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ALTON PROPERTY GROUP PTY LTD

Preliminary Geotechnical Assessment

93-107 Cecil Avenue & 9-10 Roger Avenue, Castle Hill NSW

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Document Control

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1. Introduction

1.1 Background

At the request of Alton Property Group Pty Ltd (the Client), EI Australia (EI) has carried out a Preliminary Geotechnical Assessment (PGA) for the proposed development at 93-107 Cecil Avenue & 9-10 Roger Avenue, Castle Hill NSW (the Site).

This PGA report has been undertaken to assess the likely Site surface and subsurface conditions and anticipated geotechnical factors associated with the proposed development, in support of a Development Application and the preparation of the initial design of the proposed development.

1.2 Proposed Development

The following documents, supplied by the Client, were used to assist with the preparation of this PGA report:

- Architectural drawings prepared by A+ Design Group, Project No: A24033, revision A, dated December 2024; and
- Site survey plan prepared by SDG Land Development Solutions – Referenced 6864, Revision. C, Sheet 1 to 6, dated 22 February 2017.

Based on the provided documents, EI understands that the proposed development involves the demolition of the existing site structures and the construction of four structures Building A, B C and D. Building A is proposed to be five-storeys high, Building B is proposed to range between twelve and twenty -one, Building C ranging between seven and twenty-five and building D is proposed to be seven-storey. All four buildings are to be built over a common split two to three-level basement. The lowest basement level is proposed to have a Finished Floor Level (FFL) of between RL 110m AHD and RL 114m AHD. A Bulk Excavation Level (BEL) ranging between RL 109.8m AHD and 113.7m AHD is assumed, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depths from 5.0m to 21m Below Existing Ground Level (BEGL) have been estimated. Locally deeper excavations may be required for footings, lift shafts, water tanks, and service trenches.

1.3 Assessment Objectives

This PGA report has been undertaken to assess the likely Site surface and subsurface conditions for the development of a preliminary conceptual ground model of soil, rock and groundwater conditions beneath the site based on our experience and previous investigations within the vicinity of the site. This model is to assist in providing preliminary geotechnical advice and recommendations for consideration in the preparation of concept designs and construction methodologies for the proposed development including:

- Dilapidation surveys;
- Excavation assessment;
- Groundwater considerations;
- Excavation retention;
- Building foundation options including design parameters;
- The requirement for specific geotechnical investigations for detailed design post-DA and following site clearance.

2. Site Description

2.1 Site Description and Identification

The site identification details and associated information are presented in **Table 2-1** below while the site locality is shown on **Figure 1.**

Table 2-1 Summary of Site Information

Information	Detail
Street Address	93-107 Cecil Avenue & 9-10 Roger Avenue, Castle Hill NSW
Lot and Deposited Plan (DP) Identification	Lot 27 in DP 15399, Lot 21 to 22 in DP778595, Lot 1 and 4 in DP 531559, Lot 5 and 6 in DP705913, Lot 1 to 4 in DP581293, Lot 1 to 2 in DP 547897, Lot 1 to 2 in DP 591676, Lot 20 in DP15399, Lot 9 and 10 in DP 29141
Brief Site Description	The site comprises of multiple single and two-storey residential brick and clad dwelling (potentially asbestos) with tile and metal roofs.
Site Area	The site area is approximately 17,623.6 m^2 (based on the provided survey plan referenced above).

Plate 1 Aerial photograph of the site (**Source**: SIX Maps, 26 November 2024)

2.2 Local Land Use

The site is situated within an area of residential use. Current uses on surrounding land at the time of our presence on site are described in **Table 2-2** below. For the sake of this report, the site boundary nearest to Cecil Avenue shall be adopted as the northern site boundary.

Table 2-2 Summary of Local Land Use

Direction Relative to Site	Land Use Description
North	Cecil Avenue, a two lane, asphalt-paved road. Beyond the roadway is one to two storey residential and commercial buildings.
East	Property at 109 Cecil Avenue, a single-storey residential brick dwelling and 7 Roger Avenue, a part double storey clad residential dwelling.
South	20, 22 and 24 Lincoln Place, 8 and 7 Roger Avenue, two storey brick residential dwellings. Roger Avenue, a two lane asphalt-paved road cul-de-sac.
West	Property at 91 Cecil Avenue, a single storey commercial building with at grade parking to the south of the property. Property at 20 to 24 Lincoln Place, single to two-storey residential brick dwellings and a church cemetery.

