HOSPITAL ROAD REF WORKS

ELECTRICAL & TELECOMMUNICATION SERVICES REPORT

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DOCUMENT CONTROL SHEET

Title	Existing Infrastructure Analysis & Recommendation Assessment Report
Project Name	Hospital Road REF Works
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1 REF WORKS BACKGROUND

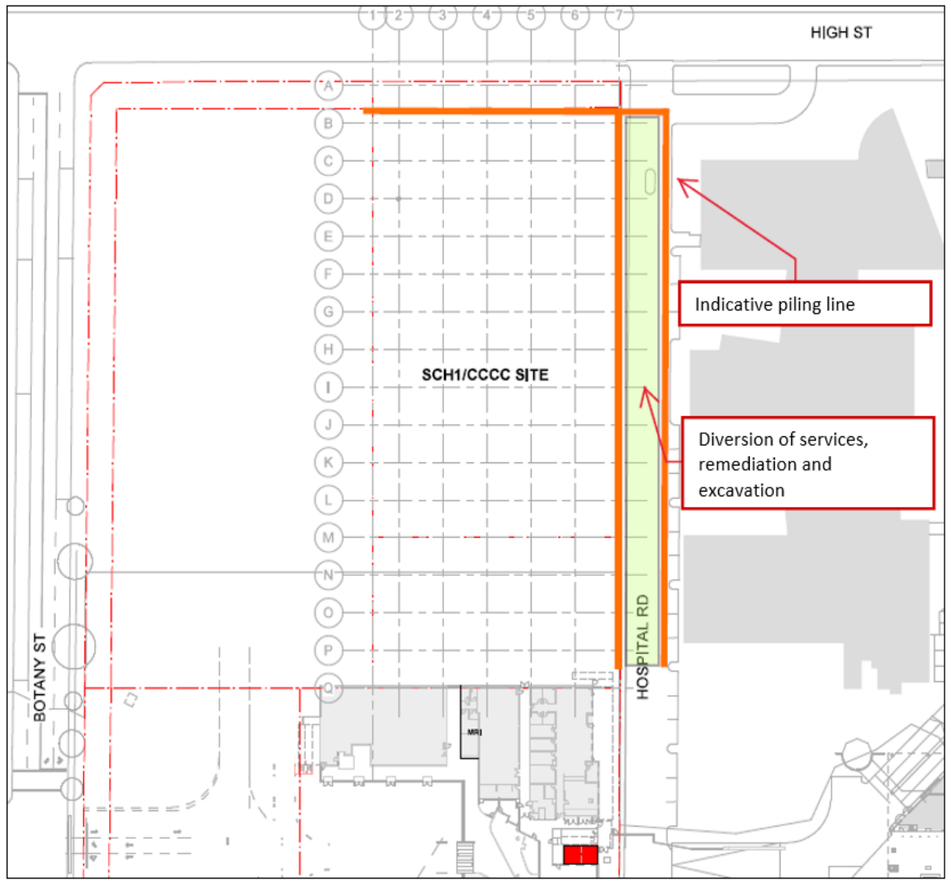
The intent of this Report is to provide a services summary that supports the Review of Environmental Factors (REF) for the proposed Hospital Road upgrade works.

The Randwick Health and Education Precinct (RHEP) is one of the most comprehensive health innovation districts in Australia. While health care at RHEP has been evolving for over 160 years, the last five years has seen a strengthening of collaboration amongst a wide range of organisations in the precinct, including with government, universities and community.

Hospital Road is an important campus road that supports the precinct and provides access to existing buildings such as the Sydney Children's Hospital (SCH) and Royal Hospital for Women (RHW). Hospital Road provides access to the campus logistical hub located on Delivery Drive. Additionally, Hospital Road will become a key link for vehicles and pedestrians enabling the integration of the existing campus with the future Integrated Acute Services Building (IASB) and Sydney Children's Hospital Stage 1/ Children's Comprehensive Cancer Centre (CCCC).

1.1 HOSPITAL ROAD

Hospital Road provides access to Delivery Drive and is currently accessed by vehicles and pedestrians from Magill Street to the South and High Street to the North. The figure below shows the area of Hospital Road that this report addresses and illustrates the scope of works.



The proposed scope of works on Hospital Road will include the following key elements:

- Hospital Road North services diversions
- Remediation of Hospital Road North
- Retention piling north-south on Hospital Road
- Retention piling east-west along the High Street boundary
- Excavation of Hospital Road North

The works detailed above on Hospital Road are pivotal in allowing for the development of an interlinked campus and removing the interface between pedestrians and vehicles to provide for a safe and interconnected campus link. To achieve this, key service infrastructure assets that are currently located in Hospital Road will need to be diverted. Additionally, remediation, piling works, and excavation will need to be undertaken.

This report will summarise the existing infrastructure that will be affected by future works. Specifically, this Report will look to address the following key elements:

1. The location of existing major Electrical and Telecommunication services infrastructure in Hospital Road;
2. The suitability and compliance of such identified services infrastructure to facilitate continued service to the surrounding hospital installations;
3. The key service infrastructure works required in Hospital Road as part of the REF; and
4. What potential risks may exist and the potential high-level mitigation measures that can be implemented.

All analysis undertaken has been done so with an understanding that a high level of seamless integration with all precinct elements is necessary.

