of contamination;
- Historical investigations relating to the site (if any);
- Dial-Before-You-Dig enquiry for an evaluation into local underground services and assets;
- Review of local geological and hydrogeological information, including an evaluation of the WaterNSW registered groundwater bore database; and
- Limited sampling program focusing on the western portion of the site.
- Dial-Before-You-Dig enquiry for an evaluation into local underground services and assets; and
- Review of local geological and hydrogeological information, an evaluation of the WaterNSW registered groundwater bore database and Acid Sulphate Soil (ASS) data.

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### 1.5.2 Fieldwork & Laboratory Analysis

A site inspection and soil investigation program were undertaken on 25<sup>th</sup> June 2019 by GCA, and included:

- Hand auger excavation of twelve (12) boreholes (BH1 to BH12 inclusive) spread across accessible areas of the site in a systematic approach to identify areas of contamination; and
- Multiple level soil sampling within fill and natural soils which included the collection of fifteen (15) primary soil samples and 1 secondary blind duplicate soil sample, were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities, as determined from the site history survey and field observations made during the investigation program.

### 1.5.3 Data Analysis and Reporting

The objective of this DSI report is to document desktop study findings, the conceptual site model, data quality objectives, investigation methodologies and analytical results. In addition, a discussion of laboratory analytical results and recommendations for remediation of contamination are presented.

## 2. SITE INFORMATION

### 2.1 SITE IDENTIFICATION

The location of the site is shown in **Figure 1** with a detailed site plan shown in **Figure 2**.

**Table 1:** Site Details

<b>Address</b>	1174-1178 Forest Road Lugarno NSW 2210
<b>Deposited Plan</b>	Lot A DP 328702, Lot 2 DP 18873 & Lot 3 DP 18873
<b>Locality Map</b>	<b>Figure 1</b>
<b>Site Plan</b>	<b>Figure 2</b>
<b>Site Photographs</b>	<b>Appendix A</b>
<b>Total Area (approx.)</b>	1,920m <sup>2</sup>

### 2.2 SITE DESCRIPTION

A qualified environmental consultant inspected the site on 25<sup>th</sup> June 2019. Site photographs are provided in **Appendix A**. Observations noted during the inspection are summarised below.

At the time of the site inspection, the site contained the following structures and features:

- Three two-storey brick-rendered dwellings with tile roofs. All three dwellings appeared to be incomplete and still within the construction phase of their development;
- Two dwellings had basement level double-garages and one dwelling had an adjoining ground-level double garage;
- Three in-ground swimming pools were located in the western portion of the property. One swimming pool per dwelling;
- Construction materials and construction waste were located across the site including suspected asbestos containing materials (ACM);
- On-site vegetation showed no signs of decay and/or stress;
- Surface standing water was noticed at the site in all three swimming pools and the two basement garages; and



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- There were no indicators of underground storage tanks.

## 2.3 SURROUNDING LAND USE

**Table 2** below outlines the surrounding land-uses neighbouring the site.

**Table 2:** Surrounding Land-Use Adjacent to the Site.

Direction from Site	Land-Use
North	Vacant property fronting Forest Road and residential properties beyond.
East	Forest Road and residential properties beyond.
South	Residential properties, Forest Road and residential properties beyond.
West	Residential properties.

## 2.4 SURFACE WATER RECEPTORS

Based on regional topography and the nearest surface water source, Boggywell Creek approximately 470m east and the Georges River approximately 520m south from the site, groundwater is expected to flow towards the east and/or south. Given the distance to Boggywell Creek and Georges River, they are not considered to be receptors of groundwater contamination sourced from the site (if any).

## 2.5 GEOLOGY

The Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, Edition 1, 1983), published by the Department of Minerals and Energy indicates the residual soils within the site to be underlain by Hawkesbury Sandstone of the Wianamatta group comprising medium to coarse-grained quartz sandstone, very minor shale and laminite lenses.

## 2.6 HYDROLOGY

A groundwater bore search was conducted on 24 June 2019 and no registered groundwater bores were detected within 500m of the site.

## 2.7 ACID SULPHATE SOILS

To determine whether there is a potential for acid sulphate soils (ASS) to be present at the site, a review of available ASS risk maps was undertaken. The site is located within an area which suggests there is no known occurrence regarding the presence of ASS. This review is indicative only as a detailed investigation into ASS risk at the site was not included as part of the scope of this DSI.

## 3. PREVIOUS INVESTIGATIONS

Previous environmental investigations of the site were recorded under the following report:

- Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at: 1174 to 1178 Forest road, Lugarno, NSW, 2210*, dated 21<sup>st</sup> May 2018.

AG (2018) undertook a PSI of the site to assess whether the fill materials on site presented a risk to human health. A limited sampling program was undertaken on 6<sup>th</sup> May 2018 targeting fill materials in the western portion of the site. Soil sample analytical results found that the soils were considered suitable to remain on-site when compared to appropriate Health Investigation Levels (HIL) and Health Screening Levels (HSL) for the exposure setting of 'standard residential with garden/accessible soil'.

Refer to **Appendix B** for further details of these results.

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#### 4. CONCEPTUAL SITE MODEL

In accordance with NEPM (2013) Schedule B2 – Guideline on Site Characterisation, and to aid in the assessment of data collection for the site, a Conceptual Site Model (CSM) was created to assess the plausible pollutant linkages between potential contamination sources, migration pathways and receptors. The CSM provides a framework for the review of the reliability and useability of the data collected and to identify data gaps in the existing site characterisation. The CSM can be seen in **Table 3** in **Section 4.2**.

##### 4.1 POTENTIAL CONTAMINATION

Based on the findings of the previous site investigation by AG (2018), a desktop review of the site and neighbouring properties and nearby ecological receptors, the chemicals of potential concern (COPC) at the site are considered to be:

Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), heavy metals and asbestos.

##### 4.2 CONTAMINATION SOURCES, EXPOSURE PATHWAYS & RECEPTORS

Potential contamination sources, exposure pathways and human and environmental receptors that were considered relevant for this assessment are summarised along with a qualitative assessment of the potential risks posed by complete exposure pathways in **Table 3**.

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**Table 3: Conceptual Site Model**

Potential Sources	Potential Receptor	Potential Exposure Pathway	Complete connection	Risk	Justification
Contaminated soil from importation of uncontrolled fill across the site.  ACM  Use of OCPs	Site occupants, workers, general public	Dermal contact, inhalation/ingestion of particulates	Limited (current)	Low	Direct contact with potentially contaminated soils is limited.
			No (Future)	Negligible	If present, impacted soils are likely to be disposed of off-site.
	Ecosystem of Boggywell Creek and Georges River	Migration of impacted groundwater and surface water run-off.	Yes (current)	Low	No obvious sources of inorganic contamination were observed on site that could migrate off-site with surface water run-off.
			No (Future)	Negligible	If present, contaminated soils and groundwater are likely to be remediated. Unlikely contamination would reach Boggywell Creek and Georges River due to distance from site.
	Underlying aquifer	Leaching and migration of contaminants through groundwater infiltration.	Limited (current)	Low	Due to existing sealed surfaces, expected shallow bedrock, leachability of CoCs, migration of CoCs is likely to be limited.
			No (Future)	Low	If present, contaminated soil and/or groundwater is likely to be remediated.

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#### 4.3 ADDRESSED DATA GAPS

Based on information on the site history and the site investigation on 25<sup>th</sup> June 2019, a program of intrusive soil investigation was required to address the following data gaps:

- Previous environmental investigations targeted only the western portion of the site therefore, to gain an overall understanding of potential on-site contamination a systematic approach to soil sampling accessible areas was undertaken across the entirety of the site;
- Potential presence of onsite contamination (as listed in **Section 4.1**); and
- The degree and extent of onsite contamination, if present.

#### 5. DATA QUALITY OBJECTIVES

In accordance with the US EPA (2006) Data Quality Assessment and the DEC (2006) Guidelines for the NSW Site Auditor Scheme, the process of developing Data Quality Objectives (DQO) was used to determine the appropriate level of data quality needed for the specific data requirements of the project. The DQO process that was applied for this assessment is documented below.

- **Step 1:** State the problem.  
The subject site may be contaminated as a result of previous and current land use which may impact suitability of the site for use as the proposed childcare centre.
- **Step 2:** Identify the decision.  
The site is suitable for residential land use without the requirement for remediation and/or management.
- **Step 3:** Identify inputs into the decision.
  - Identification of issues of potential environmental concern;
  - Appropriate identification of COPC;
  - Systematic soil sampling and analysis programs of shallow soil across the site
  - Visual inspection of systematic shallow soil samples for presence of ACM;
  - Appropriate quality assurance / control to enable an evaluation of the reliability of the analytical data; and
  - Screening sample analytical results against appropriate assessment criteria for the intended land use.
- **Step 4:** Define the boundaries of the site. The project boundary is defined as the area within the site boundary of the proposed development.
- **Step 5:** Develop a decision rule.
  - To accept the assessment decision the following decision rules apply:  
For systematic grid based soil sampling the sampling data must meet the following qualifiers;
    - The 95% Upper Confidence Limit of COPC concentration data does not exceed the soil assessment criteria;
    - No single sample exceeds 250% of the soil COPC assessment criteria;
    - The standard deviation of COPC analytical results is less than 50% of the soil assessment criteria; and
    - There is no visible identification of ACM in soil samples or on the ground surface.
- **Step 6:** Specify acceptable limits on decision errors.  
The field sampling methodology, sample preservation techniques, and laboratory analytical procedures must be appropriate to provide confidence in data quality so

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any comparison against assessment criteria can be considered reliable. This is achieved by defining and comparing results against the Data Quality Indicators (DQIs).

- **Step 7:** Optimise the design for obtaining data.  
This is achieved by sampling plan design in consideration of the available site history information, area of investigation, contaminant behaviour in the environment, and likely spatial distribution of contamination.

## 6. INVESTIGATION METHODOLOGIES

GCA conducted a site inspection and soil sampling program on 25<sup>th</sup> June 2019. Sample locations for the site are presented on **Figure 2**. The investigation methodology is presented below.

### 6.1 SAMPLING ANALYSIS PLAN

To assess the potential for soil contamination at the site, GCA completed the following scope of works:

- Collection of fifteen (15) primary soil samples (BH1 0.1 to BH12 0.5), from twelve (12) locations (BH1 to BH12 inclusive) at depths ranging from approximately 0.1m to 0.8m. Refer to **Figure 2** for sample depths and locations;
- Quality Assurance (QA) and Quality Control (QC) sampling of one secondary blind duplicate sample (QS-1);
- Visual inspection of the ground surface and excavated soil for ACM; and
- Submission of fifteen (15) primary soil samples (BH1 0.1 to BH12 0.5) and one secondary blind duplicate soil sample (QS-1) to a NATA accredited laboratory for analysis of COPC comprising TRH, BTEX, PAHs, OCPs, OPPs, heavy metals and asbestos.

### 6.2 SOIL SAMPLING METHODOLOGY

Boreholes BH1 to BH12 inclusive were completed using a manual hand auger to a maximum depth of 0.8m below ground surface (bgl) or prior refusal.

Soil samples were collected directly from the auger, placed in laboratory prepared 250mL soil jars, labelled and placed on ice in an esky for transport under chain of custody (COC) to a NATA Accredited Laboratory for the analysis of the COPC. The hand auger was decontaminated between each borehole excavation with Decon90.

**Table 4** below summarises subsurface conditions across the site as observed during borehole excavations. Borehole locations are referenced in **Figure 2**.

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**Table 4:** Borehole Logs

Borehole	Depth Range (m)	Description	Moisture	Density	Plasticity
BH1	0.0 - 0.2	Grass cover.  Gravelly Clayey SAND, fine to coarse grain, brown, crushed sandstone cobbles.	Medium	Loose	Low
	0.2 - 0.3	Silty SAND, fine to medium grain, brown	Low	Loose	-
	0.3 - 0.5	Clayey SAND, fine to coarse grain, crushed sandstone, plastic fragments, red/ pale grey	Medium	Loose - Medium Dense	-
	0.5 - 0.6	Natural: Clayey SAND, fine to medium grain, pale brown/ orange/ pale grey.	Medium	Loose - Medium Dense	-
	Hand auger refusal at 0.6m				
BH2	0.0 - 0.4	Grass cover. Sandy CLAY, fine to coarse grain, brown, crushed sandstone cobbles.	High	Loose	Low
	Hand auger refusal at 0.4m				
BH3	0.0 - 0.3	Sandy CLAY, fine to medium grain, crushed bricks and sandstone, brown.	Medium	Loose	Low
	0.3 - 0.5	Natural: Clayey SAND, fine to medium grain, pale brown/ orange/ pale grey.	Medium	Loose - Medium Dense	-
	Hand auger refusal at 0.5m				
BH4	0.0 - 0.4	Sandy CLAY, fine to medium grain, crushed bricks and sandstone, brown.	High	Medium Dense	Low
	Hand auger refusal at 0.4m				
BH5	0.0 - 0.8	Grass cover.  Gravelly Clayey SAND, crushed sandstone.	Medium	Loose - Medium Dense	
	Hand auger refusal at 0.8m				
BH6	0.0 - 0.3	Grass cover.  Gravelly Clayey SAND, crushed sandstone.	Medium	Loose - Medium Dense	
	Hand auger refusal at 0.3m				
BH7	0.0 - 0.5	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone.	High	Loose - Medium Dense	

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	Hand auger refusal at 0.5m				
BH8	0.0 – 0.3	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, glass, brick, concrete, plastic.	High	Loose - Medium Dense	
	0.3 – 0.6	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Medium Dense	
	Hand auger refusal at 0.6m				
BH9	0.0 - 0.5	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.5m				
BH10	0.0 – 0.4	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.4m				
BH11	0.0 – 0.4	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.4m				
BH12	0.0 – 0.6	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.6m				

### 6.3 QUALITY ASSURANCE

Quality Assurance (QA) and Quality Control (QC) sampling was undertaken in general accordance with relevant Australian Standards and guidelines. Field QC samples collected are summarised in **Table 5**.

**Table 5:** Quality Control Duplicate Sample Summary

Sample Identification	Sample Type	Sample Matrix	Rate of Collection
QS-1	Field Duplicate of BH1 0.1	Soil	1 in 20 Samples

The laboratory internal QC procedures are consistent with NEPM policy on laboratory analysis of contaminated soils.

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## 7. ASSESSMENT CRITERIA

The following soil assessment criteria were adopted for the investigation.

### **NEPM Health Based Investigation Level A (HILs A)**

HILs are Tier 1 risk based generic assessment criteria used for the assessment of potential risks to human health from chronic exposure to contaminants in soil. They are intentionally conservative and based on a reasonable worst-case scenario for generic land use settings including Residential (HILs A/B), Open Space/Recreational (HILs C) and Commercial Industrial (HILs D). HILs A soil assessment criteria were adopted on the basis the proposed site use is a residential unit block.

### **NEPM Health Screening Levels A (HSLs A)**

HSLs are Tier 1 risk based generic soil assessment criteria used for the assessment of potential risks to human health from chronic inhalation exposure of petroleum vapour emanating off petroleum contaminated soils (Vapour Risk). They are intentionally conservative and based on a reasonable worst-case scenario for generic soil types, contamination depth and land use settings including Residential (HSLs A/B), Open Space/Recreational (HSLs C) and Commercial Industrial (HSLs D). HSLs A soil assessment criteria for sand soil from 0 to <1 m were adopted on the basis that the proposed site use is a residential unit block and onsite topsoil comprised sandy loam.

### **NEPM Management Limits – Residential, Parkland and Public Open Space**

Management Limits for petroleum have been developed for prevention of explosive vapour accumulation, prevention of the formation of observable Light Non-Aqueous Phase Liquids (LNAPL) and protection against effects on buried infrastructure. Residential, parkland and public open space limits have been adopted based on the proposed land use.

### **NEPM Soil Ecological Assessment Levels**

Soil ecological assessment was not considered warranted based on the following:

- There are no onsite or nearby off site sensitive ecological receptors.

## 8. INVESTIGATION RESULTS

### **8.1 SOIL ANALYTICAL RESULTS**

The soil analytical results are summarised below. Soil analytical results are presented in the laboratory reports in **Appendix C**.

#### **Total Recoverable Hydrocarbons**

No TRHs were detected at concentrations greater than laboratory limits of reporting (LOR) in any of the soil samples.

#### **Benzene Toluene Ethylbenzene Xylenes**

No BTEX compounds were detected at concentrations greater than laboratory LOR in any of the soil samples.

#### **Polycyclic Aromatic Hydrocarbons**

No PAHs were detected at concentrations greater than laboratory LOR in any of the soil samples.



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### Organochlorine Pesticides

No OCPs were detected at concentrations greater than laboratory LOR in any of the soil samples.

### Organophosphorus Pesticides

No OPPs were detected at concentrations greater than laboratory LOR in any of the soil samples.

### Heavy Metals

Heavy metals were detected at concentrations greater than laboratory limits of reporting (LOR) in all soil samples collected, however, no concentrations exceeded the Health Investigation Levels for Residential A criteria. Refer to **Table 6** below for a summary of these results. Laboratory analytical reports are presented in **Appendix C**.

**TABLE 6:** Summary of Soil Analytical Data Against Health Investigation Levels Residential A Criteria – Heavy Metals

Chemical	LOR	HIL A	Sample Name	BH1 0.1 (mg/kg)	BH2 0.2 (mg/kg)	BH3 0.2 (mg/kg)	BH3 0.5 (mg/kg)	BH4 0.1 (mg/kg)
			Sample Depth (m bgl)	0.1	0.2	0.2	0.5	0.1
Arsenic	2	100		28	6	<4	5	10
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	5	100		11	9	10	27	11
Copper	5	7000		6	9	3	<1	16
Lead	5	300		12	19	48	3	19
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		1	3	1	<1	3
Zinc	5	8000		29	43	12	5	94
Chemical	LOR	HIL A	Sample Name	BH5 0.2 (mg/kg)	BH6 0.2 (mg/kg)	BH7 0.1 (mg/kg)	BH8 0.1 (mg/kg)	BH9 0.1 (mg/kg)
			Sample Depth (m bgl)	0.2	0.2	0.1	0.1	0.1
Arsenic	2	100		<4	12	10	8	9
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	5	100		7	9	11	11	10
Copper	5	7000		6	4	5	5	5
Lead	5	300		16	12	11	10	10
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		2	2	<1	<1	<1
Zinc	5	8000		54	120	57	58	56
Chemical	LOR	HIL A	Sample Name	BH9 0.5 (mg/kg)	BH10 0.2 (mg/kg)	BH11 0.1 (mg/kg)	BH12 0.1 (mg/kg)	BH12 0.5 (mg/kg)
			Sample Depth (m bgl)	0.5	0.2	0.1	0.1	0.5
Arsenic	2	100		8	7	8	15	13
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4

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Chromium	5	100		11	9	11	17	10
Copper	5	7000		4	6	5	3	5
Lead	5	300		9	9	9	7	9
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		1	<1	<1	<1	<1
Zinc	5	8000		51	48	52	52	44

#### pH in Soil

**Table 7** below summarises the results for pH in the soil samples collected.

**Table 7:** pH Analytical Results

Analyte	Sample Name	BH1 0.1 (pH Units)	BH2 0.2 (pH Units)	BH5 0.2 (pH Units)	BH12 0.5 (pH Units)
	Sample Depth (m bgl)	0.1	0.2	0.2	0.5
pH 1:5 soil : water		7.1	8.9	9.0	6.6

#### Asbestos

Asbestos was detected in soil samples BH7 0.1, BH8 0.1 and BH11 0.1 exceeding applicable guidelines criteria for standard residential use as determined by NEPM (2013). **Table 8** provides a summary of these findings.

**Table 8:** Asbestos Detected in Soil Samples Compared with Adopted Criteria

Chemical	LOR	HIL A	Sample Name	BH7 0.1 (mg/kg)	BH8 0.1 (mg/kg)	BH11 0.1 (mg/kg)
			Sample Depth (mbgl)	0.5	0.2	0.1
Asbestos Detected				Yes	Yes	Yes
Asbestos Type				Chrysotile	Chrysotile, Amosite and Crocidolite	Chrysotile, Amosite and Crocidolite
Total Asbestos (%)	0.1	0.01%		1.58	0.39	0.14

#### 8.2 QA/QC RESULTS

Relative Percentage Difference (RPD) applies if results are at least 10 times the LOR, otherwise no acceptance criteria for RPD's applies. Soil duplicate results are within the adopted acceptance criteria of 30-50% (AS4482.1) RPD of values exceeding laboratory limits of reporting. **Table 9** summarises these results.

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**Table 9:** Summary of Primary Sample and Field Duplicate Sample with Results Exceeding LORs and Respective RPD Values.

Chemical	LOR	HIL A	Sample Name	BH1 0.1 (mg/kg)	QS-1 (mg/kg)	RPD (%)
			Sample Depth (m)	0.1	0.1	
Arsenic	2	100		28	27	3.6
Cadmium	0.4	20		<0.4	<0.4	0
Chromium	5	100		11	13	0
Copper	5	7000		6	7	16.7
Lead	5	300		12	14	15.4
Mercury	0.1	200		<0.1	<0.1	0
Nickel	5	400		1	2	66.7
Zinc	5	8000		28	31	10.2

## 9. DATA GAPS

The scope of works described in this DSI report are subject to restrictions and limitations. GCA did not perform a complete assessment of all possible conditions and locations at the site. This is due to the areas to be sampled were either outside the scope of works and/or inaccessible at the time of the site inspection and sampling program therefore, data gaps exist and are listed below.

- Due to the characteristics of fill material across the site consisting of bricks, concrete and sandstone, refusal of the hand auger to penetrate to fill material caused borehole excavations to be terminated at shallow depths. The depth of fill and natural soil material was established in few boreholes and is inferred to be relatively consistent across the site;
- The characteristics of groundwater and surface water onsite was outside the scope of works; and
- Characteristics of fill and natural soils in inaccessible areas and beneath all concrete surfaces (i.e.: beneath dwellings and in-ground pools).

## 10. CONCLUSIONS

The properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site) was the subject of a DSI to assess the presence of on-site contamination associated with current and historical uses of the property. The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an in-built double garage. Each dwelling has an in-ground swimming pool constructed at the rear, in the western portion of the property.

GCA field staff conducted a site inspection on 25<sup>th</sup> June 2019 and a soil investigation program was undertaken with a systematic approach in accessible locations across the site to identify areas of contamination. Soil samples were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities.

COPCs were not identified in soil samples collected at concentrations in excess of applicable guideline criteria, with the exception of heavy metals and asbestos. It is noted that, heavy metals were identified in soil samples collected above laboratory LOR, however these did not exceed applicable guideline criteria.

Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-1, 17<sup>th</sup> July 2019



During the site inspection fragments of suspected ACM were discovered in the north-western portion of the property. Soil sampling established contamination at the site in the form of asbestos (refer to **Appendix C** for laboratory analytical results and **Figure 2** for locations of samples collected). The levels of this contamination exceeded Health Investigation Levels relevant to the site being residential A criteria (HILs A).

Given the type of onsite contamination identified through soil sampling, GCA recommended an Asbestos Removal Scope of Works (ARSW) in order to make the site suitable for its intended development as low-density residential land-use. This is further discussed in **Section 11** below.

## 11. RECOMMENDATIONS

It is the opinion of GCA and in accordance with relevant Australian Standards and guidelines that the site can be made suitable for the proposed development as low-density residential dwellings subject to the implementation of the following recommendations.

The presence of asbestos in fill materials exceeding applicable guideline criteria in soil samples taken from BH7 0.1, BH8 0.1 and BH11 0.1 must be remediated according to the appropriate Australian Standards and guidelines.

An Asbestos Removal Scope of Works (ARSW) should be prepared prior to the remediation of the asbestos contaminated areas. This document will provide details of the methodology and procedures required for the appropriate excavation, stockpiling, handling, transport and disposal off-site at an appropriately licenced facility to accept such waste.

The ARSW will also provide the requirements and procedures for contaminated site soils to be excavated and disposed off-site to complete remedial works and must be done so in accordance with the appropriate Australian Standards and guidelines including, *Waste Classification Guidelines* (NSW EPA, 2014). Validation of soils will be done in accordance with the ARSW to ensure that any contamination is remediated or managed by assessing against the respective NSW EPA thresholds and guidelines.

Preparation of a final site validation report by GCA, concluding that the site has been remediated to allow the proposed development for residential purposes.

Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-1, 17<sup>th</sup> July 2019



## 12. LIMITATIONS

The findings of this report are based on the Scope of Work outlined in Section 1.5. GCA performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of GCA personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, GCA assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of GCA, or developments resulting from situations outside the scope of this project.

The results of this assessment are based on the site conditions identified at the time of the site inspection and validation sampling. GCA will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report.

GCA is not engaged in environmental consulting and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

### Geotechnical Consultants Australia Pty Ltd (GCA)

**Prepared by:**

**Luke Breva**  
Environmental Scientist

**Reviewed by:**

**Nick Caltabiano**  
Project Manager

Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-1, 17<sup>th</sup> July 2019

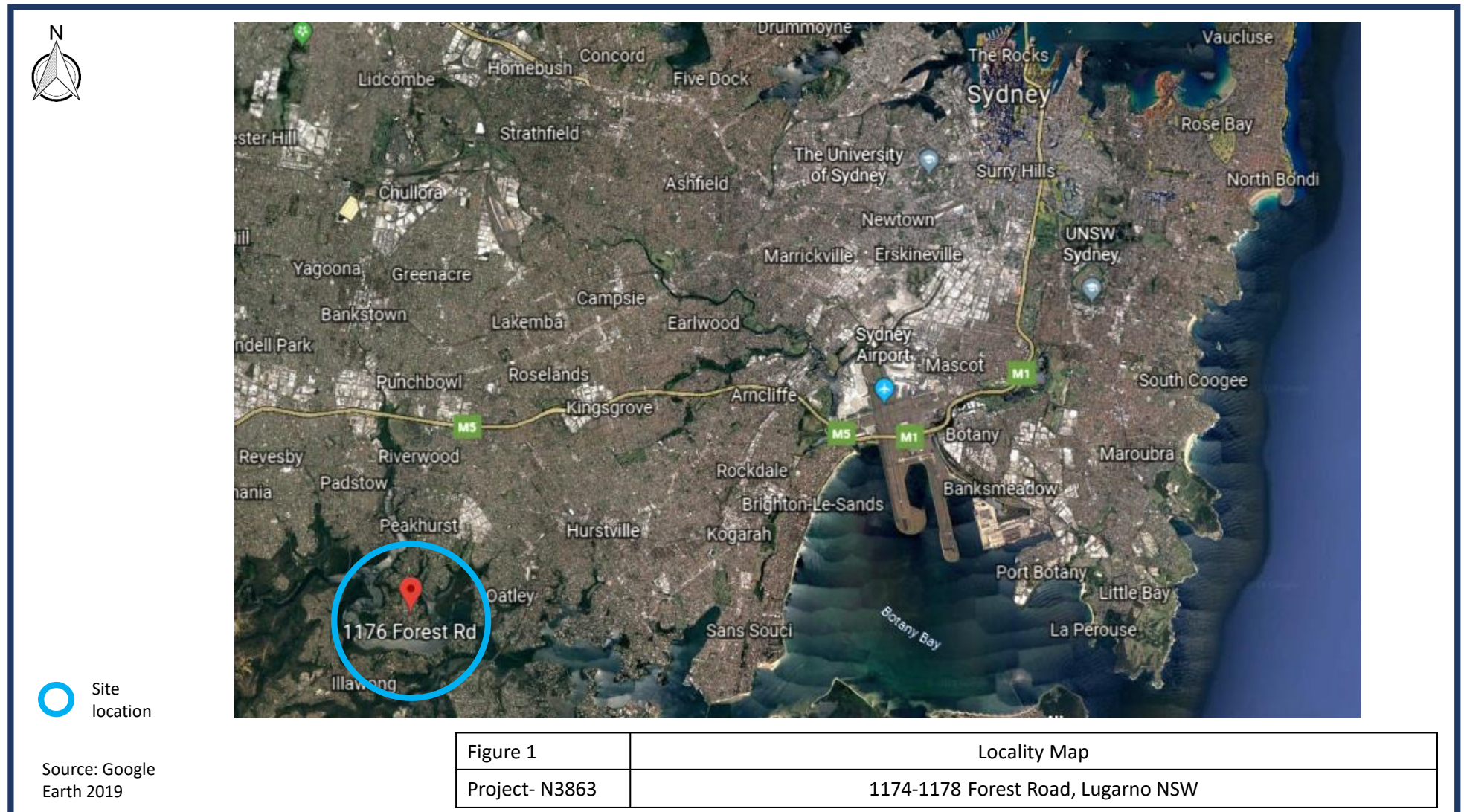


### 13. REFERENCES

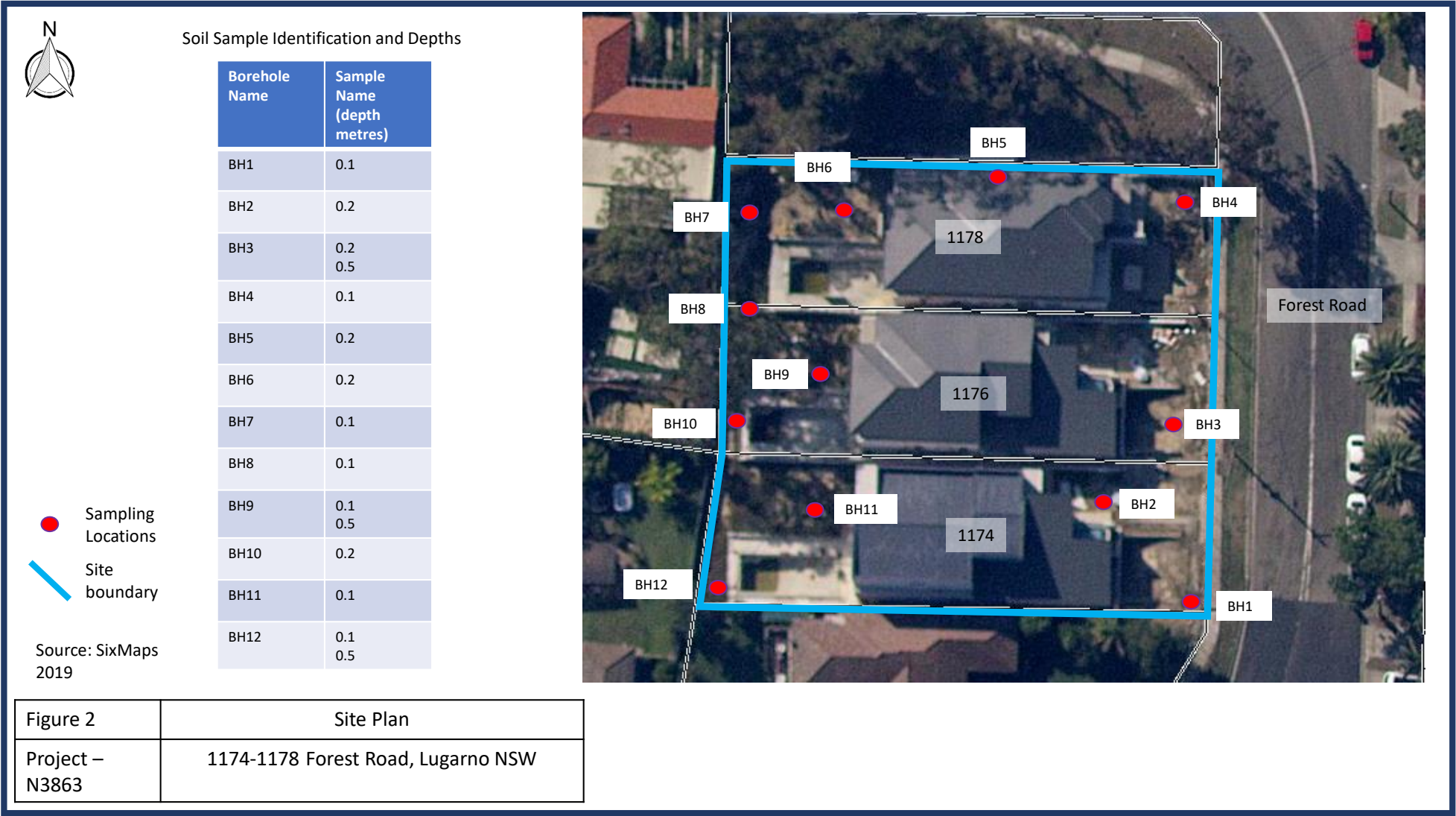
- NSW Environmental Protection Authority, *Waste Classification Guidelines Part 1: Classifying Waste*, 2014.
- Google Earth, <https://www.google.com/earth>.
- National Environment Protection Measures (2013), *Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater*.
- National Environment Protection Measures (2013), *Schedule B2 – Guideline on Site Characterisation*.
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- NSW Environmental Protection Authority, *Guidelines for Consultants Reporting on Contaminated Sites*, 2011.
- NSW Environmental Protection Authority, *Sampling Design Guidelines*, 1995
- Six Maps, <https://www.maps.six.nsw.gov.au>.
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## FIGURES











# APPENDIX A

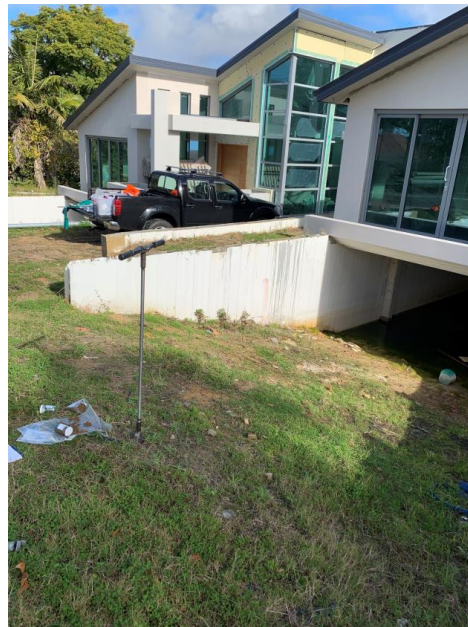
## Photographic log

## APPENDIX A

# PHOTOGRAPHIC LOG



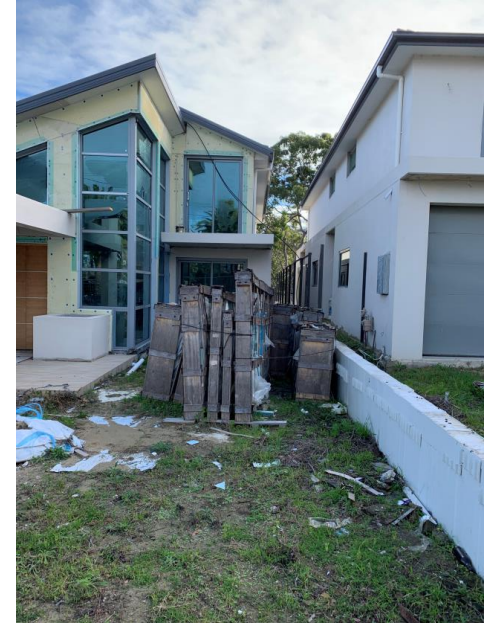
Photograph 1: Street view looking south-west at 1178 Forest Road, main dwelling and basement garage containing surface water.



Photograph 2: Street view looking south-west at 1176 Forest Road, main dwelling and basement garage containing surface water.



Photograph 3: View looking north from 1176 Forest Road, eastern portion of the site. Construction materials, waste and fill material with grass cover visible.



Photograph 4: View looking at 1176 Forest Road, from eastern portion of the site. Construction materials, waste and fill material with grass cover visible.

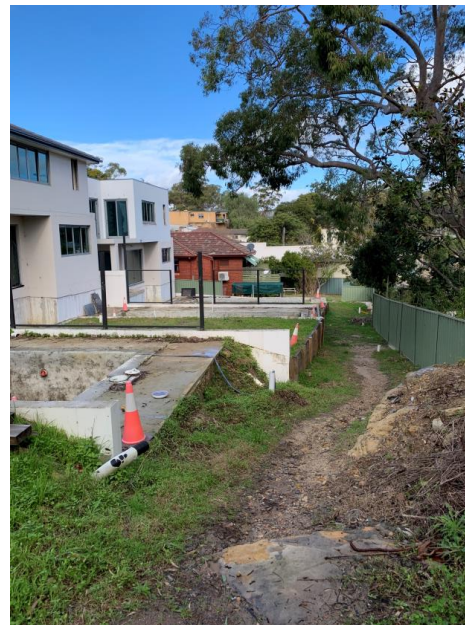




Photograph 5: Street view looking west at 1174 Forest Road, main dwelling and ground-level garage.



Photograph 6: Street view looking north at 1174 Forest Road, main dwelling and adjacent garage.



Photograph 7: View looking south from north-west corner of the site. Exposed fill material visible.



Photograph 8: View looking north from rear of 1178 Forest Road dwelling.





Photograph 9: Western portion of 1174 Forest Road. Image shows grass covered fill material.



Photograph 10: Western portion of 1174-1176 Forest Road. Image shows exposed fill material including crushed bricks, tiles concrete.



Photograph 11: Western portion of 1178 Forest Road. Image shows grass covered fill material and in-ground swimming pool with surface water.



Photograph 12: Western portion of 1178 Forest Road. Image shows grass covered fill material and green waste.





Photograph 13: Suspected Asbestos Containing Material (ACM) fragment on ground surface of fill material in north-western portion of the site .



Photograph 14: Typical fill material across the site consisting of gravelly, clayey sand with crushed sandstone, bricks and tiles.



# APPENDIX B

## Previous site investigation



## APPENDIX B

### PREVIOUS SITE INVESTIGATIONS



A U S T R A L I A N  
GEOTECHNICAL

Australian Geotechnical Pty Ltd  
ACN 611 088 192  
ABN 27 611 088 192  
2 Shirley Street,  
Rose Hill, NSW, 2142  
info@austgeo.com.au

Our Ref: AG-372\_1  
21<sup>st</sup> May 2018

Astor Homes Pty Ltd

11 Tanglewood Place,  
WEST PENNANT HILLS  
New South Wales 2125

**RE: PRELIMINARY SITE INVESTIGATION AT  
1174 to 1178 FOREST ROAD LUGARNO, NSW, 2210**

### **1.0 Introduction**

As requested, Australian Geotechnical Pty Ltd (AG) undertook sampling and testing on the 6<sup>th</sup> May 2018 at the above site for the purpose of preliminary site investigation. This has been undertaken to assess whether the material placed within the western portion of site (Refer to Appendix A for approximate fill location) presents a risk to human health. Based on discussions with the client, it is understood that filling material has been placed behind retaining structures within the site to a maximum depth of 1.0m during construction of the residential dwellings.

### **2.0 Scope of Work**

AG carried out the following scope of works in order to complete the material classification;

- Site Inspection by a representative from AG to ascertain current activities, and any visible signs of contamination;
- Collection of soil samples according to a sampling plan.
- Transferring samples to a NATA accredited laboratory for analysis;

- Laboratory analysis of samples for Heavy Metals, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), OC and OP Pesticides, Polychlorinated Biphenyl (PCBs), Electrical Conductivity, pH and Asbestos;
- Preparation of a report detailing findings and recommendations in general accordance with the National Environment Protection Council (NEPC) National Environment Protection Measure (Assessment of Site Contamination) 2013 (NEMP ASC 2013) and NSW Office of Environment and Heritage Guidelines for Consultants Reporting on Contaminated Sites (OEH 2011); and
- Preparation of a report outlining investigation methodology, sampling rationale, interpretation of the test data and a conclusion.

### **3.0 Field Investigation, Site Inspection and Sampling**

Discrete sampling was undertaken in general accordance with AS1141.3.1-2014 methods for sampling and testing aggregates in accordance with Appendix 1 of the Waste Classification Guidelines (2014) published by the Environment Protection Authority NSW. Minimum Sampling densities were adopted from Table 1 of the '*The Excavated Natural Material Order 2014*', with six (6) samples (based on an total area of less than 1000m<sup>2</sup>).

Material was selected from hand auger excavations into the fill soil horizon, which generally comprised of Silty Gravelly Clay, medium to high plasticity, brown mottled grey red, moist, hard. Samples numbered E1-400mm, E2-300mm, E3-500mm, E4-600mm, E5-850mm and E6-200mm were selected from this soil horizon

It should be noted that paint chips, sulphidic ores, hydrocarbon odours, or foreign material such as brick and concrete were not observed at the time of our inspection. Furthermore, no visible asbestos contamination was observed.

The samples were placed in 250ml glass jars with Teflon lined lids, with asbestos samples placed in separate bags. The samples were then placed in a chilled container to maintain samples at a temperature below approximately 4°C then were then transported to SGS Pty Ltd (NATA accredited laboratory) under stringent chain of custody (COC) procedures. Each sample location was excavated utilizing hand equipment to a maximum depth of up to 850mm. The sample was collected directly from the auger using a stainless steel trowel, which had been decontaminated prior to use to prevent cross contamination occurring.

**Image 1: South-East view at rear of constructed dwellings**



**Image 2: North-East view of retaining structures**



#### 4.0 Test Results

Test results obtained from SGS Environmental (Certificate Reference number SE192497) are summarised in Table 1 with the relevant contaminant threshold values. The table compares the results of the fill material to The National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; 'standard residential with garden/accessible soil' ('A') which is considered suitable for children's day care centres, preschools and primary schools.

**Table 1: Analysis of the solid sample (NEPM, 2013)**

Contaminant	Assessment Criteria (mg/kg)		Maximum Concentration (mg/kg)	Acceptable comparing to Health Based Investigation Level (HIL'A')
	Health Based Investigation Level (HIL'A')	Health Screening Levels (HSL) mg/kg		
<b>Inorganics (Heavy Metals)</b>				
Arsenic (total)	100		11	Yes
Cadmium	20		<0.3	Yes
Chromium (VI)	100		8.8	Yes
Copper	6000		10	Yes
Lead	300		13	Yes
Mercury	40		<0.05	Yes
Nickel	400		0.9	Yes
Zinc	7400		45	Yes
<b>Organics</b>				
<b>TPH</b>				
C <sup>6</sup> -C <sup>10</sup>		50	<25	Yes
Benzene		10.6	<0.1	Yes
Toulene		190	<0.1	Yes
Ethylbenzene		390	<0.1	Yes
Xylene				
Phenol	3000			
<b>PAH</b>	300	45	<0.2	Yes
<b>OCP</b>		3	<1	Yes
Aldrin + Dieldrin	7			
Chlordane	50			
Heptachlor	6			
DDD+DDE+DDT	260			
<b>OPP</b>			<1	Yes
Diazinon				
Ethion				
Fenitrothion				
<b>PCB</b>	1		<1	Yes
Asbestos	0.01%	-	None Detected	Yes

## **5.0 Conclusion**

Test results analysed were compared against the Health Investigation Levels (HIL) and Health Screening Levels (HSL) for the exposure setting; 'standard residential with garden/accessible soil' ('A'). Results indicate that the material placed on-site behind retaining structures at 1174 to 1178 FOREST ROAD LUGARNO, NSW, 2210 (Refer to Appendix A for approximate fill location) does not present a risk to human health in a 'standard residential with garden/accessible soil' setting, therefore the material is considered suitable to remain on-site.

## **6.0 Limitations**

Australian Geotechnical (AG) has performed its services for this project in accordance with current industry codes and practices.

When assessing the nature and extent of contamination, this type of investigation (as per our commission) is not designed or capable of locating all ground conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall ground conditions. However, it should be noted that actual conditions in some parts of the site might differ from those found. If excavations reveal ground conditions significantly different from those shown in our findings, AG must be consulted. The actual presence of contaminated material at the site may potentially differ from that referred to or inferred herein, since no sampling program, no matter how complete, can reveal all anomalies and hot spots that may be present. Furthermore, our opinions and judgments expressed herein, which are based on our analysis of current industry codes and practices, should not be interpreted as legal opinions.

The scope and the period of AG services are described in the report and are subject to restrictions and limitations. AG did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by AG in regard to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by AG for incomplete or inaccurate data supplied by others.

Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

We trust that the information within and attached meets your present requirements. Should you have any queries, please do not hesitate to contact the undersigned.

**For and on behalf of AG**



**M. Tofler**

*Environmental Consultant*

Appendices: A. Sampling location plan  
B. Certificate of Analysis – SE192497

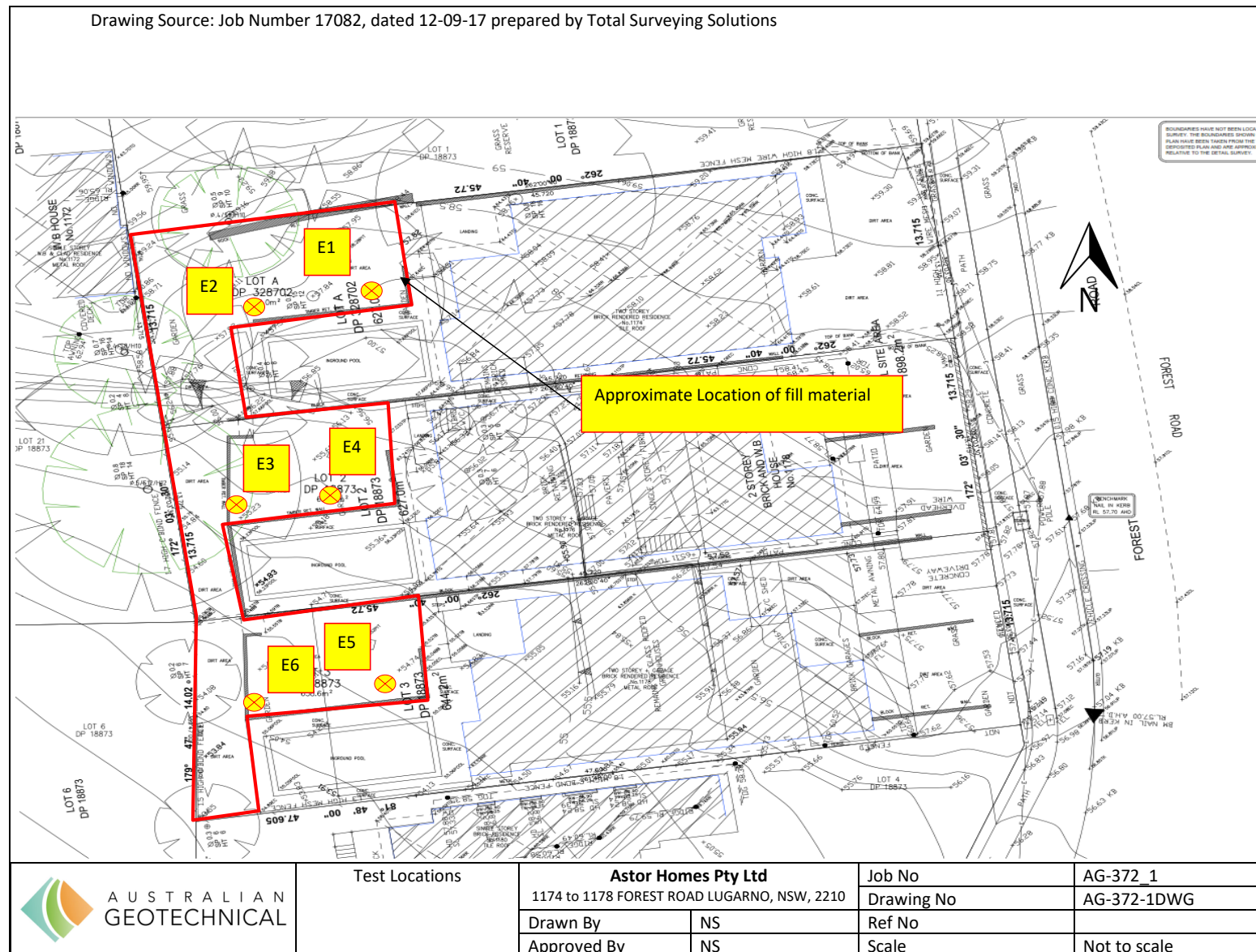
## APPENDIX A

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### FIGURES

*Figure 1: Sampling Location Plan View*





## **APPENDIX B**

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### **LABORATORY TEST RESULTS**



## ANALYTICAL REPORT



Accreditation No. 2562

## CLIENT DETAILS

Contact Nathan Smith  
 Client AUSTRALIAN GEOTECHNICAL PTY LTD  
 Address 2 SHIRLEY STREET  
 ROSEHILL NSW 2144

Telephone (Not specified)  
 Facsimile (Not specified)  
 Email nathan@austgeo.com.au  
 Project AG-372  
 Order Number AG-372  
 Samples 6

## LABORATORY DETAILS

Manager Huong Crawford  
 Laboratory SGS Alexandria Environmental  
 Address Unit 16, 33 Maddox St  
 Alexandria NSW 2015

Telephone +61 2 8594 0400  
 Facsimile +61 2 8594 0499  
 Email au.environmental.sydney@sgs.com  
 SGS Reference SE192497 R0  
 Date Received 6/5/2019  
 Date Reported 15/5/2019

## COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

## SIGNATORIES

**Kamrul Ahsan**  
 Senior Chemist

**Ly Kim Ha**  
 Organic Section Head

**Ravee Sivasubramaniam**  
 Hygiene Team Leader

**Shane McDermott**  
 Inorganic/Metals Chemist



## ANALYTICAL RESULTS

SE192497 R0

VOC's in Soil [AN433] Tested: 14/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			6/5/2019 SE192497.001	6/5/2019 SE192497.002	6/5/2019 SE192497.003	6/5/2019 SE192497.004	6/5/2019 SE192497.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	E6
			SOIL
			6/5/2019 SE192497.006
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1



## ANALYTICAL RESULTS

SE192497 R0

### Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 14/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 6/5/2019 SE192497.001	- 6/5/2019 SE192497.002	- 6/5/2019 SE192497.003	- 6/5/2019 SE192497.004	- 6/5/2019 SE192497.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	E6
			SOIL
			- 6/5/2019 SE192497.006
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25



## ANALYTICAL RESULTS

SE192497 R0

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			6/5/2019 SE192497.001	6/5/2019 SE192497.002	6/5/2019 SE192497.003	6/5/2019 SE192497.004	6/5/2019 SE192497.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	E6
			SOIL
			6/5/2019 SE192497.006
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210



## ANALYTICAL RESULTS

SE192497 R0

## PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.002	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.004	SOIL - 6/5/2019 SE192497.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	E6
			SOIL - 6/5/2019 SE192497.006
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8



## ANALYTICAL RESULTS

SE192497 R0

OC Pesticides in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1





## ANALYTICAL RESULTS

SE192497 R0

OP Pesticides in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7



## ANALYTICAL RESULTS

SE192497 R0

PCBs in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1



## ANALYTICAL RESULTS

SE192497 R0

pH in soil (1:5) [AN101] Tested: 13/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
pH	pH Units	0.1	7.2	7.3	7.8	7.7	8.4

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
pH	pH Units	0.1	8.1



## ANALYTICAL RESULTS

SE192497 R0

Conductivity and TDS by Calculation - Soil [AN106] Tested: 13/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			- 6/5/2019 SE192497.001	- 6/5/2019 SE192497.002	- 6/5/2019 SE192497.003	- 6/5/2019 SE192497.004	- 6/5/2019 SE192497.005
Conductivity of Extract (1:5 as received)	µS/cm	1	<b>21</b>	<b>70</b>	<b>59</b>	<b>56</b>	<b>120</b>
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	<b>23</b>	<b>76</b>	<b>64</b>	<b>61</b>	<b>120</b>

PARAMETER	UOM	LOR	E6
			SOIL
			- 6/5/2019 SE192497.006
Conductivity of Extract (1:5 as received)	µS/cm	1	<b>45</b>
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	<b>49</b>



## ANALYTICAL RESULTS

SE192497 R0

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 10/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.002	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.004	SOIL - 6/5/2019 SE192497.005
Arsenic, As	mg/kg	1	11	9	10	8	7
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	5.6	7.4	8.7	8.2	8.1
Copper, Cu	mg/kg	0.5	4.8	4.7	4.4	4.6	10
Lead, Pb	mg/kg	1	14	13	11	9	8
Nickel, Ni	mg/kg	0.5	0.9	0.6	<0.5	0.8	0.6
Zinc, Zn	mg/kg	2	83	48	44	41	39

PARAMETER	UOM	LOR	E6
			SOIL - 6/5/2019 SE192497.006
Arsenic, As	mg/kg	1	8
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	8.8
Copper, Cu	mg/kg	0.5	4.3
Lead, Pb	mg/kg	1	11
Nickel, Ni	mg/kg	0.5	<0.5
Zinc, Zn	mg/kg	2	45



## ANALYTICAL RESULTS

SE192497 R0

Mercury in Soil [AN312] Tested: 10/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
Mercury	mg/kg	0.05	<0.05



## ANALYTICAL RESULTS

SE192497 R0

Moisture Content [AN002] Tested: 10/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
% Moisture	%w/w	0.5	8.6	7.5	7.0	8.7	7.8

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
% Moisture	%w/w	0.5	8.9



## ANALYTICAL RESULTS

SE192497 R0

Fibre Identification in soil [AN602] Tested: 14/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
			SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
PARAMETER	UOM	LOR					
Asbestos Detected	No unit	-	No	No	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

			E6
			SOIL
			-
			6/5/2019
			SE192497.006
PARAMETER	UOM	LOR	
Asbestos Detected	No unit	-	No
Estimated Fibres*	%w/w	0.01	<0.01





## METHOD SUMMARY

SE192497 R0

## METHOD

## METHODOLOGY SUMMARY

AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl <sub>2</sub> ) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H <sup>+</sup> .
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states: "Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."



## METHOD SUMMARY

SE192497 R0

## AN602

The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if-

- (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres);
- (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg; and
- (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

## FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: [www.sgs.com.au/pv.sgsvr/en-gb/environment](http://www.sgs.com.au/pv.sgsvr/en-gb/environment).

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## ANALYTICAL REPORT



Accreditation No. 2562

## CLIENT DETAILS

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Project **AG-372**  
 Order Number **AG-372**  
 Samples 6

## LABORATORY DETAILS

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SGS Reference **SE192497 R0**  
 Date Received 06 May 2019  
 Date Reported 15 May 2019

## COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

## SIGNATORIES

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 Senior Chemist

Ly Kim Ha  
 Organic Section Head

Ravee Sivasubramaniam  
 Hygiene Team Leader

Shane McDermott  
 Inorganic/Metals Chemist



## ANALYTICAL REPORT

SE192497 R0

## RESULTS

## Fibre Identification in soil

Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE192497.001	E1	Soil	268g Sand,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.002	E2	Soil	172g Sand,Soil,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.003	E3	Soil	94g Sand,Soil,Rocks	06 May 2019	No Asbestos Found Organic Fibres Detected	<0.01
SE192497.004	E4	Soil	133g Sand,Soil,Rocks	06 May 2019	No Asbestos Found Organic Fibres Detected	<0.01
SE192497.005	E5	Soil	176g Clay,Sand,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.006	E6	Soil	193g Clay,Sand,Rocks	06 May 2019	No Asbestos Found	<0.01



## METHOD SUMMARY

SE192497 R0

## METHOD

## METHODOLOGY SUMMARY

AN602

Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.

AN602

Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf). The fibres detected may or may not be asbestos fibres.

AN602

AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states: "Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."

AN602

The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if-

- (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres);
- (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg; and
- (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

## FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service.
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.

Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.

Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: [www.sgs.com.au/py.sgsvr/en-gb/environment](http://www.sgs.com.au/py.sgsvr/en-gb/environment).

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**LPP019-24 Attachment 10**



# APPENDIX C

## Laboratory Analysis Reports

# APPENDIX C

## LABORATORY

## ANALYTICAL RESULTS





**Envirolab Services Pty Ltd**  
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 12 Ashley St Chatswood NSW 2067  
 ph 02 9910 6200 fax 02 9910 6201  
 customerservice@envirolab.com.au  
 www.envirolab.com.au

### **CERTIFICATE OF ANALYSIS 220438**

<b>Client Details</b>	
<b>Client</b>	NEO Consulting Pty Ltd
<b>Attention</b>	Nick Caltabiano
<b>Address</b>	PO Box 279, Riverstone, NSW, 2765

<b>Sample Details</b>	
<b>Your Reference</b>	<b>N3863</b>
<b>Number of Samples</b>	19 Soil
<b>Date samples received</b>	26/06/2019
<b>Date completed instructions received</b>	26/06/2019

<b>Analysis Details</b>	
Please refer to the following pages for results, methodology summary and quality control data.	
Samples were analysed as received from the client. Results relate specifically to the samples as received.	
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.	
<b>Please refer to the last page of this report for any comments relating to the results.</b>	

<b>Report Details</b>	
<b>Date results requested by</b>	03/07/2019
<b>Date of Issue</b>	02/07/2019
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### **Asbestos Approved By**

Analysed by Asbestos Approved Identifier: Lucy Zhu  
 Authorised by Asbestos Approved Signatory: Lucy Zhu

#### **Results Approved By**

Hinoko Miyazaki, Senior Chemist  
 Jaimie Loa-Kum-Cheung, Metals Supervisor  
 Jeremy Faircloth, Operations Manager, Sydney  
 Lucy Zhu, Senior Asbestos Analyst  
 Priya Samarawickrama, Senior Chemist  
 Steven Luong, Organics Supervisor

#### **Authorised By**

Nancy Zhang, Laboratory Manager

## Client Reference: N3863

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	85	74	87	82	86

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	83	86	81	83	88

## Client Reference: N3863

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	90	81	73	86	87

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	87

## Client Reference: N3863

svTRH (C10-C40) in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	87	87	89	88	85

svTRH (C10-C40) in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	85	85	84	85	85

## Client Reference: N3863

svTRH (C10-C40) in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	86	84	84	85	83

svTRH (C10-C40) in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	84

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j,k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	98	83	90	86	92

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	87	86	91	86	85

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	86	84	87	85	90



## Client Reference: N3863

PAHs in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	93

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	90	89	89

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	85	87	90	86

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	89	87	86	87

## Client Reference: N3863

Organochlorine Pesticides in soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	88

Client Reference: N3863

Organophosphorus Pesticides						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	90	89	89

Organophosphorus Pesticides						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	85	87	90	86

## Client Reference: N3863

Organophosphorus Pesticides						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	89	87	86	87

Organophosphorus Pesticides		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyrifos	mg/kg	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	88

**Client Reference: N3863**

Acid Extractable metals in soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	28	6	<4	5	10
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	9	10	27	11
Copper	mg/kg	6	9	3	<1	16
Lead	mg/kg	12	19	6	3	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	3	1	<1	3
Zinc	mg/kg	29	43	12	5	94

Acid Extractable metals in soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	<4	12	10	8	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	7	9	11	11	10
Copper	mg/kg	6	4	5	5	5
Lead	mg/kg	16	12	11	10	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	<1	<1	<1
Zinc	mg/kg	54	120	57	58	56



## Client Reference: N3863

Acid Extractable metals in soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	8	7	8	15	13
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	9	11	17	10
Copper	mg/kg	4	6	5	3	5
Lead	mg/kg	9	9	9	7	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	<1	<1	<1	<1
Zinc	mg/kg	51	48	52	52	44

Acid Extractable metals in soil			
Our Reference		220438-19	220438-20
Your Reference	UNITS	QS-1	BH1 0.1 - [TRIPLICATE]
Type of sample		Soil	Soil
Date prepared	-	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019
Arsenic	mg/kg	27	23
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	13	11
Copper	mg/kg	7	8
Lead	mg/kg	14	14
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	2	1
Zinc	mg/kg	31	31

**Client Reference: N3863**

Moisture						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	16	16	15	15	17

Moisture						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	12	16	10	14	10

Moisture						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	9.0	10	12	12	15

Moisture		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date prepared	-	27/06/2019
Date analysed	-	28/06/2019
Moisture	%	16

## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001						
Our Reference		220438-1	220438-3	220438-4	220438-6	220438-7
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH4 0.1	BH5 0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Sample mass tested	g	713.1	567.76	521.6	616.05	599.57
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	—	—	—	—	—
FA and AF Estimation*	g	—	—	—	—	—
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001						
Our Reference		220438-9	220438-10	220438-11	220438-13	220438-15
Your Reference	UNITS	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1	BH10 0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Sample mass tested	g	569.02	523.52	517.82	656.5	522.05
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	Chrysotile asbestos detected  Organic fibres detected	Chrysotile asbestos detected  Amosite asbestos detected  Crocidolite asbestos detected  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	<0.1	8.2932	2.0399	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	See Above	See Above	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	—	4.3416	1.0563	—	—
FA and AF Estimation*	g	—	—	—	—	—
ACM >7mm Estimation*	%(w/w)	<0.01	0.8293	0.2040	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001			
Our Reference		220438-16	220438-17
Your Reference	UNITS	BH11 0.1	BH12 0.1
Type of sample		Soil	Soil
Date analysed	-	27/06/2019	27/06/2019
Sample mass tested	g	582.31	599.55
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected Synthetic mineral fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	0.8087	<0.1
Asbestos ID in soil <0.1g/kg*	-	See Above	No visible asbestos detected
ACM >7mm Estimation*	g	0.4709	—
FA and AF Estimation*	g	—	—
ACM >7mm Estimation*	%(w/w)	0.0809	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001

**Client Reference: N3863**

Misc Inorg - Soil					
Our Reference		220438-1	220438-3	220438-7	220438-18
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH5 0.2	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Date analysed	-	01/07/2019	01/07/2019	01/07/2019	01/07/2019
pH 1:5 soil:water	pH Units	7.1	8.9	9.0	6.6

**Client Reference: N3863**

CEC					
Our Reference		220438-1	220438-3	220438-7	220438-18
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH5 0.2	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Date analysed	-	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Exchangeable Ca	meq/100g	7.8	20	22	3.5
Exchangeable K	meq/100g	0.1	0.1	0.2	<0.1
Exchangeable Mg	meq/100g	0.80	0.24	0.31	0.28
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	8.8	21	22	3.9

**Client Reference: N3863**

Method ID	Methodology Summary
<b>ASB-001</b>	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
<b>ASB-001</b>	<p>Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004.</p> <p>Results reported denoted with * are outside our scope of NATA accreditation.</p> <p><b>NOTE #1</b> Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM &gt;7mm, &lt;7mm and FA/AF)</p> <p><b>NOTE #2</b> The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.</p> <p>Estimation = Estimated asbestos weight</p> <p>Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.</p>
<b>Inorg-001</b>	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
<b>Inorg-008</b>	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
<b>Metals-009</b>	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-021</b>	Determination of Mercury by Cold Vapour AAS.
<b>Org-003</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.



**Client Reference: N3863**

Method ID	Methodology Summary
<b>Org-003</b>	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.</p> <p>F2 = (&gt;C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.</p> <p>Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (&gt;C10-C40).</p>
<b>Org-005</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
<b>Org-005</b>	<p>Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.</p> <p>Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.</p>
<b>Org-008</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
<b>Org-012</b>	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.</p> <p>For soil results:-</p> <ol style="list-style-type: none"> <li>1. 'EQ PQL' values are assuming all contributing PAHs reported as &lt;PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present.</li> <li>2. 'EQ zero' values are assuming all contributing PAHs reported as &lt;PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL.</li> <li>3. 'EQ half PQL' values are assuming all contributing PAHs reported as &lt;PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above.</li> </ol> <p>Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.</p>
<b>Org-014</b>	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
<b>Org-016</b>	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
<b>Org-016</b>	<p>Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.</p> <p>Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.</p>

## Client Reference: N3863

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			29/06/2019	1	29/06/2019	29/06/2019		29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	25	Org-016	<25	1	<25	<25	0	100	85
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	25	Org-016	<25	1	<25	<25	0	100	85
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	105	91
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	102	89
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	83
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	96	80
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	82
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	1	85	72	17	96	79

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	29/06/2019	29/06/2019		[NT]	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	25	Org-016	[NT]	14	<25	<25	0	[NT]	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	25	Org-016	[NT]	14	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	14	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	14	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	14	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	14	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	14	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	14	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	14	90	88	2	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	50	Org-003	<50	1	<50	<50	0	101	98
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	100	93
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	71	103
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	50	Org-003	<50	1	<50	<50	0	101	98
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	100	93
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	71	103
Surrogate o-Terphenyl	%		Org-003	89	1	87	88	1	112	108

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	50	Org-003	[NT]	14	<50	<50	0	[NT]	[NT]
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	50	Org-003	[NT]	14	<50	<50	0	[NT]	[NT]
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	14	86	84	2	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	108	108
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	98
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	96
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	96
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	98
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	96
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	96	94
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	86	1	98	90	9	93	90

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	[NT]	14	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	14	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	14	86	85	1	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	87	79
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	86
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	90	84
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	88
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	88
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	98	92
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	102	103
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	82
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	83	77
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	74
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	93	1	90	91	1	89	84

Client Reference: N3863

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	14	87	90	3	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	101	96
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	89	100
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	90	87
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	110	96
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	106	91
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	112	106
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	99	89
Surrogate TCMX	%		Org-008	93	1	90	91	1	92	88

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	14	87	90	3	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date prepared	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Arsenic	mg/kg	4	Metals-020	<4	1	28	28	0	105	102
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	103	96
Chromium	mg/kg	1	Metals-020	<1	1	11	11	0	109	102
Copper	mg/kg	1	Metals-020	<1	1	6	10	50	109	111
Lead	mg/kg	1	Metals-020	<1	1	12	15	22	112	107
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	97	100
Nickel	mg/kg	1	Metals-020	<1	1	1	3	100	110	104
Zinc	mg/kg	1	Metals-020	<1	1	29	36	22	116	106

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	14	8	9	12	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	14	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	14	11	10	10	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	14	4	6	40	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	14	9	13	36	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	14	1	1	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	14	51	71	33	[NT]	[NT]



**Client Reference: N3863**

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			01/07/2019	[NT]	[NT]	[NT]	[NT]	01/07/2019	[NT]
Date analysed	-			01/07/2019	[NT]	[NT]	[NT]	[NT]	01/07/2019	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]

## Client Reference: N3863

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			02/07/2019	7	02/07/2019	02/07/2019		02/07/2019	[NT]
Date analysed	-			02/07/2019	7	02/07/2019	02/07/2019		02/07/2019	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	7	22	21	5	105	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	7	0.2	0.2	0	108	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	7	0.31	0.29	7	109	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	7	<0.1	<0.1	0	108	[NT]

**Client Reference: N3863**

Result Definitions	
<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

Quality Control Definitions	
<b>Blank</b>	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
<b>Matrix Spike</b>	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
<b>LCS (Laboratory Control Sample)</b>	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

**Client Reference: N3863**

### Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

**Client Reference: N3863**

### Report Comments

Asbestos-ID in soil: NEPM

This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 220438-1 for Cu. Therefore a triplicate result has been issued as laboratory sample number 220438-20.

Sample information					Tests Required												Comments		
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	BTEX	TRH	PAH	TOTAL METALS	OC/OP	ASBESTOS (QUANTIFICATION)	PH	CEC							Provide as much information about the sample as you can
	BH1 0.1				X	X	X	X	X	X	X	X							
	BH1 0.5																		HOLD
	BH2 0.2				X	X	X	X	X	X	X	X							
	BH3 0.2				X	X	X	X	X	X									
	BH3 0.5				X	X	X	X	X										
	BH4 0.1				X	X	X	X	X	X									
	BH5 0.2				X	X	X	X	X	X	X	X							
	BH5 0.7																		HOLD
	BH6 0.2				X	X	X	X	X	X									
	BH7 0.1				X	X	X	X	X	X									
	BH8 0.1				X	X	X	X	X	X									
	BH8 0.5																		HOLD
	BH9 0.1				X	X	X	X	X	X									
<input type="checkbox"/> Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis																			
Relinquished by (Company):					Received by (Company):					Lab Use Only									
Print Name: D TAYLOR					Print Name:					Job number:					Cooling: Ice / Ice pack / None				
Date & Time 26.6.19					Date & Time:					Temperature:					Security seal: Intact / Broken / None				
Signature:					Signature:					TAT Req - SAME day / 1 / 2 / 3 / 4 / STD									





# APPENDIX D

## Supporting Documents



## APPENDIX D

# SUPPORTING DOCUMENTS



Job No 16517804

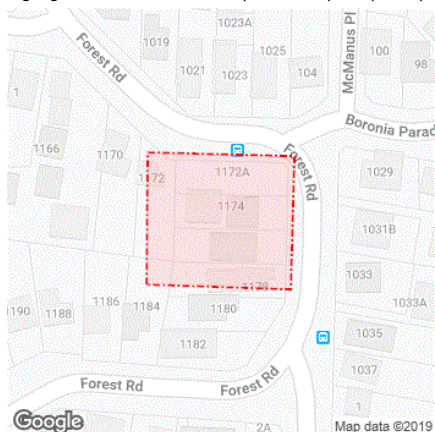
Phone: 1100  
www.1100.com.au**Caller Details**

**Contact:** Mr Daniel Taylor  
**Company:** Not Supplied  
**Address:** 76/20 Illawong Avenue  
 Sydney NSW 2026

**Caller Id:** 1941922 **Phone:** 0409492988  
**Mobile:** Not Supplied **Fax:** Not Supplied  
**Email:** dataylor88@outlook.com

**Dig Site and Enquiry Details**

**WARNING:** The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



**User Reference:** DSI  
**Working on Behalf of:** Private  
**Enquiry Date:** 24/06/2019 **Start Date:** 26/06/2019 **End Date:** 26/06/2019  
**Address:** 1174 Forest Road  
 Lugarno NSW 2210  
**Job Purpose:** Design  
**Location of Workplace:** Private Property  
**Onsite Activity:** Planning & Design  
**Location in Road:** Not Supplied

- Check the location of the dig site is correct. If not submit a new enquiry.
- If the scope of works change, or plan validity dates expire, resubmit your enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

**Notes/Description of Works:**  
 Not Supplied

**Your Responsibilities and Duty of Care**

- The lodgement of an enquiry does not authorise the project to commence. You must obtain all necessary information from any and all likely impacted asset owners prior to excavation.
- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at [www.1100.com.au](http://www.1100.com.au)
- For more information on safe excavation practices, visit [www.1100.com.au](http://www.1100.com.au)

**Asset Owner Details**

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days. Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.

\*\* Asset owners highlighted by asterisks \*\* require that you visit their offices to collect plans.

# Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

Seq. No.	Authority Name	Phone	Status
84785210	Ausgrid	0249510899	NOTIFIED
84785208	Georges River Council	0293306400	NOTIFIED
84785214	Jemena Gas South	1300880906	NOTIFIED
84785215	Sydney Water	132092	NOTIFIED
84785212	Telstra NSW, Central	1800653935	NOTIFIED

END OF UTILITIES LIST

**Lodge Your Free Enquiry Online – 24 Hours a Day, Seven Days a Week**



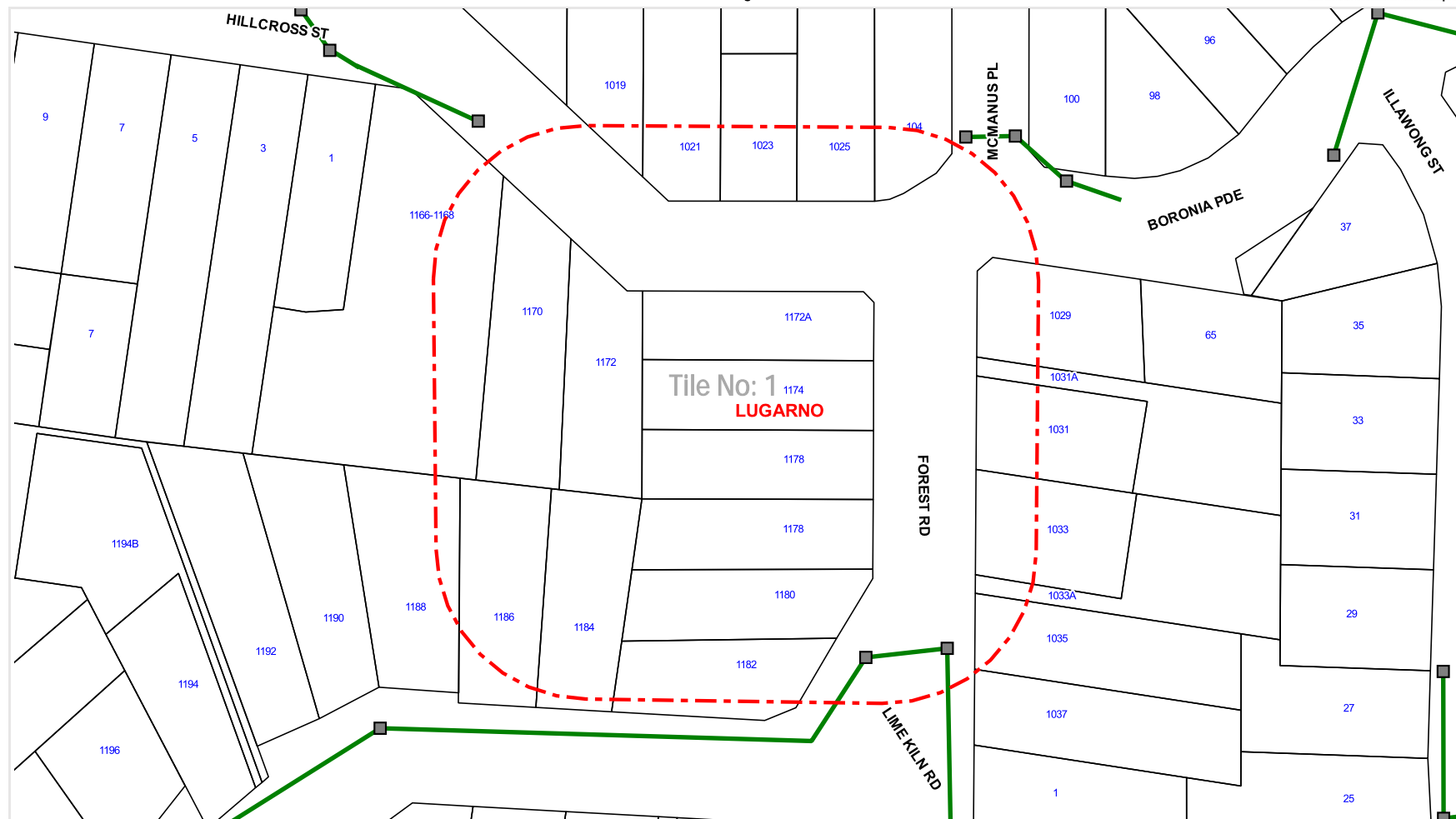
Sequence No: 84785208

Job No: 16517804

Location: 1174 Forest Road, Lugarno, NSW 2210



The Essential First Step.



Legend | Scale: 1:1000



Please refer to attached Georges River Council Map Legend

**DISCLAIMER:** While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither Georges River Council or PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

If further information is required, please contact:

Ausgrid DBYD

Phone: (02) 4951 0899

Fax: (02) 4951 0729

Emergency Phone Number 131388



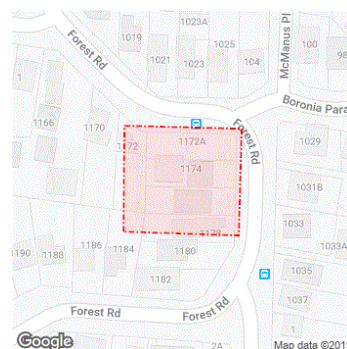
## Underground Cable Location Search Advice -- Ausgrid Assets Affected --

To:	Mr Daniel Taylor Not Supplied 76/20 Illawong Avenue Sydney NSW 2026	Phone No:	0409492988
		Issue Date:	24/06/2019

In response to your enquiry, Sequence No: 84785210 the records of Ausgrid disclose that there **are** Ausgrid underground cables in the defined search location and relevant Ausgrid plans have been provided.

This search is based on the geographical position of the dig site as denoted in the Dial Before You Dig caller confirmation sheet and an overview is provided:

Address:	1174 Forest Road Lugarno NSW 2210
Job #:	16517804



### \*\*Important\*\*

- All information provided to you is **ONLY VALID FOR 30 DAYS** from the date of issue
- You must keep Ausgrid plans on site during excavation works. If the people actually performing the excavation works do not know how to read and interpret Ausgrid's plans, then the work must be directed by a person who knows how to read and interpret plans.
- If you require a full size print of A0 plans and don't have the resources to do so please contact our office on 49510899 to request a hard copy to be posted. **Please allow 3 working days for delivery.**
- Please note you will ONLY receive portions of your search area that contain Ausgrid Underground Assets

### YOU MUST READ AND UNDERSTAND THE **SUPPLEMENTARY MATERIAL** CONTAINED IN THIS ADVICE **BEFORE** PROCEEDING WITH ANY WORKS.

#### Summary of Supplementary Information:

Material	Purpose	Location
<b>URGENT SAFETY ALERT</b>	Safety precautions when working on or near low voltage stranded aluminium cable	Web Link <a href="#">[Click Here]</a>
Important Information.pdf	Details important information	Attached
Working near Ausgrid Cables.pdf	Summary of NS156	Attached
COMN0119 How To Read Ausgrid Plans.pdf	Details how to read Ausgrid plans	Attached
SafeWork NSW "Work near underground assets: Guide"	To assist you in deciding appropriate measures to eliminate or control risks when working near underground assets.	Web Link <a href="#">[Click Here]</a>
Ausgrid's Network Standard NS156	For important information for work near or around underground cables	Web Link <a href="#">[Click Here]</a>
Working in Confined Spaces	For important information when working in confined spaces	Web Link <a href="#">[Click Here]</a>





## Network Protection

### High Pressure - Assets Affected

In reply to your enquiry, there are **High Pressure Gas Mains** in the vicinity of your intended work, as generally illustrated on the attached map. There may also be other mains or services at the location, as discussed in the warning below. For an explanation of the map, please see the key below.

The following excavations guidelines apply:

#### Excavation Guidelines:

Prior to **any** excavations in this area, you **must** contact the High Pressure Response Coordinator on **1300 665 380**. **(Appointments will be coordinated with availability of a Jemena Representative)** to arrange a survey. For all works in the vicinity of High Pressure Gas Mains you must arrange for a Jemena Representative to attend and supervise all excavations. Charges apply for attendance of any works outside the hours of 7am to 4pm, Monday to Friday ("**Standard Business Hours**") and for any attendance during Standard Business Hours that is longer than 2 hours.