2.3 Regional Setting

The site topography and geological information for the locality is summarised in **Table 2-3** below**.**

Table 2-3 Topographic and Geological Information

Attribute	Description
Topography	The site is located on the low south side of the road within gently (0° to 10°), south dipping topography with site levels varying from R.L. 116.5 at the southern site corner to R.L. 132.61 at the northern site corner.
Regional Geology	Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Sydney 1:100,000 Geological Series Sheet 9130 (DMR 1983) indicates the site to be underlain by Ashfield Shale, which typically comprises of black to dark grey shale and laminate and Hawkesbury Sandstone, which typically comprises of medium to coarse-grained quartz sandstone with very minor shale and laminite lenses. To the north of the site the “Dural Dome” Anticline is running in a north south direction. Anticlines are generally associated with increased fracturing within the bedrock.

Plate 2. Excerpt of the geological map showing location of site.

2.4 Conceptual Ground Model

A summary of subsurface ground conditions likely to be encountered at the Site is presented in **Table 2-4** below. The information presented below is inferred from a review of our in-house database and our knowledge of the area. Based on regional information, the subsurface conditions around the site are likely comprised of fill and residual soils over shale.

Table 2-4 Conceptual Ground Model

Unit	Material	Comment
1	Fill	Fill material is inferred to be uncontrolled and poorly compacted. Filling may be deeper beneath existing structures and in landscaped areas of the site.
2	Residual Soil	Silty CLAY; medium to high plasticity, typically stiff to hard grading onto extremely weathered material.
3	Sandstone	Sandstone is expected to be initially of very low strength and extremely to distinctly weathered. The strength generally increases and weathering generally decreases with depth. The sandstone bedrock in the area is anticipated to be interbedded with siltstone, and sections or bands of siltstone and shale are expected to be present.

3. Recommendations

3.1 Overview

Considering the proposed development and likely subsurface conditions that may be encountered, we consider the following to be the main geotechnical issues for the proposed development:

- Basement Excavatability;
- Excavation Retention;
- Depth of groundwater; and
- Depth to rock and rock quality for foundation design.

Further discussions on the above issues are provided in the following sections.

3.2 Dilapidation Surveys

Dilapidation surveys should be carried out on the adjoining structures and infrastructures that fall within the zone of influence of the excavation. The zone of influence of the excavation can be defined as a horizontal distance back from the edge of the excavation of at least twice the excavation depth.

3.3 Excavation Methodology and Vibration Monitoring

3.3.1 Preliminary Excavation Assessment

In order to achieve the proposed two to three-level basement, excavation depths of 5.0m to 21m BEGL are expected across the site. Therefore, it is likely that the proposed development will therefore extend through all Units / Units 1 and 2 as described in **Table 2-4** above.

Prior to any excavation commencing:

- An appropriate full depth retention system must be installed; and

- Reference must be made to the Safe Work Australia Excavation Work Code of Practice – January 2020.

Units 1 and 2 can be readily excavated by buckets of medium hydraulic excavators. Unit 3 may require a high capacity and heavy bulldozer for effective production should bedrock of at least low to medium strength be encountered. Further Geotechnical Investigation should be undertaken on the site, to confirm the quality of bedrock within the excavation depth. Alternative methods using rock saws, ripping hooks or rotary grinders could be used, though productivity would be lower and equipment wear increased, and this should be allowed for. Such equipment would also be required for detailed excavation, such as footings or services on the rock, and for trimming of faces. Final trimming of faces may also be completed using a grinder attachment rather than a rock breaker in order to assist in limiting vibrations. The use of rotary grinders generally generates dust and this may be supressed by spraying with water.

Should rock breakers be used, vibration monitoring must be carried out and further advice must be sought from the geotechnical engineer.

Groundwater monitoring should be carried out during bulk excavation prior to finalising the design of a pump out facility. Outlets into the stormwater system will require Council approval.

