

CIVIL ENGINEERING REVIEW OF ENVIRONMENTAL FACTORS DESIGN REPORT

HI21536 – Cowra Hospital Redevelopment

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Revisions

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A	Draft Issue	15/11/22	NP	
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C	Re-issue for REF Amendment	13/12/2023	CR	CR
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1 Executive Summary

ACOR Consultants Pty Ltd, in the capacity of the project Civil Engineering Consultant has reviewed and analysed the environmental and functional requirements as well as performance standards to be met by the Civil design elements for the proposed Cowra Hospital Redevelopment.

Cowra Hospital is located on Liverpool Street, Cowra, within the Cowra Shire Council Local Government Area (LGA). The site is bounded by Ina Drive to the east, Brisbane Street to the west, numbers 2 and 4 Ina Drive to the north and Liverpool Street to the south. The site is approximately 1.5 ha, of which the main hospital building, and staff accommodation occupy approximately half of the area and are located on the southern portion of the site. Ancillary buildings and landscaped areas, including staff parking and maintenance buildings are spread across the northern portion of the site.

Buildings on site vary from singular to multiple storeys and generally exhibit brick facades, except for the Life Skills building on the north-eastern corner the site which is clad. Existing buildings and infrastructure are generally of the same age (approximately 60 years old) and vary widely in their condition, with some buildings on site currently unoccupied.

1.1 Earthworks

There is approximately 16 metres of level difference from RL338 in the northeast corner to RL322 in the southwest corner. The building floor levels are proposed to be RL332.50 for Level 1 and RL327.60 for the Ground level. As such the proposed building will predominately be in cut in the north and the southern carpark in fill to be able to match into the existing boundary levels along the surrounding roads.

A preliminary bulk earthworks model has been undertaken to estimate volumes cut and fill. The earthworks range between approximately 6.5 metres of cut to 2.5 metres of fill with the total balance calculated to be approximately 19,660m³ of excess cut (incl. 150mm surface stripping), which will need to be appropriately disposed of off-site during construction.

The existing hospital is also required to remain operational during the construction of the new buildings and as such the staging of the works will also impact on how the earthworks are completed. Shoring and retaining walls will be required as the proposed excavation will be in close proximity to the existing operational building.

Approximate earthworks volumes are as follows:

Stage	Cut Volume (m ³)	Fill Volume (m ³)	Balance (m ³) (-Excess Cut)
1	-15,200	1,250	(-13,950)
2	-2,360	1,510	(-850)
Overall	-17,560	2,760	(-14,800)
Surface Stripping (150mm)	-2,100	-	(-2,100)

1.2 Site Access, Roads and Grading

The entrance to the site is proposed to be on Level 1 of the Hospital with a driveway access provided at the northern end of Brisbane Street which will be shared by logistics, ambulances, and the general public. The area is proposed to be relatively flat and constructed out of concrete to allow manoeuvrability for all vehicles.

A carpark is proposed to be constructed at the lower southern end of as part of stage 2 works which will ultimately act as the main public access to the site and subsequently segregate the public from Ambulance and logistics. The carpark is proposed to be constructed out of asphalt and will provide access from Liverpool Street which will ramp up to match the Ground floor finished floor level.

1.3 Stormwater Drainage

The new hospital building is proposed to be drained via a conventional roof drainage system connecting to a new inground pit and pipe network which is to discharge at multiple locations into the existing Council drainage system in Brisbane Street, and some connections discharging to kerb on Ina Drive. The onsite in-ground drainage will be sized for the 20-year ARI storm event with overland flow paths designed to convey flows up to 100-year ARI storm event.

A review of Cowra Councils DCP notes that there is no mention of stormwater On-Site Detention (OSD) or stormwater quality treatment requirements. Council however has advised that they are likely to request that OSD be implemented to reduce the impact that the development will have on its existing drainage infrastructure. The development however does not increase the impervious area of the Hospital site and has a net reduction of impervious area and as such less stormwater runoff will be generated during rain events. It is therefore anticipated that OSD will not be required for this site.

Stormwater quality treatment is not required by Cowra Council and no provision has been made for this in the design. Water quality initiatives are also not required to achieve the targeted Green Star certification.

1.4 Flooding

The Cowra Hospital site has not been identified to be within a Flood Planning Area as assessed by the Cowra Local Environmental Plan 2012 and as such is considered not to be flood effected.

2 Introduction

2.1 Project Scope

ACOR Consultants have been engaged by Health Infrastructure NSW as the Civil engineering consultants on the Cowra Hospital Redevelopment Project. This report has been prepared to outline the existing site conditions and the Civil Engineering requirements applicable for the Review of Environmental Factors (REF) of the project, including earthworks, roads and access, stormwater drainage and flooding.

Cowra Health Service (hereafter referred to as Cowra Hospital) is a district general hospital providing inpatient, outpatient, and community services to the communities of Cowra, Grenfell and Canowindra. Cowra Hospital is in the Cowra Local Government Area (LGA) in central NSW and is located towards the southern border of the Western NSW Local Health District.

The NSW Government announced a \$110M investment to redevelop Cowra Hospital. The project announcement includes drivers to retain the and enhance the health services provided to the local community, with the overall project vision being the creation of “a patient focused health service that is integrated, equitable and sustainable for Cowra and the surrounding communities”.

3 Existing Site Conditions

3.1 Existing Site Overview

Cowra Hospital is located on Liverpool Street, Cowra, within the Cowra Shire Council Local Government Area (LGA). The site is bounded by Ina Drive to the east, Brisbane Street to the west, numbers 2 and 4 Ina Drive to the north and Liverpool Street to the south. The site is approximately 1.6 ha, of which the main hospital building and staff accommodation occupy approximately half of the area and are located on the southern portion of the site. Ancillary buildings and landscaped areas, including staff parking and maintenance buildings are spread across the northern portion of the site.

Buildings on site vary from singular to multiple storeys and generally exhibit brick facades, except for the Life Skills building on the north-eastern corner the site which is clad. Existing buildings and infrastructure are generally of the same age (approximately 60 years old) and vary widely in their condition, with some buildings on site currently unoccupied. An existing site arrangement plan is provided in Figure 1 below.



Figure 1 - Existing site arrangement plan (Source: EUG Workshop Master Plan Presentation).

3.2 Geotechnical Investigation & Site Geology

A preliminary geotechnical assessment has been undertaken by Macquarie Geotech. This has been used to inform the design:

Name:	Cowra Hospital Redevelopment- Geotechnical Investigation
Contact Details:	Macquarie Geotech 3 Watt Drive, Bathurst NSW 2795
Job Reference:	B21501 (revision: 02)
Report Issue Date:	27/02/2022

The Geotechnical report states that the geology consists of fill overlaying stiff clays, followed by weathered diorite rock which could be up to 5m below the proposed ground level. The NSW Government's MinView geoscience webapp shows that there is a dyke consisting of dolerite igneous rock cutting east to west through the site. Refer to Figure 2 for a screenshot of the MinView geoscience webapp showing the general site geology.

Large boulders and rock outcrops are generally visible to the north of the site, as was verified by the borehole results contained within the geotechnical report.

Groundwater monitoring wells were installed in Boreholes BH03 and BH08 at the time of investigation, however no groundwater was observed in any of the test locations. It is not expected that groundwater will be encountered during excavations for the project.

The site classification in accordance with AS2870:2011 is Class P due to uncontrolled fill across the site.

Laboratory test results of the site estimate an anticipated surface movement (Ys) of 20-25mm which will need to be considered when designing the structural footings and interfaces between structures and external on-grade hardstand and potential differential movement and long-term settlement.

California Bearing Ration (CBR) testing was undertaken on three bulk samples recovered from various boreholes. The CBR values ranged from 6% to 9%. The Macquarie Geotech report recommends using a design subgrade CBR value of 6% for pavement design. An indicative pavement design has also completed assuming low traffic volumes ($ESA = 1.06 \times 10^5$) and a subgrade CBR 6%.

No geotechnical investigations were undertaken in the southern portion of the site within the existing hospital building footprint and as such it is assumed that material will be similar to the northern portion of the site. Further geotechnical testing, particularly CBR testing, is to be undertaken once the existing building is demolished as part of stage 2 works to confirm this assumption.



Figure 2 - Site Geology (Pink represents granodiorite and grey represents dolerite) (Source: NSW MinView geoscience webapp).



Figure 3 - Borehole locations (Source: Macquarie Geotech)

Table 4: Borehole Summary

Unit	Name	Depth Range (m)	Maximum Thickness (m)	Material Description
1	Topsoil	0.00 – 0.10	0.10	Sandy CLAY / Silty CLAY
2A	Asphalt/Concrete	0.00 – 0.15	0.15	Concrete / Asphalt
2B	Fill	0.00 – 1.50	1.50	Sandy CLAY / Clayey SAND / Gravelly SAND/ ASH
3	Residual	0.50 – 6.50	5.50	Sandy CLAY / Clayey SAND / Silty CLAY
4	Extremely Weathered Material	3.00 – 8.70	4.70	SAND / Clayey SAND
5	Diorite	7.50 – EOH	-	Diorite

Note: Please refer to borehole logs in Appendix C for detailed descriptions.

Figure 4 - Boreholes Summary (Source: Macquarie Geotech)

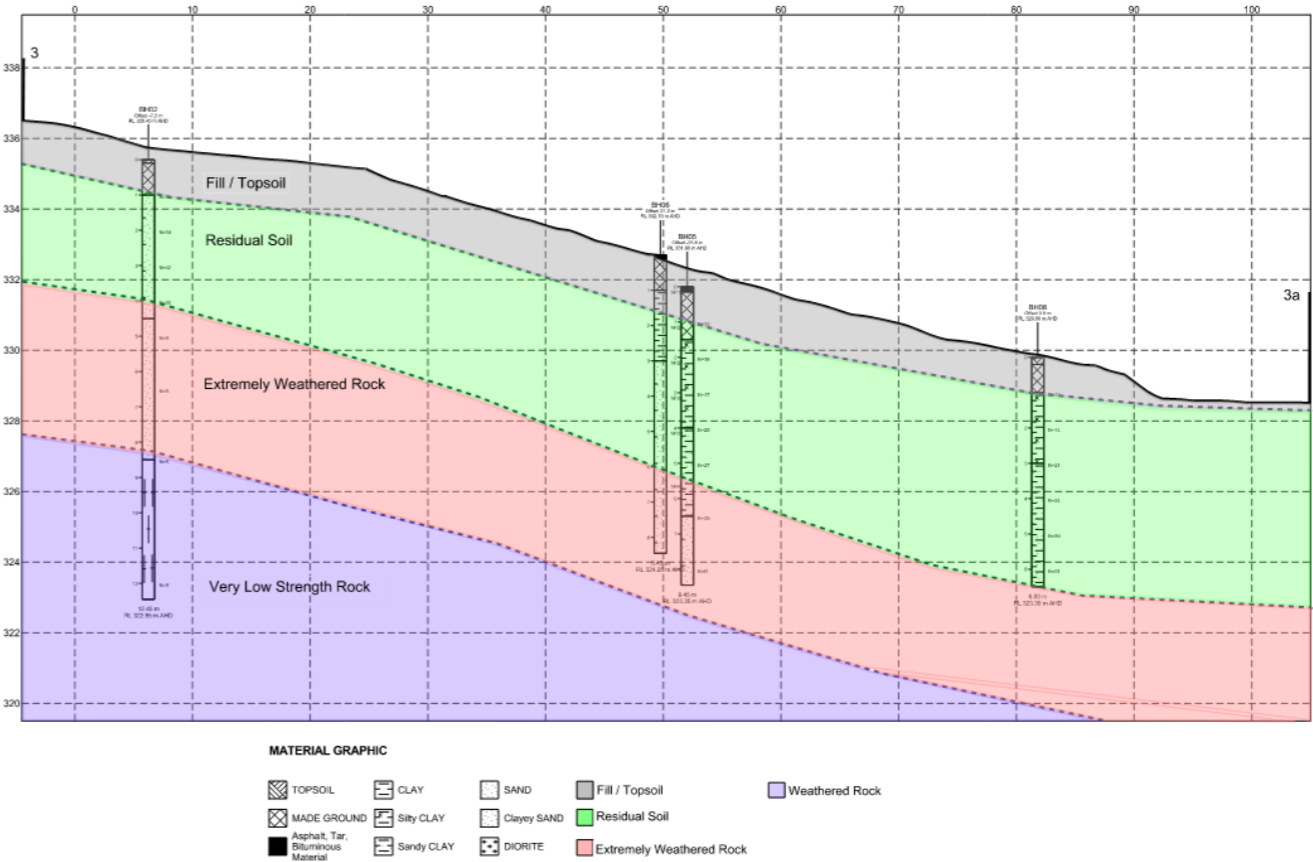


Figure 5 - Geotechnical Cross section 3 (Source: Macquarie Geotech)

Table 6: Laboratory Test Results - California Bearing Ratio (CBR)

Hole ID	Depth (m)	Sample Description (USCS)	Field Moisture Content (%)	California Bearing Ratio (CBR)			
				MDD (t/m³)	OMC (%)	CBR (%)	CBR Swell (%)
BH01-BH03	0.0-1.0	FILL	10.7	1.94	13	9	0.5
BH04-BH05	0.0-1.0	FILL	13.3	1.91	13	8	1.5
BH07-BH09	0.0-1.0	FILL	13.7	1.88	14	6	1.0

Note: USCS – Unified Soil Classification System, MDD – Maximum Dry Density, OMC – Optimum Moisture Content.

*Visual description.

