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Project 85374.00
21 March 2016
R.001.Rev1
KS

Attention: Louise Browne

Email: louise.browne@grimshaw-architects.com

Dear Sirs

Review of Reports - Geotechnical
Arthur Phillip High School and Parramatta Public School
Macquarie Street, Parramatta

1. Introduction

This letter report provides a review of existing geotechnical information relating to the proposed redevelopment of Arthur Phillip High School (APHS) and Parramatta Public School (PSS), Macquarie Street, Parramatta (the site).

The proposed redevelopment includes the retention of heritage buildings, demolition of other existing buildings and the construction of a seventeen storey secondary school (APHS) on the northern part of the site and a four storey primary school (PPS) on the southern part of the site.

The aim of the review of existing geotechnical report provided by the client is to present a summary of the findings, identify potential data gaps or omissions, and offer preliminary advice regarding further investigations and other options in relation to the proposed redevelopment.

The nature and extent of contamination and hazardous building materials on the site, has been addressed in other review reports by DP

2. Background

Previous geotechnical investigation of the site has been carried out by Alliance Geotechnical titled *Geotechnical Investigation Report, Arthur Phillip High School and Parramatta Public School, Macquarie Street, Parramatta Report Number: 1915-GR-1-1, dated 31 July 2015.* A review of the information contained in the report is provided in Section 4 below.

3. Site Description and Regional Geology

The site is located on Macquarie Street in Parramatta CBD and comprises two existing schools. APHS is located on the northern and southern sides of Macquarie Street and PPS is located on the southern side of Macquarie Street (refer to AG Drawing Number: 1915 attached). APHS occupies a total area of approximately 2.14 ha (1.24 ha in the north and 0.9 ha in the south) and PPS occupies an area of approximately 0.87 ha.

Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the site is underlain by Ashfield Shale of Triassic Age. The Ashfield Shale typically comprises dark grey to black shale and laminite which weathers to a residual clay profile of medium to high plasticity and is sometimes of significant depth (greater than 5 m).

4. Review of Report

The Alliance Geotechnical 2015 geotechnical investigation comprised borehole drilling with in-situ sampling and testing, followed by laboratory testing, analysis and reporting.

In summary, the field work include drilling of 13 boreholes (BH1 – BH13) augered, rotary drilled and some diamond cored to depths in the range 3.0 – 12.4 m with the subsurface conditions encountered comprising filling to depths of up to 1.5 m overlying (in Bores BH3 and BH6 only) alluvium to depths of up to 5.1 m and silty clay to depths of up to 5.0 m then shale. Initially the shale was deeply weathered in most boreholes, becoming medium to high strength with depth.

Groundwater was encountered during auger drilling at depths of 1.7 – 3.6 m (RL 5.9 – 3.3 mAHD) in three boreholes.

Laboratory testing was carried out to determine mechanical and chemical properties of the soil and rock. The results indicated that the soils are of low to medium plasticity and prone to dispersion. The samples tested were also non to slightly saline and mildly aggressive to buried concrete but non-aggressive to steel.

Typical design parameters were provided for excavations, batter slopes, retaining structures and foundations.

Excavations are expected to be predominantly in soil and readily carried out using conventional excavating plant. Temporary batters slopes of 1:1 (H:V) are nominated and 2.5:1 (H:V) for permanent soil batters.

For shallow footings, maximum allowable bearing pressures of 150 kPa were nominated for bearing in natural very stiff clay to 600 kPa for extremely weathered rock.

Given the likely loads, pile footings founding uniformly in the underlying shale of at least medium strength will minimise total and differential settlement. Typical design values for various classes of

shale (extremely low, low and medium) were provided, resulting in maximum allowable base bearing pressures of up to 6000 kPa and shaft adhesion of 350 kPa.

5. DP Comments and Suggestions for Additional Work

In general the extent of field work and the comments provided are considered to be acceptable for the proposed development.

Notwithstanding this observation, further investigation, in consultation with ARUP, the civil and structural designers for the project, may be required to address the following issues:

- The shallow depth or lack of diamond coring in some boreholes; to provide sufficient information to optimise footing design and minimise potential variations during foundation construction.
- Groundwater monitoring, to provide longer term information for the design of detention tanks, excavations, excavation support and basements, if any.
- Underpinning; new excavations are proposed adjacent to a heritage listed building (which is to be retained). Footing exposures and an underpinning methodology will probably need to be developed.
- Pavement design; collection of bulk samples and California bearing ratio testing for pavement thickness design.
- Vibrations; no assessment has been made to determine vibration limits for construction plant. Monitoring and trials can be carried out if required.
- Determine the presence or otherwise of acid sulphate soils on the site.

6. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at Macquarie Street, Parramatta in accordance with DP's proposal SYD160205 dated 12 February 2016 and acceptance received from Grimshaw Architects dated 3 March 2016. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Grimshaw Architects for this project only and for the purposes as described in the report. It should not be used for other projects or purposes or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological

processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

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

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

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

The scope for work for this report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

If you have any comments or queries, please contact the writer.

Yours faithfully
Douglas Partners Pty Ltd

Konrad Schultz
Principal

Reviewed by

Michael J Thom
Principal
for:

Attachments: About this Report
Site Drawing

About this Report

Douglas Partners

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

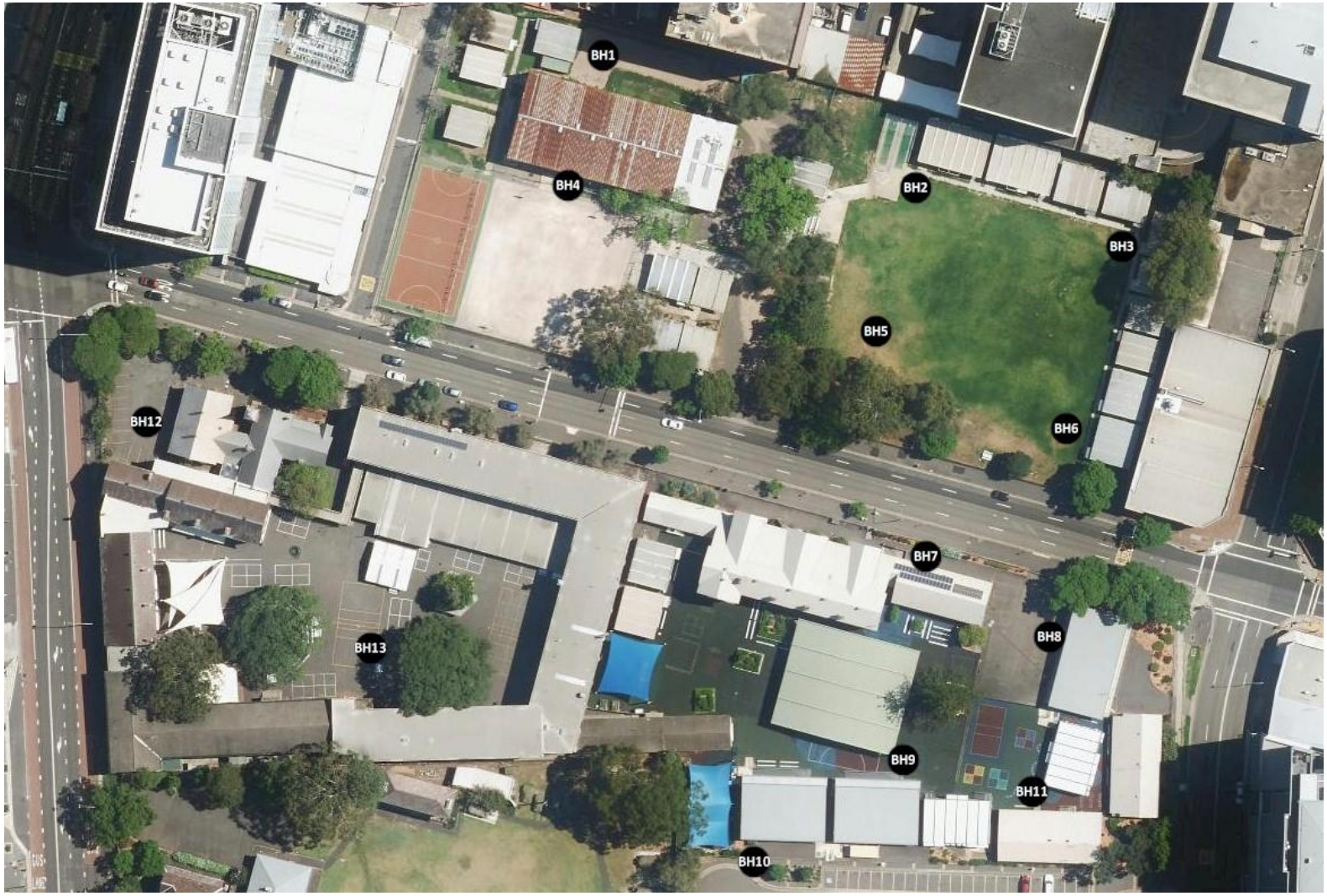
The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Alliance Geotechnical Pty Ltd
ENGINEERING | ENVIRONMENTAL | TESTING

Geotechnical Borehole Locations

Not To Scale

N



Source: SIX Maps (www.maps.six.nsw.gov.au)