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**Project: 161 Sussex Street
Redevelopment
Rail Corridor Impact Statement**

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1 Introduction

This report addresses the impacts that may need to be considered in respect of the proposed redevelopment of Hotel at 161 Sussex Street and a CBD Rail Link in the center of Sussex Street, should this Link proceed in the future, and further it responds to the Director General Requirements for consultation with RailCorp.

The expansion project at 161 Sussex Street comprises a 25 story tower to the south containing hotel and commercial accommodation plus an extension of the conferencing space to the west over the expressway

The existing building straddles the western distributor currently and there are minor infill structures to be located within this section The new 25 story tower will be constructed on existing breaks between roadways and will also straddle the lower road, known as Slip lane plus the Eastern Lanes of the expressway, similarly the convention centre to the west will be located on islands and will straddle the other expressway lanes to the west. (Figure 1).

Key constraints related to the founding of the structure will relate to the critical coordination with infrastructure, including but not limited to RMS, Railcorp, Ausgrid, andSHFA.

Geotechnical investigation has s been undertaken to determine that the founding rock is more than 20 meters below the Sussex Street level. Extensive in ground services information has been gather on the area from physical investigation and from existing drawings to develop the schematic design of services, the findings are contained in the main Aurecon report to the Application.

This report identifies the design constraints that will need to be considered and resolved should the Railcorp infrastructure represented by the easement of plan proceed in the future.



2 Executive Summary

The proposed development is identified under application number 4972-2011, as Four Points by Sheraton Hotel Expansion, Lots 101 and 102 DP1009697, 161 Sussex Street, Sydney, by M&L Development Co Pty Ltd. 24 November 2011.

Consultation has occurred between Railcorp, Cadence, Aurecon and Cox on behalf of M&L Development PTY LTD in order to understand the plans and requirements of the authority. At this time the CBDRL in Sussex Street is an easement only, there is no network layout, no height of possible alignment or plans to construct

In particular this report outlines responses to the following items in the DGR;

9. Rail Corridor – coordination with Railcorp requirements

- As a result of the separation between the possible tunnel alignment and the hotel foundations there is no perceived impact on the practicality and cost of a rail expansion project utilising the Sussex Street easement.
- The engineering components of the following report provide details of the technical interface outlined in the Rail Corp discussions. Any implication of vibration or stray current analysis can only be dealt with if and when a CBDRL project might proceed, the analysis would have to be conducted across the entire hotel project.

This preliminary investigation shows that the intended hotel construction is;

- Founded on rock well outside of the structural zone of influence of any possible tunnel,
- That there is no perceived impact on the practicality or cost of rail asset located within the easement
- That impacts of vibration and/or stray current would be dealt with as standard engineering responses should there be a material proposal made available, and
- That based on the information within this report and discussions with Railcorp it is understood that there is no further specific contact required with CBDRL in this matter.

The key issue with the project remains the ongoing resolution of the design in consultation with the relevant infrastructure authority and stakeholder bodies.

3 Infrastructure Coordination

The project addresses Sussex Street, the CBDRL easement runs down approximately the center of Sussex Street and the tower footings are located to the west of Slip Lane and will extend approximately 25 meters below the Sussex Street road surface. Utilising the available information, namely the coordinated cadastre and the coordinated tunnel alignment and overlaying this on the proposed architectural layout, the approximate horizontal and vertical location of the proposed CBD Rail Link tunnel has been identified in relation to the proposed footings for the new tower structure.

