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CIVIL ENGINEERING STATE SIGNIFICANT DEVELOPMENT APPLICATION

Rouse Hill Hospital Project

Prepared for: Health Infrastructure

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Revisions

Revision	Description	Date	Prepared by	Approved by
A	Draft Issue	27/06/2025	TW	GL
B	Draft Issue	15/08/2025	TW	GL
C	Draft Issue	28/08/2025	TW	GL
D	Final Issue	24/10/2025	TW	GL

Review Panel

Division/ office	Name
Sydney	Gregory Lyell

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1 Introduction

The Project consists of two stages, with Early Works undertaken as Development Without Consent. Early Works will be completed prior to the commencement of the works sought for approval under the SSDA.

This Civil Engineering Report has been prepared by ACOR Consultants Pty Ltd to support a State Significant Development Application (SSDA) for the construction and operation of a new hospital campus at the Corner of Commercial Road and Windsor Road, Rouse Hill (SSD-XXXXXXXX).

The proposed development comprises:

- Site preparation including earthworks and tree removal;
- Construction of internal roads with connection to Commercial Road;
- Incoming electrical and communications services
- Construction of hospital buildings up to eleven storeys;
- Construction of a ten storey above-ground car park;
- Pedestrian and cycle pathway connections;
- Landscaping; and
- Ancillary works to Commercial Road, comprising:
  - minor works (including realignment of existing median strip, kerb and gutter, footpath and lane marking) to provide access from Commercial Road into Hospital Road; and
  - associated tree removal along Commercial Road.
  -

The subject site comprises a total area of 2.35ha and comprises the following properties:

- Hospital site boundary (Lots 311 and 312)
- SSDA site will extend to the full extent of works including the hospital site, footpath connection (Part Lot 229), construction compounds (Part Lot 229) and works to Commercial Rd (Lot 2011, DP 1131519 and Lot 101, DP1060353)

1.1 Project Scope

The scope of the proposed works includes:

- An emergency department and primary access clinic
- Comprehensive birthing services including birthing rooms and a maternity inpatient unit
- Inpatient beds and day surgery services
- Short stay medical assessment services
- Pathology, pharmacy, and medical imaging services
- Outpatient and ambulatory care services including paediatrics and renal dialysis and antenatal and postnatal services

- Virtual care and hospital in the home services
- Prehabilitation, rehabilitation and lifestyle medicine.
- Administration, staff support, loading dock and back-of-house services; and
- Ancillary commercial uses to support the hospital, including retail.

1.2 Previous Construction Stage - Early Works

The previous construction works undertaken as apart of Review of Environmental Factors (REF) approval has included Early works which comprises the following works:

- Tree removal;
- Aboriginal cultural artefact salvage works;
- Construction of a temporary access road to facilitate construction access into the site, with access from Commercial Road, Stormwater system including pits and pipes and installation of an on-site detention (OSD) tank;
- Excavation and earthworks;
- Site sheds and amenities, at-grade contractor and visitor parking; and Services connections relating to early works.

1.3 SEARs Requirements

This report has addressed the following matters within the Secretary's Environmental Assessment Requirements (SEARs) issued for the SSDA on XXXXXX 2025 (see Table 1).

Table 1 - SEAR's Requirements

Item	SEARs Requirements	Relevant Section of Report
14	**Water Management** ▪ Provide an Integrated Water Management Plan for the development that: – is prepared in consultation with the local council and any other relevant drainage or water authority.	Section 2 Please refer to Civil design Drawings
	– Outlines the water-related servicing infrastructure required by the development (informed by the anticipated annual and ultimate increase in servicing demand) and evaluates opportunities to reduce water demand (such as recycled water provision).	Section 2 Please refer to Civil design Drawings
	– Details the proposed drainage design (stormwater and wastewater) for the site including any on-site treatment, reuse and detention facilities, water quality management measures, and nominated discharge points.	Section 2.3

	– Demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse downstream impacts.	Section 2.3
	▪ Where water and drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority.	Section 2.1
15	**Flooding Risk** ▪ Identify the flood planning level as set out in the relevant council LEP or SEPP and identify any: ○ flood risks on site having regard to adopted flood studies ○ the potential effects of climate change, and ○ any relevant provisions of the NSW Flood Risk Management Manual. ▪ Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the Flood Impact and Risk Assessment Guideline – LU01 (FIRA guide). When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered. ▪ Detail any flood risk management measures that are to be incorporated part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).	The site/proposal is not subject to flooding; therefore, an operational response is not applicable. For further details, refer to Sections 3.1 and 3.2

2 Stormwater Drainage

2.1 Design Requirements

The following list indicates the relevant infrastructure design guides and standards considered through the Stormwater design:

- Australian Rainfall and Runoff (2019) – with AR&R (2016) rainfall datasets sourced from the ARR Data Hub and Bureau of Meteorology (BOM);
- AS/NZS 3500.3:2021 Plumbing and Drainage Part 3: Stormwater Drainage;
- Austroads: Guide to Road Design, Part 5 Drainage Design (2023);
- Managing Urban Stormwater: Soils and Construction, “The Blue Book” – 4th edition 2004;
- Water Sensitive Urban Design (WSUD) Technical Guidelines for Western Sydney;
- On-site Stormwater Detention Handbook (2005);
- The Hills Development Control Plan (2012);

- The Hills Local Environmental Plan (2019);
- The Hills Shire Council Design Guidelines Subdivisions/ Developments;
- The Hills Shire Council Design Works Specification Subdivisions/ Developments; and
- New South Wales Floodplain Development Manual (2005).

2.2 Stormwater Quantity

The stormwater drainage network within the project site, up to the site boundary—including the on-site detention (OSD) tank and the water treatment tank, has been completed as part of the Early Works package. However, the proposed modifications to the existing stormwater drainage network along Commercial Road will be delivered under the SSDA scope.

2.2.1 Onsite Stormwater Detention (OSD) Systems

Modelling of the stormwater pit and pipe network and OSD tank was completed using the Runoff Routing software DRAINS (Watercom). The purpose of the model was to determine the OSD tank size and outlet controls required to meet the Permissible Site Discharge (PSD) values while maintaining the requirements of the pit and pipe network outlined in Sections 2.1 and 2.2.2.

Pervious area percentages for each catchment have been conservatively estimated based on the landscape architectural design documentation to date. Rationalising the OSD sizing and water quality treatment train will be able to be undertaken during Design Finalisation once the site layout has been finalised, and exact percentage of pervious area proposed for the development can be calculated.

The stormwater network in Commercial Road and Rouse Hill Drive bypasses the precinct detention system which has been constructed for the Rouse Hill Town Centre. On Site Detention therefore, will be provided for the site in accordance with The Hills Shire Council Design Guidelines Subdivisions/Developments. It is proposed to provide a single detention structure for the site.

2.2.2 DRAINS Results

The proposed site stormwater system incorporates a connection to the existing 1000 m^3 OSD with a Ø220mm orifice (invert 47.50m) to restrict the stormwater discharge rate. The OSD is constrained by the invert level of the downstream pit that the site is connecting into, hence the effective depth of the OSD is limited to 2.50m. Consequently, the volume provided exceeds the minimum required site storage. Table 2 demonstrates the effectiveness of the OSD tank.

Table 2: Summary of Pre-development flowrate and OSD Outflows

Storm Event	PSD (l/s)	Pre-development Flow (l/s)	Post-development Flow (l/s)
20% AEP	216	511	130
10% AEP	216	611	147
5% AEP	216	721	164
2% AEP	216	919	186
1% AEP	216	1040	205

2.3 Stormwater Quality

Water quality measures are to be provided to treat the site stormwater in accordance with The Hills Shire Council Design Guidelines Subdivisions/Developments.
Water quality catchments have been separated to provide accurate calculations the pollutants in the proposed stormwater runoff. The catchments are separated into the following sub-catchment types:

- Roof
- Roads
- Other impervious area (such as hardstand)

- Pervious area (such as landscape

2.3.1 Water Sensitive Urban Design (WSUD)

WSUD Measures incorporated into the proposed development must satisfy the pollutant target controls set by Hills Shire Council:

- Gross Pollutants (GP): 90%
- Total Suspended Solids (TSS): 85%
- Total Phosphorus (TP): 65%
- Total Nitrogen (TN): 45%

A MUSIC model was developed to indicate the suitability of the proposed WSUD measures on the site. The MUSIC Model was set up in accordance with ARR Guidelines using rainfall data from Sydney.