Figure 6 - CBR Testing Results (Source: Macquarie Geotech)

3.3 Site Contamination Investigations

A preliminary Site Investigation (Contamination) has been undertaken by SMEC. This has been used to inform the design:

Name:	Cowra Hospital Redevelopment – Preliminary Site Investigation (Contamination)
Contact Details:	SMEC Level 5, 20 Berry Street, North Sydney NSW 2060
Job Reference:	30013211 PSI
Report Issue Date:	1/03/2022

In accordance with NSW EPA Waste Classification Guidelines Part 1: Classifying Waste 2014, the preliminary waste classification on site is as follows:

- Soils comprising fill or disturbed ground from test pit logs are General Solid Waste (non-putrescible)
- One location with high levels of BaP would be classified as Restricted Solid Waste
- Materials/solids containing asbestos are classified Special Waste (Asbestos)
- Natural soils have the potential to classify as Virgin Excavated Natural Material (VENM) subject to careful segregation and validation
- Some soils may be recyclable

Ash material was identified in the northern portions of the site and would not meet the criteria to be classified as Excavated Natural Material (ENM). Further characterisation is required to determine if the Ash poses a contamination issue, and if it is suitable for re-use.

Bonded Asbestos Containing Materials (ACM) fragments were observed on the ground surface at three locations, likely associated with historic building materials. ACM was not observed in the subsurface at sample locations. A previous asbestos survey noted the presence of friable asbestos in sub-floors of buildings and some subsurface pipework.

3.4 Site Survey, Grading and Topography

A detailed topographical site survey and inground services survey has been undertaken by Premise. This has been used to inform the design:

Name:	Cowra Health Service Redevelopment
Contact Details:	Premise 154 Peisley Street, Orange, NSW, 2800
Job Reference:	222022
Survey Issue Date:	21/01/2022

As shown in Figure 7 below, the site slopes generally from the northeast to the southwest, with an approximate surface level of RL338 at the north-eastern boundary, down to an approximate surface level of RL322 at the south-western boundary. This equates to an approximate level difference across the site of 16m and an average grade of 8.5% (~1:12).



Figure 7 – Site Topography

3.5 Existing Stormwater Drainage

A desktop study of the existing stormwater infrastructure has been undertaken. The services map provided by Cowra Council from their GIS system, refer Figure 8 below, shows a 375-diameter stormwater pipe within eastern verge of Brisbane Street.

Kerb inlet pits are located at the northern end of the site along Brisbane Street however no pits are apparent along the south end of the road. Culvert crossings are provided at the kerb to channel flows beneath the driveway layback at the Logistics and the Old Nurse's Quarters entries. The flows within the kerb and gutter are directed to headwalls that (see Figure 11 and Figure 12) seem to connect to the 375mm diameter stormwater pipe beneath the roundabout intersection of Liverpool Street and Brisbane Street.

There is no Council inground stormwater drainage within Ina Drive. Roof and surface runoff generated by the site is generally collected and conveyed to the Council network via an onsite inground drainage network that discharges to the kerb and gutter.

The stormwater system servicing the existing main hospital building drains to the kerb and gutter system in Brisbane and Liverpool St as documented on the design drawings for the building dated 1947 (Figure 9).

The staff accommodation building is serviced by downpipes which connect into an inground drainage system internal to the site which appears to discharge to the kerb via a kerb converter downstream of the emergency vehicle entry (see Figure 13). The life skills building on the north-eastern corner of the site is serviced by downpipes which discharge directly to the ground and into the kerb system of Ina Drive via overland flow.

The following notes and Figure 10 to Figure 13 highlight the existing stormwater drainage features visible in the area.



Figure 8 – Cowra Council GIS

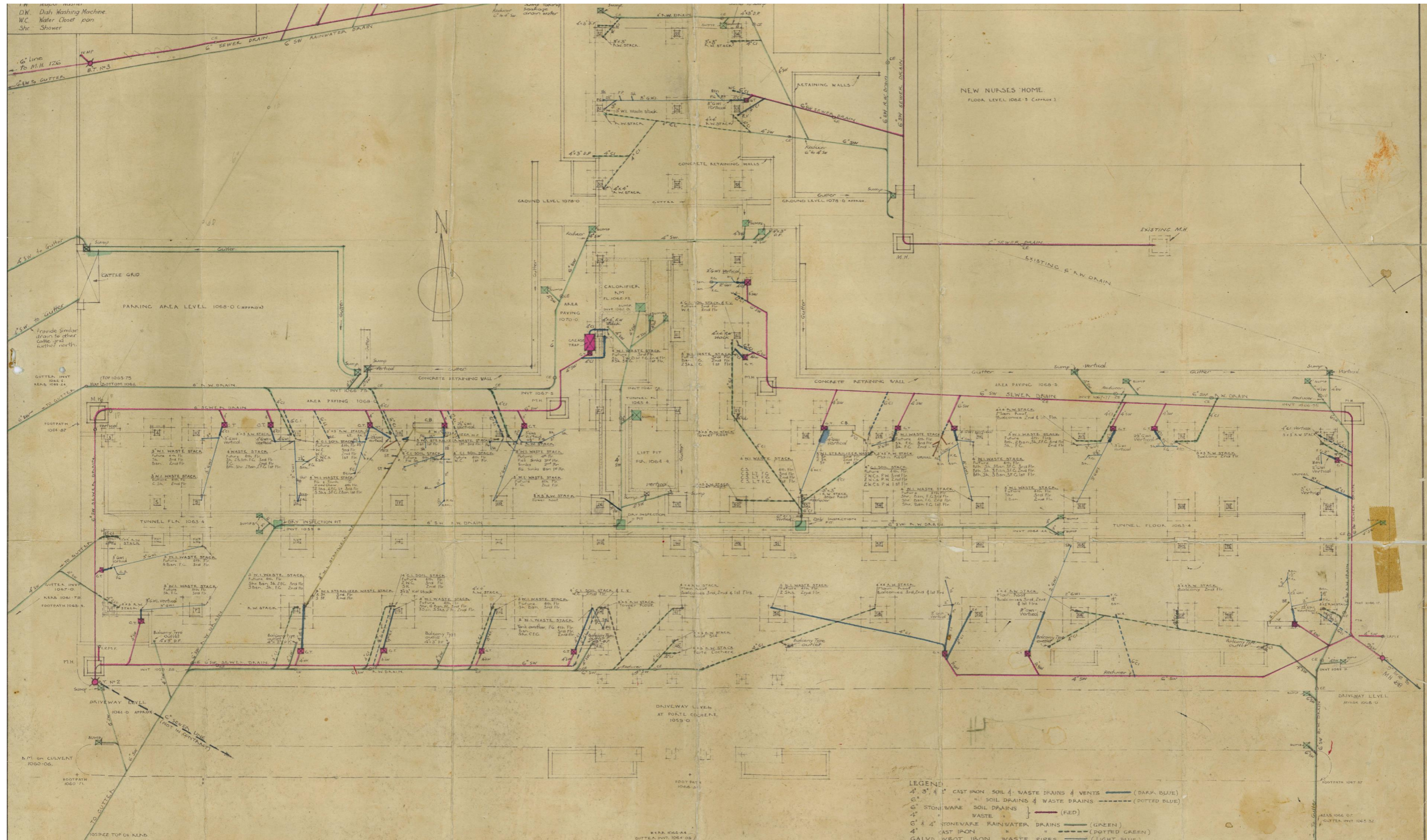


Figure 9 – Existing Hospital Drainage Plan



Figure 10 - Stormwater kerb inlet pit on Brisbane Street near rear site boundary. (Source: Google Maps)



Figure 12 - Stormwater culvert inlet - view from Brisbane Street upstream of roundabout looking south. (Source: Google Maps)

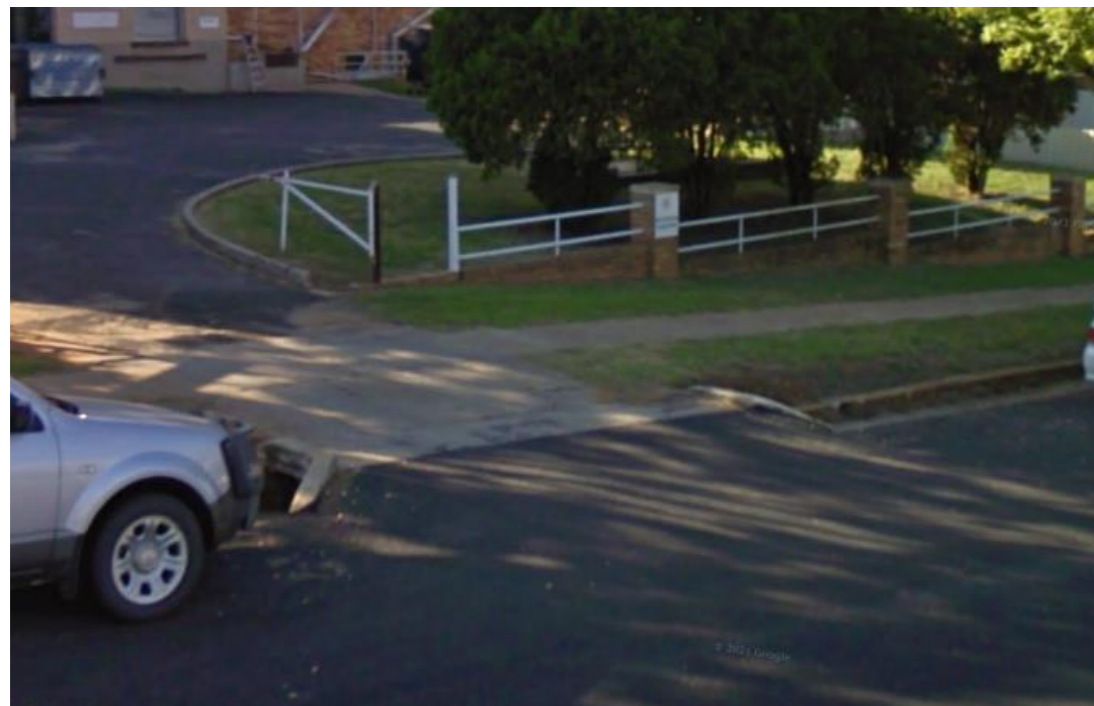


Figure 11 – Driveway Culvert at Logistics Entry 1 on Brisbane Street. (Source: Google Maps)



Figure 13 – Kerb converter on Ina Drive - adjacent to emergency vehicle entry. (Source: Google Maps)

3.6 Flooding

The Cowra Hospital site has not been identified to be within a Flood Planning Area (see Figure 14 below) as assessed by the NSW Government Flood Planning Maps and the Cowra Local Environmental Plan 2012.

While the site is not flood affected, we recognise that regional flooding of the Lachlan River does occur, with the potential to create major disruptions to roads. Flooding in the wider Cowra and Gooloogong areas are detailed in the 'Cowra and Gooloogong Floodplain Risk Management Study and Plan - Volume One – Report' prepared by SMEC in 2006.

Rainfall runoff generated on the site due to the proposed development will need to be controlled to ensure there are no adverse effects on downstream properties due to the proposed development for storms up to and including the 1% Annual Exceedance Probability (AEP).

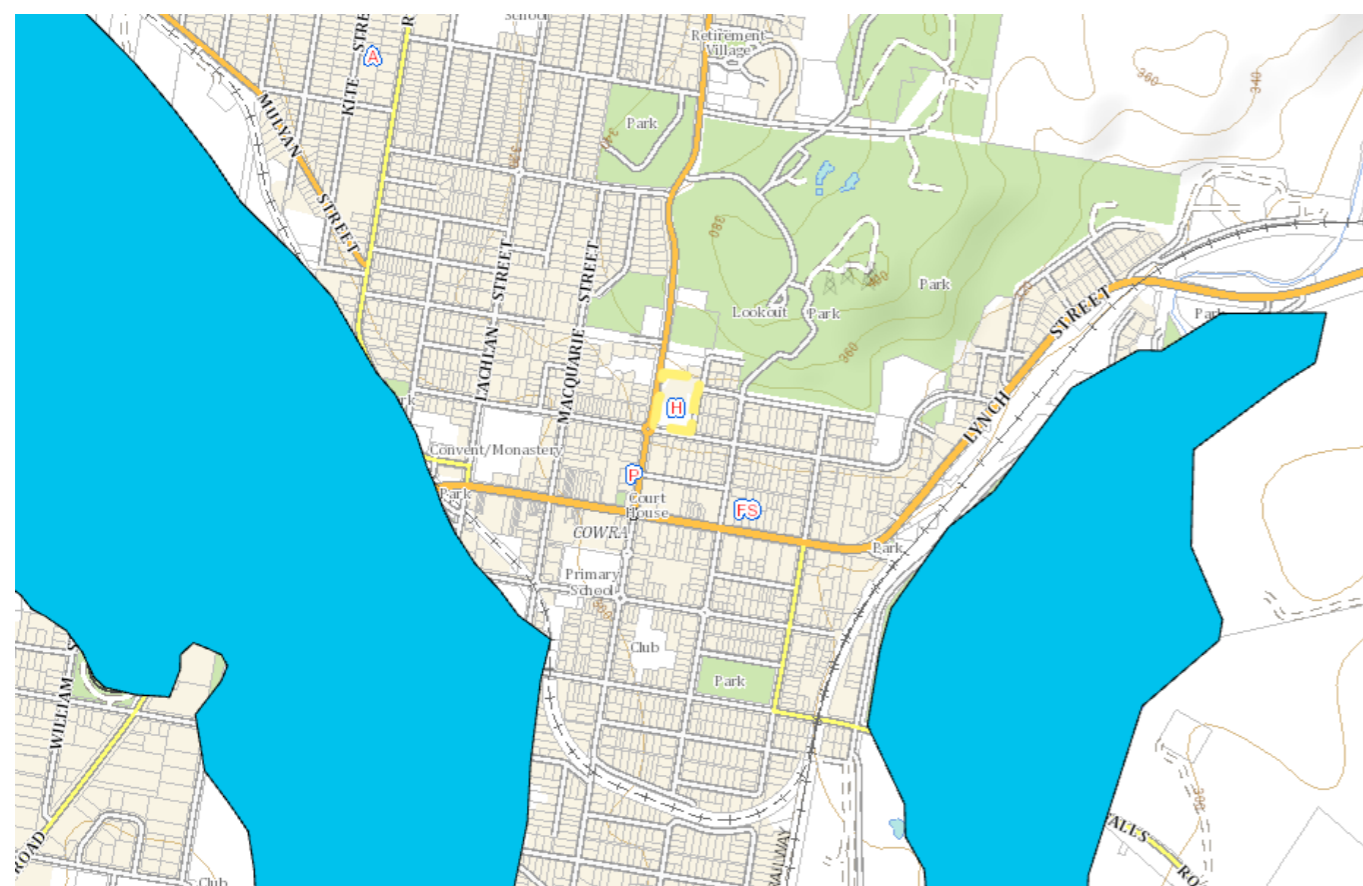


Figure 14 – Flood Planning Area Map with Hospital Location in yellow (Source: NSW ePlanning Spatial Viewer).

