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Project 84955.01
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R.006.Rev1
JAM

Attention: Barry Steedman

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Dear Sirs

Geotechnical Response to Submissions
ATP Development, Buildings 1, 2 and 3
ATP Park Eveleigh

1. Introduction

This document is a brief reply to the "Response to Submissions" that were received in relation to the proposed development of Buildings 1, 2 and 3 at the Australian Technology Park, Eveleigh, NSW. The submissions with a geotechnical component were related to Building 1, on Lot 9 and were concerned with:

- a) massing of the building and potential to relocate car parking areas underground
- b) request by Sydney Trains to provide additional information related to construction methods and potential rail tunnel interface issues.

This geotechnical response was prepared using data collated previously.

2. Scope of Works

Douglas Partners Pty Ltd (DP) carried out an initial desktop assessment of the likely subsurface conditions at the proposed development site (Building 1), which was followed by a geotechnical site investigation comprising drilling of four boreholes into rock.

3. Comments

3.1 Building 1 Underground Car Park Option

To reduce the mass of Building 1, the relocation of the proposed car parking space into basement levels was suggested for consideration. Basement level car parking was considered in the concept stage design but was rejected due to the inherent geotechnical risks associated with the proximity of the railway tunnel and increased potential to disturbance to the surrounding area, together with the related cost implications. Details of the geotechnical risks are described below.

The subsurface conditions within the footprint of Building 1 comprise 2-3 m of sandy filling ($\pm$ sandstone, rubble, ash and contamination) overlying in situ sands to a depth of about 6-7 m, which are in turn underlain by residual clay. The top of rock is at a depth of about 10-12 m and rock that may be considered as a suitable foundation strata was encountered from a depth of about 14-15 m. Both the filling and the in situ sands are saturated with groundwater with water level at a depth of about 2-2.5 m.

The existing railway tunnel is located about 6 m in plan from the south-western corner of Building 1 and preliminary information indicates that its crown is likely to be at a depth of about 5 m with the invert at a depth of about 10 m.

Assuming a two level basement car park, excavation to a depth of about 6 m would be required. Assessment of the subsurface conditions indicated that all of the basement excavation would be in either imported and contaminated sandy sandstone filling or in the in situ sands. Based on the potential excavation depths and the subsurface conditions, the following geotechnical risks were identified:

- Disturbance of contaminated filling.
- Excavation in saturated sands that would require de-watering. The wet sand is difficult to handle, can't be stockpiled even after de-watering and may also be contaminated.
- The de-watering process could induce settlement in areas adjacent to the excavation. Any shoring system employed to enable the excavation of the saturated materials would need to be watertight and socketed into rock to reduce the need for continuous de-watering during construction.
- Shoring of the excavation is likely to require temporary tie-back anchors in the sand. It is unlikely that sufficient space would be available between the proposed shoring and the railway tunnel easement to develop the required bond length.
- De-watering induced settlement of the surrounding area could affect the structural stability of the railway tunnel, the childcare centre, pavements and buried services.
- The de-watering would need to be designed for potential removal of large volumes of groundwater due to the high permeability of the sand and shallow groundwater.
- The cone of depression of the drawdown around the site would be extensive due to the high permeability of the sand.
- The basement would need to be fully tanked to exclude the need for permanent de-watering. The fully tanked basement could have a damming effect on the upstream side with negative environmental effects and lowering of the water levels on the downstream side and possibly inducing settlement.
- The basement in the saturated soil would require a full hydrostatic slab.
- The timeframe for the excavation and construction of Building 1 would increase significantly and introduce a large number of truck movements on the local roads.
- Ongoing seepage management would be expected.

While there are engineering solutions for the mitigation of some of the above listed geotechnical risks, residual risks to adjacent properties and the excavation will remain throughout the construction and service life of the project. Consequently, the above ground car parking option for Building 1 was considered more appropriate compared to the basement solution.

3.2 Rail Tunnel Interface Issues

As part of the DA application process, DP has prepared a desktop study regarding the potential interaction between the proposed Building 1 and the existing railway tunnel (Report No. 84955.01.R001.Rev1, dated 12 November 2015). The study considered the typical Sydney Rail requirements (RailCorp Technical Brief, 2009), the known or estimated subsurface conditions and the design features of Building 1 at the time of the study.

The conclusions of the study are as follows:

- Based on the estimated depth of the tunnel adjacent to Building 1 and that the building is proposed to be founded on rock at a depth of more than 10 m, the rail requirements do not pose a geotechnical constraint for the foundations of the proposed building, as they will be outside of the “zone of influence” of the existing tunnel. The proposed foundation method of bored piles or similar, socketed into rock is a viable foundation method.
- During the demolition and construction phase for Building 1 an approximately 5 m wide exclusion zone should be established parallel to the boundary with the rail easement above the tunnel. No large earthmoving machinery or crane should be allowed in this exclusion zone and weight restriction should be in place for material storage.
- A dilapidation survey will need to be completed for the section of the tunnel parallel to Building 1, i.e. from the corner of Davey and Henderson Roads to the south-western corner of Lot 9.
- No bulk excavation is planned for Building 1, therefore in DP’s opinion there should be no need to carry out a 3D Finite Element Analysis.

Recent design indicates that a truck access is proposed from Henderson Road to Lot 9 in the south-western corner, which will cross the tunnel alignment at surface level. Once accurate design information is received from Sydney Trains for the existing rail tunnel, the potential impact of the proposed crossing, together with any load limitations (if required) will be assessed.

Mirvac Construction and DP have established contact with Sydney Trains (ST) to brief the relevant ST departments about the proposed works. At the same time, Mirvac Construction and DP applied to access the ST “data room” to acquire the as-constructed drawings for the existing railway tunnel. The design information will be used to establish the spatial relationship between the existing tunnel and the proposed structures and if required, redesign the structures to reduce the risk of impact on the tunnel.

In summary, since the proposed development doesn’t contain basement excavation and all foundations are proposed to be founded outside of the zone of influence, the risk of potential negative interaction between the development and the existing railway tunnel is low. Initial discussions with ST

indicated that the supplied geotechnical information is adequate for the current stage of the project however, additional information will be required as the project design progresses.

3.2.1 Dilapidation Survey

In addition to the review of the tunnel information, once it becomes available, a dilapidation survey will be carried out of the existing tunnel to prepare a pre-construction record of the condition of the tunnel lining. The findings of the dilapidation survey will be confirmed on site with representatives of ST. A similar dilapidation survey will be carried out at the completion of the construction phase.

The spatial extent and timing of the dilapidation surveys will be coordinated between Mirvac Construction and ST.

Considering that no bulk excavation is planned, DP considers that there would be no requirements for monitoring instrumentation in the tunnel.

4. Limitations

Douglas Partners (DP) has prepared this report for this project at ATP Park Eveleigh. This report is provided for the exclusive use of Mirvac Construction for this project only and for the purposes as described in the report. It should not be used by or 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 assessment. 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.

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.

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

Yours faithfully

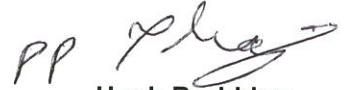
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Attachments: About this Report