Significant electrical and telecommunication infrastructure is present within Hospital Road carriageway and footpath that will be affected by the proposed civil alteration and level changes. These existing services and associated authorities include:

- Electrical: Ausgrid HV and LV
- Electrical: Prince of Wales Hospital Street Lighting
- Communications: Telstra
- Communications: AARNet

Potential impacts and risks for the existing services is subject to negotiation and approvals by each affected authority. Liaison with each authority is to be undertaken as part of the concept design phase works for the site.

1.2 ELECTRICAL SERVICES

Existing Ausgrid infrastructure along Hospital Road includes a number of different equipment including a surface chamber substation, HV & LV cable, pits and ducts, and Hospital owned street lighting and associated network.

Existing substation arrangements will be adversely impacted in terms of authority access and ventilation that at present are still unknown and prove a high-risk item for construction consideration to be addressed as early works for the project.

It is important to note that existing high voltage cables exist beneath and along the western side of Hospital Road and that these cables will be impacted by the proposed new works (lowering of Hospital Road). This existing high voltage infrastructure serves existing substation serving the existing Children's Hospital and, as such, the integrity of these cables must be maintained.

Interface with the already undertaken IASB construction works for the south section of Hospital Road will be required and information on what has already transpired for this section of the road will greatly assist in coordinating construction works.

An appropriate conduit and pit network will need to be considered under the Hospital Road upgrade project to allow for future connectivity flexibility. Such conduits and pits will be strategically positioned so as not to impede or limit the construction.

1.3 TELECOMMUNICATION SERVICES

Existing authority telecommunication services will similarly be affected by the new civil works to be undertaken along the work extent of Hospital Road. These include the services of Telstra, AARNet, and construction site lead-in services.

Telecommunication service infrastructure is to a lesser scale than the electrical infrastructure noted above, and have been assessed with a low to medium risk threshold for consideration of the works due to their impact to the existing hospital installations and requirements for relocation.

Further discussion regarding these elements is required with the various stakeholders and authorities.

2 REPORT QUALIFICATIONS

This report should be considered as a living document that will be continually updated as further coordination and information becomes available.

It should be noted that this report has been prepared with information obtained from site visits and review of previously prepared reports, drawings and designs. At present, this report's assessment is based upon the following data:

- Visual site inspection carried out May 2020
- Dial-Before-You-Dig information
- Hospital Road survey – Bonacci SK200429-01&02 drawings dated 29/04/2020
- LTS precinct wide survey drawing set dated 29/04/2020
- No obtrusive inspections were carried out as part of the site review
- Risk profiles are qualitative and are our best estimates of risk exposure and have not yet been reviewed or confirmed by HI.

Final arrangements and relocation of any authority assets will be subject to each of the respective authority reviews and approvals.

JHA strongly recommend commencing formal applications with relevant authorities for all infrastructure works (new connections and relocations) for electrical and communication assets to enable early dialogue. These negotiations can take some time and do affect the overall planning of services. The earlier we can get Authority feedback (and buy-in) the earlier we can inform the design of any implications; until then all advice provided is speculative based on previous experience.