3.7 Existing Site Access

Numerous vehicle entries and exits service the existing hospital site, with the surrounding roadways of Brisbane Street, Liverpool Street, and Ina Drive being sealed bitumen. Logistics Entries 1 and 2 are sealed with bitumen pavement. At the hospital frontage on Liverpool Street, the drive through drop-off/pick-up is concrete paved. The emergency vehicle entry off Ina Drive is concrete paved and the staff parking driveway and carpark south of the Life Skills building are sealed with bitumen pavement. Staff parking driveway and carpark north of the Life Skills building is unsealed.

Pedestrian access is mostly confined to the main Hospital entrance off Liverpool Street, with access to the northern portions of the site largely shared with the vehicular access paths described above.

4 Proposed Development Design and Requirements

4.1 Development Overview

When compared to the existing hospital and site layout, the proposed hospital is proposed to sit on the northern half of the site, to utilise currently available site areas, whilst also enabling the continued operation of the existing Cowra Hospital during the construction of the new hospital building and ancillary structures. At the completion of the new hospital works, the existing hospital building will be decommissioned and demolished and replaced with a visitor carpark, landscaped area with pedestrian stairs and walkway which will lead from Liverpool Street up to the hospital entrance.

The proposed Cowra Hospital development site plan is provided in Figure 15 below.

The proposed development will incorporate all hospital functions into a singular dual-level development when compared to the detached-style development which exists on site currently. Provisions for off-street carparking are also streamlined by combining reserved staff parking and visitor parking into a common area on site.

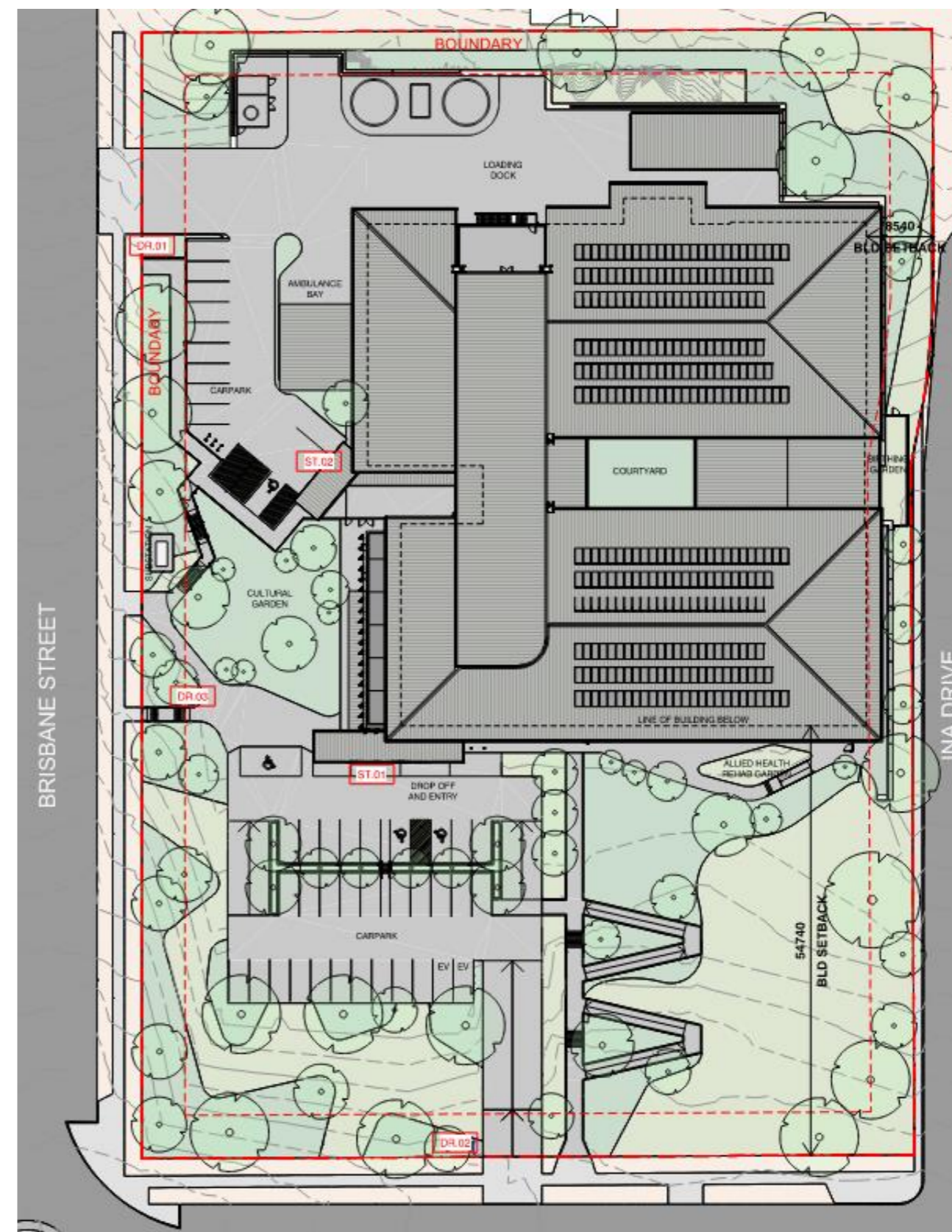


Figure 15 – Proposed Site Plan Prepared by DJRD Architects.

4.2 Earthworks

4.2.1 Design standards

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

- AS3798 Guidelines on Earthworks for Commercial and Residential Developments
- Cowra Shire Council Development Control Plan 2021
- Health Infrastructure Guidance Notes
- Relevant RMS Technical Directions and Guidelines

4.2.2 Earthworks

There is approximately 16 metres of level difference across the site that will need to be managed as part of the redevelopment due to the topography of the site. As such the proposed building will predominately be in cut and the southern carpark in fill to be able to match into the existing boundary levels along the surrounding roads.

The existing hospital is required to remain operational during the construction of the new buildings and as such the earthworks and construction are proposed to be completed in two stages. Stage 1 includes demolition of the existing buildings on the northern half of the site, and construction of the new hospital building. The existing building can then be decanted into the new building and Stage 2 will include demolition of the existing building and construction of the southern visitor carpark and landscaping. Temporary retaining walls and shoring will be required along some of the proposed building extents and at the interface between the proposed development and existing structures to be retained.

A preliminary bulk earthworks model has been undertaken to estimate volumes of cut and fill (see Figure 16 below). Cut and fill levels on-site range between approximately 6.5 metres of cut to 2.5 metres of fill, with the total balance calculated to be approximately 17,560m³ of excess cut and an additional 2,100m³ of surface/topsoil stripping, which will need to be appropriately disposed of off-site during construction, . Refer to Appendix A for Earthworks Cut and Fill plans.

The geotechnical and environmental investigation reports have determined that there is a layer of uncontrolled fill, including an area of ash material, which could be contaminated and not suitable for reuse on site. This layer is likely to be needed to be excavated and removed from site as General Solid Waste (GSW).

Approximate volumes are shown in Table 1.

Table 1 – Earthwork Volumes

Stage	Cut Volume (m ³)	Fill Volume (m ³)	Balance (m ³) (-Excess Cut)
1	-15,200	1,250	(-13,950)
2	-2,360	1,510	(-850)
Overall	-17,560	2,760	(-14,800)
Surface Stripping (150mm)	-2,100	-	(-2,100)

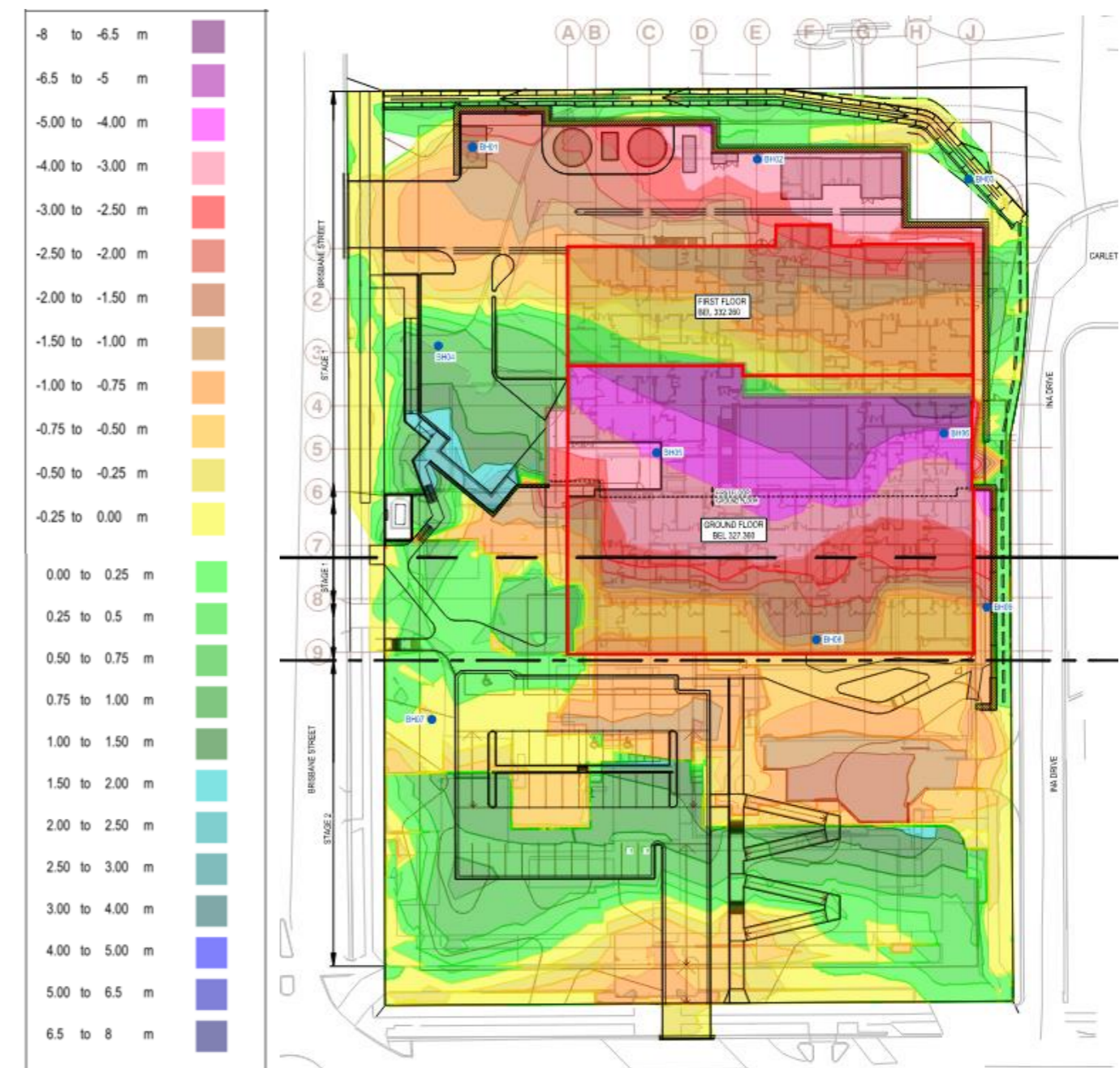


Figure 16 – Cut and Fill Plan of Proposed Earthworks

4.3 Site Access, Roads and Grading

4.3.1 Design standards

The following list indicates the relevant infrastructure design guides and standards to be considered through the Civil road and site grading 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
- AS2890.1 Parking Facilities: Off-street car parking
- AS2890.2 Parking Facilities: Off-street commercial parking
- AS2890.5 Parking Facilities: On-street parking
- AS2890.6 Parking Facilities: Off-street for people with disabilities
- Cowra Shire Council Development Control Plan 2021
- Health Infrastructure Guidance Notes
- Relevant RMS Technical Directions and Guidelines

4.3.1.1 Proposed Works

The entrance to the site is proposed to be on Level 1 of the Hospital with a driveway access provided at the northern end of Brisbane Street. This entrance provides shared access to the Hospital for logistic vehicles as well as ambulances and the general public. The access roadway and surrounding hardstands are proposed to be relatively flat to allow easy manoeuvrability for delivery vehicles and will match into the Level 1 finished floor level of RL332.50.