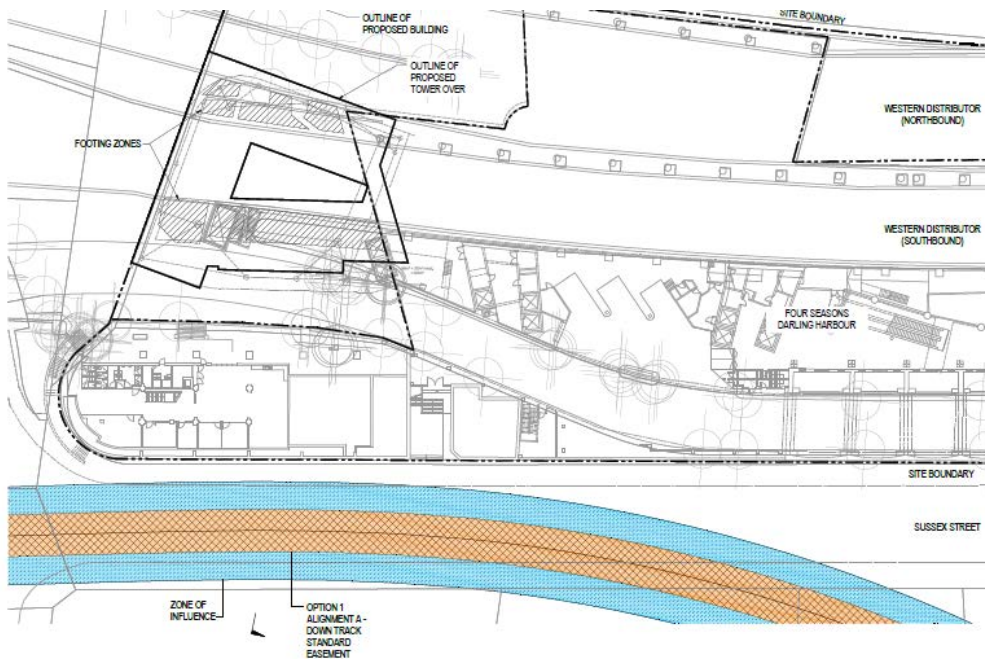


Figure 1 Extract from Plan

The Geotechnical Investigation report produced by Consulting Earth Scientists, dated 29 May has been reviewed and the resulting rock strata on which the proposed redevelopment is to be founded has been established, this is deeper than -11m AHD, some 21 meters below the nominal level of Sussex Street.

The subsequent underground influence zones are represented on the section, Figure 2, which also includes the site and the proposed foundation zones. The building foundations and structure are outside the zone of influence indicated on the Railcorp proposed alignment

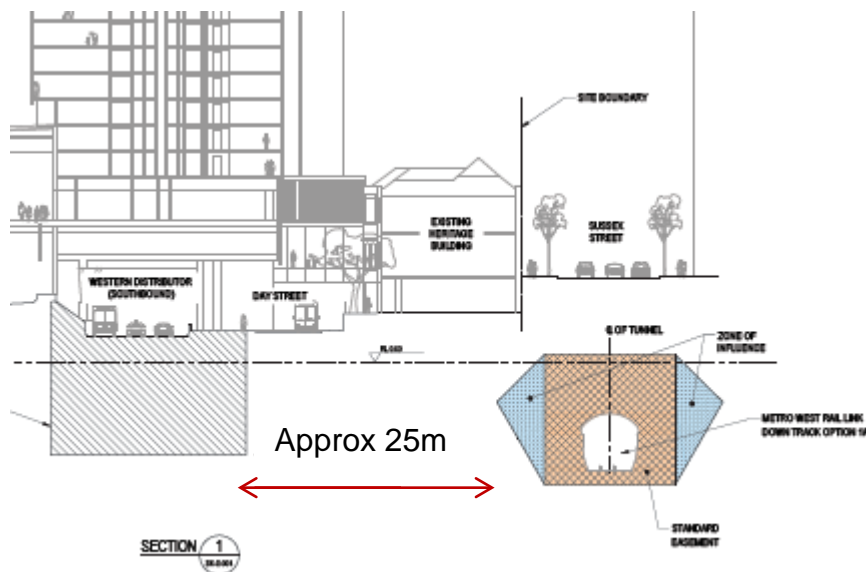
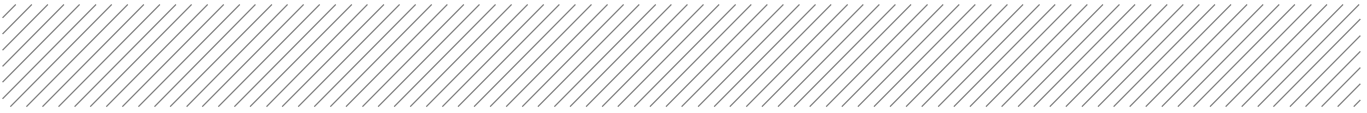


Figure 2 Extract from Section – site is outside zone of influence



Written and verbal correspondence between M&L and RailCorp's Network Development Branch has been undertaken in order to address RailCorp's issues of concern raised in the DGR's.