The proposed water quality control devices for the site are:

- 22 x 690 NPSORB Stormfilter Cartridges within a minimum 11m^2 chamber within the OSD Tank, and
- At least 26 OceanGuard 200um pit inserts

The results of the MUSIC model seen in Table 3 confirmed the ability of the above devices to reduce the pollutants discharged from the site to below the Stormwater Treatment Objects described by Council as per Table 4.

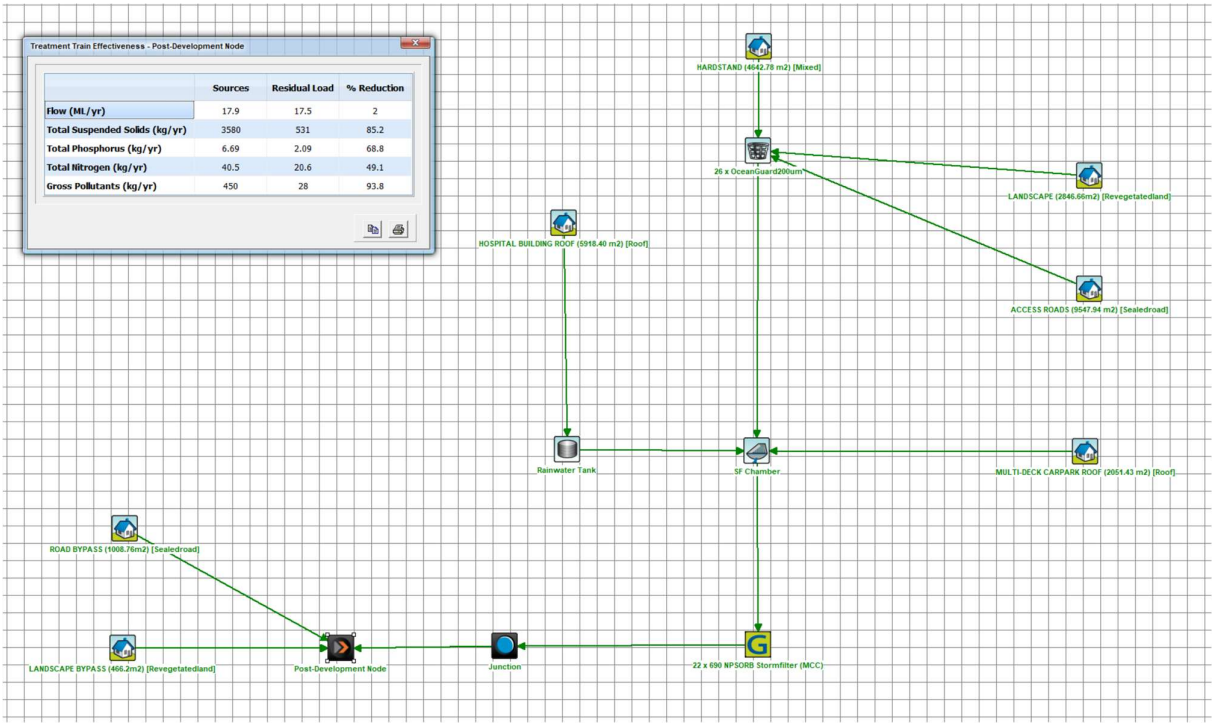

Table 3: MUSIC Treatment Train and Results

To achieve a 90% reduction in Total Petroleum Hydrocarbons (TPH)content, an oil baffle will be required within the water treatment tank. Stormwater flows will first be reduced to the 2 Exceedance Year (2EY) flow, with this portion directed through the treatment tank. The remaining flows will be diverted to the on-site detention (OSD) system via a splitter pit.