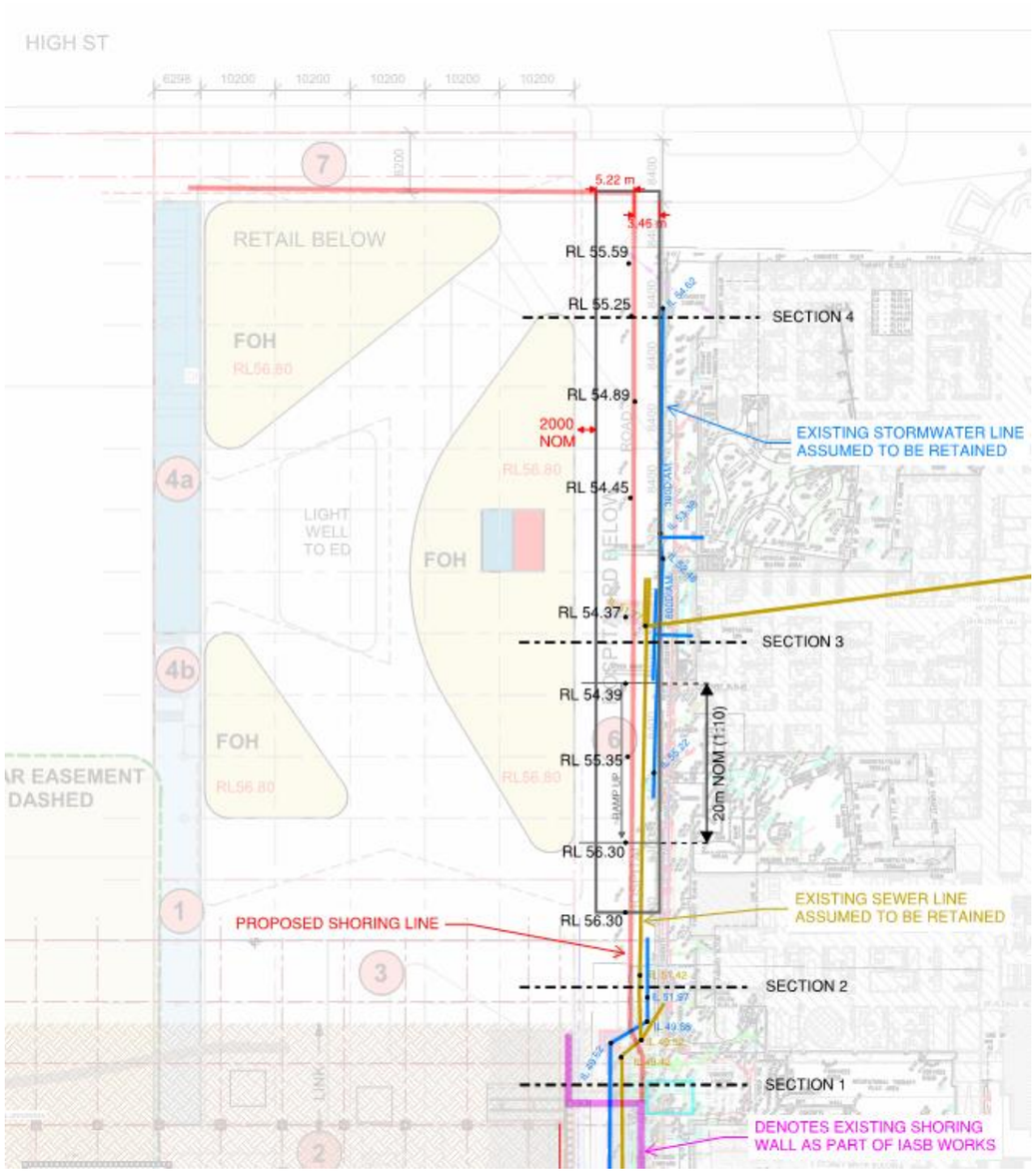
3 PRIMARY STANDARDS AND REGULATIONS

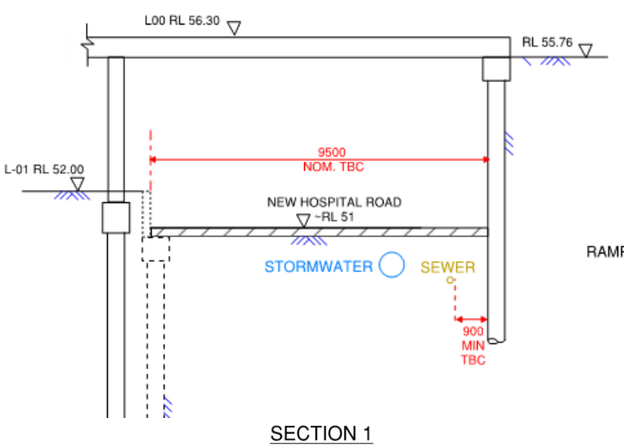
Australian Standards	Electrical Installation	AS/NZS 3000:2018
	Electrical installations - Selection of cables.	AS 3008:2017
	Control of Obtrusive Lighting	AS 4282:2019
	Lighting for roads and public spaces series	AS/NZS 1158:2005
Authorities	National Construction Code (NCC) 2019	
	Randwick City Council	
	NSW Service and Installation Rules	
	NSW Fire Brigade	
	Ausgrid Network Standards	
	Communication Carrier Services, including Telstra and AARNet	
Client Standards	NSW Health Infrastructure Engineering Services Guidelines (ESG)	Aug 2016
	NSW Health ICT Cabling Standard Version V3	Nov 2018
	NSW Health, Protecting People & Property	June 2013
	All issued NSW Health Design Guidance Notes	

4 HOSPITAL ROAD UPGRADE

As part of the overall precinct development works, the existing Hospital Road arrangement is to be augmented through new civil works to lower / alter the final levels of the existing roadway between Magill Street to the south, and High Street to the north.

It is understood some civil works have already occurred for the area immediately adjacent the IASB as part of the IASB scope. This report has accounted for the regrading of the road and connection of the IASB substations and affected multiple services in the surrounding area. Designs to relocate these services is understood to have already occurred within the IASB works.





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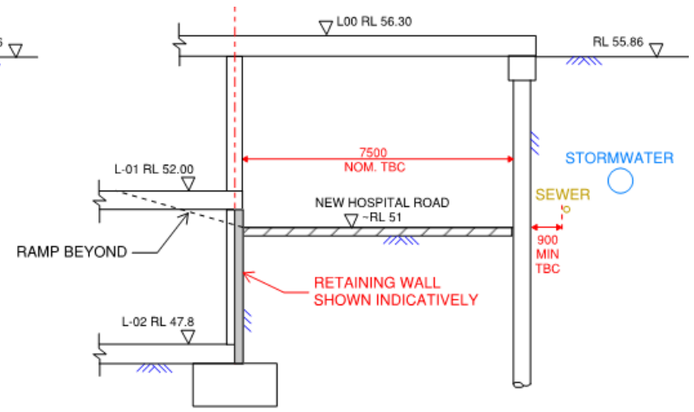