Following coordination and the provision of drawings between M&L and RailCorp, the CBD Rail Link (CBDRL) was identified as being directly beneath Sussex Street at its closest proximity to the proposed site is greater than 25m away from any zone of influence

The key issues being assessed by Railcorp include;

- a) Foundation forces
- b) Construction vibrations
- c) Vibrations from rail corridor
- d) Electrolysis, Stray Currents, Electromagnetic fields
- e) Noise
- f) Maintenance access to Railcorp

A Number of discussions and presentations have been made to Railcorp to date, through Cadence.

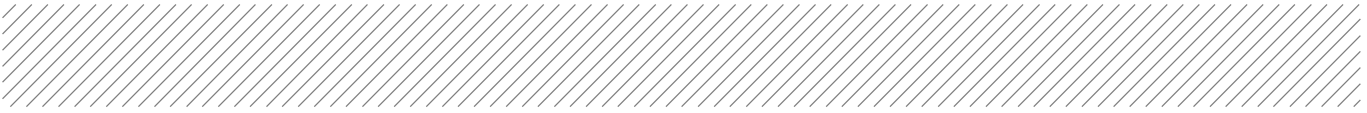
- a) **Foundation Forces.** The foundation scheme is physically outside the "zone of influence" indicated on the corridor drawings and also beyond what one would normally consider a "zone of influence" in a sense that the lateral forces from the piles will not load adversely the tunnel face. The piled foundation groups are founded into the underlying bed rock which is well below the tunnel. The proposed will not add any additional vertical surcharge to the tunnel.
- b) **Construction Vibration.** The Rail infrastructure will not exist during construction.
- c) **Vibrations from Rail corridor.** There are no uses proposed in the new facility which will require any more onerous design considerations than that exist in the current facility. The foundations and structure will be similar to that which already exists. There is no intention to isolate the structure from the ground for the purposes of eliminating vibrations from the Rail corridor.
- d) **Electrolysis and Stray currents** due to DC traction can have severe detrimental effects to buried metallic structures if not mitigated, these include amongst others, metallic pipelines, lead shielded cables, culverts, buried reinforced concrete structures and pipes and steel piling. Over long periods of time, the current if not managed will corrode metallic components.

With a rail tunnel in close proximity of the new development, stray current should be considered during all phases of design and construction:

- Consideration during design
- Testing during and after construction

Design and implementation of further mitigation if required.

Stray current mitigation in design should assess the risk to the corresponding asset and implement the most suitable mitigation methodologies. To assess the risk for a new structure consideration needs to be given to the size, orientation and proximity of the structure to the rail and construction methodology. e.g. a structure supported by steel piling, which is made electrically continuous via the superstructure would be exposed to a much higher risk compared to a structure supported by electrically isolated steel piles.



Furthermore, bonding of the structure to other assets such as metallic pipelines, earthing systems etc. needs to be considered due to their ability to pick up and discharge stray currents.

Mitigation methods in design include electrical isolation between different structures, minimising the size of electrically continuous buried assets e.g. by isolating piles from headstocks or slabs, segregation of buried sections into smaller sections. Within individual structural elements steel reinforcing must be made electrically continuous. Test points should also be provided at critical areas to permit testing and future bonding.

The success of design measures will ultimately be tested by site measurement following completion of construction. Further mitigation can be provided by the use of sacrificial anodes/impressed current systems if required.

