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Tenancy 1A, 100 Market Street,
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Project 99566.00
17 December 2020
R.002.Rev0
HB

Attention: Travis Reid

Email: Travis@blueprintaustralia.com.au

Preliminary Impact Assessment
Proposed New Development
21-23 Victoria Avenue, Castle Hill

1. Introduction

This letter report presents the results of a preliminary impact assessment carried out by Douglas Partners Pty Ltd (DP) for a proposed new development at 21-23 Victoria Avenue, Castle Hill. The assessment was commissioned in an email dated 1 September 2020 by Travis Reid of Blueprint Australia on behalf of Spotlight Property Group and was undertaken in accordance with Douglas Partners' email proposal dated 26 August 2020.

This letter report provides preliminary comment on the potential geotechnical impact of the proposed development in relation to the Sydney Metro North-West rail tunnels that run directly beneath the site.

2. Site Description

The rectangular shaped site is situated within the centre of an industrial area of Castle Hill, in the Northern Hills District of Sydney. The site is bound by Carrington Road to the south, Victoria Avenue to the west, Salisbury Road to the north and commercial developments to the east. The site has plan dimensions of approximately 220 m along Victoria Avenue by 95 m along Carrington Road. 21 Victoria Avenue is currently occupied by two, two-storey commercial buildings while 23 Victoria Avenue is occupied by a single storey commercial development.

With reference to the NSW 2.0 m contour maps, the lowest elevation on the site runs roughly east-west through the middle of 21 Victoria Avenue, with the ground levels rising gently to the north and south. The elevation change across the site is approximately 4.0 m. A culvert also runs beneath 21 Victoria Avenue.

The Sydney Metro North-West Rail twin tunnels pass roughly east-west, directly beneath the middle of the site.

3. Preliminary Geotechnical Model

The derived geotechnical model has been based on a review of DP project records in the vicinity of the site, along with a review of published geological survey and soil landscape maps. The results indicate that the geotechnical model for the site, from surface, is:

- possible filling to depths of up to 1.0 m; overlying,
- residual clay and silty/sandy clay, generally stiff to very stiff, likely to depths of between 1.5 m and 3.0 m; overlying,
- highly weathered and very low to low strength shale and laminite, likely to depths of between 2.5 m and 4.5 m; overlying,
- medium and medium to high strength shale and laminate, with sandstone at depth.

It should also be noted that there is potential for the occurrence of alluvial soils within the lowest lying area of the site where a possible paleochannel previously existed, prior to development of the area and installation of the culvert. This old channel runs directly beneath the 23 Victoria Avenue site.

Groundwater was encountered in nearby boreholes at depths of between 3 m and 5 m below surface, possibly a perched water table at the soil / rock interface. The groundwater, however, may be shallower within the vicinity of the paleochannel that crosses the site, with levels rising after periods of prolonged wet weather.

4. Proposed Development

It is understood that the proposed redevelopment will include the demolition of the existing buildings, excavation of common two-level basement and construction of the new structure. The new structure will consist of two commercial towers, one 14 floors and one 12 floors.

The proposed bulk excavation level is RL 81.7 m (approximately 7 m below current ground level). Detailed excavation for foundations and lift over-runs are expected to be about 700 mm deeper at about RL 81 m and 1.5 m deeper at about RL 80.2 m, respectively.

5. Sydney Metro Information

The top of the Stratum Boundary/First Reserve associated with the tunnels is about 17 m below current ground level. The tunnel crowns are about 25 m below current ground level. Based on the Surveyor's annotations on the architectural drawing (see attached), the tunnel crowns are at RL 63.82 m and RL 63.84 m (about 18 m below the proposed bulk excavation level). The Sydney Metro Stratum Boundary/First Reserve is shown to be at RL 71.8 m (about 10 m below proposed bulk excavation level) and the Second Reserve is shown to be at RL 85 m, about 3 m below current ground level.

6. Preliminary Impact Assessment

The ASA Standard sets out requirements for TfNSW tunnel assets and safety assurance. The Sydney Metro Technical Guidelines[1] outlines 'Protection Reserves', construction restrictions and other aspects relating to developments in the vicinity of the rail infrastructure (e.g. tunnel displacement, induced cracking and tunnel monitoring criteria). The document states that an assessment is required for excavations greater than 2.0 m deep that are located within the Second Reserve. Shallow footings are allowed in the Second Reserve, subject to assessment.

The proposed basement and foundations are located within the Second Reserve. Although the proposed structure is only four levels high in the area directly above the tunnels, the footings of the 14-level tower is expected to be within the zone of influence of the tunnels. It is understood that columns will be at spaced at 8.7 m with typical column loads of 6 MN. Pad footing dimensions have not been provided. The footing size, and therefore the bearing pressure, will ultimately be governed by the allowable bearing capacity of the founding material. Available information indicates that the medium strength shale expected at founding level will be suitable for an allowable bearing pressure of 3.5 MPa.

