

# **Southern Cross Hospitals Limited Proposed Consulting Building**

90 Hanson St  
Newtown  
Wellington

**Construction Effects Report**

**Report**

Proposed Consulting Building - Construction Effects

Prepared For:  
Southern Cross Hospitals Limited

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Prepared By:



Mark Browne  
SENIOR PROJECT ENGINEER  
Holmes Consulting LP

Prepared By:



Alex Ross  
PROJECT ENGINEER (CIVIL)  
Holmes Consulting LP

Reviewed By:



Jeff Clendon  
PROJECT DIRECTOR  
Holmes Consulting LP

Reviewed By:



Aaron Prince  
SENIOR PROJECT ENGINEER (CIVIL)  
Holmes Consulting LP

### Report Issue Register

DATE	REV. NO.	REASON FOR ISSUE
20 April 2018	1	Resource consent
17 July 2018	2	Revised earthworks volumes and truck movements
15 February 2019	3	Revised earthworks volumes and truck movements

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## **1 INTRODUCTION**

Holmes Consulting LP have been engaged by the client to summarise the potential impacts of the proposed Consulting building's construction activities on the existing buildings and surroundings. This report discusses potential mitigation measures that are to be undertaken. As such, it constitutes the performance standard that is required to be achieved by the Contractor.

The geotechnical investigation and design of the structure have yet to be completed and the contracts for the building trades have not been awarded yet, so construction methodologies cannot be confirmed in detail but the various contract requirements and/or restrictions discussed herein and/or conditions of the Resource Consent will be included in the design of the building and written into the contract documentation.

The Contractor will be required to prepare a detailed Construction Environment Management Plan (CEMP) which addresses all the potential impacts and the proposed mitigation measures. The CEMP is to be approved prior to commencing construction. In the event of the CEMP not being complied with, or if in the opinion of the Engineer to the contract, the effects of the construction activities are contrary to the requirements of the CEMP, work shall cease until suitable mitigation measures have been implemented.

## **2 NATURE OF THE SITE**

The site is presently occupied by a car park and is located on the east side of the Southern Cross Hospital site adjacent to Hanson Street.

A geotechnical investigation has yet to be carried out in the location of the proposed new building. Geotechnical investigations have been carried out in other areas of this site by Tonkin & Taylor in 1990 and 2008 and Geoscience (now called ENGEO) in 2012. The soil conditions indicated in those investigations were varying depths of fill over alluvial and colluvial soils over completely or highly weathered greywacke sandstone/siltstone. The water table varied between 1.1 and 1.9m below ground surface although artesian water was found in one location.

A geotechnical investigation will be carried out in the proposed location for the new building and the design and construction methodologies modified as required by the soil conditions identified.

## **3 IMPACT ON EXISTING BUILDINGS AND ROADWAY**

The proposed Consulting building is to be constructed on the eastern side of the site in the area currently bounded by:-

- Hanson St to the east;
- The existing Southern Cross Hospital building to the west;
- An existing carpark to the north.

During the construction process, there are a number of potential effects that are taken into account and mitigated against if necessary.

The following potential construction-related activities and associated effects on existing buildings and roadway have been considered:-

- Excavation

- Dewatering
- Vibration
- Dust Nuisance
- Impact
- Existing services
- Overland flow path
- Other noteworthy site information

### 3.1 Excavation

Due to the sloping nature of the site the proposed building varies between being approximately at grade to the north and cut into the existing ground to the south by approximately 5m. When construction is complete the new building will retain the soil, roadway and car parking above. During construction the ground will be supported by a temporary retaining structure.

The building has been located on the site at 1.9m from the eastern boundary where the building is typically retaining up to 3m of ground. There is an existing retaining wall in the south east corner which increases the retained height to approximately 6m for a short section. This provides the space to construct a retaining system and have clearance for construction on site.

A construction methodology has been prepared based on the soils information in the surrounding areas. This construction methodology will be confirmed or modified as required when the soils investigation has been carried out.

The proposal is to temporarily retain the excavation on the east, south and west of the new building using cantilever sheet piles. If cantilever sheet piles are not suitable due to encountering rock, horizontal steel wailers and angled props can be used to support the upper portion of the sheet piles back to temporary footings within the excavation.