In accordance with clause 34(5) of the Gas Supply (Safety and Network Management) Regulation 2013 (NSW), you should be informed that all excavation, (including pot-holing by hand to confirm the location of pipes) should be performed in accordance with "**Work Near Underground Assets Guideline**" published in 2007 by the Work Cover Authority.

A copy of this Guideline is available at: [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)

KEY					
Main	In Service	Proposed	High Pressure Main & Pipeline		Fittings, Valves & Regulators
Unknown Pressure	—	----	Secondary - 1050 kPa		Regulator Set
Distribution - 2 kPa			Secondary Service - 1050kPa		Regulator Station
Distribution - 7 kPa			Primary - 3500 kPa		Automatic Line Break Valve
Distribution - 30 kPa			JGN Trunk - 4000 to 14500 kPa		Valve
Distribution - 100 kPa			Transmission		Siphon
Distribution - 210 kPa			50mm Nylon main inserted into 6 inch (Nominal Bore) Cast Iron Main		
Distribution - 300 kPa			32mm Nylon main inserted into 50mm Steel Main		
Distribution - 400 kPa			MBK = Metres Back of Kerb MFL = Metres from Fence Line		
Critical Main - Treat as High Pressure Main					

**Warning:** The enclosed plans show the position of Jemena Gas Networks (NSW) Ltd's underground gas mains and installations in public gazetted roads only. **Individual customers' services and services belonging to other third parties are not included** on these plans. These plans have been prepared solely for the use of Jemena Gas Networks (NSW) Ltd and Jemena Asset Management Pty Ltd (together "**Jemena**") and any reliance placed on these plans by you is entirely at your own risk. The plans may show the position of underground mains and installations relative to fences, buildings etc., as they existed at the time the mains etc were installed. The plans may not have been updated to take account of any subsequent change in the location or style of those features since the time at which the plans were initially prepared. Jemena makes no warranty as to the accuracy or completeness of the enclosed plans and does not assume any duty of care to you nor any responsibility for the accuracy, adequacy, suitability or completeness of the plans or for any error, omission, lack of detail, transmission failure or corruption in the information provided. Jemena does not accept any responsibility for any loss that you or anyone else may suffer in connection with the provision of these plans, however that loss may arise (including whether or not arising from the negligence of Jemena, its employees, agents, officers or contractors). The recipient of these plans must use their own care and diligence in carrying out their works and must carry out further surveys to locate services at their work site. Persons excavating or carrying out other earthworks will be held responsible for any damage caused to Jemena's underground mains and equipment. Jemena advises that you may be required to carry out potholing by hand if required by a Jemena Representative to confirm the location of Jemena's main and installations. This must also be performed by you under the supervision of a Jemena Representative and be carried out in accordance with the Working Near Underground Assets Guideline published in 2007 by Work Cover Authority

**In case of Emergency Phone 131 909 (24 hours)**

Admin  
1300 880 906

Jemena Asset Management Pty Ltd ABN 53 086 013 461  
for and on behalf of Jemena Gas Networks (NSW) Ltd ABN 87 003 004 322



## IMPORTANT INFORMATION - DIAL BEFORE YOU DIG

### Attention: You must read the information below

The material provided or made available to you by Sydney Water (including on the Sydney Water website) in relation to your Dial Before You Dig enquiry (**Information**) is provided on each of the following conditions, which you are taken to have accepted by using the Information:

- 1 The Information has been generated by an automated system based on the area highlighted in the "Locality Indication Only" window on your Caller Confirmation. It is your responsibility to ensure that the dig site is properly defined when submitting your Dial Before You Dig enquiry and, if the Information does not match the dig site, to resubmit your enquiry for the correct dig site.
- 2 Neither Sydney Water nor Dial Before You Dig make any representation or give any guarantee, warranty or undertaking (express or implied) as to the currency, accuracy, completeness, effectiveness or reliability of the Information. The Information, including Sydney Water plans and work-as-executed diagrams, amongst other things:
  - (a) may not show all existing structures, including Sydney Water's pipelines, particularly in relation to newer developments and in relation to structures owned by parties who do not participate in the Dial Before You Dig service;
  - (b) may be out of date and not show changes to surface levels, road alignments, fences, buildings and the like;
  - (c) is approximate only and is therefore not suitable for scaling purposes; and
  - (d) does not show locations of property services (often called house service lines) belonging to or servicing individual customers, which are usually connected to Sydney Water's structures.
- 3 You are responsible for, amongst other things:
  - (a) exposing underground structures, including Sydney Water's pipelines, by pot-holing using hand-held tools or vacuum techniques so as to determine the precise location and extent of structures before any mechanical means of excavation are used;
  - (b) the safe and proper excavation of and for underground works and structures, including having regard to the fact that asbestos cement pipelines, which can pose a risk to health, may form part of Sydney Water's water and sewerage reticulation systems;
  - (c) protecting underground structures, including Sydney Water's pipelines, from damage and interference;
  - (d) maintaining minimum clearances between Sydney Water's structures and structures belonging to others;
  - (e) ensuring that backfilling of excavation work in the vicinity of Sydney Water's structures complies with Sydney Water's standards contained on its website or otherwise communicated to you;
  - (f) notifying Sydney Water immediately of any damage caused or threat of damage to Sydney Water's structures;
  - (g) ensuring that plans are approved by Sydney Water (usually signified by stamping) prior to landscaping or building over or in the vicinity of any Sydney Water structure; and
  - (h) ensuring that the Information is used only for the purposes for which Sydney Water and Dial Before You Dig intended.

- 4 You acknowledge that you use the Information at your own risk. In consideration for the provision of the Dial Before You Dig service and the Information by Sydney Water and Dial Before You Dig, to the fullest extent permitted by law:
- (a) all conditions and guarantees concerning the Information (whether as to quality, outcome, fitness, care, skill or otherwise) expressed or implied by statute, common law, equity, trade, custom or usage or otherwise are expressly excluded and to the extent that those statutory guarantees cannot be excluded, the liability of Sydney Water and Dial Before You Dig to you is limited to either of the following as nominated by Sydney Water in its discretion, which you agree is your only remedy:
    - (i) the supplying of the Information again; or
    - (ii) payment of the cost of having the Information supplied again;
  - (b) in no event will Sydney Water or Dial Before You Dig be liable for, and you release Sydney Water and Dial Before You Dig from, any Loss arising from or in connection with the Information, including the use of or inability to use the Information and delay in the provision of the Information:
    - (i) whether arising under statute or in contract, tort or any other legal doctrine, including any negligent act, omission or default (including wilful default) by Sydney Water or Dial Before You Dig; and
    - (ii) regardless of whether Sydney Water or Dial Before You Dig are or ought to have been aware of, or advised of, the possibility of such loss, costs or damages;
  - (c) you will indemnify Sydney Water and Dial Before You Dig against any Loss arising from or in connection with Sydney Water providing incorrect or incomplete information to you in connection with the Dial Before You Dig service; and
  - (d) you assume all risks associated with the use of the Dial Before You Dig and Sydney Water websites, including risk to your computer, software or data being damaged by any virus, and you release and discharge Sydney Water and Dial Before You Dig from all Loss which might arise in respect of your use of the websites.
- 5 “**Sydney Water**” means Sydney Water Corporation and its employees, agents, representatives and contractors. “**Dial Before You Dig**” means Dial Before You Dig Incorporated and its employees, agents, representatives and contractors. References to “**you**” include references to your employees, agents, representatives, contractors and anyone else using the Information. References to “**Loss**” include any loss, cost, expense, claim, liability or damage (including arising in connection with personal injury, death or any damage to or loss of property and economic or consequential loss, lost profits, loss of revenue, loss of management time, opportunity costs or special damages). To the extent of any inconsistency, the conditions in this document will prevail over any other information provided to you by Sydney Water and Dial Before You Dig.

**In an emergency, or to notify Sydney Water of damage or threats to its structures, call 13 20 90 (24 hours, 7 days)**

Further information and guidance is available in the Building Development and Plumbing section of Sydney Water's website at [www.sydneywater.com.au](http://www.sydneywater.com.au), where you will find the following documents under 'Dial Before You Dig':

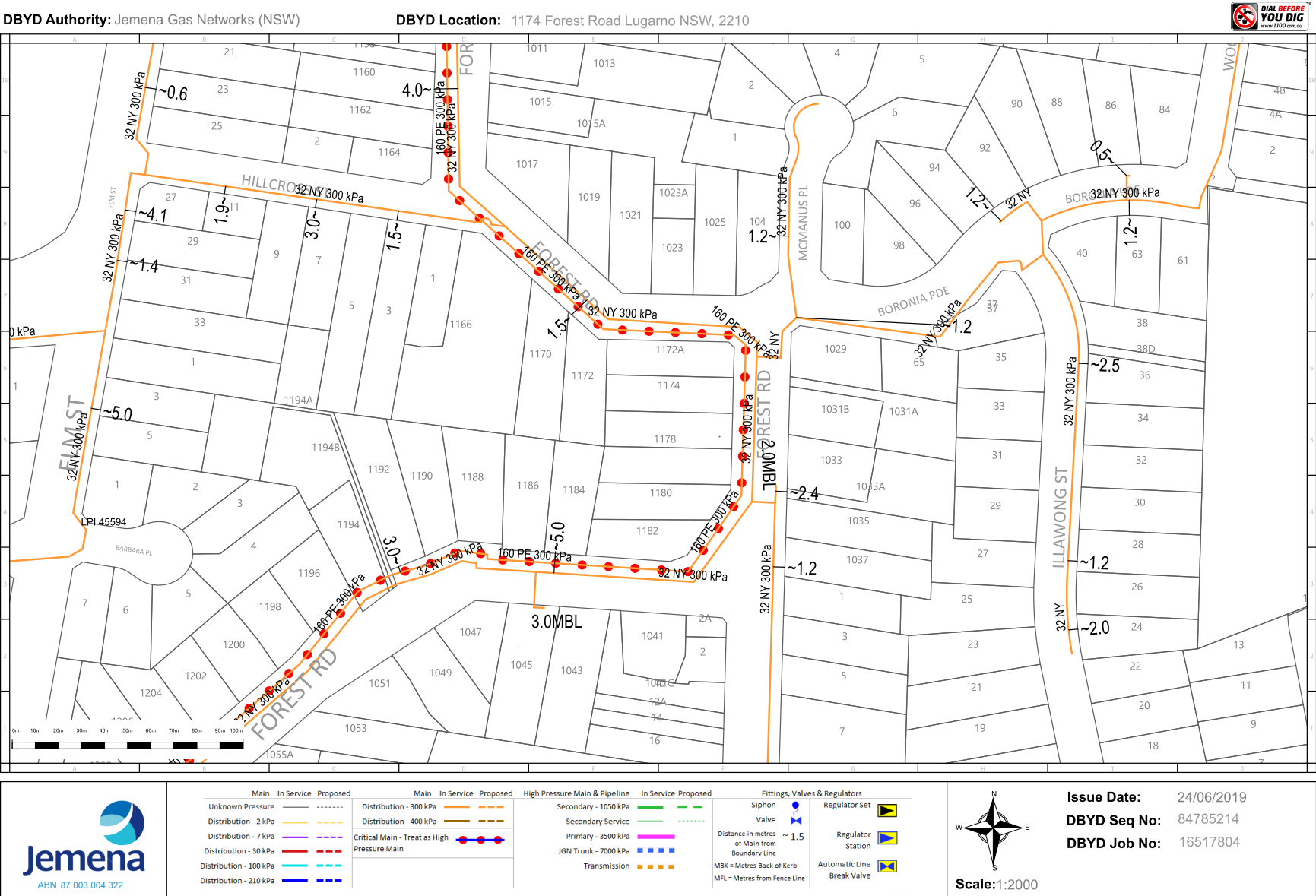
- Avoid Damaging Water and Sewer Pipelines
- Water Main Symbols
- Depths of Mains
- Guidelines for Building Over/Adjacent to Sydney Water Assets
- Clearances Between Underground Services

Or call **13 20 92** for Customer Enquires.

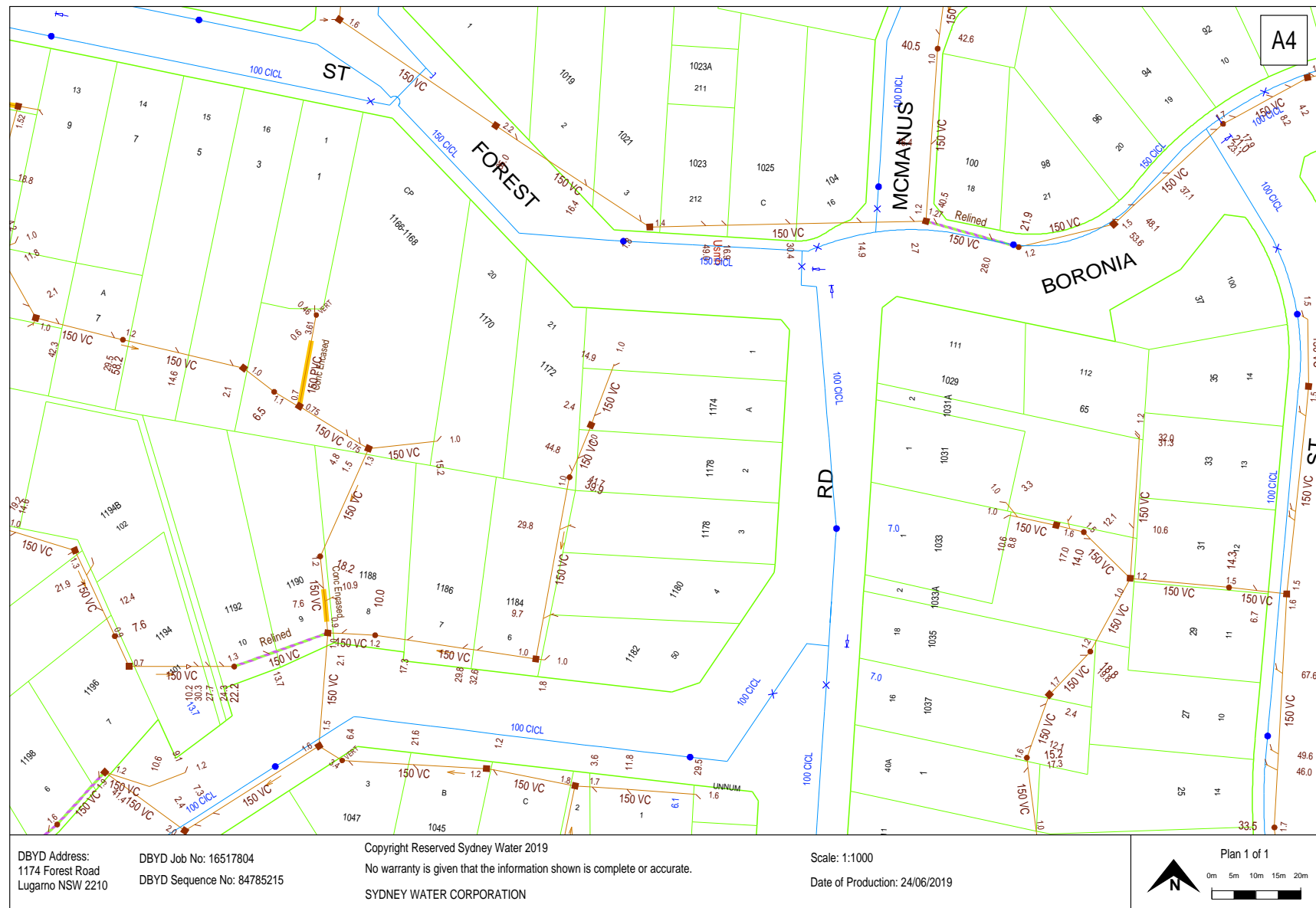
Note: The lodging of enquiries via [www.1100.com.au](http://www.1100.com.au) will enable you to receive colour plans in PDF format 24 hours a day, 7 days a week via email.

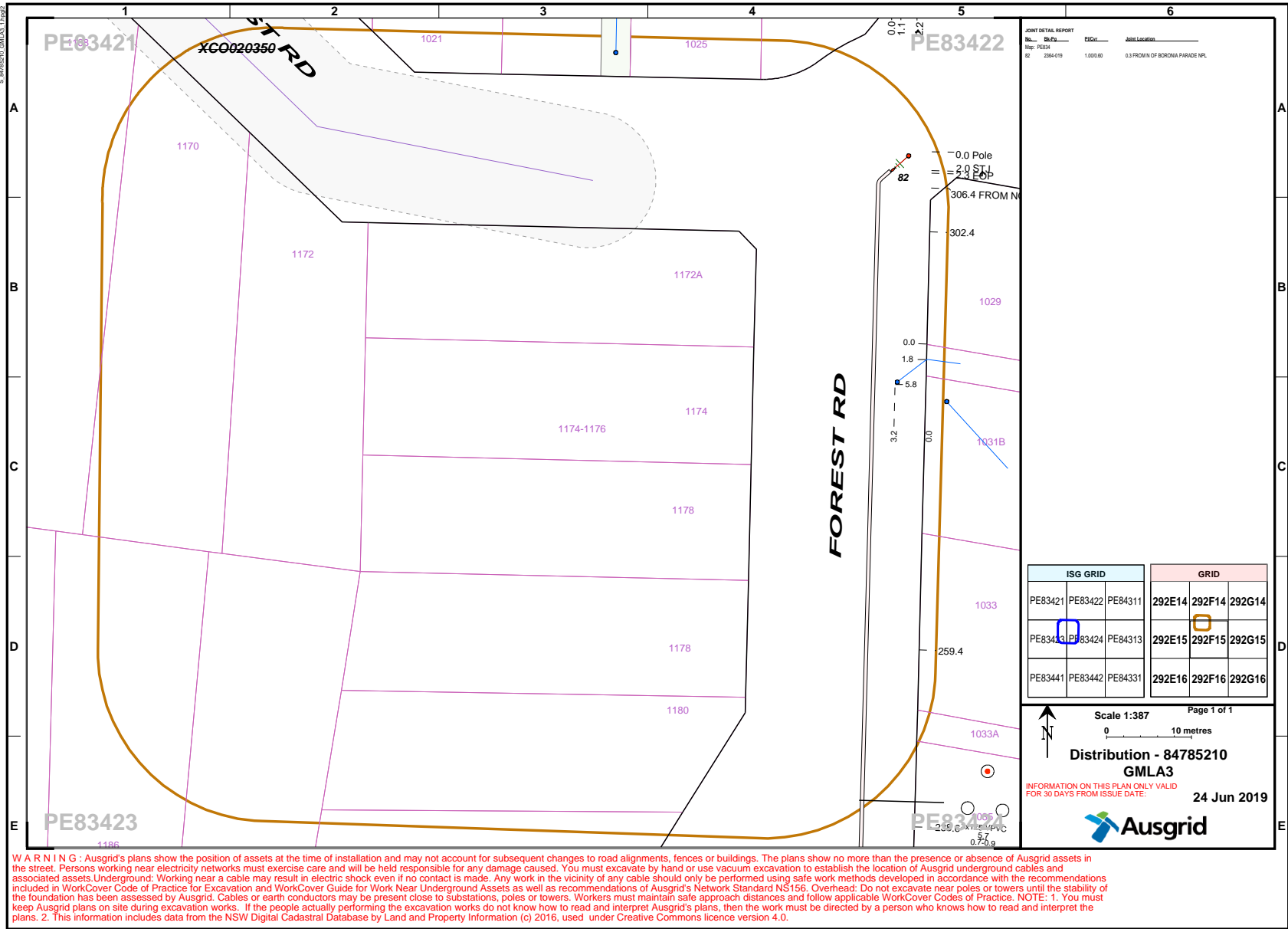
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**WARNING:** This is a representation of Jemena Gas Networks underground assets only and may not indicate all assets in the area. It must not be used for the purpose of exact asset location in order to undertake any type of excavation. This plan is diagrammatic only, and distances scaled from this plan may not be accurate. Please read all conditions and information on the attached information sheet. This extract is subject to those conditions. The information contained on this plan is only valid for 28 days from the date of issue.







## Spatial Services

### Works likely to impact survey marks

Penalties apply for unauthorised removal, damage, destruction, displacement, obliteration or defacing of survey marks

ISSN 2203-9384

Information Sheet

July 2018

### Legislation

Survey marks are protected under the *Surveying and Spatial Information Act 2002 (NSW) Section 24*. The following penalties and orders apply for unauthorised removal, damage or disturbance of survey marks:

- Maximum penalty of 25 units, currently **\$2,750** per mark; and
- up to **\$10,000** per mark in compensation to the Surveyor-General towards the cost of reinstatement of each survey mark; and
- up to **\$10,000** per mark in compensation to any other person towards any loss or damage suffered by that person as a consequence of the offence.

If works are likely to impact a survey mark, an application under the *Surveying and Spatial Information Regulation 2017 Clause 90* must be lodged with the Surveyor-General.

### Why are survey marks important?

Survey marks are a State asset and provide a wealth of important information to a wide range of people in the community. They are used to support the surveying of property boundaries and easements, and are important for engineering, road building, mapping and other land surveys.

The loss of survey marks can significantly degrade the integrity of the legal property boundaries and impact on the costs of development projects that depend upon position and height.

### How do I preserve survey marks?

*Surveyor-General's Direction No.11 – Preservation of Survey Infrastructure* provides directions on how to comply with the Legislation.

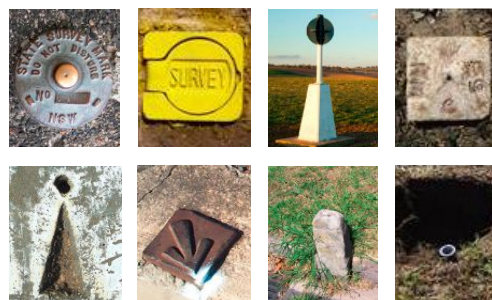
You can find the Direction on the following link: [http://spatialservices.finance.nsw.gov.au/\\_data/assets/pdf\\_file/0005/217094/SG\\_Direction\\_11.pdf](http://spatialservices.finance.nsw.gov.au/_data/assets/pdf_file/0005/217094/SG_Direction_11.pdf)

A Registered Land Surveyor will be able to provide advice about the preservation of survey infrastructure. A list of Registered Land Surveyors is available from the Board of Surveying and Spatial Information website: [http://www.bossi.nsw.gov.au/about/find\\_a\\_registered\\_surveyor](http://www.bossi.nsw.gov.au/about/find_a_registered_surveyor)

Additional information to assist with best practice guidelines for road infrastructure development can be found in Roads and Maritime Services QA Specification G71 – *Construction Surveys* by following the link: <http://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/specifications/g071.pdf>

### Types of survey marks

There are many types of survey marks used for various purposes. Many are buried and may only be identified by a Registered Land Surveyor. Some examples of common survey marks can be seen below.



### More information

For more information or to obtain advice on compliance with Legislation, please forward your enquiry to:

[Surveyor-General-Approvals@finance.nsw.gov.au](mailto:Surveyor-General-Approvals@finance.nsw.gov.au)

Applications to remove a Survey Mark can be lodged here: [http://spatialservices.finance.nsw.gov.au/surveying/surveying\\_services/forms\\_and\\_applications/survey\\_marks\\_removal](http://spatialservices.finance.nsw.gov.au/surveying/surveying_services/forms_and_applications/survey_marks_removal)



Geotechnical Consultants Australia

Astor Homes

**ASBESTOS CONTROL PLAN**  
**REMOVAL SCOPE OF WORKS**

1174-1178 Forest Road  
Lugarno NSW 2210

Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873

E1933-2

12<sup>th</sup> August 2019

Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



### Report Distribution

Asbestos Control Plan Removal Scope of Works

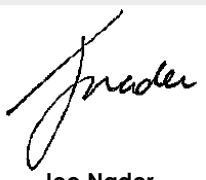
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GCA Report No.: E1933-2

Date: 12<sup>th</sup> August 2019

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Version	Prepared By	Reviewed By	Date Issue
Draft	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	6 <sup>th</sup> August 2019
FINAL	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	12 <sup>th</sup> August 2019

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1	FINAL Report	E1933-2	12 <sup>th</sup> August 2019	-
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Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



## EXECUTIVE SUMMARY

**Note: This Executive Summary must not be read in isolation, but should be read in conjunction with all sections of this report.**

### Asbestos Removal Scope of Works:

All work is to be undertaken in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011).

The scope of work described within this document is considered non friable asbestos and not requiring a licenced assessor due to the small localised areas.

### Prior to Removal Works Commencement:

- Restrict access to the removal area.
- Install 'Asbestos Warning' signs on all boundaries of the exclusion zone and on all places where anyone may gain access to the impacted area.

### Removal of asbestos contaminated soil as Non-Friable Asbestos:

- All asbestos removal works are to be undertaken with the exclusion of all non-asbestos workers during a time when the area is not occupied.
- Ensure water is available for misting / dust suppression and power is available for lighting and HEPA vacuuming prior to commencing.
- Emu pick all ACM fragments from the ground surface within the entire contaminated area
- Remove any asbestos contaminated soil/fill material (approximately 2m x 2m) within the identified area to a depth of 400mm or until a clean soil profile is achieved or no visible ACM is observed
- Soil contaminated with ACM must be appropriately wetted down to minimise dust prior to disturbance/removal
- Following removal of all ACM from the property, obtain clearance certification from GCA.



Asbestos Control Plan Removal Scope of Works  
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## INTRODUCTION

### Assessment:

The scope of work described within this document is considered Non-Friable asbestos removal work.

### Site Description:

The site consists of a residential dwelling with ACM identified within three site locations. This report should be read in conjunction with the Detail Site Investigation report (Report No: E1933-1, Date: 17<sup>th</sup> July 2019).

### Removal Area:

The removal area includes a section (approximately 2m x 2m) located at three sites. From the Detail Site Investigation report (Report No: E1933-1, Date: 17<sup>th</sup> July 2019), asbestos was detected within borehole 11 (BH11), borehole 8 (BH8) and borehole 7 (BH7). It is within these three boreholes where soil removal is required.



Figure 1: Soil removal occurred at Borehole 7, Borehole 8 and Borehole 11



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## ABBREVIATIONS

- AIB - Asbestos Insulating Board (also referred to as LDB)
- ACM - Asbestos Containing Material
- ACD - Asbestos Contaminated Dust
- AC - Asbestos Cement (commonly known as fibro)
- EDB - Electrical Distribution Board
- FCS - Fibrous Cement Sheeting
- LDB - Low Density Board (a Friable ACM that appears similar to Asbestos Cement)
- NATA - National Association of Testing Authorities
- NES - National Exposure Standard
- NOHSC - National Occupational Health and Safety Commission
- Pb - Lead
- PCB - Polychlorinated Biphenyls
- PPE - Personal Protective Equipment
- QA/QC - Quality Assurance / Quality Control
- SMF - Synthetic Mineral Fibre
- SWA - Safe Work Australia
- TWA - Time Weighted Average
- VFT - Vinyl Floor Tile
- WHS - Work Health and Safety

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## ASBESTOS REMOVAL PLAN

### 1.0 GENERAL

- The Removal Contractor is to ensure that all work is undertaken in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011), and the Work Health and Safety Act 2011 (WHS 2011);
- The Removal Contractor is required at all times to strictly adhere to all relevant Acts, Regulations and Codes of Practice;
- The Removal Contractor shall obtain all necessary permits and approvals and give required notices (e.g. WorkCover permit to undertake removal works and any site specific approvals from the Local Council Authority);
- The Removal Contractor shall ensure that site access is restricted and unauthorised access into the site is prevented. Install barricades and/or hoardings, and appropriate signs, including asbestos removal signs, before beginning any work;
- All non-essential persons are to be separated from the removal area by at least 10 metres as a general guide. If a shorter boundary is required then a Licensed Asbestos Assessor (friable) or Competent Person (nonfriable) should determine the new boundary based on a risk assessment;
- Access for other persons to within any asbestos removal control boundary is not permissible without the supervision of the asbestos removal contractor and whilst wearing the correct PPE;
- The Removal Contractor shall ensure that the site is secure and safe;
- The Removal Contractor shall establish procedures for dealing with emergencies. Fully inform all site personnel of work plan and safety procedures;
- Where an asbestos removal exclusion zone is established in the vicinity of a fire exit or emergency egress route, procedures should be implemented such that emergency evacuation may occur unhindered;
- No asbestos removal work is to be undertaken during any period of high wind or within the period of effect of any high wind warning, gale warning or other storm warning;
- Where removal works extend beyond 1 day, the Removal Contractor shall ensure that the removal site and any associated asbestos removal equipment is made weather / storm proof prior to leaving site each day;
- The Removal Contractor shall seal all penetrations, holes, vents, air plenums, HVAC ducting and the like prior to the commencement of work;
- The Removal Contractor shall cover all vegetation, shrubs, grassed surfaces, gardens and the like with 0.2mm plastic sheeting with taped joints prior to the commencement of work;
- The Removal Contractor shall remove or seal all soft furnishings, floor coverings, window coverings, fly screens, and other porous or perforated materials prior to the commencement of work;
- The Removal Contractor shall ensure that all drains etc. are fitted with an appropriate filter medium in order to remove contaminants from any water leaving the site. The condition of the filters shall be checked regularly and filters replaced when necessary;
- The Removal Contractor will decide if electrical services etc. are to remain in operation during remedial works and ensure all other services are assessed prior to commencement. Arrange service alternatives as required;

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- The Removal Contractor shall ensure that fire extinguisher(s) suitable for the area of work are present and accessible at all times during the removal program.
- To ensure that dust generation is minimised, the Removal Contractor shall ensure that all sources of dust are suppressed with low-pressure water sprays. The sprays will apply minimal amounts of water to the work areas in a fine mist to minimise or eliminate water run-off and free water;
- The Removal Contractor shall ensure that all confined spaces are adequately designated, and that all works within any identified confined spaces are conducted in accordance with the relevant legislative requirements;
- The Removal Contractor is responsible for the proper disposal of all wastes in accordance with all statutory requirements. Waste disposal receipts and/or tipping documentation is to be supplied to the Principal. Refuse arising from the execution of work (including food scraps and the like) shall be removed from the site;
- Any ancillary workers (tradesman / machinery operators / specialist technicians and the like) required to be present during the asbestos removal must undergo Asbestos awareness training prior to the commencement of work;
- The Removal Contractor shall ensure that all workers have received appropriate instruction in the health hazards associated with asbestos the use of PPE and that all workers wear their PPE in accordance with the manufacturer's specifications;
- The Removal Contractor shall ensure that all workers required to wear respiratory protective equipment have undergone a qualitative fit testing assessment to ascertain that they are able to maintain an adequate facial seal while wearing the chosen RPE.
- The Removal Contractor shall establish an area for decontamination of equipment/plant/vehicles and wetting down and disposal of PPE. Decontamination facilities must be appropriate for the nature of the planned removal;
- No disposable coveralls or PPE is to be worn outside of the removal area;
- No vehicle or container shall leave the site unless it is loaded appropriately, within the safe working limit of the vehicle/container and is adequately covered;
- All material which may contain asbestos should be assumed to contain asbestos unless NATA accredited analysis indicates otherwise;
- Asbestos containing materials should not be broken in any way and are to be disposed of as whole components;
- All tools and equipment that has entered the contaminated areas is to undergo decontamination in the decontamination area prior to leaving the contaminated area;
- The Removal Contractor is advised that the WorkCover Authority may be called upon by the Consultant to give advice on current work procedures and practices at any stage throughout the Project without prior notice to the Principal Contractor.

## 2.0 CONDUCT OF WORK

- Undertake a detailed and site specific risk assessment in consultation with all workers involved;
- Hold a tool box meeting to ensure that all workers are fully informed of works involved;
- Demarcate an Asbestos removal exclusion zone at greater than 10m from the worksite, or where practical;
- Install barricades and signage on all potential points of entry to the exclusion zone;
- Designate a decontamination area for the removal and disposal of all used PPE;

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- Designate an Asbestos waste storage area for the temporary storage of waste;
- As a dust minimisation measure, spray all asbestos contaminated/potentially contaminated material with a low pressure water mist or PVA emulsion prior to, and during the removal. The sprays are not to generate free water/water runoff;
- Undertake ALL asbestos removal works detailed in the Executive Summary of this report in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011);
- At the completion of the scheduled asbestos removal work, undertake a walk-over inspection to ascertain the complete removal of all ACM within the current scope of work;
- Undertake a general site clean-up and restore the worksite condition in a tradesman-like manner;
- Request for the Licensed Asbestos Assessor (friable) or Competent Person (non-friable) to conduct a final visual clearance inspection and issue a clearance certificate upon satisfactory clearance results;
- Subsequent to satisfactory inspection by the Hygienist, all surfaces within the work area are to be sprayed with a dilute PVA emulsion;
- Subsequent to a satisfactory Clearance Inspection, remove non-essential containment and associated equipment. Any contaminated/potentially contaminated containment materials (e.g. plastic sheeting) are to be disposed of as asbestos contaminated waste;
- Conduct a final walk-over inspection to ascertain the complete make-good of the worksite.

### 3.0 PERSONAL PROTECTIVE EQUIPMENT AND WORK PRACTICES

During all Asbestos removal work, the Removal Contractor is to ensure that the following precautions and safety measures are implemented:

- The exclusion of non-workers;
- Use of appropriate respiratory protection;
- The correct and proper wearing of disposable suits with hood;
- The wearing of non-porous gloves;
- The wearing of non-lace-up boots;
- Eye protection (e.g. goggles), steel capped boots, and hard hat as per general requirements for site work;
- Use of decontamination units/facilities to include washing of face, hands, and all skin thoroughly before leaving the removal area, eating, drinking or smoking;
- No food consumption or smoking inside the treatment area;
- Showering and changing before leaving the site each day (friable work);
- Cleaning of boots before leaving the treatment area;
- New disposable suits and face masks to be used for each entry to the exclusion zone;
- No disposable coveralls or PPE is to be worn outside of the removal area.

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#### 4.0 CONTAMINATED WASTE

The Removal Contractor is to ensure that the transportation and disposal of contaminated waste meets the requirements of the NSW EPA as outlined in Waste Disposal Guidelines.

The Removal Contractor is responsible for controlling all waste generated. This may include determining that all testing, handling, storage, transport and disposal requirement have been met.

Copies of the waste disposal receipts are to be supplied by the Removal Contractor to the Principal. A log detailing the dates and quantities of waste removed and the disposal site is to be kept.

##### 4.1 SITE SUPERVISION AND INSPECTION

Site Supervision shall be undertaken by a qualified employee of the Removal Contractor (the Site Supervisor). The Supervisors duties include all those set out in the relevant rules and regulations as well as any other duties required by this document.

The Site Supervisor shall be fully trained, have at least 2 years experience, and a thorough knowledge of the work procedures and safety standards.

No Asbestos removal work is to be undertaken without the presence in the Asbestos Work Area of a Site Supervisor of the Removal Contractor.

##### 4.2 WASTE REMOVAL

It is the responsibility of the Removal Contractor to ensure that all waste is managed in accordance with the relevant legislation and in the following manner:

- All Asbestos waste is to be placed immediately into approved polyethylene bags or lined bins and sealed in an appropriate manner to render it safe for handling and disposal;
- Bags shall be filled to no more than 20 kg and should be no more than half full. Bins should not be overfilled;
- Bags shall be tied with wire rod ties fixed in position with a rod-tying tool and/or sealed by tape. When tying the bag, surplus air should be excluded from the bag without discharging contaminated dust;
- Loaded bags shall be carried carefully and not thrown, dropped, or roughly handled;
- Any damaged or punctured bag shall be placed into a second bag, which is then re-sealed;
- The bagged waste shall not be allowed to accumulate. It shall be removed from the site at regular intervals at the completion of decontamination in each Asbestos Work Area;
- All waste must be available for inspection;
- The external surface of the bag is to be wet wiped in the decontamination area to remove any dust adhering to the surface immediately before being shifted from the Asbestos Work Area;
- The bags shall be placed into approved storage containers/bins. The containers shall be lined with 0.2mm plastic. When the bins/containers are full they shall be sealed and removed from site; Any contamination of the work area shall be cleaned up immediately.

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#### 4.3 CLEAN-UP AND AREA RESTORATION

On completion of the asbestos remediation the Removal Contractor shall ensure the clean-up of the removal area. All surfaces shall be thoroughly cleaned and prepared for final inspection by the Hygienist. If the remediation area is not cleaned satisfactorily, the Removal Contractor shall repeat the clean up as directed by the Hygienist. Clearance air monitoring may be conducted following a satisfactory visual inspection by the Hygienist.

#### 4.4 CLEARANCE CERTIFICATION

At the completion of the Asbestos removal works, and following satisfactory clean-up and area restoration by the Removal Contractor, the Hygienist will attend the site to undertake a visual clearance inspection. Clearance sampling of settled dust may be considered necessary by the Hygienist in order to identify any residual micro-fibre Asbestos particularly if the removal area is not able to be sprayed with a dilute PVA emulsion subsequent to the removal works.

If during the Clearance Inspection:

- No further evidence of asbestos contamination is visually identified;
- Any encapsulation work is found to be complete and adequate;
- All asbestos air monitoring results are <0.01 fibres/mL;
- All sample analysis results report 'No Asbestos Detected';

Then the consultant will issue a clearance certificate with words to the effect:

The consultant considers that as far as reasonably practicable all visible and accessible Asbestos containing materials within the current scope of work have been removed to a satisfactory industry standard. It is the opinion of the Consultant, that with regard to Asbestos, the above-mentioned areas inspected are considered safe for normal activities to proceed.

Included will be a limitation clause(s) to cover any possible or actual remaining contamination/issues of concern.

Asbestos Control Plan Removal Scope of Works  
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## LIMITATIONS

GCA performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of GCA personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, GCA assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of GCA, or developments resulting from situations outside the scope of this project.

The results of this assessment are based on the site conditions identified at the time of the site inspection and validation sampling. GCA will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report.

GCA is not engaged in environmental consulting and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

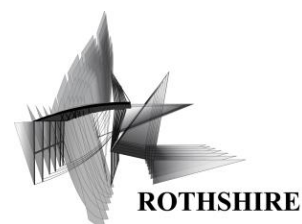
### Geotechnical Consultants Australia Pty Ltd (GCA)

#### Prepared by:

**Luke Breva**  
Environmental Scientist

#### Reviewed by:

**Nick Caltabiano**  
Project Manager

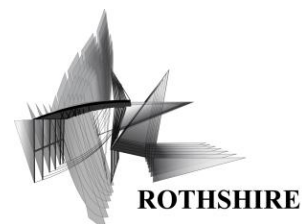


DOCUMENT NO.: 2122301-SEE-RPT-002-1

## STATEMENT OF ENVIRONMENTAL EFFECTS

<b>ADDRESS:</b>	1178 FOREST ROAD LUGARNO NSW 2224 LOT 3 IN DP 18873
<b>CLIENT:</b>	LUGARNO DEVELOPMENTS PTY LTD
<b>LOCAL GOVERNMENT AREA:</b>	GEORGES RIVER COUNCIL
<b>SCOPE</b>	RETENTION OF THE EXISTING PART CONSTRUCTED DWELLING, AND ALTERATIONS AND ADDITIONS TO ENABLE THE FINALISATION OF CONSTRUCTION AND OCCUPATION





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## 1. INTRODUCTION

This Statement of Environmental Effects (SEE) has been prepared on behalf of the property owners by Rothshire Pty Ltd (Rothshire) to accompany a Development Application (DA) to Georges River Council (Council) for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1178 Forest Road, Lugarno (the site).

The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals. These dwellings, including the subject site are known to Council.

The proposed development seeks to legitimise this ongoing matter with Council for site and is submitted concurrently with a Building Information Certificate (BC) to legitimise works undertaken to date. The subject DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

This report has been prepared with reference to the architectural plans and supporting documentation prepared by Rothshire accompanying this report. This report provides an overview of the site and its context, a detailed description of the proposed development, the planning framework and an environmental assessment of the proposed development.

Based on the conclusions of the comprehensive assessment undertaken, and in the absence of any significant adverse environmental impacts, Council's approval of the DA is sought.

### 1.1. REPORT AUTHOR

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### 1.2. DOCUMENT HISTORY

Table 1. Document revision & history

Rev.	Description	Author	Reviewer	Date
1	Issued for DA	JA	NRT	24/11/2022



## 2. THE SITE

### Site Context

The site and existing part constructed dwelling forms part of a group of three (3) dwellings, as outlined below.

- 1174 Forest Road, Lugarno. This northern allotment is regular in shape, with a total area of 626m<sup>2</sup> and is legally described as Lot A DP 328702. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (at grade) garage and swimming pool and is in the advanced stages of construction.
- 1176 Forest Road, Lugarno. This middle allotment is regular in shape, with a total area of 626m<sup>2</sup> and is legally described as Lot 2 DP 18873. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.
- 1178 Forest Road, Lugarno. This southern allotment is regular in shape, with a total area of 638.6m<sup>2</sup> and is legally described as Lot 3 DP 18873. This allotment accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.

An aerial view of each of these three dwellings is provided at **Figure 1** below.

### Subject Site

The subject site is located at 1178 Forest Road, Lugarno (Lot 3 DP 18873). This is the southernmost allotment within the group as detailed at **Figure 2** below. The site is not subject to any easements or restrictions.

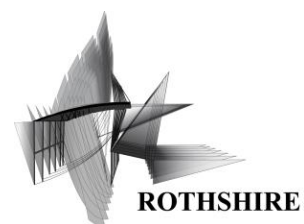
The site is located within an established residential area, with surrounding development comprising similar low scale (1-2 storey) single detached dwellings.

The site is located within the Georges River Local Government Area (LGA) and is zoned R2 Low Density Residential under the Georges River Local Environmental Plan 2021 (LEP).

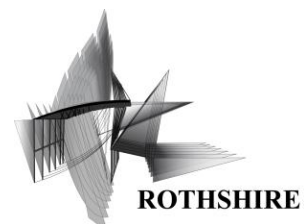
The site is not identified as, nor within proximity to any heritage items (or draft items) or Heritage Conservation Area (HCA) (or draft HCA).

The site is not identified as bushfire nor flood prone and does not include any areas of terrestrial biodiversity or Environmentally Significant Lands (ESL). The site is located within the Foreshore Scenic Protection Area.

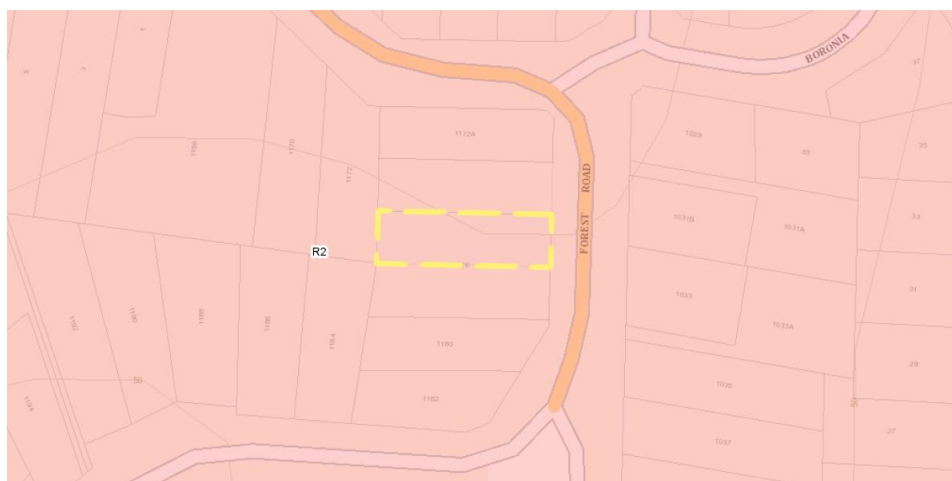
An extract of the LEP 2021 site zoning is provided at **Figure 3** below.



**Figure 1. Aerial photograph of the site context (Source Sixmaps.nsw.gov.au)**  
*Dwelling group outlined in red*

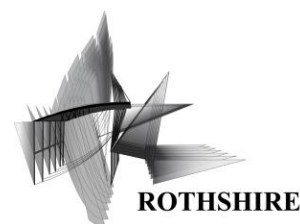


**Figure 2. Aerial photograph of the subject site (Source Sixmaps.nsw.gov.au)**  
*Site outlined in red*



**Figure 2. Extract of LEP 2021 Zoning Map**  
*Site outlined in yellow*





### 3. DEVELOPMENT HISTORY

#### Development Applications

A review of Council's DA tracker does not provide any development consent history for the subject site.

#### Complying Development Certificate

The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals.

These dwellings were initially approved, via separate Complying Development Certificates (CDCs), which were issued to enable the creation of allotments and construction of each property within the in approximately early 2015.

However, despite the legitimate issue of these CDCs and commencement of construction, that the design of each dwelling was subsequently revised, to the extent that the design of each dwelling departed from relevant guidance contained within the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (Codes SEPP). On this basis, each dwelling within the group, including the subject site, is unauthorised. Each CDC has since been surrendered.

These non-compliance matters resulted in the issue of stop work orders by Council in early 2017, with all dwellings in the advanced stages of construction unable to be completed (or regularised without further approval).

The construction of dwellings has not progressed since this time, which remains in an incomplete and unfinished state, with construction fencing remaining at the site. It is understood this compliance action was held in abeyance by Council, pending resolution of a number of design matters to obtain necessary approvals, including to regularise works undertaken to date, provide approval for remaining works required and to enable finalisation and occupation of the dwellings ongoing.

This DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling at 1178 Forest Road, Lugarno.

#### Pre-Lodgement Consultation

Given the complex history regarding the subject site and dwelling group, extensive pre-lodgement consultation has been held with Council, including on 16 June 2022.

In relation to the subject site, the following comments were provided by Council and have been addressed in the revised design as detailed at Table 1.

**Table 1. Pre-DA Considerations**

<b>Council Comment</b>	<b>Response</b>
<i>The current basement is not supported give the significant flooding issues. Majority of the basement should backfilled except for potentially 10m<sup>2</sup>, which could be used as storage as prescribed under Part 6.1.2.2.</i>	The design has been revised to backfill this basement, whilst maintaining an area of storage.



<i>A single carport within the front setback opposite the study maybe taken into consideration subject to the following: Minimum 1.5m setback from the northern boundary with no encroachment within the side setback. This may require demolition of the Piano Room.</i>	The design has been revised to provide a carport within the front setback.
<i>The second car space should be accommodated as a tandem driveway parking space forward of the carport</i>	This item has been incorporated within the proposal.
<i>Reduce the width of the driveway to be maximum 4.0m.</i>	The design has been revised to provide a driveway width of 3.0m.
<i>Combine the driveway and pedestrian path to maximise deep soil area.</i>	This has been accommodated within the revised design.
<i>Demolition of the retaining wall within the front setback and the land restored to its natural state.</i>	Site circumstances and altered levels necessitate this boundary retaining wall is maintained.
<i>External access to guest bedroom along the southern boundary at ground should be deleted. External access to the ground floor guest bedroom will not be supported.</i>	The design had been revised to remove this access.
<i>External access to the stairs on the southern façade is not supported and should be replaced with a window.</i>	This item is retained within the design.
<i>Given the lack of detail information, it is difficult to ascertain the amenity impact of the alfresco area, which may need to be demolished or privacy measures incorporated. Additional information is required on the FFLs.</i>	A site survey and detailed drawings have been prepared supporting this application, including site levels and FFLs.
<i>The first floor balcony to the rear should be deleted as it compromises amenity of the development to the west.</i>	Whilst this balcony is maintained, additional privacy screening up to 1800mm in height is provided to the northern (side) boundary, with a further opaque balustrade up to 1100mm in height is provided to the western (rear) elevation to maintain amenity to surrounding properties. The view toward the neighbouring property is limited by existing trees located within the adjoining property to the north west. Further, it is proposed to plant additional trees within the rear setback, capable of achieving a mature height greater than 6m which will further mitigate any potential privacy impacts.
<i>The balcony on the eastern (front) façade should have a minimum 1.5m side boundary setback and should not protrude beyond the main building wall.</i>	This balcony has been revised, maintaining a side setback of 1800mm with provision of privacy screening up to 1800mm in height to the northern (side) boundary, to maintain amenity to surrounding properties.
<i>The void area on first floor in excess of 15m<sup>2</sup> should be included in the FSR calculations (Refer Part 6.1.2 GRDCP 2021).</i>	This void has a maximum area 15.04m <sup>2</sup> and has been excluded from Floor Space Ratio (FSR) calculation, in accordance with the LEP 2012 definition for Gross Floor Area (GFA).
<i>External wall to the south of the stairs (southern façade) should be demolished to allow for some access to sunlight to the bedroom and also</i>	All bedrooms receive are considered to receive adequate day light and ventilation and will provide a high level of amenity to occupants.



<i>minimise bulk and scale. However, that space should be non-trafficable roof and not a balcony.</i>	
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All matters raised by Council have been taken into consideration in the design of the proposed development, including alterations from the existing circumstance to bring the existing dwelling into compliance with the applicable planning framework. Please refer to further details contained at Section 5 of this report.

#### 4. THE PROPOSED DEVELOPMENT

##### Overview

The proposed development seeks the retention of the existing part constructed dwelling, including alterations and additions to enable finalisation of construction and occupation.

A detailed breakdown of the proposed works is provided below. Please refer to a full outline of proposed works within the architectural plans, prepared by Rothshire accompanying this report.

##### Detailed Scope of Works

A detailed scope of proposed works is provided below.

- Removal of the existing retaining walls for the existing basement ramp, including the filling of land, to create a level arrangement.
- Enclosure of the existing basement garage, including construction of an eastern perimeter wall, repurposing this garage space to create a basement storage area (which is not visible from Forest Road).
- Provision of a new driveway to the northern boundary of the site, including construction of a carport constructed behind the primary building line.
- Associated internal works required to finalise construction of the existing part-constructed dwelling, including bathrooms, kitchen, fixtures and finishings.
- Provision for an On Site Detention (OSD) tank to be constructed under the proposed driveway, including a new stormwater pit located on Forest Road. An easement is also proposed servicing dwellings within the group (numbered 1174, 1176 and 1178 Forest Road) to the new pit and associated pipework.
- Provision for front fencing and completion of existing part constructed boundary fencing, as well as the provision (completion) of balustrades to balconies and internal open edges and stairs.
- Replacement of various windows.

##### Landscaping

In addition to the above, associated landscaping is proposed as follows:

- Provision of planting within the front setback, in place of the existing ramp excavation which is proposed to be removed (refer above).





- Provision of perimeter planting within the rear setback of the dwelling, including to the eastern (front) boundary and southern (side) boundary, and western (rear) boundary.
- Additional areas of turfing within the front and rear setbacks as nominated on the submitted plans.

No tree removal is proposed, nor considered to be required, to facilitate the proposed development.

#### Stormwater Management

A 13,000 litre OSD tank is proposed to be constructed within the driveway of the adjoining property to the north at 1176 Forest Road and will service the properties within the group (at 1174, 1176 and 1178 Forest Road), via a proposed easement and pipe system which will discharge by gravity to a new stormwater pit located within Forest Road (note: works within the property at 1176 Forest Road are proposed under the concurrent DA for that property).

#### Waste Management

A Waste Management Plan has been prepared by Rothshire and is submitted with this application. The plan provides details of how waste will be managed during works. Recycling and re-use has been considered and will be applied during works where possible.

#### Resolution of Matters Towards Occupation

Rothshire, on behalf of the property owners are committed to resolving ongoing issues at the site with Council. As noted within this report, the proposed development seeks to legitimise this ongoing matter with Council for site. The subject DA seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

The proposal will maintain the use of the site as a single dwelling for private residential occupation.



## 5. STATUTORY PLANNING FRAMEWORK

In accordance with Section 4.15(1)(a) of the Environmental Planning and Assessment Act 1979 (as amended) the following section provides an appraisal of the proposed development having regard to the statutory planning instruments that apply to this site, including:

- The Environmental Planning and Assessment Act 1979;
- State Environmental Planning Policy (Resilience and Hazards) 2021;
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004;
- Georges River Local Environmental Plan 2021; and
- Georges River Development Control Plan 2021.

An assessment against relevant provisions of the planning framework is provided below.

### State Environmental Planning Policy (Resilience and Hazards) 2021

Clause 4.6 of the State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) states that Council cannot consent to development on the land unless:

*"(a) it has considered whether the land is contaminated, and*

*(b) If the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*

*(c) If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose."*

The site holds a long-standing residential history and therefore there is no evidence to suggest that the site is contaminated. The site is not identified on the NSW EPA contaminated sites register and historical documentation provided by Council does not indicate any reason to suspect there is contamination at the site.

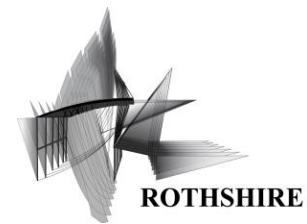
All fill introduced to the site to enable the filling of the existing driveway will be VENM, with suitably qualified contractors and appropriate material certification provided in accordance with the conditions of any consent and through the course of construction.

On this basis, the proposed development is considered acceptable with regard to Clause 4.6 of the Resilience and Hazards SEPP.

### State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (SEPP BASIX) ensures consistency in the implementation of BASIX throughout the State by overriding competing provisions in other environmental planning instruments and development control plans.

In accordance with SEPP BASIX, BASIX Certificates for each proposed dwelling has been prepared by a qualified consultant in relation to the proposal. These certificates confirm that the proposed development will meet the NSW government's requirements for sustainability, having particular regard to water, thermal comfort and energy. Please refer to the BASIX Certificates accompanying this report.



### Georges River Local Environmental Plan 2021

#### *Zoning and Permissibility*

The site is zoned R2 -Low Density Residential pursuant to the LEP 2021.

Development for the purposes of dwelling houses (including alterations and additions) is permitted within the R2 Zone, as per the Land Use Table of the LEP 2021, however requires development consent.

#### *Principal Development Standards*

An assessment of the proposal against the Principal Development Standards and key built form controls under the LEP 2021 as they apply to the proposed development are provided at **Table 2** below.

**Table 2. LEP 2021 Key Provisions**

Clause	Control	Proposal	Complies
Clause 4.3 – Height of Buildings	Max. 9m	9.076m	No
Clause 4.4 – Floor Space Ratio	0.55 (Area 1)	N/A – Refer Cl.4.4A below.	
Clause 4.4A – Exceptions to Floor Space Ratio - Certain Residential Accommodation	For lots <650m <sup>2</sup> : [site area × 0.55] ÷ site area:1  (626m <sup>2</sup> × 0.55)/626m <sup>2</sup> :1  344.3m <sup>2</sup> /626m <sup>2</sup> =0.55:1	351m <sup>2</sup> = 0.5496:1	Yes

#### *Clause 4.6 - Exceptions to Development Standards*

It is noted the proposed development represents a minor exceedance to the height of buildings control under Clause 4.4 of the LEP 2021. A separate request is made to vary this development standard, made pursuant to Clause 4.6 of the LEP 2021 accompanying this report.

As detailed at Section 1, the site is not within proximity to a heritage item, does not hold any other environmental restrictions and there are no other provisions of the LEP 2021 which apply to the proposed development.

#### *Clause 5.10 – Heritage Conservation*

The site is not identified as, nor located within proximity to, any local or state (or draft) heritage items. The site is not located within, nor within proximity to, any Heritage Conservation Area (HCA).

#### *Clause 6.1 - Acid Sulfate Soils*

The site is identified as containing Class 5 Acid Sulfate Soils (ASS). The proposed development is not within 500m of adjacent Class 1, 2, 3 or 4 land that is below 5m AHD and by which the water table is likely to be lowered below 1m AHD on adjacent Class 1, 2, 3 or 4 land.

The proposed development is therefore considered suitable with regard to Clause 6.1 of the LEP 2021.

#### *Clause 6.3 - Stormwater Management*



The proposal is accompanied by a detailed stormwater plan, detailing drainage via an interlot system to Forest Road. The proposed development is therefore considered suitable with regard to Clause 6.3 of the LEP 2021.

*Clause 6.12 - Landscaped Areas in Certain Residential and Environment Protection Zone*

The site is located within the R2 – Low Density Residential Zone and therefore requires a minimum 25% of the site to be landscaped, pursuant to Clause 6.12(5)(a) of the LEP 2021.

The proposal maintains a landscaped area of 203m<sup>2</sup> (31.8%) and therefore complies with this clause.

*Georges River Development Control Plan 2021*

The Georges River Development Control Plan 2021 (DCP) outlines development requirements, controls and guidelines within the LGA. The key relevant parts of the DCP 2021 in relation to the proposed development have been outlined below, including:

- Part 3 – General Planning Considerations;
- Part 5 – Residential Locality Statements;
- Part 6.1 – Low Density Residential Controls.
- Part 6.4 – Ancillary Development.

An assessment of the development against relevant parts of the DCP 2021 is provided below.

**Table 4. DCP 2021 Chapter 3 Key Provisions**

Clause	Proposal	Complies
<b>3.11 Ecologically Sustainable Development</b>		
<b>3.11.1 Energy and Water Efficiency</b>		
(1) All BASIX affected development must comply with SEPP (Building Sustainability Index: BASIX) 2004.	The proposal is submitted with a valid BASIX certificate accompanying this report.	Yes
(15) The use, location and placement of photovoltaic solar panels are to consider the potential permissible building form on adjacent properties	The proposal does not include any photovoltaic panels.	Yes
(16) Where possible proposals for new buildings, alterations and additions and major tree plantings are to maintain solar access to existing photovoltaic solar panels having regard to the performance, efficiency, economic viability and reasonableness of their location	The proposal does not include, not will inhibit solar access to, any photovoltaic panels.	Yes
<b>3.12 Waste Management</b>		
(1) Development must comply with Council's Waste Management requirements regarding construction waste and ongoing management of waste materials	The proposal is accompanied by a Waste Management Plan (WMP), prepared in accordance with Council's requirements.	Yes
<b>3.13 Parking Access and Transport</b>		
(1) The car parking rate for development types are outlined in Table 1 – Parking Requirements. In the event of a discrepancy between the parking rates	The proposal maintains 2 car parking spaces and therefore complies.	Yes



	specified in this Part of the DCP and any another, the specific requirements identified within the detailed controls for a locality/area shall prevail.  <i>Dwelling House:</i> -1 space per 1 and 2 beds -2 spaces per 3 beds or more		
(20)	Car parking areas may be designed as ground level parking provided that the design results in building frontages level with the street.	The proposal maintains 2 car parking spaces at ground level, with the dwelling maintaining a level frontage.	Yes
(32)	Design driveways to minimise visual impact on the street and maximise pedestrian safety.	The proposed driveway arrangement has been revised to be at grade, with 2 car parking spaces within the front setback, to minimise visual impact on the street and maximise pedestrian safety.	Yes
<b>3.14 Utilities</b>			
(1)	Applicants should consult service providers for energy, electricity, gas, water, telephone, national broadband network (NBN) fibre cables and fire requirements.	Adequate services are provided to support the proposed development.	Yes
(2)	Any services and structures required by the providers should be located within the basement, or concealed within the facade, with appropriate access. Where this is not possible, an alternative method of minimising street impact should be demonstrated, such as screening with landscape or built elements.	Adequate services are provided to support the proposed development.	Yes
(4)	Air conditioning units and mechanical plant located on the roof should be well screened and integrated into the building form.	The proposal does not include any air conditioning units within the roof form.	Yes
<b>3.19 Crime Prevention / Safety and Security</b>			
(1)	Active spaces and windows of habitable rooms within buildings are to be located to maximise casual surveillance of streets, laneways, parking areas, public spaces and communal courtyard space.	Windows have been suitably located to maintain a balance of visual privacy and passive surveillance.	Yes
(4)	Building entries are to be clearly visible, unobstructed and easily identifiable from the street, other public areas and other development. Where practicable lift lobbies, stairwells, hallways and corridors should be visible from the public domain.	The dwelling entrance is clearly visible, unobstructed and is easily visible from the street.	Yes

Table 5. DCP 2021 Chapter 5 Key Provisions

Clause	Proposal	Complies
<b>5.7 Lugarno Locality Statement - Future Desired Character</b>		



-	<i>Retain and enhance the prominence of the bushland landscaped character in new development through tree planting and landscaping.</i>	The proposed development provides for significant additional landscaping, which has been selected to suitably integrate within the local bushland character.	Yes
-	<i>Encourage consistent setbacks of buildings from the street and the provision of landscaping within the front setback.</i>	The proposal maintains a consistent alignment with adjoining dwellings, to the west of Forest Road, with landscaping provided within the front setback.	Yes
-	<i>Encourage the retention of trees and sharing of water views wherever possible, including screening via vegetation rather than solid walls.</i>	Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views.	Yes
-	<i>Public views to waterways should be retained from streets and public places.</i>	The surrounding public domain does not benefit from any significant views or vistas. In this regard, the proposal will not affect any views.	Yes

**Table 6. DCP 2021 Chapter 6.1 Key Provisions**

<b>Clause</b>		<b>Proposal</b>	<b>Complies</b>
<b>6.1.2 Single Dwellings</b>			
<b>1. Streetscape Character and Built Form</b>			
(1)	<i>New buildings and additions are to consider the Desired Future Character statement in Part 5 of this DCP.</i>	The proposed development has considered the desired future	Yes
(2)	<i>New buildings and additions are to be designed with an articulated front façade.</i>	The proposal provides for an articulated front façade, including a staggered built form with cantilevered roof above.	Yes
(3)	<i>Developments on sites with two (2) or more frontages are to address all frontages.</i>	The subject site holds a single frontage to Forest Road.	Yes
(4)	<i>Dwelling houses are to have windows presenting to the street from a habitable room to encourage passive surveillance.</i>	Windows have been suitably located to maintain a balance of visual privacy and passive surveillance.	Yes
(5)	<i>Development must be sensitively designed so as to minimise adverse impacts on the amenity and view corridors of neighbouring public and private property while maintaining reasonable amenity for the proposed development and is to balance this requirement with the amenity afforded to the new development.</i>	The proposal has been sensitively designed to address Forest Road. As noted, neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views.  All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(6)	<i>The maximum size of voids at the first floor level should be a cumulative total of 15m<sup>2</sup> (excluding voids associated with internal stairs).</i>	The proposal include a void space within the front of the dwelling totalling 15.04m <sup>2</sup> .	Yes



<b>2. Building Scale and Height</b>			
(1)	<i>New buildings are to consider and respond to the predominant and desired future scale of buildings within the neighbourhood, and consider the topography and form of the site.</i>	The proposed dwelling has been designed with consideration to the existing and desired future character of the locality.	Yes
(2)	<i>On sites with a gradient or cross fall greater than 1:10, dwellings are to adopt a splitlevel approach to minimise excavation and fill. The overall design of the dwelling should respond to the topography of the site.</i>	The design of the development is considered to appropriately respond to the landform.	Yes
(3)	<i>A maximum of two (2) storeys plus basement is permissible at any point above ground level (existing). Basements are to protrude no more than 1m above existing ground level.</i>	The proposal provides for two (2) habitable storeys with basement storage.	Yes
(4)	<i>Where topography conditions require a basement, the area of the basement should not exceed the area required to meet the car parking requirements for the development, access ramp to the parking and a maximum 10m<sup>2</sup> for storage and 20m<sup>2</sup> for plant rooms. Additional basement area to that required to satisfy these requirements may be included as floor space area when calculating floor space ratio</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Where the entry to the basement carpark is visible from the street, the entry should be recessed a minimum of 1m (from the edge of the external wall or balcony) from the levels above and the external walls of the garage differentiated from the walls above through articulation and external materials.</i>	This item is not applicable to the proposed development.	N/A
<b>3. Setbacks</b>			
<b>Front Setback</b>			
(1)	<i>The minimum setback from the primary street boundary is: i. 4.5m to the main building wall / facade; ii. 5.5m to the front facade of a garage or carport; or iii. Where the prevailing street setback is greater than the minimum, the average setback of dwellings on adjoining lots is to be applied.</i>	The proposal maintains a setback of 8.245m to the primary building line and therefore complies.	Yes
<b>Side and Rear Setbacks</b>			
(1)	<i>Buildings are to have a minimum rear setback of 15% of the average site length, or 6m, whichever is the greater (excluding detached secondary dwellings – see Point 12 in Section 6.1.2.12- Secondary Dwellings of this DCP).</i>	The site has a depth of 47.6m and therefore requires a minimum setback of 7.14m.	Yes





		The proposal maintains a rear setback of 14.658m and therefore complies.	
(2)	<i>The minimum side setbacks for ground and first floor are: i. 900mm for lots up to 12.5m in width measured at the front building line for the length of the development. ii. 1.2m for lots greater than 12.5m in width measured at the front building line for the length of the development. iii. 1.5m for all lots within the Foreshore Scenic Protection Area measured at the front building line for the length of the development.</i>	<p>The proposal maintains a side setback of 990mm to the northern (side) boundary and 870mm to the southern (side) boundary at the ground floor, and 1639mm to the northern (side) boundary and 1503mm to the southern (side) boundary at upper levels.</p> <p>It is acknowledged this represents a variation to the minimum required 1.5m at (2)(iii), however is compliant with the BCA (including associated fire rating requirements) and is not considered to result in any amenity impacts to surrounding properties. Given the existence of the dwelling, it is not practicable to increase this setback at the site.</p>	Refer Comment
(3)	<i>Where alterations and additions (ground and first floor) to an existing dwelling are proposed, an existing side setback less than the setback required in Control 3 can be maintained, provided the reduced setback does not adversely affect compliance with the solar access and landscaped area controls or adversely impact upon the visual and acoustic amenity of neighbouring dwellings.</i>	This item is not applicable to the proposed development.	N/A
(4)	<i>For battle-axe lots, minimum side and rear boundary setbacks apply, except the front setback of the battle-axe lot without a street frontage, where a minimum setback of 4.0m is to be provided as illustrated in Figure 1.</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Any garages or parking structures fronting rear lanes may encroach upon the rear setback areas but are still to provide a minimum setback of 1m from the lane.</i>	This item is not applicable to the proposed development.	N/A
<b>4. Private Open Space</b>			
(1)	<i>Private open space is to be located at the rear of the property and/or behind the building line and is to have a minimum area of 60m<sup>2</sup> with minimum dimensions of 6m and located on the same level (not terraced or over rock outcrops).</i>	The proposal provides for 60m <sup>2</sup> private open space within the rear setback and therefore complies.	Yes
(2)	<i>Private open space is to be provided for all dwellings, (with the exception of secondary dwellings, which are able to</i>	This item is acknowledged.	Yes





	<i>share the private open space of the principal dwelling).</i>		
(3)	<i>Private open space is to be located so as to maximise solar access.</i>	Private open space has been located to maximise solar access.	Yes
(4)	<i>Private open space is to be designed to minimise adverse impacts upon the privacy of the occupants of adjacent buildings.</i>	Private open space has been suitably located so as to not result in any unreasonable adverse impacts to surrounding properties. The orientation of the subject site, being in an east-west arrangement, further mitigates any potential impacts to adjoining properties to the west, which hold a north-south orientation.	Yes
<b>5. Landscaping</b>			
(1)	<i>Landscaped area (has the same meaning as GRLEP 2021) is to be provided in accordance with the table contained within Clause 6.12 Landscaped areas in certain residential and environmental protection zones of GRLEP 2021.</i>	The site is located within the R2 – Low Density Residential Zone and therefore requires a minimum 25% of the site to be landscaped, pursuant to Clause 6.12(5)(a) of the LEP 2021.  The proposal maintains a landscaped area of 203m <sup>2</sup> (31.8%) and therefore complies with this clause.	Yes
(2)	<i>Provide a landscape setting within the primary and secondary street frontages, where hard paved areas are minimised. At a maximum, impervious areas, including hard paving, gravel, concrete or other material that does not permit landscaping, are to occupy no more than 40% of the street setback area.</i>	The proposal provides for a total of 69.9m <sup>2</sup> (61.5%) landscaping within the front setback and therefore complies.	Yes
(3)	<i>The front setback area is to have an area where at least one (1) tree capable of achieving a minimum mature height of 10m with a spreading canopy can be accommodated. A schedule of appropriate species to consider is provided in Council's Tree Management Policy.</i>	The proposal includes provision for one (1) <i>Elaeocarpus Reticulatus</i> "Blueberry Ash" tree within the front setback, capable of achieving a mature height of 10m and therefore complies.	Yes
<b>6. Excavation (Cut and Fill)</b>			
(1)	<i>Any excavation must not extend beyond the building footprint, including for any basement car park.</i>	This item is acknowledged. All excavation is maintained within the building envelope.	Yes
(2)	<i>The depth of cut or fill must not exceed 1.0m from existing ground level, except where the excavation is for a basement car park.</i>	The proposal includes up to 2.0m fill above natural ground level, which is limited to the rear portion of the dwelling and is contained within the envelope between the basement storage and pool pump room.  This fill does not alter the topography within the locality	Refer Comment



		outside of the building envelope and is therefore considered to be reasonable under the circumstances.	
(3)	<i>Developments should avoid unnecessary earthworks by designing and siting buildings that respond to the natural slope of the land. The building footprint must be designed to minimise cut and fill by allowing the building mass to step in accordance with the slope of the land.</i>	This item is acknowledged.	Yes
<b>7. Vehicular Access, Parking and Circulation</b>			
(1)	<i>Car parking is to be provided in accordance with the requirements in Part 3 of this DCP.</i>	The proposed driveway arrangement has been revised to be at grade, with 2 car parking spaces within the front setback, to minimise visual impact on the street and maximise pedestrian safety.	Yes
(2)	<i>A dwelling is to provide one (1) garage and one (1) tandem driveway parking space forward of the garage (unless otherwise accommodated within the building envelope).</i>	Given previous discussions with Council to remove basement car parking from the site, the proposed parking arrangement within the front setback is considered to be suitable for the site.	Refer Comment
(3)	<i>Driveways, garages and basements should be accessed from a secondary street or rear lane where this is available.</i>	This item is not applicable to the proposed development.	N/A
(4)	<i>Entry to parking facilities off the rear lane must be setback a minimum of 1m from the lane.</i>	This item is not applicable to the proposed development.	N/A
(5)	<i>Driveway crossings are to be positioned so that on-street parking and landscaping on the site are maximised, and removal or damage to existing street trees is avoided.</i>	The driveway crossing from Forest Road has been suitably located to maximise pedestrian safety and landscaping within the front setback.	Yes
(6)	<i>The maximum driveway width between the street boundary and the primary building setback alignment of the garage is 4.0m.</i>	The proposal provides for a maximum driveway width of 3.0m and therefore complies.	Yes
(7)	<i>Basements are permitted where the LEP height development standard is not exceeded, and it is demonstrated that there will be no adverse environmental impacts (e.g. affectation of watercourses and geological structure). (i) Basements on land where the average grade is less than 12.5% are permitted only where they are not considered a storey (see definition in the LEP) and the overall development presents as two (2) storeys to the street.</i>	The proposal no longer includes basement car parking.	N/A
(8)	<i>Car parking layout and vehicular access requirements and design are to be in</i>	All car parking and access complies with Australian Standards.	Yes



	<i>accordance with the Australian Standards, in particular AS 2890.1 (latest edition).</i>		
(9)	<i>The maximum width of a garage opening is 6m.</i>	The proposal no longer includes a garage.	N/A
<b>8. Visual Privacy</b>			
(1)	<i>Windows from active rooms are to be offset with windows in adjacent dwellings, or appropriately treated so as to avoid direct overlooking onto neighbouring windows.</i>	All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(2)	<i>For active rooms or balconies on an upper level, the design should incorporate placement of room windows or screening devices to only allow oblique views to adjoining properties.</i>	As detailed within this report, upper level balconies include privacy screening to maintain amenity to surrounding properties.	Yes
(3)	<i>Upper level balconies should not project more than 1500mm beyond the main rear wall alignment so as to minimise adverse visual privacy impacts to adjoining properties.</i>	Upper level balconies include privacy screening to maintain amenity to surrounding properties. Balconies are contained within the overall building envelope and do not extend beyond primary building walls.	Yes
(4)	<i>Windows for primary living rooms must be designed so that they reasonably maintain the privacy of adjoining main living rooms and private open space areas.</i>	All windows have been suitably located within the façade to maintain a balance of visual privacy to surrounding properties and passive surveillance to the street.	Yes
(5)	<i>Development applications are to be accompanied by a survey plan or site analysis plan (to AHD) of the proposed dwelling showing the location of adjoining property windows, floors levels, window sill levels and ridge and gutter line levels</i>	The proposal is accompanied by both a survey and site analysis plan detailing levels and the location of windows.	Yes
<b>9. Noise</b>			
(1)	<i>Noise generators such as plant and machinery including air conditioning units and pool pumps are located away from windows or other openings in habitable rooms; they are to be screened to reduce noise or acoustically treated.</i>	All plant (including air conditioning and pool pump) is located within the building envelope of the dwelling and is not considered to result in any unreasonable acoustic impact to surrounding properties.	Yes
<b>10. Solar Access</b>			
(1)	<i>New buildings and additions are sited and designed to facilitate a minimum of 3 hours direct sunlight between 9am and 3pm on 21 June onto living room windows and at least 50% of the minimum amount of private open space.</i>	The proposal is accompanied by detailed solar diagrams demonstrating compliance with this requirement.	Yes
(2)	<i>To facilitate sunlight penetration to adjoining development, building bulk may be required to be articulated to achieve the required sunlight access.</i>	The built form has been suitably articulated to maintain solar access to the subject site and adjoining properties.	Yes
(3)	<i>Direct sunlight to north-facing windows of habitable rooms and 50% of the principal</i>	The proposal is accompanied by detailed solar access diagrams	Yes



	<i>private open space area of adjacent dwellings should not be reduced to less than 3 hours between 9.00am and 3.00pm on 21 June.</i>	demonstrating compliance with these provisions.	
(4)	<i>Note: Variations will be considered for developments that comply with all other requirements but are located on sites with an east-west orientation or steeply sloping sites with a southerly orientation away from the street.</i>		Yes
(5)	<i>Shadow diagrams are required to show the impact of the proposal on solar access to the principal private open space and living rooms of neighbouring properties. Existing overshadowing by fences, roof overhangs and changes in level should also be reflected in the diagrams. It may also be necessary to provide elevations or views from sun diagrams to demonstrate appropriate solar access provision to adjoining development.</i>		Yes
<b>11. Materials, Colour Schemes and Details</b>			
(1)	<i>Large expansive surfaces of predominantly white, light or primary colours which would dominate the streetscape or other vistas should not be used.</i>	The proposal is submitted with a detailed schedule of colours and finishes, having been selected with regard to the broader bushland setting of the locality. Buildings are suitably articulated, with material and finishes not considered to dominate the streetscape.  The proposal will be further supported by significant landscaping proposed within the front setback, noting there is also a strong prevalence of white houses within the locality. The proposal is therefore considered acceptable in this regard.	Yes
(2)	<i>New development should incorporate colour schemes that have a hue and tonal relationship with the predominant colour schemes found in the street.</i>	This item is acknowledged.	Yes
(3)	<i>Matching buildings in a row should be finished in the same colour or have a tonal relationship.</i>	Proposed colours and finishes are considered to be consistent with surrounding properties.	Yes
(4)	<i>All materials and finishes utilised should have low reflectivity.</i>	All colours and finishes are of low reflectivity.	Yes
<b>12. Secondary Dwellings</b>			
The proposed development does not include any secondary dwellings.			
<b>13. Site Facilities</b>			
(1)	<i>All dwellings are to be provided with adequate and practical internal and</i>	The dwelling provides for adequate and practical storage.	Yes



	external storage (garage, garden sheds, etc.).		
(2)	Provision for water, sewerage and stormwater drainage for the site shall be nominated on the plans to Council's satisfaction.	Services are available to the site and are nominated on the supporting plans.	Yes
(3)	Each dwelling must provide adequate space for the storage of garbage and recycling bins (a space of at least 3m by 1m must be provided) and this space is not to be located within the front setback.	The proposal provides for adequate waste storage as nominated on the supporting plans.	Yes
(4)	Letterboxes are to be located on the frontage where the address has been allocated in accordance with Australia Post requirements.	The letterbox will be oriented towards the street.	Yes

**Table 7. DCP 2021 Chapter 6.4 Key Provisions**

Clause	Proposal	Complies
<b>6.4.4 Swimming Pools/Spas</b>		
(1)	Swimming pools/spas are to be located to the rear of properties.	The proposal includes a swimming pool located within the rear setback. Yes
(2)	For corner allotments or where the property has two street frontages, swimming pools/spas are not to be located in the primary frontage.	This item is not applicable to the proposed development. N/A
(3)	Swimming pools/spas must be positioned a minimum of 900mm from the property boundary with the water line being a minimum of 1500mm from the property boundary	The swimming pool maintains the following setbacks: <ul style="list-style-type: none"> <li>– Coping: 927mm to the southern (side) boundary.</li> <li>– Water Line 1327mm to the southern (side) boundary.</li> <li>– Coping: 3306mm to the western (rear) boundary.</li> <li>– Water Line 3706mm to the western (rear) boundary.</li> </ul> Yes
(4)	In-ground swimming pools shall be built so that the top of the swimming pool coping is as close to the existing ground level as possible. On sloping sites this will often require excavation of the site on the high side to obtain the minimum out of ground exposure of the swimming pool consistent with the low side	This item is acknowledged. Yes
(5)	Swimming pools/spas are to be no more than 500mm above existing ground level.	The proposed pool maintains a maximum height of 1530mm above existing ground level, noting the site is sloping, with a fall to the south and therefore compliance with this provision is not able to be achieved. Refer Comment
(6)	On steeply sloping sites, Council may consider allowing the top of the swimming pool at one point or along	This item is acknowledged. Yes



	<i>one side to extend up to 1m above existing ground level, provided that the exposed face of the swimming pool wall is treated to minimise impact. The materials and design of the retaining wall should be integrated with and complement the style of the swimming pool</i>		
(7)	<i>Decking around a swimming pool must not be more than 600mm above existing ground level.</i>	The proposed pool edging is constructed on retained earth, maintaining a height of 1530mm above existing ground level.	Refer Comment
(8)	<i>Filling is not permitted between the swimming pool and the property boundary. The position of the swimming pool, in relation to neighbours and other residents, must be considered to minimise noise associated with activities carried out in the swimming pool or from the swimming pool equipment, such as cleaning equipment.</i>	This item is acknowledged.	Yes
(9)	<i>Council may require mechanical equipment to be suitably acoustically treated so that noise to adjoining properties is reduced.</i>	This item is acknowledged.	Yes
(10)	<i>A pool fence complying with the legislation is to separate access from the residential dwelling on the site to the pool.</i>	This item is acknowledged.	Yes
(11)	<i>Safety and security measures for swimming pools must comply with the relevant requirements of the Swimming Pools Act 1992 and any relevant Australian Standards.</i>	This item is acknowledged.	Yes
(12)	<i>A spa is not required to be surrounded by a child resistant barrier provided that the spa is covered or secured by a child-safe structure (e.g. door, lid or mesh) that is fastened to the spa pool by a child-resistant device at all times when the spa pool is not in actual use and complies with Swimming Pools Act 1992 and any relevant Australian Standards.</i>	This item is acknowledged.	Yes

There are no other provisions of the DCP 2021 applicable to the proposal.