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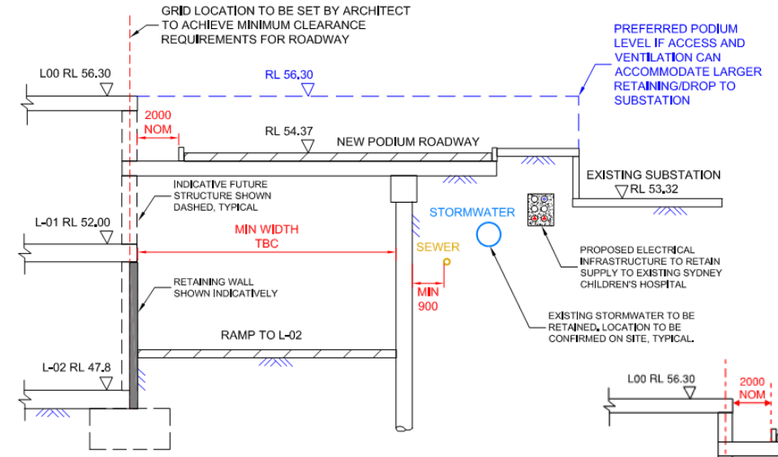

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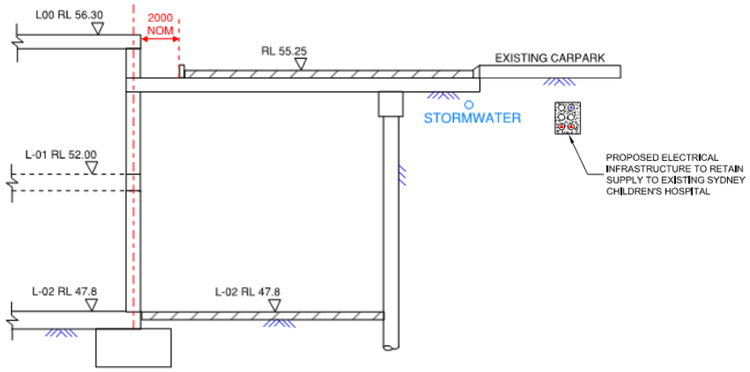

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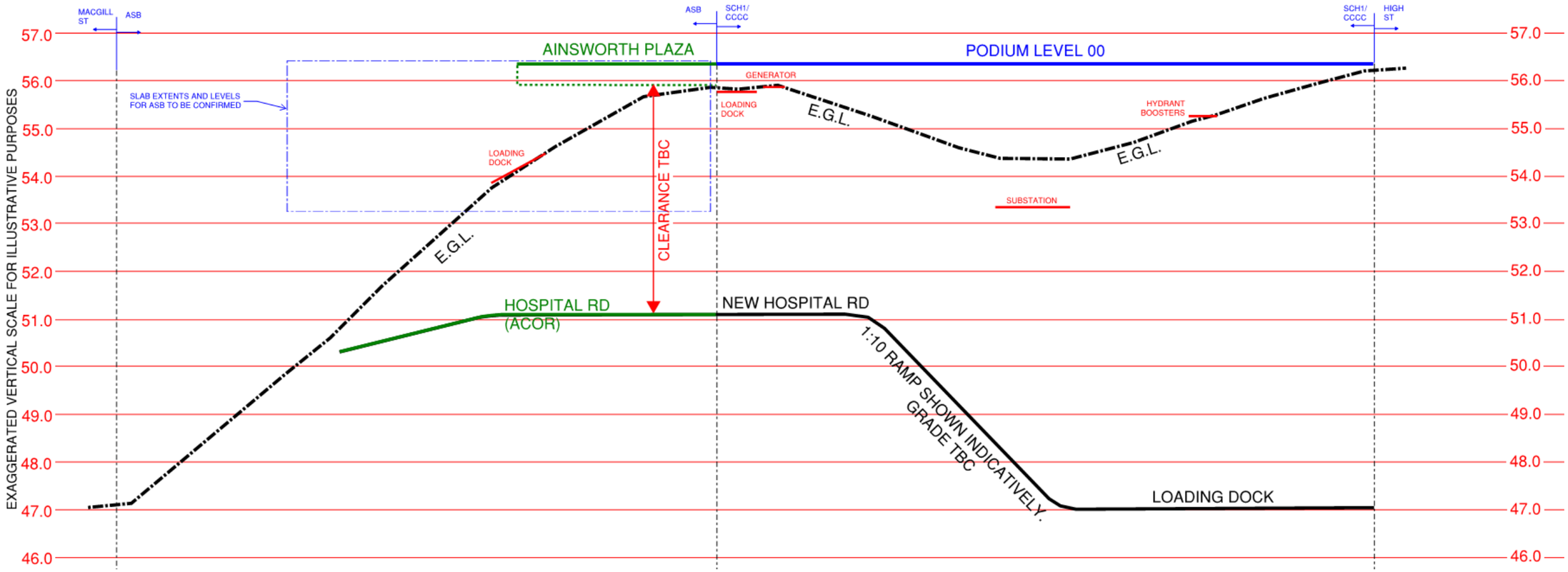


Hospital Road Longitudinal Section (Bonacci, SK200429-02)

Hospital Road is believed to be owned and operated by the Prince of Wales Hospital as part of an overarching property arrangement for the hospital. Being a privately owned road and not a Council gazetted road, all existing authority services are understood to be installed under easement arrangements in favour of each of the respective authorities. Further to the authority services, existing private street lighting and associated electrical network believed to be owned and operated directly by the Hospital is located along Hospital Road. Existing hospital owned assets will also need to be reconfigured to align with the new civil works to be undertaken in the area north of the IASB works.

We understand the civil design is still in early concept, however we would like to note the following existing electrical and comms items affected for early discussions and input as part of the Hospital Road civil works.