The proposed basement will require up to 7 m of excavation. Excavation for the basement is likely to encounter filling, clay soils and weathered rock to approximately 2.5 m to 4.5 m depth, underlain by medium strength or stronger rock. Therefore, horizontal stress relief is likely to very minor and not expected to impact the tunnels which are some 17 m below. Vertical displacement as a result of unloading (reduction in stress of about 150 kPa) is also unlikely to significantly affect the tunnels.

Based on the anticipated dissipation of stress, an expected bearing pressure of 3.5 MPa for the footings and 17 m of medium strength or stronger shale (800 MPa Youngs Modulus) between the footing and the tunnel crown, the increase in stress in the rock around the tunnel as a result of the new structure is expected to be less than 50 kPa with displacements likely to be less than 1 mm (to be confirmed by further analysis).

7. Comments

Based on our experience of similar projects over/adjacent to rail tunnels in Sydney, the depth of the tunnels beneath the proposed works and the expected ground conditions, the effect of the proposed development on the tunnels is likely to be minor with changes in stress and displacement well below the allowed tunnel limits set out in the guidelines.

Sydney Metro will likely require a geotechnical investigation and an impact assessment, including numerical modelling. Dilapidation surveys of the tunnels to assess the current condition may also be required. It will also be necessary to carry out monitoring during the construction to ensure that predicted deformations are as anticipated, and that vibration is kept below acceptable levels.

[1] Transport for New South Wales: Sydney Metro – Technical Services, Sydney Metro Underground Corridor Protection Technical; Guidelines , Document No.: NWRLSRT-PBA-SRT-TU-REP-000008 Revision 1, dated 16 October 2017

It is recommended that a preliminary meeting is held with Sydney Metro to confirm the actual requirements for the project.

8. Limitations

Douglas Partners (DP) has prepared this report for this project at 21-23 Victoria Avenue, Castle Hill in accordance with DP's email proposal accepted on 1 September 2020 by Travis Reid of Blueprint Australia on behalf of Spotlight Property Group. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Spotlight Property Group for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or other site 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 investigation. 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 contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk

assessment would, however, be necessarily restricted to the (geotechnical / environmental / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

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

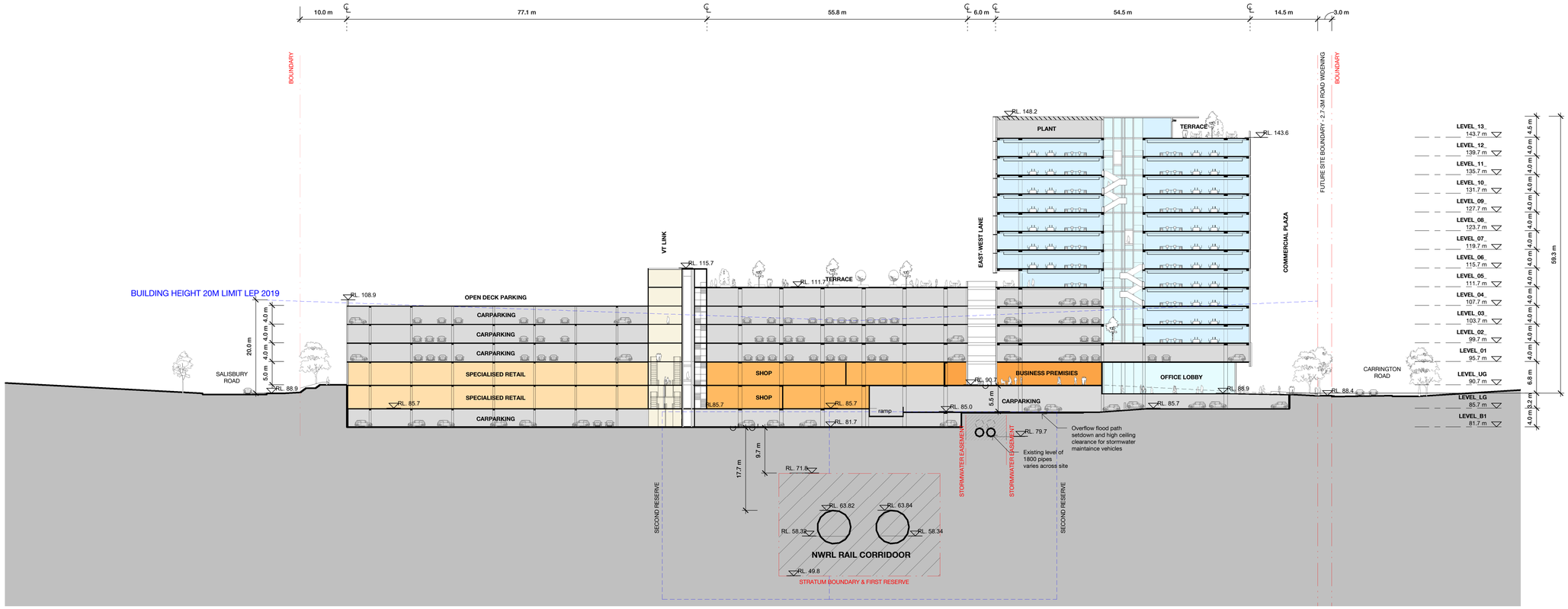
Yours faithfully
Douglas Partners Pty Ltd