Sheet piling also has the benefit of minimising the effect of any potential dewatering drawdown of the surrounding groundwater.

The method proposed for installation of the sheet piling is the high-frequency resonance free driving process, which was specifically developed in Europe for use in such settings. Monitoring of the impact of vibrations and movement will be required to be carried out during the installation process.

An alternative to sheet piling on the western face could be batter slopes, if existing trees can be relocated. Both options can achieve a 1m working space to build the permanent reinforced concrete basement wall.

The temporary retaining structures will be designed to minimise the horizontal movement of the wall and hence any settlement of the adjacent properties. They will be designed by the Contractor but will be required to be certified by an Engineer with CPEng.

Once the sheet piling has been installed, excavation will commence and the temporary props installed as the excavation progresses.

The total volume of excavation for the building will be approximately 3,630 cubic metres solid measure or 4,085 cubic metres loose measure (with a bulking ratio of 1.125). The number of truck movements will be a function of the truck size. With, say 12 tonne trucks, each truck can carry approximately seven cubic metres of loose measure spoil. That means that approximately 585 trips with that truck size will be required. The excavated material will be removed from the site via the street access at the north of the proposed new building. When the building has been completed up to ground level, the area between the sheet piles and the building will be back filled and compacted.

As noted above, a comprehensive soils investigation will be undertaken, in order to ascertain the soil profile. The construction methodology will be confirmed or modified as required in order to minimise the negative impact of the excavation on the adjacent areas.

### **3.2 Dewatering**

As noted above, the water table at the time of the geotechnical investigations completed on the adjacent areas of the site was measured at 1.1 to 1.9m below ground level.

Excavation on the site varies up to 5m, therefore it is likely that dewatering will be required for the excavation during the construction period. The dewatering is likely to be from near the surface, as opposed to deep dewatering due to the sloped nature of the site.

In order to ascertain the dewatering requirements and risk of settlement arising from the dewatering process, the geotechnical investigation will give consideration to the water-table depth and subsoil type, likely dewatering flow and requirements to mitigate the risk of potential settlements if required.

Any dewatering would be through a WCC approved silt trap to the storm-water system in accordance with current practice. The Contractor will be responsible for the design of the dewatering system to suit his construction methodology and will make the appropriate water discharge application to the Wellington City Council.

### **3.3 Vibration**

Construction effect vibrations are generally high frequency, small displacement vibrations, with much less potential effect on buildings than low frequency vibrations such as generated during earthquakes.

A range of measures are proposed to avoid or mitigate any potential effects from vibration.

Monitoring of vibrations will be included in the CEMP that can be undertaken in a range of locations on the site.

#### **3.3.1 Sheet piling**

This can be mitigated during installation and extraction by using the high-frequency resonance free method, as opposed to conventional driving.

#### **3.3.2 Piling**

The building foundations are proposed to be constructed from piles due to the liquefaction potential identified in the latest geotechnical report. The impact of vibrations on the adjacent

buildings will be considered in the selection of the piles. Low impact options such as bored reinforced concrete piles or steel screw piles should be employed.

### **3.3.3 Excavation**

Given the nature of the soil types, conventional excavation equipment can be used. This is unlikely to result in significant vibration effects given the distance of most of the excavation from the existing buildings.

### **3.3.4 Heavy Vehicle Movements**

Access to the application site will be from Hanson Street, to the north of the proposed building. This access way is a reasonable distance from neighbouring properties, therefore the risk to the neighbouring properties is not considered significant.

### **3.4 Dust and mud Nuisance**

During the excavation process in particular, dust may be generated. While dust suppression measures are to be taken for the site as a whole, specific dust monitoring and protection measures may need to be employed when work is proceeding immediately adjacent to the existing buildings. Details of dust monitoring and dust nuisance mitigation measures will be included within the dust management plan detailed in the CEMP. Vehicle wash down is noted in section 4.2 of this report.