Having regard to the above, the proposed development is consistent with the applicable provisions of the DCP 2021.





## 6. ENVIRONMENTAL ASSESSMENT

Section 4.15 of the Environmental Planning and Assessment Act 1979 requires the following matters to be considered in the assessment of the proposed development.

### Impact of the Development on Both the Natural and Built Environments, and Social and Economic Impacts in the Locality

The proposed development is not considered to result in any unreasonable environmental impact. As detailed within this report, the proposed development has been designed with regard to the local context, is considered to suitably integrate within the streetscape and will provide for improved housing stock and high-quality design outcomes within the locality.

Subject to minor variations relating to height and setbacks discussed within this report, the proposal is generally consistent with the applicable planning framework and is not anticipated to result in any loss of solar access nor visual privacy or acoustic impacts to surrounding properties. The proposal does not involve the removal of any trees and suitable landscaping is provided in accordance with the DCP 2021 to ensure integration within the bushland setting of the Lugarno locality. Whilst it is acknowledged there is a departure from the DCP 2021 in relation to building side setbacks, setbacks are consistent with those approved within the initial CDC, are compliant with relevant provisions of the BCA and will not result in any solar access or visual privacy impacts to surrounding properties.

The proposal to legitimise existing works undertaken and to provide for single private residential accommodation. This is an efficient use of the site and provides for an orderly development of the land in accordance with the planning framework. The proposal is considered to present suitably within the streetscape, will not reduce the development capability of surrounding sites and will not detract from the character of the locality.

All necessary services are available to the site, and both waste and stormwater can be appropriately managed in accordance with the provisions of the DCP 2021.

Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views in the locality.

The proposal is not considered to have any adverse social or economic impact on the locality.

### Suitability of the Site for the Development

The proposal is permissible within the zone and is consistent with the objectives of the R2 – Low Density Residential zone to provide for the housing needs of the community, including through a variety of housing types within a low-density residential environment.

Subject to minor variations relating to height and setbacks discussed within this report, the proposal is generally consistent with the applicable planning framework and by virtue of the lot orientation, siting of the dwelling and development patterns within the locality, the site is capable of accommodating the proposed development without any unreasonable amenity impact to the existing dwelling nor neighbouring dwellings on surrounding properties.

The proposal to legitimise existing works undertaken and resolve this long running matter with Council to provide for single private residential accommodation. This application seeks to resolve existing uncertainties



surrounding the site, including for the owner, Council and neighbouring residents, to provide for certainty and a clear and legitimate approval pathway for the completion of the dwelling.

In this regard, the proposal is considered to be an efficient use of the site and provides for an orderly development of the land in accordance with the planning framework. As detailed above, the proposal is considered to maintain a suitable presentation within the streetscape. The proposed development is therefore considered to be suitable for the site.

Any Submissions Made in Accordance with the Act or Regulation

The development application will be publicly notified in accordance with Council's notification policy. The proponent will prepare a response to any submissions received by Council during the exhibition period.

The Public Interest

For the reasons discussed within this report, and in the absence of any unreasonable social, economic or environmental impact, the proposed development is considered to be in the public interest.





## 7. CONCLUSION

The proposal seeks development consent for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1178 Forest Road, Lugarno (Lot 3 DP 18873).

The proposed development seeks to legitimise existing unauthorised works at the site, which are currently subject to compliance action by Council. Whilst works were initially approved and commenced by way of a Complying Development Certificate (CDC), through the course of construction the design of the dwelling has departed from this approved design, meaning this process was not able to be finalised and Occupation Certificates unable to be issued.

The proposal therefore seeks to rectify matters raised by Council, whilst providing for additional alterations to bring into consistency (where practicable) with applicable planning framework. Accordingly, the proposed development seeks to legitimise these works with Council through concurrent Development Application (DA) and Building Certificate (BC) processes. A supporting BC has been submitted under separate cover.

The proposal is a permissible use and is consistent with the objectives of the R2 – Low Density Residential zone. The proposal is generally consistent with the development standards, relevant provisions and built form guidelines contained within the LEP 2021 and DCP 2021.

The proposed works do not detract from the presentation of dwelling within the streetscape and are not considered to result in any unreasonable amenity impact to the locality.

Based on the conclusions of the comprehensive assessment undertaken, and in the absence of any significant adverse environmental, social, heritage or economic impacts Council's approval of the development application is sought.



Ref: 2122301-LET-008-R1

17 November 2022

The General Manager  
Georges River Council  
PO Box 205  
Hurstville BC  
NSW 1481

**RE: Request to Vary the Height of Buildings Development Standard for the Property Located at 1176 Forest Road, Lugarno**

Dear Sir/Madam,

This request is made pursuant to Clause 4.6 of the Georges River Local Environmental Plan 2021 (LEP) to accompany a Development Application (DA) to Georges River Council (Council) for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1178 Forest Road, Lugarno (the site). This request seeks a variation to the maximum building height limit pursuant to Clause 4.3 of the LEP 2021.

Clause 4.6 of the LEP 2021 aims to provide an appropriate degree of flexibility in applying certain development standards to achieve better outcomes for and from development by allowing flexibility in particular circumstances, and enables the consent authority to grant consent for development even though the development contravenes the maximum height of building development standard.

Clauses 4.6(3)&(4) require the consent authority to consider a written request from the applicant that seeks to justify the contravention of the development standard. Clause 4.6(4)(a) states that development consent must not be granted for development that contravenes a development standard unless the consent authority is satisfied::

- That the applicant's written request has adequately demonstrated that compliance with the development standard is unreasonable or unnecessary in the circumstances of the case;
- That the applicant's written request has adequately demonstrated that there are sufficient environmental planning grounds to justify contravening the development standard; and
- That the proposed development will be in the public interest because it is consistent with the objectives of the particular standard and the objectives for development within the zone in which the development is proposed to be carried out.

Accordingly, this request provides an overview of the site and proposed development, details the extent of the proposed variation and why compliance with the development standard is unreasonable or unnecessary in the circumstances of the case, including sufficient environmental planning grounds to justify the contravention, having regard for the matters for contained within Clause 4.6(4)(a).



### 1. The Site

The subject site is located at 1178 Forest Road, Lugarno (Lot 3 DP 18873). The site accommodates a two (2) storey detached 5-bedroom dwelling with integrated (basement) garage and swimming pool and is in the advanced stages of construction.

Please also refer to a detailed description of the site within the supporting Statement of Environments (SEE).

### 2. Proposed Development

The proposal seeks the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation. The site and existing part constructed dwelling forms part of a group of three (3) dwellings located at 1174, 1176 and 1178 Forest Road, Lugarno. Each exist under similar circumstances, whereby lots have been created, and dwellings part constructed, without appropriate planning approvals. These dwellings, including the subject site are known to Council.

The proposed development seeks to legitimise this ongoing matter with Council for site and is submitted concurrently with a Building Information Certificate (BC) to legitimise structural works undertaken to date. The subject DA therefore seeks to undertake necessary alterations and additions to enable the finalisation of construction and occupation of the dwelling ongoing.

Please also refer to a detailed description of the proposed development within the supporting SEE.

### 3. Land Zoning

The site is zoned R2 – Low Density Residential Pursuant to the LEP 2021. The objectives of the R2 zone are:

- *“To provide for the housing needs of the community within a low density residential environment.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*
- *To promote a high standard of urban design and built form that enhances the local character of the suburb and achieves a high level of residential amenity.*
- *To provide for housing within a landscaped setting that enhances the existing environmental character of the Georges River local government area.”*

### 4. Development Standard to be Varied

This request seeks a variation to Clause 4.3 (Height of Buildings) of the LEP 2021. The objectives of this development standard are:

- *“(a) to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of the locality,*
- *(b) to minimise the impact of overshadowing, visual impact, disruption of views and loss of privacy on adjoining properties and open space areas,*
- *(c) to ensure an appropriate height transition between new buildings and—*



- (i) adjoining land uses, or
- (ii) heritage items, heritage conservation areas or Aboriginal places of heritage significance.”

Pursuant to Clause 4.3(2), the site is subject to a maximum permitted building height of 9.0m.

## 5. Nature of Variation Sought

The proposed development has a maximum height of 9.076m and therefore represents a variation to Clause 4.3 of the LEP 2021 by 76mm (0.84%).

The extent of this variation is limited to a small element of the rear (south western) portion of the roof form, as detailed at Figures 1 and 2 below.

The reason for this request to vary the height of building development standard is that it is not practicable to undertake alterations to the existing built form to bring the dwelling into compliance. To do so would require a significant scope of works, including erection of full scaffolding to the rear portion of the dwelling, without any improved amenity as a result of compliance.

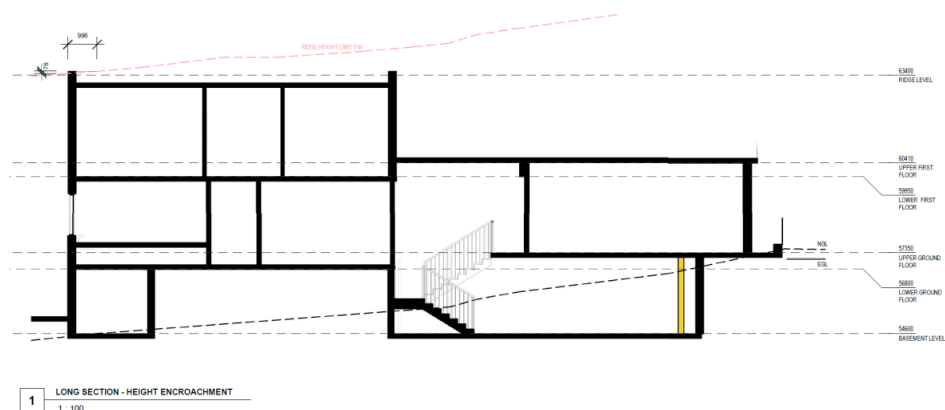
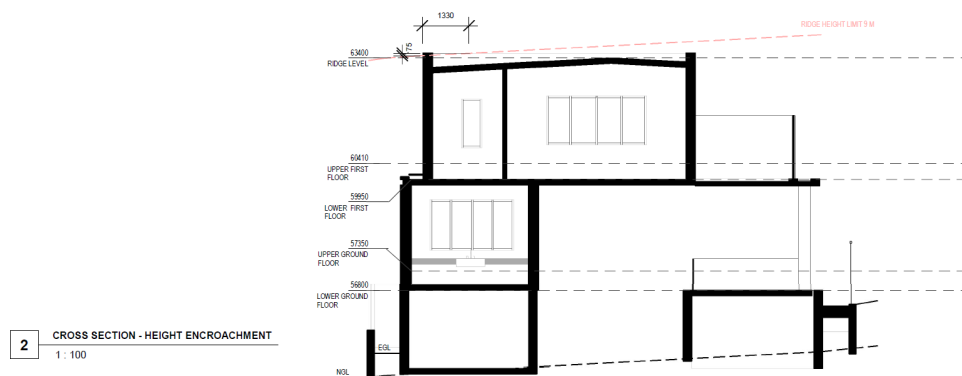
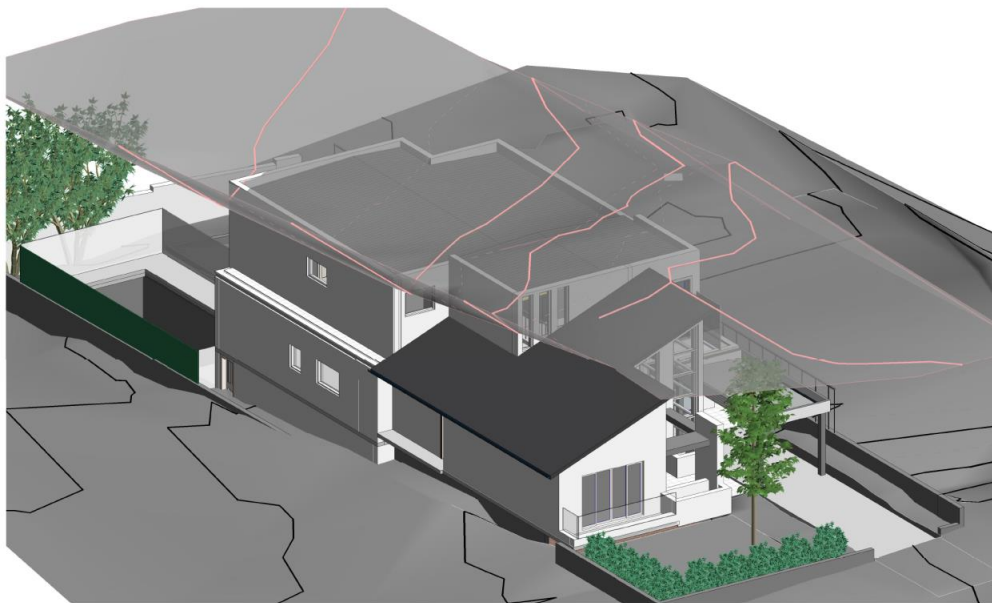


Figure 1. Extract of proposed section (Drawing No. DA-801) showing extent of proposed variation.





**Figure 2. Extract of proposed short section (Drawing No. DA-506) showing extent of proposed variation.**



**Figure 3. Extract of Drawing No. DA-800 showing 3D extent of proposed variation.**

**6. Clause 4.6(3)(a): Compliance with the Development Standard is Unreasonable or Unnecessary in the Circumstances of the Case**

Clause 4.6(3)(a) of the LEP 2021 requires the applicant to provide justification that strict compliance with the maximum building height development standard is unreasonable or unnecessary in the circumstances of the case.

Assistance on the approach to justifying a contravention to a development standard is also to be taken from the applicable decisions of the NSW Land and Environment Court (LEC) and the NSW Court of Appeal in:

- *Wehbe v Pittwater Council [2007] NSW LEC 827 (Wehbe); and*
- *Four2Five Pty Ltd v Ashfield Council [2015] NSWLEC 1009 (Four2Five).*

The relevant matters contained in Clause 4.6 of the LEP 2021, with respect to the maximum building height development standard, are each addressed below, including with regard to these decisions.

In *Wehbe* (at 43-48), Preston CJ established five potential ways for determining whether a development standard could be considered to be unreasonable or unnecessary and that approval of the objection may be consistent with the aims of the policy. These include the following methods:

1. *“The objectives of the standard are achieved notwithstanding non-compliance with the standard;*



2. *The underlying objective or purpose of the standard is not relevant to the development and therefore compliance is unnecessary;*
3. *The underlying object or purpose would be defeated or thwarted if compliance was required and therefore compliance is unreasonable;*
4. *The development standard has been virtually abandoned or destroyed by the Council's own actions in granting consents departing from the standard and hence compliance with the standard is unnecessary and unreasonable.*
5. *The zoning of the particular land is unreasonable or inappropriate so that a development standard appropriate for that zoning is also unreasonable and unnecessary as it applies to the land and compliance with the standard would be unreasonable or unnecessary. That is, the particular parcel of land should not have been included in the particular zone."*

In the matter of *Four2Five*, Commissioner C Pearson, at 62 stated within the judgement the following, in reference to a variation:

*"The case law developed in relation to the application of SEPP1 may be of assistance in applying cl 4.6. While Wehbe concerned an objection under SEPP 1, in my view the analysis is equally applicable to a variation under cl 4.6 where cl 4.6(3)(a) uses the same language as cl 6 of SEPP1."*

Relevant to the proposed development, the first method is considered to be appropriate in establishing that compliance with a development standard is unreasonable or unnecessary. Given the proposed development and this variation request relates to the retention of an existing dwelling, having been established without necessary planning approvals, there are practical impediments to modifying the structure into compliance with the development standard. Therefore, methods two through five are not considered applicable.

An assessment of proposed development against the objectives of the height of building development standard are provided at Table 1 below.

**Table 1. Assessment of the Objectives of the Height of Buildings Development Standard**

Objective		Proposal
Cl.4.3(1)	<i>The objectives of this clause are as follows—</i>	Refer below.
Cl.4.3(1)(a)	<i>to ensure that buildings are compatible with the height, bulk and scale of the existing and desired future character of the locality,</i>	<p>The proposed development is considered to be compatible with the height, bulk and scale of the existing and desired future character of the Lugarno locality.</p> <p>The proposal complies with the applicable Floor Space Ratio (FSR) development standard and presents as a well-designed, articulated two (2) storey form, comparable to surrounding developments within the streetscape and with suitable landscaping to integrate with the bushland setting of the locality.</p> <p>The proposed variation is limited to the south western (rear) element of the roof form, which due to site levels, will not be visible from nor alter the presentation of the dwelling from Forest Road. In this regard, the proposed variation is not considered to increase the overall bulk of the building.</p>



Cl.4.3(1)(b)	<i>to minimise the impact of overshadowing, visual impact, disruption of views and loss of privacy on adjoining properties and open space areas,</i>	<p>As detailed in the supporting solar access diagrams, the proposal maintains compliant solar access to the subject and surrounding properties (including areas of private open space) in accordance with the Georges River Development Control Plan 2021 (DCP).</p> <p>Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views in the locality.</p> <p>The proposal is considered to maintain residential amenity and visual privacy in accordance with the provisions of the DCP 2021. The proposal maintains a compliant rear setback of 14.658m, with windows having been offset from those on adjoining properties, as well as privacy screening (up to 1800mm) and an opaque balustrade installed on the rear balcony, to mitigate potential privacy impacts.</p> <p>The orientation of the subject site, being in an east-west arrangement, further mitigates any potential impacts to adjoining properties to the west, which hold a north-south orientation.</p> <p>Further, the extent of the variation is limited to the roof form only, and does not resulting in any increased void space or any additional Gross Floor Area (GFA).</p>
Cl.4.3(1)(c)	<i>to ensure an appropriate height transition between new buildings and—</i>	Refer below.
Cl.4.3(1)(c)(i)	<i>adjoining land uses, or</i>	<p>The proposal is considered to result in an appropriate transition to adjoining properties. The site sits within a group of three dwellings fronting Forest Road, each have been designed and constructed concurrently and in a similar manner.</p> <p>As noted above, given the orientation of the subject and significant rear setbacks, the proposed development is considered to maintain an appropriate transition to adjoining properties to the west of the site and will not result in any unreasonable visual imposition, loss of solar access or loss of visual privacy.</p>
Cl.4.3(1)(c)(ii)	<i>heritage items, heritage conservation areas or Aboriginal places of heritage significance.</i>	The site is not identified as, nor within proximity to any heritage items (or draft items) or Heritage Conservation Area (HCA) (or draft HCA). The site is not located within close proximity to any Aboriginal places of heritage significance.

Having regard to the above, it is considered that compliance with the height of buildings development standard is unreasonable and unnecessary in the circumstances, as the objectives of the standard are achieved notwithstanding the non-compliance with the standard.



It is not practicable to undertake alterations to the existing built form to bring the dwelling into compliance. To do so would require a significant scope of works, including erection of full scaffolding to the rear portion of the dwelling, without any improved amenity as a result of compliance.

#### **7. Clause 4.6(3)(b): Environmental Planning Grounds to Justify Contravening the Development Standard**

It is considered there are sufficient environmental planning grounds to justify the proposed contravention of the maximum height of building development standard as follows:

- The extent of the variation is limited to a small element of the roof form only, being the south western (rear) portion of the roof form and is located behind the main ridge form. The majority of the dwelling form is within the maximum permitted building height.
- The extent of the proposed variation is not visible from Forest Road and does not alter the presentation of the dwelling within the streetscape. The extent of the proposed variation is not visible from any other public place.
- Due to the topography of the site, the extent of the proposed variation does not increase the overall maximum RL of the roof form and is not considered to alter the visual bulk of the dwelling when viewed from surrounding properties.
- The extent of the proposed variation comprises the roof structure only and does not contribute to any additional GFA at the site, noting the proposal complies with the maximum FSR for the site.
- The extent of the proposed variation does not result in any additional storeys or accessible areas (that are not GFA, such as attic storage or a roof terrace). The proposal maintains a two (2) storey built form, consistent with surrounding development patterns and the built form intended by the planning framework.
- Neither the site or surrounding properties benefit from any significant views or vistas. In this regard, the proposal will not affect any views in the locality.
- The proposal does not result in any unreasonable visual impact to surrounding properties. Suitable design measures have been incorporated within the design of the dwelling, including window positioning and the provision of privacy screening, to ensure a suitable relationship to neighbouring properties.
- The proposal maintains compliance solar access to the subject site and surrounding properties, in accordance with the provisions of the DCP 2021.

For the reasons nominated above, it is considered there are sufficient environmental planning grounds to support the proposed variation to the height of buildings development standard.

#### **8. Clause 4.6(4)(a)(ii): In the Public Interest Because it is Consistent with the Objectives of the Zone and Development Standard**

The proposal is considered to be in the public interest because it is consistent with the objectives of the zone and the height of buildings development standard.

An assessment of proposed development against the objectives of the height of building development standard are provided at Table 1 above.





An assessment of proposed development against the objectives of R2 – Low Density Zone are provided at Table 2 below.

are provided at Table 2 below.

**Table 2. Assessment of the Objectives of the R2 – Low Density Residential Zone**

Objective	Proposal
<i>To provide for the housing needs of the community within a low density residential environment.</i>	The proposal seeks to legitimise the existing single detached dwelling for private single residential occupation.  The proposal complies with the applicable FSR for the site and is therefore considered to provide for the housing needs of the community within a low density residential environment.
<i>To enable other land uses that provide facilities or services to meet the day to day needs of residents.</i>	This item is not applicable to the proposed development.
<i>To promote a high standard of urban design and built form that enhances the local character of the suburb and achieves a high level of residential amenity.</i>	The proposal is considered to be of a high design standard and built form. The scale of the proposal is consistent with surrounding development patterns, complies with applicable solar access, private open space and residential amenity provisions within the DCP 2021 and is considered to maintain a high level of amenity within the locality.
<i>To provide for housing within a landscaped setting that enhances the existing environmental character of the Georges River local government area.</i>	As detailed in the supporting SEE, the proposal provides for compliant landscaped areas and landscaping in accordance with the DCP 2021, and is therefore considered to maintain and enhance the existing environmental character of the locality.

For the reasons nominated above, the proposed variation to the height of buildings development standard is considered to be in the public interest as it would allow for the retention and legitimisation of the existing part completed dwelling, consistent with the objectives of the R2 – Low Density Residential Zone and the height of buildings development standard, without unreasonable impact to surrounding properties, the character of the locality or the broader environment.

## 9. Other Matters For Consideration

Pursuant to Clause 4.6(5) of the LEP 2012, in deciding whether to grant concurrence, the Planning Secretary must consider

- (a) whether contravention of the development standard raises any matter of significance for State or regional environmental planning, and
- (b) the public benefit of maintaining the development standard, and
- (c) any other matters required to be taken into consideration by the Secretary before granting concurrence.



It is understood that concurrence to the proposed variation is not required by the Planning Secretary pursuant to clause 4.6(4)(b), as we understand that the relevant consent authority has the necessary delegation as set out in the Assumed Concurrence Notice issued by the Secretary of the Department of Planning and Environment dated 21 February 2018 (attached to DPE Planning Circular PS 20-002 dated 5 May 2020).

Notwithstanding, a response to these matters is provided below.

#### **10. Whether Contravention of the Development Standard Raises any Matter of Significance for State or Regional Environmental Planning**

The variation of the maximum height development standard is not considered to not raise any matter of significance for State or regional planning.

#### **11. The Public Benefit of Maintaining the Development Standard**

For the reasons discussed within this letter, in the circumstances of the proposed development, it is considered there is no public benefit in maintaining the development standard.

If the development standard were to be maintained, this would further prolong this long running compliance matter with Council, meaning the dwelling would continue to remain in an unsightly and uninhabitable part completed state and continue the existing state of uncertainty for Council, the property owner and the local community.

#### **12. Any Other Matters Required to be Taken into Consideration by the Secretary Before Granting Concurrence**

There are no other relevant matters requiring consideration.

#### **13. Conclusion**

This request is made pursuant to Clause 4.6 of the LEP 2021 to accompany a DA to Council for the retention of the existing part constructed dwelling, and alterations and additions to enable finalisation of construction and occupation at 1178 Forest Road, Lugarno.

This request seeks a variation to the maximum building height limit pursuant to Clause 4.3 of the LEP 2021.

Pursuant to Clause 4.3(2), the site is subject to a maximum permitted building height of 9.0m. The proposed development has a maximum height of 9.076m and therefore represents a variation to Clause 4.3 of the LEP 2021 by 76mm (0.84%).

For the reasons discussed within this letter, despite the minor variation to the height of buildings control, the proposal is considered to be of high architectural merit, having been sensitively designed and incorporate modulation, articulation and high-quality finishes. The proposed variation does not increase the height of the dwelling in storeys and does not result in any additional GFA at the site.

The proposed design is considerate in ensuring compatibility with adjacent and surrounding dwellings and is presented appropriately when viewed from the surrounding areas. The appropriate design ensures no



unreasonable adverse environmental impacts will result from the proposed works, including in terms of privacy, view sharing, visual intrusion and overshadowing.

Consequently, strict compliance with the height of buildings development standard is considered to be unreasonable and unnecessary in the circumstances and the use of Clause 4.6 of the LEP 2021 to vary this development standard is appropriate in this instance.

Based on the above, it is sensible to conclude that strict compliance with the maximum building height control is not necessary and that a better outcome is achieved for this development by allowing flexibility in the application.





# DEVELOPMENT APPLICATION

LOT 3 DP 18873  
1178 FOREST RD LUGARNO NSW 2210

## ARCHITECTURAL PACKAGE

AERIAL IMAGE



LOCATION PLAN



### GENERAL NOTES

#### PRIOR TO COMMENCEMENT

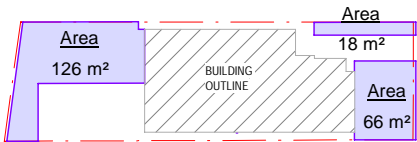
1. ALL DIMENSIONS AND FLOOR AREAS TO BE VERIFIED PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
2. ANY DISCREPANCIES ARE TO BE CONFIRMED BY THE DESIGNER.
3. LEVELS SHOWN ARE APPROXIMATE UNLESS ACCOMPANIED BY REDUCED LEVELS BY A REGISTERED SURVEYOR.
4. FIGURED DIMENSIONS ARE TO BE TAKEN IN PREFERENCE TO SCALING.
5. ALL BOUNDARY CLEARANCES MUST BE VERIFIED BY THE SURVEYOR PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
6. THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS DRAWINGS & SPECIFICATIONS INCLUDING STRUCTURAL, MECHANICAL & HYDRAULICS.
7. WHERE ENGINEERING OR HYDRAULIC DRAWINGS ARE REQUIRED, SUCH DRAWINGS MUST TAKE PREFERENCE TO THESE DRAWINGS.
8. FAILURE TO COMPLY WITH DRAWINGS & SPECIFICATIONS COULD RESULT IN ALTERATIONS BEING MADE AT THE COST TO THE CONTRACTOR.
9. ALL SERVICES AND UTILITIES TO BE LOCATED AND VERIFIED BY THE CONTRACTOR WITH THE RELEVANT AUTHORITIES PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORKS.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM ALL SITE CONDITIONS & REQUIREMENTS.

#### DEMOLITION & SITE PREPARATION

11. BEFORE COMMENCEMENT OF DEMOLITION WORKS THE CONTRACTOR MUST CONTACT THE CONSULTANT ENGINEER TO ESTABLISH WHICH WALLS ETC ARE ABLE TO BE SAFELY REMOVED.
12. ALL DEMOLITION WORK TO BE CARRIED OUT IN ACCORDANCE WITH AS2401.
13. REMOVAL OF ASBESTOS CEMENT SHEETING MUST BE CARRIED OUT BY A LICENSED CONTRACTOR IN COMPLIANCE WITH THE REQUIREMENTS OF THE NSW WORKCOVER AUTHORITY IN RELATION TO THE REMOVAL, HANDLING AND DISPOSAL OF ALL MATERIAL CONTAINING ASBESTOS AND THE WORKSAFE AUSTRALIA ASBESTOS CODE OF PRACTICE & GUIDANCE NOTES.
14. PROTECTIVE MEASURES ARE REQUIRED FOR EACH TREE BEING RETAINED ON SITE AND SHALL BE ESTABLISHED BEFORE ANY BUILDING WORKS COMMENCE AND SHALL BE CONSTRUCTED AND MAINTAINED AS PER COUNCILS REQUIREMENTS.
15. SILT/SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO ANY EXCAVATION OR CONSTRUCTION WORK.

### ARCHITECTURAL DRAWING LIST

SHEET No.	SHEET NAME	SCALE	DATE	REV
DA-3-000	COVER SHEET	N/A	03.11.2023	2
DA-3-050	EXISTING SITE PLAN	1:200	03.11.2023	2
DA-3-100	EXISTING UNDERCROFT PLAN	1:100	24.11.2022	1
DA-3-101	EXISTING GROUND FLOOR PLAN	1:100	24.11.2022	1
DA-3-103	EXISTING FIRST FLOOR PLAN	1:100	24.11.2022	1
DA-3-201	EXISTING EAST & WEST ELEVATIONS	1:100	24.11.2022	1
DA-3-202	EXISTING SOUTH & NORTH ELEVATIONS	1:100	24.11.2022	1
DA-3-205	EXISTING LONG SECTION	1:100	24.11.2022	1
DA-3-206	EXISTING CROSS SECTIONS	1:100	24.11.2022	1
DA-3-302	GROUND FLOOR DEMO PLAN	1:100	03.11.2023	2
DA-3-303	FIRST FLOOR DEMO PLAN	1:100	03.11.2023	2
DA-3-350	PROPOSED SITE PLAN	1:200	03.11.2023	2
DA-3-351	SITE SETBACK PLAN	1:200	03.11.2023	2
DA-3-400	PROPOSED UNDERCROFT PLAN	1:100	03.11.2023	2
DA-3-401	PROPOSED GROUND FLOOR PLAN	1:100	03.11.2023	2
DA-3-402	PROPOSED FIRST FLOOR PLAN	1:100	03.11.2023	2
DA-3-501	PROPOSED EAST AND WEST ELEVATIONS	1:100	03.11.2023	2
DA-3-502	PROPOSED SOUTH ELEVATION	1:100	03.11.2023	2
DA-3-504	PROPOSED NORTH ELEVATION	1:100	03.11.2023	2
DA-3-505	PROPOSED LONG SECTION	1:100	03.11.2023	2
DA-3-506	PROPOSED CROSS SECTIONS	1:100	03.11.2023	2
DA-3-507	SHADOW DIAGRAM	1:200	03.11.2023	2
DA-3-600	PROPOSED LANDSCAPE PLAN	1:200	03.11.2023	2
DA-3-601	DOOR & WINDOW SCHEDULE AND BASIX	N/A	24.11.2022	1
DA-3-701	FINISHES SCHEDULE	N/A	03.11.2023	2
DA-3-702	PHOTO MONTAGE	N/A	03.11.2023	2
DA-3-800	3D HEIGHT LIMIT VIEW	N/A	24.11.2022	1
DA-3-801	HEIGHT LIMIT ENCROACHMENT SECTIONS	1:100	24.11.2022	1
DA-3-802	FRONTAGE ELEVATION	1:100	03.11.2023	2
INFO-3-03	3D ELEVATION	N/A	03.11.2023	2

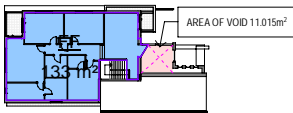
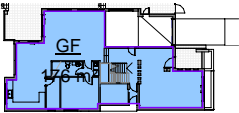


### 3 LANDSCAPE AREA

1 : 500

### 1 GROUND FLOOR GFA

1 : 500



### 2 FIRST FLOOR GFA

1 : 500

Area Schedule	
Level	Area
UPPER GROUND FLOOR	176 m²
UPPER FIRST FLOOR	133 m²
Grand total	309 m²

LOT 3 DP 18873  
1178 Forest Rd Lugarno NSW 2210

CLIENT	LUGARNO DEVELOPMENTS PTY LTD
PROJECT STATUS	DEVELOPMENT APPLICATION
PROJECT TITLE	SINGLE DWELLING
REVISION	2
PROJECT No.	2122-301

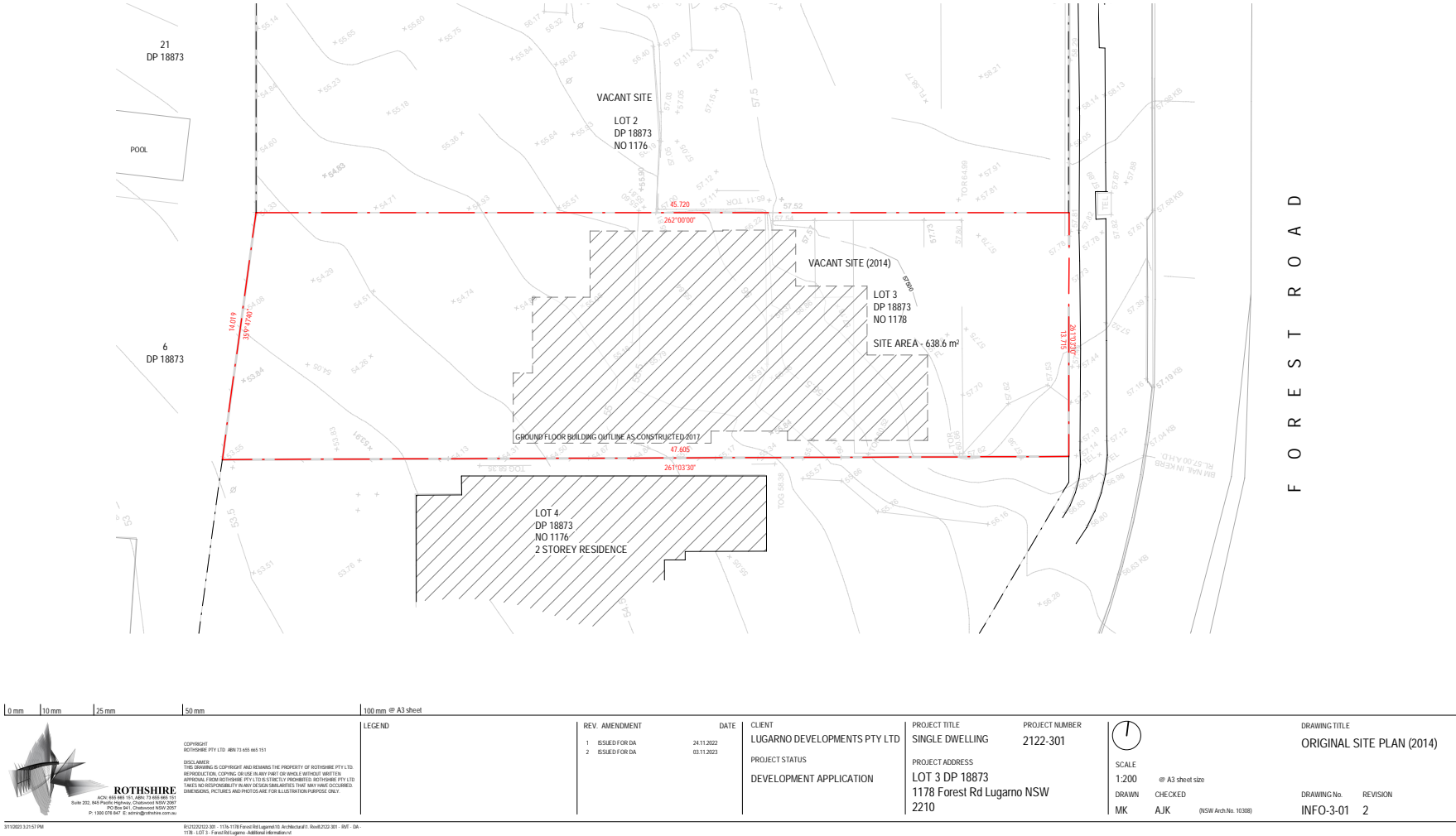
### PROJECT CONSULTANTS

ARCHITECTURE & DESIGN	
Alana Kowalczyk (NSW Arch No. 10308)	Rothshire Services
STORMWATER ENGINEERS	
Alexander Kamas	Rothshire Services
STRUCTURAL ENGINEERS	
Alexander Kamas	Rothshire Services
SURVEYING	
Peter Nancarrow	Summit Geomatic
TOWN PLANNING	
Jonathan Archibald	Rothshire Services

REVISION TABLE		
REV	AMENDMENT	DATE
1	ISSUED FOR DA	24.11.2022
2	ISSUED FOR DA	03.11.2023



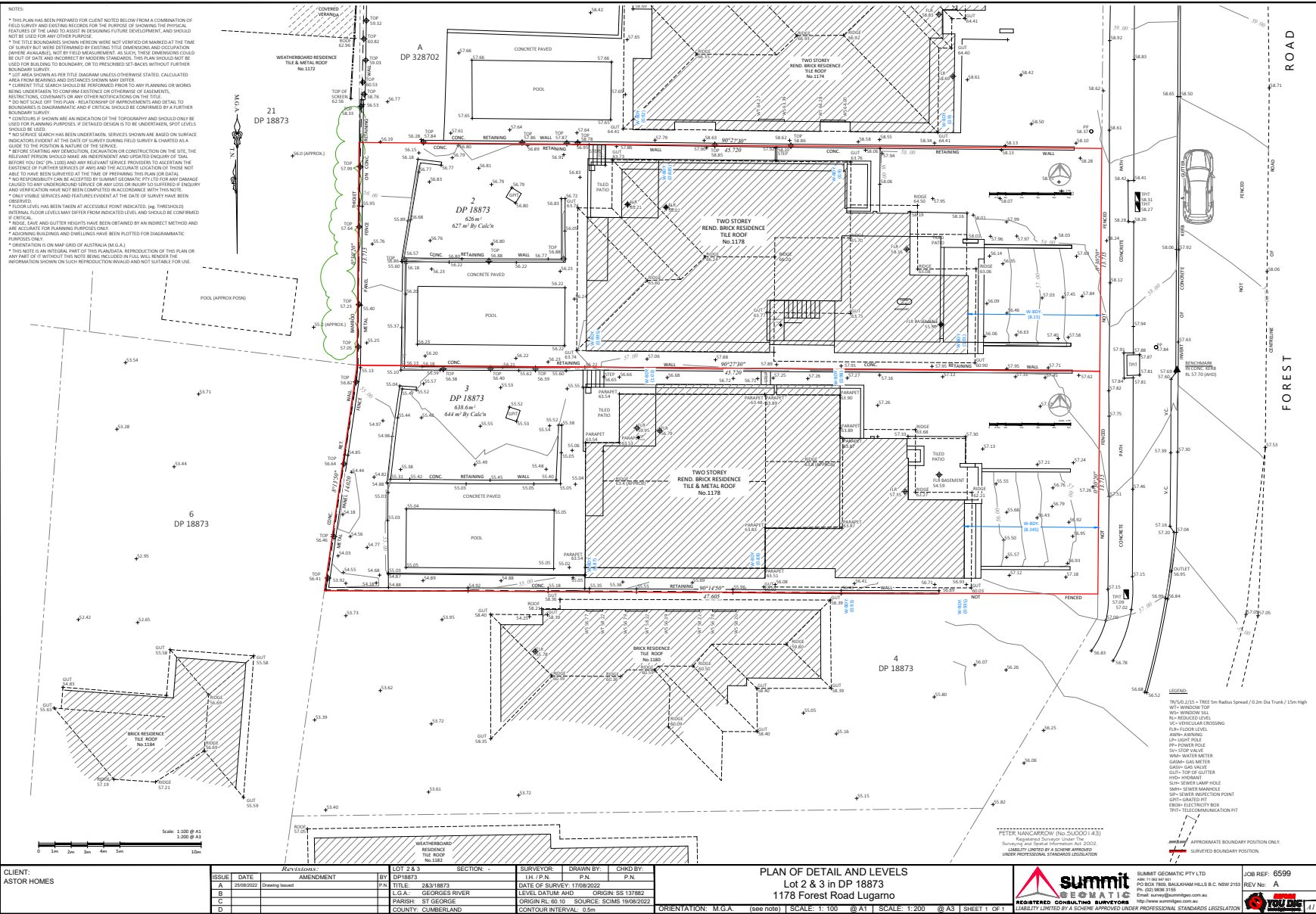
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1. TOPOGRAPHY IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES, DATED 19 MAY 2014.  
2. THE ORIGINAL SITE DEPICTS THE SITE IN PREDEVELOPMENT STATE WITH THE FUTURE 2017 BUILDING OUTLINE



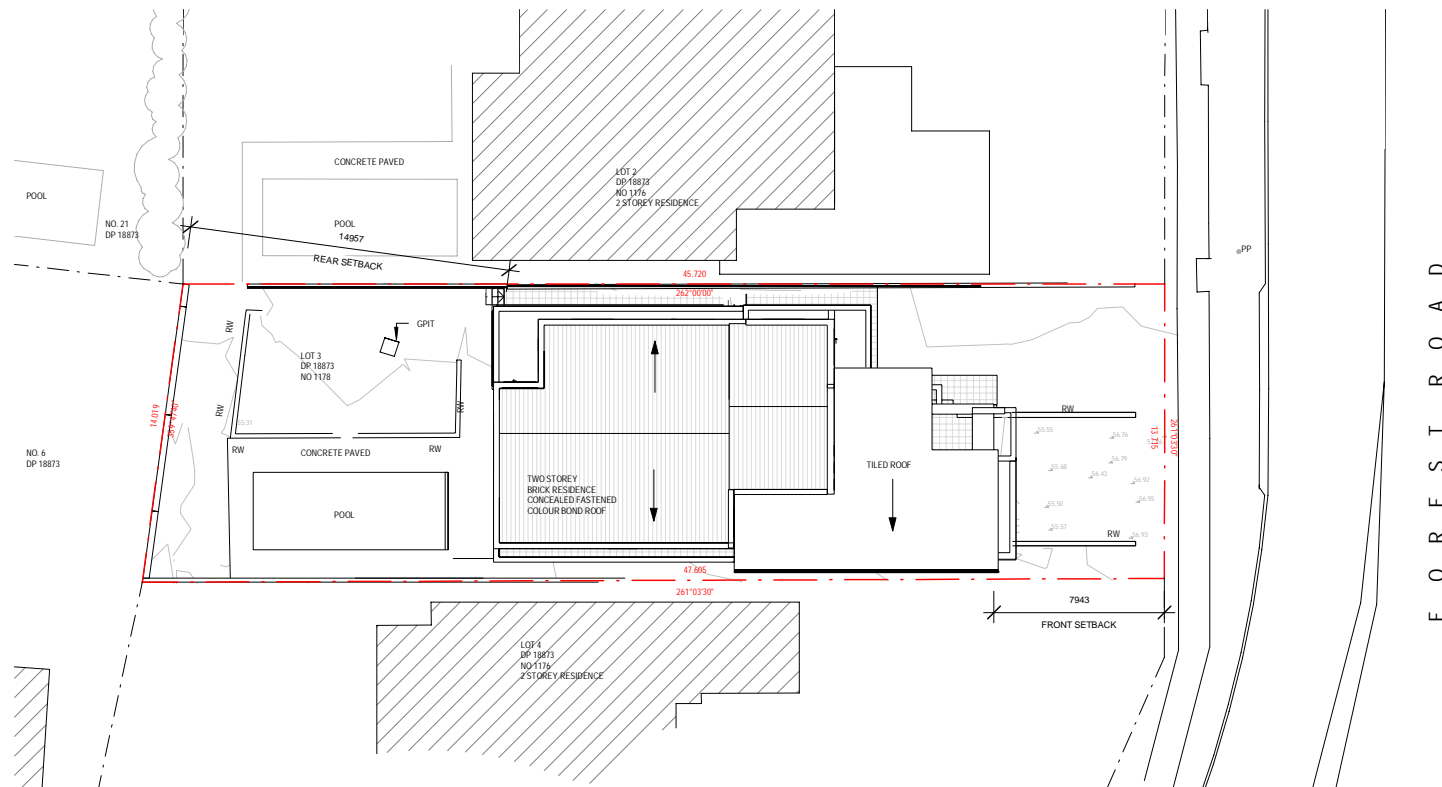








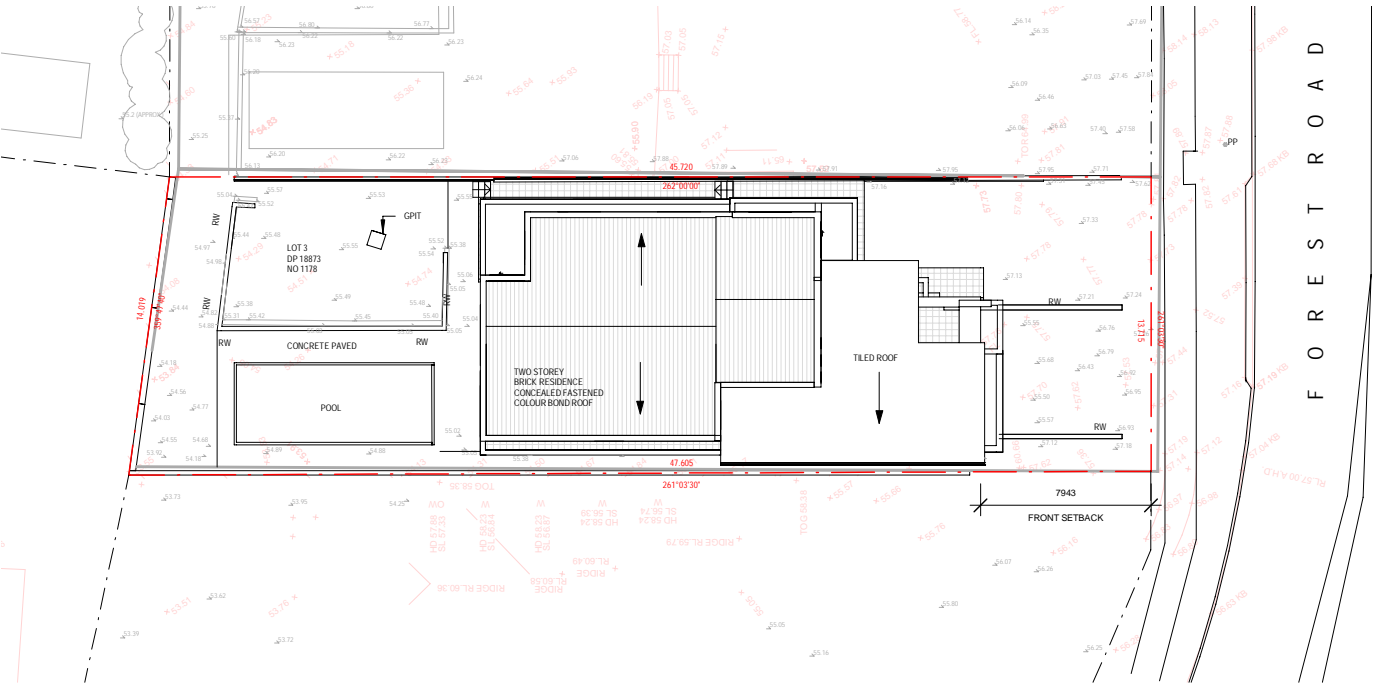
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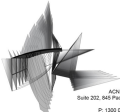



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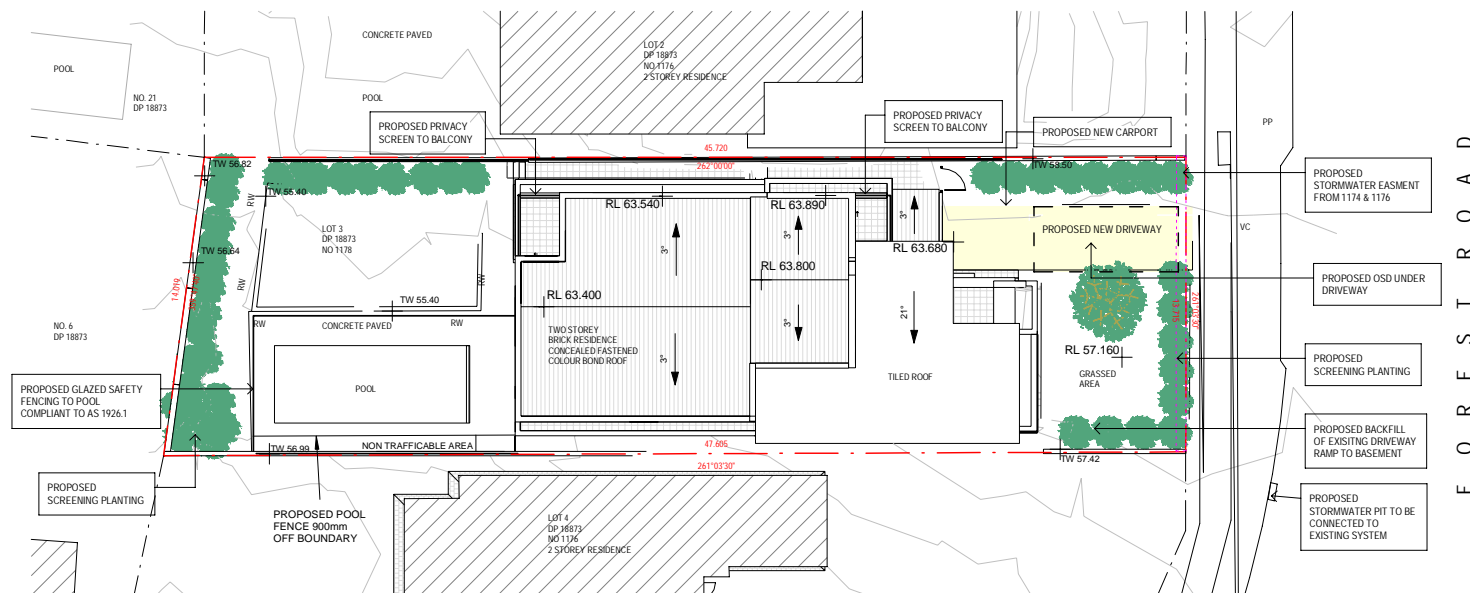


NOTES:  
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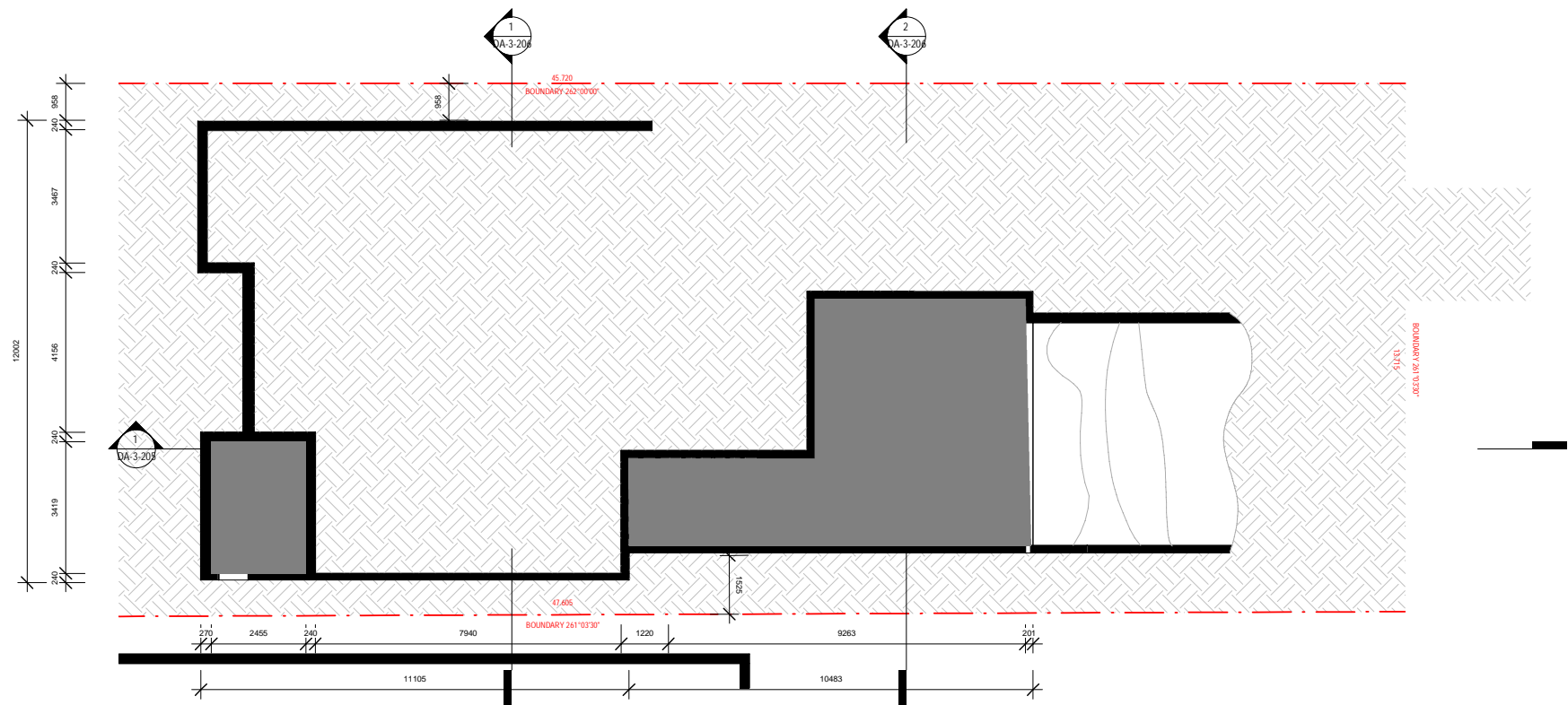
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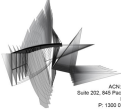
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REPORT 2122301-BCA-RPT-002 BY ROTHSHIRE



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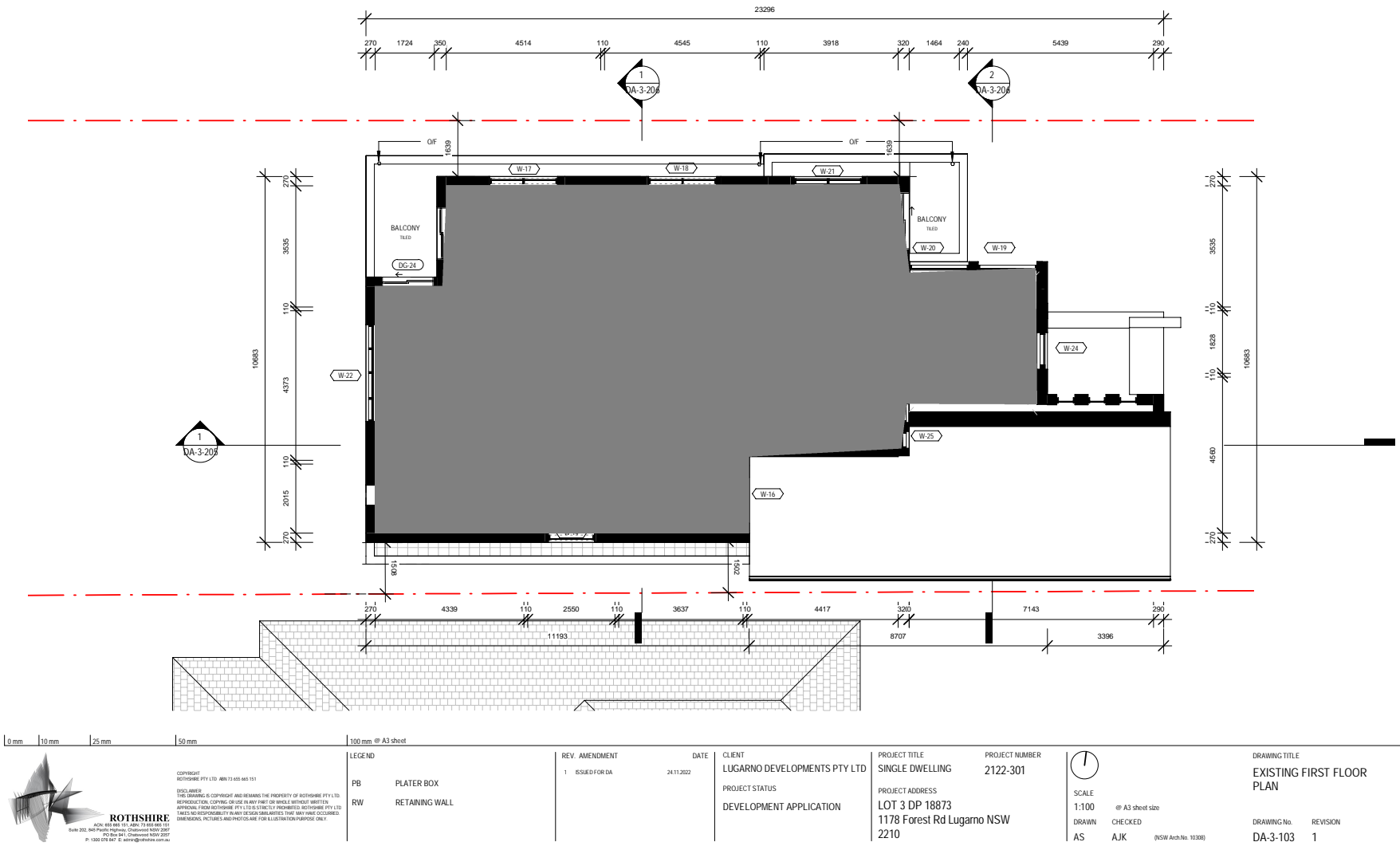




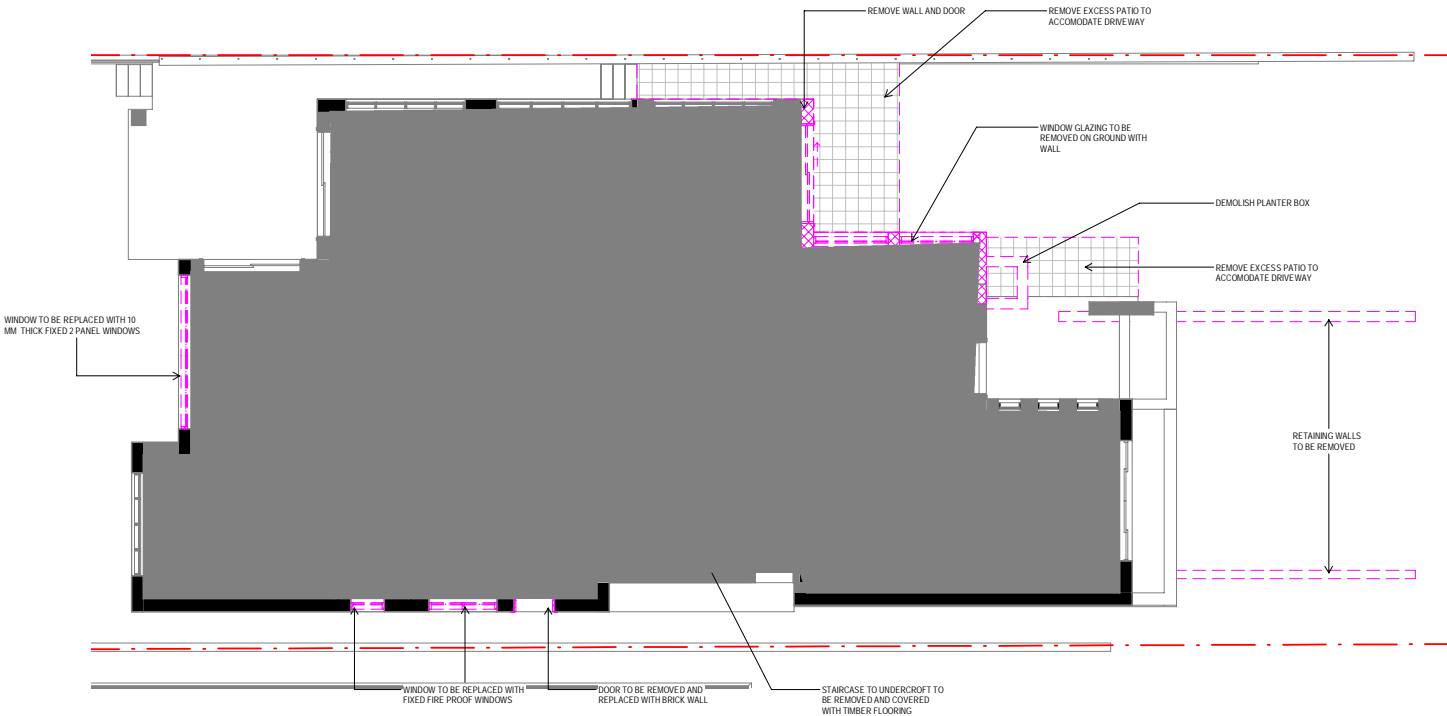
 <p><b>ROTHSHIRRE</b> ARCHITECTURE</p> <p>1178 Forest Rd Lugarno NSW 2202 P: 1300 078 847 E: info@rothshirre.com.au</p>	<p>LEGEND</p> <p>PB PLATER BOX</p> <p>RW RETAINING WALL</p>	<p>REV. AMENDMENT</p> <p>1 ISSUED FOR DA</p> <p>DATE 24.11.2022</p>	<p>CLIENT LUGARNO DEVELOPMENTS PTY LTD</p> <p>PROJECT STATUS DEVELOPMENT APPLICATION</p>	<p>PROJECT TITLE SINGLE DWELLING</p> <p>PROJECT ADDRESS LOT 3 DP 18873 1178 Forest Rd Lugarno NSW 2210</p>	<p>PROJECT NUMBER 2122-301</p> <p>SCALE 1:100</p> <p>DRAWN AS</p> <p>CHECKED AJK</p> <p>(NSW Arch.No. 10388)</p>	<p>DRAWING TITLE EXISTING UNDERCROFT PLAN</p> <p>DRAWING No. DA-3-100</p> <p>REVISION 1</p>
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LEGEND

--- SITE BOUNDARY LINE

--- PROPOSED DEMOLITION WORKS

REV. AMENDMENT

1 ISSUED FOR DA

2 ISSUED FOR DA

DATE

24.11.2022

03.11.2023

CLIENT

LUGARNO DEVELOPMENTS PTY LTD

PROJECT STATUS

DEVELOPMENT APPLICATION

PROJECT TITLE

SINGLE DWELLING

PROJECT ADDRESS

LOT 3 DP 18873

1178 Forest Rd Lugarno NSW

2210

PROJECT NUMBER

2122-301

SCALE

1:100

@ A3 sheet size

DRAWN

AS

CHECKED

AJK

(NSW Arch.No. 10388)

DRAWING TITLE

GROUND FLOOR DEMO PLAN

DRAWING No.

DA-3-302


REVISION

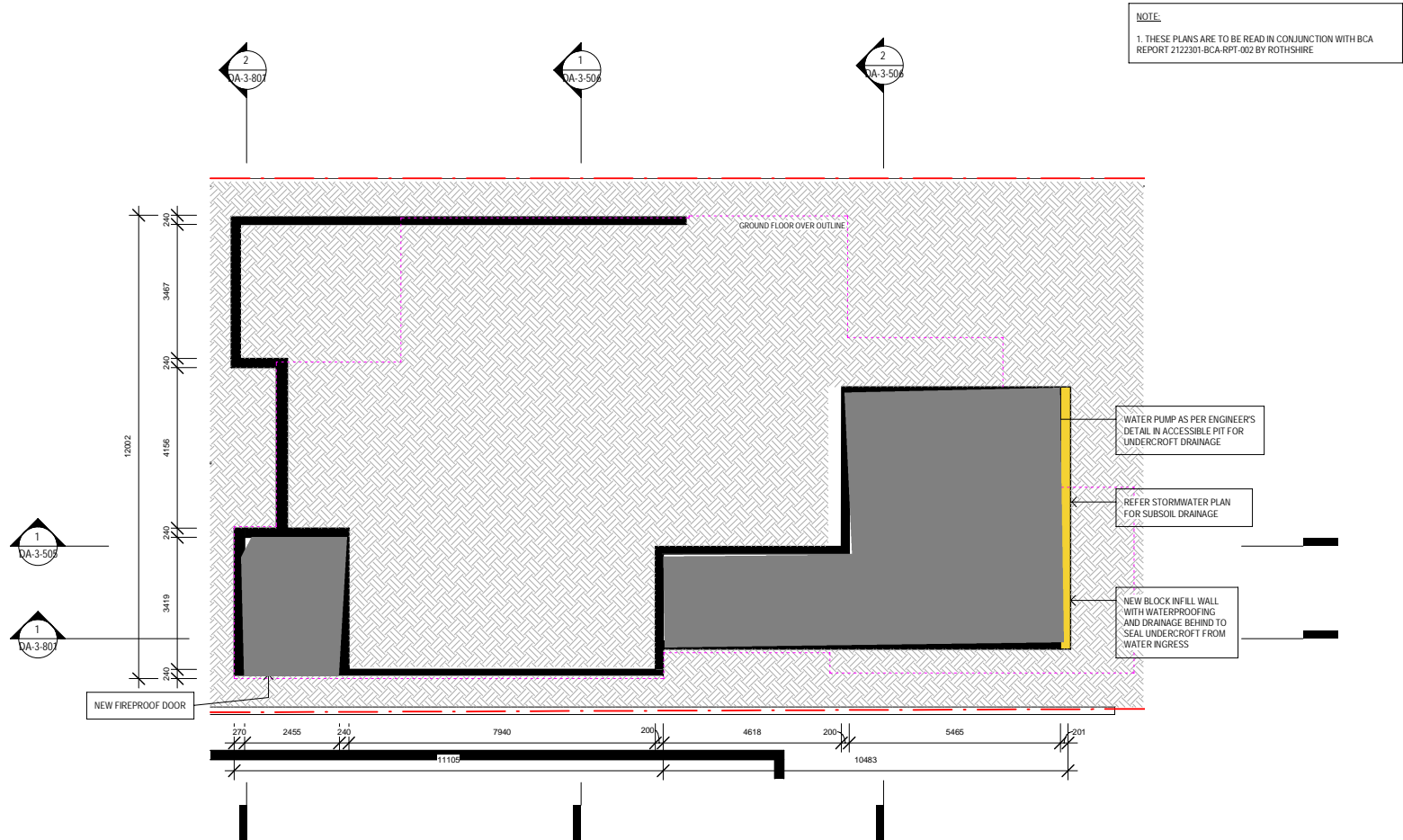
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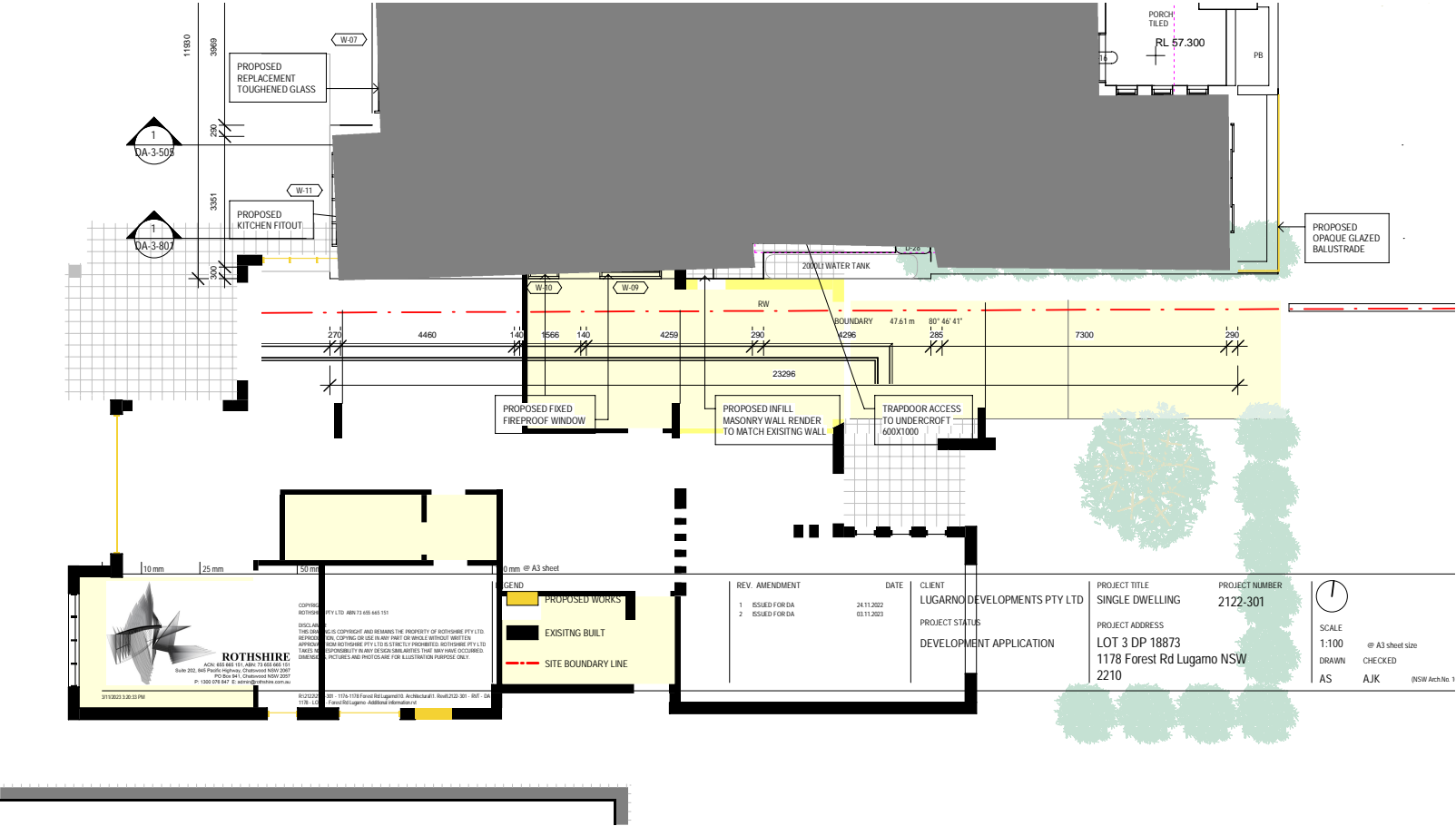
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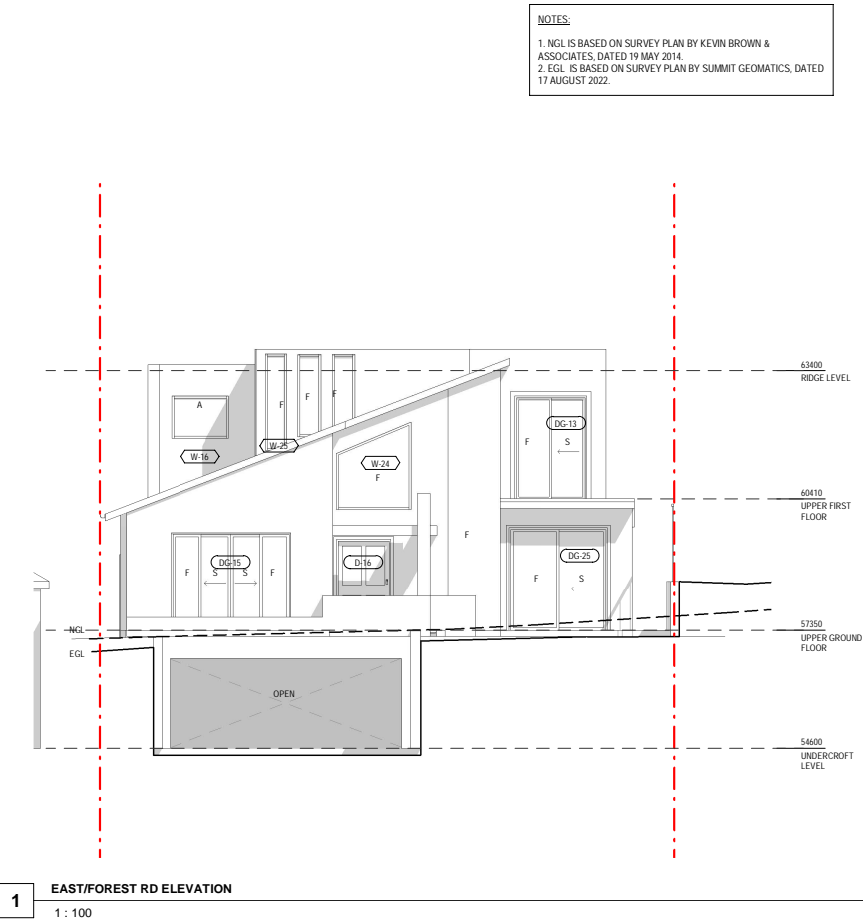
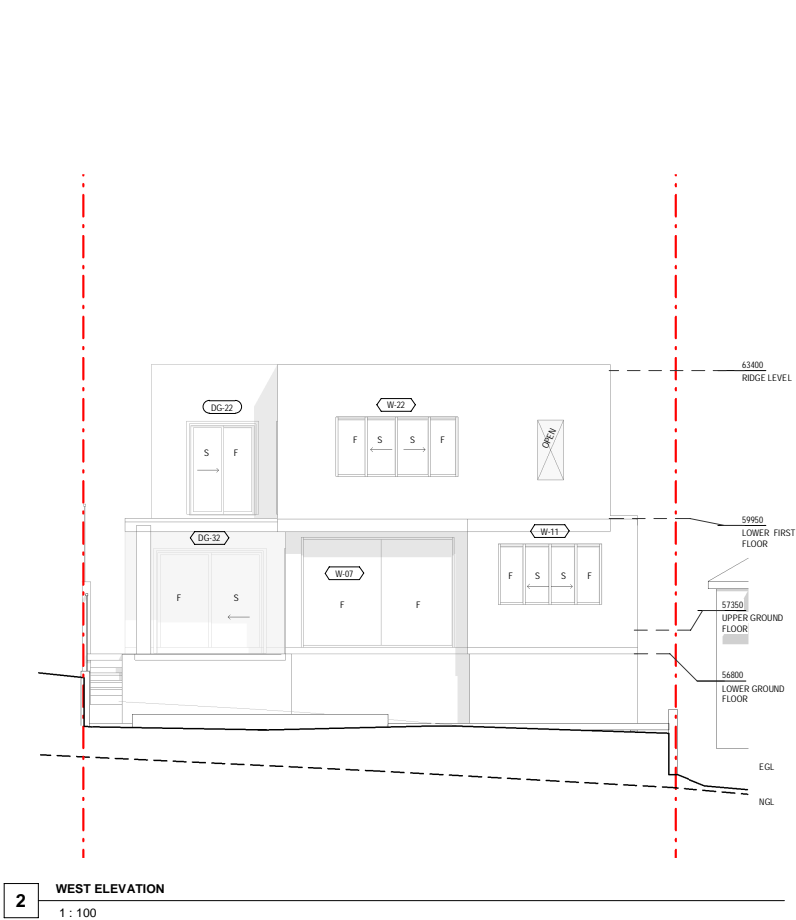
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Do not scale from drawings. Use only figured dimensions



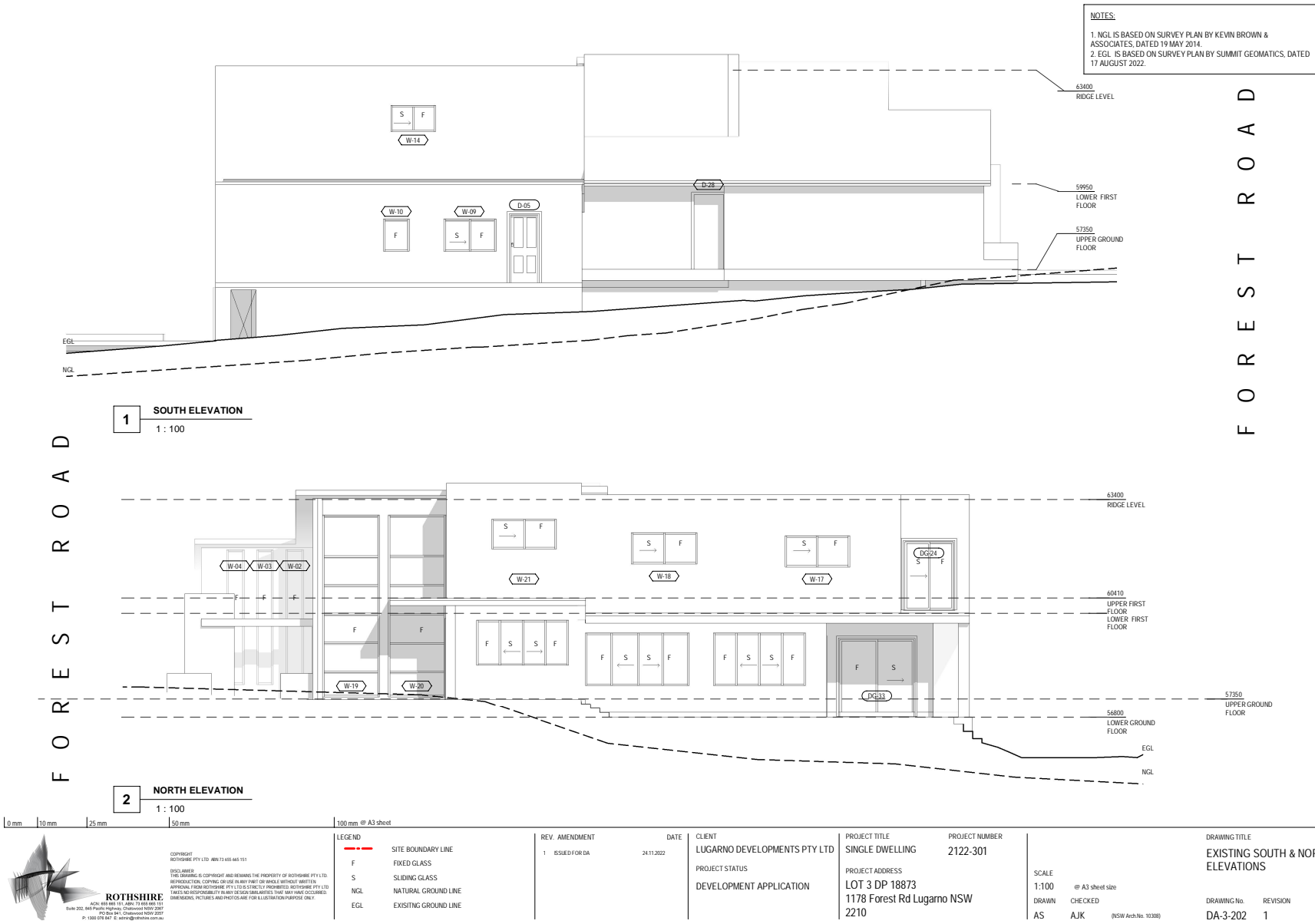
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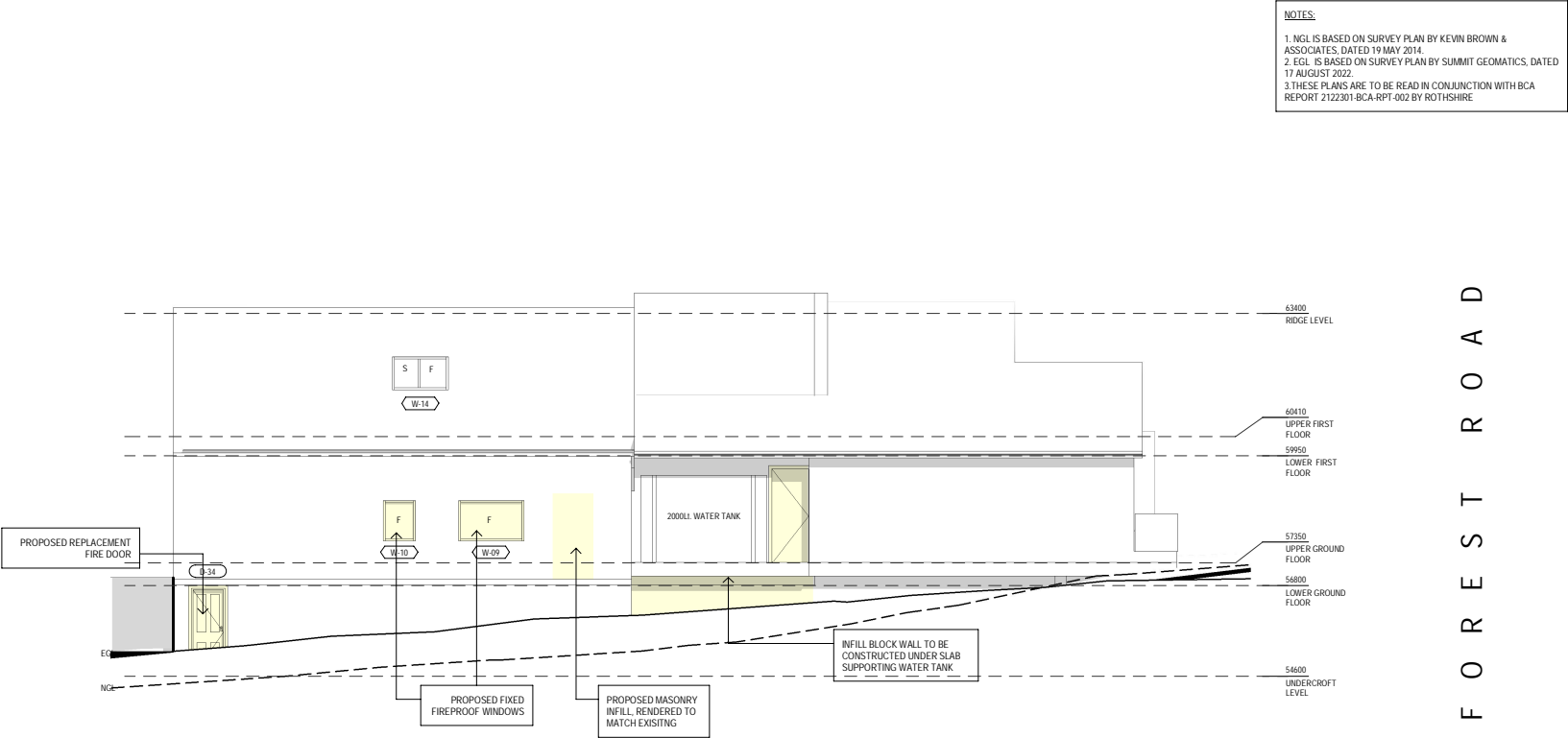
1. NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES, DATED 19 MAY 2014.