5 EXISTING AUTHORITY SERVICES INFRASTRUCTURE & IMPACTS

5.1 GENERAL

Significant electrical and communication infrastructure is present within Hospital Road carriageway and footpath impacted by the proposed extension of civil works from Magill Street. These existing services and associated authorities include:

- Electrical: Ausgrid HV and LV
- Electrical: Prince of Wales Hospital Street Lighting
- Communications: Telstra
- Communications: AARNet

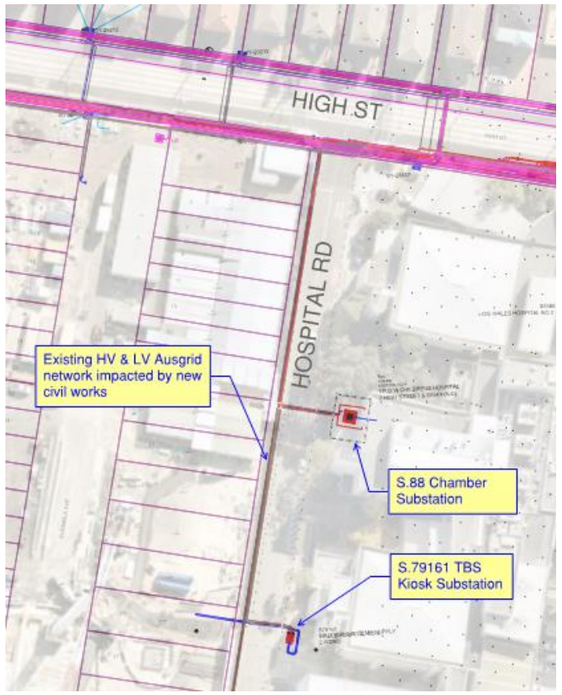
Each respective authority governs their own requirements regarding existing services, protection and relocation as required when considering changes in civil surface levels and arrangements. The following information surrounding potential impacts and risks for the existing services is subject to negotiation and approvals by each affected authority. Liaison with each authority is to be undertaken as part of the design phase works for the site.

Any electrical or communication services affected by the new civil alteration works of Hospital Road will need to be relocated or removed as early works prior to civil level changes occurring on site.

5.2 ELECTRICAL HV & LV INFRASTRUCTURE

5.2.1 AUSGRID HV & LV ASSETS

Existing Ausgrid infrastructure impacted along the Hospital Road construction zone include existing chamber substation S.88, existing temporary builders supply kiosk substation S.79161, high voltage and low voltage cabling, and associated pits and ducts.



Existing Ausgrid HV & LV Assets (Ausgrid GIS)

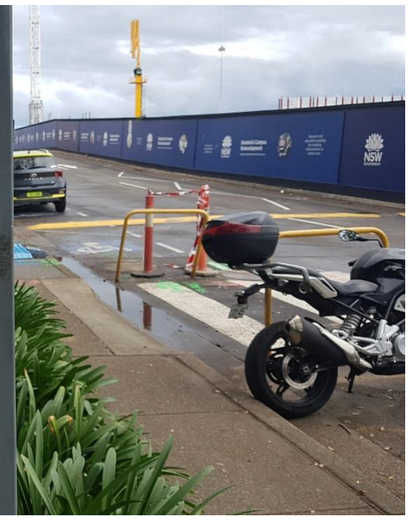
CHAMBER SUBSTATION S.88

The existing chamber substation S.88 is currently supplying the Prince of Wales Children's Hospital and the High Street low voltage Ausgrid network for the surrounding houses.

The existing substation is expected to be retained in its current location; however, its access appears to be affected by the proposed changes to Hospital Road. Ausgrid access requirements that will need to maintained at all times include:

- 24-hour / 7-days a week unobstructed clear access to their substations for both personnel and heavy vehicles and cranes
- Heavy vehicle path must be suitable to withstand heavy vehicle and franna crane loading of a minimum 21 tonne
- Right-of-way access is to be a minimum 4.0m wide x 4.0m hight clear arrangement from a public Council gazetted road to the substation louvered doors
- Suitable area for heavy vehicles to turn around if required

The substation is currently accessed from Hospital Road for heavy vehicles to pull up in front of the chamber substation. The chamber entry doors are located at RL 53.32 which is approximately 1.2m below the currently level of Hospital Road. Access is achieved by stairs to the south and a metal ladder arrangement at the north.



With the change in civil levels proposed for Hospital Road, a large concern is put around how to maintain suitable access to this chamber during construction, but also once the final levels are completed. The current longitudinal section of the civil design indicates the new roadway will be well below the current substation RL level with new access to be provided from the new podium level.

It is believed this substation will likely be located below the new podium level zone affecting ventilation arrangements for fresh air to the existing transformers. Air is provided through the existing façade louvers which must be maintained at all times. Should this be located below the podium build, there are concerns ventilation and dissipation of hot air will not be to the standards Ausgrid require.

At present, a survey of the internal substation arrangements, modelling of ventilation impacts, and traffic studies for access are being undertaken to develop a clear a concise understanding and documentation to provide to Ausgrid, as the owner / operator, as part of ongoing discussions on retaining the existing substation in place (relocation of the chamber substation is ill-advised and will require significant design and timing).

Further consideration around the levels and arrangement are required.