### **3.5 Impact**

The new building has a clearance of approximately 0.25m from the existing Southern Cross Hospital building at the closest point. In these locations a number of measures will be undertaken to mitigate any potential effects from impact during construction activities. These measures will be outlined in the CEMP and may include specific protection to the face of the buildings and employing special handling procedures. For the remainder of the site, clearance between new construction and existing buildings is sufficient that there is negligible risk of impact damage to other buildings.

### 3.6 Existing services

A review of the Wellington City Council (WCC) GIS Map viewer has identified the following services at the site, wastewater, stormwater and water. An overlay of the existing services is shown in the figure below:



#### 3.6.1 Wastewater

There is a WCC Wastewater main that runs to the west of the original building and under the newer western building away from the proposed building footprint.

The existing building connections appear to discharge to this line in the northern car parking area.

There is an abandoned 200 mm diameter earthenware Wastewater pipe that crosses the existing eastern car park. There is potential for this line to clash with the proposed retaining walls/foundations. Consultation with WCC will be required during detailed design to confirm that this pipe has been abandoned. Prior to construction the location of the pipe shall be confirmed through potholing and where necessary sections shall be removed and capped.

#### 3.6.2 Stormwater

There is a WCC Stormwater main that runs to the west of the original building and under the newer western building away from the proposed building footprint.

The existing building connections appear to run along the outer edges of the building including the eastern side and discharge to this line in the northern car parking area. The eastern building connection appears to be approximately 2m from the building and clashes with the retaining walls

for the lower parking area/stairs. A siphon system may be required to re-route this line under the proposed building foundations.

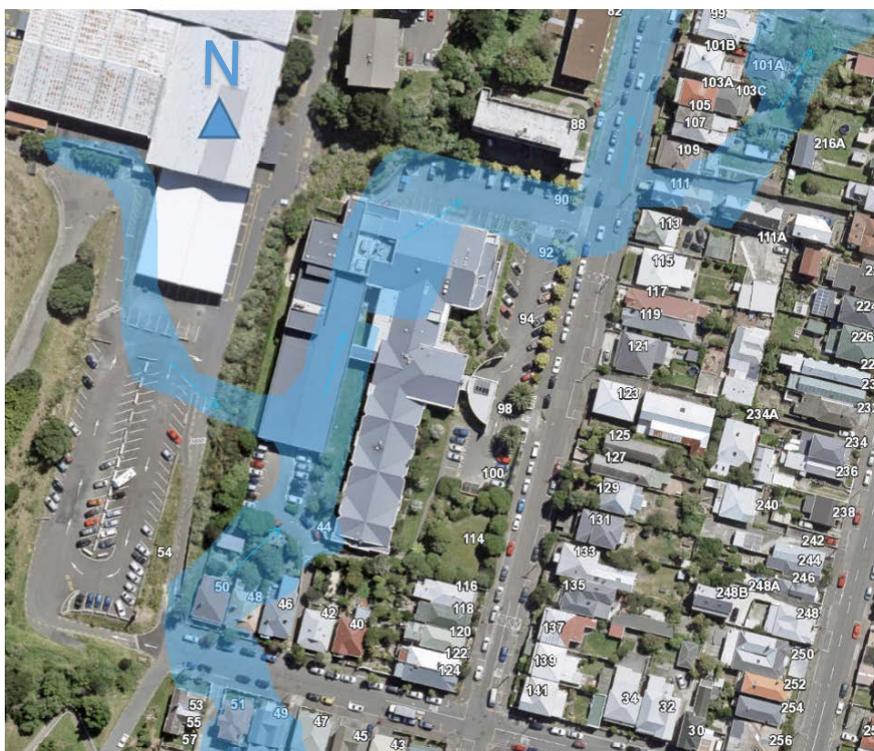
There are two abandoned stormwater lines that cross the eastern car park area. A 675 mm diameter concrete pipe and a 450 mm diameter Earthenware pipe that crosses the existing eastern car park. There is potential for these lines to clash with the proposed retaining walls/foundations. Consultation with WCC will be required during detailed design to confirm that these pipes have been abandoned. Prior to construction the location of the pipe shall be confirmed through potholing and where necessary sections shall be removed and capped.

