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Project 210589.01
2 November 2022
R.002.Rev0
CSM:cj

Attention: Cameron Hay

Email: chay@essencepm.com.au

Comments on Groundwater Inflow
16 & 17, 12-20 Berry Road and 11-19 Holdsworth Avenue
St Leonards

1. Introduction

This report has been prepared by Douglas Partners Pty Ltd (DP) to provide comment on the expected water inflow into the proposed basement at 16&17, 12-20 Berry Road and 11-19 Holdsworth Avenue, St Leonards. The comments were commissioned in an email, dated 31 October 2022, by Cameron Hay of Essence and was undertaken in accordance with Douglas Partners' email proposal, dated 31 October 2022.

The aim of this report is to provide comment on the expected groundwater level and inflow into the proposed basement.

DP has used the following drawings/information for the preparation of this assessment report:

- DP Geotechnical Investigation Report 210589.01.R.001.Rev0 dated 22 July 2022.
- Silvester Fuller Architectural DA Drawing Package Rev A dated 29 August 2022.

This report should be read in conjunction with this report and the architectural drawings provided.

2. Site Description and Proposed Development

The development comprises 10 adjacent properties (16&17, 12-20 Berry St and 11-19 Holdsworth Ave, St Leonards) which are situated between Berry Rd and Holdsworth Ave. The site is approximately rectangular with an area of about 5015 m^2 and situated on a south facing hillside that falls down towards River Rd. The site levels were observed to be following the general shape of the surrounding hillside, falling from RL 75.6 m AHD at the northwest corner to RL 65.6 m AHD at the southeast corner of the site.

Adjacent land use generally comprises residential houses of between 1 and 2 storeys (some over a partial basement level) and residential streets.

From the architectural drawings (refer to Section attached) it is understood that the development comprises a 10-level residential building over a three-level basement, with the lowest basement level (Basement Level 03) extending to RL 55.4 m.

3. Geology and Groundwater Levels

Reference to the Sydney 1:100 000 Geological Sheet indicated that the site is underlain by Ashfield Shale which is typically a dark grey to black shale and laminite. The site is also near a boundary with Hawkesbury Sandstone (approx. 20 m to the south of the site) which typically comprises medium to coarse grained quartz sandstone with some shale bands or lenses. The results of the investigation on the site confirmed the regional mapping with interbedded siltstone and sandstone intersected at shallow depths.

Groundwater monitoring wells were installed in Boreholes BH1, BH1A, BH3, BH3A, BH6 and BH6A to allow for measurement of groundwater levels. Tests were also carried out to determine the rock mass permeability.

Based on the water level measurements it is evident that there is an elevated water table at the soil rock interface which appears to be disconnected from the permanent water table. This has affected the readings taken in some of the shallower standpipes. The permanent water table, however, is shown to be between RL 55.1 and 55.7 m (disregarding the level measured in BH1, which appears to be affected by the water at the rock-soil interface). Given that the past two years were exceptionally wet one can assume that these levels are upper bound levels given the current climatic conditions. Note that future climatic influences may affect this level.

Permeability testing indicated that the permeability was less than 9×10^{-8} m/s.

4. Basement Impact on Groundwater Levels

The proposed basement will extend to RL 55.4 m. The current water level is estimated to be RL 55.7 m, only 300 mm above the current basement level. Given the low permeability and minimal pressure head difference, seepage into the basement is expected to be quite low. A drained basement is therefore unlikely to have a significant effect on the surrounding groundwater levels. Given the disconnect between the permanent water level and the water commonly found on the soil-rock interface it is also unlikely that a drained basement will impact near surface conditions.

5. Unexpected Seepage through Bedding Planes and other Defects in the Rock Mass

Localised higher inflows than predicted can occur. In this development the basement is close to the water table and it is less likely that higher than anticipated flows will occur. It is nevertheless

recommended that the inflow is assessed during excavation and that high inflow areas, should any be encountered, be treated (for example, grouted). In the worst case, if flows are considerably higher than predicted, it is still possible to reconsider partial tanking of an area, or basement level.

6. Conclusions

Given the limited depth of the basement and position of the water table and low permeability of the rock, it is DP's view that a drained basement is feasible, provided that ongoing monitoring is carried out during excavation to confirm that conditions are as anticipated.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd

Reviewed by

Charles Marais
Principal

Peter Oitmaa
Principal

Attachments: About this Report
Architectural Section

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.

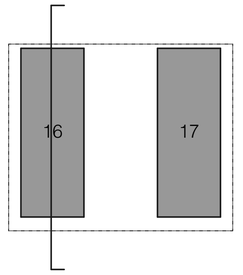
Information for Contractual Purposes

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.