3.3.2 Excavation Monitoring

Consideration should be made to the impact of the proposed development upon neighbouring structures, roadways and services. Basement excavation retention systems should be designed so as to limit lateral deflections.

Contractors should also consider the following limits associated with carrying out excavation and construction activities:

- Limit lateral deflection of temporary or permanent retaining structures; and
- Limit vertical settlements of ground surface at common property boundaries and services easement.
- Limit Peak Particle Velocities (PPV) from vibrations, caused by construction equipment or excavation, experienced by any nearby structures and services.

Monitoring of deflections of retaining structures and surface settlements should be carried out by a registered surveyor at agreed points along the excavation boundaries and along existing building foundations/ services/ pavements and other structures located within or near the zone of influence of the excavation. Owners of existing services adjacent to the site should be consulted to assess appropriate deflection limits for their infrastructure. Measurements should be taken:

- Prior to commencement of excavations;
- Immediately after installation of any temporary or permanent retaining structures;
- Immediately after the excavation has reached a depth of 1.5 m, and each 1.5 m depth increment thereafter;
- Immediately after the excavation has reached bulk excavation level; and
- Immediately after backfilling behind retaining structures.

3.3.3 Site Preparation and Earthworks

Working platforms for construction plant, placed on in-situ materials or on new fill, may be required and should be designed by a geotechnical engineer.

3.4 Excavation Retention and Retaining Walls

From a geotechnical perspective, it is critical to maintain the stability of the adjacent structures and infrastructures during demolition and excavation works. Excavations and retention systems will need to take into consideration the stability of adjoining structures so as not to have any adverse effects on the buildings and structures adjoining the excavation.

Based on the provided architectural drawings, the basement is proposed to abut the each site boundary and have setbacks of 6m to the north, 9m to the east, 0m to 9m to the south, 6m to 8m to the west.

Temporary batters of 1 Vertical to 1 Horizontal may be possible only, where space is available. The temporary batters should remain stable provided that all surcharge loads, including construction loads, are kept at a distance of at least 2h (where 'h' is the height of the batter in metres) from the crest of the batter. If steeper batters are to be used, then these must be supported by shotcrete and soil nail system designed by a suitable structural or geotechnical engineer. The stability of these batters can be assessed using computer slope stability analysis software such as Slope/W.

Alternatively, where space does not allow for temporary batters, a suitable full depth retention system will be required for the support of the entire excavation. The retention system must be installed to below Bulk Excavation Level (BEL) (including footings, service trenches and lift overrun pits) and socketed into low strength bedrock or better.

Unsupported vertical cuts in low strength shale or better may be possible, subject to cored boreholes confirming the quality and suitability of the exposed bedrock. Vertical cuts in bedrock, if possible, must be inspected during construction at regular depth intervals no greater than 1.5m by a geotechnical engineer to check for any inclined joints or weak seams that require stabilisation.

We recommend that information regarding the depth of the adjacent basements (if any) and founding materials of the adjacent footings be sought, to determine the requirement of underpinning of these structures.

3.5 Groundwater Considerations

Based on the limited in-house information available for the area, the depth to groundwater seepage (if any) is likely to be along or top of the overburden soil profile and bedrock interface. Investigations conducted at surrounding sites have reported seepage at levels ranging between 2.5 m and 4.5 m below existing ground level (BEGL)..

The in-house data is relevant for assessing potential groundwater levels expected during intrusive geotechnical investigations. Nonetheless, we recommend installing groundwater monitoring wells to observe groundwater levels and conducting pump-out tests at the site. These should be carried out in accordance with the minimum recommendations outlined by the DPIE/DCCEEW minimum requirements for groundwater investigations

The purpose of the groundwater monitoring is to estimate the groundwater seepage into the excavation to assist in finalisation of the drainage system. Groundwater aggressivity towards steel and concrete should also be assessed against the criteria set out in AS 2159:2009, which gives guidelines for steel and concrete foundation susceptibility to soil and groundwater aggressivity.

3.6 Foundation Options

Following the completion of bulk excavations, Unit 3 bedrock is expected to be exposed at the base. We recommend that all footings be founded on similar material.