A carpark is proposed to be constructed as part of Stage 2 works which will ultimately act as the main public access to the site, which will segregate the public from Ambulance and logistics. This future access is proposed to be from Liverpool Street and will ramp up to match the ground floor finished floor level.

Accessibility requirements have been considered in the design with stairs, walkways and ramps to be included to ensure that equitable access is provided into and around the site complying with AS1428.1 requirements.

Areas where trucks will undertake turning movements, such as the loading dock are proposed to be a rigid concrete pavement, as asphalt pavements are prone to deformation in the form of rutting due to the on-the-spot turning of heavy vehicles. The concrete pavement will provide a long-lasting pavement that will require less future maintenance.

It is therefore proposed that the new northern access road from Brisbane Street to both the loading dock and ambulance bay will be concrete pavement. The future carpark to the south which will be accessed via Liverpool Street is proposed to be constructed out of asphalt.

All access roads will be designed in accordance with Australian Standards for parking and road designs as stated in Section 4.3.1 above. Access roads within the site will typically grade between 1% and 12.5% longitudinal fall and will be designed to prevent scraping 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 rainfall runoff to drain away to the kerbs for collection by the inground stormwater drainage.

4.4 Stormwater Drainage Design

4.4.1 Design standards

The following list indicates the relevant infrastructure design guides and standards to be considered through the Civil stormwater design:

- Australian Rainfall and Runoff (2019) – with AR&R (2016) rainfall datasets sourced from BoM
- Austroads: Guide to Road Design, Part 5 Drainage Design 2008
- AS3500.3:2018 Plumbing and Drainage Part 3: Stormwater Drainage
- Bureau of Meteorology IFD data – sourced from <http://www.bom.gov.au>
- Cowra Shire Council Development Control Plan 2021
- Health Infrastructure Guidance Notes
- Managing Urban Stormwater: Soils and Construction, “The Blue Book” – 4th edition 2004

4.4.1.1 Stormwater Quantity

The new hospital building is proposed to be drained via a conventional roof drainage system connecting to a new inground pit and pipe network.

The in-ground pit and pipe systems will be designed to capture and convey all runoff from external hardstand areas for up to and including a 20-year ARI storm event. Overland flow paths will be designed to convey flows from all storms above a 20-year ARI event up to and including the 100-year ARI storm event. The IFD data extracted from the Bureau of Meteorology’s IFD tool for the Cowra Hospital Site is presented in Table 2 below and is being used for design development.

Table 2 – Cowra Hospital Site IFD Data (Source: BOM)

Storm Duration	5-year ARI (mm/hr)	20-year ARI (mm/hr)	100-year ARI (mm/hr)
5 min	101	140	190
1 hour	27.3	38.1	51.6
12 hour	4.87	6.62	8.64

4.4.1.2 On-Site Detention

Cowra Council DCP states that Hospitals are required to comply with DCP Part H for Commercial Developments. There is no mention of stormwater On-Site Detention (OSD) requirements within this section of the DCP. Council however has advised, that even though it is not mentioned in the DCP, they are likely to request that OSD be implemented on the Hospital site, with the aim to reduce the impact that the development will have on its existing drainage infrastructure.

Notwithstanding, the development reduces the impervious area of the Hospital site which means that there will be a reduction in stormwater runoff during rain events and as such OSD is not expected to be required for this site.

Approximate impervious areas for the site development are shown in Table 3 below

Table 3 – Impervious Area

Total Site Area (m²)	Pre-Development (m²)	Post Development (m²)
14,220	9,650	9,000

4.4.1.3 Surface Runoff

Property drainage systems must be designed to reduce the extent and level of ponding water on the property, prevent concentrated stormwater runoff entering neighbouring sites and reduce erosion. All rainfall runoff from impervious areas is to be collected by the stormwater infrastructure.

4.4.1.4 Stormwater Discharge from Property

The stormwater design has taken into account the existing site drainage, the staging of the construction works, and the steep site topography, and the following discharge locations are proposed, (refer to the stormwater plan in Figure 17 below and in Appendix A):

- Three separate in-ground connections to the Council main along Brisbane Street for each of the following areas:
 - Northern driveway, parking and loading dock area, to discharge to the existing Council pit adjacent to the proposed substation
 - The roof drainage (via the proposed RWT overflow) and the cultural gardens, to discharge to a new kerb inlet pit aligned with the southern edge of the building
 - Stage 2 works including the southern carpark and landscaping, to discharge to a new kerb inlet pit at the southern end of Brisbane Street.
- Two separate connections to kerb on Ina Drive- for each of the following areas:
 - Walkway and Birthing Garden on the eastern side of the building at Level 1
 - Walkway on the eastern side of the building at the Ground Floor.

Existing kerb connection points for the existing hospital are proposed to be retained during Stage 1 prior to the demolition of the existing main building.

4.4.1.5 Stormwater Quality

Cowra Council DCP Part H for Commercial Developments does not stipulate any requirements for stormwater quality treatment or Water Sensitive Urban Design (WSUD). Cowra Council has preliminarily advised that WSUD is not required to be implemented within commercial developments. As such the Cowra redevelopment does not propose to implement WSUD into the design. Water quality initiatives are also not required to achieve the targeted Green Star certification.

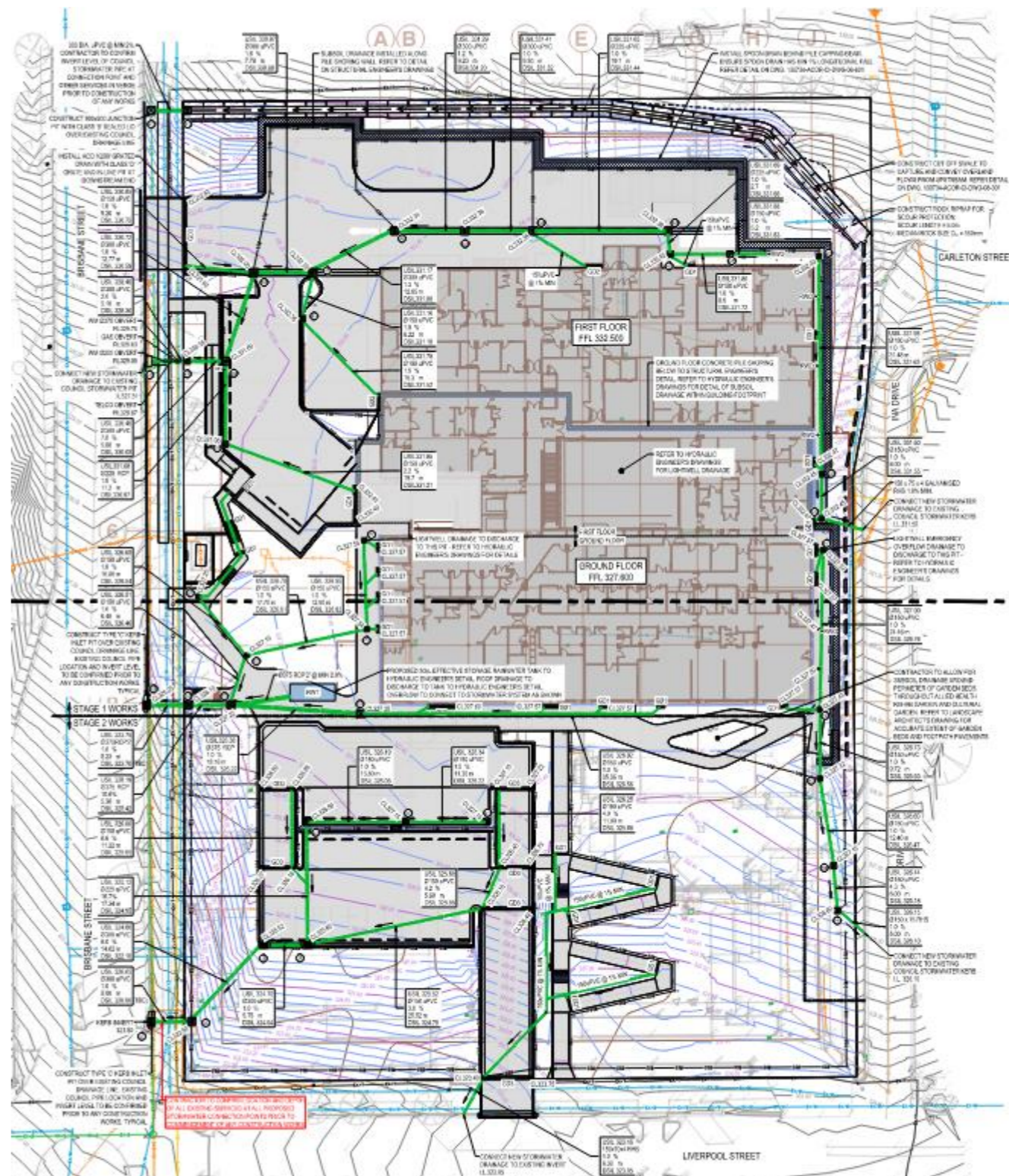


Figure 17 – Stormwater Drainage Layout

4.5 Flooding

The proposed hospital facility is classified as a critical use for the purposes of flood planning, and therefore is to be constructed to ensure no ingress of flood water in a Probable Maximum Flood (PMF) event.

It is not expected that flood controls will be placed on the development at the Cowra Hospital site as the hospital is not subject to flooding.

4.6 Sediment, Erosion and Dust Control

4.6.1 General Principles

The following general principles of soil and water management have been developed and will be applied to the future re-development works:

- Minimise the area of soil disturbed and exposed to erosion
- Conserve topsoil for later site rehabilitation/revegetation
- Control water flow from the top of, and through the development area
- Rehabilitate disturbed lands quickly
- Maintain soil and water management measures appropriately during the construction phase

4.6.2 Sources of Pollution

Based on the proposed development activities, the following sources of pollution during construction that could lead to earthworks erosion, sediment and silt transportation and contamination of downstream stormwater systems have been considered:

- Earthworks undertaken prior to rainfall events without sufficient auxiliary measures to manage drainage
- Earthworks areas that have not been stabilised or are exposed prior to temporary or permanent ground cover
- Establishment time for rehabilitation / revegetation of exposed earthworks
- Localised groundwater dewatering activities during earthworks excavations
- Construction works to existing stormwater pipelines and overland flow paths
- Vehicle entry and exit to the construction site and associated tracking of debris out of the site
- Clearing and grubbing of vegetation / organic matter and stripping of topsoil
- Stockpiling of excavated materials or construction materials (e.g., road base, ordinary and select fill, etc)
- Re-fuelling and general maintenance of construction plant and equipment
- Storage of chemicals, fuel and other hazardous materials
- Ineffective / incorrect installation or maintenance of soil erosion and sedimentation control measures

4.6.3 Soil and Water Management Strategy

The following construction management methodology has been developed for the re-development works and should be included in the soil erosion and sediment control for the site:

- Establish sediment fencing to the downstream perimeter of the zone of disturbed works to protect downstream assets and properties
- Installation of stabilised construction entry and exit grids to prevent construction vehicles tracking debris into adjacent Authority roadways and stormwater systems

- Construction of “clean water” diversion drains with rock check dams to divert unpolluted water to the existing stormwater system in a controlled manner
- Construction of “dirty water” catch drains with rock check dams to divert sediment-laden and silt-laden water to proposed sedimentation basins
- Construction of appropriately sized and maintained sedimentation basins to promote settling of gross pollutants and suspended solids. Dosing and flocculation of fine suspended particulates will also be undertaken depending on tested water quality profiles within the sedimentation basin
- Protection of materials stockpiles by suitable wind protection fencing and / or temporary covering of stockpiles
- Protection of existing and recently constructed surface inlet pits with temporary sediment traps using geotextile filter fabric and sandbags
- Protection of existing and recently constructed overland flow paths with vegetated ground cover
- General expedited revegetation and stabilisation of exposed earthworks to prevent sedimentation of stormwater runoff

Appendix A - Civil Drawings

NOTES



BRISBANE STREET

INA DRIVE

CARLETON STREET

LIVERPOOL STREET

LOCALITY PLAN

NOT TO SCALE

MAP DATA @ SIXMAPS 2022

DWG NAME	DRAWING NUMBER	DRAWING TITLE	REVISION
130734-ACOR-CI-DWG-01-001	01-001	COVER SHEET AND DRAWING INDEX	I
130734-ACOR-CI-DWG-01-002	01-002	LEGENDS	G
130734-ACOR-CI-DWG-01-201	01-201	KEY PLAN	H
130734-ACOR-CI-DWG-03-101	03-101	SOIL EROSION AND SEDIMENT CONTROL PLAN - SHEET 1	G
130734-ACOR-CI-DWG-03-102	03-102	SOIL EROSION AND SEDIMENT CONTROL PLAN - SHEET 2	G
130734-ACOR-CI-DWG-03-201	03-201	SOIL EROSION AND SEDIMENT CONTROL NOTES	G
130734-ACOR-CI-DWG-03-301	03-301	SOIL EROSION AND SEDIMENT CONTROL DETAILS	G
130734-ACOR-CI-DWG-04-101	04-101	BULK EARTHWORKS PLAN - SHEET 1	H
130734-ACOR-CI-DWG-04-102	04-102	BULK EARTHWORKS PLAN - SHEET 2	H
130734-ACOR-CI-DWG-05-101	05-101	CIVIL WORKS PLAN - SHEET 1	H
130734-ACOR-CI-DWG-05-102	05-102	CIVIL WORKS PLAN - SHEET 2	G
130734-ACOR-CI-DWG-08-101	08-101	STORMWATER MANAGEMENT PLAN - SHEET 1	H
130734-ACOR-CI-DWG-08-102	08-102	STORMWATER MANAGEMENT PLAN - SHEET 2	G