Hugh Burbidge
Principal

Reviewed by

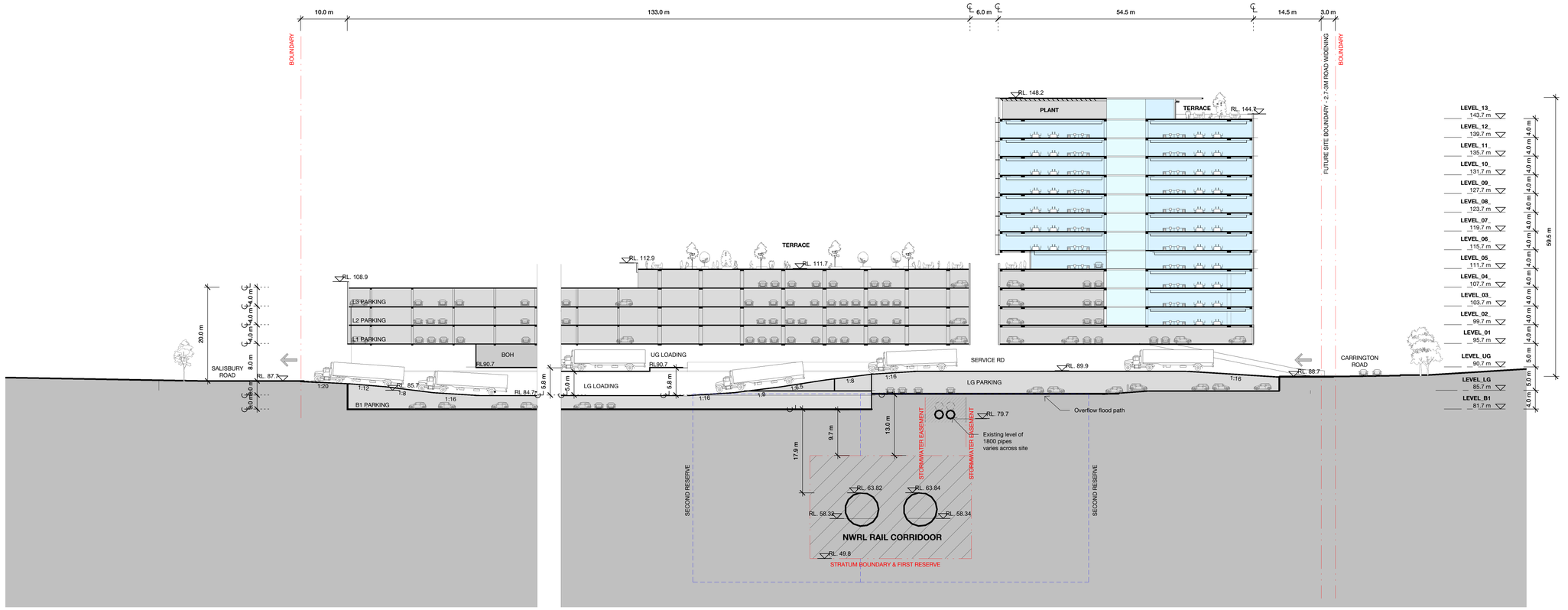
Charles Marais
Principal

Attachments: Surveyor's Annotated Architectural Drawing



A Section A

1 : 500



D Section D

1 : 500

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Check all dimensions and site conditions prior to commencement of any work, the purchase or ordering of any materials, fittings, plant, services or equipment and the preparation of shop drawings and or the fabrication of any components.

Do not scale drawings - refer to figured dimensions only. Any discrepancies shall immediately be referred to the architect for clarification.

Rev	Date	Description	Initial	Checked
2	30/11/20	Planning Proposal Submission	JH	MA
1	11/11/20	Consultant Issue	JH	MA

Concept Design
21-23 Victoria Ave Castle Hill

Section A & D

Status	Planning Proposal
Scale	1 : 500 @ A1
Drawn	JH
Checked	MA
Project No.	S12408
Plot Date	15/12/2020 4:56:27 PM
BIM	
Drawing no.	A10.01
Revision	2

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