Pads/strip footings founded within Unit 3 sandstone bedrock may be preliminarily designed for a maximum allowable bearing capacity of 600 kPa. For piles, an allowable shaft adhesion equal to 10% of the allowable bearing pressure in compression may also be used.

EI recommends a geotechnical investigation to be carried out, preferably following demolition, involving at least nine cored boreholes drilled to a minimum of 3m below final bulk excavation levels to determine the depth and quality of bedrock to ascertain our assumptions and optimize the bearing pressures.

Design of piles should consider the aggressivity of the soil and groundwater in accordance with Sections 6.4 and 6.5 of AS2159-2009.

4. Conclusions

This PGA report provides preliminary advice for construction at the site based on available information prior to intrusive geotechnical investigations. Geotechnical factors which may influence development of the site include:

- Depth to rock and rock quality for foundation design; and
- Depth of groundwater; and
- Foundation conditions of adjoining properties

Further geotechnical investigation and design input are required during the detailed design phase prior to and during construction. These are detailed further in **Section 5** below.

It is our preliminary assessment that the site is considered suitable provided the following: (1) excavation methodologies are carried out (2) all excavation faces are retained by engineered retaining walls and (3) all footings/piles for the proposed development are designed to be founded and socked into sandstone bedrock as per the recommendations outlined in this report and subjected to a detailed geotechnical investigation to confirm the findings

Further geotechnical investigation and design input are required during the detailed design phase prior to and during construction. These are detailed further in **Section 5** below

5. Further Geotechnical Inputs

Detailed geotechnical subsurface investigation prior to final design to determine the site specific subsurface profile and geotechnical parameters for design of footings is recommended.

The geotechnical investigation should involve:

- At least **nine (9)** cored boreholes within the site to bedrock of sufficient quality.
- At least **three (3)** groundwater wells within the site to monitor the groundwater levels and for completion of pump out tests.

We do not recommend that the final design be carried out based on this PGA report. The PGA report must be reviewed following the completion of the intrusive geotechnical investigation.

In addition, geotechnical footing inspections should be carried out during the construction stage (if new footings are necessary) to check initial assumptions about foundations conditions and likely variations that may occur between borehole locations and to provide additional advice.

6. Statement of Limitations

This report has been prepared for the exclusive use of Alton Property Group Pty Ltd who is the only intended beneficiary of EI's work. The scope of the assessment carried out for the purpose of this report is limited to those agreed with Ms Kaichi Leung and Alton Property Group Pty Ltd

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the geotechnical industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments.

The conclusions presented in this report are based on a limited investigation of conditions, with specific sampling and test locations chosen to be as representative as possible under the given circumstances.

EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during construction. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

We draw your attention to the document "Important Information", which is included in **Appendix A** of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by EI, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

Should you have any queries regarding this report, please do not hesitate to contact EI.

References

AS1289.6.3.1:2004, Methods of Testing Soils for Engineering Purposes, Standards Australia.

AS1726:2017, *Geotechnical Site Investigations*, Standards Australia.

AS2159:2009, *Piling – Design and Installation*, Standards Australia.

AS3600:2018, *Concrete Structures,* Standards Australia

Safe Work Australia Excavation Work Code of Practice, dated January 2020 – WorkCover NSW