AUTHORISED FOR ISSUE	DIRECTOR
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SIGN OFF DATE			
P1	21.09.22	ISSUE FOR COORDINATION	NP
P2	04.10.22	ISSUE FOR COORDINATION	CR
A	18.11.22	DRAFT SCHEMATIC DESIGN	NP
B	15.12.22	ISSUE FOR MAIN WORKS REF	NP
C	15.12.22	SCHEMATIC DESIGN	NP
D	19.12.22	SCHEMATIC DESIGN	CR
E	24.01.23	DRAFT 70% DETAILED DESIGN	CR
F	14.02.23	DRAFT 70% DETAILED DESIGN	CR
G	02.03.23	ISSUE FOR TENDER	CR
H	13.12.23	RE-ISSUE FOR REF	CR
I	19.12.23	RE-ISSUE FOR REF	CR

[illegible]

ISSUE	DATE	SUBJECT	VALIDITY
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CLIENT



PROJECT MANAGER



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T 9438 5098

LANDSCAPE ARCHITECT



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REDFERN, NSW 2016
T 8332 5600

ARCHITECT



T +612 9319 2955
ABN: 48 942 921 969
Nominated Architects:
Andrew Hipwell 6562
Daniel Beekwilder 619

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Chippendale NSW 2008
Sydney Australia
djrd.com.au

PROJECT

COWRA HOSPITAL
REDEVELOPMENT
CNR LIVERPOOL AND BRISBANE ST
COWRA NSW

ACOR JOB NO.
NA230222

PHASE
TENDER

DRAWN	SCALE	SHEET SIZE	ORIGIN DATE
JK	N/A	A1	AUG 2022

DESCRIPTION

COVER SHEET AND DRAWING INDEX

PROJECT No	DRAWING No	REVISION
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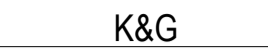

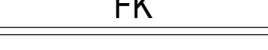
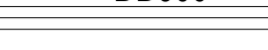




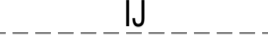
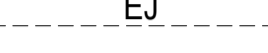
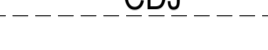
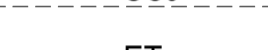



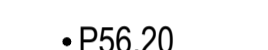
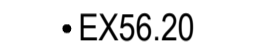
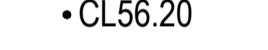
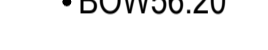



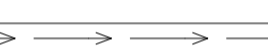





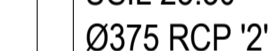
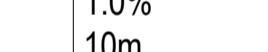



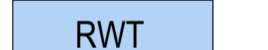
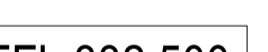







DIAL BEFORE YOU DIG








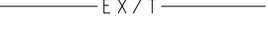











IMPORTANT: THE CONTRACTOR IS TO MAINTAIN A CURRENT SET OF "DIAL BEFORE YOU DIG" DRAWINGS ON SITE AT ALL TIMES.

THIS DRAWING IS INTENDED
TO BE PRINTED IN COLOUR








CIVIL LEGEND PROPOSED

	K&G	KERB AND GUTTER
	KO	KERB ONLY
	FK	FLUSH KERB
	DD900	DISH DRAIN WITH WIDTH
	MK	MOUNTABLE KERB
	SB	SPOON DRAIN
	SK	SLOTTED KERB
	IK	INTEGRAL KERB
	IWK	INTEGRAL WIDE KERB
	IJ	ISOLATION JOINT
	EJ	DOWELLED EXPANSION JOINT
	CDJ	CONTINUOUS POUR DOWEL JOINT
	SCJ	SAW CUT JOINT
	ET	EDGE THICKENING
		INGAL WHEEL STOP
	B1	BOLLARD AND NUMBER
	RW	RETAINING WALL TO STRUCTURAL ENGINEERS DETAIL
	• P56.20	FINISHED SURFACE LEVEL
	• EX56.20	EXISTING SURFACE LEVEL
	• CL56.20	COVER LEVEL
	• BOW56.20	BOTTOM OF WALL LEVEL
	• TOW58.40	TOP OF WALL LEVEL
	56.00	FINISHED SURFACE CONTOUR MAJOR
	56.20	FINISHED SURFACE CONTOUR MINOR
	DP	DOWNPIPE CONNECTION (Ø150 uPVC UNO)
		GRASS LINED SWALE DRAIN (GRASS TO BE LAID KIKUYU OR EQUAL)
	GD1	GRATED DRAIN AND TYPE
	SSD	SUBSOIL DRAINAGE LINE
	SSD-IR-HER	SUBSOIL HIGH END RISER AND INTERMEDIATE RISER
		STORMWATER DRAINAGE STRUCTURE
		STORMWATER DRAINAGE LINE WITH;
	USIL 25.30	INVERT LEVEL UPSTREAM
	Ø375 RCP '2'	PIPE SIZE AND MATERIAL CLASS
	1.0%	PIPE GRADE
	10m	PIPE LENGTH
	DSIL 25.10	INVERT LEVEL DOWNSTREAM
	RWO	RAINWATER OUTLET (SPS TRUFLO 150)
	BH05	BOREHOLE LOCATIONS
	RWT	RAINWATER TANK
	FFL 332.500	FINISHED FLOOR LEVEL
		ROCK RIPRAP SCOUR PROTECTION
		AREA DETAILED BY LANDSCAPE ARCHITECT




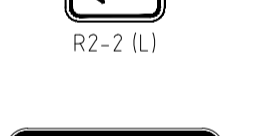




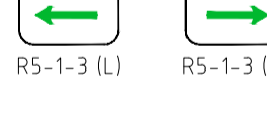

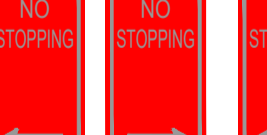

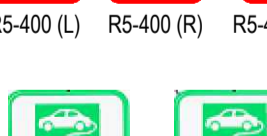
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	EX/D	EXISTING STORMWATER DRAINAGE
	EX/S	EXISTING SEWER MAIN
	EX/C	EXISTING COMMUNICATIONS MAIN
	EX/G	EXISTING GAS MAIN
	EX/W	EXISTING WATER MAIN
	EX/E	EXISTING ELECTRICITY
	EX/OF	EXISTING OPTIC FIBRE
	EX/T	EXISTING TELECOMMUNICATIONS
	EX/U	EXISTING UNKNOWN SERVICE
		EXISTING STORMWATER DRAINAGE PIT
		EXISTING FIRE HYDRANT
		EXISTING COMMUNICATIONS PIT
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		EXISTING ELECTRICAL MANHOLE
		EXISTING SEWER PIT
		EXISTING GAS VALVE
		EXISTING TREE



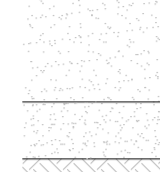

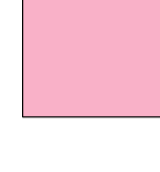
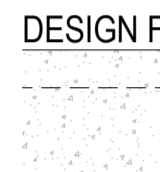
SOIL EROSION AND SEDIMENT CONTROL
LEGEND-PROPOSED WORKS

	SEDIMENT FENCE
	PIT INLET TRAP
	SAND BAG SEDIMENT TRAP
	STABILISED CONSTRUCTION EXIT
	ROCK CHECK DAM
	CATCH DRAIN
	SEDIMENT BASIN


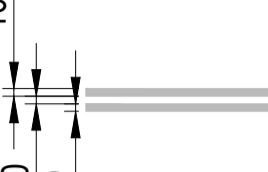
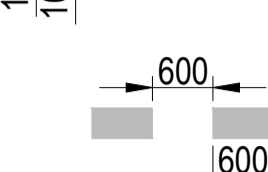
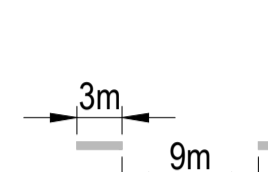





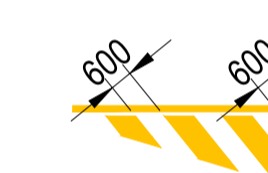

SIGNAGE LEGEND

	GIVEWAY SIGN		ONE WAY
	NO ENTRY		EMERGENCY VEHICLE EXCEPTED
	DISABILITY PARKING (LEFT & RIGHT)		AUTHORISED VEHICLES EXCEPTED
	NO STOPPING (LEFT, RIGHT, BOTH WAYS)		NO LEFT TURN, NO RIGHT TURN
	ELECTRIC VEHICLE PARKING (LEFT & RIGHT)		SPEED CONTROL
	NO PARKING (LEFT & RIGHT)		PEDESTRIAN CROSSING
	DISABILITY PARKING DROP OFF (LEFT & RIGHT)		

PAVEMENT LEGEND

	PAVEMENT TYPE 1 ASPHALT PAVEMENT (CARPARK) ESA = 1 x 10 ⁶ CBR = 6%
	PAVEMENT TYPE 2 CONCRETE PAVEMENT ESA = 5 x 10 ⁶ (ASSUMED) CBR = 6%
	PAVEMENT TYPE 3 CONCRETE FOOTPATH PAVEMENT
	PAVEMENT TYPE 4 STRUCTURAL SLAB
	PAVEMENT TYPE 5 ASPHALT MILL AND RESHEET 50mm THICKNESS MILL EXISTING ASPHALT PAVEMENT AND RESHEET WITH AC14
	PAVEMENT TYPE 6 PUBLIC DOMAIN DEEP LIFT ASPHALT PAVEMENT AC14 INSTALLED IN MAXIMUM 200mm THICK LAYERS

PAVEMENT MARKING LEGEND

	P1 PARKING BAY LINE
	BB DIVIDING BARRIER LINE - BOTH DIRECTIONS
	TB GIVEWAY LINE
	L1 LANE LINE
	THROUGH ARROW
	DIRECTIONAL ARROW
	PROPOSED DISABLED CAR PARKING SPACE AND SHARED ZONE WITH BOLLARD
	PROPOSED DISABLED CAR PARKING SPACE
	CHEVRON
	PROPOSED ELECTRIC VEHICLE PARKING SPACE
	PROPOSED TRAFFIC SIGN

NOTES

- ALL PAVEMENT MARKING AND SIGNAGE SHALL BE IN ACCORDANCE WITH AS1742, 1743, 2890 AND TNSW QA SPECIFICATIONS.

THIS DRAWING IS INTENDED
TO BE PRINTED IN COLOUR

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NOTES

AUTHORISED FOR ISSUE DIRECTOR

SIGN OFF DATE

P1	21.09.22	ISSUE FOR COORDINATION	NP
P2	04.10.22	ISSUE FOR COORDINATION	CR
A	18.11.22	DRAFT SCHEMATIC DESIGN	NP
B	15.12.22	ISSUE FOR MAIN WORKS REF	NP
C	15.12.22	SCHEMATIC DESIGN	NP
D	24.01.23	DRAFT 70% DETAILED DESIGN	CR
E	14.02.23	DRAFT 70% DETAILED DESIGN	CR
F	02.03.23	ISSUE FOR TENDER	CR
G	13.12.23	RE-ISSUE FOR REF	CR

ISSUE DATE SUBJECT VALIDN.

CLIENT

PROJECT MANAGER

PO BOX 61, OBERON, NSW 2787 T +61 438 243 068

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1/33 HERBERT ST, ST LEONARDS, NSW 2065 T 9438 5098

LANDSCAPE ARCHITECT

3 BAPTIST ST, REDFERN, NSW 2016 T 8332 5600

ARCHITECT

T +612 9319 2955 ABN: 48 942 921 969 Nominated Architects: Andrew Hipwell 6562 Daniel Beekwilder 6192

PROJECT

COWRA HOSPITAL REDEVELOPMENT

CNR LIVERPOOL AND BRISBANE ST COWRA NSW

ACOR JOB NO. NA230222

PHASE TENDER

DRAWN SCALE SHEET SIZE ORIGIN DATE

JK N/A A1 AUG 2022

DESCRIPTION

LEGENDS

PROJECT No DRAWING No REVISION

130734-ACOR-CI 01-002 G

ISSUE	DATE	SUBJECT	VALID'N.
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LANDSCAPE ARCHITECT

ARCHITECT

djrd
architects

T +612 9319 2955
ABN: 48 942 921 969
Nominated Architects:
Andrew Hipwell 6562
Daniel Beekwilder 6192

63 Myrtle Street
Chippendale NSW 2008
Sydney Australia
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PROJECT

ACOR JOB NO.

PHASE

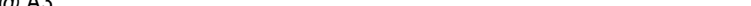
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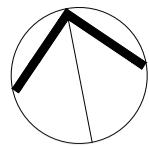
PROJECT No	DRAWING No	REVISION
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130734-ACOR-CI	01-201	H
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SHEET 2

SCALE 1:500 @ A1
SCALE 1:1000 @ A3





NOTES

AUTHORISED FOR ISSUE DIRECTOR

SIGN OFF DATE		
A	18.11.22	DRAFT SCHEMATIC DESIGN
B	15.12.22	ISSUE FOR MAIN WORKS REF
C	15.12.22	SCHEMATIC DESIGN
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G	13.12.23	RE-ISSUE FOR REF

ISSUE DATE SUBJECT VALIDN.

CLIENT



PROJECT MANAGER



STRUCTURE & CIVIL



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ST LEONARDS, NSW 2065
T 9438 5098

LANDSCAPE ARCHITECT



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PROJECT

COWRA HOSPITAL
REDEVELOPMENT
CNR LIVERPOOL AND BRISBANE ST
COWRA NSW

ACOR JOB NO.