Table 4: WSUD Treatment Train Reduction Targets and MUSIC Model Results

Pollutant	Percentage Reduction Target	Percentage Reduction Achieved
Gross Pollutants	90%	93.8%
Total Suspended Solids (TSS)	85%	85.4%
Total Phosphorus (TP)	65%	68.8%
Total Nitrogen (TN)	45%	49.1%
Total Hydrocarbons	90%	90%

2.3.2 Potable Water Consumption

Reducing potable water demand can be achieved by providing rainwater harvesting and reuse system and the installation of water efficient fittings and appliances. The following features have been introduced to reduce potable water consumption:

- Rainwater tank: Rainwater tanks will be provided for use and re-use across the site either in landscape elements or via internal re-use.
- Water efficient landscaping: choose native species suitable to the climate and with low irrigation demands; choose well-structured topsoils to increase water storage in soil; where potable water is used for irrigation; it is recommended to use Drip or subsurface irrigation to avoid over watering.
- Water efficient fittings and appliances: Supply water efficient products with higher water rating based on AS/NZ6400 Water efficient products – Rating and Labelling, products including tap fittings, showers heads, toilets.

2.3.3 Rainwater Harvesting and Reuse

Rainwater harvesting is designed to provide an alternative source for non-potable water uses for Hospital. Rainwater harvesting conserves potable water and reduces the daily water demand. Rainwater reuse can reduce the volume of stormwater leaving the site which is beneficial for water quantity control, hence less pressure for local drainage system.

Rainwater will be collected via gutters and downpipes from each of the new building/developments.
For more significant storm events, overflow from rainwater tank will be collected by the On- Site (OSD) Detention tank at the north of the property. Refer to the Project's Hydraulic Engineers Report for the sizing of rainwater tank.

Rainwater from highlighted roof catchment will be and collected by the rainwater tank. A preliminary water balance study was carried out using MUSIC for the development.
Assuming all roof water will be captured and collected by the rainwater tank, and the rainwater is for irrigation use only.

2.4 Existing Stormwater Infrastructure

Council Stormwater infrastructure exists in Commercial Road and Rouse Hill Drive. It will be possible to connect new inground stormwater pipes for the site to the system in Commercial Road; however, there is no direct connection to the other networks adjacent.

Figure 1: Existing Stormwater Network (Extracted from DBYD)

3 Flooding

The proposed hospital facility is classified as critical use for the purposes of flood planning and therefore is to be constructed to ensure no ingress of flood water during Probable Maximum Flood (PMF) events.
The site is not affected by the PMF event with Building A Loading Dock FFL of 49.8, LG FFL of 51.00, GF FFL of 55.50. The multi-deck car park has FFL of 56.85m. All stated levels are above the PMF level of RL49.30 based on the flood studies included in Section 3.1.

3.1 Onsite Flood Risks with regard to Adopted Studies

Available flood maps (Northwest Flood Study) indicate that the site is not located on flood affected land and is not affected by the 1% AEP flood event.

The intersection of Rouse Hill Drive and Windsor Road has been identified as flood affected during a PMF event in studies undertaken by TfNSW. This will need to be considered as part of the site access strategy for emergency vehicles.