2. EGL IS BASED ON SURVEY PLAN BY SUMMIT GEOMATICS, DATED 17 AUGUST 2022.

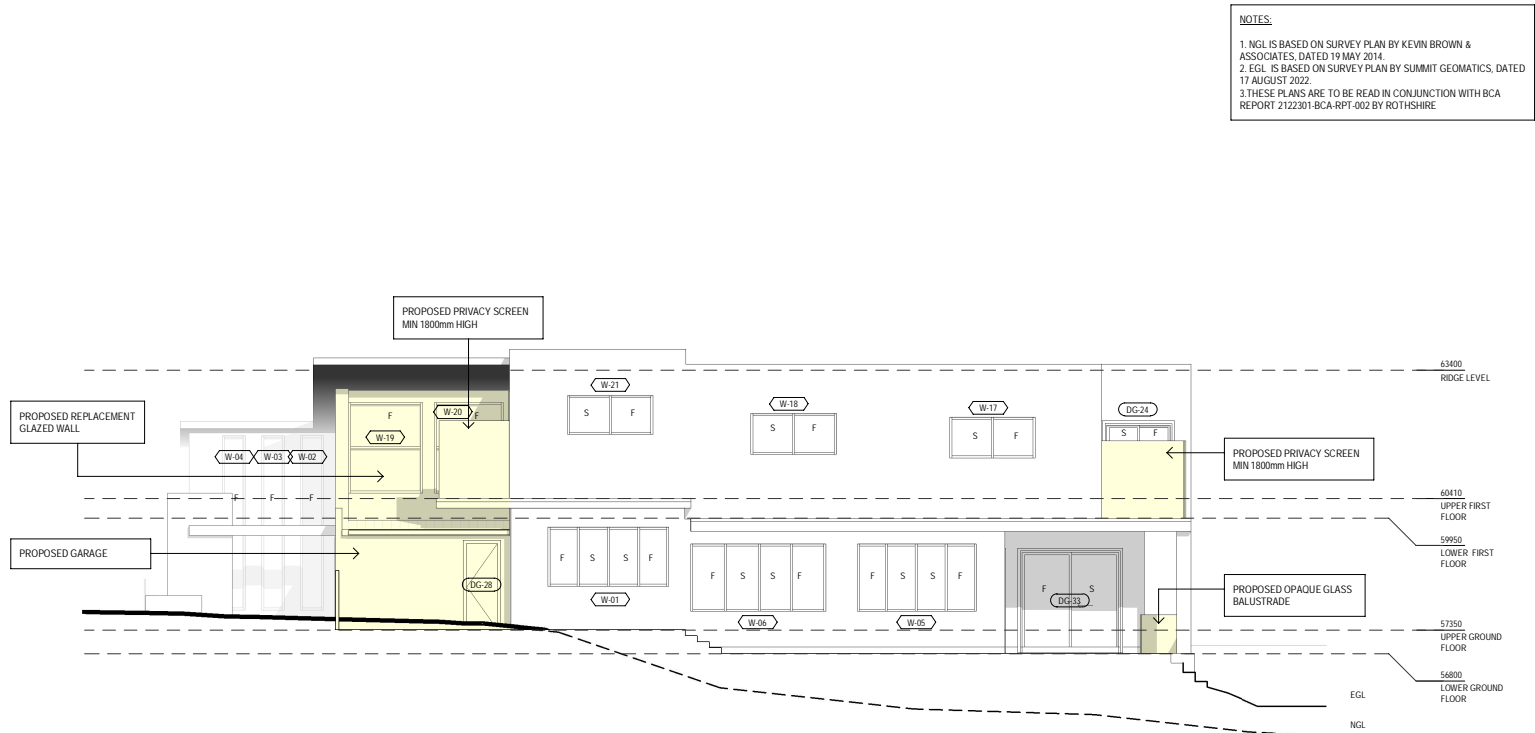
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 ROTHSHIRRE ARCHITECTURE 1178 Forest Rd Lugarno NSW 2147 P: 1300 578 847 E: info@rothshirre.com.au		COPYRIGHT ROTHSHIRRE PTY LTD. ABN 13 455 445 151		1	ISSUED FOR DA	24.11.2022	LUGARNO DEVELOPMENTS PTY LTD	SINGLE DWELLING	2122-301	EXISTING EAST & WEST ELEVATIONS
DISCLAIMER: THIS DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY OF ROTHSHIRRE PTY LTD. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE WRITTEN PERMISSION OF ROTHSHIRRE PTY LTD. ROTHSHIRRE PTY LTD IS NOT RESPONSIBLE FOR ANY CONSEQUENCES THAT MAY BE INCURRED BY THE USE OF THIS DRAWING FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT WAS PREPARED.		F FIXED GLASS S SLIDING GLASS NGL NATURAL GROUND LINE EGL EXISTING GROUND LINE		PROJECT ADDRESS LOT 3 DP 18873 1178 Forest Rd Lugarno NSW 2210		PROJECT STATUS DEVELOPMENT APPLICATION	SCALE 1:100 @ A3 sheet size	DRAWN AS	CHECKED AJK (NSW Arch.No. 10388)	REVISION DA-3-201 1





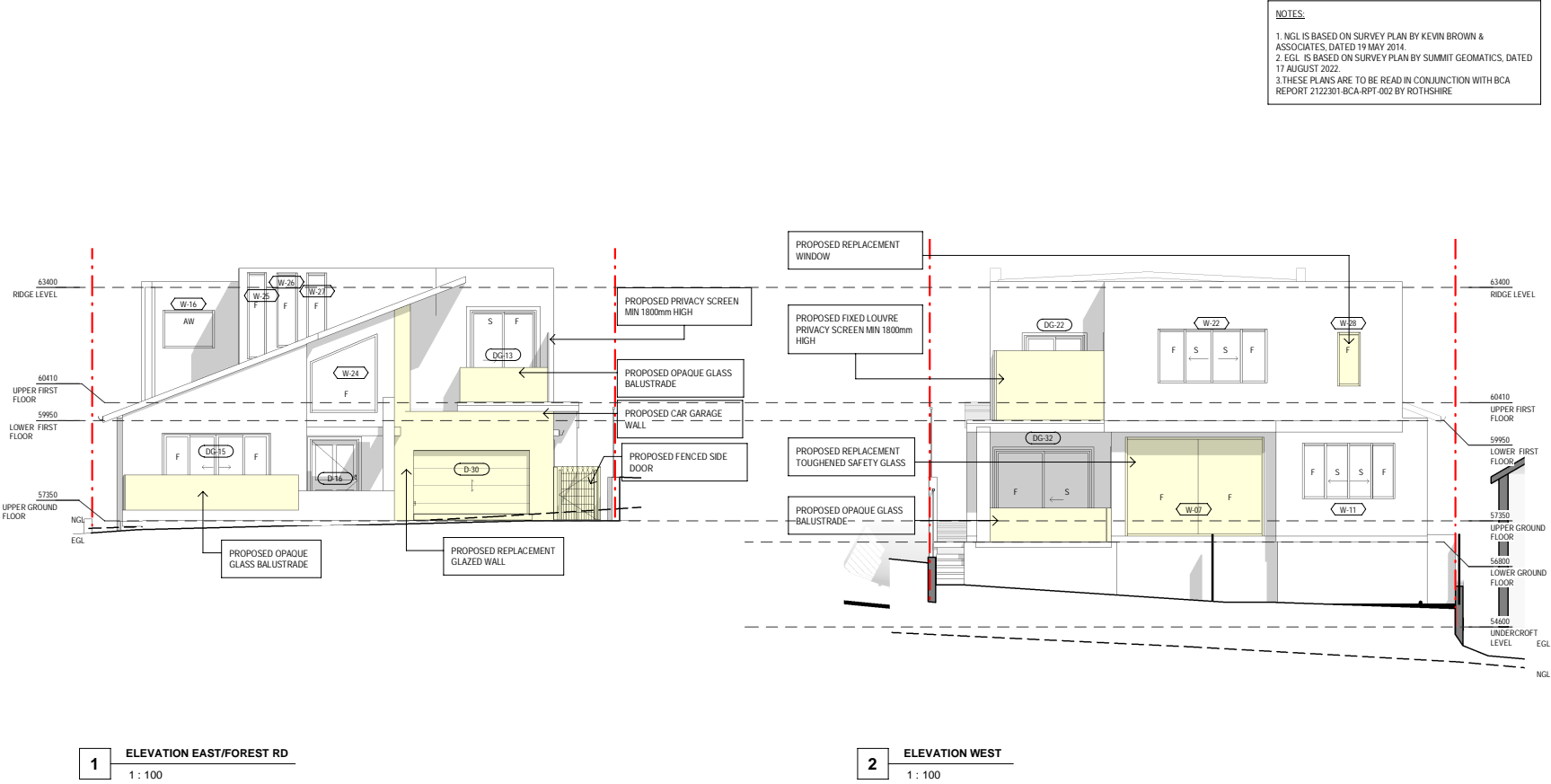


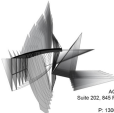






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		2 ISSUED FOR DA		24.11.2022		PROJECT STATUS		PROJECT ADDRESS		SCALE		DRAWN	
		NGL NATURAL GROUND LINE		03.11.2023		DEVELOPMENT APPLICATION		1178 Forest Rd Lugarno NSW		1:100 @ A3 sheet size		CHECKED	
		EGL EXISTING GROUND LINE						2210		AS AJK (NSW Arch.No. 10388)		DRAWING No.	
												REVISION	
												DA-3-502	
												2	



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			NGL NATURAL GROUND LINE							DRAWING No. DA-3-504	REVISION 2
			EGL EXISTING GROUND LINE								



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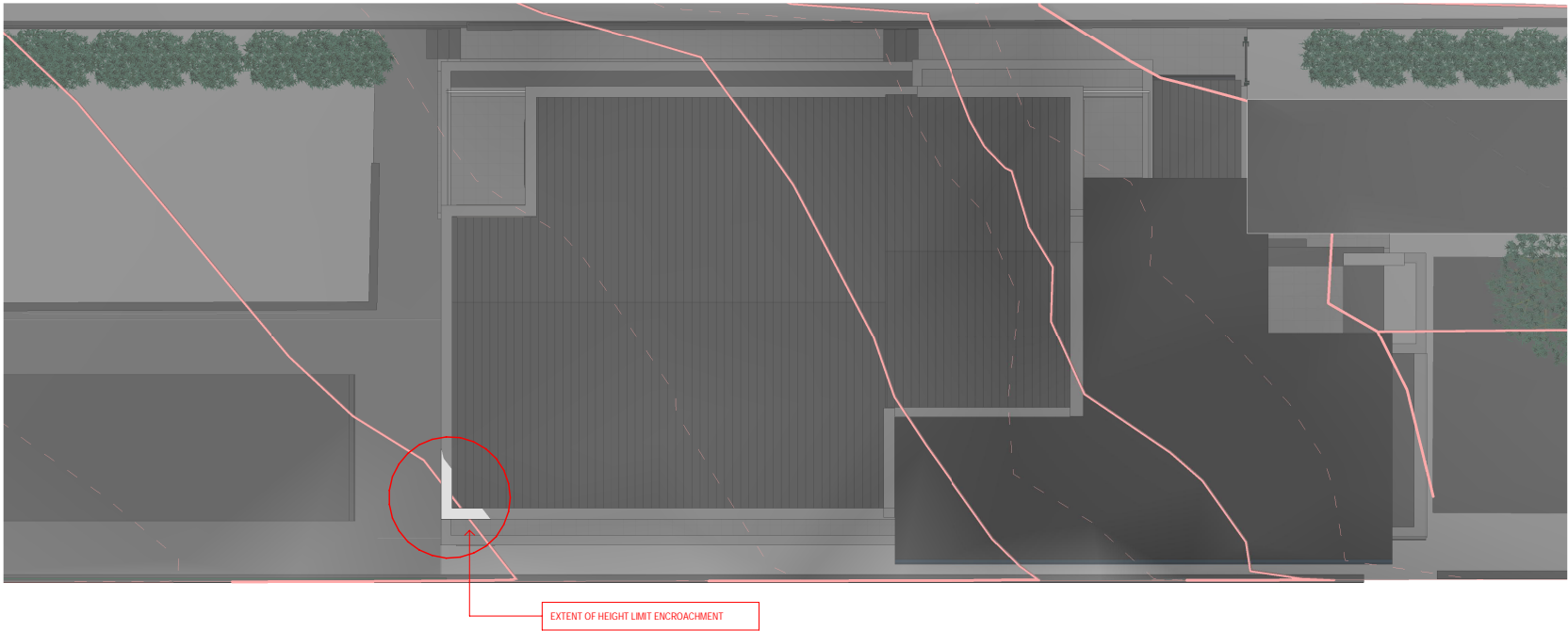




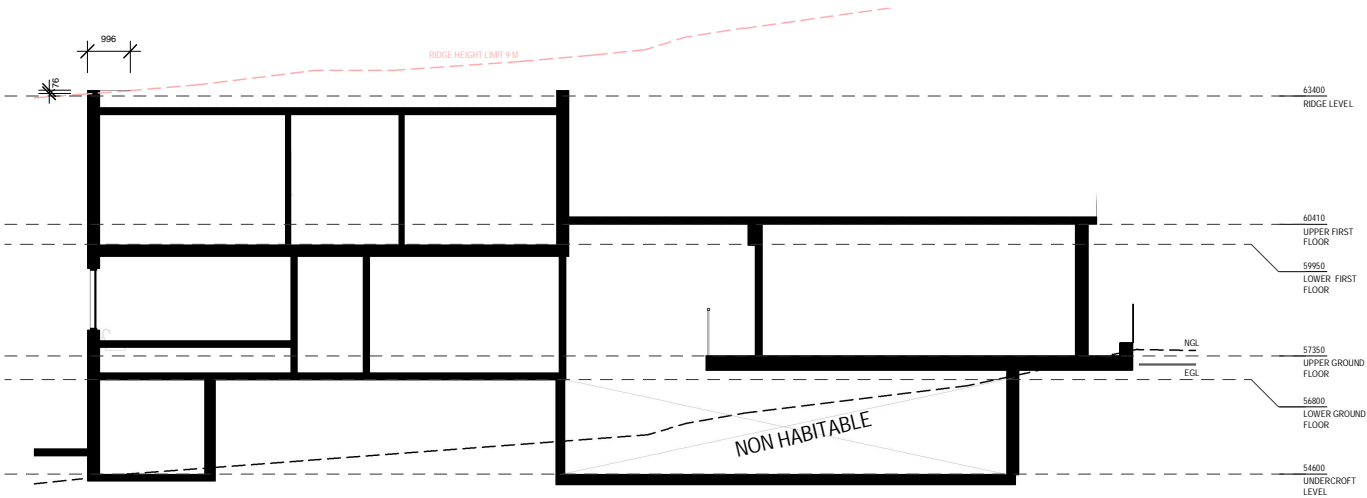




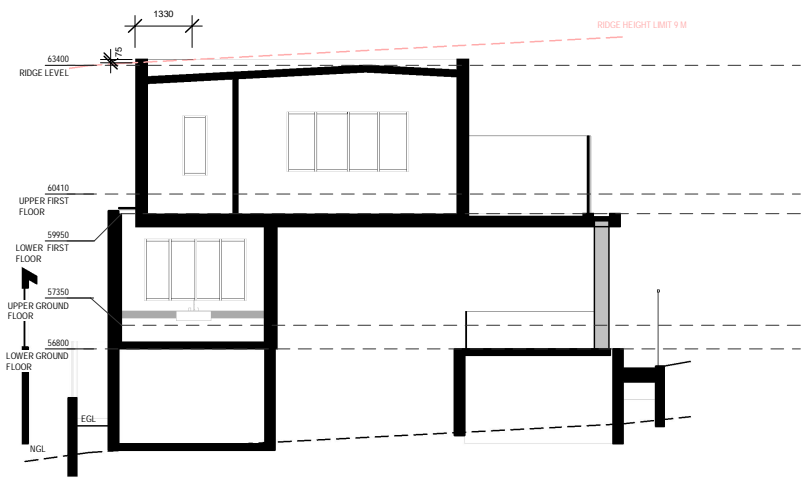
NOTES:  
1. HEIGHT LIMIT HAS BEEN DETERMINED FROM NGL AND NGL IS BASED ON SURVEY PLAN BY KEVIN BROWN & ASSOCIATES, DATED 19 MAY 2014.  
2. BUILDING HEIGHT IS BASED ON SURVEY PLAN BY SUMMIT GEOMATICS, DATED 17 AUGUST 2022.



0 mm10 mm25 mm50 mm100 mm @ A3 sheet		LEGEND		REV. AMENDMENT	DATE	CLIENT	PROJECT TITLE	PROJECT NUMBER	DRAWING TITLE		
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						PROJECT STATUS	PROJECT ADDRESS		SCALE		
						DEVELOPMENT APPLICATION	LOT 3 DP 18873		N/A	@ A3 sheet size	
							1178 Forest Rd Lugarno NSW		DRAWN	CHECKED	
							2210		AS	AJK	(NSW Arch.No. 10388)
										DRAWING No.	REVISION
										DA-3-800	1



1 LONG SECTION - HEIGHT ENCROACHMENT  
1 : 100



2 CROSS SECTION - HEIGHT ENCROACHMENT  
1 : 100

0 mm 10 mm 25 mm 50 mm 100 mm @ A3 sheet

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LEGEND

REV.	AMENDMENT	DATE
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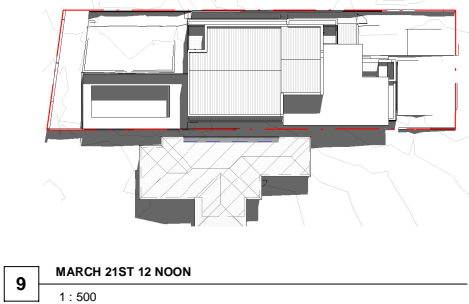
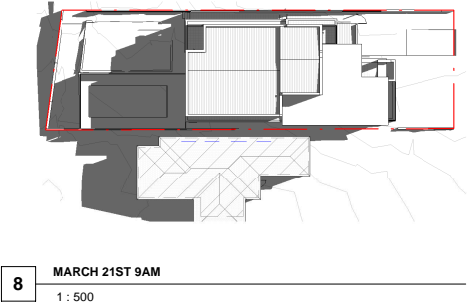
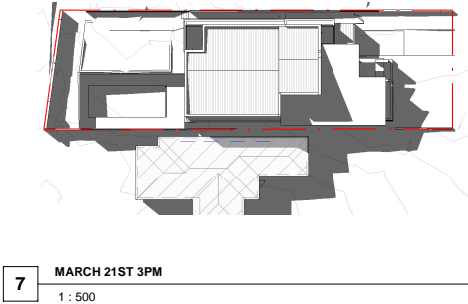
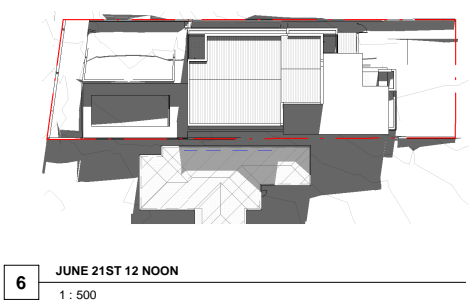
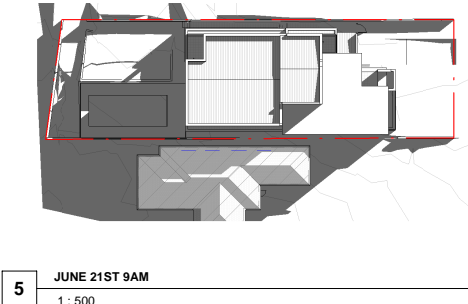
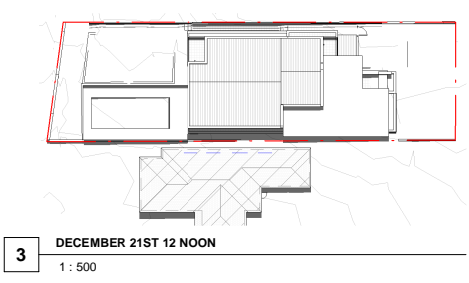
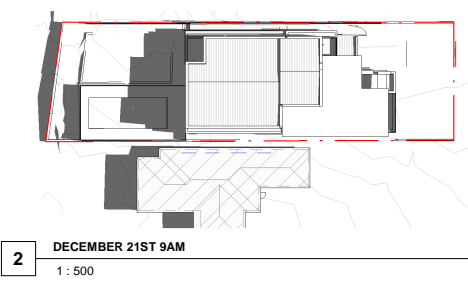
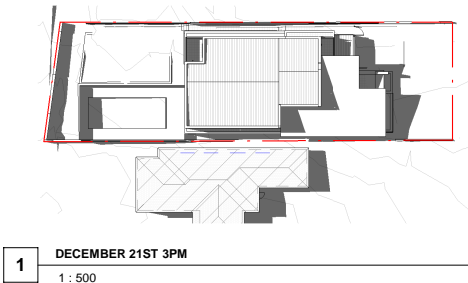
CLIENT	LUGARNO DEVELOPMENTS PTY LTD
PROJECT STATUS	DEVELOPMENT APPLICATION


PROJECT TITLE	SINGLE DWELLING
PROJECT ADDRESS	LOT 3 DP 18873 1178 Forest Rd Lugarno NSW 2120

PROJECT NUMBER  
2122-301

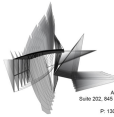
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CHECKED	AJK

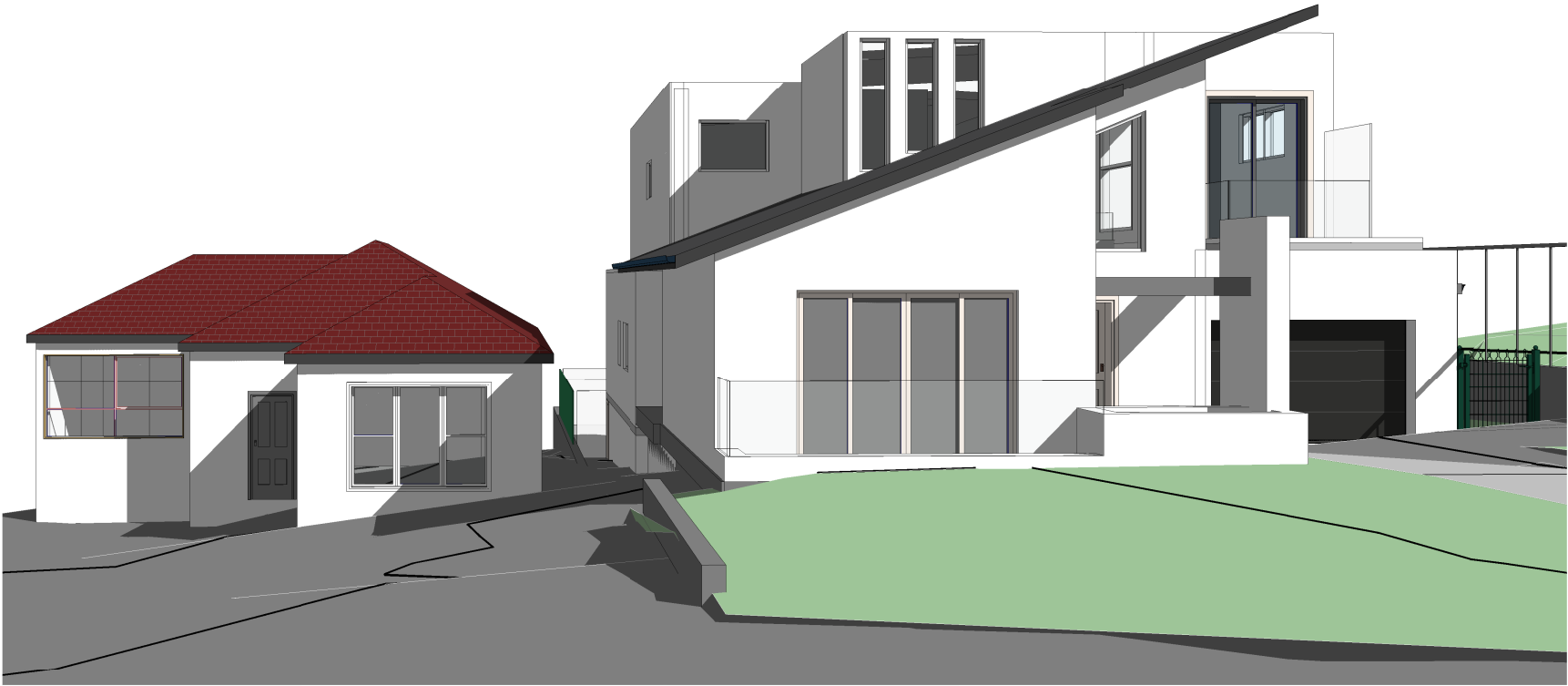
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DRAWING No.	DA-3-801
REVISION	1

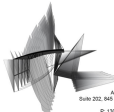


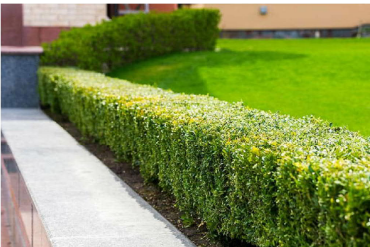
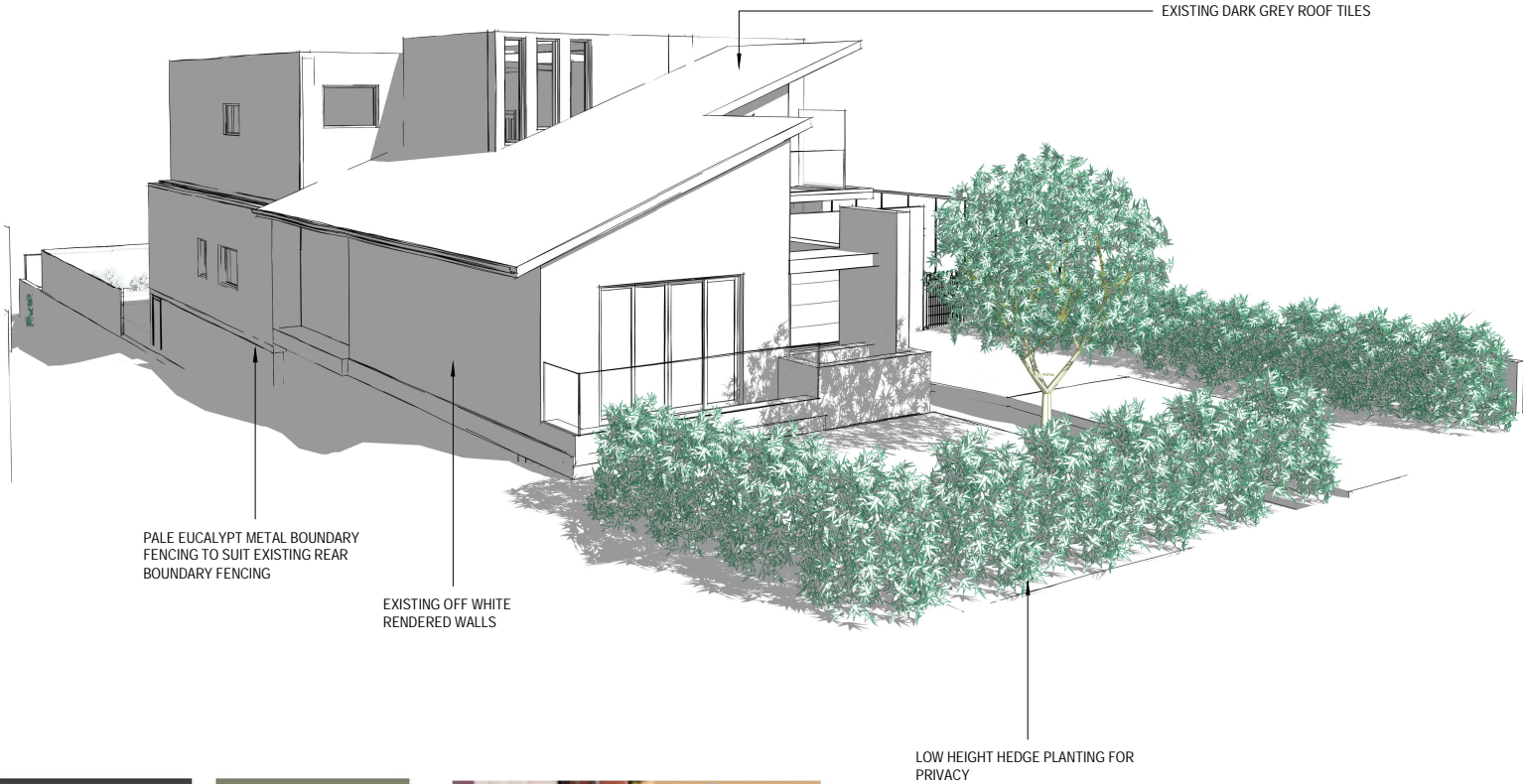
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					2	ISSUED FOR DA	03.11.2023	PROJECT STATUS	PROJECT ADDRESS			
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									1178 Forest Rd Lugarno NSW			
									2210			

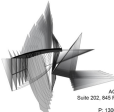


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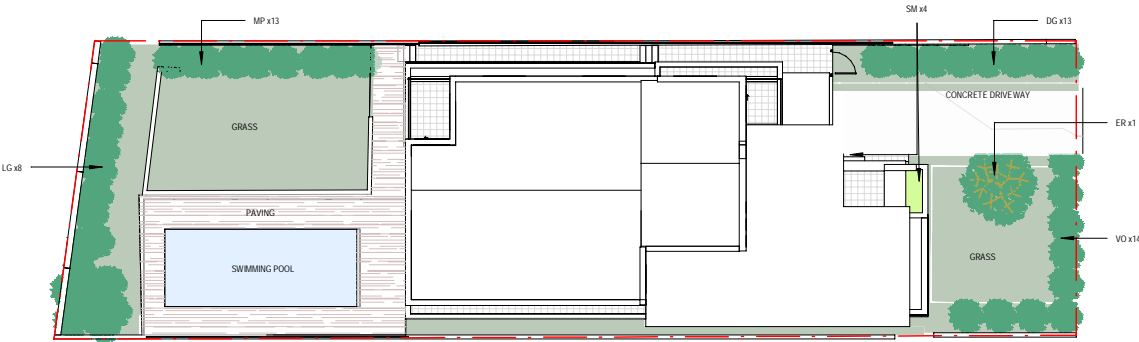
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						PROJECT STATUS	PROJECT ADDRESS		SCALE		
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							1178 Forest Rd Lugarno NSW		DRAWN	CHECKED	
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										DRAWING No.	REVISION
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 <div><div>ROTHSHIR</div><div>ARCHITECTURE</div><div>34/36-38/40 Pacific Highway, Chateau NSW 2067</div><div>PO Box 841, Chateau NSW 2067</div><div>PH: 1300 678 847 E: info@rothshir.com.au</div></div>			COPYRIGHT ROTHSHIR PTY LTD. ABN 13 455 445 151		1 ISSUED FOR DA	24.11.2022	LUGARNO DEVELOPMENTS PTY LTD	SINGLE DWELLING	2122-301	FINISHES SCHEDULE	
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							DEVELOPMENT APPLICATION	1178 Forest Rd Lugarno NSW		N/A	@ A3 sheet size
								2210		DRAWN	AS
										CHECKED	AJK
										(NSW Arch.No. 10388)	
										DRAWING No.	DA-3-701
										REVISION	2



SURFACE TREATMENT LEGEND	
STF	SYNTHETIC TURF
TF	TURF
GE	GARDEN EDGE
CL	CLOTHES LINE
CB/T/P	COLORBOND / TIMBER PAILING (1.8 HIGH)
T	TILE
RWT	RAINWATER TANK
PV	PAVERS
PP	WATER PERMEABLE UNIT PAVEMENT
SC	STENCILED CONCRETE (CHARCOAL/GUNMETAL)
DGR	DECOMPOSED GRANITE FINISH
TPF	TEMPORARY PROTECTION FENCE
GVL	GRAVEL SURFACE / PATH (NEPEAN RIVER PEBBLE)
TD	TIMBER DECK
PLTR	PLANTER
CP	CONCRETE PATH
B	BENCH SEAT
BT	TABLE BENCH SEATING

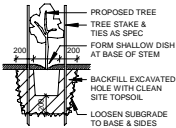


GENERAL NOTES AND SPECIFICATIONS

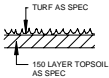
1. EXCAVATIONS  
Prior to carrying out any excavations, the contractor is to confirm the locations of all services. Service pits and lids are not to be covered by any materials. Trim and grade to form a smooth even finish.
2. EXISTING TREES TO BE RETAINED  
The existing trees indicated for retention shall be protected for the duration of the construction period. Install a 1.8m high temporary protective fence (TPF) to the locations as indicated on the plan. Do not store or otherwise place bulk or harmful materials under or near a tree which is to be retained. Do not attach slays, guys and the like to a tree which is to be retained. Where it is absolutely necessary to prune tree roots / limbs contractor to ensure all Council approvals have been obtained. All tree work is to be carried out by a qualified and insured arborist. Where an arborist report has been prepared for the existing tree on site: the landscape plan shall be read in conjunction with this report. All trees identified for retention shall be protected and managed in accordance with recommendations of this report. These recommendations will take precedence over any measures outlined in the landscape plan.
3. FALLS  
All pavement, planting & turf areas to be graded evenly. Ponding is unacceptable.
4. SURFACE LEVELS  
Final surface levels to be verified on site after Civil Constructor spoil spread. All adjacent surfaces are to be level and flush unless stated or documented otherwise.
5. TURFING AREA  
Remove existing grass. Cultivate subgrade to depth of 150mm and place site topsoil to areas to be turfed to a depth of 100mm. Landscape Contractor is to prepare the insitu topsoil, removing rocks and clods etc., and make good for the placing of turf. Place 25mm turf as specified.
6. PLANTING AREAS  
Remove existing grass. Cultivate to a depth of 150mm, place 300mm imported topsoil and 100mm of mulch as specified. Mound all planting areas min. 200mm above adjacent hard surfaces to allow positive drainage. Soil blends to comply with AS 4419.
7. GARDEN BED / MULCH  
The topsoil to all garden bed areas shall be four (4) parts site topsoil to one (1) part organic compost thoroughly blended together prior to placing into position. Where the site topsoil is considered not suitable, an imported topsoil blend meeting the requirements of AS4419 (1998) shall be used. Garden bed subgrades are to be cultivated to a depth of 150mm. Topsoil depths to all garden bed areas in deep soil to be 300mm (min). At the completion of all planting operations apply a 75mm layer of mulch over entire garden bed taking care not to smother plants. Reduce depth of mulch around base of plants to form "watering dish". Mulch used shall be Pine Bark Nuggets as supplied by ANL or similar. All proposed planting is subject to suitable topsoil depths on site. Where there is insufficient depth due to presence of bedrock or other structures, the proposed planting is to be modified to suit in accordance with instructions from landscape architect.
8. PLANT MATERIAL  
The plants are to be healthy nursery stock, free from disease injury, insects all weed or roots of weeds. All plants are to be thoroughly soaked 1 hour prior to planting. All plants delivered for use on site shall be fully acclimatised to prevailing local Sydney conditions.
9. MAINTENANCE & ESTABLISHMENT  
All landscape works are to be maintained for the period of three months from the date of practical completion. This includes all watering, weeding, spraying and re-mulching necessary to achieve vigorous growth. Any defects which arise during this period are to be rectified immediately. Any plants or areas of turf which fail during this period are to be replaced at no additional cost.
10. DISCREPANCIES  
Should there be any discrepancies on the drawings with existing site conditions; contractor is to notify the landscape architect prior to proceeding with the works.

PLANT SCHEDULE

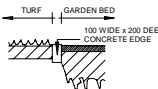
CODE	PLANT NAME	SIZE	MATURE SIZE	QTY
DG	Dietses Grandiflora	100 mm	1.0 m	13
ER	Euaecarpus Reticulatus "Blueberry Ash"	75 Litres	10.0 m	1
LG	Cupressocyparis leylandii "Leighton's Green"	200 mm	Trim to 4.0m	8
MP	Murraya Paniculata	200 mm	Trim to 2.0 m	13
SM	Raphiolepis "Snow Maiden"	200 mm	Trim to 1.0 m	4
VO	Viburnum Odoratissimum	200 mm	Trim to 2.0 m	14



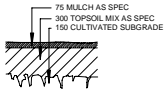
TREE PLANTING DETAIL



TURF DETAIL

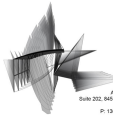


GARDEN EDGE



GARDEN BED

0 mm 10 mm 25 mm 50 mm 100 mm @ A3 sheet



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LEGEND
OUTLINE OF BUILDING
LANDSCAPE AREA
CONCRETE AREA
SITE BOUNDARY LINE

REV.	AMENDMENT	DATE
1	ISSUED FOR DA	24.11.2022
2	ISSUED FOR DA	03.11.2023

CLIENT LUGARNO DEVELOPMENTS PTY LTD
PROJECT STATUS DEVELOPMENT APPLICATION

PROJECT TITLE SINGLE DWELLING
PROJECT ADDRESS LOT 3 DP 18873 1178 Forest Rd Lugarno NSW 2210

PROJECT NUMBER  
2122-301



SCALE  
1:200

DRAWN  
AS

CHECKED  
AJK

@ A3 sheet size  
(NSW Arch.No. 10388)

DRAWING TITLE  
PROPOSED LANDSCAPE PLAN

DRAWING No. DA-3-600  
REVISION 2

GENERAL NOTES:

1.

All work is to be performed in accordance with AS3500.3 and council codes where applicable.
2.

The Plumber/ Drainer shall inspect the site and confirm the existing site structures, services and conditions prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
3.

All pipes shall be sewer grade P.V.C. laid at min. 1:100, unless noted otherwise.
4.

All connections to P.V.C. pipes are to be solvent welded to manufacturers specification
5.

All prefabricated pits, drains etc. are to be of heavy duty concrete construction unless noted other.
6.

Precise location of down pipes shall be nominated by others. Locations shown are for hydraulic design purposes only.
7.

Precise location of pits shall be nominated by others. Locations shown are for hydraulic design purposes only.
8.

All eaves gutters shall be of minimum cross sectional area of 8500mm<sup>2</sup> unless noted otherwise.
9.

This design covers the collection and disposal of rainwater from ROOF AREAS ONLY. Any paved areas not noted on the supplied architectural drawings are not included, unless shown.
10.

This design does not cover sub surface hydraulic flows.
11.

The installer is encouraged to use the 'Dial Before You Dig' service prior to excavation. No underground services have been noted or surveyed in this design. Dig at your own risk.
12.

IF IN DOUBT ASK. Consult the design engineer for any changes, omissions and discrepancies.
13.

System design has been produced to reflect reduced levels shown on architect supplied drawings.
14.

Pipe cover for uPVC pipes:

a.

Single dwellings, no vehicular loading- 100mm

b.

Single dwellings, vehicular loading on concrete- 450mm

c.

Single dwellings, vehicular loading, un-reinforced concrete-100mm below underside of concreteSilt arrestor pit and rain guards must be regularly inspected and cleaned.
15.

Location of Stormwater Systems, including downpipes, pipes,pits and rainwater tank are indicative only. Exact locations shall be determined on site to suit site conditions.
16.

Sub-soil drains for retaining wall shall be installed by the builder and connected to Stormwater lines. All Agg Lines shall be 100mm DIA, unless noted otherwise.
17.

Levels are approximate only. The plumber/drainer shall confirm the levels prior to proceeding. If any discrepancies found, contact the engineer for further instructions.
18.

Inspection and certification, if required, shall be done prior to backfilling, allow 24 hour notice for the engineer to carry out the inspection.
19.

Any damage to services during construction shall be repaired immediately at the plumber/drainers own expense.
20.

Areas & Geometry calculated are approximate and dependent on Surveyors & Architects drawings.
21.

It is essential that areas calculated are within plus/minus 5% range.
22.

Provide adequate access and overland flow routes out of property and not into adjoining properties
23.

Provide minimum 75mm clearance under all gates and operable external doors as to not impede overland flow
24.

Water entry and backflow into buildings should be prevented at all times
25.

All finished ground surfaces should fall away from structures
26.

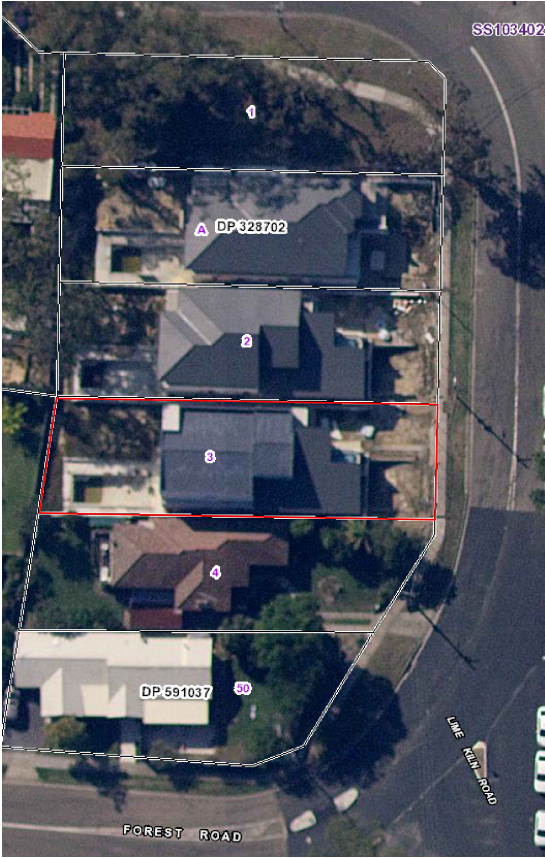
Charged lines are to be flushed regularly and flush/arrestor pits are to be regularly inspected and cleaned
27.

All pipes entering a water tank shall have a first flush device installed
28.

All water tanks will be insect proofed by other
29.

If tanked water is being reused for drinking or sanitary purposes, appropriate disinfecting by others should be considered.
30.

Schedule of calculations is based on plan areas



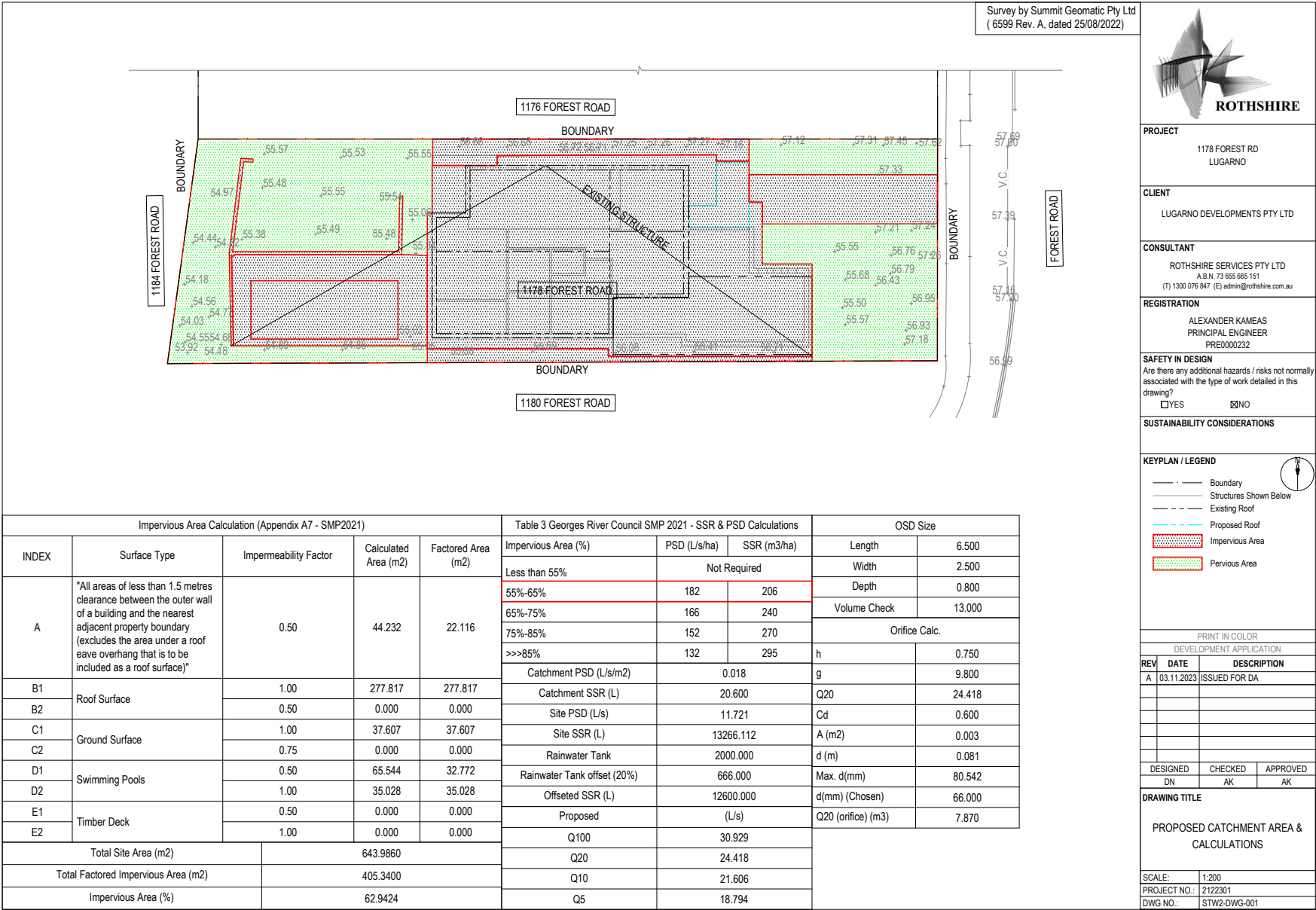
LOCALITY PLAN  
NOT TO SCALE

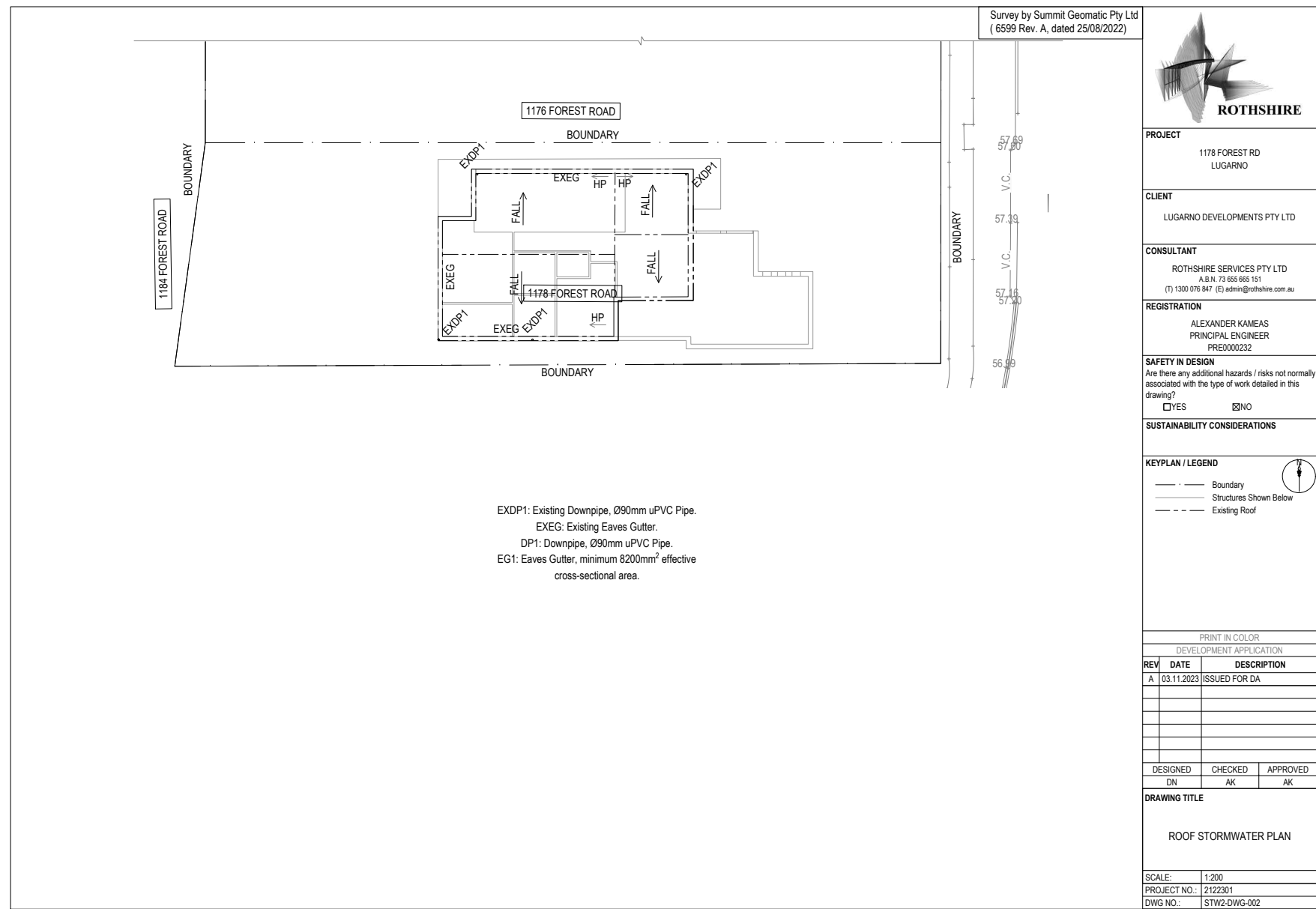


PROJECT		
1178 FOREST RD LUGARNO		
CLIENT		
LUGARNO DEVELOPMENTS PTY LTD		
CONSULTANT		
ROTHSHIRE SERVICES PTY LTD A.B.N: 73 655 665 151 (T) 1300 076 847 (E) admin@rothshire.com.au		
REGISTRATION		
ALEXANDER KAMEAS PRINCIPAL ENGINEER PRE0000232		
SAFETY IN DESIGN		
Are there any additional hazards / risks not normally associated with the type of work detailed in this drawing?		
<div><input type="checkbox"/>YES</div> <div><input checked="" type="checkbox"/>NO</div>		
SUSTAINABILITY CONSIDERATIONS		
KEYPLAN / LEGEND		
ISSUED FOR DA		
REV	DATE	DESCRIPTION
A	03.11.2023	ISSUED FOR DA
DESIGNED	CHECKED	APPROVED
DN	AK	AK
DRAWING TITLE		
GENERAL NOTES & STANDARD PRACTICES		
PROJECT NO.:	2122301	
DWG NO.:	STW2-DWG-000	

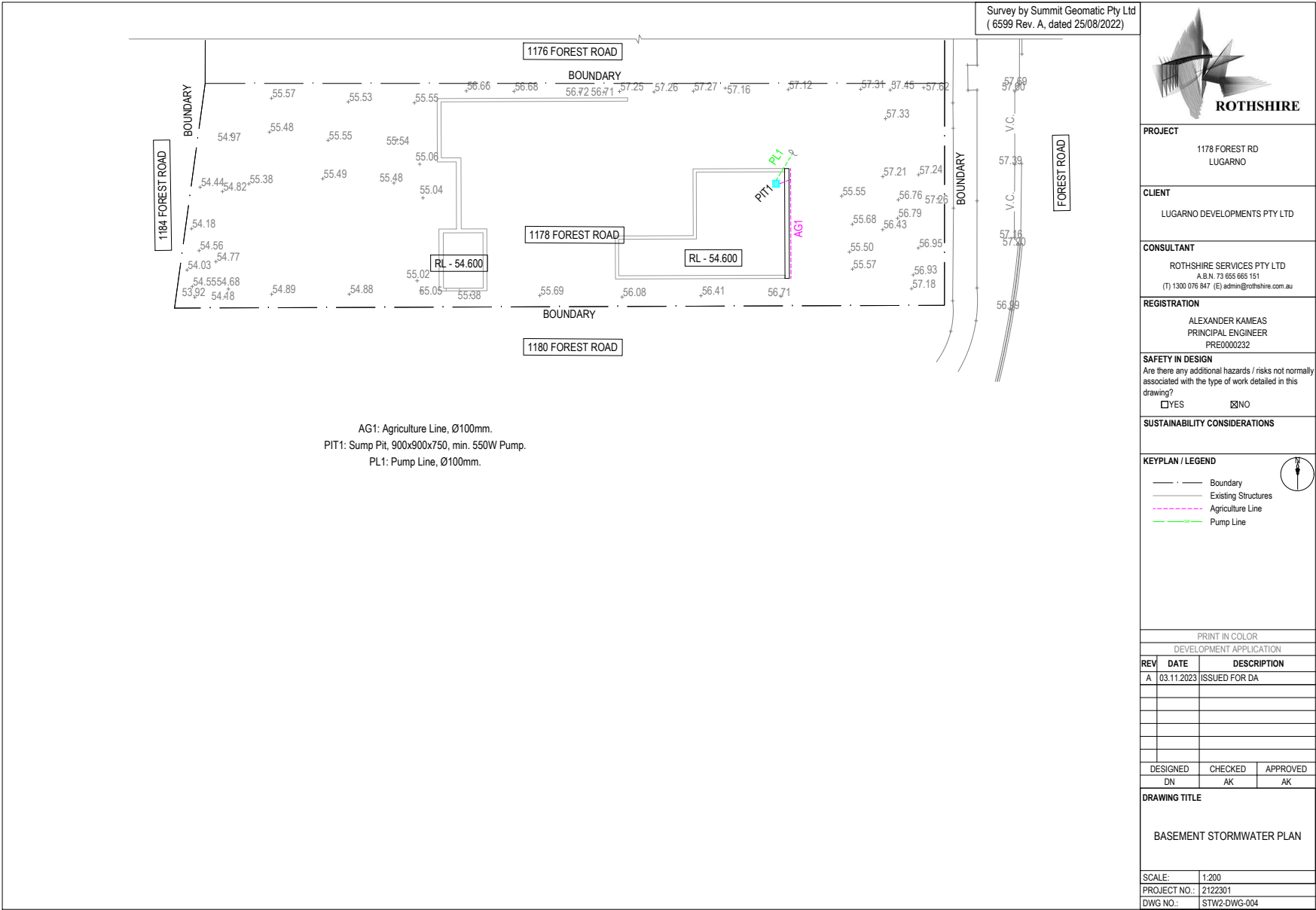
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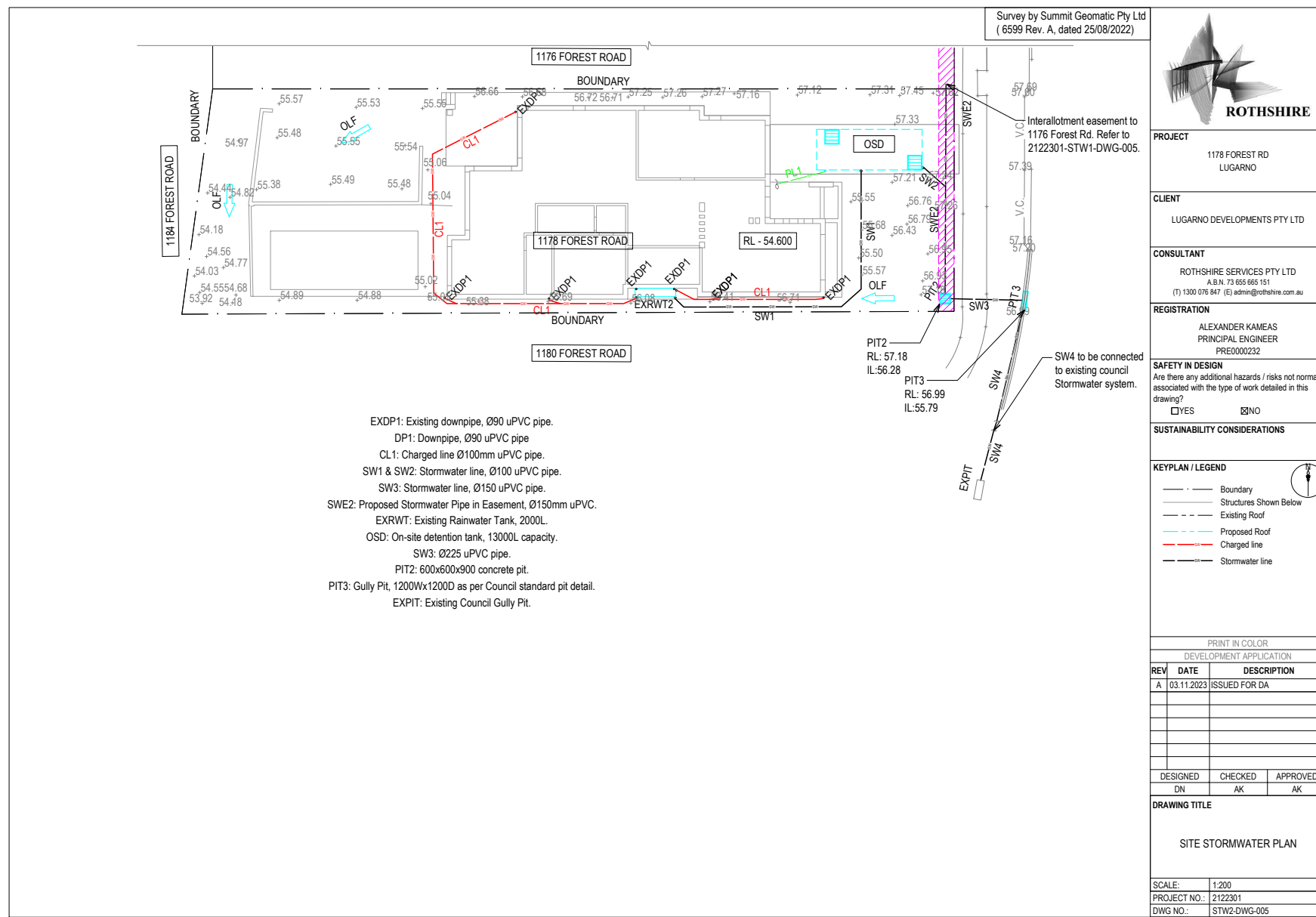


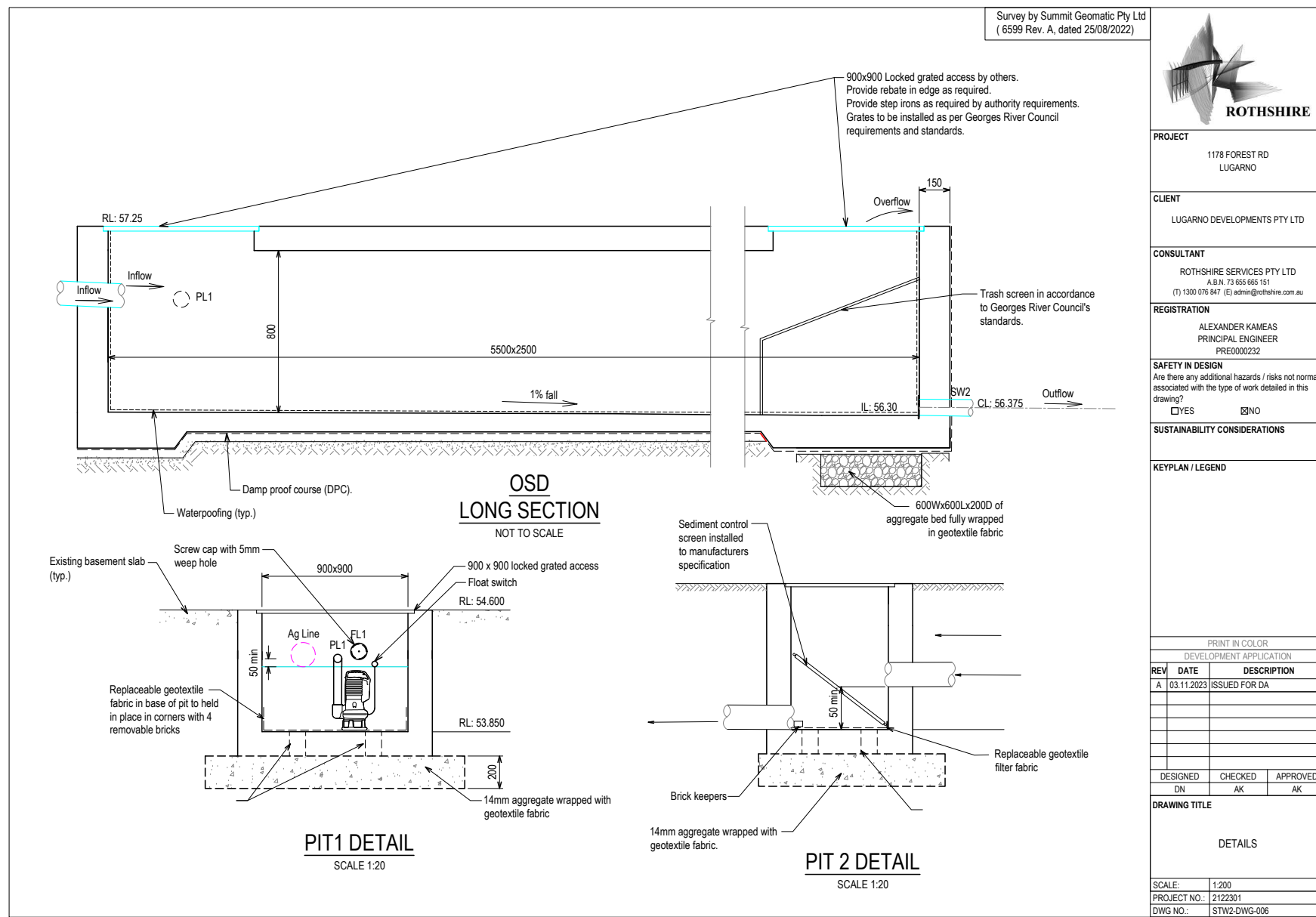




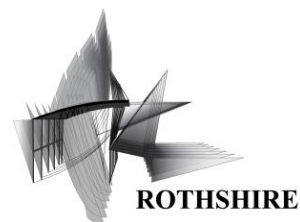
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DOCUMENT NO.: 2122301-BCA-RPT-004-1

## BCA COMPLIANCE REPORT

**ADDRESS:**

1178 FOREST ROAD  
LUGARNO NSW 2224  
LOT 3 IN DP 18873

**CLIENT:**

ASTOR HOMES

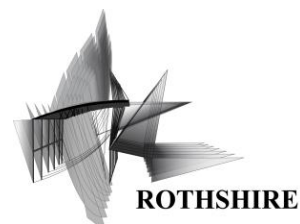
**LOCAL GOVERNMENT AREA:**

GEORGES RIVER COUNCIL

**SCOPE**

EXISTING DWELLING & FITOUT





## TABLE OF CONTENTS

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## LIST OF APPENDICES

- APPENDIX A – ARCHITECTURAL PLANS
- APPENDIX B – SITE CLASSIFICATION REPORT
- APPENDIX C – ENGINEERING CERTIFICATE – RETAINING WALL
- APPENDIX D – SITE PHOTOS
- APPENDIX E – WATERPROOFING CERTIFICATE
- APPENDIX F – CERTIFICATE OF STRUCTURAL ADEQUACY



## EXECUTIVE SUMMARY

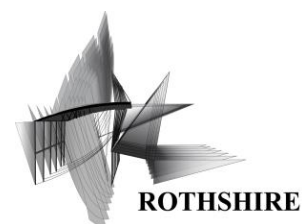
A Building Code of Australia (**BCA**) assessment to the BCA 2019 Amdt 1 has been undertaken for an existing dwelling at 1178 Forest Rd, Lugarno NSW 2210 (**Site**) which was built without Division 4.3 or Division 4.5 certification pursuant to the Environmental Planning and Assessment Act 1979 (**EP&A Act**).

This report is to be read in conjunction with the plans listed in **Section 4**, the structural report undertaken by Rothshire reference 2122301-LET-010-V1 and the documents listed in the Appendices to this report.

Where compliance with the Deemed-to-Satisfy (**DtS**) provisions of the BCA 2019 Amdt 1 has not been confirmed or is not sufficiently clear to deem compliance with the BCA, a Performance Solution has been undertaken (see below), or alternatively a rectification performance criterion has been specified (refer **Sections 6 and 8** of this report).

Any rectification performance criterion has been document within **Section 6** of this report and summarised in **Section 8**.

DRAFT



## NOMENCLATURE

The nomenclature relevant to this report is detailed in **Table 1**.

**Table 1. Abbreviations and definitions**

Abbreviation	Definition
BCA	Building Code of Australia
Client	Astor Homes
DtS	Deemed to Satisfy
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Reg	Environmental Planning and Assessment Regulation 2021
FFL	Finished floor level
FGL	Finished ground level
NGL	Natural ground level
NCC	National Construction Code
Site	1178 Forest Rd Lugarno NSW

## DOCUMENT HISTORY

**Table 2. Document revision & history**

Rev.	Description	Author	Reviewer	Date
1	Issued for DA	NRT	SM	24/11/2022



## 1. INTRODUCTION

This report provides a BCA 2019 Amdt 1 compliance assessment of an existing partially complete residential building at the Site to support a Development Application made to Georges River Council.

The development involves the assessment of an existing partially complete Class 1a detached dwelling without appropriate Division 4.3 or Division 4.5 building approval pursuant to the EPA Act. The purpose of this report is to provide a summary of the building compliance with the BCA 2019 Amdt 1 including any unfinished or remedial works to be undertaken.

## 2. REPORT AUTHOR

Author: Naomi Roberts-Thomson

Qualifications: B.Eng (Civil) Hons.; MBA; Certification Short Course; Cert IV (Building & Construction); Juris Doctor (currently completing).

Business Address: Level 2, Suite 202, 845 Pacific Highway, Chatswood NSW 2067

Review: Samy Mikhail

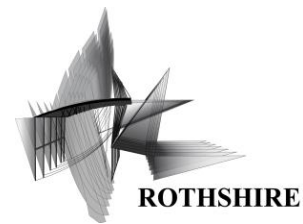
Qualifications: BDC2277 - Building Surveyor - Unrestricted

Business Address: 49/2 O'Connell St, Parramatta NSW 2150

## 3. BASIS OF REPORT

The key objective of the report is to make an:

1. Assessment under the current Building Code of Australia 2019 Amdt 1 (BCA) Volume Two and list any non-compliances and information applicable from the BCA that will need to be addressed.
2. Provide BCA compliance advice and information where non-compliances are identified.



#### 4. REFERENCE DOCUMENTS

The documents that were used to prepare this BCA compliance report are provided in **Table 3 – Architectural Plans** (refer **Appendix A**), **Table 4 – Stormwater Plans** and **Table 5**.

**Table 3 – Architectural Plans**

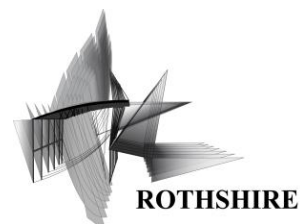
Drawing No.	Drawing Title	Revision	Revision Date
PL-3-000	COVER SHEET	1	24/11/2022
PL-3-050	SITE PLAN	1	24/11/2022
PL-3-100	BASEMENT PLAN	1	24/11/2022
PL-3-101	GROUND FLOOR PLAN	1	24/11/2022
PL-3-103	FIRST FLOOR PLAN	1	24/11/2022
PL-3-201	EAST & WEST ELEVATION PLAN	1	24/11/2022
PL-3-202	SOUTH & NORTH ELEVATION PLAN	1	24/11/2022
PL-3-205	LONG SECTION PLAN	1	24/11/2022
PL-3-206	CROSS SECTION PLAN	1	24/11/2022

**Table 4 – Stormwater Plans**

Drawing No.	Drawing Title	Revision	Revision Date
2122301-GEN-DWG-000	GENERAL NOTES	1	13/12/2022
2122301-STW-DWG-001	EXISTING CATCHMENT PLAN	1	13/12/2022
2122301-STW-DWG-002	PROPOSED CATCHMENT PLAN	1	13/12/2022
2122301-STW-DWG-003	TABLE OF COMPLIANCE AND CALCULATION	1	13/12/2022
2122301-STW-DWG-004	PROPOSED ROOF STORMWATER PLAN	1	13/12/2022
2122301-STW-DWG-005	PROPOSED LEVEL 1 STORMWATER PLAN	1	13/12/2022
2122301-STW-DWG-006	PROPOSED GROUND FLOOR STORMWATER PLAN	1	13/12/2022
2122301-STW-DWG-007	OSD DETAILS	1	13/12/2022
2122301-STW-DWG-008	DETAILS	1	13/12/2022

**Table 5 – Other Reference Documents**

Document No.	Document Title	Revision	Revision Date
1334892S_02	BASIX Certificate	02	02/12/2022
2122301-LET-010-V1	Certificate of Structural Adequacy	V1	09/12/2022



## 5. BUILDING CHARACTERISTICS

A summary of the building characteristics is provided in Error! Reference source not found. below.

**Table 6 – Building characteristics**

Classification of Building	Class 1a
Rise in Storeys	2 storeys with a non-habitable basement level
Subject to flooding	N/A
Bushfire	N/A
Rainfall	<sup>2015</sup> 182mm/hr
Climate zone	Zone 5
Soil classification	Class A (referenced by Geotechnical Report <b>Appendix B</b> )
Cladding	Double brick (ground floor); Brick veneer (first floor); NRG Greenboard™ Polystyrene Cladding (minor walls around doors and windows identified on the plans); HardieTex Blueboard (minor walls around roof articulations and identified on the plans).



6. BCA 2019 AMDT 1 - VOLUME 2 ASSESSMENT

The BCA assessment has been made to Building Code of Australia 2019 Amdt 1 (BCA) Volume Two. Where this report has been unable to confirm compliance (based on the information attached or discussed in this report) the non-compliances have been identified and remedial work has been recommended to bring the building up to compliance.

Where unable to confirm compliance via visual inspection we have recommended that certification be provided to support the application prior to the issue of the Construction Certificate. Any additional work or additional inspections have been indicated the information applicable will need to be addressed prior to the issue of the Building Certificate.

Table 7 – BCA Compliance Assessment

PART 3.0 STRUCTURAL PROVISIONS

Line number	BCA Clause	Title	Assessment	Recommendation	
1.	Part 3.0	Structural provisions	Refer to engineers Proposed Certificate of Structural Adequacy 2122301-COSA-001-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.

PART 3.1 SITE PREPARATION

Line number	BCA Clause	Title	Assessment	Recommendation	
2.	Part 3.1	Site Preparation	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1.



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.1.1 Earthworks					
3.	3.1.1.1	Earthworks	N/A – All fill on site is retained. Cut and fill undertaken at the site. Cut embankment of 2.5:1 is consistent with Table 3.1.1.1.	Complies	Note that a concurrent DA for the subject site proposes to back fill the existing ramp the basement.
4.	3.1.1.2	Earthworks	N/A – All fill on site is retained. Compacted fill has been levelled and retained.	Complies	
Part 3.1.3 Drainage					
5.	Part 3.1.2	Earth retaining structures	Retaining structure inspected by Professional Engineer.	Complies	Refer to certificate by CJS Flora dated 14 June 2017 (Appendix C).
Part 3.1.3 Drainage					
6.	3.1.3.0	Acceptable Construction Manual	Drainage provisions inspected by Professional Engineer.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.
7.	3.1.3.1	Acceptable Construction Practice	Refer to assessment BCA clause 3.1.3.3.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.
AS3500.3:2018					
8.		Stormwater drainage	Drainage provisions inspected by Professional Engineer.	Remedial	Refer to stormwater plans referenced in Section 4 of this report.





Line number	BCA Clause	Title	Assessment	Recommendation	
Acceptable Construction Practice					
9.	3.1.3.2	Drainage requirements	Refer to assessment BCA clause 3.1.3.3.	Remedial	The alfresco will be graded 1% with a linear drain in accordance with AS3500.3.
10.	3.1.3.3(a)	Surface water drainage systems – design	Adequate falls (0.050:1) have not been observed in all locations at the external finished surface adjacent to the building.  All finished ground level external to building is reasonably impermeable.	Remedial	The alfresco will be graded 1% with a linear drain in accordance with AS3500.3.
11.	3.1.3.3(b)	Surface water drainage systems – design	The building has been constructed adjacent to impermeable finished surfaces only.  The FFL to surrounding ground level achieves a height of one brick course or a concrete setdown, with clearance of greater than 50mm observed in all cases.	Complies	Refer to architectural plans sheet no. BIC-101.  Refer to site photos in <b>Appendix D</b> .
12.	3.1.3.4	Subsoil drainage	Subsoil drainage required to the basement and retaining walls as constructed.	Remedial	Subsoil drainage to the basement level to be connected to the stormwater system via sump pit, refer to Stormwater Plans.
13.	3.1.3.5	Stormwater drainage	Drainage provisions inspected by Professional Engineer. Assessment has been made to AS3500.3.  Drainage from the first-floor roof to the ground floor non-trafficable area to be redirected in two locations due to breaches of waterproofing and internal damage.	Remedial  Remedial	Refer to stormwater plans referenced in Section 4 of this report.  Refer to site photos in <b>Appendix D</b> . For remedial works, refer to stormwater plans referenced in Section 4 of this report.