NA230222

PHASE

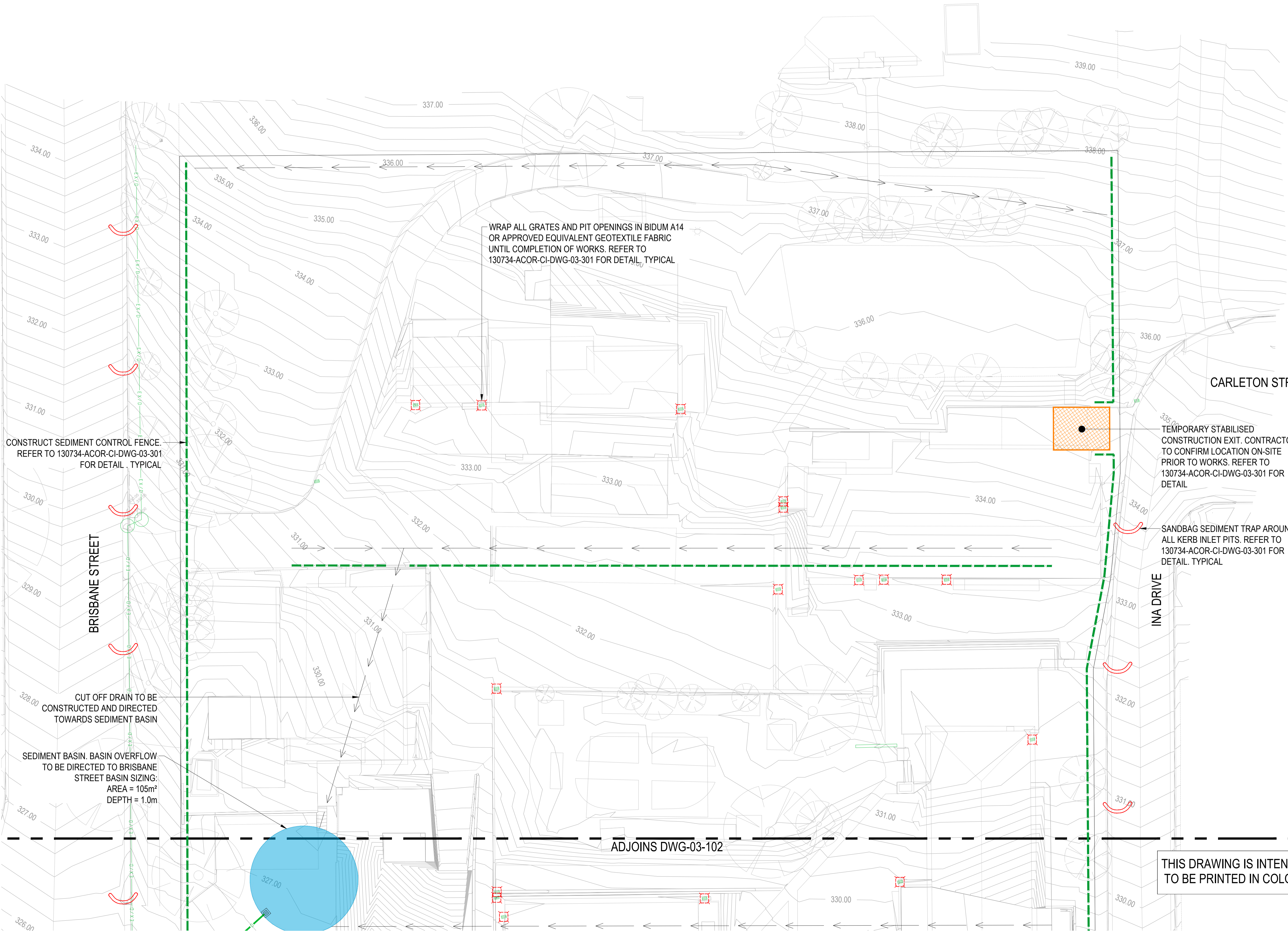
TENDER

DRAWN	SCALE	SHEET SIZE	ORIGIN DATE
JK	1:200	A1	AUG 2022

DESCRIPTION

SOIL EROSION AND SEDIMENT
CONTROL PLAN - SHEET 1

PROJECT No	DRAWING No	REVISION
130734-ACOR-CI	03-101	G



WRAP ALL GRATES AND PIT OPENINGS IN BIDUM A14
OR APPROVED EQUIVALENT GEOTEXTILE FABRIC
UNTIL COMPLETION OF WORKS. REFER TO
130734-ACOR-CI-DWG-03-301 FOR DETAIL, TYPICAL

CONSTRUCT SEDIMENT CONTROL FENCE.
REFER TO 130734-ACOR-CI-DWG-03-301
FOR DETAIL, TYPICAL

TEMPORARY STABILISED
CONSTRUCTION EXIT. CONTRACTOR
TO CONFIRM LOCATION ON-SITE
PRIOR TO WORKS. REFER TO
130734-ACOR-CI-DWG-03-301 FOR
DETAIL

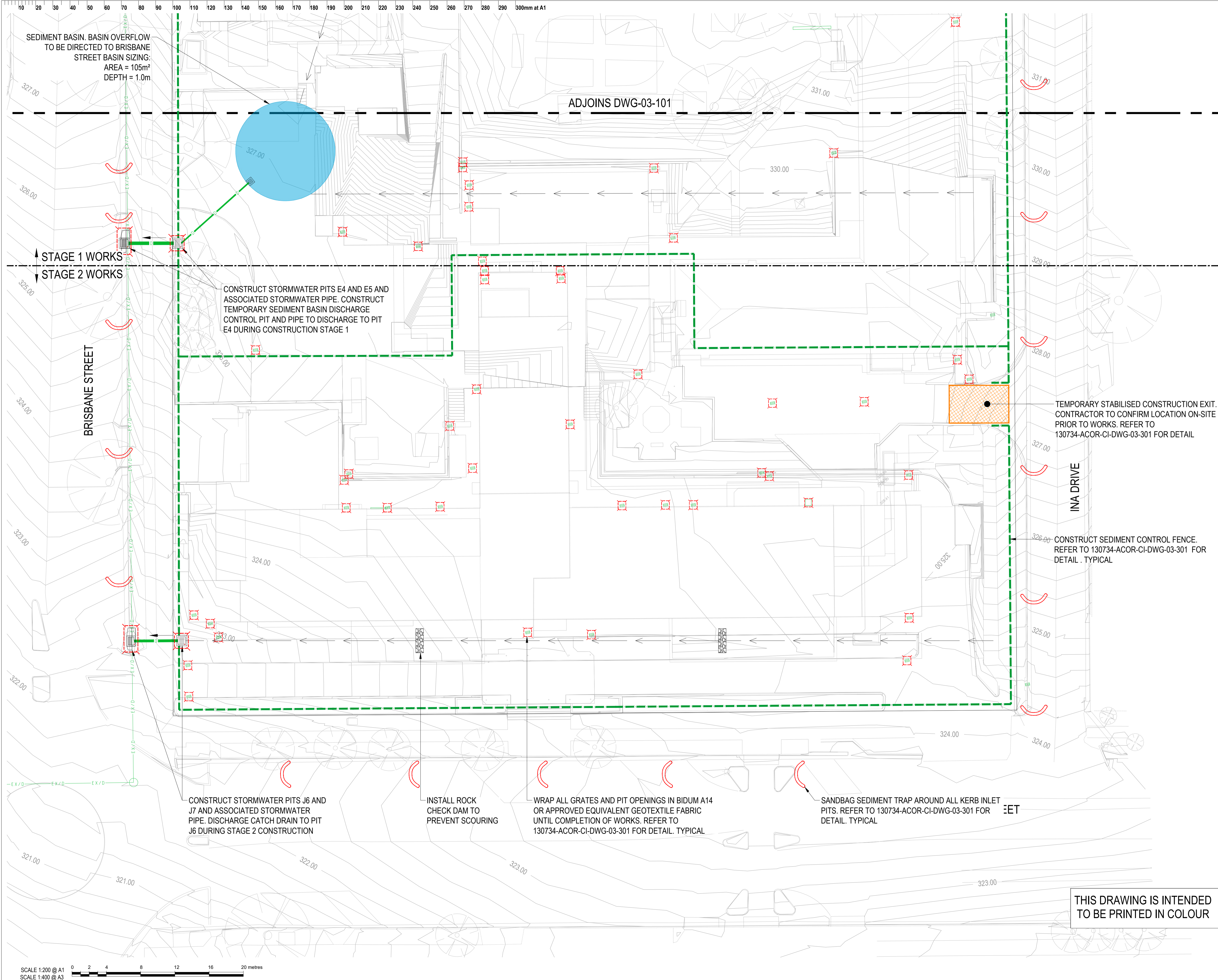
SANDBAG SEDIMENT TRAP AROUND
ALL KERB INLET PITS. REFER TO
130734-ACOR-CI-DWG-03-301 FOR
DETAIL, TYPICAL

CUT OFF DRAIN TO BE
CONSTRUCTED AND DIRECTED
TOWARDS SEDIMENT BASIN

SEDIMENT BASIN. BASIN OVERFLOW
TO BE DIRECTED TO BRISBANE
STREET BASIN SIZING:
AREA = 105m²
DEPTH = 1.0m

ADJOINS DWG-03-102

THIS DRAWING IS INTENDED
TO BE PRINTED IN COLOUR



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AUTHORISED FOR ISSUE			DIRECTOR
SIGN OFF DATE			
A	18.11.22	DRAFT SCHEMATIC DESIGN	NP
B	15.12.22	ISSUE FOR MAIN WORKS REF	NP
C	15.12.22	SCHEMATIC DESIGN	NP
D	24.01.23	DRAFT 70% DETAILED DESIGN	CR
E	14.02.23	DRAFT 70% DETAILED DESIGN	CR
F	02.03.23	ISSUE FOR TENDER	CR
G	13.12.23	RE-ISSUE FOR REF	CR

ISSUE	DATE	SUBJECT	VALIDN.
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CLIENT

 **Health Infrastructure**

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PROJECT

**COWRA HOSPITAL
REDEVELOPMENT**

CNR LIVERPOOL AND BRISBANE ST
COWRA NSW

ACOR JOB NO.
NA230222

PHASE
TENDER

DRAWN	SCALE	SHEET SIZE	ORIGIN DATE
JK	1:200	A1	AUG 2022

DESCRIPTION

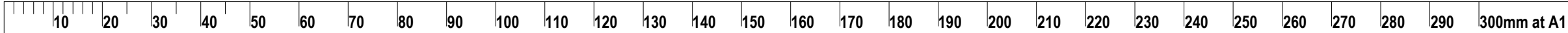
**SOIL EROSION AND SEDIMENT
CONTROL PLAN - SHEET 2**

PROJECT No	DRAWING No	REVISION
130734-ACOR-CI	03-102	G

THIS DRAWING IS INTENDED
TO BE PRINTED IN COLOUR

SCALE 1:200 @ A1
SCALE 1:400 @ A3

0 2 4 8 12 16 20 metres



EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

1. THIS SOIL AND WATER MANAGEMENT PLAN IS TO BE READ IN CONJUNCTION WITH OTHER ENGINEERING PLANS RELATING TO THIS DEVELOPMENT.
2. CONTRACTORS WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE UNDERTAKEN AS INSTRUCTED IN THIS SPECIFICATION AND CONSTRUCTED FOLLOWING THE GUIDELINES OF "MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION", DEPT OF HOUSING, 2004 (BLUE BOOK).
3. ALL SUBCONTRACTORS WILL BE INFORMED OF THEIR RESPONSIBILITIES IN REDUCING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE AREAS.

LAND DISTURBANCE INSTRUCTIONS

1. DISTURBANCE TO BE NO FURTHER THAN 5 (PREFERABLY 2) METRES FROM THE EDGE OF ANY ESSENTIAL ENGINEERING ACTIVITY AS SHOWN ON APPROVED PLANS. ALL SITE WORKERS WILL CLEARLY RECOGNISE THESE ZONES THAT, WHERE APPROPRIATE, ARE IDENTIFIED WITH BARRIER FENCING (UPSLOPE) AND SEDIMENT FENCING (DOWNSLOPE) OR SIMILAR MATERIALS.
2. ACCESS AREAS ARE TO BE LIMITED TO A MAXIMUM WIDTH OF 10 METRES THE SITE MANAGER WILL DETERMINE AND MARK THE LOCATION OF THESE ZONES ON-SITE. ALL SITE WORKERS WILL CLEARLY RECOGNISE THESE BOUNDARIES THAT, WHERE APPROPRIATE, ARE IDENTIFIED WITH BARRIER FENCING (UPSLOPE) AND SEDIMENT FENCING (DOWNSLOPE) OR SIMILAR MATERIALS.
3. ENTRY TO LANDS NOT REQUIRED FOR CONSTRUCTION OR ACCESS IS PROHIBITED EXCEPT FOR ESSENTIAL THINNING OF PLANT GROWTH.
4. WORKS ARE TO PROCEED IN THE FOLLOWING SEQUENCE:
 - a. INSTALL ALL BARRIER AND SEDIMENT FENCING WHERE SHOWN ON THE PLAN.
 - b. CONSTRUCT THE STABILISED SITE ACCESS.
 - c. CONSTRUCT DIVERSION DRAINS AS REQUIRED.
 - d. INSTALL MESH AND GRAVEL INLETS FOR ANY ADJACENT KERB INLETS.
 - e. INSTALL GEOTEXTILE INLET FILTERS AROUND ANY ON-SITE DROP INLET PITS.
 - f. CLEAR SITE AND STRIP AND STOCKPILE TOPSOIL IN LOCATIONS SHOWN ON THE PLAN.
 - g. UNDERTAKE ALL ESSENTIAL CONSTRUCTION WORKS ENSURING THAT ROOF AND/OR PAVED AREA STORMWATER SYSTEMS ARE CONNECTED TO PERMANENT DRAINAGE AS SOON AS PRACTICABLE.
 - h. GRADE LOT AREAS TO FINAL GRADES AND APPLY PERMANENT STABILISATION (LANDSCAPING) WITHIN 20 DAYS OF COMPLETION OF CONSTRUCTION WORKS.
 - i. REMOVE TEMPORARY EROSION CONTROL MEASURES AFTER THE PERMANENT LANDSCAPING HAS BEEN COMPLETED.
5. ENSURE THAT SLOPE LENGTHS DO NOT EXCEED 80 METRES WHERE PRACTICABLE. SLOPE LENGTHS ARE DETERMINED BY SILTATION FENCING AND CATCH DRAIN SPACING. 6. ON COMPLETION OF MAJOR WORKS LEAVE DISTURBED LANDS WITH A SCARIFIED SURFACE TO ENCOURAGE WATER INFILTRATION AND ASSIST WITH KEYING TOPSOIL LATER.