TEMPORARY BUILDERS SUPPLY KIOSK SUBSTATION S.79161

The existing kiosk substation S.79161 is currently supplying power to the IASB construction site for use as construction power to cranes, hoists, builders' sheds and equipment.

It is understood substation S.79161 will be removed as part of the IASB works once the permanent chamber substations are energised and is expected to be completed prior to the proposed Hospital Road works as included within this REF consideration.

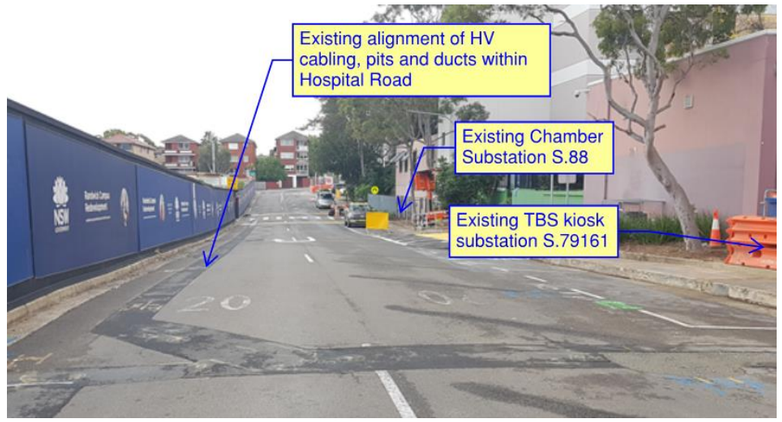
EXISTING HIGH VOLTAGE AUSGRID MAINS

The existing chamber substation S.88 along Hospital Road is supplied by existing high voltage (HV) cabling, ducts and pits reticulating from High Street south to each of the Ausgrid assets. These cables and infrastructure will be affected by the new civil works in Hospital Road and the level changes associated with the works.

HV connections must be maintained to the existing substation for power to the respective sites and will need to be relocated to another location and/or lowered out of the new construction zone prior to mass excavation. The depth of cables will need to match the new levels of roadway / footpath for a minimum depth of 750mm (roadway) and/or 600mm (footpath).

Relocation works will include demolition of any existing concrete Ausgrid pits, and establishment of new underground concrete pits (if required) of typical minimum size 5m (L) x 4m (W) x 2m (D) within the new roadway / footpath to Ausgrid NS172 standards.

Further understanding of the excavation staging of Hospital Road will assist in providing a solution to relocate the existing cables and keep the existing substation online.



Existing Ausgrid HV & LV Assets Alignment (looking north)

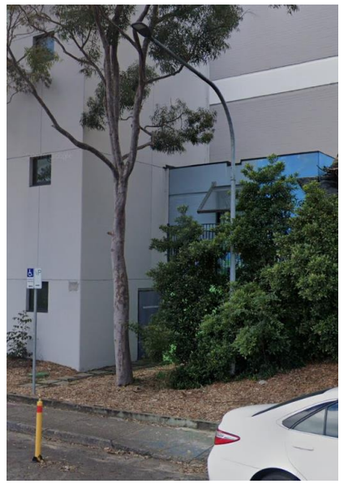
AUSGRID EAESMENT AND ACCESS ARRANGEMENTS

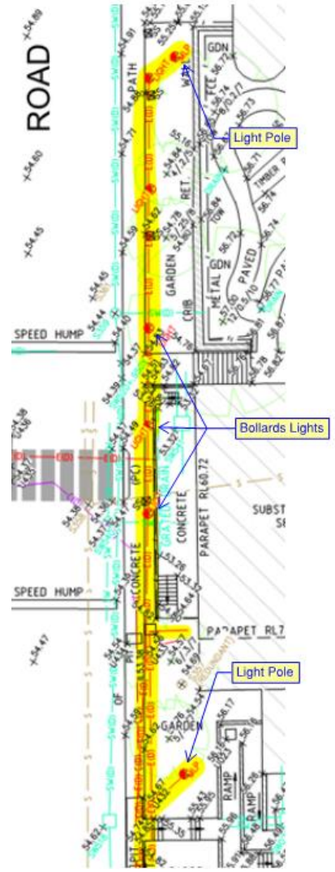
Further information and consideration on these items are expressed in section 5.4 within this report below.

5.2.2 PRINCE OF WALES HOSPITAL STREET LIGHTING

Street lighting poles and lighting bollards are installed for the extent of Hospital Road providing illumination along the roadway and footpath. From our site visit, these poles are not Ausgrid assets and are understood to be owned and operated by the Hospital as a private lighting network.

The light poles themselves are set back from the roadway and footpath within the existing SCH site, and as such are not believed to be impacted by the new civil works. However, the electrical cabling, duct network and lighting bollards are indicated to be within the footpath zone as per the below survey data and may require relocation.





Indicative Private Lighting Assets (LTS Survey 43147DT)

The electrical network supplying these existing lights continues further south beyond the extents of the northern Hospital Road works section towards Magill Street.

Confirmation of the below items will assist in understanding the requirements of relocation and infrastructure works as part of the Hospital Road augmentation works:

- Ownership of the existing street lighting network and assets
- Consideration of requirements of new street lighting for the new Hospital Road
- Confirmation on design alterations for the previous stage of Hospital Road (IASB) to continue and relocate the north part of this network in the same arrangements

Options for augmentation works of the impacted electrical service include:

1. No works, should the existing ducts be unaffected by the new civil works; or
2. Relocation to be located outside of civil alteration works zone.