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.1.4 Termite risk management					
14.	3.1.4.3	Termite management systems	Concrete and masonry construction is considered not subjected to termite attack.  Timber preservative treatment has been observed during site inspection.	Complies	N/A.
15.	3.1.4.4	Durable notice	No durable notice required.	N/A	Not applicable

**PART 3.2 FOOTINGS AND SLABS**

Line number	BCA Clause	Title	Assessment	Recommendation	
16.	Part 3.2.1	Footings and Slabs	Footings and slabs inspected by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1
17.	Part 3.2.2.6	Footings and Slabs	Suitable vapour barrier has been observed on site by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1

**PART 3.3 MASONRY**

Line number	BCA Clause	Title	Assessment	Recommendation	
18.	Part 3.3.1	Masonry Accessories	Masonry inspected by Professional Engineer. Construction is in accordance with AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .
19.	Part 3.3.3	Masonry Accessories	Masonry inspected by Professional Engineer.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .
<b>Part 3.3.4 Weatherproofing of masonry</b>					
20.	3.3.4.0	Acceptable Construction Manuals	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	Not inspected	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.
<b>Part 3.3.5 Masonry veneer</b>					
21.	3.3.5.0	Acceptable Construction Manuals	AS 4773.1 and AS 4773.2 – refer assessment below line number 23-30.	N/A	The brick veneer has been assessed against both AS 4773.1, AS4773.2 and Part 3.3.5 – this part should be read in conjunction with the engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .
22.	3.3.5.1	Acceptable Construction Practice	Part 3.3.5 – refer assessment below 3.3.5.1-3.3.5.9.	N/A	The brick veneer has been assessed against both AS 4773.1, AS4773.2 and Part 3.3.5 – this part should be read in conjunction with the engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .
<b>Acceptable Construction Manuals - AS4773.2:2015</b>					



Line number	BCA Clause	Title	Assessment	Recommendation	
23.	Section 3	Mortar	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1
24.	Section 5	Built-in Components	DPC not observed due to render however location of weep holes observed to be in a suitable level.	Acceptable	Refer to site photos in <b>Appendix D.</b>
25.	Section 7	Control joints	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1
26.	Section 8	Steel lintels	Lintels not observed due to enclosed walls and render.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1
27.	Section 9	Masonry veneer walls	40mm min. cavity as measured on site.  Brick leaf size is 110mm thick brick.  DPC not observed due to render however location of weep holes observed to be in a suitable level.	Acceptable	Refer to site photos in <b>Appendix D.</b>
28.	9.6.2.2	Sill flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
29.	9.6.2.3	Head flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
30.	9.6.2.4	Flashing at roof abutment	Flashings were not inspected to the roof, some leaks identified during inspections, all roof and roof junction flashings to be confirmed as complete and sealed.	Not inspected	To be inspected and certified by a licensed builder.



Line number	BCA Clause	Title	Assessment	Recommendation	
31.	Section 10	Cavity masonry walls	40mm min. cavity as measured on site.  Brick leaf size is 110mm thick brick.  DPC not observed due to render however location of weep holes observed to be in a suitable level.	Acceptable	Refer to site photos in <b>Appendix D</b> .
32.	10.5.3.2	Sill flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
33.	10.5.3.3	Head flashings	Flashings were not observed.	Not observed	To be inspected and certified by a licensed builder
34.	10.5.3.4	Flashing at roof abutment	N/A – Double brick walls were not observed to extend higher than ground level.	Complies	N/A
<b>3.3.5.1 Acceptable Construction Practice</b>					
35.	3.3.5.2	Height of wall limitation	Masonry veneer walls are not to be greater than 8.5m.	Complies	N/A
36.	3.3.5.3	Masonry units	Masonry existing, leaf size 110mm thick and are cored units.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .
37.	3.3.5.4	Mortar mixes	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .
38.	3.3.5.5	Mortar joints	Nominal thickness of 10mm.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1 .



Line number	BCA Clause	Title	Assessment	Recommendation	
					Refer to site photos in <b>Appendix D</b> .
39.	3.3.5.6	Cavities	40mm min. cavity as measured on site.	Complies	N/A
40.	3.3.5.7	Damp-proof courses and flashings — material	DPC or flashing not observed due to render finish to the external.	Not observed	To be inspected and certified by a licensed builder
41.	3.3.5.8	Damp-proof courses and flashings — installation	DPC was not observed due to render finish to the external, DPC expected to be encountered at the level of weepholes visible on the external walls, it is noted that the location indicates acceptable construction.  Window head and sill flashings were observed in some locations, unable to inspect some locations.	Not inspected  Not inspected	Refer to site photos in <b>Appendix D</b> .  To be inspected and certified by a licenced builder.
42.	3.3.5.9	Weep holes	Weep holes inspected and visible at suitable spans at the base of the ground floor and at the interstory junction.  Weepholes are not exposed or visible through the render in some locations, weepholes to be opened through render.	Remedial	Refer to Building Information Certificate Plans.
43.	3.3.5.10	Wall ties	Wall ties were visible and identified, galvanised material.	Complies	
44.	3.3.5.11	Openings in masonry veneer	Window lintels inspected by structural engineer.	Complies	Refer to site photos in <b>Appendix D</b> .
45.	3.3.5.12	Lintels	Steel lintels have not been inspected.	Not inspected	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.3.6 Isolated Masonry Piers					
46.	3.3.6.0	Acceptable Construction Manuals	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1
47.	3.3.6.1	Acceptable Construction Practice	Assessment to AS 4773.1:2015, AS4773.2:2015.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1

**PART 3.4 FRAMING**

Line number	BCA Clause	Title	Assessment	Recommendation	
48.	Part 3.4.0	Framing	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1 Refer to structural plans listed in Section 4 of this report.	Complies/ Remedial	Refer to structural plans for remedial work.
49.	Part 3.4.1	Subfloor ventilation	N/A - no subfloor.	N/A	N/A
50.	Part 3.4.2	Steel framing	N/A – timber framed.	N/A	N/A
51.	Part 3.4.3	Timber Framing	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1	Complies/ Remedial	Refer to structural plans for remedial work.



Line number	BCA Clause	Title	Assessment	Recommendation	
			Refer to structural plans listed in Section 4 of this report.		
52.	Part 3.4.4	Structural steel members	Steel beam located to stairs.	Complies	Refer to engineers Certificate of Structural Adequacy 2122301-LET-010-V1

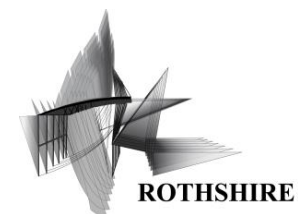
**PART 3.5 ROOF AND WALL CLADDING**

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.5.2 Roof tiles and shingles					
53.	3.5.2.0	Acceptable Construction Manual	N/A	N/A	N/A
54.	3.5.2.1	Acceptable Construction Practice	Refer to assessment below 3.5.2.2-3.5.2.6.	N/A	N/A
55.	3.5.2.2	Fixing of roof tiles and ancillaries	Fixing of concrete roof tiles have not been inspected.	Not inspected	Roof tile fixings to be inspected and certified by a licensed builder.
			Tiles are cracked or missing in some areas.	Remedial	Cracked or missing tiles to be replaced.

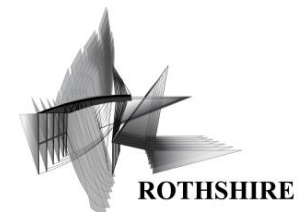




Line number	BCA Clause	Title	Assessment	Recommendation	
56.	3.5.2.3	Flashing	Flashing to be provided in accordance with this clause.	Not inspected	Wall, step, ridge, penetration flashings to be inspected and certified by a licensed builder.
57.	3.5.2.4	Sarking	The roof pitch is 20-23 degrees and sarking has been observed on site.	Acceptable	Refer to site photos in <b>Appendix D</b> .
58.	3.5.2.5	Anti-ponding device/board	N/A – Roof pitch is 20-23 degrees and has eaves.	N/A	N/A
59.	3.5.2.6	Water discharge	35mm min. roofing overlap to gutter to be confirmed on site by licensed builder.	Not inspected	To be inspected and certified by a licensed builder.
<b>Part 3.5.3 Gutters and downpipes</b>					
60.	3.5.3.0	Acceptable Construction Manual	Gutter and Downpipe sizing to AS3500.3	Complies	Refer to stormwater plans listed in Section 4 of this report.  Gutters and Downpipes have been assessed against both AS3500.3 and part 3.5.3.
61.	3.5.3.1	Acceptable Construction Practice	Overflow to Part 3.5.3	Complies	Refer to stormwater plans listed in Section 4 of this report.
<b>Acceptable Construction Manual</b>					
62.	Section 2	Materials and products	UPVC downpipes and metal gutter	Complies	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
63.	Section 3	Roof drainage systems - Design	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
Acceptable Construction Practice					
64.	3.5.3.1	Application	Refer assessment below	Complies	N/A
65.	3.5.3.2	Materials	UPVC downpipes and Metal gutter	Complies	N/A
66.	3.5.3.3	Selection of guttering	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
67.	3.5.3.4	Installation of gutters	Refer to stormwater plans showing the roof catchment area and assessment against the existing gutter and downpipe size.	Complies	Refer to stormwater plans listed in Section 4 of this report.
68.	Table 3.5.3.4a	Acceptable continuous overflow measure	Slot openings can be seen on the gutters to the alfresco and first floor.	Complies	Refer to site photos in <b>Appendix D</b> .
			Overflows are required to be installed to the entry portal.	Remedial	
Part 3.5.4 Timber and composite wall cladding					
69.	3.5.4.0	Acceptable Construction Manual	N/A	N/A	N/A
70.	3.5.4.1	Acceptable Construction Practice	Lightweight cladding is constructed with James Hardie HardieTex Blueboard 7.5mm, complaint to AS 2908.2.	Complies	Refer to site photos in <b>Appendix D</b> .



Line number	BCA Clause	Title	Assessment	Recommendation	
			Cladding assessment for other cladding types will be based on observations made on site, and where a need for further clarification has been identified.  Refer assessment below 3.5.4.3-3.5.4.8.		
71.	3.5.4.2	Timber Wall cladding	N/A – Cladding is not a timber cladding.	N/A	N/A
72.	3.5.4.3	Wall cladding boards	Wall cladding incomplete in various locations including the eastern façade on the first floor	Remedial	To be repaired and completed.
73.	3.5.4.4	Sheet wall cladding	Nail spacing for cladding appears to be suitable. Wall cladding incomplete in various locations.	Complies / remedial	To be inspected and certified by a licensed builder.
74.	3.5.4.5	Eaves and Soffit linings	Eaves are lined with a soffit lining.	Complies	Refer to site photos in <b>Appendix D</b> .
			Some bowing of the eaves has been observed, possibly due to water damage and penetration to the eaves.	Remedial	Soffit to be repaired at the location of the water tank.
			Storm moulds have not been observed between the soffit and cladding.	Remedial	To be completed after finishing the cladding.
75.	3.5.4.6	Flashings to wall openings	The window head to the first floor are all to the soffit with a storm mould and do not require a flashing in this location. Refer 3.5.4.6 (d).	Acceptable	



Line number	BCA Clause	Title	Assessment	Recommendation	
			Sill flaps can be seen to the windowsills and in some locations a sill flashing appears to be visible.  Windows to be fixed or replaced in some locations, including to the bedroom and walk-in-wardrobe.	Remedial	Windows to be installed in accordance to AS2047.
76.	3.5.4.7	Clearance between cladding and ground	N/A - cladding to first floor only.	N/A	N/A
77.	3.5.4.8	Parapet capping	Parapet capping to be undertaken to front wall.	Remedial	Parapet capping to be undertaken to front wall.
78.	Part 3.5.5	Metal wall cladding	N/A - Not used.	N/A	N/A

PART 3.6 GLAZING

Line number	BCA Clause	Title	Assessment	Recommendation	
79.	3.6.0	Acceptable construction manual	N/A	N/A	N/A
80.	3.6.1	Acceptable construction practice	Refer assessment under 3.6.3 and 3.6.4.	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
81.	3.6.2	Glazing sizes and installation	Refer assessment under 3.6.3 and 3.6.4	N/A	N/A
82.	3.6.3	Fully framed glazing installed in perimeter of buildings	With the exception of windows to the dining area, all windows meet the requirements of Table 3.6.2.  Window to the dining area is to be replaced with 2-leaf 10mm toughened or 3-leaf 8mm toughened glazing to meet the requirements of AS 1288.	Complies	Refer to site photos in <b>Appendix D</b> .
<b>3.6.4 Human impact safety requirements</b>					
83.	3.6.4.1	Doors	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix D</b> .
84.	3.6.4.2	Door side panels	N/A	N/A	N/A
85.	3.6.4.3	Full height framed glazed panels	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix D</b> .
86.	3.6.4.4	Glazed panels, other than doors or side panels, on the perimeter of rooms	Grade A toughened glass 5mm each panel meets the requirements of Table 3.6.5 for the area of glazing.	Complies	Refer to site photos in <b>Appendix D</b> .
87.	3.6.4.5	Bathroom, ensuite and spa room glazing	Grade A toughened glass 5mm.	Complies	Refer to site photos in <b>Appendix D</b> .



Line number	BCA Clause	Title	Assessment	Recommendation	
88.	3.6.4.6	Visibility of glazing	Banding required on all glazed door panels in compliance with clause 3.6.4.6.	Remedial	Banding to be applied, inspection of compliance required.

**PART 3.7 FIRE SAFETY**

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.7.1 Fire properties for materials and construction					
89.	3.7.1.2	Fire hazard properties	Refer assessment below 3.7.2.2-3.7.2.8	N/A	N/A
Part 3.7.2 Fire separation of external walls					
90.	3.7.2.2	External walls of Class 1 buildings	Walls are located less than 900mm from the boundary. The southern boundary wall is required to be fire rated.	Remedial	Windows to be replaced with non-openable fire proof windows in accordance with clause 3.7.2.4.
91.	3.7.2.4	Construction of external walls	N/A – as per 3.7.2.2 and 3.7.2.5	N/A	N/A
92.	3.7.2.5	Class 10a buildings	N/A – no class 10a building.	N/A	N/A
93.	3.7.2.6	Open carports	N/A	N/A	N/A
94.	3.7.2.7	Allowable encroachments	Eave is within the 900mm of the boundary on the north and south elevation.	Acceptable	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
95.	3.7.2.8	Roof lights	Not used	N/A	N/A
96.	Part 3.7.3	Fire protection of separating walls and floors	N/A	N/A	N/A
97.	Part 3.7.4	Fire separation of garage top dwellings	N/A	N/A	N/A
<b>Part 3.7.5 Smoke alarms and evacuation lighting</b>					
98.	3.7.5.2	Smoke alarm requirements	Smoke alarms required in class 1a buildings. Electrical work is incomplete.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.
99.	3.7.5.3	Location — Class 1a buildings	Smoke alarms to be located between bedrooms and the remainder of the building.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.
100.	3.7.5.5	Installation of smoke alarms	N/A – no smoke alarms installed.	Remedial	Smoke alarms to be installed in accordance with clause 3.7.5.2, 3.7.5.3 & 3.7.5.5.

### PART 3.8 HEALTH AND AMENITY



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.8.1 Wet areas and external waterproofing					
101.	3.8.1.2	Wet Areas	All wet areas completed at time of inspection; floor wastes have been installed in accordance with this clause.	Complies	Refer to Waterproofing Compliance Certificate dated 6 June 2019, see <b>Appendix E</b> .
102.	3.8.1.3	External above ground membranes	All wet areas completed at time of inspection; floor wastes have been installed in accordance with this clause.	Complies	Refer to Waterproofing Compliance Certificate dated 6 June 2019, see <b>Appendix E</b> .
Part 3.8.2 Room heights					
103.	3.8.2.2	Height of rooms and other spaces	Minimum FFL to finished ceiling height identified at time of inspection was greater than 2700mm for ground floor & greater than 2400mm for upper floor, compliant with this clause.  Basement storage minimum FFL to finished ceiling height observed as 2.2m.	Complies	N/A
Part 3.8.3 Facilities					
104.	3.8.3.2	Required facilities	At time of inspection, no facilities were installed due to the stage of construction.	Remedial	Facilities to be completed.
105.	3.8.3.3	Construction of sanitary compartments	Ensuite and bathroom upstairs achieve the required clear space of 1200mm, refer to Figure 3.8.3.3.  Door shown opening in WC downstairs currently shows 1200mm clear space, any future fit out of the bathroom to maintain the 1200mm clear space.	Complies	Refer to existing floor plans, drawing no. BIC-101 & BIC-102.





Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.8.4 Light					
106.	3.8.4.2	Natural light	All habitable rooms provided with natural light and achieve 10% of the floor area.	Complies	
107.	3.8.4.3	Artificial lighting	Ensuite has natural light.  Bathroom, laundry and downstairs WC/bathroom have artificial light in accordance with 3.8.4.3.	Complies	
Part 3.8.5 Ventilation					
108.	3.8.5.2	Ventilation requirements	All habitable rooms provided with natural ventilation via openable doors and windows.	Complies	
109.	3.8.5.3	Location of sanitary compartments	N/A - Sanitary compartment does not open on to kitchen or pantry, mechanical ventilation provided.	N/A	N/A
110.	Part 3.8.6	Sound insulation	N/A	N/A	N/A
Part 3.8.7 Condensation management					
111.	3.8.7.2	Pliable building membrane	Drained cavity provided in external walls.  A pliable building membrane (CSR Bradford ResiWrap) to the lightweight cladding was observed on site.	Complies	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
112.	3.8.7.3	Flow rate and discharge of exhaust systems	Exhaust fans >25 L/s for sanitary compartments.  No exhaust system for kitchen areas where kitchen has not yet been installed.	Capable of compliance	N/A
113.	3.8.7.4	Ventilation of roof spaces		Remedial	Roof ventilation to be provided via eave vents.

**PART 3.9 SAFE MOVEMENT AND ACCESS**

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.9.1 Stairway and Ramp construction					
114.	3.9.1.2	Stairway construction	Riser height is within the min and max of Table 3.9.1.1.	Acceptable	N/A
115.	3.9.1.3	Ramps	N/A	N/A	N/A
116.	3.9.1.4	Slip-resistance	Stairs are unfinished concrete (non-slip).	Acceptable	N/A
117.	3.9.1.5	Landings	Landing at top and bottom of stairs.	Acceptable	N/A
118.	3.9.1.6	Thresholds	Threshold is less than 230mm to the entrance.	Acceptable	N/A
Part 3.9.2 Barriers and handrails					



Line number	BCA Clause	Title	Assessment	Recommendation	
119.	3.9.2.2	Barriers to prevent falls	Refer to 3.9.2.3, 3.9.2.6	Remedial	Handrails to be constructed.
120.	3.9.2.3	Construction of barriers to prevent falls	Temporary barriers are provided to the landing.  The barrier appears to be proprietary balustrade product and top fixed to the floor structure.	Remedial	Refer to site photos in <b>Appendix D</b> .
121.	3.9.2.4	Handrails	Handrails to be installed	Remedial	Handrails to be installed
122.	3.9.2.5	Construction of wire barriers	N/A	N/A	N/A
123.	3.9.2.6	Protection of openable windows — bedrooms	All windows to be fitted with opening protection.	Remedial	All windows to be fitted with opening protection.
124.	3.9.2.7	Protection of openable windows — rooms other than bedrooms	All windows to be fitted with opening protection.	Remedial	All windows to be fitted with opening protection.

**PART 3.10 ANCILLARY PROVISIONS AND ADDITIONAL CONSTRUCTION REQUIREMENTS**

Line number	BCA Clause	Title	Assessment	Recommendation	
125.	Part 3.10.1	Swimming Pools	Site has outdoor swimming pool.  Water depth and reticulation system not assessable during site visit.	N/A	N/A
126.	Part 3.10.1.0	Swimming Pools	No safety barrier constructed around swimming pool.	Remedial	Safety barriers to be constructed in accordance with AS 1926.1 & AS 1926.2.
127.	Part 3.10.2	Earthquake areas	N/A – not in earthquake area	N/A	N/A
128.	Part 3.10.3	Flood hazard areas	N/A – not in flood area	N/A	N/A
129.	Part 3.10.4	Construction in alpine areas	N/A – not located in alpine area	N/A	N/A
<b>Part 3.10.5 Construction in bushfire prone areas</b>					
130.	Part 3.10.5.0	Application	Refer to Bushfire report submitted with application.	N/A	N/A
131.	Part 3.10.6	Attachment of decks and balconies to external walls of buildings	N/A	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
132.	Part 3.10.7	Boilers, pressure vessels, heating appliances, fireplaces, chimneys and flues	N/A	N/A	N/A

**PART 3.12 ENERGY EFFICIENCY**

Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.12 Energy Efficiency					
133.	3.12.0.1	Heating and cooling loads	BASIX prepared and existing structure determined suitable.	Remedial	Refer BASIX Certificate number: 1334892S_02
Part 3.12.1 Building fabric					
134.	3.12.1.1	Building fabric thermal insulation	BASIX prepared; current insulation determined insufficient.	Remedial	Insulation to be installed in compliance with BASIX Certificate
135.	3.12.1.2	Roofs	BASIX prepared; current insulation determined insufficient.	Remedial	Insulation to be installed in compliance with BASIX Certificate
136.	3.12.1.3	Roof lights	N/A – no roof lights	N/A	N/A



Line number	BCA Clause	Title	Assessment	Recommendation	
137.	3.12.1.4	External walls	BASIX prepared; current insulation determined insufficient.	Remedial	Additional internal lining similar to Kingspan Kooltherm to be provided to meet BASIX requirements.
138.	3.12.1.5	Floors	Not used, concrete slab	N/A	N/A
<b>Part 3.12.2 External glazing</b>					
139.	3.12.2	External glazing	The national BCA Part 3.12.2 does not apply in NSW as the subject matter is dealt with by BASIX.	Acceptable	Refer BASIX Certificate number: 1334892S_02
<b>Part 3.12.3 Building sealing</b>					
140.	3.12.3.1	Chimneys and flues	N/A	N/A	N/A
141.	3.12.3.2	Roof lights	N/A	N/A	N/A
142.	3.12.3.3	External windows and doors	Sealing visible at time of inspection.	Complies	N/A
143.	3.12.3.4	Exhaust fans	Sealing visible at time of inspection.	Complies	N/A
144.	3.12.3.5	Construction of ceilings, walls and floors	Sealing visible at time of inspection, with exception to parts of the building which remain incomplete.	Remedial	Complete works to all external walls.
145.	NSW 3.12.3.1	Compliance with BCA provisions	The sealing of a building must comply with the national BCA provisions 3.12.3.1 to 3.12.3.6.	Refer assessment	Refer BASIX Certificate number: 1334892S_02



Line number	BCA Clause	Title	Assessment	Recommendation	
Part 3.12.4 Air movement					
146.	3.12.4	Air movement	The national BCA Part 3.12.4 does not apply in NSW as the subject matter is dealt with by BASIX.	Acceptable	Refer BASIX Certificate number: 1334892S_02
NSW 3.12.5 Application of NSW Part 3.12.5					
147.	3.12.5.0	Acceptable Construction Manual	BCA volume three.	Not inspected	Refer to assessment below.
148.	3.12.5.1	Insulation of services	Heated water systems to be insulated in accordance with this clause, visually inspected.	Not yet constructed	Works to be completed.
149.	3.12.5.2	Central heating water piping	Not used	Not inspected	N/A
150.	3.12.5.3a	Heating and cooling ductwork	Ductwork sealed and insulated in accordance with this clause, visually inspected.	Not inspected	Mechanical contractor to inspect and provide certification of compliance of ductwork sealing and insulation to be carried out concurrently with remedial works.



## 7. CONCLUSION

The primary purpose of this report is to identify review to building compliance in comparison to the current Deemed-to-Satisfy provisions of the BCA 2019 Amdt 1 Volume Two 2019.

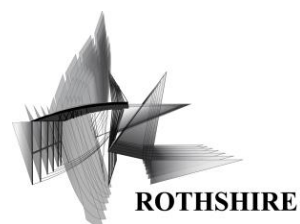
Where a non-compliance has been identified performance requirements for rectification work has been proposed to achieve compliance to the BCA 2019 Amdt 1 in **Section 8** below.

## 8. REMEDIAL WORKS SUMMARY

Additional building works are required to bring the building up to compliance with the BCA 2019 Amdt 1 Volume two, the works are summarised below.

1. Drainage from the first-floor roof to the ground floor non-trafficable area is to be redirected due to breaches of the waterproofing and internal damage. Completion of internal linings and flashing to roof & roof-to-wall junction to be undertaken.
2. Windows to some locations, including to the bedroom and walk-in-wardrobe, must be replaced and installed in accordance with AS2047. The flashings of the bedroom windows must be replaced or repaired.
3. Weepholes in some areas are to be exposed through the render.
4. Cracked or missing roof tiles are to be replaced and fixed in accordance with BCA Clause 3.5.2.2.
5. Overflow slots will be provided to the entry portal in accordance with BCA Table 3.5.3.4a and AS3500.3.
6. Remediation is to be undertaken to correct bowing of the eaves and soffit linings.
7. Visible banding will be installed to all glazed door panels in accordance with BCA Clause 3.6.4.6.
8. All windows and doors to the southern boundary wall will be removed and replaced with non-openable fire-proof windows in accordance with AS2047 and BCA Clause 3.7.2.4.
9. Smoke alarms are to be installed in the upstairs corridor between bedrooms in accordance with BCA Clause 3.7.5.2, 3.7.5.3 & 3.7.5.5. Electrical wiring for the smoke alarm on the ground floor is to be completed.
10. All required facilities are to be provided in accordance with BCA Clause 3.8.3.2.
11. Handrail is to be added to the stairs, compliant to BCA Clause 3.9.2.4.
12. All windows to bedrooms and non-bedroom areas are required to be fitted with opening protection in accordance with BCA Clause 3.9.2.6 & 3.9.2.7.
13. A safety barrier will be constructed around the swimming pool in accordance with AS1926.1 & AS1926.2.
14. Installation of insulation to the ground floor external walls compliant to the BASIX Certificate reference 1334892S\_02, internal linings to be provided to achieve Rw 0.5.
15. Installation of insulation to the ceiling and roof compliant to the BASIX Certificate reference 1334892S\_02.





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16. Structural works to be undertaken in accordance with the structural plans referenced in Section 4 of this report.

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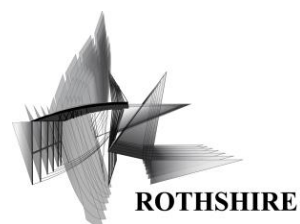
## LIMITATIONS

The explicit purpose of this report and the associated services undertaken by Rothshire Services Pty Ltd is to provide an assessment in accordance with the scope of services set out in the agreement between Rothshire Services Pty Ltd & the property owners ('the client'). The scope of services was defined by the client or their representative and in lieu of existing physical documentation.

Rothshire Services Pty Ltd concluded on information represented in this assessment from visual inspections and a survey of existing physical conditions. The passage of time, manifestation of latent conditions or impact of future events may require exploration in-situ, subsequent data analysis, and re-evaluation of the findings, observations and conclusions either implied or expressed in this assessment.

In preparing this assessment, Rothshire Services Pty Ltd has relied upon presumed accuracy of certain information (or absence thereof) relative to 1178 Forest Road, Lugarno NSW 2210, provided by the client, architect, Council, geotechnical engineer, surveyor, diagnostic technician and other identified herein. Except as otherwise stated in this assessment, Rothshire Services Pty Ltd has not attempted to verify the accuracy or completeness of any such information.

The findings, observations, examinations and conclusion expressed or implied by Rothshire Services Pty Ltd in this assessment are not, and should not be considered, an assessment concerning the physical condition or the proposed treatment of the existing conditions. No warranty or guarantee, whether expressed or implied, is made with respect to the data reported or to the findings, observations, and conclusions are based solely upon information in existence at the time of examination.

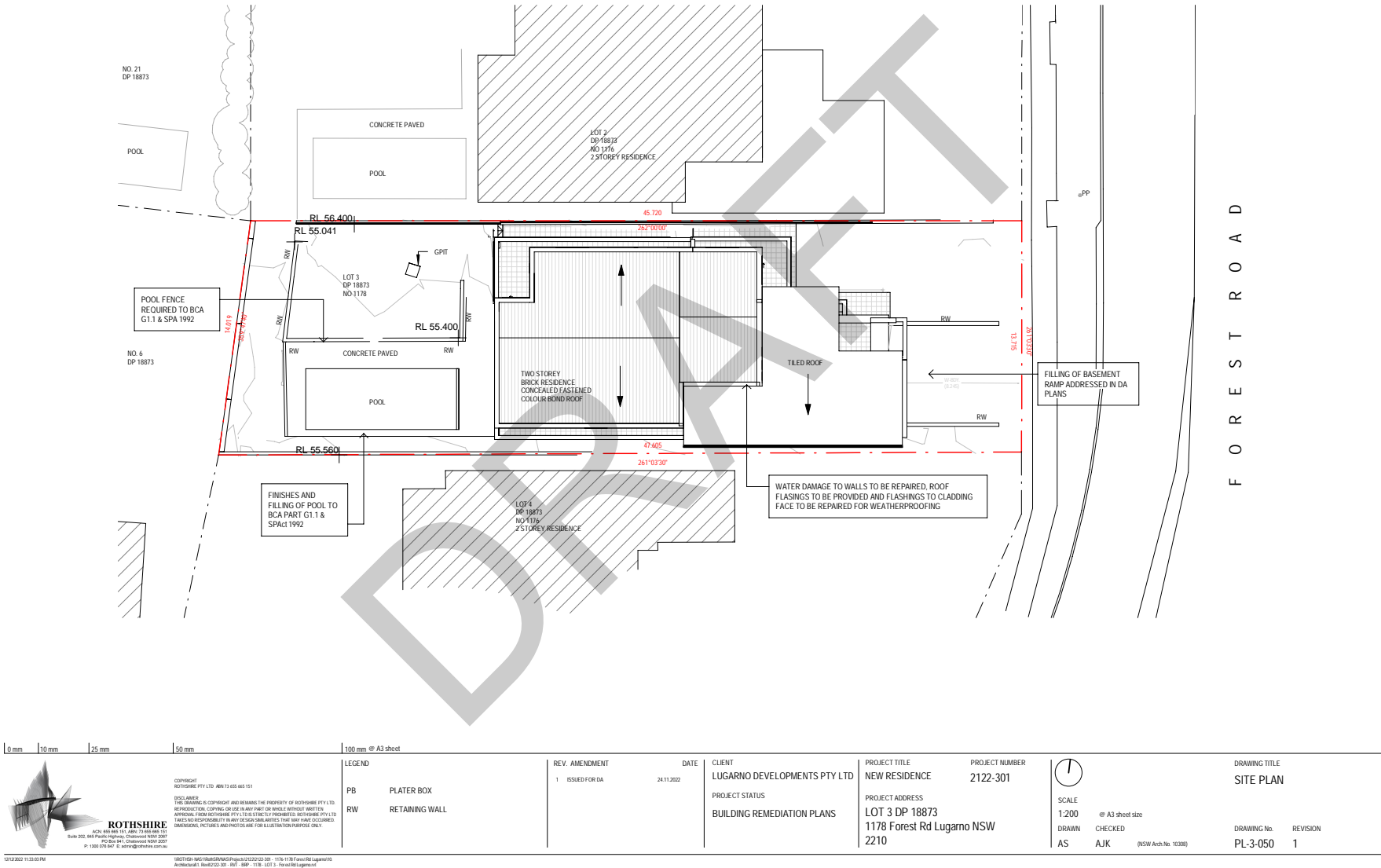


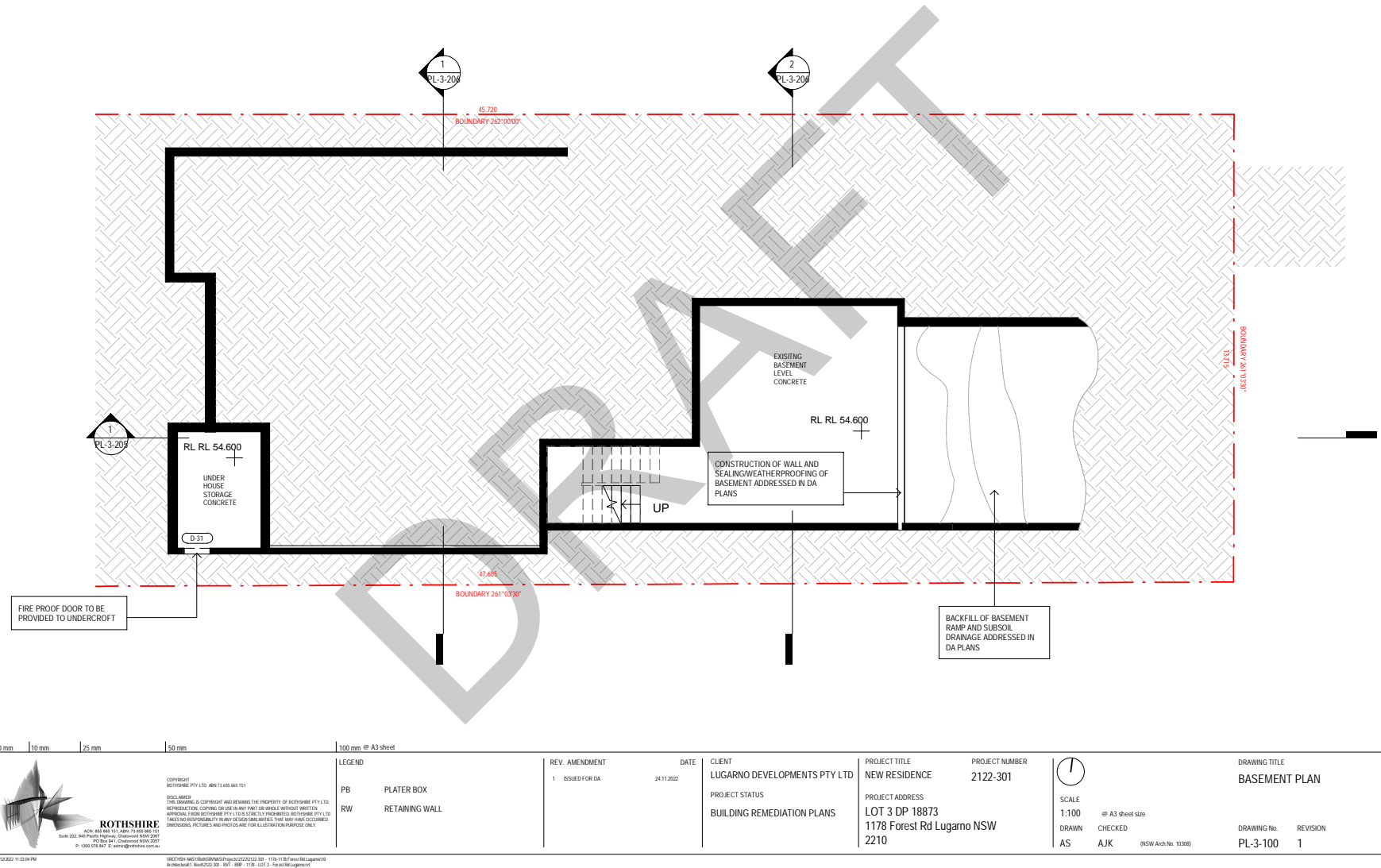
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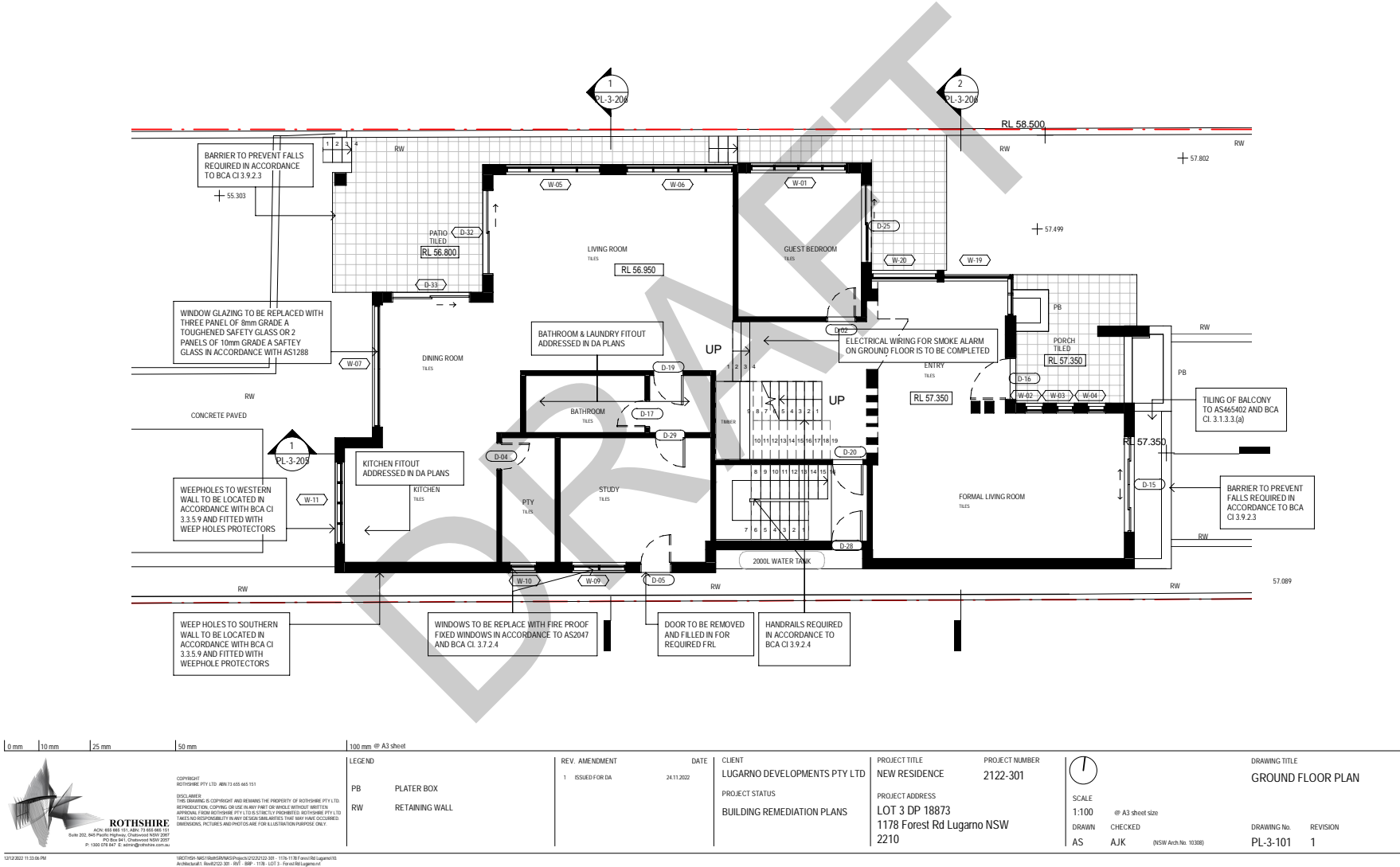
## APPENDIX A – ARCHITECTURAL PLANS

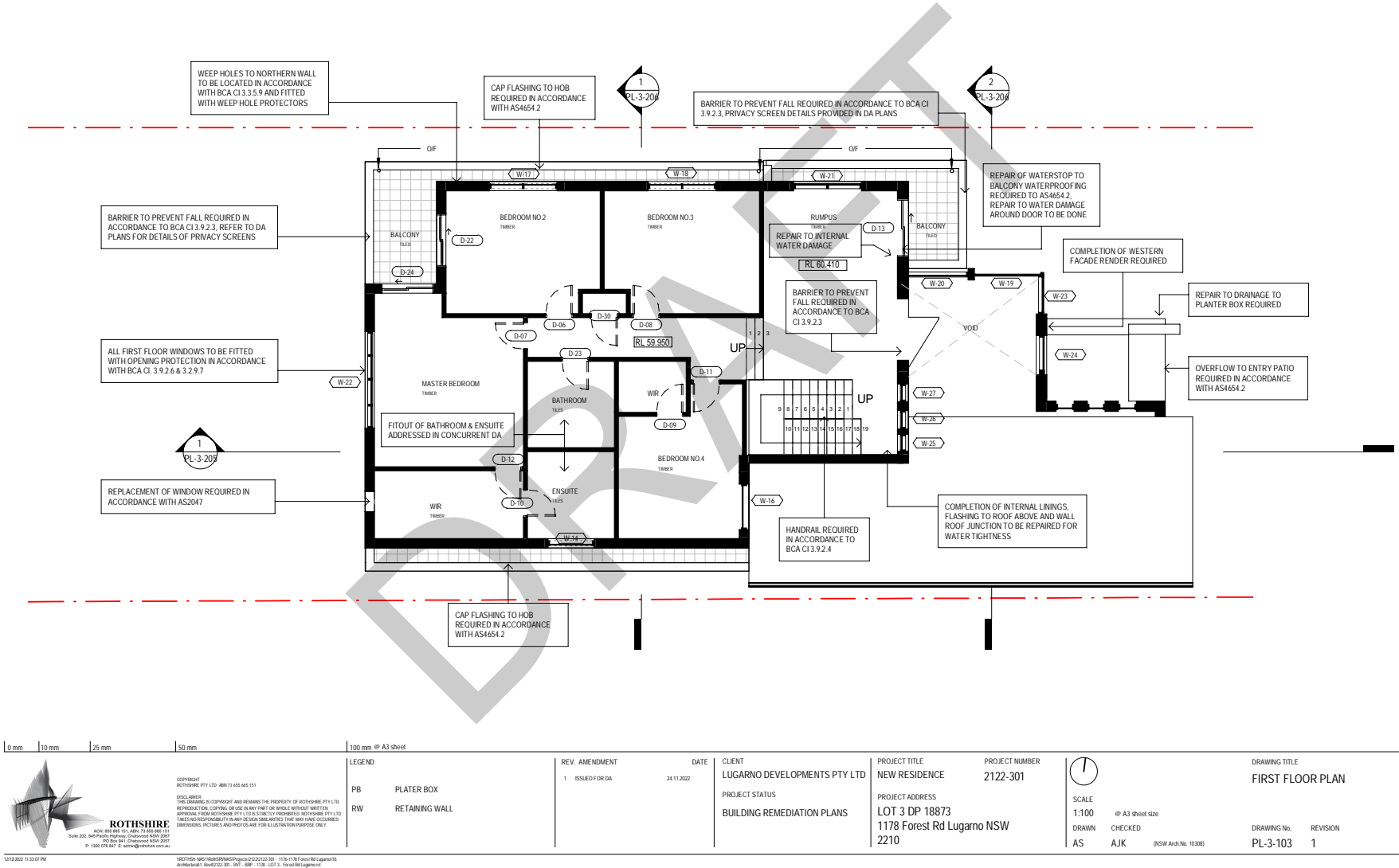
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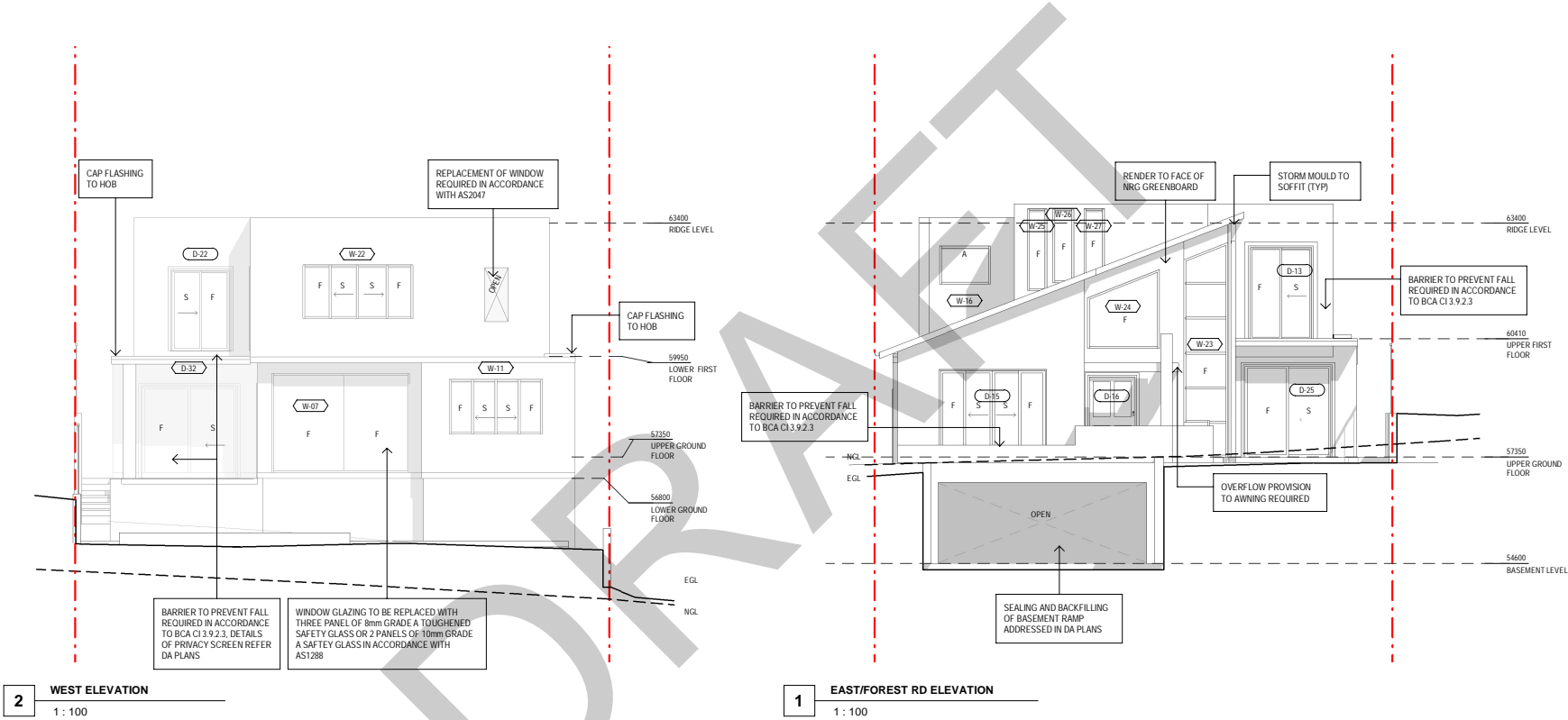





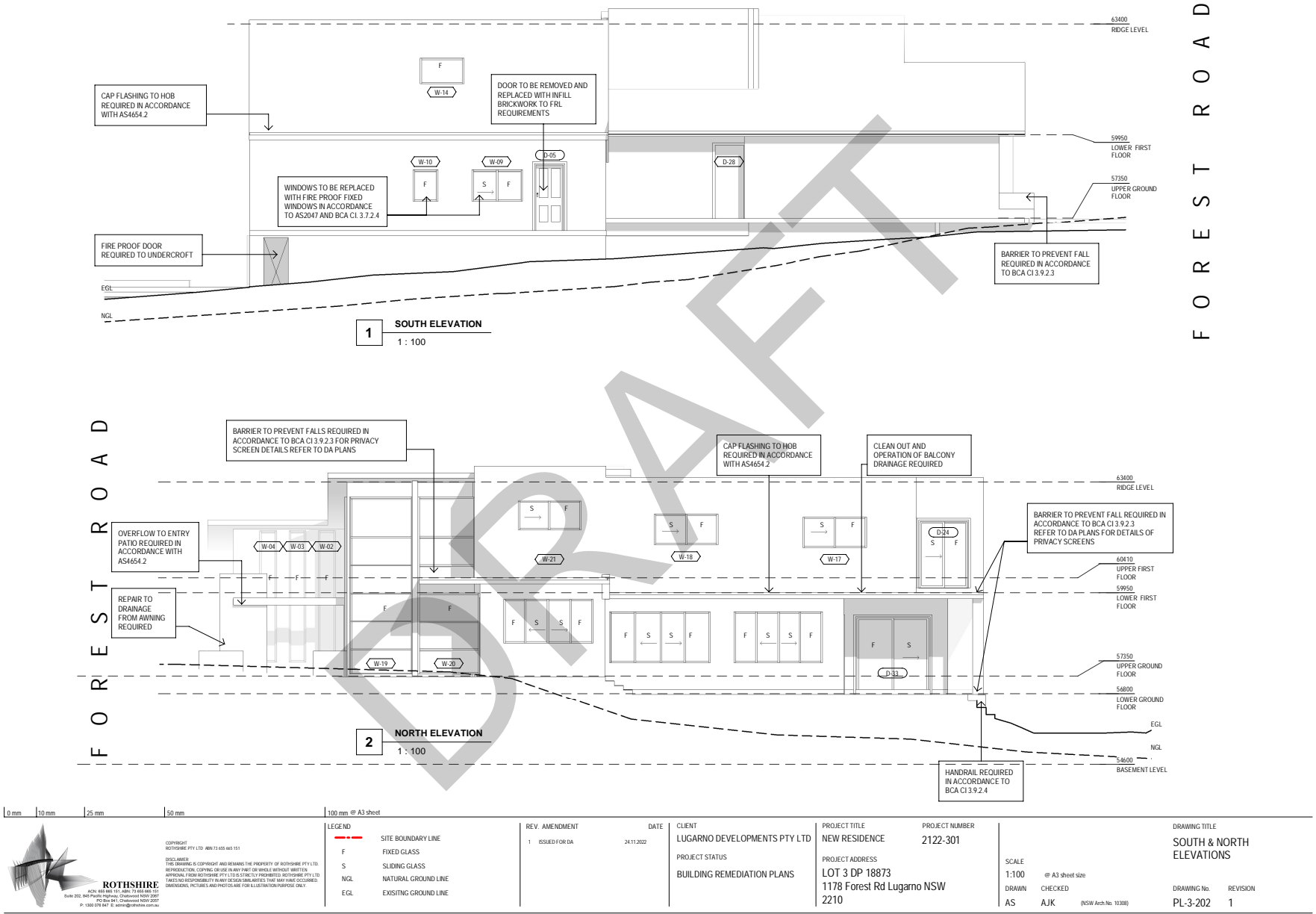


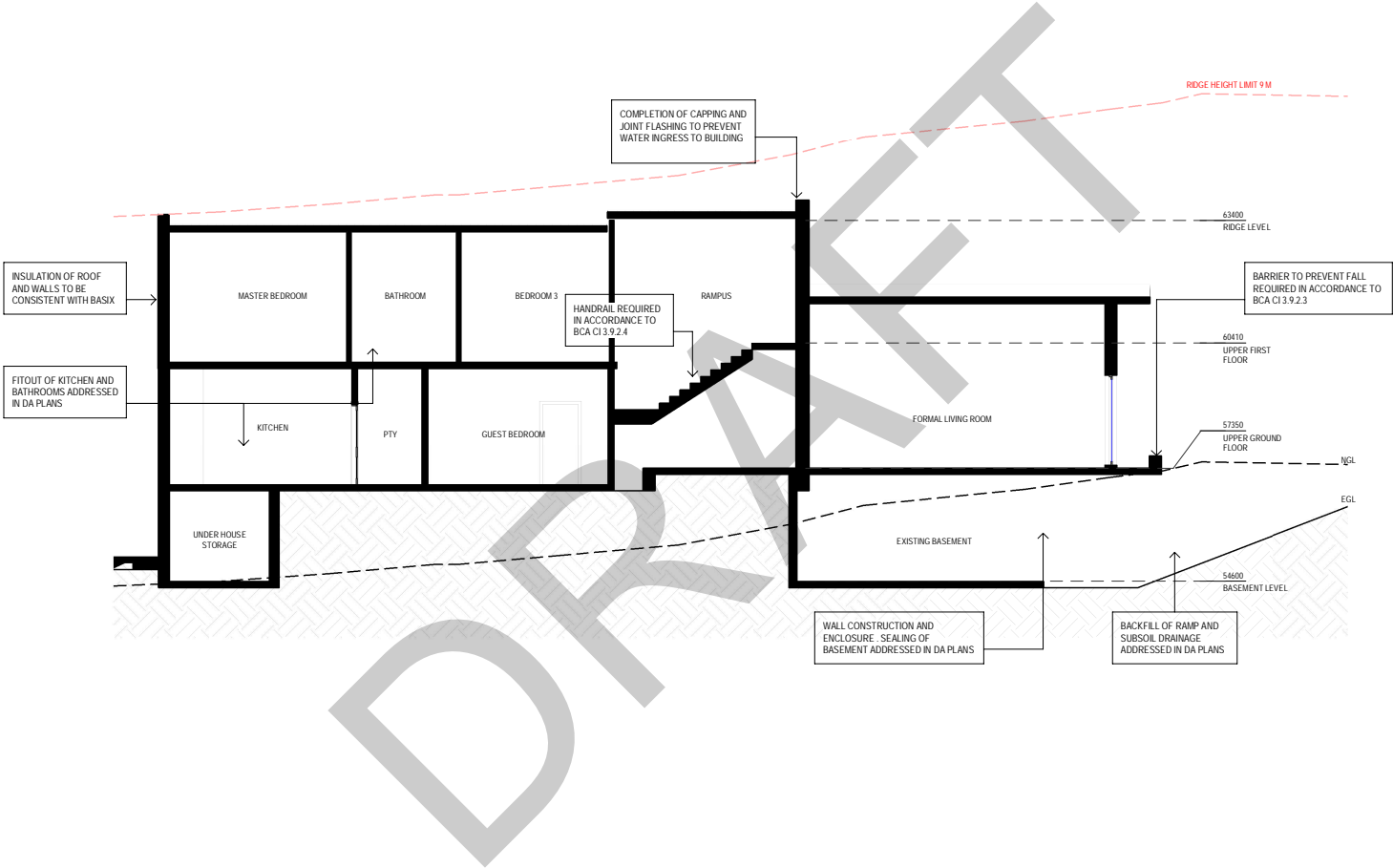




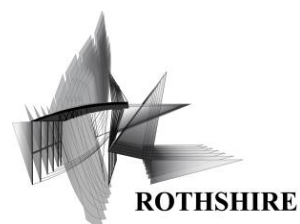


0 mm10 mm25 mm50 mm100 mm @ A3 sheet		<b>LEGEND</b> <div><div></div> SITE BOUNDARY LINE</div> <div><div></div> FIXED GLASS</div> <div><div></div> SLIDING GLASS</div> <div><div></div> NGL NATURAL GROUND LINE</div> <div><div></div> EGL EXISTING GROUND LINE</div>		<b>REV. AMENDMENT</b> 1 ISSUED FOR DA	<b>DATE</b> 24.11.2022	<b>CLIENT</b> LUGARNO DEVELOPMENTS PTY LTD	<b>PROJECT TITLE</b> NEW RESIDENCE	<b>PROJECT NUMBER</b> 2122-301	<b>DRAWING TITLE</b> EAST & WEST ELEVATIONS		
<div><b>ROTHSHIRDE</b> ARCHITECTS Suite 202, 845 Pacific Highway, Chateau NSW 2067 PO Box 841, Chateau NSW 2067 P: 1300 678 847 E: info@rothshirde.com.au</div>		<div><small>COPYRIGHT ROTHSHIRDE PTY LTD. ABN 73 455 465 751  DISCLAIMER THIS DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY OF ROTHSHIRDE PTY LTD. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF ROTHSHIRDE PTY LTD. ANY UNAUTHORIZED REPRODUCTION OR TRANSMISSION OF THIS DRAWING IS STRICTLY PROHIBITED. ROTHSHIRDE PTY LTD. ACCEPTS NO RESPONSIBILITY IN ANY CASES WHERE THE DRAWING IS USED FOR A PURPOSE OTHER THAN THAT FOR WHICH IT WAS PREPARED. DIMENSIONS, PICTURES AND PROFILES ARE FOR ILLUSTRATION PURPOSE ONLY.</small></div>		<b>PROJECT STATUS</b> BUILDING REMEDIATION PLANS		<b>PROJECT ADDRESS</b> LOT 3 DP 18873 1178 Forest Rd Lugarno NSW 2210	<b>SCALE</b> 1:100 @ A3 sheet size	<b>DRAWN</b> AS	<b>CHECKED</b> AJK (NSW Arch No. 10388)	<b>DRAWING No.</b> PL-3-201	<b>REVISION</b> 1





		LEGEND		REV. AMENDMENT	DATE	CLIENT	PROJECT TITLE	PROJECT NUMBER	DRAWING TITLE	
0 mm   10 mm   25 mm   50 mm   100 mm @ A3 sheet		NGL   NATURAL GROUND LINE		1   ISSUED FOR DA	24.11.2022	LUGARNO DEVELOPMENTS PTY LTD	NEW RESIDENCE	2122-301	LONG SECTION	
		EGL   EXISTING GROUND LINE				PROJECT STATUS	PROJECT ADDRESS	SCALE		
ROTHSHIRDE ARCHITECTURE 10/1178 Forest Rd Lugarno NSW 2210 P: 1300 578 847 E: info@rothshirde.com.au						BUILDING REMEDIATION PLANS	1178 Forest Rd Lugarno NSW 2210	1:100 @ A3 sheet size		
								DRAWN AS	CHECKED AJK	DRAWING No. PL-3-205
									(NSW Arch No. 10388)	REVISION 1



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## APPENDIX B – SITE CLASSIFICATION REPORT

DRAFT



GCA Report No.  
Date:

G18206-1  
19<sup>th</sup> December 2018

**Geotechnical Inspection Letter at:**

Nos. 1174-1178 Forest Road Lugarno NSW 2210

**Prepared for:**

Astor Homes  
Kirill Charonov  
kirill@astorhomes.com.au

**Attachment 1:** Important Information About Your Geotechnical Report

**1. INTRODUCTION**

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Mr. Kirill Charonov of Astor Homes to carry out an inspection on the stagnant water currently present within the existing basement levels of the residential dwellings at the properties nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site). The site inspection was carried out on the 27<sup>th</sup> November 2018, for the purpose of providing geotechnical advice of any potential issues which may have been caused to the structural adequacy of existing dwellings foundations due to the presence of stagnant water.

This inspection letter presents the results of our observations, along with our assessment and any recommendations which may be necessary.

For your review, **Attachment 1** contains a document prepared by GCA entitled "Important Information About Your Geotechnical Report", which summarises the general limitations, responsibilities, and use of geotechnical reports.

**2. PROVIDED INFORMATION**

The following relevant information was provided to GCA prior to the site investigation:

- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 2", referenced project No. 1718, and included drawing nos. BC005, BC100, BC101, and BC200 to BC203 inclusive.
- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 2", referenced project No. 1718, and included drawing nos. BC005, BC100, BC101, and BC200 to BC203 inclusive.
- Architectural drawings prepared by Dalgliesh Ward Architects, titled "1174-1178 Forest Road, Lugarno – Lot 3", referenced project No. 1718, and included drawing nos. BC005, BC100 to BC102 inclusive, and BC200 to BC203 inclusive.
- Site survey plan prepared by Total Surveying Solutions, titled "Plan Showing Detail & Levels Over Lots 2 & 3 in DP11873 & Lot A in DP328702", referenced job No. 170832, plan No. 170832\_A, and dated 12<sup>th</sup> September 2017.

Geotechnical Inspection Letter  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



### 3. REGIONAL GEOLOGY

Information obtained on the local regional subsurface conditions, referenced from the Department of Mineral Resources, Sydney 1:100,000 Geological Series Sheet 9130 First Edition, dated 1983, by the Geological Survey of New South Wales, indicates the site is located within an area underlain by Triassic Aged Hawkesbury Sandstone (Rh). The Hawkesbury Sandstone typically comprises "medium to coarse grained quartz sandstone, very minor shale and laminite lenses".

### 4. SITE INSPECTION

During the site inspection, stagnant water was observed within the basement levels of the properties within the site. Groundwater which was present within the basement levels is expected to be associated within surface runoff within the site, and incomplete drainage control measures within the basement levels of each property.

Observations made on the existing foundations within the basement levels indicated the presence of sandstone bedrock underlying the basement walls (where observable and accessible). Information provided by the client also indicates the foundations of the proposed development construction of each dwelling within the site were founded onto the underlying sandstone bedrock throughout. The conditions of the existing dwellings were also visually assessed to be of generally good condition, with no obvious signs of cracking or structural distress.

It is noted that sandstone outcrops were also observed in areas of the site, and within the region surrounding the site, as outlined in Section 3 above.

No groundwater seepage was observed through the basement walls of each dwelling, within the underlying exposed sandstone bedrock or throughout the site.

### 5. PRELIMINARY SITE LOT CLASSIFICATION

AS 2870-2011 indicates the site may be classified as a "Class A" site, for design and construction of the foundation system founded below any topsoil, slopewash, fill or other deleterious material, being on the inferred sandstone bedrock underlying the proposed development area of each dwelling within the site.

Classification by characteristic surface movement ( $Y_s$ ) as outlined in Table 2.3 of AS 2870-2011 is presented in Table 1 below.

**Table 1. Classification by Characteristic Surface Movement ( $Y_s$ ) AS 2870-2011**

Characteristic Surface Movement ( $Y_s$ ) mm	Site Classification in Accordance with Table 2.1
Most sand and rock sites with little or no ground movement from moisture changes	A
$0 < Y_s \leq 20$	S
$20 < Y_s \leq 40$	M
$40 < Y_s \leq 60$	H1
$60 < Y_s \leq 75$	H2
$Y_s > 75$	E

Reactive sites are sites which consist of clayey soils that are prone to swell on wetting and shrink on drying, which results in ground movements that can damage to structures. The amount of ground movement is related to the physical properties of the clay and environmental factors such as climate, vegetation and watering. A higher probability of

Geotechnical Inspection Letter  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



damage can occur on reactive sites where abnormal moisture conditions occur, as defined in AS 2870-2011, due to factors such as:

- Failure to provide adequate site drainage or lack of maintenance of site drainage.

## 6. GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

Based on our observations during our site inspection, along with the subsurface conditions within the site (where observable and accessible) and information provided by the client on the construction of the dwellings within the site, it is assessed that the stagnant water currently present within the basement levels of the properties within the site should not compromise the structural adequacy of the foundations for the dwellings.

AS2870-2011 further indicates that foundations sufficiently constructed on consistent and competent rock throughout are expected to have little or no ground movement from moisture changes. Thus, as discussed in Section 5 above, we do not expect the site to be affected by reactive clayey soils prone to swell on wetting and shrink on drying, which results in ground movements that may damage to structures.

Surface drainage within the area should be maintained to avoid flooding of the site and saturation of the foundation materials during footing construction. Stagnant water currently present within the basement levels should be removed, and appropriate drainage be implemented for each dwelling to help minimise and avoid any further water runoff into the basement levels.

It should also be noted that ground conditions within the site are expected to differ from those encountered and inferred in this letter report, since no geotechnical or geological exploration programme, no matter how comprehensive, can reveal and identify all subsurface conditions underlying the site.

## 7. LIMITATIONS

Geotechnical Consultants Australia Pty Ltd (GCA) has based its geotechnical assessment on available information obtained prior and during the site inspection/investigation. The geotechnical assessment and recommendations provided in this report, along with the surface, subsurface and geotechnical conditions are limited to the inspection and test areas during the site inspection/investigation, and then only to the depths investigated at the time the work was carried out. Subsurface conditions can change abruptly, and may occur after GCA's field testing has been completed.

It is recommended that if for any reason, the site surface, subsurface and geotechnical conditions (including groundwater conditions) encountered during the site inspection/investigation vary substantially during construction, and from GCA's recommendations and conclusions, GCA should be contacted immediately for further testing and advice. This may be carried out as necessary, and a review of recommendations and conclusions may be provided at additional fees. GCA's advice and accuracy may be limited by undetected variations in ground conditions between sampling locations.

GCA does not accept any liability for any varying site conditions which have not been observed, and were out of the inspection or test areas, or accessible during the time of the investigation. This report and any associated information and documentations have been prepared solely for **Astor Homes**, and any misinterpretations or reliances by third parties of this report shall be at their own risk. Any legal or other liabilities resulting from the use of this report by other parties can not be religated to GCA.

Geotechnical Inspection Letter  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



This report should be read in full, including all conclusions and recommendations.  
Consultation should be made to GCA for any misunderstandings or misinterpretations of this report.

For and behalf of

**Geotechnical Consultants Australia Pty Ltd (GCA)**

A handwritten signature in black ink, appearing to read 'Joe Nader', is positioned above the printed name and title.

Joe Nader  
BE (Civil – Construction), Dip.Eng.Prac., MIEAust., AGS, ISSMGE  
Cert. IV in Building and Construction  
Geotechnical Engineer  
Director

DRAFT



Geotechnical Inspection Letter  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. G18206-1, 19<sup>th</sup> December 2018



## 8. REFERENCES

Pells P.J.N, Mostyn, G. & Walker B.F., "Foundations on Sandstone and Shale in the Sydney Region", Australian Geomechanics Journal, 1998.

AS 1726-2017 Geotechnical Site Investigation. Standards Australia.

AS 2870-2011 Residential slabs and footings. Standards Australia.

NSW Department of Mineral Resources (1983) Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1) Geological Survey of New South Wales. Department of Mineral Resources.

NSW Planning Portal.

NSW Six Maps.

DRAFT



## Important Information About Your Geotechnical Report

This geotechnical report has been prepared based on the scopes outlined in the project proposal. The works carried out by Geotechnical Consultants Australia Pty Ltd (GCA), have limitations during the site investigation, and may be affected by a number of factors. Please read the geotechnical investigation report in conjunction with this "Important Information About Your Geotechnical Report".

### Geotechnical Services Are Performed for Specific Projects, Clients and Purposes.

Due to the fact that each geotechnical investigation is unique and varies from sites, each geotechnical report is unique, and is prepared solely for the client. A geotechnical report may satisfy the needs of structural engineer, where it will not for a civil engineer or construction contractor. No one except the client should rely on the geotechnical report without first conferring with the specific geotechnical consultant who prepared the report. The report is prepared for the contemplated project or original purpose of the investigation. No one should apply this report to any other or similar project.

### Reading The Full Report.

Do not read selected elements of the report or tables/figures only. Serious problems have occurred because those relying on the specially prepared geotechnical investigation report did not read it all in full context.

### The Geotechnical Report is Based on a Unique Set of Project And Specific Factors.

When preparing a geotechnical report, the geotechnical engineering consultant considers a number of unique factors for the specific project. These typically include:

- Clients objectives, goals and risk management preferences;
- The general proposed development or nature of the structure involved (size, location, etc.); and
- Future planned or existing site improvements (parking lots, roads, underground services, etc.);

Care should be taken into identifying the reason of the geotechnical report, where you should not rely on a geotechnical engineering report that was:

- Not prepared for your project;
- Not prepared for the specific site;
- Not prepared for you;
- Does not take into consideration any important changes made to the project; or
- Was carried out prior to any new infrastructure on your subject site.

Typical changes that can affect the reliability if an existing geotechnical investigation report include those that affect:

- The function of the proposed structure, where it may change from one basement level to two basement levels, or from a light structure to a heavy loaded structure;
- Location, size, elevation or configuration of the proposed development;
- Changes in the structural design occur; or
- The owner of the proposed development/project has changed.

The geotechnical engineer of the project should always be notified of any changes – even minor – and be asked to evaluate if this has any impact. GCA does not accept responsibility or liability for problems that occur because its report did not consider developments which it was not informed of.

### Subsurface Conditions Can Change

This report is based on conditions that existed at the time of the investigation, at the locations of the subsurface tests (i.e. boreholes) carried out during the site investigation. Subsurface conditions can be affected and modified by a number of factors including, but not limited to, the passage of time, man-made influences such as construction on or adjacent to the site, by natural forces such as floods, groundwater fluctuations or earthquakes. GCA should be contacted prior to submitting its report to determine if any further testing may be required. A minor amount of additional testing may prevent any major problems.

### Geotechnical Findings Are Professional Opinions

Results of subsurface conditions are limited only to the points where the subsurface tests were carried out, or where samples were collected. The field and laboratory data is analysed and reviewed by a geotechnical engineer, who then applies their professional experience and recommendations about the site's subsurface conditions. Despite investigation, the actual subsurface conditions may differ – in some cases significantly – from the results presented in the geotechnical investigation report, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface anomalies and details.



Therefore, the recommendations in this report can only be used as preliminary. Retaining GCA as your geotechnical consultants on your project to provide construction observations is the most effective method of managing the risks associated with unanticipated subsurface conditions.

**Geotechnical Report's Recommendations Are Not Final**

Because geotechnical engineers provide recommendations based on experience and judgement, you should not overly rely on the recommendations provided – they are not final. Only by observing the actual subsurface conditions revealed during construction may a geotechnical engineer finalise their recommendations. GCA does not assume responsibility or liability for the report's recommendations if no additional observations or testing is carried out.

**Geotechnical Report's Are Subject to Misinterpretations**

The project geotechnical engineer should consult with appropriate members of the design team following submission of the report. You should review your design teams plans and drawings, in conjunction with the geotechnical report to ensure they have all be incorporated. Due to many issues arising from misinterpretation of geotechnical reports between design teams and building contractors, GCA should participate in pre-construction meetings, and provide adequate construction observations.

**Engineering Borehole Logs And Data Should Not be Redrawn**

Geotechnical engineers prepare final borehole and testing logs, figure, etc. based on results and interpretation of field logs and laboratory data following the site investigation. The logs, figure, etc. provided in the geotechnical report should never be redrawn or altered for inclusion in any other documents from this report, included architectural or other design drawings.

**Providing The Full Geotechnical Report For Guidance**

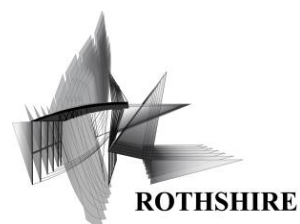
The project design teams, subcontractors and building contractors should have a copy of the full geotechnical investigation report to help prevent any costly issues. This should be prefaced with a clearly written letter of transmittal. The letter should clearly advise the aforementioned that the report was prepared for proposed development/project requirements, and the report accuracy is limited. The letter should also encourage them to confer with GCA, and/or carry out further testing as may be required. Providing the report to your project team will help share the financial responsibilities stemming from any unanticipated issues or conditions in the site.

**Understanding Limitation Provisions**

As some clients, contractors and design professionals do not recognise geotechnical engineering is much broader and less exact than other engineering disciplines, this creates unrealistic expectations that lead to claims, disputes and other disappointments. As part of the geotechnical report, (in most cases) a 'limitations' explanatory provision is included, outlining the geotechnical engineers' limitations for your project – with the geotechnical engineers responsibilities to help other reduce their own. This should be read closely as part of your report.

**Other Limitations**

GCA will not be liable to revise or update the report to take into account any events or circumstances (seen or unforeseen), or any fact occurring or becoming apparent after the date of the report. This report is the subject of copyright and shall not be reproduced either totally or in part without the express permission of GCA. The report should not be used if there have been changes to the project, without first consulting with GCA to assess if the report's recommendations are still valid. GCA does not accept any responsibility for problems that occur due to project changes which have not been consulted.



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## APPENDIX C – ENGINEERING CERTIFICATE – RETAINING WALL

DRAFT

CJS Flora T/A

## CJS Flora & Partners

Chartered Engineers & Project Managers

ABN 57 669 771 477

Job Number: 1601

Date: 14 June 2017

### STRUCTURAL ADEQUACY CERTIFICATE

**LOCATION:** Double storey residence 1178 Forest Road Lugarno NSW.

**ELEMENT:** Concrete Piers, Concrete Retaining Walls, Ground Floor Footings, Ground Floor Slab, Swimming Pool, First Floor Slab, Timber Frames and Trusses.

Structural Inspections have been carried out in accordance with accepted engineering practice and principles at the above mentioned properties. I Charan Flora hereby certify that the newly constructed elements mentioned above have been adequately constructed in accordance with the following design codes:

AS1170, AS2870, AS3600, AS1684, AS4100, AS2159

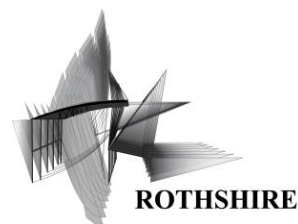
Based on site inspections and with reference to the above Australian Standard Codes it is my opinion that the structure located at the above address is structurally adequate.

Yours Sincerely,

CJS Flora and Partners



Charan Flora  
BE MIEAust



## APPENDIX D – SITE PHOTOS



Image 1 – Brick course to FFL upturn height typical.

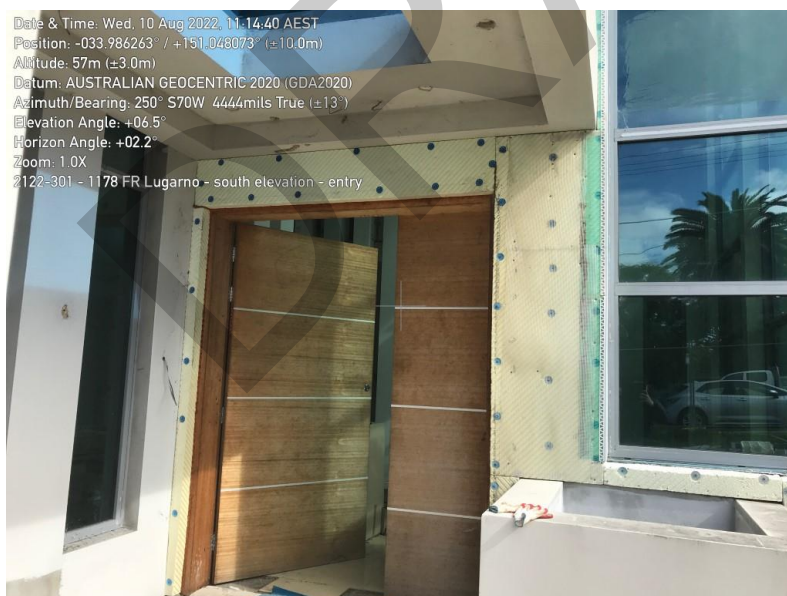


Image 2 – Lightweight cladding at entry portal.





Image 3 – Lightweight wall at entry portal.



Image 4 – Cracking in render to southwest corner.



Image 5 – West elevation existing condition.

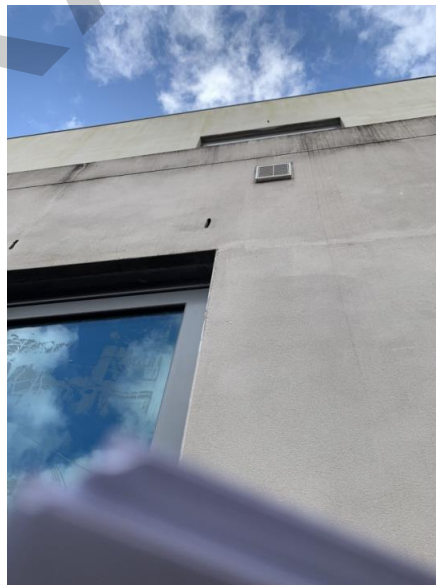


Image 6 & Image 7 – Weepholes and mechanical ventilation at interstory junction.



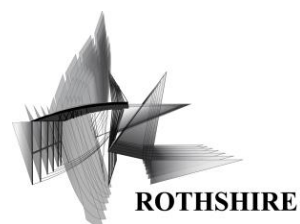


Image 8 – First floor brick veneer wall cavity.

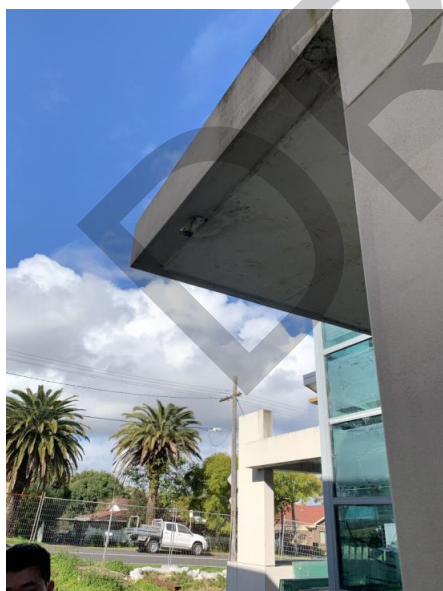


Image 9 – Balcony overflow pipe to the alfresco.

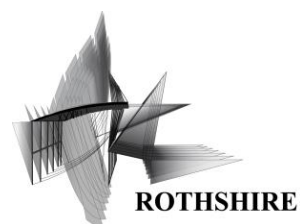


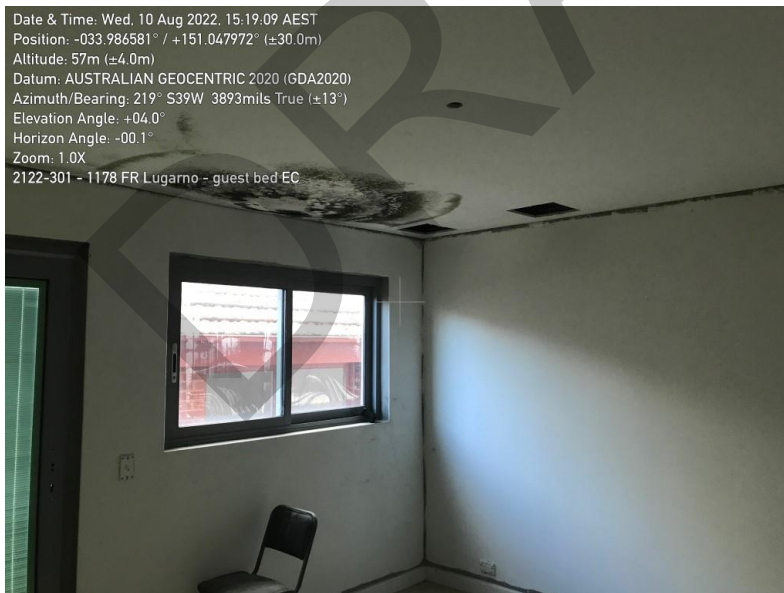
Image 10 – Rear window glazing (West elevation).



Image 11 – Proprietary balustrade product to landing.



**Image 12 – Ceiling damage to the landing.**



**Image 13 – Guest bedroom ceiling water damage.**

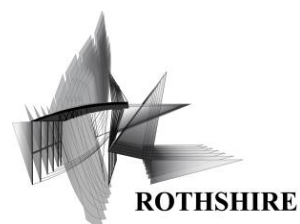
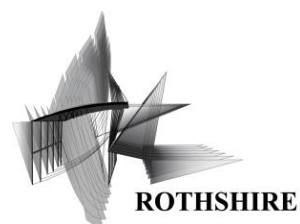


Image 14 – Planter box at entry portal.