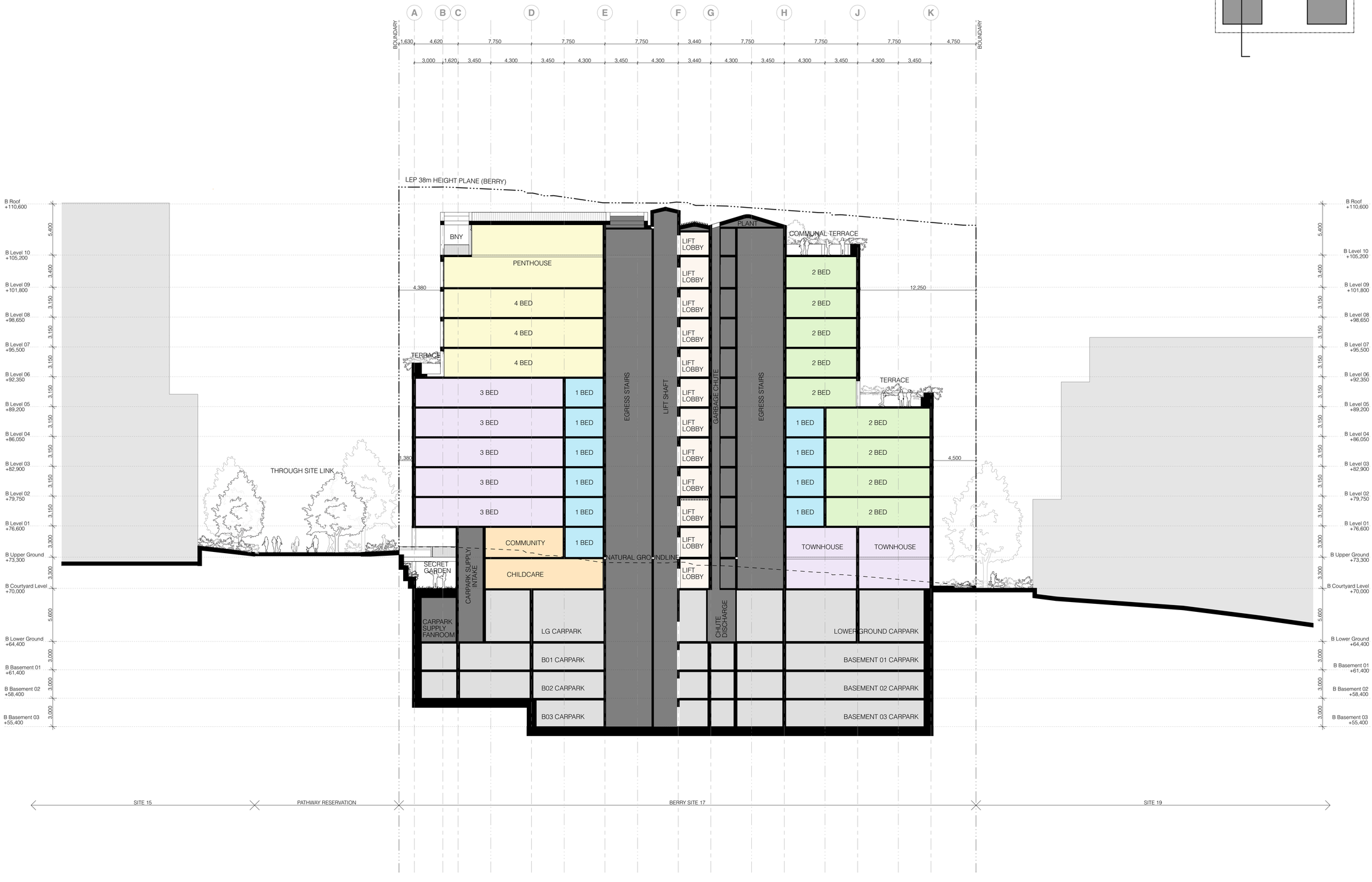
SILVESTER FULLER



FOR APPROVAL

not for construction

Rev	Date	Description	By	Chk.
A	29/8/22	Development Approval	SV BF JF	HS



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Scale	Sheet Size
1:200	A1

Drawn	Chk.	Project #
SV BF JF	HS	152

Project
Berry Holdsworth
12-20 Berry Road & 11-19 Holdsworth Avenue
St Leonards South NSW 2065 Australia

Drawing Name
SECTION
Section AA

Drawing #	Revision
DA_A-310-001	**A**