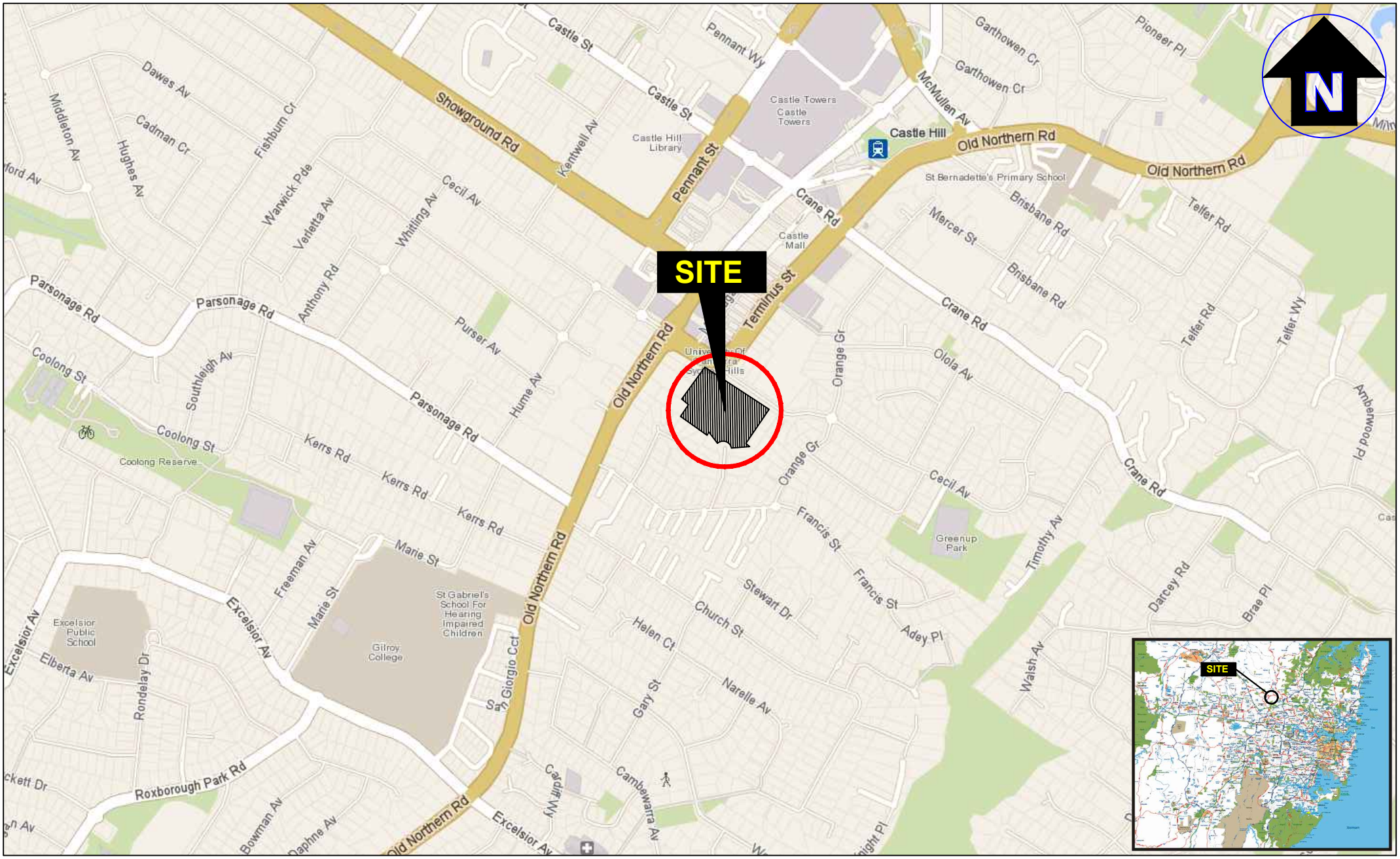
NSW Department of Mineral Resources (1983) Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1). Geological Survey of New South Wales, Department of Mineral Resources.

Abbreviations

AHD	Australian Height Datum
AS	Australian Standard
BEGL	Below Existing Ground Level
DP	Deposited Plan
EI	EI Australia
PGA	Preliminary Geotechnical Assessment
RL	Reduced Level

Figures

Figure 1 Site Locality Plan



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Alton Property Pty Ltd

Preliminary Geotechnical Investigation

93-107 Cecil Avenue & 9-10 Roger Avenue, Castle Hill, NSW

Site Locality Plan

Figure:

1

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Appendix A Important Information

Important Information

SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client And EI Australia ("EI"). The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

EI has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps and plans. EI has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, EI will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to EI.

GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g. a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

LIMITATIONS OF SITE INVESTIGATION

The investigation programme undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation programme and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. EI should be kept appraised of any such events, and should be consulted to determine if any additional tests are necessary.

VERIFICATION OF SITE CONDITIONS

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

REPRODUCTION OF REPORTS

 Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimize the likelihood of misinterpretation from logs.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. EI assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of EI or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

EI will not be liable to update or revise the report to take into account any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.