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## APPENDIX E – WATERPROOFING CERTIFICATE

DRAFT



# CERTIFICATE of WATERPROOFING WET AREAS ABN: 166 18924995

*This certifies  
Astor Homes  
Lot 1174, 1176, 1178 Forest Rd, Lugarno*

Essential waterproofing Pty Ltd is insured with Zurich Australia Insurance Ltd # 245100PZBI and also being licensed qualifications being: Waterproofing Technician #: 215239C, hereby certifies that the, **3 Houses, Bathrooms, En-suites, WC, Laundries, Balconies** has been waterproofed in Accordance with the BCA Volume 2, & 1-F 1.7 & Clause 3.8.1.3 AS3740 and AS4654 Parts 1 & 2-2012 External Balconies of the Code Australia Housesing Provisions and waterproofing wet areas with residential & Commercial building

I am appropriately qualified and experienced to provide the certificate for the component of this project.

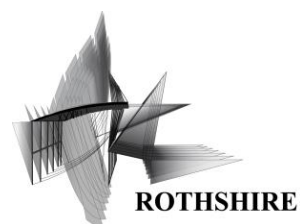
This job is guaranteed for 10 years from the day it was completed.

Product: **HPMMEGAFLEX , BOSTIC DAMPFIX PU, HPM EPOXY PRIMER, BOSTIC SEAL N FLEX FC**

ESSENTIAL WATERPROOFING  
PTY LTD  
30 FUGGLES RD  
KENTHURST, 2156  
MOBILE 0409906913

  
TIGH WALTER

DATE  
6 June 2019



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## APPENDIX F – CERTIFICATE OF STRUCTURAL ADEQUACY

DRAFT



Ref: 2122301-LET-010-V1

9 December 2022

Mr. K. Charonov  
Lugarno Developments  
1174 - 1178 Forest Rd  
Lugarno NSW 2210

Dear Kirill,

**RE: 1178 FOREST RD, LUGARNO, NSW 2210**  
**CERTIFICATE OF STRUCTURAL ADEQUACY AND RECOMMENDATIONS**

#### INTRODUCTION

1. Rothshire was engaged by Kirill Charonov of Lugarno Developments on 7/7/2022 to provide an assessment of the structural adequacy for the existing structure under loading conditions expected to be imposed onto the structure during its design life, to provide a letter of any recommended works, and to provide a certificate of structural adequacy.
2. 1178 Forest Road, Lugarno, is a detached two storey house plus one subterranean basement level accessible by driveway off Forest Road. The structure comprises a reinforced concrete ground floor slab and reinforced concrete first floor slab, hand cut timber roof structure, AFS/Dintel basement walls, external brick and brick cavity walls at ground floor, external brick veneer cavity walls at first floor, internal brick walls at ground floor and internal timber stud walls at first floor.

#### SITE INVESTIGATION

3. Structural inspections were carried out on 16/09/2022 and 24/11/2022 to inspect the structure generally, observe any deviations from the proposed structural design drawings prepared by Urbancorp Consulting, and carry out non-destructive structural investigations including taking measurements using a combination of a tape measure, laser measurer, stud finder, Ground Penetrating Radar (GPR) scanner, covermeter, and Schmidt Hammer.
4. An additional structural inspection was carried out on 8/12/2022 to inspect first floor timber wall framing and confirm extents of metal strap bracing and plywood sheeting fixed to the walls.
5. The ground floor structure appears to comprise a combination of reinforced concrete slab on ground, and reinforced concrete suspended slab over the basement.





6. At the time of the inspections, the basement was flooded with water. Therefore, measurements to the soffit (underside) of the suspended Ground Floor slab were limited to the slab zone accessible by the stairs from basement to ground floor.
7. A water tank was found to be supported on a reinforced concrete slab about halfway along the south wall of the building. The slab appeared to be supported along one edge only, by the AFS/Dintel wall.
8. At the time of the inspections, timber flooring had been applied to the top side of the first floor. Therefore, measurements to the top of the suspended First Floor slab were limited to the rear external balcony and internal cantilever slab above the ground floor entry.

#### ASSUMPTIONS

9. We assume that the material and geometrical properties of the concrete slab and reinforcement bars are consistent throughout the suspended slabs based on measurements taken at points accessible at the time of the inspections.
10. We assume that the footings and basement raft slab designed by the structural designer have been installed to the specification, were inspected by a qualified geotechnical engineer and are capable to transfer all applied loading into the ground.
11. We assume that roof tie down strapping has been applied in accordance with our sketch 20221209-2122301-SK01.

#### ANALYSIS

12. Based on our site measurements and scans, the structure was modelled using Inducta RCB and SLB.

#### STRUCTURAL RECOMMENDATIONS

13. We recommend vertical support is provided at the end of the existing cantilever slab in accordance with the drawings enclosed with this letter, in order to justify the load imposed by the external water tank at maximum capacity.

#### CERTIFICATE OF STRUCTURAL ADEQUACY

14. I herewith certify that this office has administered checks and analyses to the following standards and the National Construction Code (NCC);
  - AS 1170.0-2002 Structural design actions – Part 0: General Principles
  - AS 1170.1-2016 Structural design actions – Part 1: Permanent, imposed and other actions
  - AS 1170.2-2016 Structural design actions – Part 2: Wind actions
  - AS3700 2018 Masonry Structures
  - AS1684.2 2010 Residential Timber Framing Code (Non-Cyclonic).
  - AS1720.1 2010 Timber Structures Design Methods
  - AS3600 2018 Concrete Structures



And certify that based on our assumptions and based upon completion of the works described in Structural Recommendations above, the structure will generally appear to have been designed and constructed in conformance with the aforementioned Australian Standards.

#### LIMITATIONS AND EXCLUSIONS

15. The explicit purpose of this certificate of structural adequacy and the associated services undertaken by Rothshire Services is to provide a certificate in accordance with the scope of services set out in the agreement between Rothshire Services & Lugarno Developments. The scope of services was defined by the client or their representative and in lieu of existing physical documentation.
16. Rothshire Services concluded on information represented in this assessment from third party information. The passage of time, manifestation of latent conditions or impact of future events may require exploration in-situ subsequent data analysis, and re-evaluation of the findings, observations and conclusions either implied or expressed in this assessment.
17. In preparing this certificate of structural adequacy, Rothshire Services has relied upon presumed accuracy of certain information (or absence thereof) relative to 1178 Forest Road, Lugarno, NSW 2210, provided by the client. Except as otherwise stated in this assessment, Rothshire Services has not attempted to verify the accuracy or completeness of any such information.
18. The findings, observations, examinations and conclusion expressed or implied by Rothshire Services in this assessment are not, and should not be considered, an assessment concerning the physical condition or the proposed treatment of the existing conditions. No warranty or guarantee, whether expressed or implied, is made with respect to the data reported or to the findings, observations, and conclusions which are based solely upon information in existence at the time of this certificate.

Please do not hesitate to contact me if you wish to discuss this matter in further detail.

Yours faithfully,

Alexander Kameas

**Principal Structural Engineer**

B.E (Structures) Dip. Eng. Prac., M.E (Structural), Adv.Dip.Eng. (Structural), Builders License No. 256377C, Juris Doctor (Current), MIEAust. 4227245, Design Practitioner Registration: DEP0000258

#### ENCLOSED

2122301-STR-DWG-001-A  
2122301-STR-GEN-001-A



REF: 2122301A-COSP2-001

03 November 2023

The General Manager  
Georges River Council  
Locked Bag 205, Hurstville NSW 1481

**RE: LOT 3 1178 FOREST ROAD, LUGARNO**  
**CERTIFICATE OF SWIMMING POOL COMPLIANCE**  
**PROPOSED TWO STOREY SINGLE DWELLING WITH SWIMMING POOL RETAINING**  
**WALLS AND ASSOCIATED LANDSCAPING**

I, Alexander Kameas, hereby certify that the swimming pool part constructed at Lot 3 1178 Forest Road Lugarno is capable of compliance to the swimming pools act 1992 subject to completion of the following:

Completion of the pool finishes including surfaces and coping, paving around the pool.

Installation of appropriate fencing compliant to (NSW Pool Fencing Law) Swimming Pool Act 1992

Installation of pool pumping and filtration system compliant to (Plumbing and Drainage Act 2011 No 59)

Note, inspection and operation of plumbing has been undertaken by others.

Yours faithfully

Alexander Kameas  
**Principal Structural Engineer**  
B.E (Structures) Dip. Eng. Prac., M.E (Structural), Adv.Dip.Eng. (Structural), Builders License (NSW)  
No. 256377C, BSPL (TAS) 944877406, Juris Doctor (Current), MIEAust. 4227245; Professional  
Engineer Registration PRE0000232.

2122301A-COSP2-001

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Geotechnical Consultants Australia

Astor Homes

## Detailed Site Investigation

Proposed Development at:

1174-1178 Forest Road

Lugarno NSW 2210

Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873

E1933-1

17<sup>th</sup> July 2019

Detailed Site Investigation  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-1, 17<sup>th</sup> July 2019



### Report Distribution

Detailed Site Investigation


Address: 1174-1178 Forest Road Lugarno NSW 2210

GCA Report No.: E1933-1

Date: 17<sup>th</sup> July 2019

Copies	Recipient/Custodian
1 Soft Copy (PDF) – Secured and issued by email	Astor Homes Kirill Charonov kirill@astorhomes.com.au
1 Original – Saved to GCA Archives	Secured and Saved by GCA on Register

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Draft	<b>Luke Brevia</b> Environmental Engineer 	<b>Nick Caltabiano</b> Project Manager 	10 <sup>th</sup> July 2019
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Report Revision	Details	Report No.	Date	Amended By
1	FINAL Report	E1933-1	17 <sup>th</sup> July 2019	-
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1174-1178 Forest Road Lugarno NSW 2210  
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## Executive Summary

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Kirill Charonov of Astor Homes (the client) to conduct a Detailed Site Investigation (DSI) for the properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site).

The objectives of this DSI were to provide an assessment of potential contaminating activities to have impacted the site. Thus, this report includes the following:

- Discussion of the site condition through a desktop review of neighbouring properties and ecological receptors;
- Review of all available environmental, architectural and/or engineering reports previously prepared for the site, including Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, 21<sup>st</sup> May 2018 (AG 2018) which provided a preliminary assessment for the potential of current and historical contaminating activities to have impacted the site;
- Conduct a site inspection to establish a thorough understanding of the current site condition;
- Implement a soil investigation program in accordance with the NSW Environment Protection Authority (NSW EPA) *Sampling Design Guidelines (1995)* to investigate the degree of contamination (if present) by means of intrusive soil sampling and laboratory analysis, for relevant contaminants including: Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), heavy metals and asbestos;
- Implement standard quality assurance (QA) and quality control (QC) measures including the collection of one blind duplicate sample;
- Laboratory analysis of samples collected from the site by a National Association of Testing Authorities (NATA) accredited laboratory;
- Assessment of laboratory analytical data; and
- Provide advice on suitability of land for its proposed residential land-use; and
- Provide an assessment of site contamination (if any) and recommendations for remediation and/or management.

The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an in-built double garage. Each dwelling has in-ground swimming pools constructed at the rear of each dwelling in the western portion of the property. GCA field staff conducted a site inspection on 25<sup>th</sup> June 2019 and a soil investigation program was undertaken with a systematic approach in accessible locations across the site to identify areas of contamination. Soil samples were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities.

During the site inspection fragments of suspected asbestos containing material (ACM) were discovered in the north-western portion of the property. Soil sampling established contamination at the site in the form of asbestos (refer to **Appendix C** for laboratory analytical results and **Figure 2** for locations of samples collected). The levels of this contamination exceeded Health Investigation Levels relevant to the site being residential A criteria (HILs A).

Given the type of onsite contamination identified through soil sampling, GCA recommended an Asbestos Removal Scope of Works (ARSW) in order to make the site suitable for its

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intended development as low-density residential land-use. This is further discussed in **Section 11**.

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## FIGURES

**Figure 1** Site Locality Plan

**Figure 2** Site Plan and Sampling Locations

## APPENDICES

**Appendix A** – Photographic Log

**Appendix B** - Previous Site Investigations

**Appendix C** – Laboratory Analytical Reports (NATA)

**Appendix D** – Supporting Documents

## LIST OF ABBREVIATIONS

A list of the common abbreviations used throughout this report is provided below.

ACM - Asbestos Containing Material

AEC - Area of Environmental Concern

AGST - Above Ground Storage Tank

AHD - Australian Height Datum

BGS - Below ground surface

CSM - Conceptual site model

BTEX - Benzene, toluene, ethylbenzene and xylenes

B(a)P - Benzo(a)pyrene

CCA - Copper Chromate Arsenate

COC - Contaminants of Concern

DEC - NSW Department of Environment and Conservation

DECCW - NSW Department of Environment, Climate Change and Water DQI - Data quality indicator

DQOs - Data Quality Objectives

DWE - NSW Department of Water and Energy

EPA - NSW Environment Protection Authority

ESA - Environmental Site Assessment

ha - Hectare

HIL - Health based investigation level

LOR - Limit of Reporting

OEH - Office of Environment and Heritage

PAHs - Polycyclic aromatic hydrocarbons

PID - Photo-ionisation Detector

PCB - Polychlorinated Biphenyl

PQL - Practical Quantitation Limit

QA/QC - Quality Assurance/Quality Control

RPD - Relative Percentage Difference

SAQP - Sampling, Analysis and Quality Plan

TRH - Total Recoverable Hydrocarbons (previously Total Petroleum Hydrocarbons)

TSS - Total Suspended Solids

UST - Underground Storage Tank

VOC - Volatile Organic Compound

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## 1. INTRODUCTION

### 1.1 BACKGROUND AND PURPOSE

Geotechnical Consultants Australia Pty Ltd (GCA) was engaged by Kirill Charonov of Astor Homes (the client) to conduct a Detailed Site Investigation (DSI) for the properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site).

As shown in **Figure 1**, the site is located approximately 20 km south-west of the Sydney Central Business District, within the Local Government Area of Georges River Council. The site covers an approximate area of 1,920 m<sup>2</sup> (as shown in **Figure 2**) and is identified as Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873. The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an adjoining ground-level double garage. Each dwelling has in-ground swimming pools constructed at the rear of each dwelling in the western portion of the property and is currently zoned as low density residential.

This report is provided in support of a Development Application (DA) to Georges River Council and for the purpose of enabling the developer to meet its obligations under the Contaminated Land Management Act 1997 (CLM Act), for the assessment and management of contaminated land.

A Preliminary Site Investigation (PSI) (Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, dated 21<sup>st</sup> May 2018), was completed by Australian Geotechnical Pty Ltd (AG) for the site. This document should be read in conjunction with this report.

### 1.2 PROPOSED DEVELOPMENT

GCA understands the existing dwellings and infrastructures were recently constructed within the site, and are still under construction.

Site photographs are included in the photographic log in **Appendix A**.

### 1.3 REGULATORY FRAMEWORK

The following regulatory framework and guidelines were considered during the preparation of this report:

- ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality;
- DECCW (2009) Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008, (UPSS Guidelines);
- DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination;
- NSW EPA (1995) Sampling Design Guidelines;
- EPA (2014) Technical Note: Investigation of Service Station Sites;
- NEPC (2013) Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater;
- NEPC (2013) Schedule B(2) Guideline on Site Characterisation;
- Contaminated Land Management Act 1997;
- State Environment Protection Policy 55 (SEPP 55) – Remediation of Land, and
- Office of Environment and Heritage (2011) Guidelines for Consultants Reporting on Contaminated Sites.

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## 1.4 PROJECT OBJECTIVES

The objectives of this DSI were to provide an assessment of potential contaminating activities to have impacted the site by undertaking the following:

- Discussion of the site condition through a desktop review of neighbouring properties and ecological receptors;
- Review of all available environmental, architectural and/or engineering reports previously prepared for the site, including Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at 1174 to 1178 Forest Road Lugarno, NSW, 2210*, 21<sup>st</sup> May 2018 (AG 2018) which provided a preliminary assessment for the potential of current and historical contaminating activities to have impacted the site;
- Conduct a site inspection to establish a thorough understanding of the current site condition;
- Implement a soil investigation program in accordance with the NSW Environment Protection Authority (NSW EPA) *Sampling Design Guidelines (1995)* to investigate the degree of contamination (if present) by means of intrusive soil sampling and laboratory analysis, for relevant contaminants including: Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPP), heavy metals and asbestos;
- Implement standard quality assurance (QA) and quality control (QC) measures including the collection of one blind duplicate sample;
- Laboratory analysis of samples collected from the site by a NATA accredited laboratory;
- Assessment of laboratory analytical data;
- Provide advice on suitability of land for its proposed residential land-use; and
- Provide an assessment of site contamination (if any) and recommendations for remediation and/or management.

## 1.5 SCOPE OF WORKS

To achieve the above listed project objectives, the following scope of works were undertaken to produce this DSI.

### 1.5.1 Desktop Study

Review of available environmental, architectural and/or engineering reports, including the previous PSI (AG, 2018) prepared for the site, which covered the following:

- A site inspection to identify potential sources of contamination;
- Historical investigations relating to the site (if any);
- Dial-Before-You-Dig enquiry for an evaluation into local underground services and assets;
- Review of local geological and hydrogeological information, including an evaluation of the WaterNSW registered groundwater bore database; and
- Limited sampling program focusing on the western portion of the site.
- Dial-Before-You-Dig enquiry for an evaluation into local underground services and assets; and
- Review of local geological and hydrogeological information, an evaluation of the WaterNSW registered groundwater bore database and Acid Sulphate Soil (ASS) data.

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### 1.5.2 Fieldwork & Laboratory Analysis

A site inspection and soil investigation program were undertaken on 25<sup>th</sup> June 2019 by GCA, and included:

- Hand auger excavation of twelve (12) boreholes (BH1 to BH12 inclusive) spread across accessible areas of the site in a systematic approach to identify areas of contamination; and
- Multiple level soil sampling within fill and natural soils which included the collection of fifteen (15) primary soil samples and 1 secondary blind duplicate soil sample, were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities, as determined from the site history survey and field observations made during the investigation program.

### 1.5.3 Data Analysis and Reporting

The objective of this DSI report is to document desktop study findings, the conceptual site model, data quality objectives, investigation methodologies and analytical results. In addition, a discussion of laboratory analytical results and recommendations for remediation of contamination are presented.

## 2. SITE INFORMATION

### 2.1 SITE IDENTIFICATION

The location of the site is shown in **Figure 1** with a detailed site plan shown in **Figure 2**.

**Table 1:** Site Details

<b>Address</b>	1174-1178 Forest Road Lugarno NSW 2210
<b>Deposited Plan</b>	Lot A DP 328702, Lot 2 DP 18873 & Lot 3 DP 18873
<b>Locality Map</b>	<b>Figure 1</b>
<b>Site Plan</b>	<b>Figure 2</b>
<b>Site Photographs</b>	<b>Appendix A</b>
<b>Total Area (approx.)</b>	1,920m <sup>2</sup>

### 2.2 SITE DESCRIPTION

A qualified environmental consultant inspected the site on 25<sup>th</sup> June 2019. Site photographs are provided in **Appendix A**. Observations noted during the inspection are summarised below.

At the time of the site inspection, the site contained the following structures and features:

- Three two-storey brick-rendered dwellings with tile roofs. All three dwellings appeared to be incomplete and still within the construction phase of their development;
- Two dwellings had basement level double-garages and one dwelling had an adjoining ground-level double garage;
- Three in-ground swimming pools were located in the western portion of the property. One swimming pool per dwelling;
- Construction materials and construction waste were located across the site including suspected asbestos containing materials (ACM);
- On-site vegetation showed no signs of decay and/or stress;
- Surface standing water was noticed at the site in all three swimming pools and the two basement garages; and

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- There were no indicators of underground storage tanks.

## 2.3 SURROUNDING LAND USE

**Table 2** below outlines the surrounding land-uses neighbouring the site.

**Table 2:** Surrounding Land-Use Adjacent to the Site.

Direction from Site	Land-Use
North	Vacant property fronting Forest Road and residential properties beyond.
East	Forest Road and residential properties beyond.
South	Residential properties, Forest Road and residential properties beyond.
West	Residential properties.

## 2.4 SURFACE WATER RECEPTORS

Based on regional topography and the nearest surface water source, Boggywell Creek approximately 470m east and the Georges River approximately 520m south from the site, groundwater is expected to flow towards the east and/or south. Given the distance to Boggywell Creek and Georges River, they are not considered to be receptors of groundwater contamination sourced from the site (if any).

## 2.5 GEOLOGY

The Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, Edition 1, 1983), published by the Department of Minerals and Energy indicates the residual soils within the site to be underlain by Hawkesbury Sandstone of the Wianamatta group comprising medium to coarse-grained quartz sandstone, very minor shale and laminite lenses.

## 2.6 HYDROLOGY

A groundwater bore search was conducted on 24 June 2019 and no registered groundwater bores were detected within 500m of the site.

## 2.7 ACID SULPHATE SOILS

To determine whether there is a potential for acid sulphate soils (ASS) to be present at the site, a review of available ASS risk maps was undertaken. The site is located within an area which suggests there is no known occurrence regarding the presence of ASS. This review is indicative only as a detailed investigation into ASS risk at the site was not included as part of the scope of this DSI.

## 3. PREVIOUS INVESTIGATIONS

Previous environmental investigations of the site were recorded under the following report:

- Australian Geotechnical Pty Ltd, *Preliminary Site Investigation at: 1174 to 1178 Forest road, Lugarno, NSW, 2210*, dated 21<sup>st</sup> May 2018.

AG (2018) undertook a PSI of the site to assess whether the fill materials on site presented a risk to human health. A limited sampling program was undertaken on 6<sup>th</sup> May 2018 targeting fill materials in the western portion of the site. Soil sample analytical results found that the soils were considered suitable to remain on-site when compared to appropriate Health Investigation Levels (HIL) and Health Screening Levels (HSL) for the exposure setting of 'standard residential with garden/accessible soil'.

Refer to **Appendix B** for further details of these results.

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#### 4. CONCEPTUAL SITE MODEL

In accordance with NEPM (2013) Schedule B2 – Guideline on Site Characterisation, and to aid in the assessment of data collection for the site, a Conceptual Site Model (CSM) was created to assess the plausible pollutant linkages between potential contamination sources, migration pathways and receptors. The CSM provides a framework for the review of the reliability and useability of the data collected and to identify data gaps in the existing site characterisation. The CSM can be seen in **Table 3** in **Section 4.2**.

##### 4.1 POTENTIAL CONTAMINATION

Based on the findings of the previous site investigation by AG (2018), a desktop review of the site and neighbouring properties and nearby ecological receptors, the chemicals of potential concern (COPC) at the site are considered to be:

Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), heavy metals and asbestos.

##### 4.2 CONTAMINATION SOURCES, EXPOSURE PATHWAYS & RECEPTORS

Potential contamination sources, exposure pathways and human and environmental receptors that were considered relevant for this assessment are summarised along with a qualitative assessment of the potential risks posed by complete exposure pathways in **Table 3**.

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**Table 3: Conceptual Site Model**

Potential Sources	Potential Receptor	Potential Exposure Pathway	Complete connection	Risk	Justification
Contaminated soil from importation of uncontrolled fill across the site.  ACM  Use of OCPs	Site occupants, workers, general public	Dermal contact, inhalation/ingestion of particulates	Limited (current)	Low	Direct contact with potentially contaminated soils is limited.
			No (Future)	Negligible	If present, impacted soils are likely to be disposed of off-site.
	Ecosystem of Boggywell Creek and Georges River	Migration of impacted groundwater and surface water run-off.	Yes (current)	Low	No obvious sources of inorganic contamination were observed on site that could migrate off-site with surface water run-off.
			No (Future)	Negligible	If present, contaminated soils and groundwater are likely to be remediated. Unlikely contamination would reach Boggywell Creek and Georges River due to distance from site.
	Underlying aquifer	Leaching and migration of contaminants through groundwater infiltration.	Limited (current)	Low	Due to existing sealed surfaces, expected shallow bedrock, leachability of CoCs, migration of CoCs is likely to be limited.
			No (Future)	Low	If present, contaminated soil and/or groundwater is likely to be remediated.

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#### 4.3 ADDRESSED DATA GAPS

Based on information on the site history and the site investigation on 25<sup>th</sup> June 2019, a program of intrusive soil investigation was required to address the following data gaps:

- Previous environmental investigations targeted only the western portion of the site therefore, to gain an overall understanding of potential on-site contamination a systematic approach to soil sampling accessible areas was undertaken across the entirety of the site;
- Potential presence of onsite contamination (as listed in **Section 4.1**); and
- The degree and extent of onsite contamination, if present.

#### 5. DATA QUALITY OBJECTIVES

In accordance with the US EPA (2006) Data Quality Assessment and the DEC (2006) Guidelines for the NSW Site Auditor Scheme, the process of developing Data Quality Objectives (DQO) was used to determine the appropriate level of data quality needed for the specific data requirements of the project. The DQO process that was applied for this assessment is documented below.

- **Step 1:** State the problem.  
The subject site may be contaminated as a result of previous and current land use which may impact suitability of the site for use as the proposed childcare centre.
- **Step 2:** Identify the decision.  
The site is suitable for residential land use without the requirement for remediation and/or management.
- **Step 3:** Identify inputs into the decision.
  - Identification of issues of potential environmental concern;
  - Appropriate identification of COPC;
  - Systematic soil sampling and analysis programs of shallow soil across the site
  - Visual inspection of systematic shallow soil samples for presence of ACM;
  - Appropriate quality assurance / control to enable an evaluation of the reliability of the analytical data; and
  - Screening sample analytical results against appropriate assessment criteria for the intended land use.
- **Step 4:** Define the boundaries of the site. The project boundary is defined as the area within the site boundary of the proposed development.
- **Step 5:** Develop a decision rule.
  - To accept the assessment decision the following decision rules apply:  
For systematic grid based soil sampling the sampling data must meet the following qualifiers;
    - The 95% Upper Confidence Limit of COPC concentration data does not exceed the soil assessment criteria;
    - No single sample exceeds 250% of the soil COPC assessment criteria;
    - The standard deviation of COPC analytical results is less than 50% of the soil assessment criteria; and
    - There is no visible identification of ACM in soil samples or on the ground surface.
- **Step 6:** Specify acceptable limits on decision errors.  
The field sampling methodology, sample preservation techniques, and laboratory analytical procedures must be appropriate to provide confidence in data quality so



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any comparison against assessment criteria can be considered reliable. This is achieved by defining and comparing results against the Data Quality Indicators (DQIs).

- **Step 7:** Optimise the design for obtaining data.  
This is achieved by sampling plan design in consideration of the available site history information, area of investigation, contaminant behaviour in the environment, and likely spatial distribution of contamination.

## 6. INVESTIGATION METHODOLOGIES

GCA conducted a site inspection and soil sampling program on 25<sup>th</sup> June 2019. Sample locations for the site are presented on **Figure 2**. The investigation methodology is presented below.

### 6.1 SAMPLING ANALYSIS PLAN

To assess the potential for soil contamination at the site, GCA completed the following scope of works:

- Collection of fifteen (15) primary soil samples (BH1 0.1 to BH12 0.5), from twelve (12) locations (BH1 to BH12 inclusive) at depths ranging from approximately 0.1m to 0.8m. Refer to **Figure 2** for sample depths and locations;
- Quality Assurance (QA) and Quality Control (QC) sampling of one secondary blind duplicate sample (QS-1);
- Visual inspection of the ground surface and excavated soil for ACM; and
- Submission of fifteen (15) primary soil samples (BH1 0.1 to BH12 0.5) and one secondary blind duplicate soil sample (QS-1) to a NATA accredited laboratory for analysis of COPC comprising TRH, BTEX, PAHs, OCPs, OPPs, heavy metals and asbestos.

### 6.2 SOIL SAMPLING METHODOLOGY

Boreholes BH1 to BH12 inclusive were completed using a manual hand auger to a maximum depth of 0.8m below ground surface (bgl) or prior refusal.

Soil samples were collected directly from the auger, placed in laboratory prepared 250mL soil jars, labelled and placed on ice in an esky for transport under chain of custody (COC) to a NATA Accredited Laboratory for the analysis of the COPC. The hand auger was decontaminated between each borehole excavation with Decon90.

**Table 4** below summarises subsurface conditions across the site as observed during borehole excavations. Borehole locations are referenced in **Figure 2**.

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**Table 4:** Borehole Logs

Borehole	Depth Range (m)	Description	Moisture	Density	Plasticity
BH1	0.0 - 0.2	Grass cover.  Gravelly Clayey SAND, fine to coarse grain, brown, crushed sandstone cobbles.	Medium	Loose	Low
	0.2 - 0.3	Silty SAND, fine to medium grain, brown	Low	Loose	-
	0.3 - 0.5	Clayey SAND, fine to coarse grain, crushed sandstone, plastic fragments, red/ pale grey	Medium	Loose - Medium Dense	-
	0.5 - 0.6	Natural: Clayey SAND, fine to medium grain, pale brown/ orange/ pale grey.	Medium	Loose - Medium Dense	-
	Hand auger refusal at 0.6m				
BH2	0.0 - 0.4	Grass cover. Sandy CLAY, fine to coarse grain, brown, crushed sandstone cobbles.	High	Loose	Low
	Hand auger refusal at 0.4m				
BH3	0.0 - 0.3	Sandy CLAY, fine to medium grain, crushed bricks and sandstone, brown.	Medium	Loose	Low
	0.3 - 0.5	Natural: Clayey SAND, fine to medium grain, pale brown/ orange/ pale grey.	Medium	Loose - Medium Dense	-
	Hand auger refusal at 0.5m				
BH4	0.0 - 0.4	Sandy CLAY, fine to medium grain, crushed bricks and sandstone, brown.	High	Medium Dense	Low
	Hand auger refusal at 0.4m				
BH5	0.0 - 0.8	Grass cover.  Gravelly Clayey SAND, crushed sandstone.	Medium	Loose - Medium Dense	
	Hand auger refusal at 0.8m				
BH6	0.0 - 0.3	Grass cover.  Gravelly Clayey SAND, crushed sandstone.	Medium	Loose - Medium Dense	
	Hand auger refusal at 0.3m				
BH7	0.0 - 0.5	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone.	High	Loose - Medium Dense	

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	Hand auger refusal at 0.5m				
BH8	0.0 – 0.3	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, glass, brick, concrete, plastic.	High	Loose - Medium Dense	
	0.3 – 0.6	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Medium Dense	
	Hand auger refusal at 0.6m				
BH9	0.0 - 0.5	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.5m				
BH10	0.0 – 0.4	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.4m				
BH11	0.0 – 0.4	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.4m				
BH12	0.0 – 0.6	Gravelly Clayey SAND, fine to coarse grain, crushed sandstone, bricks.	Medium	Loose-Medium Dense	
	Hand auger refusal at 0.6m				

### 6.3 QUALITY ASSURANCE

Quality Assurance (QA) and Quality Control (QC) sampling was undertaken in general accordance with relevant Australian Standards and guidelines. Field QC samples collected are summarised in **Table 5**.

**Table 5:** Quality Control Duplicate Sample Summary

Sample Identification	Sample Type	Sample Matrix	Rate of Collection
QS-1	Field Duplicate of BH1 0.1	Soil	1 in 20 Samples

The laboratory internal QC procedures are consistent with NEPM policy on laboratory analysis of contaminated soils.

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## 7. ASSESSMENT CRITERIA

The following soil assessment criteria were adopted for the investigation.

### **NEPM Health Based Investigation Level A (HILs A)**

HILs are Tier 1 risk based generic assessment criteria used for the assessment of potential risks to human health from chronic exposure to contaminants in soil. They are intentionally conservative and based on a reasonable worst-case scenario for generic land use settings including Residential (HILs A/B), Open Space/Recreational (HILs C) and Commercial Industrial (HILs D). HILs A soil assessment criteria were adopted on the basis the proposed site use is a residential unit block.

### **NEPM Health Screening Levels A (HSLs A)**

HSLs are Tier 1 risk based generic soil assessment criteria used for the assessment of potential risks to human health from chronic inhalation exposure of petroleum vapour emanating off petroleum contaminated soils (Vapour Risk). They are intentionally conservative and based on a reasonable worst-case scenario for generic soil types, contamination depth and land use settings including Residential (HSLs A/B), Open Space/Recreational (HSLs C) and Commercial Industrial (HSLs D). HSLs A soil assessment criteria for sand soil from 0 to <1 m were adopted on the basis that the proposed site use is a residential unit block and onsite topsoil comprised sandy loam.

### **NEPM Management Limits – Residential, Parkland and Public Open Space**

Management Limits for petroleum have been developed for prevention of explosive vapour accumulation, prevention of the formation of observable Light Non-Aqueous Phase Liquids (LNAPL) and protection against effects on buried infrastructure. Residential, parkland and public open space limits have been adopted based on the proposed land use.

### **NEPM Soil Ecological Assessment Levels**

Soil ecological assessment was not considered warranted based on the following:

- There are no onsite or nearby off site sensitive ecological receptors.

## 8. INVESTIGATION RESULTS

### **8.1 SOIL ANALYTICAL RESULTS**

The soil analytical results are summarised below. Soil analytical results are presented in the laboratory reports in **Appendix C**.

#### **Total Recoverable Hydrocarbons**

No TRHs were detected at concentrations greater than laboratory limits of reporting (LOR) in any of the soil samples.

#### **Benzene Toluene Ethylbenzene Xylenes**

No BTEX compounds were detected at concentrations greater than laboratory LOR in any of the soil samples.

#### **Polycyclic Aromatic Hydrocarbons**

No PAHs were detected at concentrations greater than laboratory LOR in any of the soil samples.

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### Organochlorine Pesticides

No OCPs were detected at concentrations greater than laboratory LOR in any of the soil samples.

### Organophosphorus Pesticides

No OPPs were detected at concentrations greater than laboratory LOR in any of the soil samples.

### Heavy Metals

Heavy metals were detected at concentrations greater than laboratory limits of reporting (LOR) in all soil samples collected, however, no concentrations exceeded the Health Investigation Levels for Residential A criteria. Refer to **Table 6** below for a summary of these results. Laboratory analytical reports are presented in **Appendix C**.

**TABLE 6:** Summary of Soil Analytical Data Against Health Investigation Levels Residential A Criteria – Heavy Metals

Chemical	LOR	HIL A	Sample Name	BH1 0.1 (mg/kg)	BH2 0.2 (mg/kg)	BH3 0.2 (mg/kg)	BH3 0.5 (mg/kg)	BH4 0.1 (mg/kg)
			Sample Depth (m bgl)	0.1	0.2	0.2	0.5	0.1
Arsenic	2	100		28	6	<4	5	10
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	5	100		11	9	10	27	11
Copper	5	7000		6	9	3	<1	16
Lead	5	300		12	19	48	3	19
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		1	3	1	<1	3
Zinc	5	8000		29	43	12	5	94
Chemical	LOR	HIL A	Sample Name	BH5 0.2 (mg/kg)	BH6 0.2 (mg/kg)	BH7 0.1 (mg/kg)	BH8 0.1 (mg/kg)	BH9 0.1 (mg/kg)
			Sample Depth (m bgl)	0.2	0.2	0.1	0.1	0.1
Arsenic	2	100		<4	12	10	8	9
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	5	100		7	9	11	11	10
Copper	5	7000		6	4	5	5	5
Lead	5	300		16	12	11	10	10
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		2	2	<1	<1	<1
Zinc	5	8000		54	120	57	58	56
Chemical	LOR	HIL A	Sample Name	BH9 0.5 (mg/kg)	BH10 0.2 (mg/kg)	BH11 0.1 (mg/kg)	BH12 0.1 (mg/kg)	BH12 0.5 (mg/kg)
			Sample Depth (m bgl)	0.5	0.2	0.1	0.1	0.5
Arsenic	2	100		8	7	8	15	13
Cadmium	0.4	20		<0.4	<0.4	<0.4	<0.4	<0.4

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Chromium	5	100		11	9	11	17	10
Copper	5	7000		4	6	5	3	5
Lead	5	300		9	9	9	7	9
Mercury	0.1	200		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	5	400		1	<1	<1	<1	<1
Zinc	5	8000		51	48	52	52	44

#### pH in Soil

**Table 7** below summarises the results for pH in the soil samples collected.

**Table 7:** pH Analytical Results

Analyte	Sample Name	BH1 0.1 (pH Units)	BH2 0.2 (pH Units)	BH5 0.2 (pH Units)	BH12 0.5 (pH Units)
	Sample Depth (m bgl)	0.1	0.2	0.2	0.5
pH 1:5 soil : water		7.1	8.9	9.0	6.6

#### Asbestos

Asbestos was detected in soil samples BH7 0.1, BH8 0.1 and BH11 0.1 exceeding applicable guidelines criteria for standard residential use as determined by NEPM (2013). **Table 8** provides a summary of these findings.

**Table 8:** Asbestos Detected in Soil Samples Compared with Adopted Criteria

Chemical	LOR	HIL A	Sample Name	BH7 0.1 (mg/kg)	BH8 0.1 (mg/kg)	BH11 0.1 (mg/kg)
			Sample Depth (mbgl)	0.5	0.2	0.1
Asbestos Detected				Yes	Yes	Yes
Asbestos Type				Chrysotile	Chrysotile, Amosite and Crocidolite	Chrysotile, Amosite and Crocidolite
Total Asbestos (%)	0.1	0.01%		1.58	0.39	0.14

#### 8.2 QA/QC RESULTS

Relative Percentage Difference (RPD) applies if results are at least 10 times the LOR, otherwise no acceptance criteria for RPD's applies. Soil duplicate results are within the adopted acceptance criteria of 30-50% (AS4482.1) RPD of values exceeding laboratory limits of reporting. **Table 9** summarises these results.

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**Table 9:** Summary of Primary Sample and Field Duplicate Sample with Results Exceeding LORs and Respective RPD Values.

Chemical	LOR	HIL A	Sample Name	BH1 0.1 (mg/kg)	QS-1 (mg/kg)	RPD (%)
			Sample Depth (m)	0.1	0.1	
Arsenic	2	100		28	27	3.6
Cadmium	0.4	20		<0.4	<0.4	0
Chromium	5	100		11	13	0
Copper	5	7000		6	7	16.7
Lead	5	300		12	14	15.4
Mercury	0.1	200		<0.1	<0.1	0
Nickel	5	400		1	2	66.7
Zinc	5	8000		28	31	10.2

## 9. DATA GAPS

The scope of works described in this DSI report are subject to restrictions and limitations. GCA did not perform a complete assessment of all possible conditions and locations at the site. This is due to the areas to be sampled were either outside the scope of works and/or inaccessible at the time of the site inspection and sampling program therefore, data gaps exist and are listed below.

- Due to the characteristics of fill material across the site consisting of bricks, concrete and sandstone, refusal of the hand auger to penetrate to fill material caused borehole excavations to be terminated at shallow depths. The depth of fill and natural soil material was established in few boreholes and is inferred to be relatively consistent across the site;
- The characteristics of groundwater and surface water onsite was outside the scope of works; and
- Characteristics of fill and natural soils in inaccessible areas and beneath all concrete surfaces (i.e.: beneath dwellings and in-ground pools).

## 10. CONCLUSIONS

The properties located at nos. 1174-1178 Forest Road Lugarno NSW 2210 (the site) was the subject of a DSI to assess the presence of on-site contamination associated with current and historical uses of the property. The site is currently occupied by three partially constructed two-storey residential dwellings, two with basement double-garages and one with an in-built double garage. Each dwelling has an in-ground swimming pool constructed at the rear, in the western portion of the property.

GCA field staff conducted a site inspection on 25<sup>th</sup> June 2019 and a soil investigation program was undertaken with a systematic approach in accessible locations across the site to identify areas of contamination. Soil samples were submitted to a NATA accredited laboratory for analysis of chemicals of potential concern (COPC) which may have impacted the site during historical activities.

COPCs were not identified in soil samples collected at concentrations in excess of applicable guideline criteria, with the exception of heavy metals and asbestos. It is noted that, heavy metals were identified in soil samples collected above laboratory LOR, however these did not exceed applicable guideline criteria.

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During the site inspection fragments of suspected ACM were discovered in the north-western portion of the property. Soil sampling established contamination at the site in the form of asbestos (refer to **Appendix C** for laboratory analytical results and **Figure 2** for locations of samples collected). The levels of this contamination exceeded Health Investigation Levels relevant to the site being residential A criteria (HILs A).

Given the type of onsite contamination identified through soil sampling, GCA recommended an Asbestos Removal Scope of Works (ARSW) in order to make the site suitable for its intended development as low-density residential land-use. This is further discussed in **Section 11** below.

## 11. RECOMMENDATIONS

It is the opinion of GCA and in accordance with relevant Australian Standards and guidelines that the site can be made suitable for the proposed development as low-density residential dwellings subject to the implementation of the following recommendations.

The presence of asbestos in fill materials exceeding applicable guideline criteria in soil samples taken from BH7 0.1, BH8 0.1 and BH11 0.1 must be remediated according to the appropriate Australian Standards and guidelines.

An Asbestos Removal Scope of Works (ARSW) should be prepared prior to the remediation of the asbestos contaminated areas. This document will provide details of the methodology and procedures required for the appropriate excavation, stockpiling, handling, transport and disposal off-site at an appropriately licenced facility to accept such waste.

The ARSW will also provide the requirements and procedures for contaminated site soils to be excavated and disposed off-site to complete remedial works and must be done so in accordance with the appropriate Australian Standards and guidelines including, *Waste Classification Guidelines* (NSW EPA, 2014). Validation of soils will be done in accordance with the ARSW to ensure that any contamination is remediated or managed by assessing against the respective NSW EPA thresholds and guidelines.

Preparation of a final site validation report by GCA, concluding that the site has been remediated to allow the proposed development for residential purposes.



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## 12. LIMITATIONS

The findings of this report are based on the Scope of Work outlined in Section 1.5. GCA performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of GCA personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, GCA assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of GCA, or developments resulting from situations outside the scope of this project.

The results of this assessment are based on the site conditions identified at the time of the site inspection and validation sampling. GCA will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report.

GCA is not engaged in environmental consulting and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

### Geotechnical Consultants Australia Pty Ltd (GCA)

**Prepared by:**

**Luke Breva**  
Environmental Scientist

**Reviewed by:**

**Nick Caltabiano**  
Project Manager

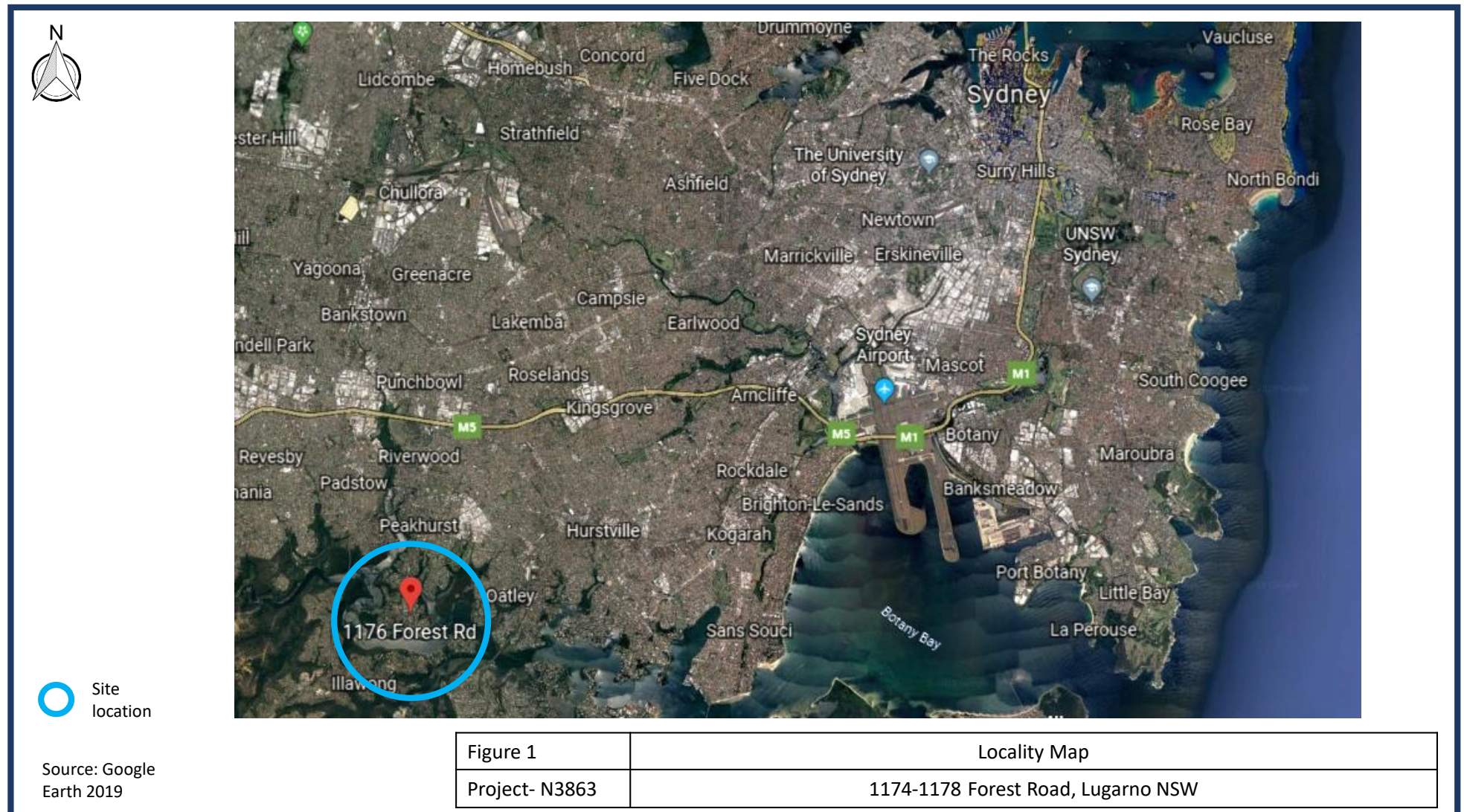
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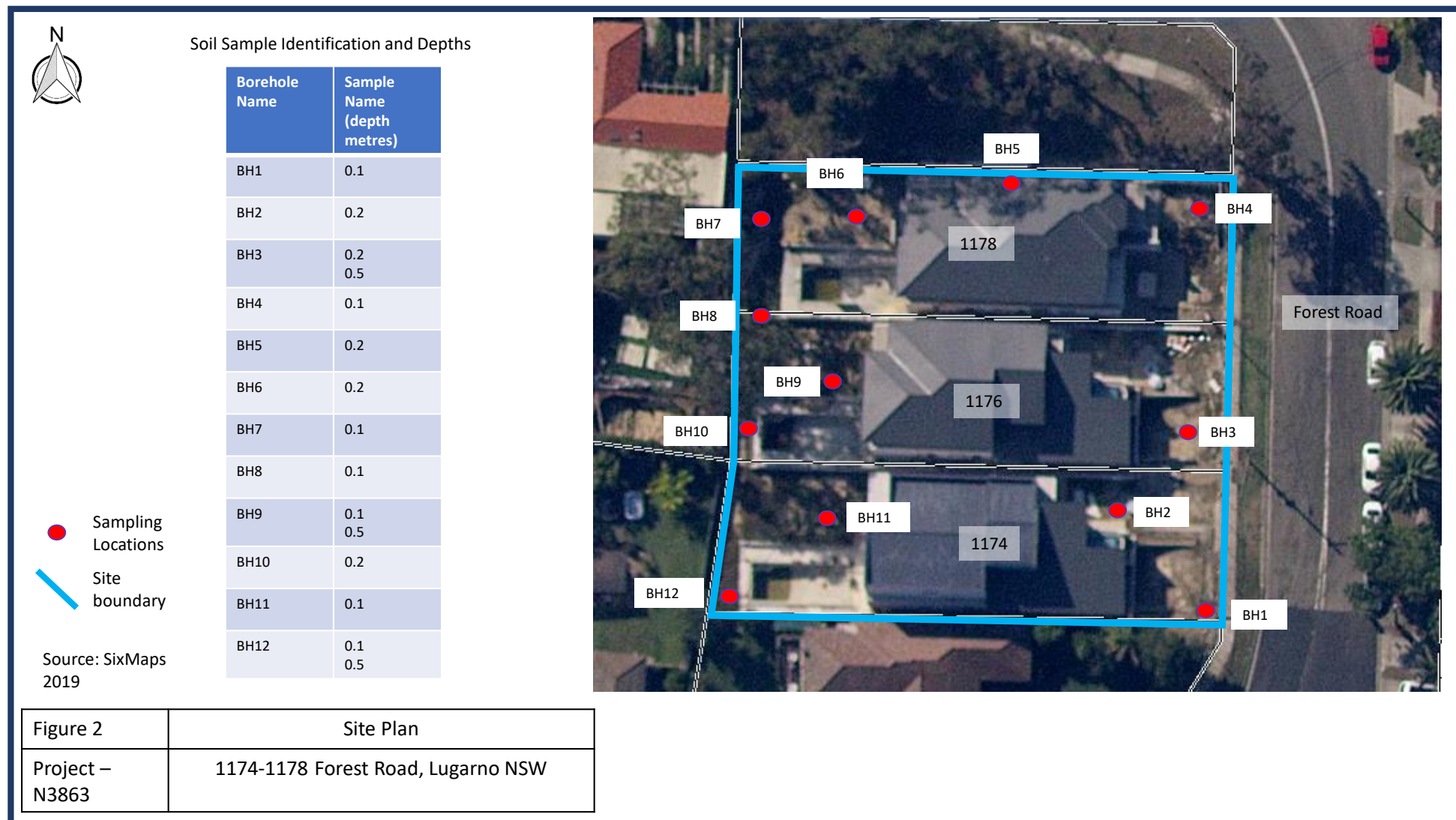
### 13. REFERENCES

- NSW Environmental Protection Authority, *Waste Classification Guidelines Part 1: Classifying Waste*, 2014.
- Google Earth, <https://www.google.com/earth>.
- National Environment Protection Measures (2013), *Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater*.
- National Environment Protection Measures (2013), *Schedule B2 – Guideline on Site Characterisation*.
- NSW Environmental Protection Authority, *Waste Classification Guidelines Part 1: Classifying Waste*, 2014.
- NSW Environmental Protection Authority, *Guidelines for Consultants Reporting on Contaminated Sites*, 2011.
- NSW Environmental Protection Authority, *Sampling Design Guidelines*, 1995
- Six Maps, <https://www.maps.six.nsw.gov.au>.
- State Environment Protection Policy 55 (SEPP 55). *Remediation of Land Under the Environmental Planning and Assessment Act*.
- WaterNSW, [water.nsw.gov.au](http://water.nsw.gov.au).

## FIGURES









# APPENDIX A

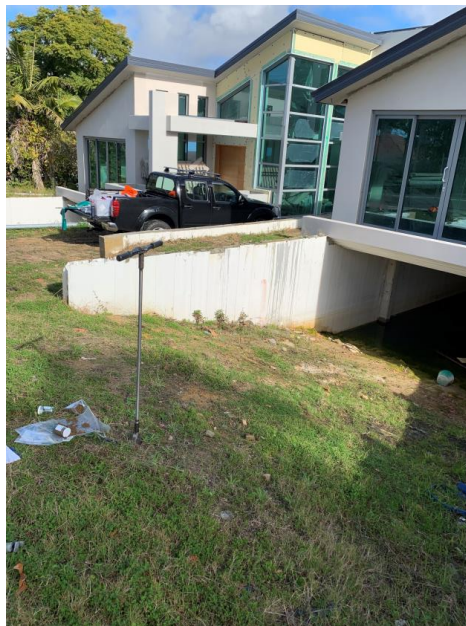
## Photographic log

# APPENDIX A

## PHOTOGRAPHIC LOG



Photograph 1: Street view looking south-west at 1178 Forest Road, main dwelling and basement garage containing surface water.



Photograph 2: Street view looking south-west at 1176 Forest Road, main dwelling and basement garage containing surface water.



Photograph 3: View looking north from 1176 Forest Road, eastern portion of the site. Construction materials, waste and fill material with grass cover visible.



Photograph 4: View looking at 1176 Forest Road, from eastern portion of the site. Construction materials, waste and fill material with grass cover visible.

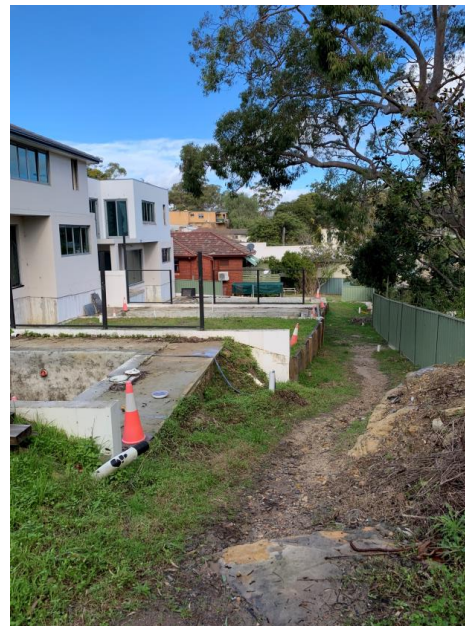




Photograph 5: Street view looking west at 1174 Forest Road, main dwelling and ground-level garage.



Photograph 6: Street view looking north at 1174 Forest Road, main dwelling and adjacent garage.



Photograph 7: View looking south from north-west corner of the site. Exposed fill material visible.



Photograph 8: View looking north from rear of 1178 Forest Road dwelling.





Photograph 9: Western portion of 1174 Forest Road. Image shows grass covered fill material.



Photograph 10: Western portion of 1174-1176 Forest Road. Image shows exposed fill material including crushed bricks, tiles concrete.



Photograph 11: Western portion of 1178 Forest Road. Image shows grass covered fill material and in-ground swimming pool with surface water.



Photograph 12: Western portion of 1178 Forest Road. Image shows grass covered fill material and green waste.





Photograph 13: Suspected Asbestos Containing Material (ACM) fragment on ground surface of fill material in north-western portion of the site .



Photograph 14: Typical fill material across the site consisting of gravelly, clayey sand with crushed sandstone, bricks and tiles.



Geotechnical Consultants Australia

# APPENDIX B

## Previous site investigation

LPP020-24 Attachment 10

# APPENDIX B

## PREVIOUS SITE

## INVESTIGATIONS



A U S T R A L I A N  
GEOTECHNICAL

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2 Shirley Street,  
Rose Hill, NSW, 2142  
info@austgeo.com.au

Our Ref: AG-372\_1  
21<sup>st</sup> May 2018

Astor Homes Pty Ltd

11 Tanglewood Place,  
WEST PENNANT HILLS  
New South Wales 2125

**RE: PRELIMINARY SITE INVESTIGATION AT  
1174 to 1178 FOREST ROAD LUGARNO, NSW, 2210**

### **1.0 Introduction**

As requested, Australian Geotechnical Pty Ltd (AG) undertook sampling and testing on the 6<sup>th</sup> May 2018 at the above site for the purpose of preliminary site investigation. This has been undertaken to assess whether the material placed within the western portion of site (Refer to Appendix A for approximate fill location) presents a risk to human health. Based on discussions with the client, it is understood that filling material has been placed behind retaining structures within the site to a maximum depth of 1.0m during construction of the residential dwellings.

### **2.0 Scope of Work**

AG carried out the following scope of works in order to complete the material classification;

- Site Inspection by a representative from AG to ascertain current activities, and any visible signs of contamination;
- Collection of soil samples according to a sampling plan.
- Transferring samples to a NATA accredited laboratory for analysis;

- Laboratory analysis of samples for Heavy Metals, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), OC and OP Pesticides, Polychlorinated Biphenyl (PCBs), Electrical Conductivity, pH and Asbestos;
- Preparation of a report detailing findings and recommendations in general accordance with the National Environment Protection Council (NEPC) National Environment Protection Measure (Assessment of Site Contamination) 2013 (NEMP ASC 2013) and NSW Office of Environment and Heritage Guidelines for Consultants Reporting on Contaminated Sites (OEH 2011); and
- Preparation of a report outlining investigation methodology, sampling rationale, interpretation of the test data and a conclusion.

### **3.0 Field Investigation, Site Inspection and Sampling**

Discrete sampling was undertaken in general accordance with AS1141.3.1-2014 methods for sampling and testing aggregates in accordance with Appendix 1 of the Waste Classification Guidelines (2014) published by the Environment Protection Authority NSW. Minimum Sampling densities were adopted from Table 1 of the *'The Excavated Natural Material Order 2014'*, with six (6) samples (based on an total area of less than 1000m<sup>2</sup>).

Material was selected from hand auger excavations into the fill soil horizon, which generally comprised of Silty Gravelly Clay, medium to high plasticity, brown mottled grey red, moist, hard. Samples numbered E1-400mm, E2-300mm, E3-500mm, E4-600mm, E5-850mm and E6-200mm were selected from this soil horizon

It should be noted that paint chips, sulphidic ores, hydrocarbon odours, or foreign material such as brick and concrete were not observed at the time of our inspection. Furthermore, no visible asbestos contamination was observed.

The samples were placed in 250ml glass jars with Teflon lined lids, with asbestos samples placed in separate bags. The samples were then placed in a chilled container to maintain samples at a temperature below approximately 4°C then were then transported to SGS Pty Ltd (NATA accredited laboratory) under stringent chain of custody (COC) procedures. Each sample location was excavated utilizing hand equipment to a maximum depth of up to 850mm. The sample was collected directly from the auger using a stainless steel trowel, which had been decontaminated prior to use to prevent cross contamination occurring.



**Image 1: South-East view at rear of constructed dwellings**



**Image 2: North-East view of retaining structures**





#### 4.0 Test Results

Test results obtained from SGS Environmental (Certificate Reference number SE192497) are summarised in Table 1 with the relevant contaminant threshold values. The table compares the results of the fill material to The National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; 'standard residential with garden/accessible soil' ('A') which is considered suitable for children's day care centres, preschools and primary schools.

**Table 1: Analysis of the solid sample (NEPM, 2013)**

Contaminant	Assessment Criteria (mg/kg)		Maximum Concentration (mg/kg)	Acceptable comparing to Health Based Investigation Level (HIL'A')
	Health Based Investigation Level (HIL'A')	Health Screening Levels (HSL) mg/kg		
<b>Inorganics (Heavy Metals)</b>				
Arsenic (total)	100		11	Yes
Cadmium	20		<0.3	Yes
Chromium (VI)	100		8.8	Yes
Copper	6000		10	Yes
Lead	300		13	Yes
Mercury	40		<0.05	Yes
Nickel	400		0.9	Yes
Zinc	7400		45	Yes
<b>Organics</b>				
<b>TPH</b>				
C <sup>6</sup> -C <sup>10</sup>		50	<25	Yes
Benzene		10.6	<0.1	Yes
Toulene		190	<0.1	Yes
Ethylbenzene		390	<0.1	Yes
Xylene				
Phenol	3000			
<b>PAH</b>	300	45	<0.2	Yes
<b>OCP</b>		3	<1	Yes
Aldrin + Dieldrin	7			
Chlordane	50			
Heptachlor	6			
DDD+DDE+DDT	260			
<b>OPP</b>			<1	Yes
Diazinon				
Ethion				
Fenitrothion				
<b>PCB</b>	1		<1	Yes
Asbestos	0.01%	-	None Detected	Yes

## **5.0 Conclusion**

Test results analysed were compared against the Health Investigation Levels (HIL) and Health Screening Levels (HSL) for the exposure setting; 'standard residential with garden/accessible soil' ('A'). Results indicate that the material placed on-site behind retaining structures at 1174 to 1178 FOREST ROAD LUGARNO, NSW, 2210 (Refer to Appendix A for approximate fill location) does not present a risk to human health in a 'standard residential with garden/accessible soil' setting, therefore the material is considered suitable to remain on-site.

## **6.0 Limitations**

Australian Geotechnical (AG) has performed its services for this project in accordance with current industry codes and practices.

When assessing the nature and extent of contamination, this type of investigation (as per our commission) is not designed or capable of locating all ground conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall ground conditions. However, it should be noted that actual conditions in some parts of the site might differ from those found. If excavations reveal ground conditions significantly different from those shown in our findings, AG must be consulted. The actual presence of contaminated material at the site may potentially differ from that referred to or inferred herein, since no sampling program, no matter how complete, can reveal all anomalies and hot spots that may be present. Furthermore, our opinions and judgments expressed herein, which are based on our analysis of current industry codes and practices, should not be interpreted as legal opinions.

The scope and the period of AG services are described in the report and are subject to restrictions and limitations. AG did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by AG in regard to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by AG for incomplete or inaccurate data supplied by others.

Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

We trust that the information within and attached meets your present requirements. Should you have any queries, please do not hesitate to contact the undersigned.

**For and on behalf of AG**



**M. Tofler**

*Environmental Consultant*

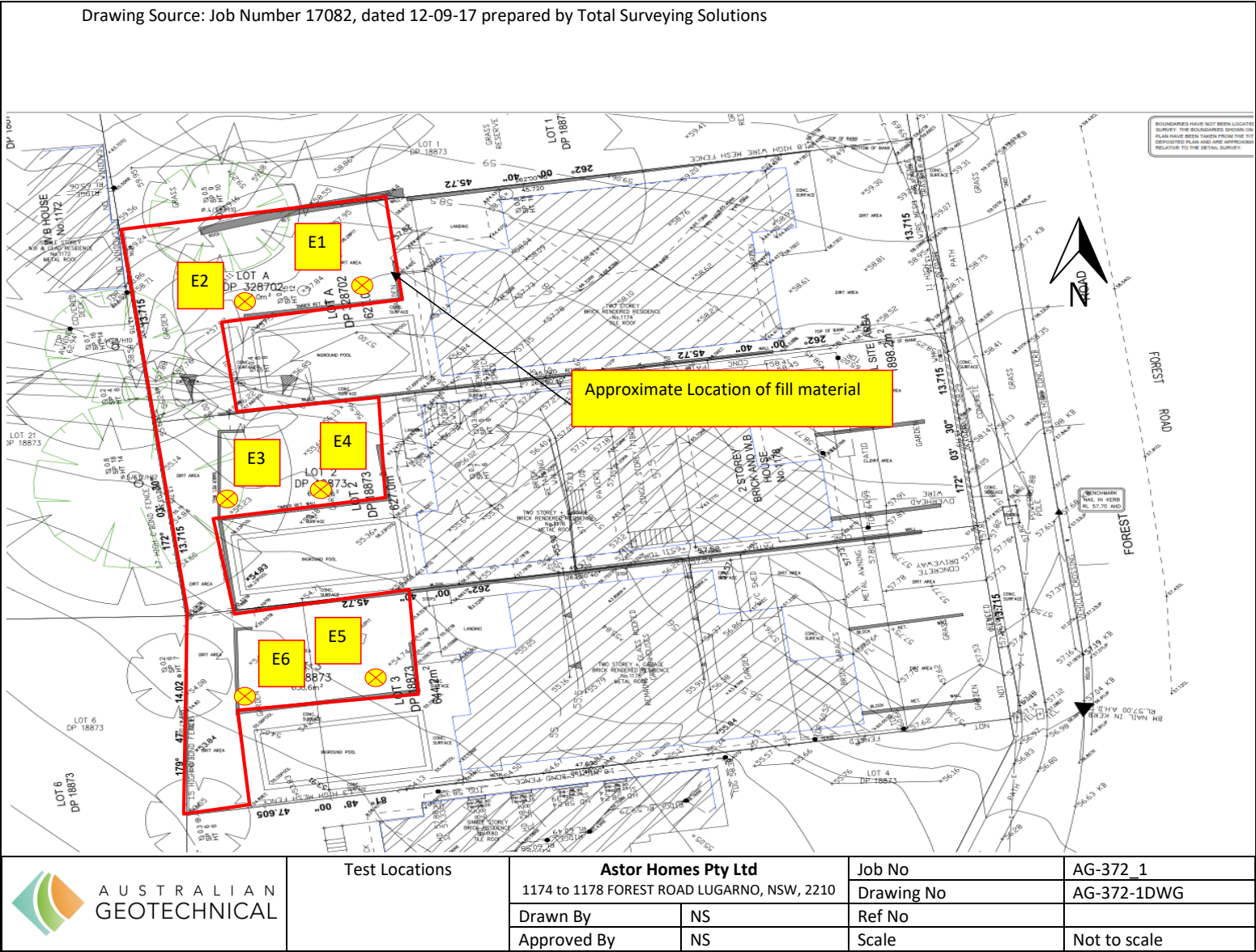
Appendices: A. Sampling location plan  
B. Certificate of Analysis – SE192497

## APPENDIX A

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### FIGURES

*Figure 1: Sampling Location Plan View*



## **APPENDIX B**

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### **LABORATORY TEST RESULTS**



## ANALYTICAL REPORT



Accreditation No. 2562

## CLIENT DETAILS

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 Project AG-372  
 Order Number AG-372  
 Samples 6

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 SGS Reference SE192497 R0  
 Date Received 6/5/2019  
 Date Reported 15/5/2019

## COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

## SIGNATORIES

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## ANALYTICAL RESULTS

SE192497 R0

VOC's in Soil [AN433] Tested: 14/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			6/5/2019 SE192497.001	6/5/2019 SE192497.002	6/5/2019 SE192497.003	6/5/2019 SE192497.004	6/5/2019 SE192497.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	E6
			SOIL
			6/5/2019 SE192497.006
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1





## ANALYTICAL RESULTS

SE192497 R0

### Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 14/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.002	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.004	SOIL - 6/5/2019 SE192497.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	E6
			SOIL - 6/5/2019 SE192497.006
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25



## ANALYTICAL RESULTS

SE192497 R0

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			6/5/2019 SE192497.001	6/5/2019 SE192497.002	6/5/2019 SE192497.003	6/5/2019 SE192497.004	6/5/2019 SE192497.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	E6
			SOIL
			6/5/2019 SE192497.006
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210



## ANALYTICAL RESULTS

SE192497 R0

## PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.002	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.004	SOIL - 6/5/2019 SE192497.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	E6
			SOIL - 6/5/2019 SE192497.006
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8



## ANALYTICAL RESULTS

SE192497 R0

OC Pesticides in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1



## ANALYTICAL RESULTS

SE192497 R0

OP Pesticides in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7



## ANALYTICAL RESULTS

SE192497 R0

PCBs in Soil [AN420] Tested: 9/5/2019

PARAMETER	UOM	LOR	E1	E3	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.005
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1



## ANALYTICAL RESULTS

SE192497 R0

pH in soil (1:5) [AN101] Tested: 13/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
pH	pH Units	0.1	7.2	7.3	7.8	7.7	8.4

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
pH	pH Units	0.1	8.1



## ANALYTICAL RESULTS

SE192497 R0

Conductivity and TDS by Calculation - Soil [AN106] Tested: 13/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
			SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
PARAMETER	UOM	LOR					
Conductivity of Extract (1:5 as received)	µS/cm	1	21	70	59	56	120
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	23	76	64	61	120

			E6
			SOIL
			-
			6/5/2019
			SE192497.006
PARAMETER	UOM	LOR	
Conductivity of Extract (1:5 as received)	µS/cm	1	45
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	49





## ANALYTICAL RESULTS

SE192497 R0

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 10/5/2019

PARAMETER	UOM	LOR	E1	E2	E3	E4	E5
			SOIL - 6/5/2019 SE192497.001	SOIL - 6/5/2019 SE192497.002	SOIL - 6/5/2019 SE192497.003	SOIL - 6/5/2019 SE192497.004	SOIL - 6/5/2019 SE192497.005
Arsenic, As	mg/kg	1	11	9	10	8	7
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	5.6	7.4	8.7	8.2	8.1
Copper, Cu	mg/kg	0.5	4.8	4.7	4.4	4.6	10
Lead, Pb	mg/kg	1	14	13	11	9	8
Nickel, Ni	mg/kg	0.5	0.9	0.6	<0.5	0.8	0.6
Zinc, Zn	mg/kg	2	83	48	44	41	39

PARAMETER	UOM	LOR	E6
			SOIL - 6/5/2019 SE192497.006
Arsenic, As	mg/kg	1	8
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	8.8
Copper, Cu	mg/kg	0.5	4.3
Lead, Pb	mg/kg	1	11
Nickel, Ni	mg/kg	0.5	<0.5
Zinc, Zn	mg/kg	2	45



## ANALYTICAL RESULTS

SE192497 R0

Mercury in Soil [AN312] Tested: 10/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
Mercury	mg/kg	0.05	<0.05



## ANALYTICAL RESULTS

SE192497 R0

Moisture Content [AN002] Tested: 10/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
PARAMETER	UOM	LOR	SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
% Moisture	%w/w	0.5	8.6	7.5	7.0	8.7	7.8

			E6
			SOIL
			-
			6/5/2019
PARAMETER	UOM	LOR	SE192497.006
% Moisture	%w/w	0.5	8.9



## ANALYTICAL RESULTS

SE192497 R0

Fibre Identification in soil [AN602] Tested: 14/5/2019

			E1	E2	E3	E4	E5
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			6/5/2019	6/5/2019	6/5/2019	6/5/2019	6/5/2019
			SE192497.001	SE192497.002	SE192497.003	SE192497.004	SE192497.005
PARAMETER	UOM	LOR					
Asbestos Detected	No unit	-	No	No	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

			E6
			SOIL
			-
			6/5/2019
			SE192497.006
PARAMETER	UOM	LOR	
Asbestos Detected	No unit	-	No
Estimated Fibres*	%w/w	0.01	<0.01



## METHOD SUMMARY

SE192497 R0

## METHOD

## METHODOLOGY SUMMARY

## AN002

The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.

## AN040/AN320

A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.

## AN040

A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.

## AN101

pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl<sub>2</sub>) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H<sup>+</sup>.

## AN106

Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.

## AN312

Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500

## AN403

Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.

## AN403

Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.

## AN403

The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.

## AN420

(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

## AN420

SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

## AN433

VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

## AN602

Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.

## AN602

Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.

## AN602

AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states: "Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."



## METHOD SUMMARY

SE192497 R0

## AN602

The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if-

- (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres);
- (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg; and
- (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

## FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: [www.sgs.com.au/pv.sgsvr/en-gb/environment](http://www.sgs.com.au/pv.sgsvr/en-gb/environment).

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## ANALYTICAL REPORT



Accreditation No. 2562

## CLIENT DETAILS

Contact Nathan Smith  
 Client AUSTRALIAN GEOTECHNICAL PTY LTD  
 Address 2 SHIRLEY STREET  
 ROSEHILL NSW 2144

Telephone (Not specified)  
 Facsimile (Not specified)  
 Email nathan@austgeo.com.au

Project **AG-372**  
 Order Number **AG-372**  
 Samples 6

## LABORATORY DETAILS

Manager Huong Crawford  
 Laboratory SGS Alexandria Environmental  
 Address Unit 16, 33 Maddox St  
 Alexandria NSW 2015

Telephone +61 2 8594 0400  
 Facsimile +61 2 8594 0499  
 Email au.environmental.sydney@sgs.com

SGS Reference **SE192497 R0**  
 Date Received 06 May 2019  
 Date Reported 15 May 2019

## COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

## SIGNATORIES

Kamrul Ahsan  
 Senior Chemist

Ly Kim Ha  
 Organic Section Head

Ravee Sivasubramaniam  
 Hygiene Team Leader

Shane McDermott  
 Inorganic/Metals Chemist



## ANALYTICAL REPORT

SE192497 R0

### RESULTS

#### Fibre Identification in soil

Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE192497.001	E1	Soil	268g Sand,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.002	E2	Soil	172g Sand,Soil,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.003	E3	Soil	94g Sand,Soil,Rocks	06 May 2019	No Asbestos Found Organic Fibres Detected	<0.01
SE192497.004	E4	Soil	133g Sand,Soil,Rocks	06 May 2019	No Asbestos Found Organic Fibres Detected	<0.01
SE192497.005	E5	Soil	176g Clay,Sand,Rocks	06 May 2019	No Asbestos Found	<0.01
SE192497.006	E6	Soil	193g Clay,Sand,Rocks	06 May 2019	No Asbestos Found	<0.01





## METHOD SUMMARY

SE192497 R0

## METHOD

## METHODOLOGY SUMMARY

AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic 'clues', which provide a reasonable degree of certainty, dispersion staining is a mandatory 'clue' for positive identification. If sufficient 'clues' are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocally identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf). The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states: "Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- <ul style="list-style-type: none"> <li>(a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres);</li> <li>(b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg; and</li> <li>(c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.</li> </ul>

## FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service.
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.

Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.

Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: [www.sgs.com.au/py.sgsvr/en-gb/environment](http://www.sgs.com.au/py.sgsvr/en-gb/environment).

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source: [U ntitled].pdf page: 1 SGS Ref: SE192497\_COC

**E-MAILED**  
8/5/19 04:02

**SGS**

**SGS Environmental Services**  
Unit 16, 33 Maddox Street  
Alexandria NSW 2015

Telephone No: (02) 85940400

Facsimile No: (02) 85940499

Email: au.samplerreceipt.sydney@sgs.com

## CHAIN OF CUSTODY & ANALYSIS REQUEST

Page \_\_\_\_ of \_\_\_\_

Company Name: Australian Geotechnical

Address: 2 Shirley Street, Rose Hill, NSW

Contact Name: Nathan Smith

Project Name/No: AG-372

Purchase Order No: AG-372\_1 quote MMG3TN

Results Required By: STD TAT

Telephone:

Facsimile:

Email Results: info@austgeo.com.au

Client Sample ID

Date  
Sampled

Lab  
Sample  
ID

WATER

SOIL

PRESERVATIVE

NO OF CONTAINERS

CL10

SV9

Asbestos ID

E1

06-05-19

1

x

2

X

x

x

E2

06-05-19

2

X

2

X

x

x

E3

06-05-19

3

X

2

X

x

x

E4

06-05-19

4

X

2

X

x

x

E5

06-05-19

5

x

2

X

x

x

E6

06-05-19

6

x

2

x

x

SGS EHS Alexandria Laboratory

**SE192497 COC**

Received: 08-May-2019

86

Relinquished By: NS

Date/Time: 06-05-19

Received By: *[Signature]*

Date/Time: 6/5 14:30

Relinquished By:

Date/Time:

Received By:

Date/Time:

Samples Intact: Yes / No

Temperature: Ambient / Chilled

Sample Cooler Sealed: Yes / No

Laboratory Quotation No:

Comments:



# APPENDIX C

## Laboratory Analysis Reports

# APPENDIX C

## LABORATORY

## ANALYTICAL RESULTS



**Envirolab Services Pty Ltd**  
 ABN 37 112 535 645  
 12 Ashley St Chatswood NSW 2067  
 ph 02 9910 6200 fax 02 9910 6201  
 customerservice@envirolab.com.au  
 www.envirolab.com.au

### **CERTIFICATE OF ANALYSIS 220438**

<b>Client Details</b>	
<b>Client</b>	NEO Consulting Pty Ltd
<b>Attention</b>	Nick Caltabiano
<b>Address</b>	PO Box 279, Riverstone, NSW, 2765

<b>Sample Details</b>	
<b>Your Reference</b>	<b>N3863</b>
<b>Number of Samples</b>	19 Soil
<b>Date samples received</b>	26/06/2019
<b>Date completed instructions received</b>	26/06/2019

<b>Analysis Details</b>	
Please refer to the following pages for results, methodology summary and quality control data.	
Samples were analysed as received from the client. Results relate specifically to the samples as received.	
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.	
<b>Please refer to the last page of this report for any comments relating to the results.</b>	

<b>Report Details</b>	
<b>Date results requested by</b>	03/07/2019
<b>Date of Issue</b>	02/07/2019
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### **Asbestos Approved By**

Analysed by Asbestos Approved Identifier: Lucy Zhu  
 Authorised by Asbestos Approved Signatory: Lucy Zhu

#### **Results Approved By**

Hinoko Miyazaki, Senior Chemist  
 Jaimie Loa-Kum-Cheung, Metals Supervisor  
 Jeremy Faircloth, Operations Manager, Sydney  
 Lucy Zhu, Senior Asbestos Analyst  
 Priya Samarawickrama, Senior Chemist  
 Steven Luong, Organics Supervisor

#### **Authorised By**

Nancy Zhang, Laboratory Manager

## Client Reference: N3863

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	85	74	87	82	86

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	83	86	81	83	88

## Client Reference: N3863

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	29/06/2019	29/06/2019	29/06/2019	29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25	<25	<25	<25	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25	<25	<25	<25	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	90	81	73	86	87

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25
vTPH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	87

## Client Reference: N3863

svTRH (C10-C40) in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	87	87	89	88	85

svTRH (C10-C40) in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	85	85	84	85	85



**Client Reference: N3863**

svTRH (C10-C40) in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50	<50	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	86	84	84	85	83

svTRH (C10-C40) in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	84

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j,k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	98	83	90	86	92

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	87	86	91	86	85

## Client Reference: N3863

PAHs in Soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	86	84	87	85	90

## Client Reference: N3863

PAHs in Soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	93

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	90	89	89

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	85	87	90	86

## Client Reference: N3863

Organochlorine Pesticides in soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	89	87	86	87



**Client Reference: N3863**

Organochlorine Pesticides in soil		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	88

## Client Reference: N3863

Organophosphorus Pesticides						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	90	89	89

Organophosphorus Pesticides						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	85	87	90	86

## Client Reference: N3863

Organophosphorus Pesticides						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	89	87	86	87

Organophosphorus Pesticides		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyrifos	mg/kg	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	88

## Client Reference: N3863

Acid Extractable metals in soil						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	28	6	<4	5	10
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	9	10	27	11
Copper	mg/kg	6	9	3	<1	16
Lead	mg/kg	12	19	6	3	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	3	1	<1	3
Zinc	mg/kg	29	43	12	5	94

Acid Extractable metals in soil						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	<4	12	10	8	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	7	9	11	11	10
Copper	mg/kg	6	4	5	5	5
Lead	mg/kg	16	12	11	10	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	<1	<1	<1
Zinc	mg/kg	54	120	57	58	56

## Client Reference: N3863

Acid Extractable metals in soil						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Arsenic	mg/kg	8	7	8	15	13
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	9	11	17	10
Copper	mg/kg	4	6	5	3	5
Lead	mg/kg	9	9	9	7	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	<1	<1	<1	<1
Zinc	mg/kg	51	48	52	52	44

Acid Extractable metals in soil			
Our Reference		220438-19	220438-20
Your Reference	UNITS	QS-1	BH1 0.1 - [TRIPLICATE]
Type of sample		Soil	Soil
Date prepared	-	27/06/2019	27/06/2019
Date analysed	-	27/06/2019	27/06/2019
Arsenic	mg/kg	27	23
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	13	11
Copper	mg/kg	7	8
Lead	mg/kg	14	14
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	2	1
Zinc	mg/kg	31	31

**Client Reference: N3863**

Moisture						
Our Reference		220438-1	220438-3	220438-4	220438-5	220438-6
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH3 0.5	BH4 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	16	16	15	15	17

Moisture						
Our Reference		220438-7	220438-9	220438-10	220438-11	220438-13
Your Reference	UNITS	BH5 0.2	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	12	16	10	14	10

Moisture						
Our Reference		220438-14	220438-15	220438-16	220438-17	220438-18
Your Reference	UNITS	BH9 0.5	BH10 0.2	BH11 0.1	BH12 0.1	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Date analysed	-	28/06/2019	28/06/2019	28/06/2019	28/06/2019	28/06/2019
Moisture	%	9.0	10	12	12	15

Moisture		
Our Reference		220438-19
Your Reference	UNITS	QS-1
Type of sample		Soil
Date prepared	-	27/06/2019
Date analysed	-	28/06/2019
Moisture	%	16

## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001						
Our Reference		220438-1	220438-3	220438-4	220438-6	220438-7
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH3 0.2	BH4 0.1	BH5 0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Sample mass tested	g	713.1	567.76	521.6	616.05	599.57
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001						
Our Reference		220438-9	220438-10	220438-11	220438-13	220438-15
Your Reference	UNITS	BH6 0.2	BH7 0.1	BH8 0.1	BH9 0.1	BH10 0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2019	27/06/2019	27/06/2019	27/06/2019	27/06/2019
Sample mass tested	g	569.02	523.52	517.82	656.5	522.05
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	Chrysotile asbestos detected  Organic fibres detected	Chrysotile asbestos detected  Amosite asbestos detected  Crocidolite asbestos detected  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	<0.1	8.2932	2.0399	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	See Above	See Above	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	—	4.3416	1.0563	—	—
FA and AF Estimation*	g	—	—	—	—	—
ACM >7mm Estimation*	%(w/w)	<0.01	0.8293	0.2040	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001



## Client Reference: N3863

Asbestos ID - soils NEPM - ASB-001			
Our Reference		220438-16	220438-17
Your Reference	UNITS	BH11 0.1	BH12 0.1
Type of sample		Soil	Soil
Date analysed	-	27/06/2019	27/06/2019
Sample mass tested	g	582.31	599.55
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected Synthetic mineral fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected
Total Asbestos <sup>#1</sup>	g/kg	0.8087	<0.1
Asbestos ID in soil <0.1g/kg*	-	See Above	No visible asbestos detected
ACM >7mm Estimation*	g	0.4709	—
FA and AF Estimation*	g	—	—
ACM >7mm Estimation*	%(w/w)	0.0809	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001

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Misc Inorg - Soil					
Our Reference		220438-1	220438-3	220438-7	220438-18
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH5 0.2	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Date analysed	-	01/07/2019	01/07/2019	01/07/2019	01/07/2019
pH 1:5 soil:water	pH Units	7.1	8.9	9.0	6.6

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CEC					
Our Reference		220438-1	220438-3	220438-7	220438-18
Your Reference	UNITS	BH1 0.1	BH2 0.2	BH5 0.2	BH12 0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Date analysed	-	02/07/2019	02/07/2019	02/07/2019	02/07/2019
Exchangeable Ca	meq/100g	7.8	20	22	3.5
Exchangeable K	meq/100g	0.1	0.1	0.2	<0.1
Exchangeable Mg	meq/100g	0.80	0.24	0.31	0.28
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	8.8	21	22	3.9

**Client Reference: N3863**

Method ID	Methodology Summary
<b>ASB-001</b>	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
<b>ASB-001</b>	<p>Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004.</p> <p>Results reported denoted with * are outside our scope of NATA accreditation.</p> <p><b>NOTE #1</b> Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM &gt;7mm, &lt;7mm and FA/AF)</p> <p><b>NOTE #2</b> The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.</p> <p>Estimation = Estimated asbestos weight</p> <p>Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.</p>
<b>Inorg-001</b>	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
<b>Inorg-008</b>	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
<b>Metals-009</b>	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-021</b>	Determination of Mercury by Cold Vapour AAS.
<b>Org-003</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.