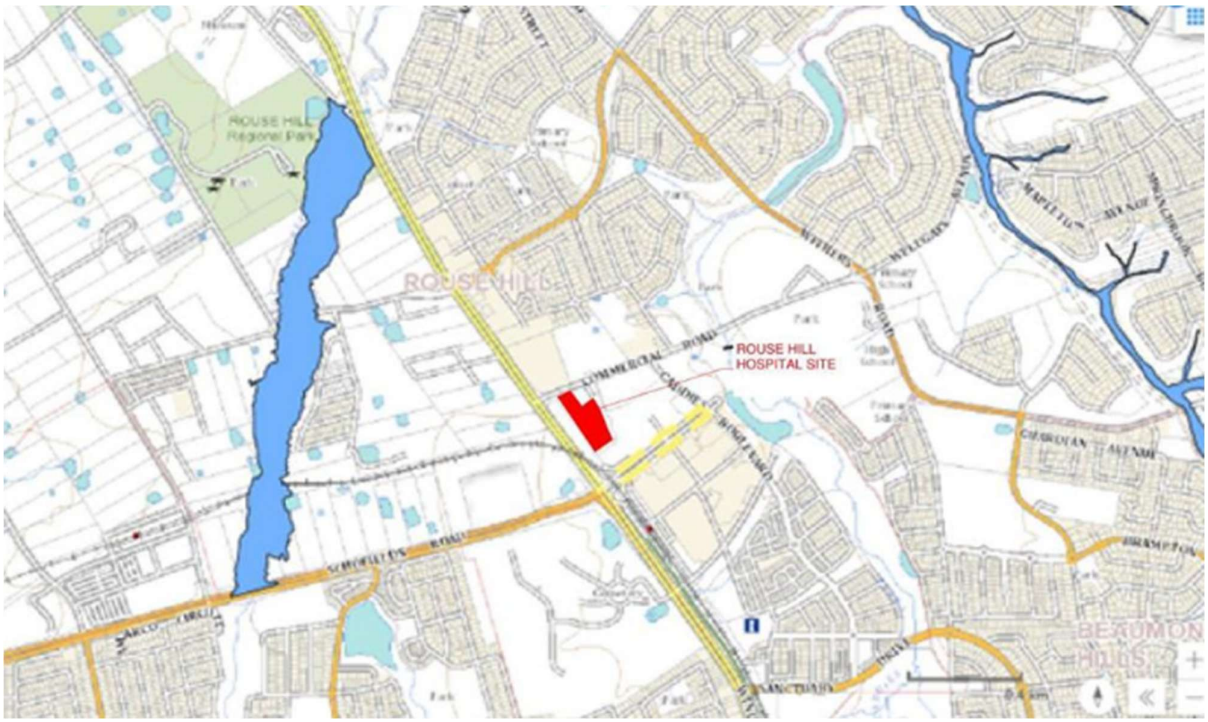

Figure 2: Extracted from Department of Planning Land Use - E-planning Spatial Viewer

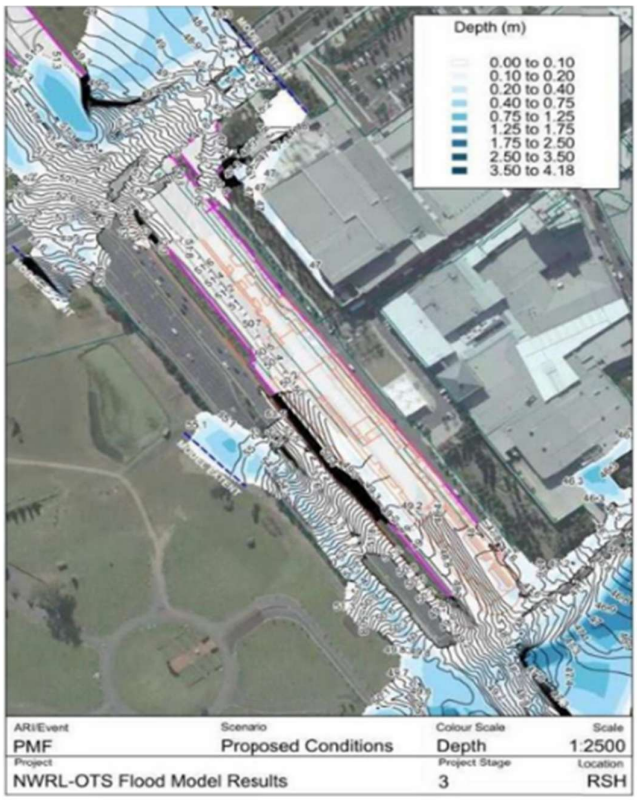

Figure 3: Extracted from Flood Study for Northwest Rail Document NWRLOTS-NRT-PRD-EN-PLN-300393 Rev C

The Flood Study for the Northwest Rail project analyzed the T-way's proposed levels against 2017 existing conditions, identifying flood vulnerabilities, particularly at the Rose Hill Drive entrance, and recommending an increase in drainage capacity as mitigation. In response, Transport for NSW (TfNSW), the authority for the T-way, reportedly implemented these measures by upgrading the existing drainage system to align with the flood study's recommendations. It is noted that the secondary access to the hospital site will be facilitated via the T-way. Furthermore, the maximum observed Probable Maximum Flood (PMF) level for the adjacent western land (GPT land) was established at RL 49.30 m. Since the lowest proposed level for the hospital access road is approximately RL 50.56 m (a difference of about 1.0m), all finished floor levels within the vicinity should be flood-protected to a minimum elevation of RL 49.30 m to account for the PMF event.