Our current assessment is as follows:

- There will be no rail connected OHW fittings in the nearby tunnel. These will only be expected in the railway stations and stabling sidings which are not anticipated to be located within 500m of the Four Points site.
- New railway tunnels are built with, and can maintain, high insulation resistance between the rail and the general mass of the earth, given the relatively clean and dry environment. This will ensure traction return current remains in the rails.
- No induction is possible into the structure from the 1500V DC circuits.
- Should Rail 33kV and 11kV AC circuits be installed in the tunnel they will be of very low ampacity and together with the 25 metres separation to the Four Points Tower foundation will ensure little to no induction risk.
- However the relocation of the expected high ampacity Ausgrid 11kV and 33kV AC circuits on and near the site may need to consider mitigation of electromagnetic induction into the structure.

The feedback from Railcorp to date has not outlined any objection to the proposed works we summarise as follows;

- Considering the distance between the CBDRL and the proposal, The CBDRL's zone of influence will not be impacted by the proposal, and hence will have no effect on the structural integrity, safety, or ability to construct and operate the CBDRL.
- Considering the distance between the CBDRL and the proposal, The CBDRL is outside the property envelope of the proposal and therefore acquisition costs, construction costs, or maintenance is unlikely to be adversely affected by the proposal.
- Impacts on the proposal as a result of; stray current, electrolysis, noise, vibration and electromagnetic fields, from the CBDRL whilst unlikely to have an impact on the development. M&L will consult with RailCorp for their assessment.

e) Noise. Refer to c)

f) Access and Maintenance. The location of the site and proximity of the foundations is outside the zone of influence of the tunnel and outside of any area identified being an access point for the infrastructure.



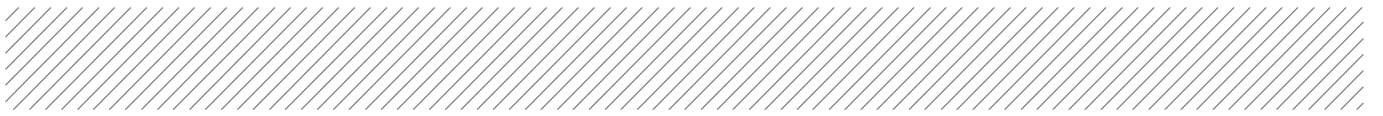
3.1 Conclusion and Recommendations

Following discussion to date the design team understands from RailCorp that the physical proximity of the building and the proposed location design will be unlikely to have a negative impact on the proposed rail corridor.

The design must however demonstrate that issues related to Electromagnetic fields, electrolysis and stray currents do not become an issue. In the worst case should stray current be determined to be an issue then corrosion can be mitigated via several various techniques such as sacrificial anodes as discussed earlier. It must be stated though that these measures introduce a maintenance liability to the facility management which must be maintained over the life of the structure.

Considering that the proposed design has little by way of services in the ground or modifies any of the in-ground services, the likely impact will be within the acceptable limits agreed with Railcorp. The choice of material being used in the ground and its purposes is the critical part of the consideration.