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Method ID	Methodology Summary
<b>Org-003</b>	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.</p> <p>F2 = (&gt;C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.</p> <p>Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (&gt;C10-C40).</p>
<b>Org-005</b>	<p>Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.</p>
<b>Org-005</b>	<p>Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.</p> <p>Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.</p>
<b>Org-008</b>	<p>Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.</p>
<b>Org-012</b>	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.</p> <p>For soil results:-</p> <ol style="list-style-type: none"> <li>1. 'EQ PQL' values are assuming all contributing PAHs reported as &lt;PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present.</li> <li>2. 'EQ zero' values are assuming all contributing PAHs reported as &lt;PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL.</li> <li>3. 'EQ half PQL' values are assuming all contributing PAHs reported as &lt;PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above.</li> </ol> <p>Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.</p>
<b>Org-014</b>	<p>Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.</p>
<b>Org-016</b>	<p>Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.</p>
<b>Org-016</b>	<p>Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.</p> <p>Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.</p>

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QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			29/06/2019	1	29/06/2019	29/06/2019		29/06/2019	29/06/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	25	Org-016	<25	1	<25	<25	0	100	85
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	25	Org-016	<25	1	<25	<25	0	100	85
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	105	91
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	102	89
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	83
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	96	80
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	82
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	1	85	72	17	96	79

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	29/06/2019	29/06/2019		[NT]	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	25	Org-016	[NT]	14	<25	<25	0	[NT]	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	25	Org-016	[NT]	14	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	14	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	14	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	14	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	14	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	14	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	14	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	14	90	88	2	[NT]	[NT]

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QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	50	Org-003	<50	1	<50	<50	0	101	98
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	100	93
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	71	103
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	50	Org-003	<50	1	<50	<50	0	101	98
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	100	93
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	100	Org-003	<100	1	<100	<100	0	71	103
Surrogate o-Terphenyl	%		Org-003	89	1	87	88	1	112	108

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	50	Org-003	[NT]	14	<50	<50	0	[NT]	[NT]
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	50	Org-003	[NT]	14	<50	<50	0	[NT]	[NT]
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	100	Org-003	[NT]	14	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	14	86	84	2	[NT]	[NT]

## Client Reference: N3863

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	108	108
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	98
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	96
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	96
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	98
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	96
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	96	94
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	86	1	98	90	9	93	90

QUALITY CONTROL: PAHs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j,k)fluoranthene	mg/kg	0.2	Org-012	[NT]	14	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	14	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	14	86	85	1	[NT]	[NT]



## Client Reference: N3863

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	87	79
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	86
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	90	84
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	88
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	88
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	98	92
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	102	103
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	82
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	83	77
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	74
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	93	1	90	91	1	89	84

Client Reference: N3863

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	14	87	90	3	[NT]	[NT]

Client Reference: N3863

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date extracted	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			28/06/2019	1	28/06/2019	28/06/2019		28/06/2019	28/06/2019
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	101	96
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	89	100
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	90	87
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	110	96
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	106	91
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	112	106
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	99	89
Surrogate TCMX	%		Org-008	93	1	90	91	1	92	88

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	28/06/2019	28/06/2019		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	14	87	90	3	[NT]	[NT]

**Client Reference: N3863**

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	220438-3
Date prepared	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Date analysed	-			27/06/2019	1	27/06/2019	27/06/2019		27/06/2019	27/06/2019
Arsenic	mg/kg	4	Metals-020	<4	1	28	28	0	105	102
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	103	96
Chromium	mg/kg	1	Metals-020	<1	1	11	11	0	109	102
Copper	mg/kg	1	Metals-020	<1	1	6	10	50	109	111
Lead	mg/kg	1	Metals-020	<1	1	12	15	22	112	107
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	97	100
Nickel	mg/kg	1	Metals-020	<1	1	1	3	100	110	104
Zinc	mg/kg	1	Metals-020	<1	1	29	36	22	116	106

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Date analysed	-			[NT]	14	27/06/2019	27/06/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	14	8	9	12	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	14	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	14	11	10	10	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	14	4	6	40	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	14	9	13	36	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	14	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	14	1	1	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	14	51	71	33	[NT]	[NT]

Client Reference: N3863

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			01/07/2019	[NT]	[NT]	[NT]	[NT]	01/07/2019	[NT]
Date analysed	-			01/07/2019	[NT]	[NT]	[NT]	[NT]	01/07/2019	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]

**Client Reference: N3863**

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			02/07/2019	7	02/07/2019	02/07/2019		02/07/2019	[NT]
Date analysed	-			02/07/2019	7	02/07/2019	02/07/2019		02/07/2019	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	7	22	21	5	105	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	7	0.2	0.2	0	108	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	7	0.31	0.29	7	109	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	7	<0.1	<0.1	0	108	[NT]

**Client Reference: N3863**

Result Definitions	
<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

Quality Control Definitions	
<b>Blank</b>	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
<b>Matrix Spike</b>	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
<b>LCS (Laboratory Control Sample)</b>	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	

**Client Reference: N3863**

### Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.



**Client Reference: N3863**

### Report Comments

Asbestos-ID in soil: NEPM

This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 220438-1 for Cu. Therefore a triplicate result has been issued as laboratory sample number 220438-20.

Sample information					Tests Required												Comments		
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	BTEX	TRH	PAH	TOTAL METALS	OC/OP	ASBESTOS (QUANTIFICATION)	PH	CEC							Provide as much information about the sample as you can
	BH1 0.1				X	X	X	X	X	X	X	X							
	BH1 0.5																		HOLD
	BH2 0.2				X	X	X	X	X	X	X	X							
	BH3 0.2				X	X	X	X	X	X									
	BH3 0.5				X	X	X	X	X										
	BH4 0.1				X	X	X	X	X	X									
	BH5 0.2				X	X	X	X	X	X	X	X							
	BH5 0.7																		HOLD
	BH6 0.2				X	X	X	X	X	X									
	BH7 0.1				X	X	X	X	X	X									
	BH8 0.1				X	X	X	X	X	X									
	BH8 0.5																		HOLD
	BH9 0.1				X	X	X	X	X	X									
<input type="checkbox"/> Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis																			
Relinquished by (Company):					Received by (Company):					Lab Use Only									
Print Name: D TAYLOR					Print Name:					Job number:					Cooling: Ice / Ice pack / None				
Date & Time 26.6.19					Date & Time:					Temperature:					Security seal: Intact / Broken / None				
Signature:					Signature:					TAT Req - SAME day / 1 / 2 / 3 / 4 / STD									





# APPENDIX D

## Supporting Documents

## APPENDIX D

# SUPPORTING DOCUMENTS



Job No 16517804

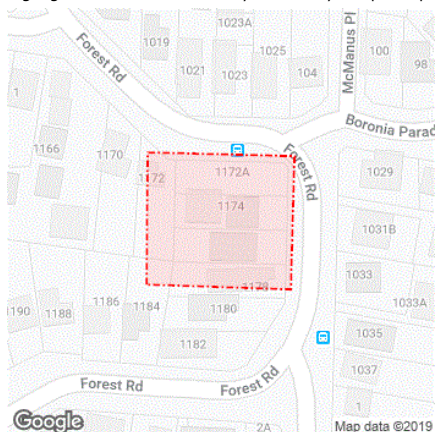
Phone: 1100  
www.1100.com.au**Caller Details**

**Contact:** Mr Daniel Taylor  
**Company:** Not Supplied  
**Address:** 76/20 Illawong Avenue  
 Sydney NSW 2026

**Caller Id:** 1941922 **Phone:** 0409492988  
**Mobile:** Not Supplied **Fax:** Not Supplied  
**Email:** dataylor88@outlook.com

**Dig Site and Enquiry Details**

**WARNING:** The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



**User Reference:** DSI  
**Working on Behalf of:** Private  
**Enquiry Date:** 24/06/2019 **Start Date:** 26/06/2019 **End Date:** 26/06/2019  
**Address:** 1174 Forest Road  
 Lugarno NSW 2210  
**Job Purpose:** Design  
**Location of Workplace:** Private Property  
**Onsite Activity:** Planning & Design  
**Location in Road:** Not Supplied

- Check the location of the dig site is correct. If not submit a new enquiry.
- If the scope of works change, or plan validity dates expire, resubmit your enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

**Notes/Description of Works:**  
 Not Supplied

**Your Responsibilities and Duty of Care**

- The lodgement of an enquiry does not authorise the project to commence. You must obtain all necessary information from any and all likely impacted asset owners prior to excavation.
- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at [www.1100.com.au](http://www.1100.com.au)
- For more information on safe excavation practices, visit [www.1100.com.au](http://www.1100.com.au)

**Asset Owner Details**

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days. Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.

\*\* Asset owners highlighted by asterisks \*\* require that you visit their offices to collect plans.

# Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

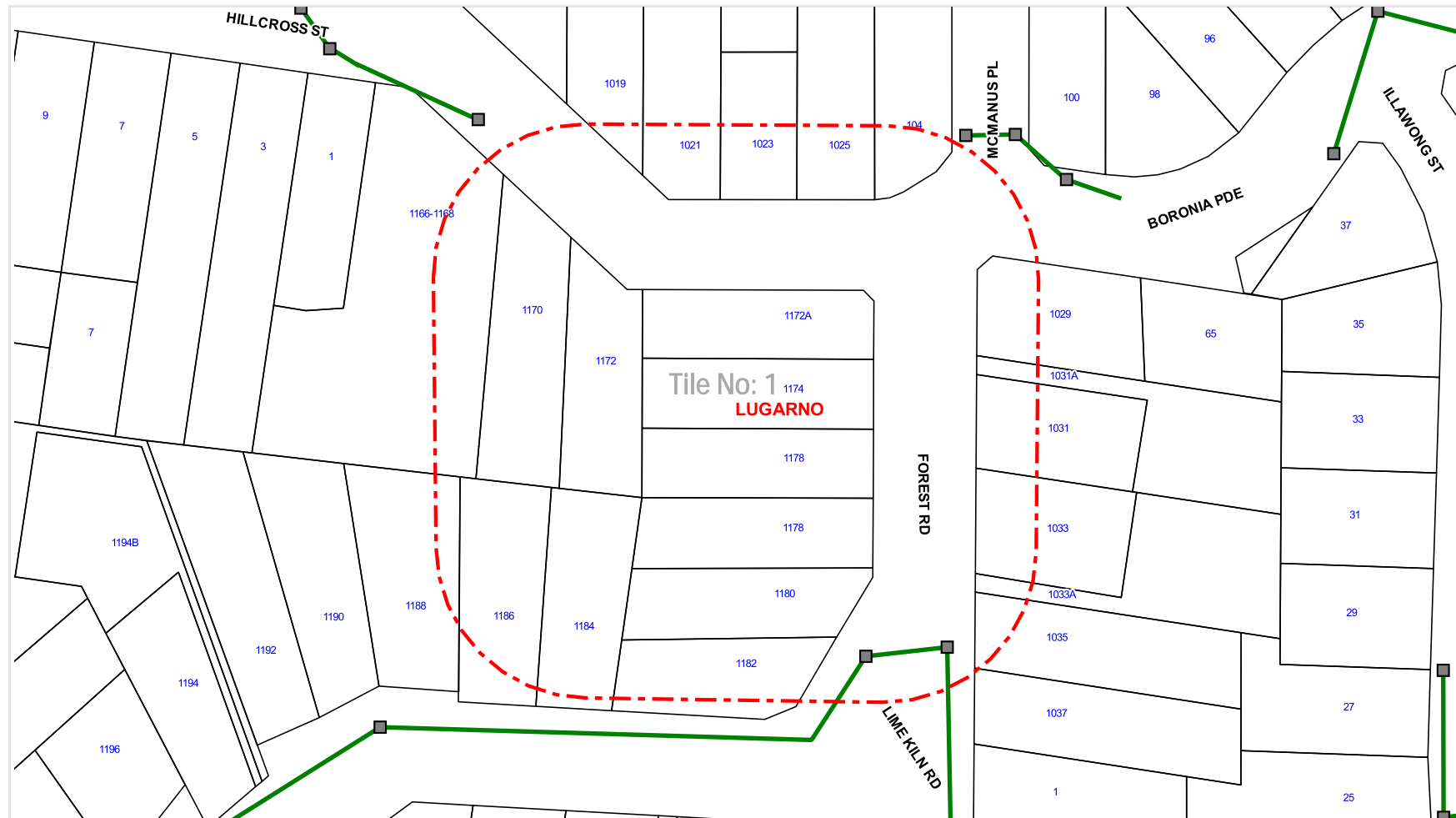
Seq. No.	Authority Name	Phone	Status
84785210	Ausgrid	0249510899	NOTIFIED
84785208	Georges River Council	0293306400	NOTIFIED
84785214	Jemena Gas South	1300880906	NOTIFIED
84785215	Sydney Water	132092	NOTIFIED
84785212	Telstra NSW, Central	1800653935	NOTIFIED

END OF UTILITIES LIST

**Lodge Your Free Enquiry Online – 24 Hours a Day, Seven Days a Week**



Sequence No: 84785208  
Job No: 16517804  
Location: 1174 Forest Road, Lugarno, NSW 2210



Legend | Scale: 1:1000



Please refer to attached Georges River Council Map Legend

**DISCLAIMER:** While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither Georges River Council or PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

If further information is required, please contact:

Ausgrid DBYD

Phone: (02) 4951 0899

Fax: (02) 4951 0729

Emergency Phone Number 131388



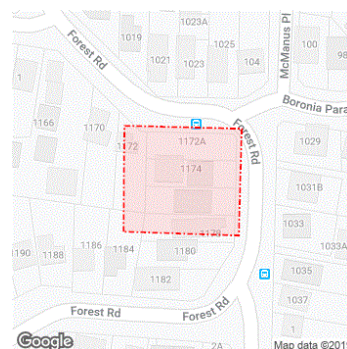
## Underground Cable Location Search Advice -- Ausgrid Assets Affected --

To:	Mr Daniel Taylor Not Supplied 76/20 Illawong Avenue Sydney NSW 2026	Phone No:	0409492988
		Issue Date:	24/06/2019

In response to your enquiry, Sequence No: 84785210 the records of Ausgrid disclose that there **are** Ausgrid underground cables in the defined search location and relevant Ausgrid plans have been provided.

This search is based on the geographical position of the dig site as denoted in the Dial Before You Dig caller confirmation sheet and an overview is provided:

Address:	1174 Forest Road Lugarno NSW 2210
Job #:	16517804



### \*\*Important\*\*

- All information provided to you is **ONLY VALID FOR 30 DAYS** from the date of issue
- You must keep Ausgrid plans on site during excavation works. If the people actually performing the excavation works do not know how to read and interpret Ausgrid's plans, then the work must be directed by a person who knows how to read and interpret plans.
- If you require a full size print of A0 plans and don't have the resources to do so please contact our office on 49510899 to request a hard copy to be posted. **Please allow 3 working days for delivery.**
- Please note you will ONLY receive portions of your search area that contain Ausgrid Underground Assets

### YOU MUST READ AND UNDERSTAND THE **SUPPLEMENTARY MATERIAL** CONTAINED IN THIS ADVICE **BEFORE** PROCEEDING WITH ANY WORKS.

#### Summary of Supplementary Information:

Material	Purpose	Location
<b>URGENT SAFETY ALERT</b>	Safety precautions when working on or near low voltage stranded aluminium cable	Web Link <a href="#">[Click Here]</a>
Important Information.pdf	Details important information	Attached
Working near Ausgrid Cables.pdf	Summary of NS156	Attached
COMN0119 How To Read Ausgrid Plans.pdf	Details how to read Ausgrid plans	Attached
SafeWork NSW "Work near underground assets: Guide"	To assist you in deciding appropriate measures to eliminate or control risks when working near underground assets.	Web Link <a href="#">[Click Here]</a>
Ausgrid's Network Standard NS156	For important information for work near or around underground cables	Web Link <a href="#">[Click Here]</a>
Working in Confined Spaces	For important information when working in confined spaces	Web Link <a href="#">[Click Here]</a>





## Network Protection

### High Pressure - Assets Affected

In reply to your enquiry, there are **High Pressure Gas Mains** in the vicinity of your intended work, as generally illustrated on the attached map. There may also be other mains or services at the location, as discussed in the warning below. For an explanation of the map, please see the key below.

The following excavations guidelines apply:

#### Excavation Guidelines:

Prior to **any** excavations in this area, you **must** contact the High Pressure Response Coordinator on **1300 665 380**. **(Appointments will be coordinated with availability of a Jemena Representative)** to arrange a survey. For all works in the vicinity of High Pressure Gas Mains you must arrange for a Jemena Representative to attend and supervise all excavations. Charges apply for attendance of any works outside the hours of 7am to 4pm, Monday to Friday ("**Standard Business Hours**") and for any attendance during Standard Business Hours that is longer than 2 hours.

In accordance with clause 34(5) of the Gas Supply (Safety and Network Management) Regulation 2013 (NSW), you should be informed that all excavation, (including pot-holing by hand to confirm the location of pipes) should be performed in accordance with "**Work Near Underground Assets Guideline**" published in 2007 by the Work Cover Authority.

A copy of this Guideline is available at: [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)

KEY					
Main	In Service	Proposed	High Pressure Main & Pipeline		Fittings, Valves & Regulators
Unknown Pressure	—	----	Secondary - 1050 kPa		Regulator Set
Distribution - 2 kPa			Secondary Service - 1050kPa		Regulator Station
Distribution - 7 kPa			Primary - 3500 kPa		Automatic Line Break Valve
Distribution - 30 kPa			JGN Trunk - 4000 to 14500 kPa		Valve
Distribution - 100 kPa			Transmission		Valve
Distribution - 210 kPa			50mm Nylon main inserted into 6 inch (Nominal Bore) Cast Iron Main		Siphon
Distribution - 300 kPa			32mm Nylon main inserted into 50mm Steel Main		
Distribution - 400 kPa			MBK = Metres Back of Kerb MFL = Metres from Fence Line		
Critical Main - Treat as High Pressure Main					

**Warning:** The enclosed plans show the position of Jemena Gas Networks (NSW) Ltd's underground gas mains and installations in public gazetted roads only. **Individual customers' services and services belonging to other third parties are not included** on these plans. These plans have been prepared solely for the use of Jemena Gas Networks (NSW) Ltd and Jemena Asset Management Pty Ltd (together "**Jemena**") and any reliance placed on these plans by you is entirely at your own risk. The plans may show the position of underground mains and installations relative to fences, buildings etc., as they existed at the time the mains etc were installed. The plans may not have been updated to take account of any subsequent change in the location or style of those features since the time at which the plans were initially prepared. Jemena makes no warranty as to the accuracy or completeness of the enclosed plans and does not assume any duty of care to you nor any responsibility for the accuracy, adequacy, suitability or completeness of the plans or for any error, omission, lack of detail, transmission failure or corruption in the information provided. Jemena does not accept any responsibility for any loss that you or anyone else may suffer in connection with the provision of these plans, however that loss may arise (including whether or not arising from the negligence of Jemena, its employees, agents, officers or contractors). The recipient of these plans must use their own care and diligence in carrying out their works and must carry out further surveys to locate services at their work site. Persons excavating or carrying out other earthworks will be held responsible for any damage caused to Jemena's underground mains and equipment. Jemena advises that you may be required to carry out potholing by hand if required by a Jemena Representative to confirm the location of Jemena's main and installations. This must also be performed by you under the supervision of a Jemena Representative and be carried out in accordance with the Working Near Underground Assets Guideline published in 2007 by Work Cover Authority

**In case of Emergency Phone 131 909 (24 hours)**

Admin  
1300 880 906

Jemena Asset Management Pty Ltd ABN 53 086 013 461  
for and on behalf of Jemena Gas Networks (NSW) Ltd ABN 87 003 004 322



## IMPORTANT INFORMATION - DIAL BEFORE YOU DIG

### Attention: You must read the information below

The material provided or made available to you by Sydney Water (including on the Sydney Water website) in relation to your Dial Before You Dig enquiry (**Information**) is provided on each of the following conditions, which you are taken to have accepted by using the Information:

- 1 The Information has been generated by an automated system based on the area highlighted in the "Locality Indication Only" window on your Caller Confirmation. It is your responsibility to ensure that the dig site is properly defined when submitting your Dial Before You Dig enquiry and, if the Information does not match the dig site, to resubmit your enquiry for the correct dig site.
- 2 Neither Sydney Water nor Dial Before You Dig make any representation or give any guarantee, warranty or undertaking (express or implied) as to the currency, accuracy, completeness, effectiveness or reliability of the Information. The Information, including Sydney Water plans and work-as-executed diagrams, amongst other things:
  - (a) may not show all existing structures, including Sydney Water's pipelines, particularly in relation to newer developments and in relation to structures owned by parties who do not participate in the Dial Before You Dig service;
  - (b) may be out of date and not show changes to surface levels, road alignments, fences, buildings and the like;
  - (c) is approximate only and is therefore not suitable for scaling purposes; and
  - (d) does not show locations of property services (often called house service lines) belonging to or servicing individual customers, which are usually connected to Sydney Water's structures.
- 3 You are responsible for, amongst other things:
  - (a) exposing underground structures, including Sydney Water's pipelines, by pot-holing using hand-held tools or vacuum techniques so as to determine the precise location and extent of structures before any mechanical means of excavation are used;
  - (b) the safe and proper excavation of and for underground works and structures, including having regard to the fact that asbestos cement pipelines, which can pose a risk to health, may form part of Sydney Water's water and sewerage reticulation systems;
  - (c) protecting underground structures, including Sydney Water's pipelines, from damage and interference;
  - (d) maintaining minimum clearances between Sydney Water's structures and structures belonging to others;
  - (e) ensuring that backfilling of excavation work in the vicinity of Sydney Water's structures complies with Sydney Water's standards contained on its website or otherwise communicated to you;
  - (f) notifying Sydney Water immediately of any damage caused or threat of damage to Sydney Water's structures;
  - (g) ensuring that plans are approved by Sydney Water (usually signified by stamping) prior to landscaping or building over or in the vicinity of any Sydney Water structure; and
  - (h) ensuring that the Information is used only for the purposes for which Sydney Water and Dial Before You Dig intended.

- 4 You acknowledge that you use the Information at your own risk. In consideration for the provision of the Dial Before You Dig service and the Information by Sydney Water and Dial Before You Dig, to the fullest extent permitted by law:
- (a) all conditions and guarantees concerning the Information (whether as to quality, outcome, fitness, care, skill or otherwise) expressed or implied by statute, common law, equity, trade, custom or usage or otherwise are expressly excluded and to the extent that those statutory guarantees cannot be excluded, the liability of Sydney Water and Dial Before You Dig to you is limited to either of the following as nominated by Sydney Water in its discretion, which you agree is your only remedy:
    - (i) the supplying of the Information again; or
    - (ii) payment of the cost of having the Information supplied again;
  - (b) in no event will Sydney Water or Dial Before You Dig be liable for, and you release Sydney Water and Dial Before You Dig from, any Loss arising from or in connection with the Information, including the use of or inability to use the Information and delay in the provision of the Information:
    - (i) whether arising under statute or in contract, tort or any other legal doctrine, including any negligent act, omission or default (including wilful default) by Sydney Water or Dial Before You Dig; and
    - (ii) regardless of whether Sydney Water or Dial Before You Dig are or ought to have been aware of, or advised of, the possibility of such loss, costs or damages;
  - (c) you will indemnify Sydney Water and Dial Before You Dig against any Loss arising from or in connection with Sydney Water providing incorrect or incomplete information to you in connection with the Dial Before You Dig service; and
  - (d) you assume all risks associated with the use of the Dial Before You Dig and Sydney Water websites, including risk to your computer, software or data being damaged by any virus, and you release and discharge Sydney Water and Dial Before You Dig from all Loss which might arise in respect of your use of the websites.
- 5 “**Sydney Water**” means Sydney Water Corporation and its employees, agents, representatives and contractors. “**Dial Before You Dig**” means Dial Before You Dig Incorporated and its employees, agents, representatives and contractors. References to “**you**” include references to your employees, agents, representatives, contractors and anyone else using the Information. References to “**Loss**” include any loss, cost, expense, claim, liability or damage (including arising in connection with personal injury, death or any damage to or loss of property and economic or consequential loss, lost profits, loss of revenue, loss of management time, opportunity costs or special damages). To the extent of any inconsistency, the conditions in this document will prevail over any other information provided to you by Sydney Water and Dial Before You Dig.

**In an emergency, or to notify Sydney Water of damage or threats to its structures, call 13 20 90 (24 hours, 7 days)**

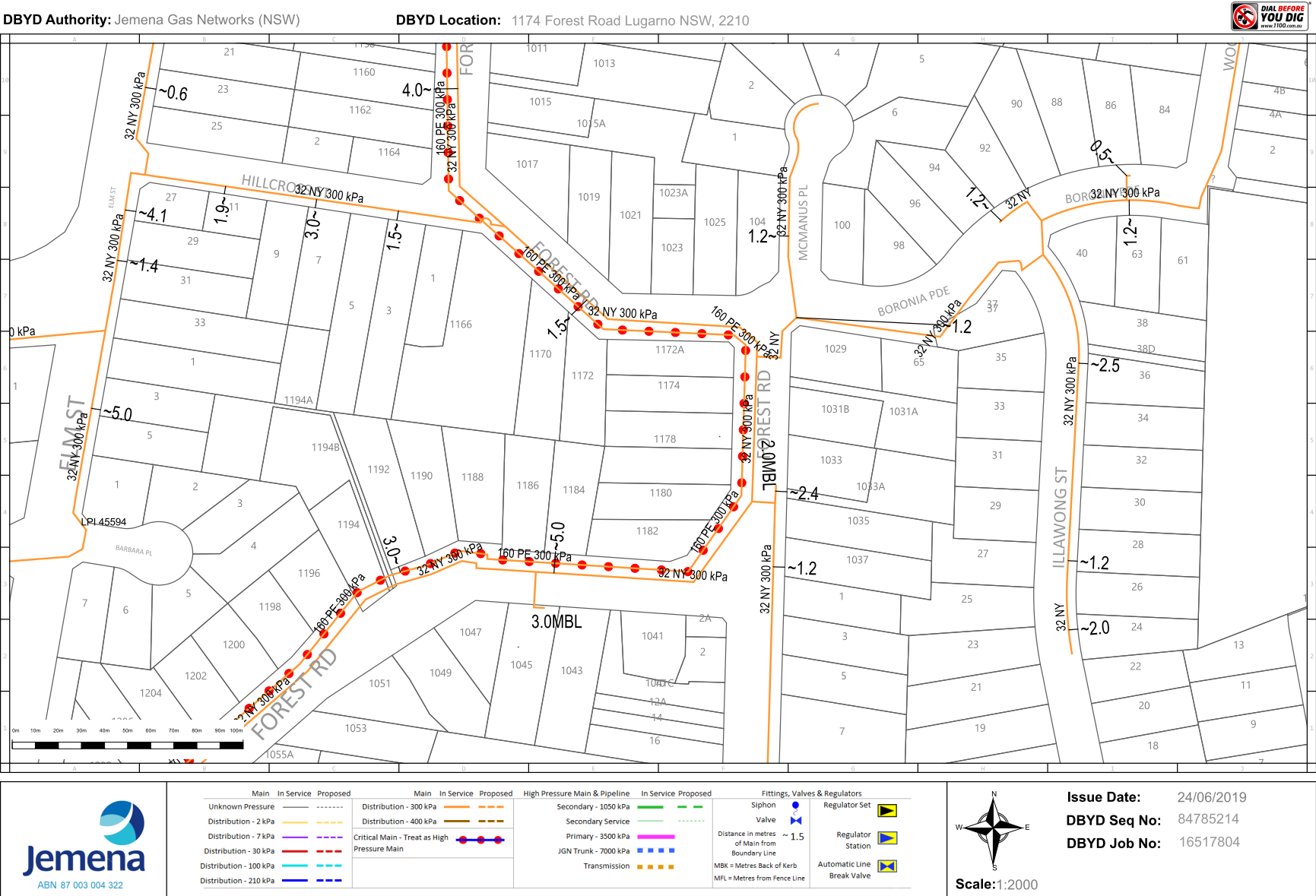
Further information and guidance is available in the Building Development and Plumbing section of Sydney Water's website at [www.sydneywater.com.au](http://www.sydneywater.com.au), where you will find the following documents under 'Dial Before You Dig':

- Avoid Damaging Water and Sewer Pipelines
- Water Main Symbols
- Depths of Mains
- Guidelines for Building Over/Adjacent to Sydney Water Assets
- Clearances Between Underground Services

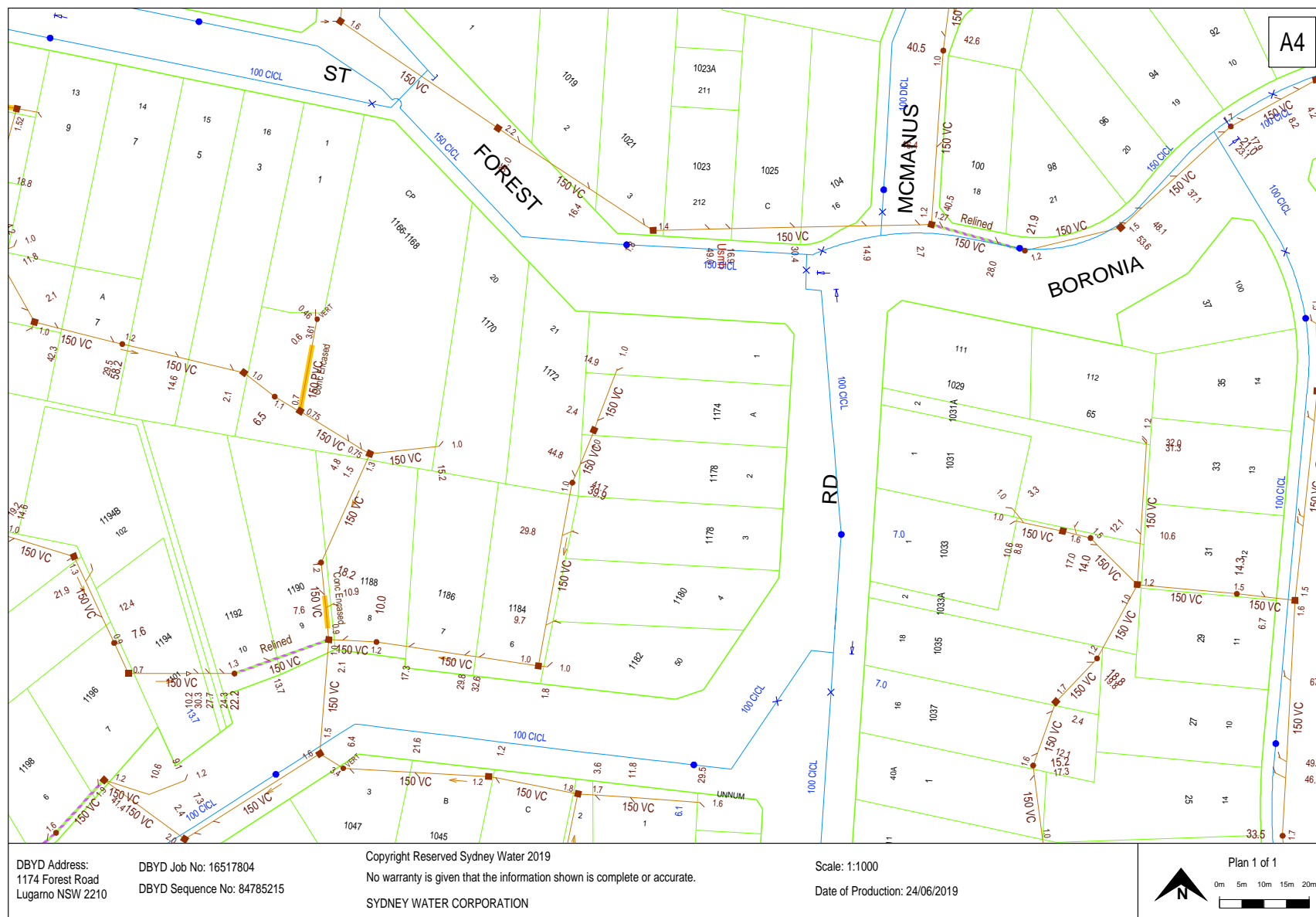
Or call **13 20 92** for Customer Enquires.

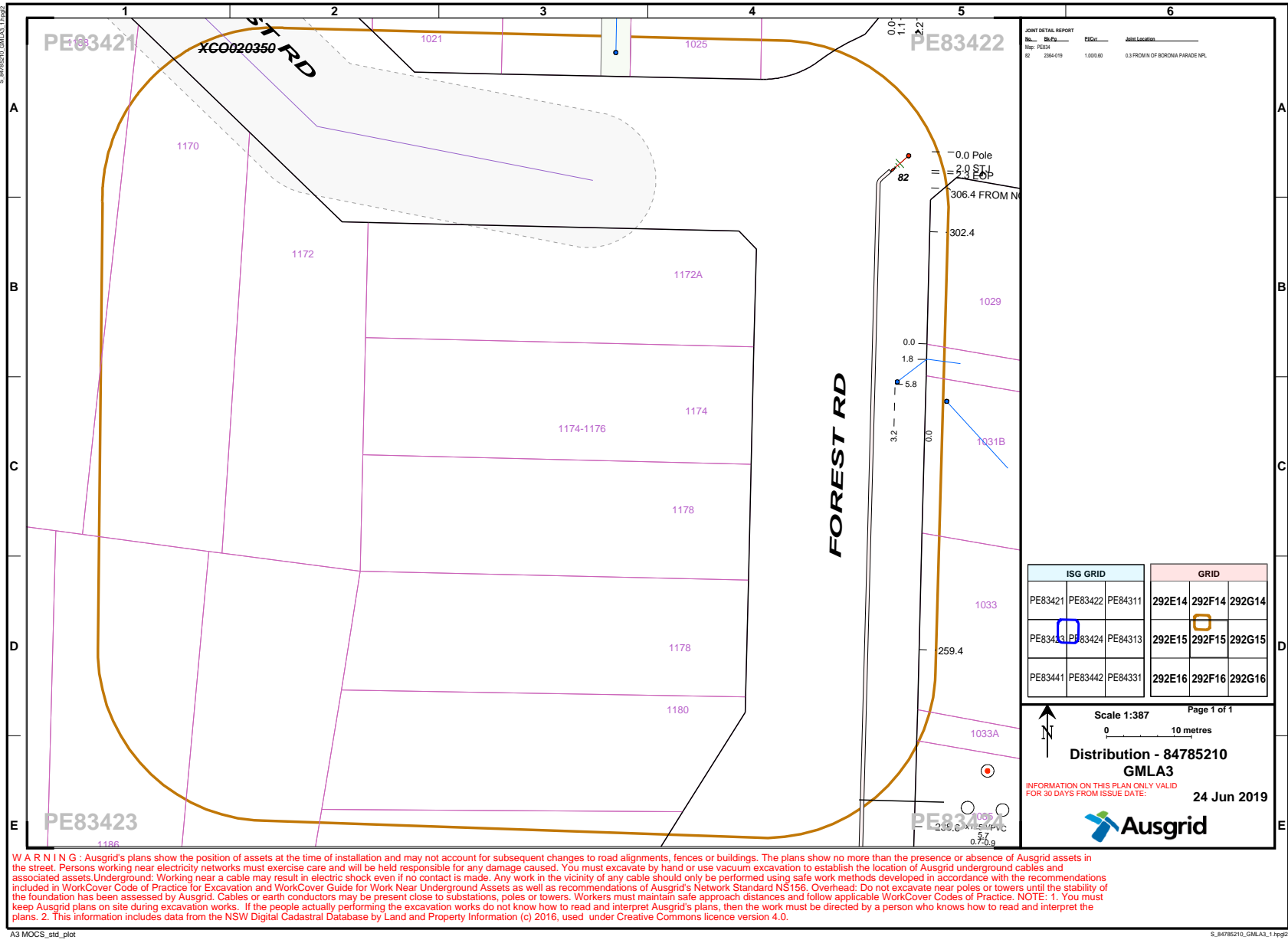
Note: The lodging of enquiries via [www.1100.com.au](http://www.1100.com.au) will enable you to receive colour plans in PDF format 24 hours a day, 7 days a week via email.

**This communication is confidential. If you are not the intended recipient, please destroy all copies immediately. Sydney Water Corporation prohibits unauthorised copying or distribution of this communication.**











## Spatial Services

### Works likely to impact survey marks

Penalties apply for unauthorised removal, damage, destruction, displacement, obliteration or defacing of survey marks

ISSN 2203-9384

Information Sheet

July 2018

### Legislation

Survey marks are protected under the *Surveying and Spatial Information Act 2002 (NSW) Section 24*. The following penalties and orders apply for unauthorised removal, damage or disturbance of survey marks:

- Maximum penalty of 25 units, currently **\$2,750** per mark; and
- up to **\$10,000** per mark in compensation to the Surveyor-General towards the cost of reinstatement of each survey mark; and
- up to **\$10,000** per mark in compensation to any other person towards any loss or damage suffered by that person as a consequence of the offence.

If works are likely to impact a survey mark, an application under the *Surveying and Spatial Information Regulation 2017 Clause 90* must be lodged with the Surveyor-General.

### Why are survey marks important?

Survey marks are a State asset and provide a wealth of important information to a wide range of people in the community. They are used to support the surveying of property boundaries and easements, and are important for engineering, road building, mapping and other land surveys.

The loss of survey marks can significantly degrade the integrity of the legal property boundaries and impact on the costs of development projects that depend upon position and height.

### How do I preserve survey marks?

*Surveyor-General's Direction No.11 - Preservation of Survey Infrastructure* provides directions on how to comply with the Legislation.

You can find the Direction on the following link: [http://spatialservices.finance.nsw.gov.au/\\_data/assets/pdf\\_file/0005/217094/SG\\_Direction\\_11.pdf](http://spatialservices.finance.nsw.gov.au/_data/assets/pdf_file/0005/217094/SG_Direction_11.pdf)

A Registered Land Surveyor will be able to provide advice about the preservation of survey infrastructure. A list of Registered Land Surveyors is available from the Board of Surveying and Spatial Information website: [http://www.bossi.nsw.gov.au/about/find\\_a\\_registered\\_surveyor](http://www.bossi.nsw.gov.au/about/find_a_registered_surveyor)

Additional information to assist with best practice guidelines for road infrastructure development can be found in Roads and Maritime Services QA Specification G71 - *Construction Surveys* by following the link: <http://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/specifications/g071.pdf>

### Types of survey marks

There are many types of survey marks used for various purposes. Many are buried and may only be identified by a Registered Land Surveyor. Some examples of common survey marks can be seen below.



### More information

For more information or to obtain advice on compliance with Legislation, please forward your enquiry to:

[Surveyor-General-Approvals@finance.nsw.gov.au](mailto:Surveyor-General-Approvals@finance.nsw.gov.au)

Applications to remove a Survey Mark can be lodged here: [http://spatialservices.finance.nsw.gov.au/surveying/surveying\\_services/forms\\_and\\_applications/survey\\_marks\\_removal](http://spatialservices.finance.nsw.gov.au/surveying/surveying_services/forms_and_applications/survey_marks_removal)





Geotechnical Consultants Australia

Astor Homes

**ASBESTOS CONTROL PLAN**  
**REMOVAL SCOPE OF WORKS**

1174-1178 Forest Road  
Lugarno NSW 2210

Lot A DP 328702, Lot 2 DP 18873 and Lot 3 DP 18873

E1933-2

12<sup>th</sup> August 2019

Asbestos Control Plan Removal Scope of Works  
 1174-1178 Forest Road Lugarno NSW 2210  
 Report No. E1933-2, 12<sup>th</sup> August 2019



### Report Distribution

Asbestos Control Plan Removal Scope of Works

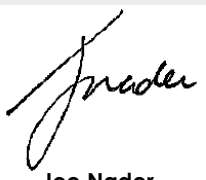
Address: 1174-1178 Forest Road Lugarno NSW 2210

GCA Report No.: E1933-2

Date: 12<sup>th</sup> August 2019

Copies	Recipient/Custodian
1 Soft Copy (PDF) – Secured and issued by email	Astor Homes Kirill Charonov kirill@astorhomes.com.au
1 Original – Saved to GCA Archives	Secured and Saved by GCA on Register

Version	Prepared By	Reviewed By	Date Issue
Draft	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	6 <sup>th</sup> August 2019
FINAL	<b>Luke Brevia</b> Environmental Scientist 	<b>Nick Caltabiano</b> Project Manager 	12 <sup>th</sup> August 2019

Report Revision	Details	Report No.	Date	Amended By
1	FINAL Report	E1933-2	12 <sup>th</sup> August 2019	-
Issued By:			 <b>Joe Nader</b>	

### Geotechnical Consultants Australia Pty Ltd

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[www.geoconsultants.com.au](http://www.geoconsultants.com.au)  
[info@geoconsultants.com.au](mailto:info@geoconsultants.com.au)

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Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



## EXECUTIVE SUMMARY

**Note: This Executive Summary must not be read in isolation, but should be read in conjunction with all sections of this report.**

### Asbestos Removal Scope of Works:

All work is to be undertaken in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011).

The scope of work described within this document is considered non friable asbestos and not requiring a licenced assessor due to the small localised areas.

### Prior to Removal Works Commencement:

- Restrict access to the removal area.
- Install 'Asbestos Warning' signs on all boundaries of the exclusion zone and on all places where anyone may gain access to the impacted area.

### Removal of asbestos contaminated soil as Non-Friable Asbestos:

- All asbestos removal works are to be undertaken with the exclusion of all non-asbestos workers during a time when the area is not occupied.
- Ensure water is available for misting / dust suppression and power is available for lighting and HEPA vacuuming prior to commencing.
- Emu pick all ACM fragments from the ground surface within the entire contaminated area
- Remove any asbestos contaminated soil/fill material (approximately 2m x 2m) within the identified area to a depth of 400mm or until a clean soil profile is achieved or no visible ACM is observed
- Soil contaminated with ACM must be appropriately wetted down to minimise dust prior to disturbance/removal
- Following removal of all ACM from the property, obtain clearance certification from GCA.

Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



## INTRODUCTION

### Assessment:

The scope of work described within this document is considered Non-Friable asbestos removal work.

### Site Description:

The site consists of a residential dwelling with ACM identified within three site locations. This report should be read in conjunction with the Detail Site Investigation report (Report No: E1933-1, Date: 17<sup>th</sup> July 2019).

### Removal Area:

The removal area includes a section (approximately 2m x 2m) located at three sites. From the Detail Site Investigation report (Report No: E1933-1, Date: 17<sup>th</sup> July 2019), asbestos was detected within borehole 11 (BH11), borehole 8 (BH8) and borehole 7 (BH7). It is within these three boreholes where soil removal is required.



Figure 1: Soil removal occurred at Borehole 7, Borehole 8 and Borehole 11

Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



## ABBREVIATIONS

- AIB - Asbestos Insulating Board (also referred to as LDB)
- ACM - Asbestos Containing Material
- ACD - Asbestos Contaminated Dust
- AC - Asbestos Cement (commonly known as fibro)
- EDB - Electrical Distribution Board
- FCS - Fibrous Cement Sheeting
- LDB - Low Density Board (a Friable ACM that appears similar to Asbestos Cement)
- NATA - National Association of Testing Authorities
- NES - National Exposure Standard
- NOHSC - National Occupational Health and Safety Commission
- Pb - Lead
- PCB - Polychlorinated Biphenyls
- PPE - Personal Protective Equipment
- QA/QC - Quality Assurance / Quality Control
- SMF - Synthetic Mineral Fibre
- SWA - Safe Work Australia
- TWA - Time Weighted Average
- VFT - Vinyl Floor Tile
- WHS - Work Health and Safety

Asbestos Control Plan Removal Scope of Works  
1174-1178 Forest Road Lugarno NSW 2210  
Report No. E1933-2, 12<sup>th</sup> August 2019



## ASBESTOS REMOVAL PLAN

### 1.0 GENERAL

- The Removal Contractor is to ensure that all work is undertaken in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011), and the Work Health and Safety Act 2011 (WHS 2011);
- The Removal Contractor is required at all times to strictly adhere to all relevant Acts, Regulations and Codes of Practice;
- The Removal Contractor shall obtain all necessary permits and approvals and give required notices (e.g. WorkCover permit to undertake removal works and any site specific approvals from the Local Council Authority);
- The Removal Contractor shall ensure that site access is restricted and unauthorised access into the site is prevented. Install barricades and/or hoardings, and appropriate signs, including asbestos removal signs, before beginning any work;
- All non-essential persons are to be separated from the removal area by at least 10 metres as a general guide. If a shorter boundary is required then a Licensed Asbestos Assessor (friable) or Competent Person (nonfriable) should determine the new boundary based on a risk assessment;
- Access for other persons to within any asbestos removal control boundary is not permissible without the supervision of the asbestos removal contractor and whilst wearing the correct PPE;
- The Removal Contractor shall ensure that the site is secure and safe;
- The Removal Contractor shall establish procedures for dealing with emergencies. Fully inform all site personnel of work plan and safety procedures;
- Where an asbestos removal exclusion zone is established in the vicinity of a fire exit or emergency egress route, procedures should be implemented such that emergency evacuation may occur unhindered;
- No asbestos removal work is to be undertaken during any period of high wind or within the period of effect of any high wind warning, gale warning or other storm warning;
- Where removal works extend beyond 1 day, the Removal Contractor shall ensure that the removal site and any associated asbestos removal equipment is made weather / storm proof prior to leaving site each day;
- The Removal Contractor shall seal all penetrations, holes, vents, air plenums, HVAC ducting and the like prior to the commencement of work;
- The Removal Contractor shall cover all vegetation, shrubs, grassed surfaces, gardens and the like with 0.2mm plastic sheeting with taped joints prior to the commencement of work;
- The Removal Contractor shall remove or seal all soft furnishings, floor coverings, window coverings, fly screens, and other porous or perforated materials prior to the commencement of work;
- The Removal Contractor shall ensure that all drains etc. are fitted with an appropriate filter medium in order to remove contaminants from any water leaving the site. The condition of the filters shall be checked regularly and filters replaced when necessary;
- The Removal Contractor will decide if electrical services etc. are to remain in operation during remedial works and ensure all other services are assessed prior to commencement. Arrange service alternatives as required;

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- The Removal Contractor shall ensure that fire extinguisher(s) suitable for the area of work are present and accessible at all times during the removal program.
- To ensure that dust generation is minimised, the Removal Contractor shall ensure that all sources of dust are suppressed with low-pressure water sprays. The sprays will apply minimal amounts of water to the work areas in a fine mist to minimise or eliminate water run-off and free water;
- The Removal Contractor shall ensure that all confined spaces are adequately designated, and that all works within any identified confined spaces are conducted in accordance with the relevant legislative requirements;
- The Removal Contractor is responsible for the proper disposal of all wastes in accordance with all statutory requirements. Waste disposal receipts and/or tipping documentation is to be supplied to the Principal. Refuse arising from the execution of work (including food scraps and the like) shall be removed from the site;
- Any ancillary workers (tradesman / machinery operators / specialist technicians and the like) required to be present during the asbestos removal must undergo Asbestos awareness training prior to the commencement of work;
- The Removal Contractor shall ensure that all workers have received appropriate instruction in the health hazards associated with asbestos the use of PPE and that all workers wear their PPE in accordance with the manufacturer's specifications;
- The Removal Contractor shall ensure that all workers required to wear respiratory protective equipment have undergone a qualitative fit testing assessment to ascertain that they are able to maintain an adequate facial seal while wearing the chosen RPE.
- The Removal Contractor shall establish an area for decontamination of equipment/plant/vehicles and wetting down and disposal of PPE. Decontamination facilities must be appropriate for the nature of the planned removal;
- No disposable coveralls or PPE is to be worn outside of the removal area;
- No vehicle or container shall leave the site unless it is loaded appropriately, within the safe working limit of the vehicle/container and is adequately covered;
- All material which may contain asbestos should be assumed to contain asbestos unless NATA accredited analysis indicates otherwise;
- Asbestos containing materials should not be broken in any way and are to be disposed of as whole components;
- All tools and equipment that has entered the contaminated areas is to undergo decontamination in the decontamination area prior to leaving the contaminated area;
- The Removal Contractor is advised that the WorkCover Authority may be called upon by the Consultant to give advice on current work procedures and practices at any stage throughout the Project without prior notice to the Principal Contractor.

## 2.0 CONDUCT OF WORK

- Undertake a detailed and site specific risk assessment in consultation with all workers involved;
- Hold a tool box meeting to ensure that all workers are fully informed of works involved;
- Demarcate an Asbestos removal exclusion zone at greater than 10m from the worksite, or where practical;
- Install barricades and signage on all potential points of entry to the exclusion zone;
- Designate a decontamination area for the removal and disposal of all used PPE;

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- Designate an Asbestos waste storage area for the temporary storage of waste;
- As a dust minimisation measure, spray all asbestos contaminated/potentially contaminated material with a low pressure water mist or PVA emulsion prior to, and during the removal. The sprays are not to generate free water/water runoff;
- Undertake ALL asbestos removal works detailed in the Executive Summary of this report in accordance with the Safe Work Australia Code of Practice How to Safely Remove Asbestos (December 2011);
- At the completion of the scheduled asbestos removal work, undertake a walk-over inspection to ascertain the complete removal of all ACM within the current scope of work;
- Undertake a general site clean-up and restore the worksite condition in a tradesman-like manner;
- Request for the Licensed Asbestos Assessor (friable) or Competent Person (non-friable) to conduct a final visual clearance inspection and issue a clearance certificate upon satisfactory clearance results;
- Subsequent to satisfactory inspection by the Hygienist, all surfaces within the work area are to be sprayed with a dilute PVA emulsion;
- Subsequent to a satisfactory Clearance Inspection, remove non-essential containment and associated equipment. Any contaminated/potentially contaminated containment materials (e.g. plastic sheeting) are to be disposed of as asbestos contaminated waste;
- Conduct a final walk-over inspection to ascertain the complete make-good of the worksite.

### 3.0 PERSONAL PROTECTIVE EQUIPMENT AND WORK PRACTICES

During all Asbestos removal work, the Removal Contractor is to ensure that the following precautions and safety measures are implemented:

- The exclusion of non-workers;
- Use of appropriate respiratory protection;
- The correct and proper wearing of disposable suits with hood;
- The wearing of non-porous gloves;
- The wearing of non-lace-up boots;
- Eye protection (e.g. goggles), steel capped boots, and hard hat as per general requirements for site work;
- Use of decontamination units/facilities to include washing of face, hands, and all skin thoroughly before leaving the removal area, eating, drinking or smoking;
- No food consumption or smoking inside the treatment area;
- Showering and changing before leaving the site each day (friable work);
- Cleaning of boots before leaving the treatment area;
- New disposable suits and face masks to be used for each entry to the exclusion zone;
- No disposable coveralls or PPE is to be worn outside of the removal area.



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#### 4.0 CONTAMINATED WASTE

The Removal Contractor is to ensure that the transportation and disposal of contaminated waste meets the requirements of the NSW EPA as outlined in Waste Disposal Guidelines.

The Removal Contractor is responsible for controlling all waste generated. This may include determining that all testing, handling, storage, transport and disposal requirement have been met.

Copies of the waste disposal receipts are to be supplied by the Removal Contractor to the Principal. A log detailing the dates and quantities of waste removed and the disposal site is to be kept.

##### 4.1 SITE SUPERVISION AND INSPECTION

Site Supervision shall be undertaken by a qualified employee of the Removal Contractor (the Site Supervisor). The Supervisors duties include all those set out in the relevant rules and regulations as well as any other duties required by this document.

The Site Supervisor shall be fully trained, have at least 2 years experience, and a thorough knowledge of the work procedures and safety standards.

No Asbestos removal work is to be undertaken without the presence in the Asbestos Work Area of a Site Supervisor of the Removal Contractor.

##### 4.2 WASTE REMOVAL

It is the responsibility of the Removal Contractor to ensure that all waste is managed in accordance with the relevant legislation and in the following manner:

- All Asbestos waste is to be placed immediately into approved polyethylene bags or lined bins and sealed in an appropriate manner to render it safe for handling and disposal;
- Bags shall be filled to no more than 20 kg and should be no more than half full. Bins should not be overfilled;
- Bags shall be tied with wire rod ties fixed in position with a rod-tying tool and/or sealed by tape. When tying the bag, surplus air should be excluded from the bag without discharging contaminated dust;
- Loaded bags shall be carried carefully and not thrown, dropped, or roughly handled;
- Any damaged or punctured bag shall be placed into a second bag, which is then re-sealed;
- The bagged waste shall not be allowed to accumulate. It shall be removed from the site at regular intervals at the completion of decontamination in each Asbestos Work Area;
- All waste must be available for inspection;
- The external surface of the bag is to be wet wiped in the decontamination area to remove any dust adhering to the surface immediately before being shifted from the Asbestos Work Area;
- The bags shall be placed into approved storage containers/bins. The containers shall be lined with 0.2mm plastic. When the bins/containers are full they shall be sealed and removed from site; Any contamination of the work area shall be cleaned up immediately.

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#### 4.3 CLEAN-UP AND AREA RESTORATION

On completion of the asbestos remediation the Removal Contractor shall ensure the clean-up of the removal area. All surfaces shall be thoroughly cleaned and prepared for final inspection by the Hygienist. If the remediation area is not cleaned satisfactorily, the Removal Contractor shall repeat the clean up as directed by the Hygienist. Clearance air monitoring may be conducted following a satisfactory visual inspection by the Hygienist.

#### 4.4 CLEARANCE CERTIFICATION

At the completion of the Asbestos removal works, and following satisfactory clean-up and area restoration by the Removal Contractor, the Hygienist will attend the site to undertake a visual clearance inspection. Clearance sampling of settled dust may be considered necessary by the Hygienist in order to identify any residual micro-fibre Asbestos particularly if the removal area is not able to be sprayed with a dilute PVA emulsion subsequent to the removal works.

If during the Clearance Inspection:

- No further evidence of asbestos contamination is visually identified;
- Any encapsulation work is found to be complete and adequate;
- All asbestos air monitoring results are <0.01 fibres/mL;
- All sample analysis results report 'No Asbestos Detected';

Then the consultant will issue a clearance certificate with words to the effect:

The consultant considers that as far as reasonably practicable all visible and accessible Asbestos containing materials within the current scope of work have been removed to a satisfactory industry standard. It is the opinion of the Consultant, that with regard to Asbestos, the above-mentioned areas inspected are considered safe for normal activities to proceed.

Included will be a limitation clause(s) to cover any possible or actual remaining contamination/issues of concern.

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## LIMITATIONS

GCA performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of GCA personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, GCA assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of GCA, or developments resulting from situations outside the scope of this project.

The results of this assessment are based on the site conditions identified at the time of the site inspection and validation sampling. GCA will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report.

GCA is not engaged in environmental consulting and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

### Geotechnical Consultants Australia Pty Ltd (GCA)

#### Prepared by:

A handwritten signature in black ink, appearing to read 'LB', followed by a horizontal line.

**Luke Brevia**  
Environmental Scientist

#### Reviewed by:

A handwritten signature in black ink, appearing to read 'N. Caltabiano', followed by a horizontal line.

**Nick Caltabiano**  
Project Manager

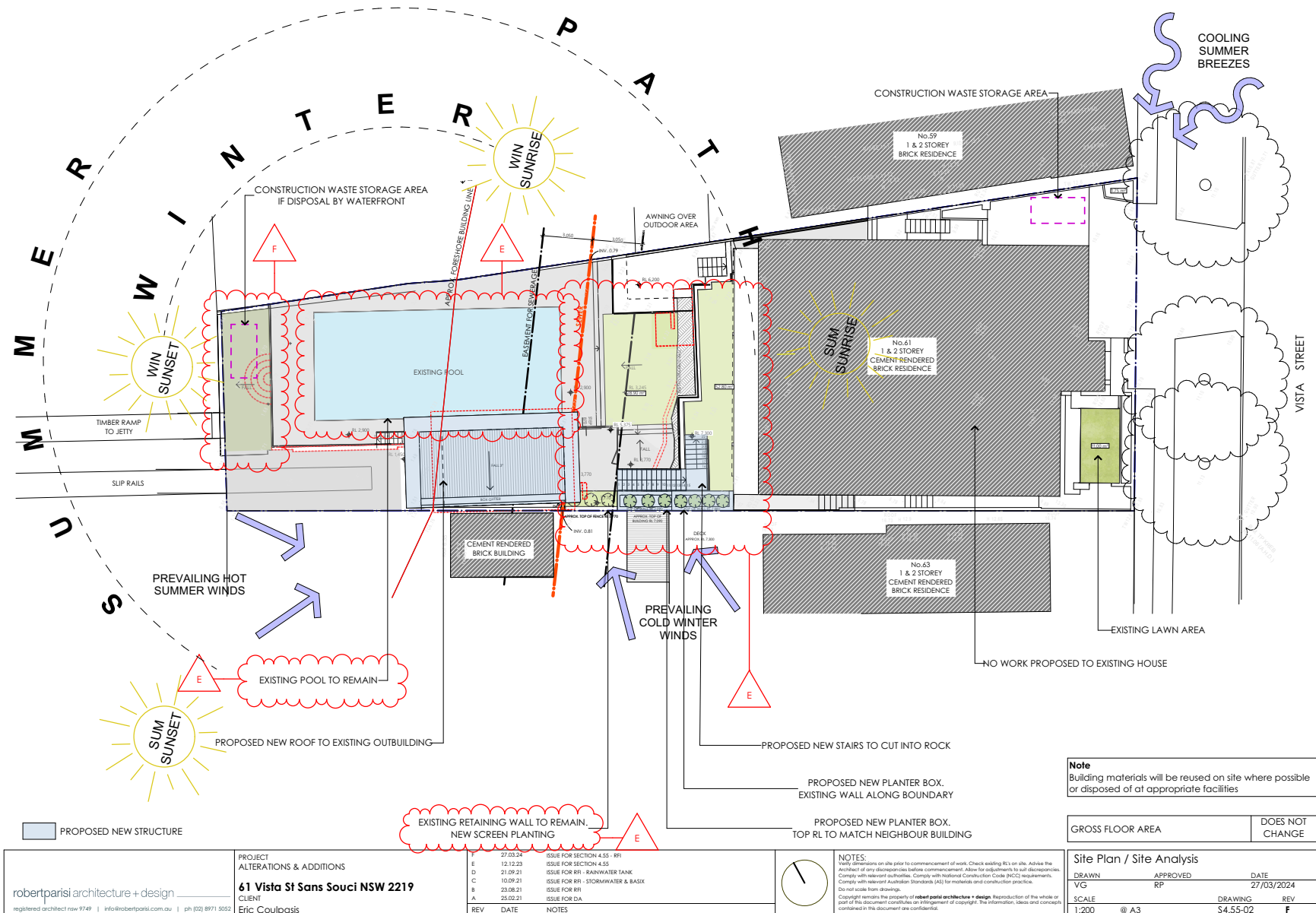
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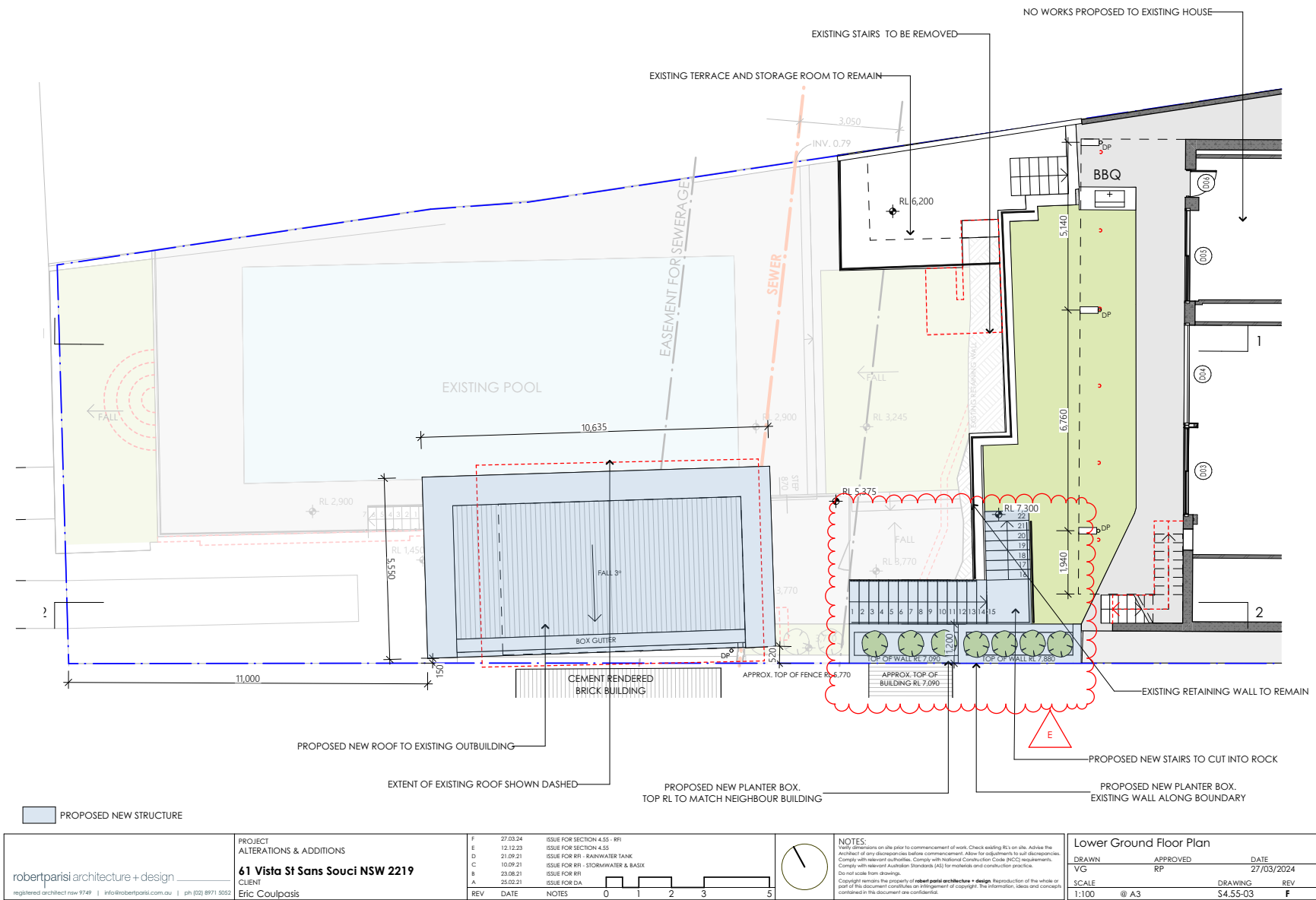
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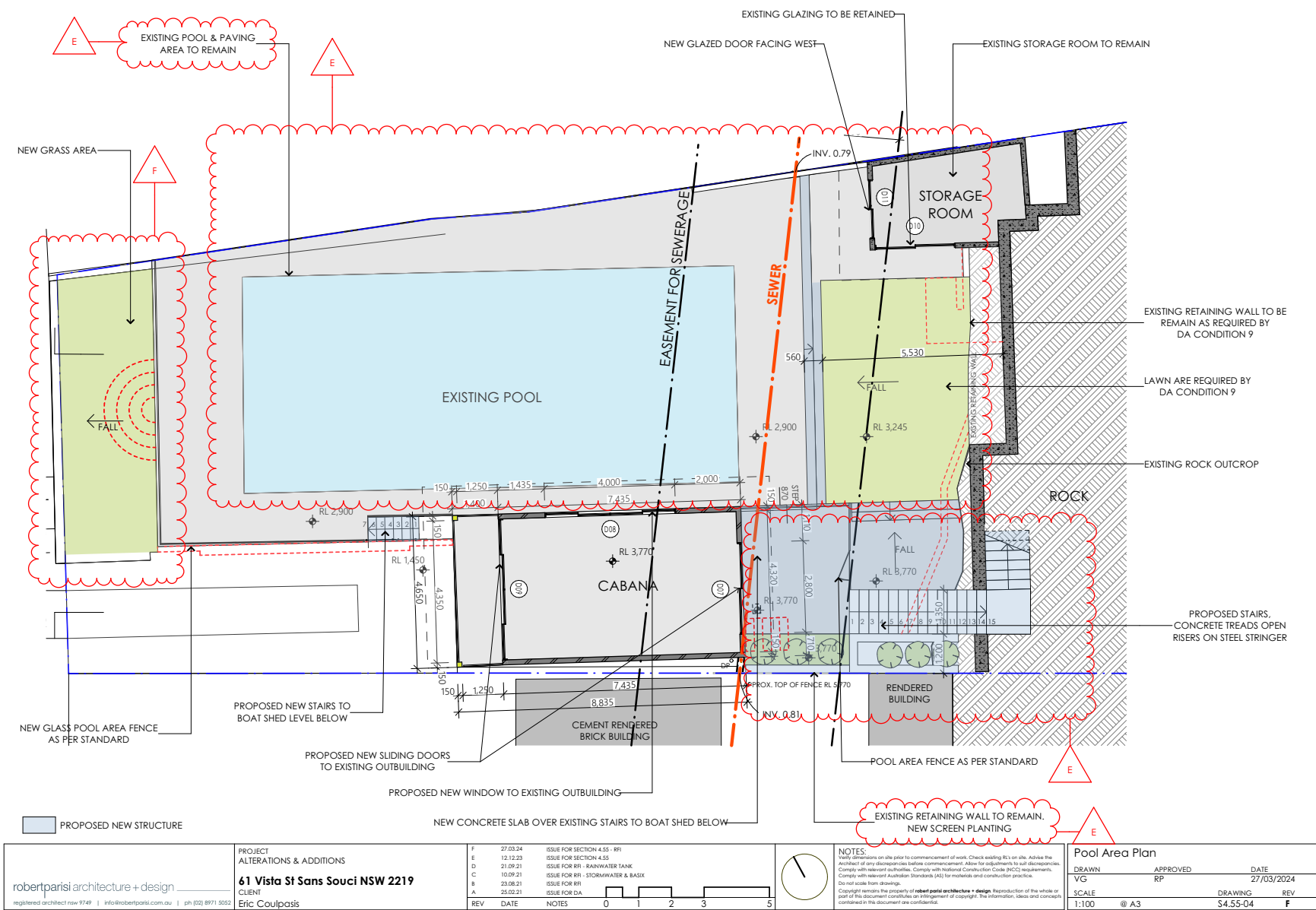
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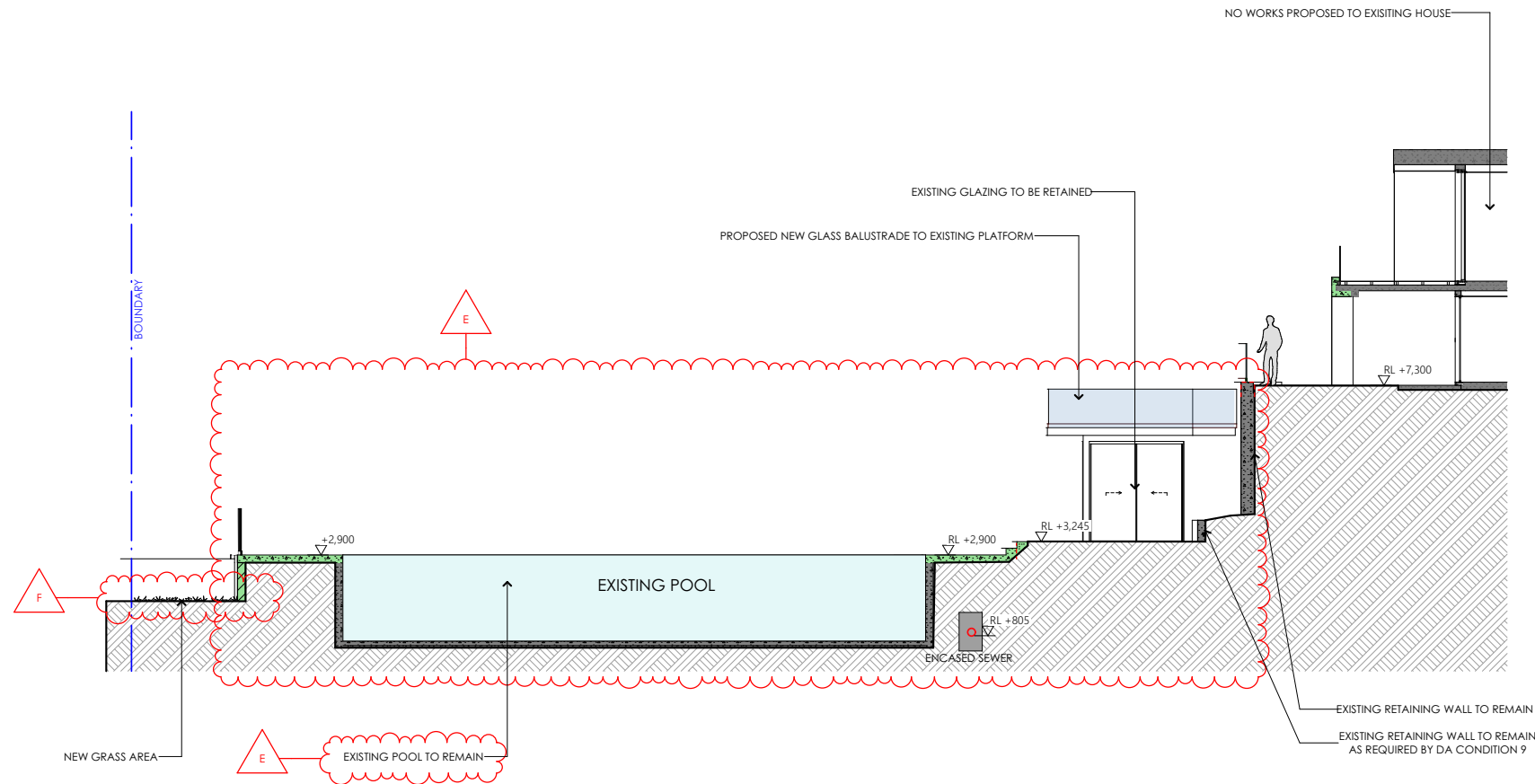
<div>robertparisi architecture + design</div> <div>registered architect nsw 9749   info@robertparisi.com.au   ph (02) 8971 3052</div>	PROJECT ALTERATIONS & ADDITIONS		F	27.03.24	ISSUE FOR SECTION 4.55 - RFI	<div>NOTES:</div> <div>Verify dimensions on site prior to commencement of work. Check existing RLs on site. Advise the Architect of any discrepancies before commencement. Allow for adjustments to suit discrepancies. Comply with relevant authorities. Comply with National Construction Code (NCC) requirements. Comply with relevant Australian Standards (AS) for materials and construction practice.</div> <div>Do not scale from drawings.</div> <div>Copyright remains the property of robert parisi architecture + design. Reproduction of the whole or part of this document constitutes an infringement of copyright. The information, ideas and concepts contained in this document are confidential.</div>	Cover Page			
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	Eric Coulpasis		B	10.09.21	ISSUE FOR RFI - STORMWATER & BASIN		SCALE	DRAWING	REV	
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RF - COPPER ROOF