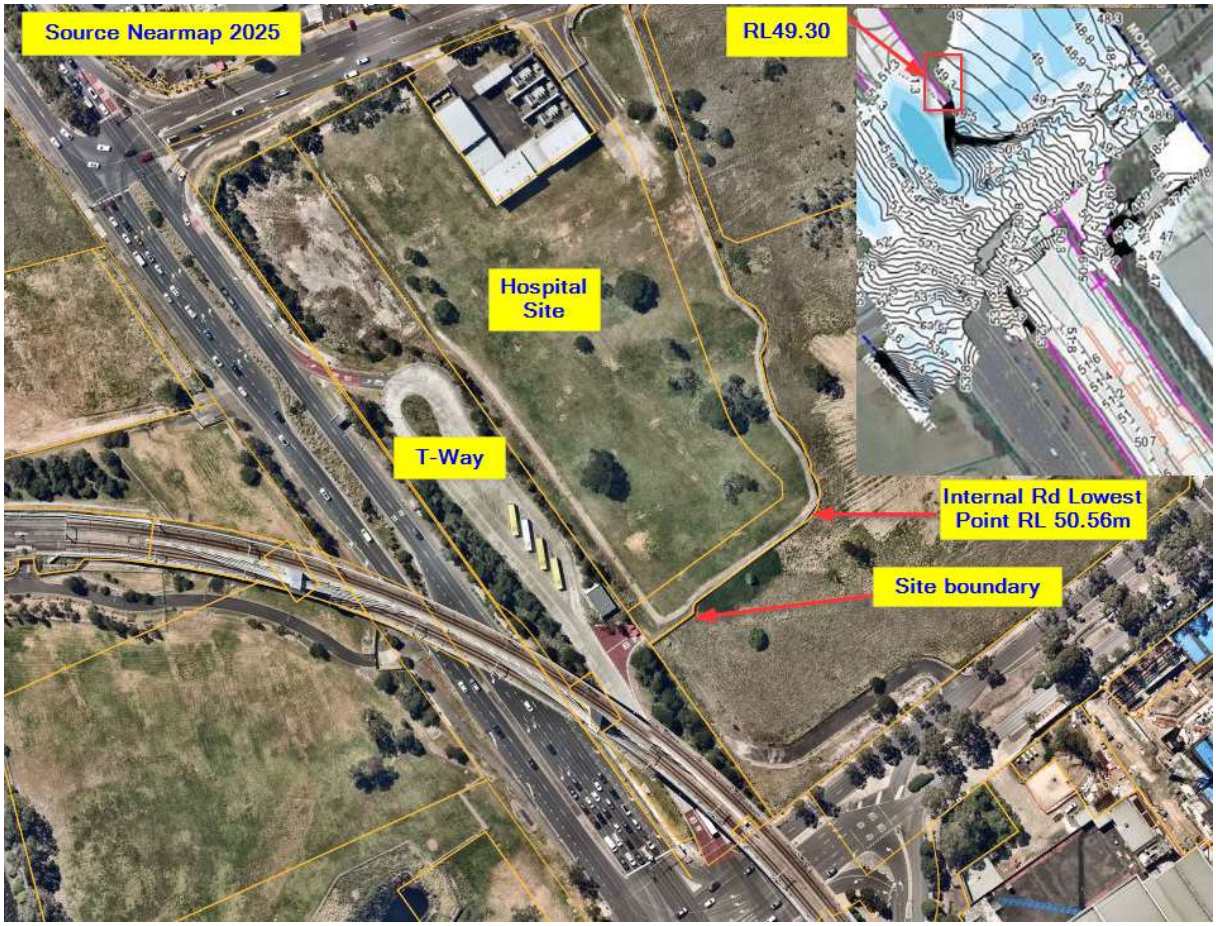

Figure 4 Northwest Rail Flood Study - PMF Extents

Furthermore, previous investigations and reports for Rouse Hill Town Centre have provided information on the stormwater system and flood affectation of the surrounding area. The Rouse Hill Regional Centre Northern Frame Precinct Plan: Stormwater Management Plan – Level 2 DA Addendum (Rev 2 prepared by Hyder Consulting August 2014) identifies overland flow paths and discusses external overland flow management. It is noted that Rouse Hill Drive acts as the overland flow path for events greater than the 1% AEP event, as described below.