EROSION AND SEDIMENT CONTROL NOTES

SITE INSPECTION AND MAINTENANCE INSTRUCTIONS

- THE SITE PRINCIPAL'S REPRESENTATIVE WILL INSPECT THE SITE AT LEAST WEEKLY AND AT THE CONCLUSION OF EVERY STORM EVENT TO:
- a. ENSURE THAT DRAINS OPERATE PROPERLY AND TO EFFECT ANY NECESSARY REPAIRS.
 - b. REMOVE SPILLED SAND OR OTHER MATERIALS FROM HAZARD AREAS, INCLUDING LANDS CLOSER THAN 5 METRES FROM AREAS OF LIKELY CONCENTRATED OR HIGH VELOCITY FLOWS ESPECIALLY WATERWAYS AND PAVED AREAS.
 - c. REMOVE TRAPPED SEDIMENT WHENEVER THE DESIGN CAPACITY OF THAT STRUCTURE HAS BEEN EXCEEDED.
 - d. ENSURE REHABILITATED LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD AND TO INITIATE UPGRADING OR REPAIR AS NECESSARY.
 - e. CONSTRUCT ADDITIONAL EROSION AND/OR SEDIMENT CONTROL WORKS AS MIGHT BECOME NECESSARY TO ENSURE THE DESIRED PROTECTION IS GIVEN TO DOWNSLOPE LANDS AND WATERWAYS. MAKE ONGOING CHANGES TO THE PLAN WHERE IT PROVES INADEQUATE IN PRACTICE OR IS SUBJECTED TO CHANGES IN CONDITIONS ON THE WORK-SITE OR ELSEWHERE IN THE CATCHMENT.
 - f. MAINTAIN EROSION AND SEDIMENT CONTROL STRUCTURES IN A FULLY FUNCTIONING CONDITION UNTIL ALL EARTHWORK ACTIVITIES ARE COMPLETED AND THE SITE IS REHABILITATED.
2. THE PRINCIPAL'S REPRESENTATIVE WILL KEEP A LOGBOOK MAKING ENTRIES AT LEAST WEEKLY, IMMEDIATELY BEFORE FORECAST RAIN AND AFTER RAINFALL. ENTRIES WILL INCLUDE:
- a. THE VOLUME AND INTENSITY OF ANY RAINFALL EVENTS.
 - b. THE CONDITION OF ANY SOIL AND WATER MANAGEMENT WORKS.
 - c. THE CONDITION OF VEGETATION AND ANY NEED TO IRRIGATE.
 - d. THE NEED FOR DUST PREVENTION STRATEGIES.
 - e. ANY REMEDIAL WORKS TO BE UNDERTAKEN. THE LOGBOOK WILL BE KEPT ON-SITE AND MADE AVAILABLE TO ANY AUTHORISED PERSON UPON REQUEST. IT WILL BE GIVEN TO THE PROJECT MANAGER AT THE CONCLUSION OF THE WORKS.

SEDIMENT CONTROL INSTRUCTIONS

1. SEDIMENT FENCES WILL BE INSTALLED AS SHOWN ON THE PLAN AND ELSEWHERE AT THE DISCRETION OF THE PRINCIPAL'S REPRESENTATIVE TO CONTAIN SOIL AS NEAR AS POSSIBLE TO THEIR SOURCE.
2. SEDIMENT FENCES WILL NOT HAVE CATCHMENT AREAS EXCEEDING 900 SQUARE METRES AND HAVE A STORAGE DEPTH OF AT LEAST 0.6 METRES.
3. SEDIMENT REMOVED FROM ANY TRAPPING DEVICES WILL BE RELOCATED WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS CANNOT OCCUR.
4. STOCKPILES ARE NOT TO BE LOCATED WITHIN 5 METRES OF HAZARD AREAS INCLUDING AREAS OF HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS AND DRIVEWAYS.
5. WATER WILL BE PREVENTED FROM DIRECTLY ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR WATER HAS BEEN TREATED BY AN APPROVED DEVICE. 6. TEMPORARY SEDIMENT TRAPS WILL REMAIN IN PLACE UNTIL AFTER THE LANDS THEY ARE PROTECTING ARE COMPLETELY REHABILITATED.
6. ACCESS TO SITES SHOULD BE STABILISED TO REDUCE THE LIKELIHOOD OF VEHICLES TRACKING SOIL MATERIALS ONTO PUBLIC ROADS AND ENSURE ALL-WEATHER ENTRY/EXIT.

EROSION AND SEDIMENT CONTROL NOTES

SOIL EROSION CONTROL INSTRUCTIONS

- a. 2(H):1(V) WHERE SLOPE LENGTH LESS THAN 12 METRES
 - b. 2.5(H):1(V) WHERE SLOPE LENGTH BETWEEN 12 AND 16 METRES.
 - c. 3(H):1(V) WHERE SLOPE LENGTH BETWEEN 16 AND 20 METRES.
 - d. 4(H):1(V) WHERE SLOPE LENGTH GREATER THAN 20 METRES.
2. ALL WATERWAYS, DRAINS, SPILLWAYS AND THEIR OUTLETS WILL BE CONSTRUCTED TO BE STABLE IN AT LEAST THE 1:20 YEAR ARI, TIME OF CONCENTRATION STORM EVENT.
 3. WATERWAYS AND OTHER AREAS SUBJECT TO CONCENTRATED FLOWS AFTER CONSTRUCTION ARE TO HAVE A MAXIMUM GROUND COVER C-FACTOR OF 0.05 (70% GROUND COVER) WITHIN 10 WORKING DAYS FROM COMPLETION OF FORMATION. FLOW VELOCITIES ARE TO BE LIMITED TO THOSE SHOWN IN TABLE 5-1 OF "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION", DEPT OF HOUSING 2004 (BLUE BOOK). FOOT AND VEHICULAR TRAFFIC WILL BE PROHIBITED IN THESE AREAS.
 4. STOCKPILES AFTER CONSTRUCTION ARE TO HAVE A MAXIMUM GROUND COVER C-FACTOR OF 0.1 (60% GROUND COVER) WITHIN 10 WORKING DAYS FROM COMPLETION OF FORMATION.
 5. ALL LANDS, INCLUDING WATERWAYS AND STOCKPILES, DURING CONSTRUCTION ARE TO HAVE A MAXIMUM GROUND COVER C-FACTOR OF 0.15 (50% GROUND COVER) WITHIN 20 WORKING DAYS FROM INACTIVITY EVEN THOUGH WORKS MAY CONTINUE LATER.
 6. FOR AREAS OF SHEET FLOW USE THE FOLLOWING GROUND COVER PLANT SPECIES FOR TEMPORARY COVER: JAPANESE MILLET 20 KG/HA AND OATS 20 KG/HA.
 7. PERMANENT REHABILITATION OF LANDS AFTER CONSTRUCTION WILL ACHIEVE A GROUND COVER C-FACTOR OF LESS THAN 0.1 AND LESS THAN 0.05 WITHIN 60 DAYS. NEWLY PLANTED LANDS WILL BE WATERED REGULARLY UNTIL AN EFFECTIVE COVER IS ESTABLISHED AND PLANTS ARE GROWING VIGOROUSLY. FOLLOW-UP SEED AND FERTILISER WILL BE APPLIED AS NECESSARY.
 8. RE-VEGETATION SHOULD BE AIMED AT RE-ESTABLISHING NATURAL SPECIES. NATURAL SURFACE SOILS SHOULD BE REPLACED AND NON-PERSISTANT ANNUAL COVER CROPS SHOULD BE USED.

WASTE CONTROL INSTRUCTIONS

1. ACCEPTABLE BINS WILL BE PROVIDED FOR ANY CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHING, LIGHTWEIGHT WASTE MATERIALS AND LITTER. CLEARANCE SERVICES WILL BE PROVIDED AT LEAST WEEKLY. DISPOSAL OF WASTE WILL BE IN A MANNER APPROVED BY THE PRINCIPAL'S REPRESENTATIVE.
2. ALL POSSIBLE POLLUTANT MATERIALS ARE TO BE STORED WELL CLEAR OF ANY POORLY DRAINED AREAS, FLOOD PRONE AREAS, STREAMBANKS, CHANNELS AND STORMWATER DRAINAGE AREAS. STORE SUCH MATERIALS IN A DESIGNATED AREA UNDER COVER WHERE POSSIBLE AND WITHIN CONTAINMENT BUNDS.
3. ALL SITE STAFF AND SUB-CONTRACTORS ARE TO BE INFORMED OF THEIR OBLIGATION TO USE WASTE CONTROL FACILITIES PROVIDED.
4. 4. ANY DE-WATERING ACTIVITIES ARE TO BE CLOSELY MONITORED TO ENSURE THAT WATER IS NOT POLLUTED BY SEDIMENT, TOXIC MATERIALS OR PETROLEUM PRODUCTS.
5. PROVIDE DESIGNATED VEHICULAR WASHDOWN AND MAINTENANCE AREAS WHICH ARE TO HAVE CONTAINMENT BUNDS.

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[illegible]

ISSUE	DATE	SUBJECT	VALIDITY
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CLIENT



PROJECT MANAGER



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PROJECT

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ACOR JOB NO.
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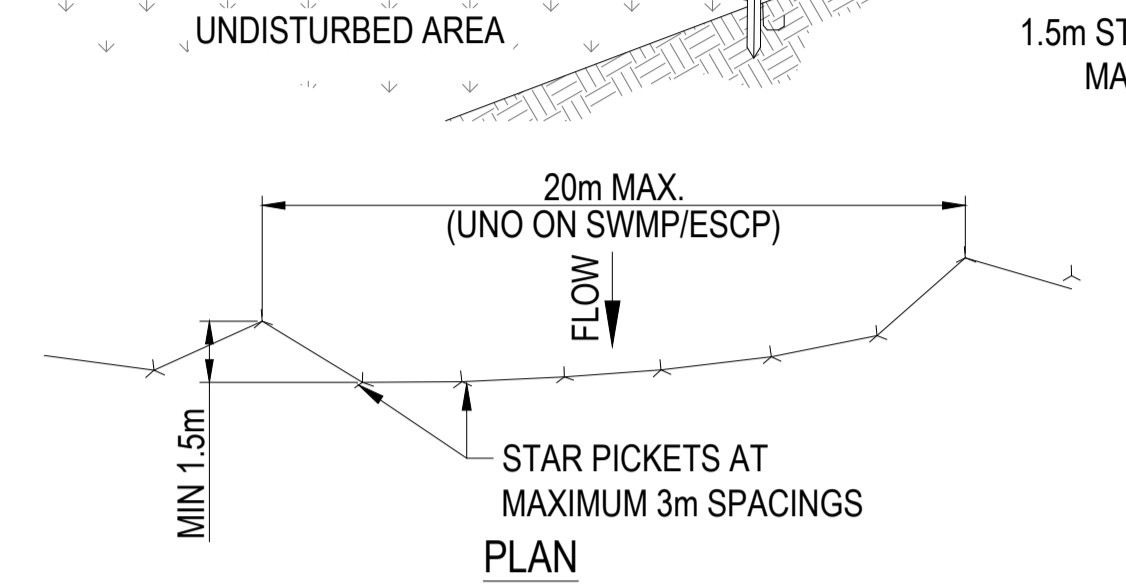
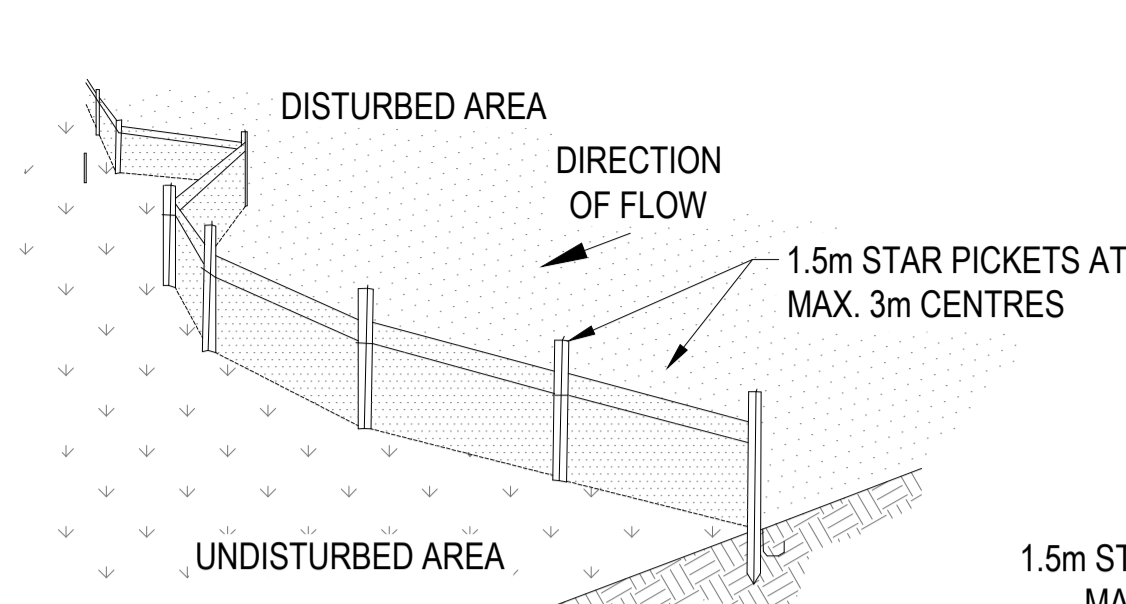
PHASE
TENDER