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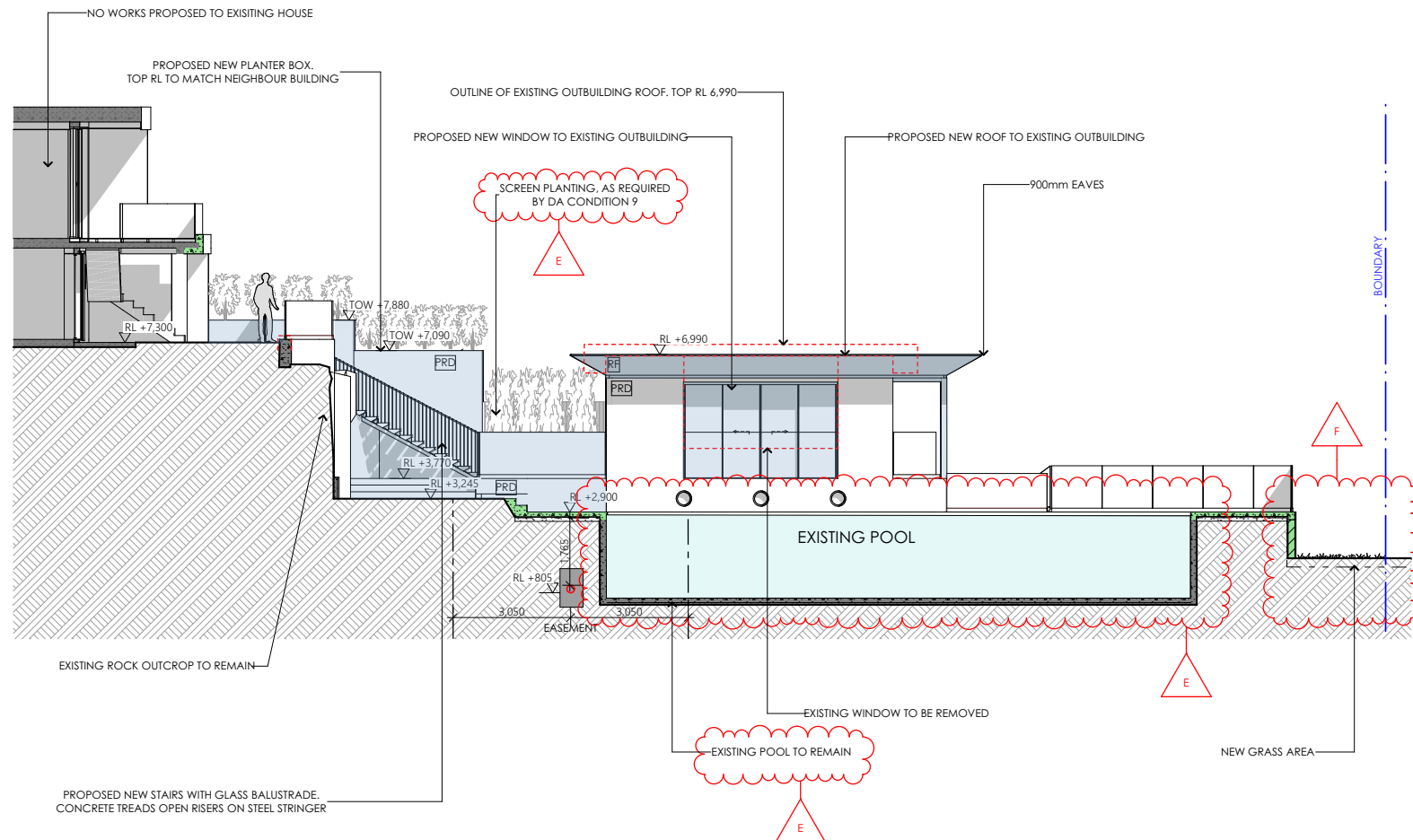
<div>robertparisi architecture + design</div> <div>registered architect nsw 9749   info@robertparisi.com.au   ph (02) 8971 3052</div>	<div>PROJECT</div> <div>ALTERATIONS &amp; ADDITIONS</div> <div>61 Vista St Sans Souci NSW 2219</div> <div>CLIENT</div> <div>Eric Coulpasis</div>	F	27.03.24	ISSUE FOR SECTION 4.55 - RF1	<div>NOTES:</div> <div>Verify dimensions on site prior to commencement of work. Check existing RLs on site. Advise the Architect of any discrepancies before commencement. Allow for adjustments to suit discrepancies. Comply with relevant authorities. Comply with National Construction Code (NCC) requirements. Comply with relevant Australian Standards (AS) for materials and construction practice.</div> <div>Do not scale from drawings.</div> <div>Copyright remains the property of robertparisi architecture + design. Reproduction of the whole or part of this document constitutes an infringement of copyright. The information, ideas and concepts contained in this document are confidential.</div>	Section 1		
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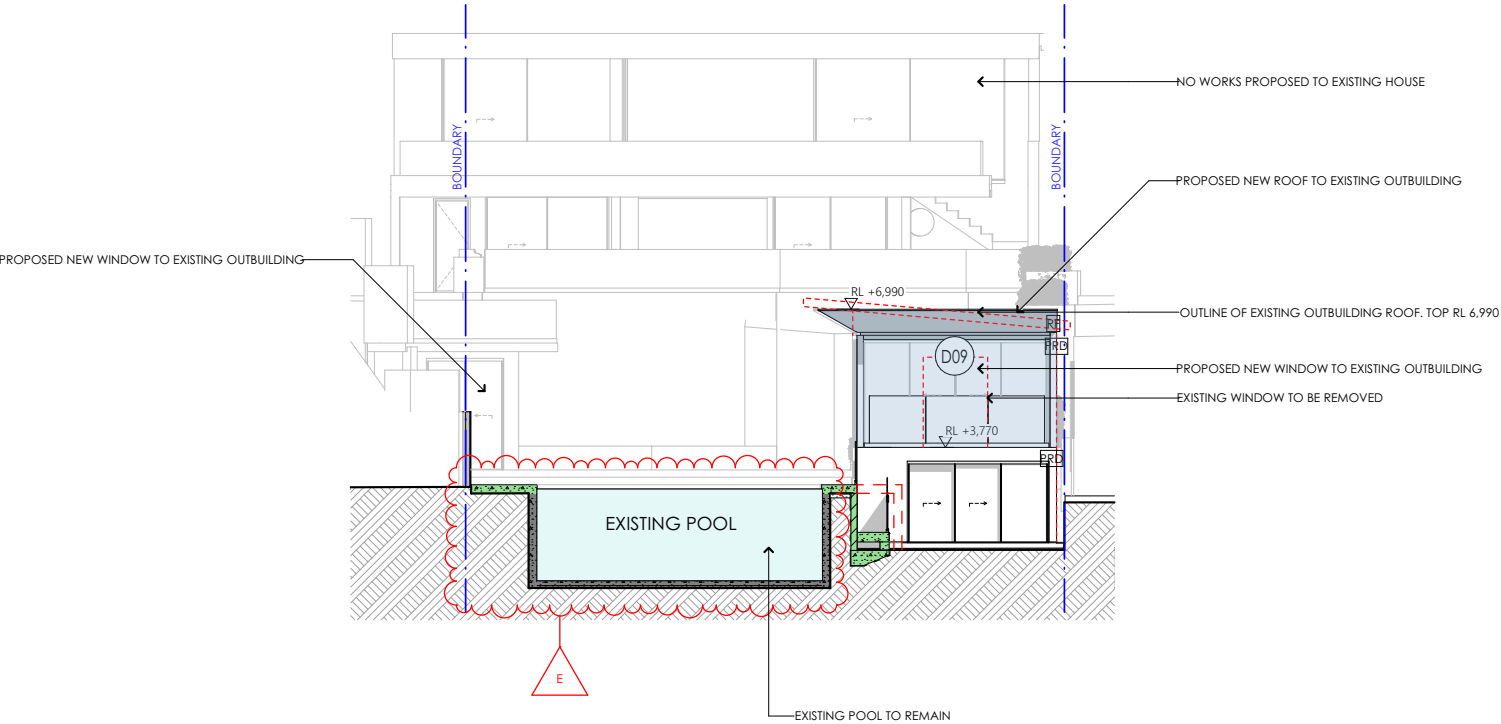
**NOTES:**  
NO EXCAVATION REQUIRED FOR PROPOSED DEVELOPMENT.

robertparisi architecture + design <small>registered architect nrw 9749   info@robertparisi.com.au   ph (02) 8971 5052</small>	PROJECT ALTERATIONS & ADDITIONS		<table><tr><td>F</td><td>27.03.24</td><td>ISSUE FOR SECTION 4.55 - RPI</td><td></td><td></td><td></td><td></td></tr><tr><td>E</td><td>12.12.23</td><td>ISSUE FOR SECTION 4.55</td><td></td><td></td><td></td><td></td></tr><tr><td>D</td><td>21.09.21</td><td>ISSUE FOR RPI - RAINWATER TANK</td><td></td><td></td><td></td><td></td></tr><tr><td>C</td><td>10.09.21</td><td>ISSUE FOR RPI - STORMWATER &amp; BAIXI</td><td></td><td></td><td></td><td></td></tr><tr><td>B</td><td>23.08.21</td><td>ISSUE FOR RPI</td><td></td><td></td><td></td><td></td></tr><tr><td>A</td><td>26.02.21</td><td>ISSUE FOR D.A.</td><td></td><td></td><td></td><td></td></tr></table>					F	27.03.24	ISSUE FOR SECTION 4.55 - RPI					E	12.12.23	ISSUE FOR SECTION 4.55					D	21.09.21	ISSUE FOR RPI - RAINWATER TANK					C	10.09.21	ISSUE FOR RPI - STORMWATER & BAIXI					B	23.08.21	ISSUE FOR RPI					A	26.02.21	ISSUE FOR D.A.					NOTES: Verify dimensions on site prior to commencement of work. Check existing RPI on site. Advise the Architect of any discrepancies before commencement. Allow for adjustments to suit discrepancies. Comply with relevant authorities. Comply with National Construction Code (NCC) requirements. Comply with relevant Australian Standards (AS) for materials and construction practice. Do not start from existing. Copyright remains the property of robert parisi architecture + design. Reproduction of this whole or part of this document constitutes an infringement of copyright. The information, ideas and concepts contained in this document are confidential.		North Elevation	
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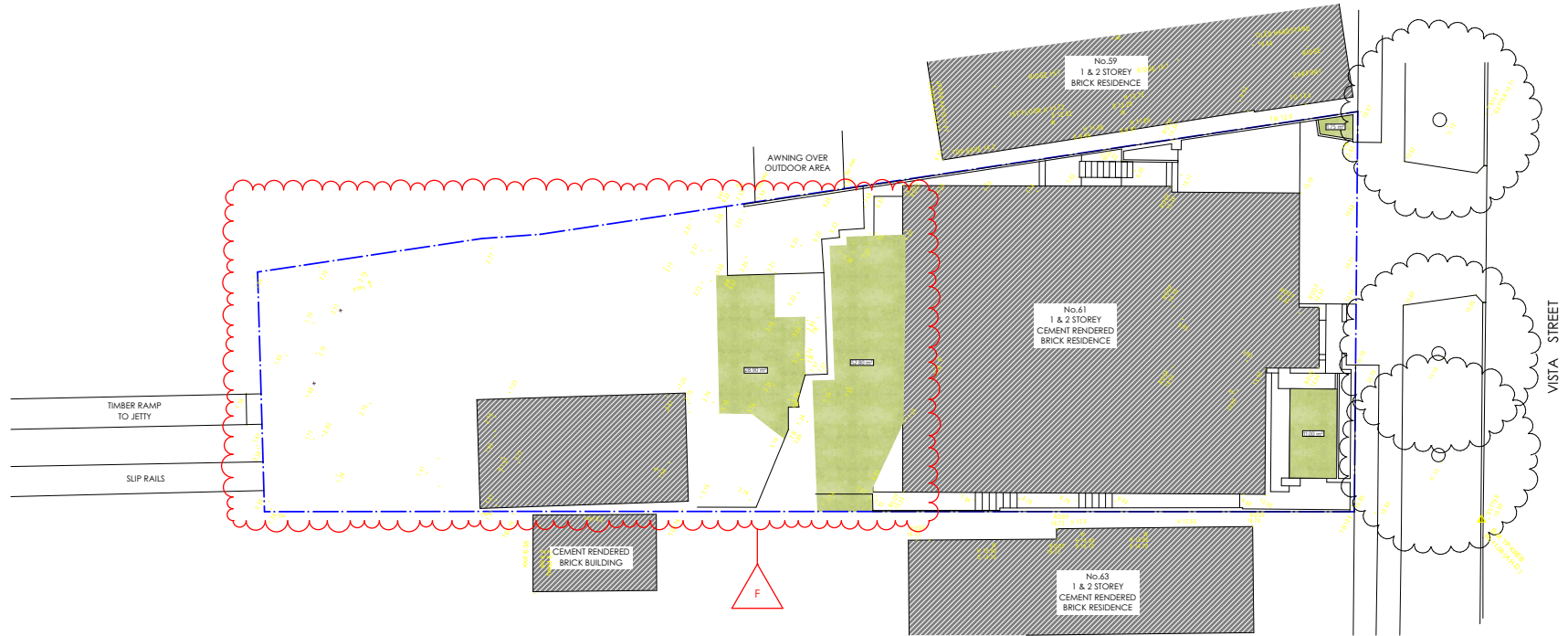
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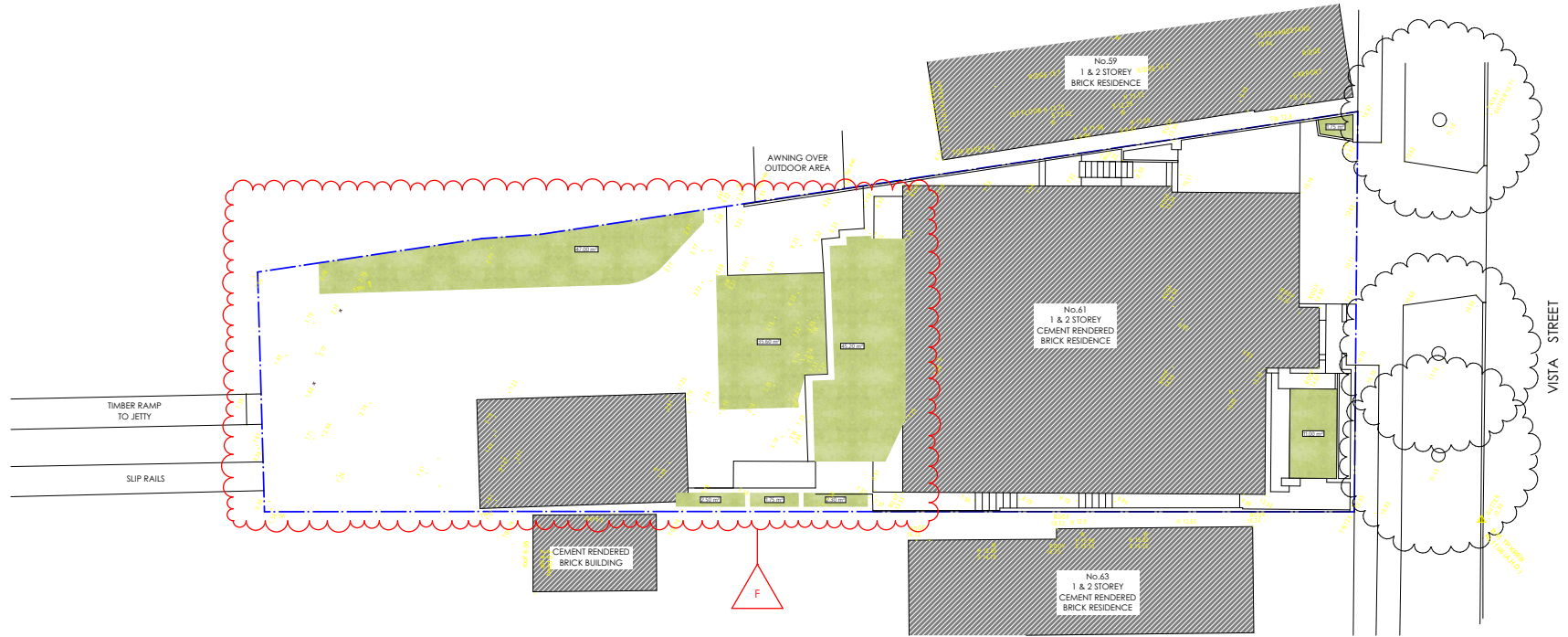


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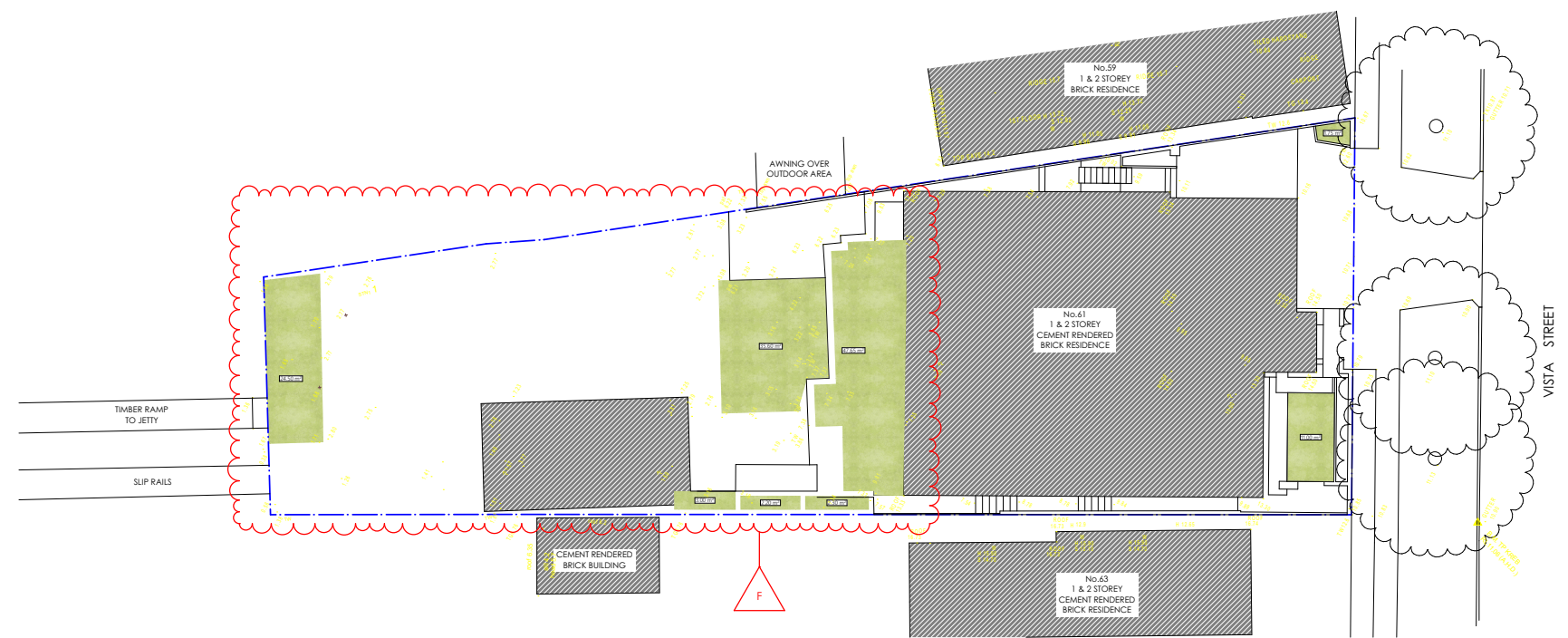
<div>robertparisi architecture + design</div> <div>registered architect nsw 9749   info@robertparisi.com.au   ph (02) 8971 3052</div>	PROJECT ALTERATIONS & ADDITIONS		F 27.03.24 ISSUE FOR SECTION 4.55- RRI		<div>NOTES:</div> <div>Verify dimensions on site prior to commencement of work. Check existing RL's on site. Advise the Architect of any discrepancies before commencement. Allow for adjustments to suit discrepancies. Comply with relevant authorities. Comply with National Construction Code (NCC) requirements. Comply with relevant Australian Standards (AS) for materials and construction practice.</div> <div>Do not scale from drawings.</div> <div>Copyright remains the property of robertparisi architecture + design. Reproduction of the whole or part of this document constitutes an infringement of copyright. The information, ideas and concepts contained in this document are confidential.</div>	West Elevation			
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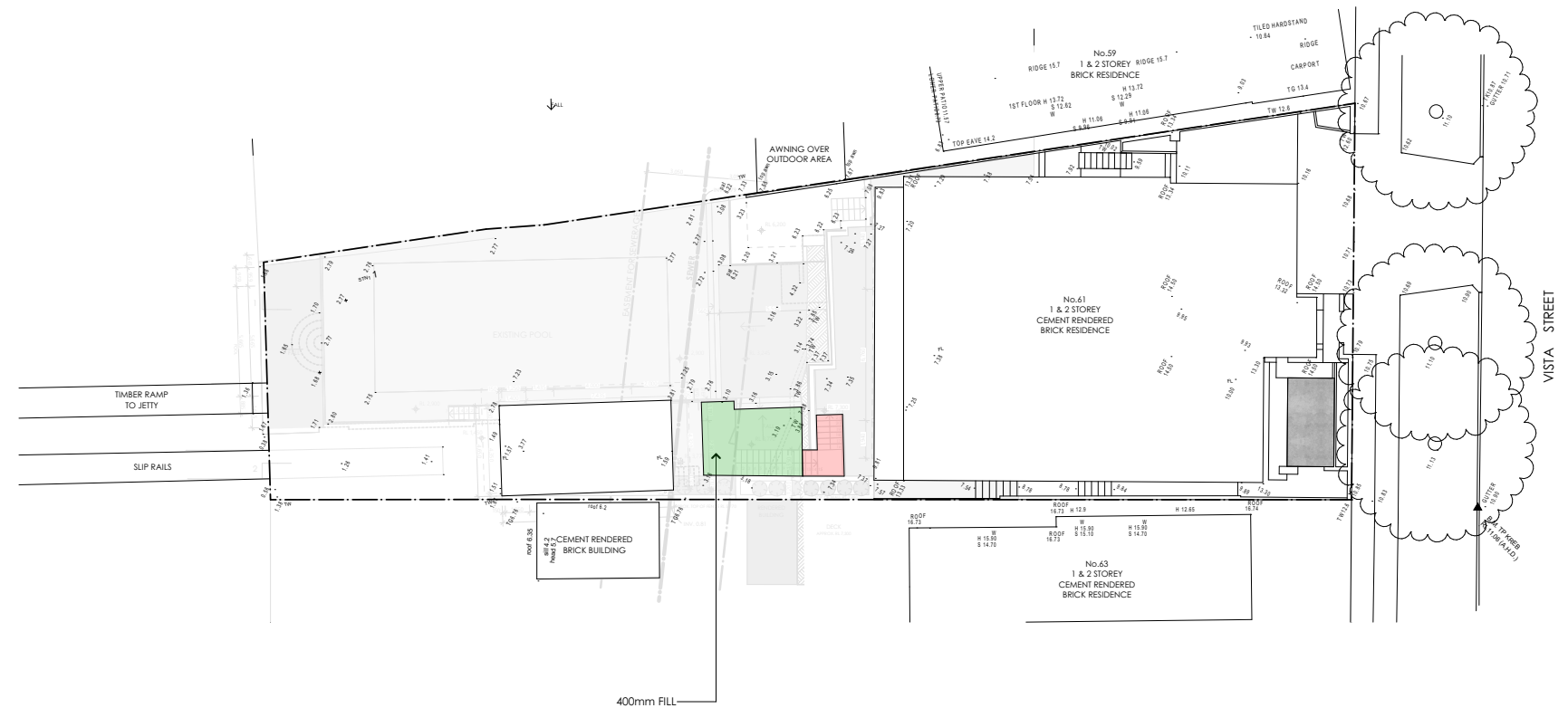
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- PROPOSED ROCK CUT
- PROPOSED EARTH FILL

NOTES:  
NO EXCAVATION REQUIRED FOR PROPOSED DEVELOPMENT.

NO NEW RETAINING WALL ALONG BOUNDARIES

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registered architect nsw 9749 | info@robertparisi.com.au | ph (02) 8971 3052

PROJECT  
ALTERATIONS & ADDITIONS

61 Vista St Sans Souci NSW 2219

CLIENT  
Eric Coulpasis

REV

DATE

NOTES

F

27.03.24

ISSUE FOR SECTION 4.55 - RFI

E

12.12.23

ISSUE FOR SECTION 4.55

D

21.09.24

ISSUE FOR RFI - RAWWATER TANK

C

10.09.21

ISSUE FOR RFI - STORMWATER & BASIN

B

23.08.21

ISSUE FOR RFI

A

25.02.21

ISSUE FOR DATA

NOTES:

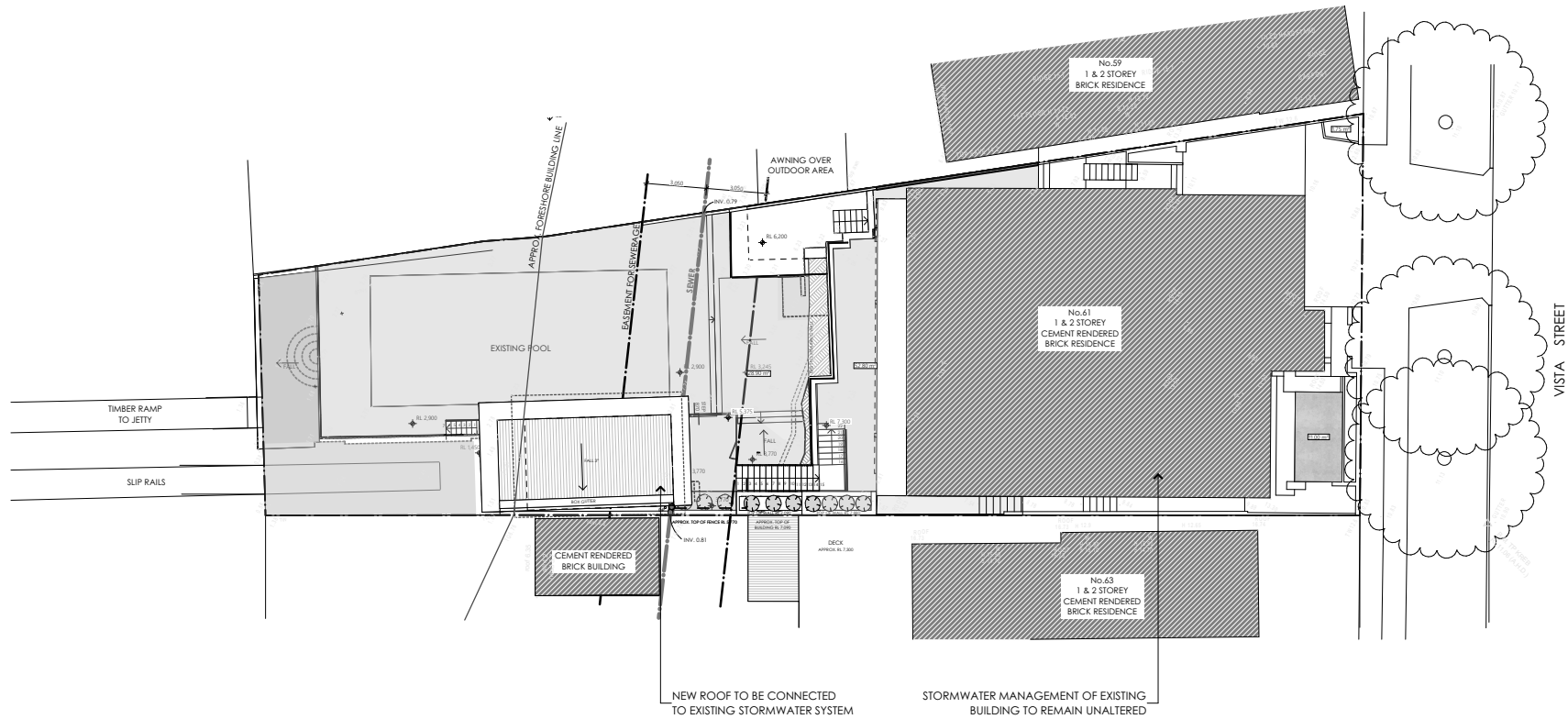
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Cut & Fill Plan

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SCALE	DRAWING	REV
1:200 @ A3	S4.55-11	F



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ISSUE FOR RFI

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ISSUE FOR DA

REV

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NOTES

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Stormwater Concept Plan

DRAWN

APPROVED

DATE

VG

RP

27/03/2024

SCALE

DRAWING

REV

1:200

@ A3

S4.55-12 F

**BASIX<sup>®</sup> Certificate**  
Building Sustainability Index [www.basix.nsw.gov.au](http://www.basix.nsw.gov.au)

**Alterations and Additions**

Certificate number: A1729895

This certificate confirms that the proposed development will meet the NSW government's requirements for sustainability, if it is built in accordance with the commitments set out below. Terms used in this certificate, or in the commitments, have the meaning given by the document entitled "BASIX Definitions" dated 10/09/2020 published by the Department. This document is available at [www.basix.nsw.gov.au](http://www.basix.nsw.gov.au)

Secretary  
Date of issue: Tuesday, 12 December 2023  
To be valid, this certificate must be lodged within 3 months of the date of issue.



BASIX Certificate number: A1729895

page 1/6

Project address	
Project name	61 Vista
Street address	61 VISTA Street SANS SOUCI 2219
Local Government Area	Georges River Council
Plan type and number	Deposited Plan D9752056
Lot number	471
Section number	N/A
Project type	
Dwelling type	Separate dwelling house
Type of alteration and addition	My renovation work is valued at \$50,000 or more, and does not include a pool (and/or spa).
N/A	N/A
Certificate Prepared by <small>(please complete before submitting to Council or PCA)</small>	
Name / Company Name:	Robert Parisi
ABN (if applicable):	17311480250

BASIX Certificate number: A1729895

page 4/6

Glazing requirements	Show on DA Plans	Show on CC/CDC Plans & specs	Certifier Check
<b>Windows and glazed doors</b>			
The applicant must install the windows, glazed doors and shading devices, in accordance with the specifications listed in the table below. Relevant overshadowing specifications must be satisfied for each window and glazed door.	✓	✓	✓
The following requirements must also be satisfied in relation to each window and glazed door:		✓	✓
Each window or glazed door with standard aluminium or timber frames and single clear or toned glass may either match the description, or, have a U-value and a Solar Heat Gain Coefficient (SHGC) no greater than that listed in the table below. Total system U-values and SHGCs must be calculated in accordance with National Fenestration Rating Council (NFRC) conditions.		✓	✓
For projections described in millimetres, the leading edge of each eave, pergola, verandah, balcony or awning must be no more than 500 mm above the head of the window or glazed door and no more than 2400 mm above the sill.	✓	✓	✓
Pergolas with polycarbonate roof or similar translucent material must have a shading coefficient of less than 0.35.		✓	✓
Pergolas with fixed battens must have battens parallel to the window or glazed door above which they are situated, unless the pergola also shades a perpendicular window. The spacing between battens must not be more than 50 mm.		✓	✓

BASIX Certificate number: A1729895

page 5/6

Glazing requirements							Show on DA Plans	Show on CC/CDC Plans & specs	Certifier Check
Windows and glazed doors glazing requirements									
Window/door number	Orientation	Area of glass including frame (m <sup>2</sup> )	Overshadowing height (m)	Overshadowing distance (m)	Shading device	Frame and glass type			
W1	SE	7	0	0	eave/ verandah/ pergola/balcony >=500 mm	standard aluminium, single clear, (or U-value: 7.63, SHGC: 0.75)			
W2	NE	10	0	0	eave/ verandah/ pergola/balcony >=500 mm	standard aluminium, single clear, (or U-value: 7.63, SHGC: 0.75)			
W3	NW	10.8	0	0	eave/ verandah/ pergola/balcony >=500 mm	standard aluminium, single clear, (or U-value: 7.63, SHGC: 0.75)			
W4	NW	4.7	0	0	eave/ verandah/ pergola/balcony >=500 mm	standard aluminium, single clear, (or U-value: 7.63, SHGC: 0.75)			

BASIX Certificate number: A1729895

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Legend
In these commitments, "applicant" means the person carrying out the development.
Commitments identified with a <b>✓</b> in the "Show on DA plans" column must be shown on the plans accompanying the development application for the proposed development (if a development application is to be lodged for the proposed development).
Commitments identified with a <b>✓</b> in the "Show on CC/CDC plans & specs" column must be shown in the plans and specifications accompanying the application for a construction certificate / complying development certificate for the proposed development.
Commitments identified with a <b>✓</b> in the "Certifier check" column must be certified by a certifying authority as having been fulfilled, before a final occupation certificate for the development may be issued.

Fixtures and systems	Show on DA Plans	Show on CC/CDC Plans & specs	Certifier Check
<b>Lighting</b>			
The applicant must ensure a minimum of 40% of new or altered light fixtures are fitted with fluorescent, compact fluorescent, or light-emitting-diode (LED) lamps.		✓	✓

BASIX Certificate number: A1729895

page 3/6

Construction	Show on DA Plans	Show on CC/CDC Plans & specs	Certifier Check
<b>Insulation requirements</b>	✓	✓	✓
The applicant must construct the new or altered construction (floor(s), walls, and ceilings/roofs) in accordance with the specifications listed in the table below, except that a) additional insulation is not required where the area of new construction is less than 2m <sup>2</sup> , b) insulation specified is not required for parts of altered construction where insulation already exists.			
Construction	Additional insulation required (R-value)	Other specifications	
flat ceiling, flat roof: framed	ceiling: R1.58 (up), roof: foil backed blanket (55 mm)	medium (solar absorbance 0.475 - 0.70)	

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	61 Vista St Sans Souci NSW 2219		S	12.12.23	ISSUE FOR SECTION 4.55												
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VG	RP	27/03/2024															
SCALE	DRAWING	REV															
@ A3	S4.55-13	F															





## STATEMENT OF ENVIRONMENTAL EFFECTS

Section 4.55 Modification (MOD2023/0056) to approved DA2021/0081 for alterations and additions to the dwelling house including a new pool and upgrades to the existing cabana

61 Vista Street  
Sans Souci

Prepared for: Mr & Mrs Coulpasis

REF: M180462  
DATE: 3 April 2024





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# 1. Introduction

This Statement accompanies a Section 4.55(2) Modification (MOD2023/0056) to approved Development Application DA2021/0081 involving alterations and additions within the rear yard of the subject site including a new pool and upgrades to the existing cabana at No. 61 Vista Street, Sans Souci.

This Statement has been prepared following a Request for Information Letter (RFI) issued by Georges River Council dated 14 March 2024 requesting that a more detailed Statement of Environmental Effects be prepared to accompany the Section 4.55 Modification Application.

This Statement should be read in conjunction with the amended Architectural Plans (Revision F, dated 27 March 2024) lodged with this Statement in response to the RFI Request Letter.

The proposed modification application seeks to retain the existing in-ground swimming pool rather than replace it with a new in-ground swimming pool and provide other minor modifications to the configuration of the external rear stairs and additional landscaped area.

This statement demonstrates that the proposed modified development meets the objectives of Zone R2 Low Density Residential and complies with the core development standards and applicable controls of the Foreshore Scenic Protection Area and Landscaped Area controls in the Georges River Local Environmental Plan 2021. Importantly, the proposed development responds appropriately to the character of the surrounding locality and site constraints and enhances the existing site conditions by providing refurbished ancillary residential structures.

The purpose of this Statement is to address the planning issues associated with the development proposal and specifically to assess the likely impact of the development on the environment in accordance with the requirements of S4.55 and S4.15 of the Environmental Planning & Assessment (EP&A) Act, 1979.

This Statement is divided into five sections. The remaining sections include a locality and site analysis; a description of the proposal; an environmental planning assessment; and a conclusion.





## 2. Site Analysis and Context

### 2.1 THE SITE

The subject site is known as No. 61 Vista Street, Sans Souci and has a legal description of Lot A in DP 333109 and Lots 404 and 471 in DP 752056. The location of the subject site is shown shaded in yellow in the aerial image provided in **Figure 1**.



**Figure 1** Aerial photo of the site and surrounds (source: SIX Maps)

The site is irregular in shape with a south-eastern frontage to Vista Street of 20.295m and north-western (rear) boundary of 12.22m. The north-eastern (side) boundary shared with No. 59 Vista Street has a length of 42.16m and the south-western (side) boundary shared with No. 63 Vista Street, a length of 44.87m. The site has a total area of 906.7m<sup>2</sup>.

The site has a slope, falling approximately 9m from the front to the rear boundary, where the site meets the water. Due to the slope of the site, the rear garden is terraced with stairs providing access to the various levels. There are rocky outcrops located in the rear garden as well. The site contains a double vehicle crossing from Vista Street. The site is currently occupied by a two-storey residential dwelling with a swimming pool and two outbuildings, one of which is a cabana.

Photographs of the site are provided in **Figure 2** through to **Figure 6**.





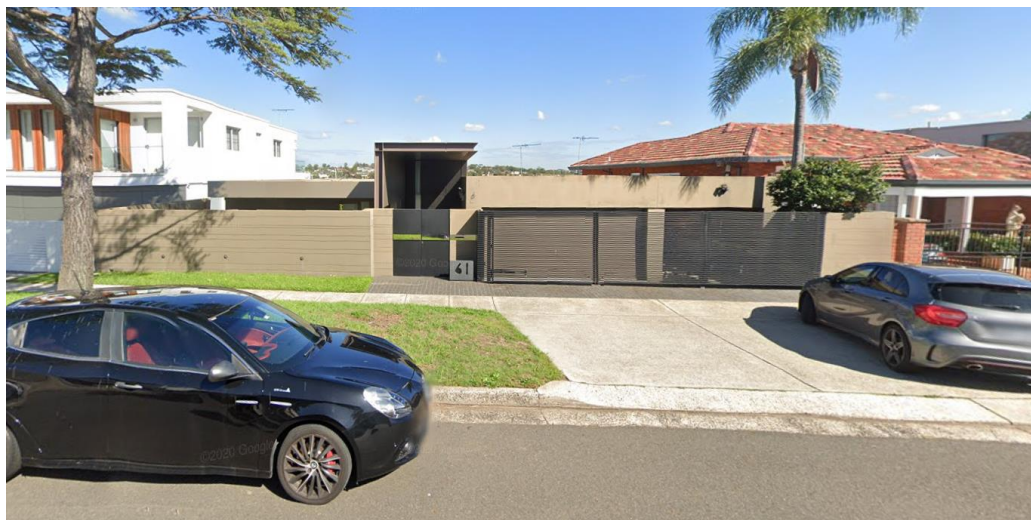


Figure 2 Subject site viewed from Vista Street (source: Google Maps Streetview)



Figure 3 Rear of subject site, also depicting rear of adjoining sites



Figure 4 Existing swimming pool and adjoining cabana



Figure 5 Outbuilding in rear yard



Figure 6 Rocky outcrop in rear yard



## 2.2 SURROUNDING DEVELOPMENT

The surrounding locality consists of generally one, two and three storey residential dwellings which vary in architectural styles, reflecting the different periods of development. A number of contemporary residential dwellings along Vista Street and in the surrounding locality have been recently approved and constructed.

Immediately adjoining the development to the north is No. 59 Vista Street which contains a detached two storey dwelling with a rear garden and swimming pool. This property has direct access from Vista Street via two driveways. No. 59 Vista Street, as viewed from the front is depicted in **Figure 7**. **Figure 8** depicts No. 59 Vista Street, as viewed from the rear, as well as the rear of Nos. 57 and 55 Vista Street which are further to the north.



Figure 7 No. 59 Vista Street, adjoining to the north (source: Google Maps Streetview)



Figure 8 Rear of Nos. 59, 57 and 55 Vista Street

Immediately adjoining the development to the south is No. 63 Vista Street which contains a detached two-three storey dwelling with a rear garden and swimming pool. This property has direct access from Vista Street. No. 63 Vista Street is





depicted in **Figure 9**. **Figure 10** depicts No. 63 Vista Street, as viewed from the rear. Note the location of the outbuilding at No. 63 Vista Street immediately adjoining the outbuilding/cabana on the subject site. This relationship ensures protection of amenity of both sites.



**Figure 9** No. 63 Vista Street, adjoining to the south (source: Google Maps Streetview)



**Figure 10** Rear of No. 63 Vista Street (right)



## 2.3 CONNECTIVITY AND ACCESS TO PUBLIC TRANSPORT

The site is located within the urbanised neighbourhood of Sans Souci and is located within walking distance to bus services operating along Rocky Point Road. All relevant utility services including water, sewer, electricity, gas and telephone are available and connected to the subject property.

## 2.4 LOCAL CHARACTER STATEMENT

The site is located in the **Sans Souci – Ramsgate** Locality in the Georges River Local Government Area. The Locality Statement as outlined in Part 5 of the Georges River Development Control Plan 2021 is detailed below and discussed later in this Statement.

### ***“Built Form and Setting***

*Part of the Ramsgate commercial centre and is located within this locality, which is adjoined by a small area of contemporary residential flat buildings. There are also two smaller commercial centres with one located along Rocky Point Road and the other at the end of the headland at the corner of Water Street. The latter is flanked by a high density residential area.*

*The locality is generally low density residential with some villa and town house developments between Endeavour Street and Nelson Street along Rocky Point Road. The wider area consists mostly of detached and semi-detached houses.*

*The housing styles are mixed, with no particular style predominating. There are numerous properties dating to the post-war era with a varying degree of alterations and large contemporary houses becoming increasingly common throughout the area, particularly towards the Kogarah Bay waterfront.*

*The subdivision pattern shows largely medium sized lots laid out in a regular grid-like pattern which is typical of the post-war era. Several lots (along the foreshore in particular) have been subdivided into battle-axe lots.*

*The land is relatively low lying with only a gentle slope on the western side. This slope allows a view overlooking the Georges River towards Kogarah Bay, particularly along Vista Street. The view of the bay is obscured in places due to development along the foreshore. The waterfront areas of this locality are located within the Foreshore Scenic Protection Area (refer to GRLEP 2021 Foreshore Scenic Protection Area Map).*

*In this locality there are several reserves and parks with direct waterfront access and vistas including Anderson Park, Bonney Street Reserve, The Boulevard Reserve, Claydon Reserve, Endeavour St Reserve, Len Reynolds Reserve, Northcote Street Reserve and Sans Souci Park (including Sans Souci Leisure Centre).*

### ***Streetscape Character***

*Some streets within this locality have mature street trees, such as Alice Street, Torwood Street and The Boulevard. In particular, the Phoenix Canariensis on The Boulevard are recognised as street trees with heritage significance. Other streets like Rocky Point Road, Vista Street and the Promenade are characterised by a noticeably lack of planned treescapes on the verges. The lack of street trees on the residential streets contributes to the feeling of width and openness to the streets and draws more attention to facades, driveways, fences along the streetscape.*

*However, the streetscape exhibits an eclectic character attributed to the variety of housing and fence materials, roof forms, driveway widths and garage styles. The treatments of the front setback spaces are also inconsistent in many streets as the contemporary two storey dwellings have little to no landscaping and are often dominated by hardscaping and driveways. There are also varying heights for front fences, including a range of visually permeable to solid fencing materials and fence heights of up to 1.6m in height.*

### ***Future Desired Character***

- *Retain and enhance the existing low density suburban residential character through articulated contemporary developments that respond to the human scale.*



- *Encourage well-designed high density residential development in designated areas along Rocky Point Road.*
- *Encourage consistent setbacks of buildings from the street and the provision of landscaping within the front setback, alongside low fencing to enhance visual permeability.*
- *Encourage the retention of trees and sharing of water views wherever possible, including screening via vegetation rather than solid walls. • Protect public vistas over Georges River towards Kogarah Bay from Vista Street”.*

The proposed modifications involve the retention of the existing pool and the provision of additional landscaped area between the waterway and swimming pool which will improve the visual appearance of the dwelling pool. The proposed modifications are not antipathetic to the above-mentioned desired future character statements as discussed below.



## 3. Details of Proposed Modification

### 3.1 BACKGROUND

Development Application DA2021/0081 was approved by Georges River Council on the 24 September 2021 for alterations and additions to an existing dwelling house including a new inground swimming pool and associated works in the rear yard at 61 Vista Street Sans Souci.

This subject application (MOD2023/0056) represents the first modification to the approved Development Application.

This Statement of Environmental Effects has been prepared in response to a Request for Information letter issued by Georges River Council dated 14 March 2024, which required the submission of a Modification letter/Statement of Environmental Effects to accompany the modified plans. Council's RFI Letter requested the following information:

***"1. Supply A Modification/Cover Letter in accordance with The Environmental Planning and Assessment Regulation 2021.***

*A Modification Cover Letter / Statement of Environmental Effects is to be supplied which contains information that addresses Environmental Planning and Assessment Regulation 2021 - Part 5 Modification of development consents—the Act, ss 4.55, 4.56 and 4.57, Division 1 Applications for modification of development consent, Section 100 Content of modification application.*

*The supplied information is to include (but not be limited to) the following:*

- a) the name and address of the applicant,*
- b) a description of the development that will be carried out under the development consent,*
- c) the address and folio identifier of the land on which the development will be carried out,*
- d) a description of the modification to the development consent, including the name, number and date of plans that have changed, to enable the consent authority to compare the development with the development originally approved*
- (e) whether the modification is intended to— i. merely correct a minor error, misdescription or miscalculation, or*
- ii. have another effect specified in the modification application,*
- f) a description of the expected impacts of the modification,*
- g) an undertaking that the modified development will remain substantially the same as the development originally approved,*

***2. Controls to Address in the Above Modification Letter/SoEE***

*In the above-requested modification cover letter under (g), describe the effect of the modification on the following:*

- a) Georges River Local Environmental Plan 2021 i. Clause 6.6 Foreshore Scenic Protection Area*
- ii. Clause 6.13 Landscaped Areas certain residential and conservation zones*
- b) Georges River Development Control Plan 2021 i. Part 5.20 Residential Locality Statements - Sans Souci and Ramsgate*
- ii. Part 6.1.2 Single Dwellings – Subsection 5. Landscaping*

***3. Landscaping Calculation***

*On a revised Deep Soil Plan, revisit the landscaping calculations, it appears that the existing and proposed landscaping is inaccurate. You are requested to recalculate the landscaping as the 'proposed' landscaping appears to be indicative of the existing landscaping as the plan appears to propose the lower grass level which is existing.*

*As such, on a revised plan, show all landscaped areas that exist currently. Then indicate if any loss or gain is to occur as a result of the proposal.*

*Please Note: Preference is given to a development outcome that results in either no net loss of vegetation or an increase of vegetation.*

*The calculation is to be in accordance with the GRLEP 2021 definition of landscaped area which is as follows: **landscaped area** means a part of a site used for growing plants, grasses and trees, but does not include any building, structure or hard paved area".*

The content of this Statement of Environmental Effects and modified plans now includes the above information requested by Council. This will be discussed throughout this SEE.

### 3.2 MODIFIED PROPOSAL

The proposed modification involves the following:

- Deletion of the proposed new inground swimming pool and retention of the existing in-ground swimming pool with existing associated paving surrounding the existing pool
- Amendments to the configuration of the external stairs descending from the dwelling house down to the swimming pool area within the rear yard.
- Deletion of the rainwater tanks which are no longer required by the amended BASIX Certificate
- Addition of a new grass area comprising 24.50m<sup>2</sup> on the western side of the existing pool

The modified plans also detail the architectural design changes required by Condition 9 of the Development Consent (DA2021/0081) which now form part of the modified proposal.

The proposed modifications have been triggered by the following factors:

- Deletion of the new inground swimming pool - reducing the cost of construction
- Reconfiguration of the external stairs - Sydney Water will not support structural building elements within the easement for sewer and as such the stairs needed reconfiguration.
- Addition of new grassed area comprising 24.50m<sup>2</sup> on the north-western side of the existing swimming pool - As the existing in-ground swimming pool is larger in area than the approved swimming pool, additional grass area has been proposed to assist off-set the increase in impervious area by having to retain the existing pool.

### 3.3 LANDSCAPING

To provide the clarification requested in Council's RFI Letter, the following Deep Soil Plans (ie Landscaped Area) have been provided as part of this application;

- **Deep Soil – Existing** (Drawing S4.55-08): This plan shows the "existing" landscaped area which corresponds to the grassed areas identified in the original Survey Plan. This plan shows that the existing landscaped area comprises a total of 94.45m<sup>2</sup> (10.4% of site area). It should be noted the existing landscaped area does not achieve the minimum 25% required under Clause 6.12 of the GRLEP 2021.



- **Deep Soil – Approved** (Drawing S4.55 -09): This plan shows the “approved” landscaped area under DA2021/0081. This includes the relevant design change conditions outlined in Condition 9 of the consent which required impervious area to become grass areas. The DA was approved with total landscaped area of 147.10m<sup>2</sup> (16.2% of the site area). The approved site area under the original DA also fails to achieve the minimum 25% site area required under Clause 6.12 of the GRLEP 2021.



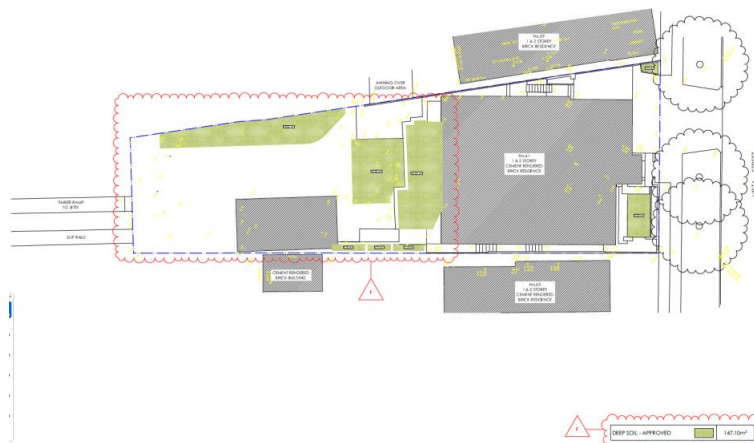


Figure 13 Deep Soil – Approved

- Deep Soil – Proposed** (Drawing S4.55-10): This plan shows the “proposed” landscaped area which forms part of this Section 4.55 Modification application. As the existing swimming pool is larger than the approved swimming pool, the 47m<sup>2</sup> of landscaped area on the northern side can no longer be accommodated. To off-set the deletion of this area, a new landscaped area comprising 24.50m<sup>2</sup> is proposed to be included west of the existing swimming pool. As a result, the proposed modified development involves a total landscaped area of 128m<sup>2</sup> (14.1% of the site area). Although the proposed modification results in less landscaped area than the approved development, the area proposed significantly enhances status quo by 3.7%.



Figure 14 Deep Soil – Proposed

Whilst the merits of this case will be discussed in more detail under Section 5 of this report, it can be concluded that the proposed modification results in 33.55m<sup>2</sup> more than the existing development and 19.1m<sup>2</sup> less than the approved development. Despite the reduction in landscaped from the approved development, the proposed modifications are certainly better than the existing situation and provides landscaping that will have a greater impact when viewed from the waterway. Importantly, the landscaping will break up the hard paved areas between the waterway and the existing swimming pool which will be a visual improvement on the existing and approved situation.



## 4. Section 4.55 of EP& A Act Assessment

### 4.1 SECTION 4.55 – ENVIRONMENTAL PLANNING AND ASSESSMENT ACT

Section 4.55 of the *Environmental Planning & Assessment Act 1979* contains provisions relating to the modification of development consent. Specifically, subclause (2) refers to modifications as follows:

#### (2) Other modifications

*A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:*

- (a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and*
  - (b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and*
  - (c) it has notified the application in accordance with:*
    - (i) the regulations, if the regulations so require, or*
    - (ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and*
  - (d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.*
- Subsections (1) and (1A) do not apply to such a modification*

The proposal is the subject of a Section 4.55 (2) modification. The proposal does not require a new development application as it is substantially the same as the approved development, given that the proposal does not seek to alter the use or significantly change the scale and form of the approved development.

The proposed modification seeks to delete the new in ground swimming pool and maintain the existing in ground swimming pool that currently exists on site. Although the 47m<sup>2</sup> of landscaped area which was approved north of the swimming pool cannot be accommodated (due to the existing pool being a larger size), the proposed modification includes a new landscaped area of 24.50m<sup>2</sup> west of the existing pool resulting in a net loss of 19.1m<sup>2</sup> of landscaped area when compared to the approved development.

Whilst a minor net loss of landscaped area occurs when considering the approved development, a net gain of landscaping of 33.55m<sup>2</sup> is achieved when considering the existing development. Furthermore, the location of the landscaped area currently proposed will enhance the visual appearance of the approved development and will have negligible environmental impacts as discussed in this Statement.

In relation to neighbouring amenity, the retention of the existing swimming pool does not significantly alter the approved amenity relationship given the existing larger pool will be retained within the primary area of private open space. If anything, the retention of the existing pool provides more certainty for the adjoining neighbours in terms of preservation of the status quo and no new impacts in terms of views and/or privacy impacts.







When assessing a modification application, the consent authority has a threshold decision to make, and must be satisfied that what is proposed is “substantially the same” development as the original development, as set out in Section 4.55(2)(a) of the EP&A Act. Whether the development will be “substantially the same” as the original consent is a mixed question of fact and law. This decision can be guided by principles and tests established in the Courts.

Decisions of the Land and Environment Court support the proposition that the main elements of the proposal are matters substantially the same as the existing development consent, as outlined below.

#### Modification Principles Established by the Courts

The traditional ‘test’ as to whether or not a development as modified will be “substantially the same” development as that originally approved was applied by J Stein and the Court of Appeal in *Vacik Pty Limited v Penrith City Council* [1992] NSWLEC 8 and endorsed by J Bignold in *Moto Projects (No 2) Pty Ltd v North Sydney C* [1999] NSWLEC 280.

J Stein stated in the *Vacik* case: “In my opinion ‘substantially’ when used in the section [s102, the predecessor of s96] means essentially or materially having the same essence”.

J Bignold expressed in the *Moto* case: “The requisite factual finding obviously requires a comparison between the development, as currently approved, and the development as proposed to be modified ... not merely a comparison of the physical features or components of the development ... rather ... involves an appreciation, qualitative as well as quantitative, of the developments being compared in their proper contexts (including the circumstances in which the development consent was granted).”

J Bignold came to deal with the matter of “substantially the same” again in *Tipalea Watson Pty Limited v Kurringai Council* [2003] NSWLEC 253. From this Judgement, one can distil a list of matters or ‘tests’ to consider, being whether the modification involves the following:

- (a) significant change to the nature or the intensity of the use;
- (b) significant change to the relationship to adjoining properties;
- (c) adverse amenity impacts on neighbours from the changes;
- (d) significant change to the streetscape; and
- (e) change to the scale or character of the development, or the character of the locality

In 2015, the principles regarding Section 96(2)(a) (now Section 4.55(2)(a)) were summarised in *Agricultural Equity Investments Pty Ltd v Westlme Pty Ltd (No 3)* [2015] NSWLEC 75 where Pepper J set out the legal principles that apply as follows:

*The applicable legal principles governing the exercise of the power contained in s 96(2)(a) of the EPAA may be stated as follows:*

1. first, the power contained in the provision is to “modify the consent”. Originally the power was restricted to modifying the details of the consent but the power was enlarged in 1985 (*North Sydney Council v Michael Standley & Associates Pty Ltd* (1998) 43 NSWLR 468 at 475 and *Scrap Realty Pty Ltd v Botany Bay City Council* [2008] NSWLEC 333; (2008) 166 LGERA 342 at [13]). Parliament has therefore “chosen to facilitate the modification of consents, conscious that such modifications may involve beneficial cost savings and/or improvements to amenity” (*Michael Standley* at 440);
2. the modification power is beneficial and facultative (*Michael Standley* at 440);
3. the condition precedent to the exercise of the power to modify consents is directed to “the development”, making the comparison between the development as modified and the development as originally consented to (*Scrap Realty* at [16]);

4. the applicant for the modification bears the onus of showing that the modified development is substantially the same as the original development (*Vacik Pty Ltd v Penrith City Council* [1992] NSWLEC 8);

5. the term "substantially" means "essentially or materially having the same essence" (*Vacik endorsed in Michael Standley at 440 and Moto Projects (No 2) Pty Ltd v North Sydney Council* [1999] NSWLEC 280; (1999) 106 LGERA 298 at [30]);

6. the formation of the requisite mental state by the consent authority will involve questions of fact and degree which will reasonably admit of different conclusions (*Scrap Realty at* [19]);

7. the term "modify" means "to alter without radical transformation" (*Sydney City Council v Ilene Pty Ltd* [1984] 3 NSWLR 414 at 42, *Michael Standley at 474, Scrap Realty at* [13] and *Moto Projects at* [27]);

8. in approaching the comparison exercise "one should not fall into the trap" of stating that because the development was for a certain use and that as amended it will be for precisely the same use, it is substantially the same development. But the use of land will be relevant to the assessment made under s 96(2)(a) (*Vacik*);

9. the comparative task involves more than a comparison of the physical features or components of the development as currently approved and modified. The comparison should involve a qualitative and quantitative appreciation of the developments in their "proper contexts (including the circumstances in which the development consent was granted)" (*Moto Projects at* [56]); and

10. a numeric or quantitative evaluation of the modification when compared to the original consent absent any qualitative assessment will be "legally flawed" (*Moto Projects at* [52]).

In the recent case of *Arrage v Inner West Council* [2019] NSWLEC 85, Preston J found that there was no legal obligation to consider the circumstances in which the development consent was granted when comparing the approved development and the proposed modified development, or to consider the material or essential elements of the original development consent when considering substantially the same development as neither of which are mandatory relevant matters. Rather it is the statutory provision of Section 4.55(2)(a) which provides the relevant test.

Whether or not there will be increased environmental or neighbourhood amenity impacts under a proposed modified development is not a consideration as to whether or not a modification proposal is substantially the same under Section 4.55 of the EP&A Act. Authority for this position is set out in a decision of Talbot J in *Wolgan Action Group Incorporated v Lithgow City Council* [2001] NSWLEC 199 [43] in which he provides:

*"Even if the present applicant is correct in that there will be a significant increase in the environmental impact ... that, nevertheless, does not necessarily preclude a conclusion that the development, to which the consent as modified relates, is substantially the same development as that already permitted. The extension ... alone does not change the inherent character of the development itself. There may be some additional environmental impact but that is a matter to be considered as part of the deliberations on the merits."*

#### Modification Principles Applied to the Proposal

The proposed modifications to the development will still provide for a development that is substantially the same as the development for which consent was originally granted (DA2021/0086) and the consent authority can therefore consider the application pursuant to Section 4.55(2) of the EP&A Act. In reaching this conclusion, we have considered the above principles against the proposed modification described at Section 3 of this Statement.

A comparison between the development as modified and the development the subject of the original consent can conclude that there is no significant change to the approved built form. This modification application will slightly decrease the landscaped area in the rear yard simply because the existing pool is larger than the approved pool, but the visual essence of the approval remains when viewed from the river or adjoining properties. The proposed modification does not alter the approved use of the land for the purpose of a residential dwelling house. Whilst the intensity of use, of itself, is not sufficient to conclude the development is substantially the same, it is a relevant consideration which adds to the above analysis.



With consideration to the tests identified in *Tipalea Watson Pty Limited v Kurringai Council*, the proposal as modified will not change the nature or the intensity of the use or significantly change the relationship to adjoining properties. The proposed modifications will not substantially alter the approved built form and as such will not result in any adverse impacts on the views of adjoining properties or the view of the property as viewed from the river. The rear yard was always intended to be occupied by ancillary residential structures, including swimming pools, and used by the residents for passive and active recreational purposes and the modification guarantees this intended purpose.

Although the modified development reduces the approved landscaped area from 147m<sup>2</sup> to 128m<sup>2</sup>, it still results in a significant improvement to the existing landscaped area which is only 94.45m<sup>2</sup>. Furthermore, the increase in green spaces between the pool and waterway will result in an enhanced visual amenity when the property is viewed from the river and/or adjoining properties. As discussed, the proposed modifications will not result in any substantial change to the scale or character of the development within the locality as the proposal will still present as ancillary residential structures associated with a waterfront residential dwelling house.

As noted in *Wolgan Action Group Incorporated v Lithgow City Council*, an increase in environmental impacts is not a consideration as to whether or not a modification proposal is substantially the same. Nonetheless, in our view the impact of the proposed modifications will not result in any significant loss of amenity for adjoining properties in terms of privacy, solar access, views and/or the visual distribution of green spaces within the development.

Finally, *Moto Projects (No. 2) Pty Limited v North Sydney Council* [1999] NSWLEC 280; (1999) 106 LGERA 298, which outlines principles for determining whether a S.4.55(2) application is 'substantially the same' as an originally issued development consent. The assessment of 'substantially the same' needs to consider qualitative and quantitative matters.

Quantitatively, the proposal will not significantly alter the approved numerical aspects of the development, other than the landscaped area as discussed. The proposed modifications will result in a technical decrease of 19.1m<sup>2</sup> of landscaped area resulting in a total landscaped area of 128m<sup>2</sup>. Despite the decrease in landscaped area, the modifications are contained within the approved footprint of the rear yard and will not significantly alter the approved built form. Similarly, the modifications to the external stairway configuration to address the sewer easement encroachment are negligible and result in no additional impact to adjoining properties.

As detailed under Section 5 of this Statement, the proposed decrease in landscaped area will not result in any adverse stormwater issues or impacts on the waterway. In fact, the retention of the existing swimming pool will mean less disturbance to the rear portion of the site that adjoins the river. Additionally, as a new landscaped area 24.50m<sup>2</sup> in size is proposed west of the existing swimming pool, which simply reduces and relocates the approved landscaping area rather than deleting it. Therefore, the modified development will remain compatible with the rear yards of the adjoining developments which also incorporate green spaces adjoining the waterways (See **Figure 15**).

As discussed in this Section 5 of this Statement, the proposed modification achieves the objectives of *Clause 6.12 Landscaped areas in certain residential and conservation zones* and despite the numerical non-compliance with the required landscaped area, the modified proposal is substantially the same as the approved development under DA2021/0081.

Qualitatively, the proposal will retain the contemporary architectural form and presentation of the approved cabana, landscape improvements and swimming pool of the approved development. As discussed in Section 5 of this Statement, the proposed modifications achieve the objectives of *Clause 6.6 Foreshore Scenic Protection Area* under the GRLEP 2021 and in doing so ensures the scenic amenity of the Georges River Foreshore is maintained.

The minor improvements to the rear yard are not considered to be substantially different when compared to the character, bulk and scale of the approved development. Whilst the proposed modifications will look marginally different, this is not the test rather it is the fact that essence of what has been approved remains substantially the same as originally approved. By retaining the existing pool, the proposed modifications will also seek to minimise the disturbance to the rear portion of the site which adjoins the Georges River Foreshore which is a positive environmental outcome resulting from the modifications.





Given the above, it is evident that the proposal is substantially the same as the approved building both qualitatively and quantitatively. It is therefore considered that the proposed development is of minor environmental impact and is appropriately categorised as a S4.55(2) application.



Figure 15 Aerial photo from NearMap



## 5. Section 4.15 of EP&A Act Assessment

### 5.1 STATUTORY AND POLICY COMPLIANCE

Section 4.55(3) requires consideration of Section 4.15(1)(a) of the EP&A Act, 1979 which was undertaken in the original development application assessment report and associated planning documents. The reasons provided on the development consent are as follows:

*(a) To ensure compliance with the terms of the relevant Environmental Planning Instrument and/or Building Code of Australia and/or Council's codes, policies and specifications.*

*(b) To protect the environment.*

*(c) To ensure that there is no unacceptable impact on the amenity of the area, or to private and public property.*

*(d) It is in the public interest.*

Given that the proposed modifications do not significantly alter the approved built form, it reasonably follows that the proposed modifications should also be considered satisfactory with regard to the above reasons by Council. As such, the conclusion of the original development application assessment report remains valid and applicable to the subject modification application.

Where the proposed modifications result in a variation to these controls, the variation will be considered below.

#### 5.1.1 SEPP Building Sustainability Index: BASIX 2004

SEPP (Building Sustainability Index: BASIX) 2004 commenced on 1 July 2004 and applies to the proposed development. In accordance with the provisions of the SEPP, an amended BASIX Certificate is submitted with the application and confirms that the proposed rainwater tanks originally required for the new swimming pool is no longer required as the existing swimming pool is being retained as part of the modification.

It should be noted that the SEPP (Sustainable Buildings) 2022, does not apply to the proposed development by virtue of savings and transitional Clause 4.2(1)(f) which states the policy does not apply to:

*"(f) an application for modification of a development consent under the Act, section 4.55 or 4.56 submitted on the NSW planning portal on or after 1 October 2023, if the development application for the development consent was submitted on the NSW planning portal before 1 October 2023".*

#### 5.1.2 Georges River Local Environmental Plan 2021

The DA was originally assessed and determined under the former *Kogarah Local Environmental Plan 2012* (KLEP 2012) which was the former local environmental planning instrument in force for this site prior to the gazettal of the Georges River Local Environmental Plan 2021 which commenced on the 8 October 2021.

Under the Kogarah LEP 2012 there were no applicable landscaped area controls and the site was within the *R2 Low Density Residential* zone. Council reached a level of satisfaction that the original DA satisfied the relevant objectives and controls and approved DA2021/0081.

Under Georges River Local Environmental Plan (GRLEP) 2021, a dwelling house remains with development consent in the R2 -Low Density Residential Zone. The proposed modification achieves the objectives of the R2 Residential Zone in the following manner:

- *To provide for the housing needs of the community within a low-density residential environment.*







The proposed modification relates to the improvements in the rear yard which is associated with residential housing that exists on the site. The modifications are for ancillary residential structures which are appropriate and commonly found on waterfront allotments along the Georges River Foreshore. The proposed modifications achieve this objective because the structures are compatible in scale, form and character of structures typically located in a low-density environment.

- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*

The proposed modification continues the approved residential use and therefore does not provide other land uses. The modifications do not inhibit other uses or services to provide for the day to day needs of residents.

- *To promote a high standard of urban design and built form that enhances the local character of the suburb and achieves a high level of residential amenity.*

The proposed modifications achieve this objective because the development seeks to renovate and refurbish the waterfront structures which are in need of enhancement. The proposed development will provide a new modern built form with additional landscaping within the foreshore area that will significantly enhance the aesthetics of this site as viewed from the river and the adjoining properties.

As discussed later in this Statement, the proposed modification also achieves the existing and desired future character statements outlined in the Georges River Development Control Plan 2021.

- *To provide for housing within a landscaped setting that enhances the existing environmental character of the Georges River local government area.*

The proposed modification achieves this objective because even though the proposed modification results in 19.1m<sup>2</sup> less landscaped area than the approved development, it will result in 33.55m<sup>2</sup> more landscaped area than the existing site provides. This increase in green space is considered to enhance the existing environmental character of the Georges River Foreshore and ensure the site is compatible with the surrounding waterfront allotments.

The proposed modifications satisfy the relevant development controls with the exception of the those discussed below.

#### **Clause 6.6 - Foreshore Scenic Protection Area**

The proposed development achieves the objectives of Clause 6.6(1) of the GRLEP 2021 because the development protects and maintains the scenic amenity of the Georges River Foreshore by providing more landscaped area than what's existing on site. Whilst the landscape area is slightly less than the approved development, the outcome of the development will enhance the green spaces currently available on site, especially where it will have the greatest effect between the foreshore and the swimming pool.

The proposed modifications will satisfy the requirement of Clause 6.6(3) for the following reasons:

- The proposed modification will protect the natural environment by retaining the existing swimming pool and providing additional landscaping between the pool and foreshore;
- The proposed modifications will not create any additional adverse impacts on the local flora and fauna;
- The proposed modifications will enhance the landscaping on the site when compared to the existing situation and will provide an improve visual aesthetic with additional landscaping between the foreshore and swimming pool similar to other properties on Vista Street;
- The proposed modifications will not result in the loss of any significant vegetation or habitat;
- The proposed modifications will not result in clearing or have any significant impact on stability of land;
- The proposed modifications will minimise the impacts of views to and from the waterway; and
- The proposed modifications will minimise the bulk and scale of the development as the pool is at ground level and the stairs are below the approved built form and compatible with surrounding development.

There are no adverse impacts on views, privacy, natural vegetation or the scenic quality of the Foreshore. As discussed in this Statement, the proposed development enhances the status quo and in doing so achieves the objectives of the FSPA.



#### Clause 6.12 - Landscaped Areas in certain residential and conservation zones

Clause 6.12(5)(b) requires that dwelling houses in a foreshore scenic protection area provides 25% of the site as landscaped area. The existing site achieves 10.4% landscape area which is significantly under the required 25% under the Georges River LEP 2021.

The proposed modification will provide 14.1% of landscaped area, significantly improving the amount of existing deep soil available on site. Whilst the proposed landscaped area is 19.1m<sup>2</sup> less than the approved development, the modification will reduce the existing impervious areas of the existing dwelling house and result in a net increase of 35.55m<sup>2</sup> of landscaped area over the existing situation.

It is noted that in the NSW Land and Environment Court case of *Gann & Anor v Sutherland Shire Council [2008]*, the Court held that there is power to modify a development application where the modification would result in the breach of development standards. The Court took the view that development standards within an LEP did not operate to prohibit the grant of consent if they were not complied with (and no objection pursuant to SEPP No. 1 or Clause 4.6 of Standard template LEPs had been lodged). Notwithstanding, the Court held that despite a SEPP No. 1 Objection (or Clause 4.6 variation) not being required, Section 4.55(3) of the EP&A Act still requires the consent authority to take into consideration those matters referred to in Section 4.15. The following clauses and development standards require consideration:

Specifically, the proposed development achieves the objectives because:

*(a) to ensure adequate opportunities exist for the retention or provision of vegetation that contributes to biodiversity and enhances the tree canopy of the Georges River local government area,*

There is no significant vegetation or habitat within the rear yard. The proposed modifications will provide an additional 24.50m<sup>2</sup> of landscaped area between the swimming pool and foreshore which will provide opportunities for further tree growth to enhance the tree canopy.

*(b) to minimise urban run-off by maximising permeable areas on the sites of development,*

The proposed modifications will provide a further 24.50m<sup>2</sup> between the swimming pool and river to minimise runoff and increase infiltration of stormwater.

*(c) to ensure that the visual impact of development is minimised by sufficient and appropriately located landscaping that complements the scale of buildings,*

The proposed modifications will not significantly alter the visual appearance of the dwelling given it relates to stairs and the retention of the existing swimming pool. Despite the reduction in landscaped area from the approved development, the proposed modifications are certainly a visual improvement when compared to the existing situation. In this regard, the additional 24.50m<sup>2</sup> of landscaped area between the pool and river will break up the hard paved areas and provide landscaping where none previously existed to be compatible with other waterfront properties on Vista Street.

*(d) to ensure that the use of surfaces that absorb and retain heat are minimised.*

The proposed modifications will retain the existing swimming pool which will minimise the extent of paving when considering the additional 24.50m<sup>2</sup> of landscaped area adjacent to the river.

The proposal therefore satisfies the objectives of Cl6.12 and provides for an improvement on the existing situation in terms of the quantum and location of the landscaped area. The variation is worthy of Council's support.

#### 5.1.3 Georges River Development Control Plan 2021

The proposed modification triggers consideration of the Sans Souci locality statement and the landscaping controls within Part 6.1.2 of the GRDCP 2021. These matters for consideration are discussed in the sections below.





## Part 5.20 - Locality Statement for Sans Souci, Ramsgate

The existing character of the Sans Souci Ramsgate Area in terms of housing is described in the GRDCP 2021 as follows:

*"The housing styles are mixed, with no particular style predominating. There are numerous properties dating to the post-war era with a varying degree of alterations and large contemporary houses becoming increasingly common throughout the area, particularly towards the Kogarah Bay waterfront...The land is relatively low lying with only a gentle slope on the western side. This slope allows a view overlooking the Georges River towards Kogarah Bay, particularly along Vista Street".*

The proposed modifications are compatible with the character of the Sans Souci area because they involve modernising 'tired' structures along the waterfront rather than replacing them as part of the approved development. In doing so, the development is contributing to the contemporary new housing stock and ancillary structures associated with that housing on the subject site. The modifications in no way impede views, privacy or solar access to the adjoining properties also situated on the waterfront.

The desired future character of the Sans Souci – Ramsgate as it relates to the residential area is discussed below: follows:

- *Retain and enhance the existing low density suburban residential character through articulated contemporary developments that respond to the human scale.*

The proposed modifications enhance the lower density residential character by refurbishing the ancillary residential structures in the rear yard. The scale and form of the modifications proposed are consistent with the approved development and will enhance the scenic quality of the site as viewed from the Georges River and the adjoining properties.

- *Encourage consistent setbacks of buildings from the street and the provision of landscaping within the front setback, alongside low fencing to enhance visual permeability.*

The proposed modifications do not alter the landscaping within the front setback area.

- *Encourage the retention of trees and sharing of water views wherever possible, including screening via vegetation rather than solid walls.*

The proposed modifications incorporate the screening recommended in the design changes of Condition 9 in the approved development, negating the need for those conditions in any future consent issued by Council. The proposed modifications will not result in any significant change in views to or from the waterway. The reconfiguration of the external stair case and changes to the landscaped area will not detrimentally impact on the existing views enjoyed by the adjoining dwelling houses.

- *Protect public vistas over Georges River towards Kogarah Bay from Vista Street.*

The proposed modifications in no way impede public vistas over the Georges River towards Kogarah Bay as viewed from Vista Street. The modifications are proposed within the rear yard of the existing dwelling house which is topographically situated at a lower level than the existing dwelling house.

### Part 6.1.2 - Single dwellings

The extent to which the proposed modification achieves the controls of *Section 6.1.2.5- Landscaping* in the GRDCP 2021 is discussed below:

1. *Landscaped area (has the same meaning as GRLEP 2021) is to be provided in accordance with the table contained within Clause 6.12 Landscaped areas in certain residential and conservation zones of the GRLEP 2021.*

The extent to which the proposed development achieves the requirements of Clause 6.12 has been discussed earlier in this Statement.





2. *Soft soil landscaping is to be provided in all landscaped areas as required by the GRLEP 2021 and must have a minimum dimension of 1.2m in all directions. Existing natural rock outcrops can be counted towards the calculation of soft soil landscaping.*

The proposed new landscaped areas achieve a minimum depth of 1.2m.

3. *Provide a landscape setting within the primary and secondary street frontages, where impervious areas are minimised. Impervious areas include hard paving, gravel, concrete, artificial turf, rock gardens (excluding natural rock outcrops) and other material that does not permit soft soil landscaping.*

There is no change proposed to the existing landscaped area within the frontage of the site.

4. *Impervious areas are to occupy no more than:*
  - i. *60% of the street setback area where the front setback is less than 6m, or*
  - ii. *50% of the street setback area where the front setback is 6m or greater, or*
  - iii. *50% of the primary street setback area on corner allotments.*

There is no change to the existing impervious areas within the front setback of the development.

5. *The front setback area is to have an area where at least one (1) tree capable of achieving a minimum mature height of 6-8m with a spreading canopy can be accommodated. A schedule of appropriate species to consider is provided in Council's Tree Management Policy.*

There is no change to the approved front setback area.

Accordingly, the proposed modifications aligns with the objectives for the GRDCP despite the numerical variations. As such, the modifications are considered to be a reasonable alternative solution in accordance with clause 4.15(3A)(b) of the EP&A Act 1979 and the variations to the controls are warranted in this instance.

## 5.2 IMPACTS ON NATURAL & BUILT ENVIRONMENT

### 5.2.1 Topography & Scenic Impacts

The existing pool will remain and as such no excavation is proposed within the rear portion of the site. Minor changes to the site topography will occur to accommodate the new stairs along the south-western boundary, however there is no adverse impacts anticipated to adjoining owners. Overall, no significant changes are proposed to the topography of the site, with the proposed modifications being consistent with existing conditions.

With regards to scenic impacts, the approved development will improve the overall amenity of the subject site, providing improvements to the cabana and introducing landscaping, ensuring no unreasonable impact to the scenic qualities of the area. The same conclusion applies for the proposed modifications. Additionally, the proposed landscaping, will provide improvements to the site and ensure there are no long term impacts on the scenic qualities of the site.

### 5.2.2 Micro-climate Impacts

The proposed development will have no significant impact on the micro-climate of the locality.

### 5.2.3 Water & Air Quality Impacts

The proposed development will have no significant impact on air or water quality in the locality. The completed project will be connected to the sewer, connects to the existing stormwater system and will incorporate water efficient design in accordance with the original BASIX certificate.

The proposed development is not likely to generate any unusual liquid waste, odour or fumes. It is therefore unlikely to have any adverse impact in terms of air or water quality.



#### 5.2.4 Flora & Fauna Impacts

The proposed modifications provide overall improvements to the landscaped area of the site when considering the impact to flora and fauna. New landscaping is proposed adjoining the new pool, with grass. In addition, a number of planter boxes are proposed within the rear yard, providing further opportunities for increased green space. The proposed development is minor in nature, with the works proposed having no negative impact on the flora and fauna of the locality.

#### 5.2.5 External Appearance & Design

The proposed works are contained within the rear yard only and provide no visible change to the appearance and design of the building from Vista Street. The intent of the proposed modifications are to retain the existing pool rather than providing a new pool due to an increase in construction costs. Additional works to the rear yard and structures to reflect the conditions of consent all provide improvements to the appearance and design of the rear yard, increasing the amenity afforded to the residents of the subject site as well as the appearance of the subject site from adjoining sites and the waterway.

Accordingly, the proposed development is considered to provide high quality upgrades to the rear yard and associated facilities at the subject site, providing a visual benefit to the property and character of the locality.

#### 5.2.6 Solar Access

There are no additional solar access considerations above and beyond that which was considered as part of the original development assessment. The proposal continues to satisfy Council's solar access requirements.

#### 5.2.7 Views

There are no additional view sharing considerations above and beyond that which was considered as part of the original development assessment. The proposal continues to provide for view sharing in accordance with Council requirements.

#### 5.2.8 Aural & Visual Privacy

The proposed modifications are unlikely to result in an adverse additional impacts on aural or visual privacy of neighbouring properties. The works proposed will be less intensive than those considered in the original proposal as the existing swimming pool is intended to be retained. The use of the rear yard in terms of being for passive and active recreation remain unaltered by the proposed modifications ensuring that the works will not have any adverse impact in terms of aural and visual privacy, beyond that which is currently accepted and reasonably anticipated at the subject site. The proposal continues to satisfy Council's privacy requirements.

### 5.3 ECONOMIC & SOCIAL IMPACTS

The proposed development will provide upgrades to the facilities at the subject site and will offer new development with high levels of amenity. The subject site enjoys access to public transport services which provide access to a wide range of commercial centres.

The proposed development will utilise existing infrastructure including electricity, gas, sewer, water and telecommunication services.

Undertaking the demolition and construction works will have some short-term positive economic impacts through employment generation, both direct employment and multiplier effects. Accordingly, the proposed development is likely to have only positive social and economic impacts in the locality.





## 5.4 THE SUITABILITY OF THE SITE

### 5.4.1 Access to Services

The site is within an established area, electricity, gas, sewer, telephone, and water services are readily available to the subject site.

### 5.4.2 Parking and Access

No change is proposed to the existing car parking and access arrangements at the subject site. The proposed development works do not require any further consideration to be given to parking and access.

### 5.4.3 Hazards

The site is not in an area recognised by Council as being subject to flooding, landslip or bushfire. The proposed development is not likely to increase the likelihood of such hazards occurring.

## 5.5 THE PUBLIC INTEREST

The proposal is considered to be in the public interest in that it aligns with the objectives of Zone R2 – Low Density Residential under GRLEP 2021 and satisfies the objectives of applicable development standards relating to building scale and development density as adopted in Georges River Council's instruments and development control plans.

The proposed modification is considered to be compatible with existing development and will allow for future development to provide a balance between protecting residential amenity and the natural environment, and providing appropriate amenity to the future occupants. The proposal complies with the broad objectives contained within the GRLEP 2021 and adequately responds to the GRDCP 2021.





## 6. Conclusion

This Statement accompanies a Section 4.55 Modification for the development works within the rear yard of the subject site including retention of the existing in ground swimming pool, reconfiguration of the external stairs and provision of additional landscaped area. The proposed development has been assessed in light of Section 4.55 and Section 4.15 of the Environmental Planning & Assessment Act, 1979 and Council's planning instruments and development control plans.

This Statement establishes that the proposal aligns with the objectives of Zone R2 Low Density Residential and adequately satisfies the relevant development standards within the GRLEP 2021 as they relate to the Foreshore Scenic Protection Area and Landscaped Areas in residential zones. Furthermore it responds adequately to all DCP requirements ensuring a high quality and well-designed development which enhances the existing site.

The proposal is not likely to result in any significant loss of privacy to any adjoining or nearby residents and will offer high levels of improved amenity for the occupants. The proposed works will have no unreasonable impact on the views or solar access to nearby residential properties and will not change the topography, micro-climate, air or water quality of the locality. This Statement demonstrates that the proposal will have positive social impacts in that it will contribute to the quantum of housing in the locality and will also have a positive economic impact through temporary job creation.

Accordingly, the proposal is considered to be in the public interest and worthy of Council's support.