It notes:
"An existing stormwater system located under Rouse Hill Drive to the south of the site has the capacity to convey flows up to 1% AEP ARI from the external catchment to the west of the Northern Frame Precinct into the Caddies Creek Corridor"
This is consistent with the flood mapping for the Probable Maximum Flood (PMF) event shown within the flood study for the Northwest Rail document and validates use of this as the preliminary flood planning level for the proposed hospital. Currently all documentation provided via Council has been reviewed. In addition, ACOR have received endorsement of the Northwest Rail Report by the Department of Climate Change, Energy, the Environment and Water. Sydney Water is currently developing a new flood model for the area surrounding the hospital site; however, it has not yet been released.

3.2 Impacts of the development

The development is not located within flood affected land and the proposed development does not cause increase of flood affectation to neighbouring sites as all stormwater generated by the site is captured and detained. To ensure that the rate of stormwater runoff does not adversely affect the existing regional

stormwater system, post-development discharge rates are to be limited to pre-development rates through measures described in Section 2.2.

4 Civil Works

4.1 Design Requirements

The following list indicates the relevant infrastructure design guides and standards considered through the Civil Engineering design:

- Austroads: Guide to Road Design;
- Austroads: Guide to Pavement Technology;
- Austroads: Guide to Traffic Engineering Practice Parts 1 – 14;
- Austroads: Guide to the Geometric Design of Urban Roads;
- AS1428.1 Design for Access & Mobility;
- AS/NZS 2890.1 Parking Facilities: Off–street car parking;
- AS2890.2 Parking Facilities: Off-street commercial parking;
- AS2890.5 Parking Facilities: On-street parking;
- AS/NZS 2890.6 Parking Facilities: Off-street for people with disabilities;
- AS3798 Guidelines on Earthworks for Commercial and Residential Developments;
- Relevant RMS Technical Directions and Guidelines; and
- The Hills Development Control Plan.

4.2 Earthworks

4.2.1 Geotechnical Investigation and Site Geology

A desktop review was undertaken by Jeffery and Katauskas on behalf of GPT and findings provided in report Ref 24529SB2rpt dated 20 April 2016. This refers to a previous preliminary geotechnical investigation of the Northern Precinct detailed in a report dated 25 July 2003 (Ref: 17777SPnvrptv2). This investigation was to determine the subsurface conditions on a coarse grid (approximately 100m) to provide preliminary comments on development of the Northern Precinct. Additionally, a preliminary geotechnical investigation was undertaken by JK Geotechnics on behalf of NSW Health Infrastructure dated 26 Nov 2024 (namely: 35128LFrptRev2) with this report being supplemented by further investigative works.

The boreholes drilled within the Northern Precinct encountered topsoil or fill to depths of approximately 0.2m to 0.5m. The topsoil/ fill was typically silty clay and contained traces of roots and ironstone gravel (E35128PHrpt-Rev1). Below the topsoil and fill residual silty clay was generally encountered, with sandy clay encountered in one borehole and clayey sand in two boreholes just above the sandstone bedrock. The silty clay was assessed to be of medium to high plasticity and of very stiff to hard strength. Weathered sandstone and shale bedrock were encountered at depths ranging from about 0.40 m to 2.50m. In the boreholes towards the higher Windsor Road portion of the site the bedrock encountered was predominantly shale, while sandstone (sometimes with a capping of shale) was encountered in the boreholes drilled within the lower areas.