If the lighting and circuit assets are indeed owned by the Hospital, the Hospital and the construction team will be in control of all requirements, timing and construction works.

5.3 TELECOMMUNICATION INFRASTRUCTURE

5.3.1 TELSTRA ASSETS

Existing Telstra assets are noted to be located within the eastern footpath of Hospital Road reticulating up from the south. The majority of the network assets are shown to be within the Sydney Children's Hospital (SCH) building boundary and opposite the IASB to the south. Depth of cover is typically between 300mm-500mm below the ground surface however will require confirmation on site.

The Telstra network ends at a pit near the High Street entry but does not interface to the High Street network. From the data available it is believed the infrastructure consists of a 1 x P10 conduit with old copper 2-pair service within the footpath zone.

Indicative Telstra Assets Location (DBYD)

The impact to these existing copper pairs is subject to the final civil design, width and levels and also their need to be retained.

Options for augmentation works of the impacted section of Telstra pit and ducts include:

1. No works, should the existing ducts be unaffected by the new civil works;
2. Removal of redundant infrastructure (if these are indeed redundant);
3. Relocation within the Sydney Children's Hospital building boundary to retain connection. Relocation arrangements will need to be coordinated and considered with the building arrangements of the existing Children's Hospital; or
4. Removal from Hospital Road and reconnection of the Sydney Children's Hospital from the High Street network.

Liaison with Telstra will assist in confirming existing arrangements and if this section of cable is indeed redundant.

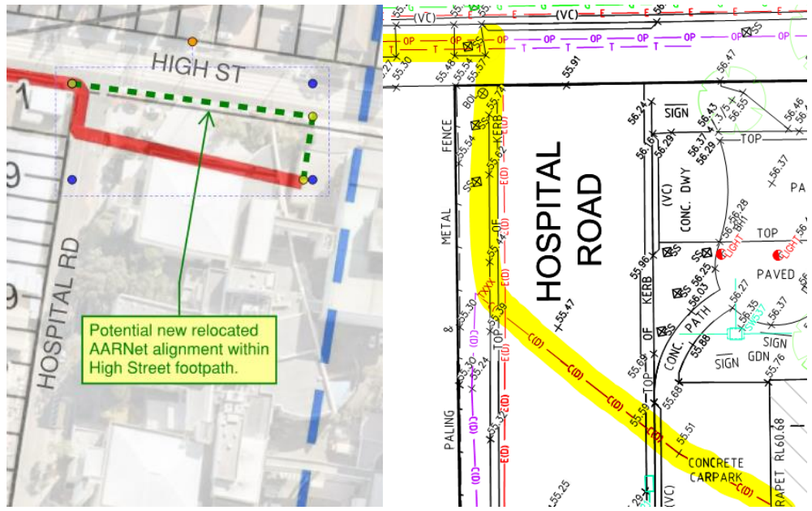
Downtime to complete the works for the communication connection to existing hospital buildings will need to be considered and agreed to for understanding of the requirements, limitations and staging of the works.

5.3.2 AARNET ASSETS

Existing AARNet fibre assets reticulate into and across the north end of Hospital Road to provide service to the existing Sydney Children's Hospital. Depth of cover is typically between 300mm-500mm below the ground surface however will require confirmation on site.

The impact to these existing fibres is subject to the final civil design and how the new roadway / podium will interface with the existing High Street roadway. As civil levels need marry with the existing levels at High Street, and that the AARNet assets are located not too far from the road junction, there may be an opportunity to retain the services in place with suitable protection.

Should relocation be required, it is expected these assets would be moved to within the High Street footpath and not reticulate through Hospital Road. This would be installed in the standard communications alignment (1800-2400mm from boundary) at standard depth (300-500mm) crossing Hospital Road to reconnect the Sydney Children's Hospital and retain service, coordinated through AARNet contractors.



Indicative AARNet Assets Location (DBYD & Bonacci SK200429-01)

Contact has been made with AARNet and as part of ongoing discussions a concept plan for the proposed works is currently underway to allow discussions for the relocation scope of works.

Downtime to complete the works for the communication connection to existing hospital buildings will need to be considered and agreed to understand the requirements of the connection and limitations of the works.