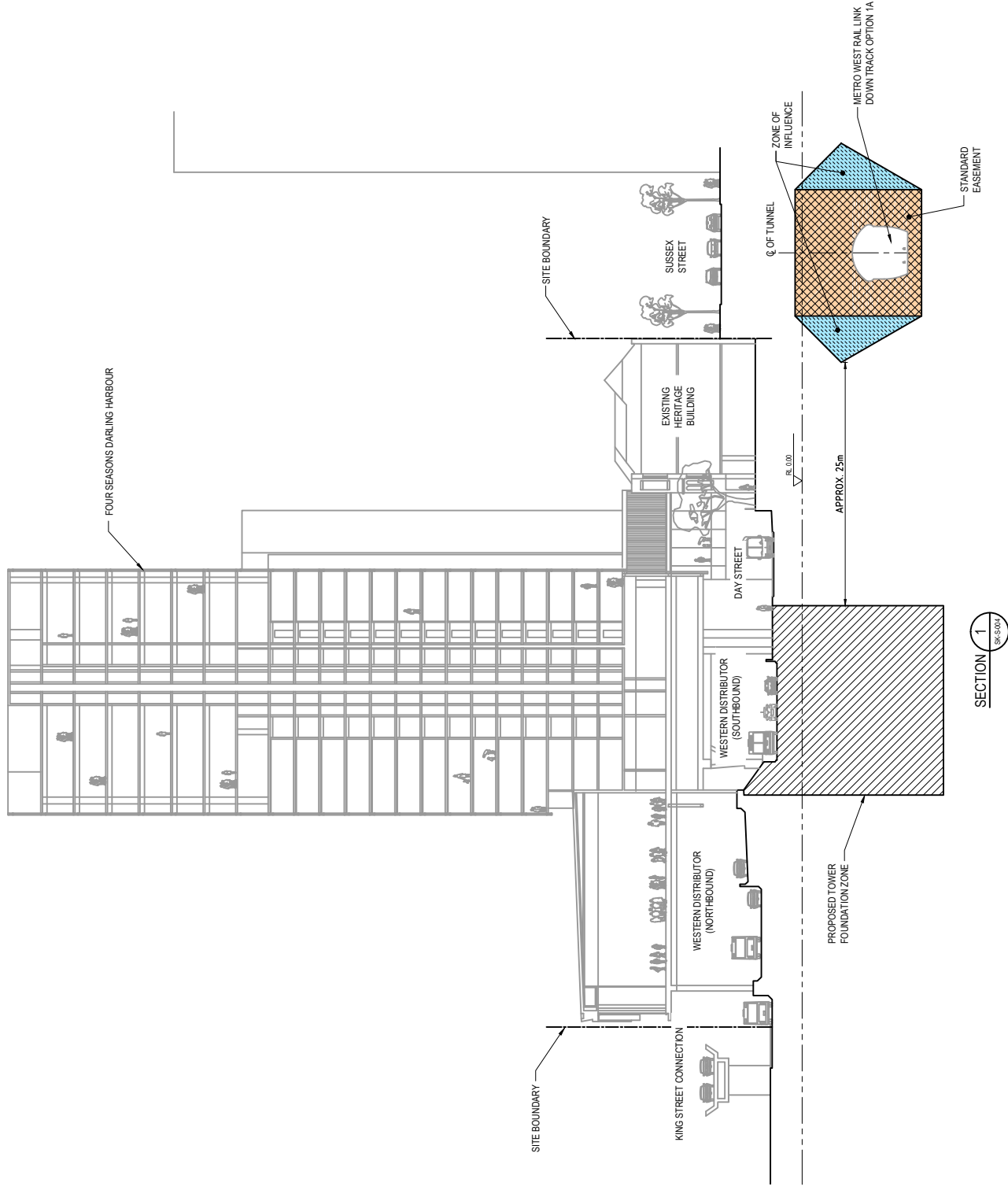
These issues are to be agreed with Railcorp and specified accordingly as the design progresses.



Appendix A

Railcorp Coordination Drawings

Schematic Drawings



NOTES:
 1. RAIL CORP TUNNEL LOCATION IS SHOWN AS INDICATIVE ONLY AND SHALL NOT BE SCALED FROM THE DRAWING.
 2. PROPOSED TOWER FOUNDATION TO BE 12m LONG PILES.

| REV | DATE | REVISION DETAILS | APPROVED | DRAWN | DESIGNED | PROJECT | PRELIMINARY |
|-----|------|------------------|----------|--------------|----------|---|----------------------|
| | | | | C/MACPHERSON | | FOUR POINTS HOTEL - EXPANSION | NOT FOR CONSTRUCTION |
| | | | | CHECKED | | TITLE | PROJECT NO. |
| | | | | APPROVED | | APPROXIMATE LOCATION OF PROPOSED RAIL CORP TUNNEL | 220041 |
| | | | | | | SHEET 2 | SCALE |
| | | | | | | | 1:250 @ A4 |
| | | | | | | | DATE |
| | | | | | | | REV |
| | | | | | | | SK-S-005 |
| | | | | | | | REV |
| | | | | | | | A |

M&L DEVELOPMENT





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