The contact between the shale and sandstone appeared to be undulating, ranging from RL39.00 m to RL47.00 m. The upper (about) 1.00 m to 1.50 m of the rock was generally of extremely low to very low strength, but in some boreholes was of at least low strength on first contact. Below that the rock was generally of medium to high strength. Within the cored shale numerous joints were present, which were generally inclined at 20 to 45 degrees. The joints within the sandstone were widely spaced and were inclined at about 20 degrees.

Groundwater seepage was only encountered in a few boreholes at depths ranging from 2.50 m to 5.50 m, with most boreholes dry on completion of drilling.

The report highlights the following geotechnical issues should be considered for the proposed development.

- Excavation for the proposed construction works is anticipated to reach depths of up to 2 metres. Fill depths of up to 4 metres will be required, primarily within landscaped areas, and will be carried out under the SSDA scope. Particular care must be taken during excavation near the existing substation to ensure that the footings of the existing building or retaining walls are not undermined or compromised.
- The geotechnical investigation undertaken by JK Geotechnics in March 2025 verified and expanded upon the initial desktop study findings. Further determination of the rock profile and material characteristics. Clayey fill was encountered in all boreholes, extending from approximately 0.2 m to 0.9 m below ground level (BGL), with inclusions of ash and root fibres. Residual silty clay of high plasticity and hard strength was present beneath the fill in all locations, underlain by weathered siltstone bedrock at depths of approximately 0.6 m to 1.8 m BGL. In test pits, fill was recorded at the surface in all locations except TP11, extending to depths of approximately 0.1 m to 1.2 m BGL, typically comprising silty clay with ironstone, sandstone and siltstone gravel, ash, and root fibres.

4.2.2 Cut and Fill Estimates

A conceptual design has been developed for the bulk earth works for construction access roads, landscape and on-site detention basin which revealed that a minor quantity of excavation and fill are anticipated. Excess of fill is expected. Some contamination may be encountered in localized areas of fill; the volume of which is currently unknown. However, Supplementary Detailed (Stage 2) Site Investigation by JK environment dated 19 March 2025 (namely: E35128Brpt5-SAQP) concluded that the site is suitable for the proposed development and applying unexpected finds procedures prepared by a qualified contaminated land consultant.

Table 5: Bulk Earthworks Cut and Fill Estimates (Extracted from ACOR Drawing 045001)

CUT / FILL Estimates (m^3)	
Total cut	1,350
Total fill	7,550
Total cut / fill balance	6,200 (fill)

Additionally, due to the topography of the existing site and the extent of the proposed development, there is approximately 5.00 m of level difference across the site that will need to be managed as part of the development. Retaining walls will also likely be required along some of the proposed building extents.

4.3 Pavements and Signage and Linemarking

All access roads will be designed in accordance with Australian Standards for parking and road designs as stated in 4.1 above. Access roads for the site will typically grade between 1% and 10% longitudinal fall and will be designed to prevent scrapping on the underside of vehicles including ambulances and trucks.

Cross fall for road lanes will generally be between 2-3% to prevent ponding water and allow it to drain away to the kerbs for collection by the inground stormwater drainage.

In general, the new access roads across the site will align with the existing surrounding pavements and will be constructed using flexible asphalt pavement. Rigid concrete pavement is proposed for the loading dock areas, as asphalt is susceptible to rutting and deformation caused by heavy vehicle turning movements. Concrete pavement will offer greater durability and require less maintenance over time.

For the access road located between the multi-deck car park and the hospital building, concrete block paving will be used to comply with Credit 25 – Heat Island Effect, as outlined in the latest DGN58.

Pavement designs will be chosen to ensure long life, compatibility with existing road construction and to minimise long-term maintenance. Subgrade strengths forming the basis of pavement designs will be obtained

from the results of the site Geotechnical investigations. All pavements will be designed in accordance with TfNSW guidelines, Council guidelines and Austroads design standards including Guide to Pavement Technology.

Signposting and linemarking for the proposed development will be designed to ensure clear and defined wayfinding for all users, including emergency vehicles, patients and visitors, along with providing the relevant regulatory frameworks for enforcement of errant vehicles/parking. Signage and linemarking will be designed in accordance with TfNSW guidelines and AS1742, with supplementary non-standard linemarking and directional signage as required.