### 3.6.3 Water

There are three WCC water mains running along Hanson Street – two reticulation mains and a trunk main. From the western reticulation main there are nine connections to the property boundary shown with two of these shown as the firefighting water supply. There is potential that the connections between the WCC service and the building will clash with the proposed retaining walls/foundations. During detailed design the location of these service connections will be confirmed and re-routing designed as required.

### 3.7 Overland Flow Path

A review of the WCC GIS Map viewer has shown an area of potential flooding hazard that runs from the south-west corner of the site, to the west of the original building, through the northern car park area before running north along Hanson Street as shown in the figure below:



This appears to be the location of a historic stream that has been piped underground through this area under urban development. The proposed building does not block this flow path.

In the area of the proposed building the existing overland flow path appears to run from the south-east corner towards the existing car park towards the north east corner before heading out on to Hanson Street. Design of the level 1 car parking will need to consider this potential overland flow path to ensure there is no flooding hazard to the building. The proposed vehicle entry/exit points will be designed to allow the overland flow path to exit the site.

### **3.8 Other noteworthy site information**

A search of the Wellington City Council District Plan has shown a noteworthy Maori Site M73 within the vicinity of the proposed building. It is recorded as 'Te O'.

## **4 SURROUNDING AREAS**

There are a number of potential effects to the surrounding area in general that will be considered and managed during the construction period, in accordance with recommended best practice:-

### **4.1 Disposal of Excavated Material**

Soils investigations on the west and north side of the Southern Cross site were carried out in August 2008 and July 2012 respectively. The investigations showed that contaminated demolition fill was present. The testing of the samples indicated that the fill was required to be disposed of at a consented landfill. The metal concentrations in some of the samples tested exceeded landfill acceptance guidelines for contamination. It does not appear that the contaminated fill was tested for asbestos, which will need to be included in the soils investigation for the site.

The contaminated demolition fill may or may not extend to this application. The soils investigation for the application site will include test pits, augers and boreholes which will be spread extensively across the site. The material at the test sites will be assessed for the presence of contaminated material. If contaminated material is present, then the CEMP will include the procedure for monitoring, handling and disposing of the contaminated fill.

### **4.2 Dust, Mud, Noise, & Fumes**

Dust, mud, noise, and fumes will be kept to a minimum to avoid effects on neighbouring properties in accordance with accepted practice.

Dust control will be to the recommendations of the Ministry for the Environment publication: Good Practice Guide for Assessing and Managing Dust, November 2016.

Noise control will be to the requirements of the relevant sections of NZS 6803:1999 Acoustics – Construction Noise.

The contractor will be required to employ damping down procedures during excavation and loading of trucks. Where excessive wind or heat is making damping down ineffective, operations shall cease until conditions return to normal. The CEMP shall nominate a maximum operating wind speed to avoid wind-borne spread of dust from the site. At wind speeds above the nominated limit, excavation and loading operations shall stop, and the application site will be kept damped down.

In addition the following measures will be implemented:-

There shall be no stockpiling of excavated material on site.

Trucks and other equipment shall be washed down prior to leaving the site, to avoid spreading mud and dust off the site. The truck wash down area will be located at the north end of the site adjacent

to the exit way to the street. It will be drained to a sump which will be pumped to a site settling tank before it is discharged to the adjacent street sump.

If fumes from machinery are causing nuisance due to environmental conditions (wind or lack thereof), the work shall be stopped until the conditions are favourable, or an alternative method can be employed.

Excavation, filling, and construction activities shall be carried out within the hours of 7:30-6:00pm Monday to Friday and 7:30-1:00pm Saturday. Activities such as concreting which cannot be practicably undertaken in the above time periods may be carried out at other times subject to prior notification of neighbours.

A site liaison officer will be appointed who will be responsible for communicating with adjoining landowners/occupiers and other potentially affected parties. The CEMP will provide for reasonable notice to be given for construction activities and include ample opportunity to provide feedback to the Contractor. The Contractor is required to self-monitor their performance against the standards agreed and take prompt steps to mitigate any failure to adhere to those standards.

#### **4.3 Traffic**

Construction traffic will be generated, particularly during the removal of excavated material and with materials being brought to site during construction. The transportation assessment has been prepared by others.