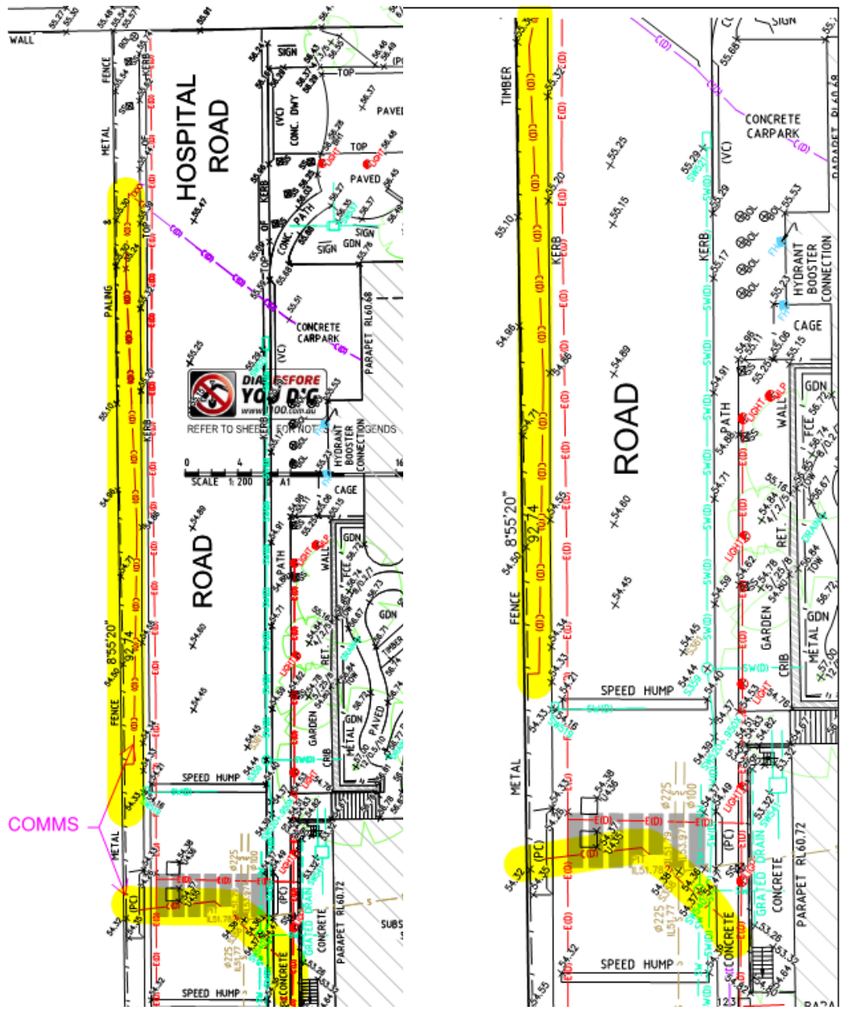
5.3.3 CONSTRUCTION SITE COMMUNICATIONS INFRASTRUCTURE

In addition to the authority telecommunication assets, there are existing telecommunications assets shown on both the Bonacci and LTS survey drawings crossing the existing Hospital Road carriageway at the existing pedestrian crossing and reticulating north as below.

This service is not indicated on the current Dial-Before-You-Dig authority drawings that JHA have sourced which leads us to believe this is a hospital private service potentially leading into the currently hoarded construction zone.

From further discussions with project managers, it is understood these are service connections supporting the current IASB and CCCC construction sites and sheds. Final coordination with construction sites will be required to understand timing of their removal which is currently understood to be completed prior to the proposed Hospital Road civil upgrade works.

Further investigations are required to understand what this service is and the ownership of the services for it to be relocated to de-risk the construction works.



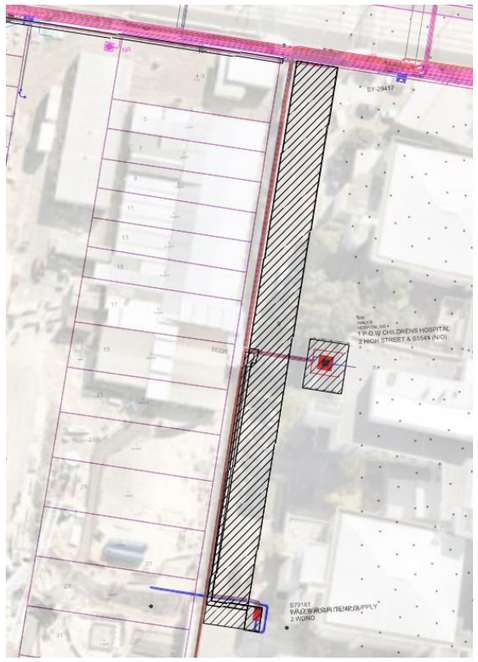
Indicative Unknown Communication Asset (LTS 43147DT & Bonacci SK200429-01)

5.4 SERVICES EASEMENTS & ACCESS

Additional requirements to be considered as part of the overarching civil works with respect to the existing services are authority easements.

Telecommunication authority services typically do not require easements for installation of their infrastructure over private land, covered under the NSW Telecommunication Act. However, title deeds should be sourced to confirm this arrangement.

Ausgrid electrical assets over private land do require easements and as such the existing Ausgrid electrical assets along the Hospital Road work zone are currently located within registered easements as per the below drawing extract.



Existing Ausgrid Easements (Ausgrid GIS & DBYD)

As part of the infrastructure relocation works, existing easements over assets to be relocated or removed will need to be formally relinquished. Similarly, the newly installed and final relocated Ausgrid assets will require the registration of new easements.

Typical Ausgrid easement requirements are 2.0m wide, centred on the Ausgrid underground cable and duct bank.

Additional to the Ausgrid easement requirements, existing substations require a minimum 4.0m wide x 4.0m high clear right-of-way access arrangement 24 hours, 7 days a week from a public road. This must be maintained 24/7 throughout the construction works and final finished arrangements including the ability to withstand loads of heavy vehicles and franna cranes (minimum 21 tonne).

Early engagement and applications with Ausgrid have been undertaken for all aspects of affected Ausgrid assets and are progressing. Following further onsite investigations such as internal substation surveys and ventilation modelling currently underway, greater confirmation around potential podium construction works will be provided.