DRAWN	SCALE	SHEET SIZE	ORIGIN DATE
JK	N/A	A1	AUG 2022

DESCRIPTION

SOIL EROSION AND SEDIMENT CONTROL NOTES

PROJECT No	DRAWING No	REVISION
130734-ACOR-CI	03-201	G

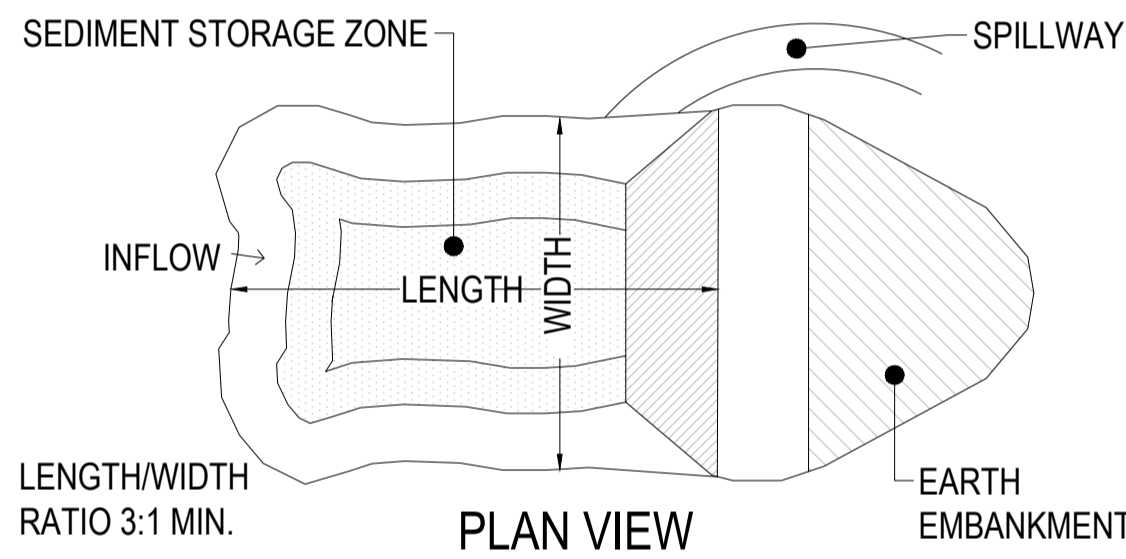


CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
2. DRIVE 1.5m LONG STAR PICKETS INTO GROUND, 3 METRES APART.
3. DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACKFILL TRENCH OVER BASE OF FABRIC.
5. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.
6. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.

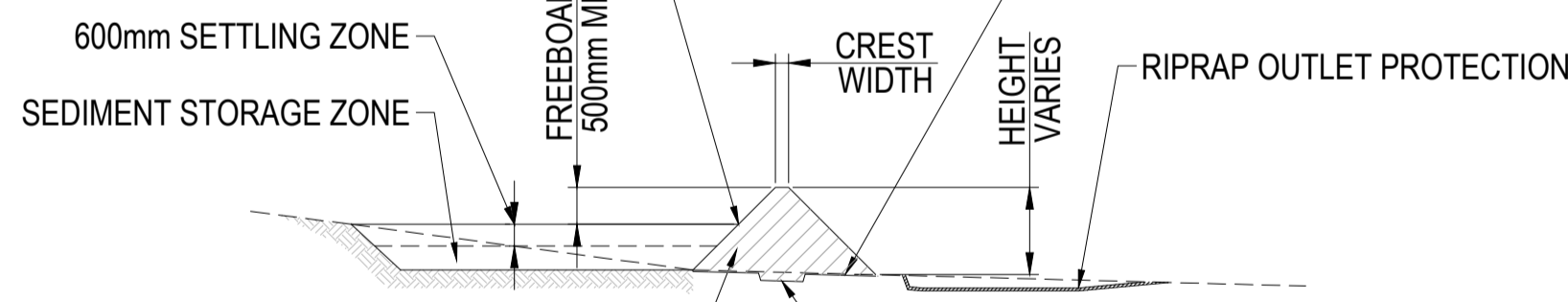
SEDIMENT CONTROL FENCE

N.T.S.



PREVIOUSLY STRIPPED TOPSOIL SHOULD BE RETURNED TO SURFACES OF THE BANK TO PROVIDE A MINIMUM OF 40mm AND A MAXIMUM OF 60mm DEPTH TOPSOIL

BEFORE CONSTRUCTION OF BANK, STRIP 100mm DEPTH OF TOPSOIL UNDER AREA OF BANK AND ALL TOPSOIL FROM AREA OF EXCAVATION

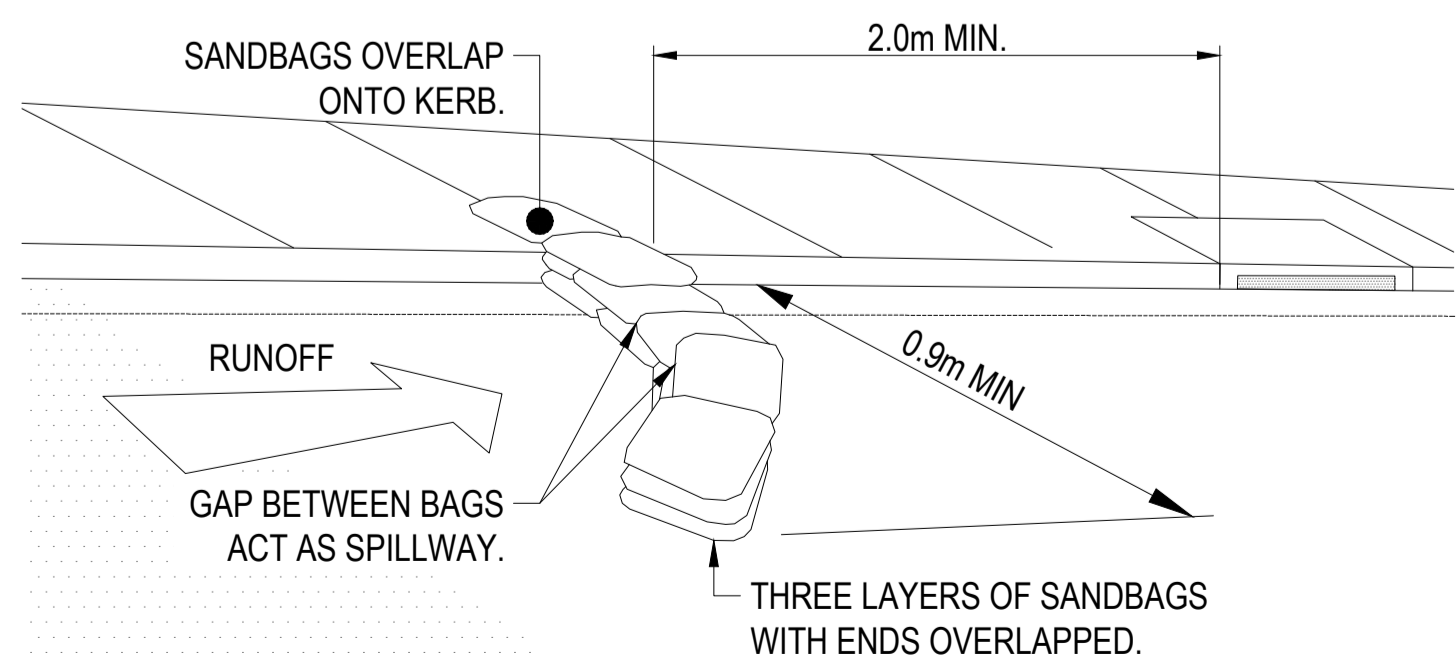


THE MATERIAL FORMING THE EMBANKMENT SHOULD BE SPREAD IN LAYERS NOT EXCEEDING 100mm LOOSE THICKNESS AND EACH LAYER THOROUGHLY COMPACTED BEFORE THE NEXT LAYER IS ADDED

SECTION

SEDIMENT BASIN (TYPICAL) CROSS SECTION

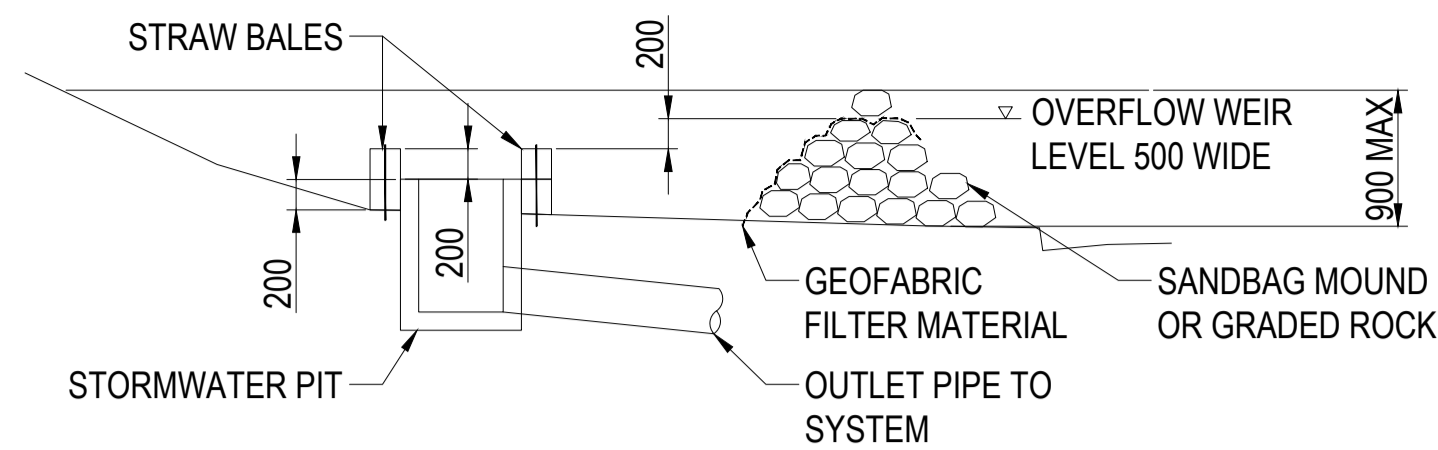
N.T.S.



SANDBAG SEDIMENT TRAP - AT ON GRADE PIT

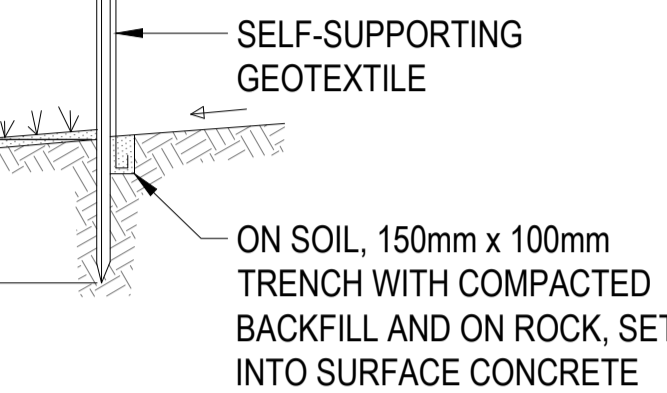
SANDBAG SEDIMENT TRAP

N.T.S.



SEDIMENT BASIN DISCHARGE CONTROL PIT

N.T.S.



SECTION DETAIL

SEDIMENT BASIN VOLUME

SOIL TYPE: F
BASIN VOLUME = SETTLING ZONE VOLUME + SEDIMENT STORAGE ZONE VOLUME

THE SETTLING ZONE VOLUME FOR TYPE D SOILS IS CALCULATED TO PROVIDE CAPACITY TO CONTAIN ALL RUNOFF EXPECTED FROM UP TO THE 80th PERCENTILE RAINFALL EVENT. THE SETTLING ZONE VOLUME (V) CAN BE DETERMINED BY THE FOLLOWING EQUATION:

$$V = 10 \times C_v \times A \times R \text{ 80th ile, 5 day (m}^3\text{)}$$

WHERE:

	DESCRIPTION	VALUE:
10	= A UNIT CONVERSION FACTOR	
C_v	= THE VOLUMETRIC RUNOFF COEFFICIENT, DEFINED AS THAT PORTION OF RAINFALL THAT RUNS OF AS STORMWATER OVER THE 5-DAY PERIOD	10 0.35
R	= IS THE 5-DAY TOTAL RAINFALL DEPTH (mm) WHICH IS NOT EXCEEDED IN 80% OF THE RAINFALL EVENTS	21.6 (ADOPT FIGURE)
A	= AREA OF CATCHMENT IN HECTARES (ha)	0.92

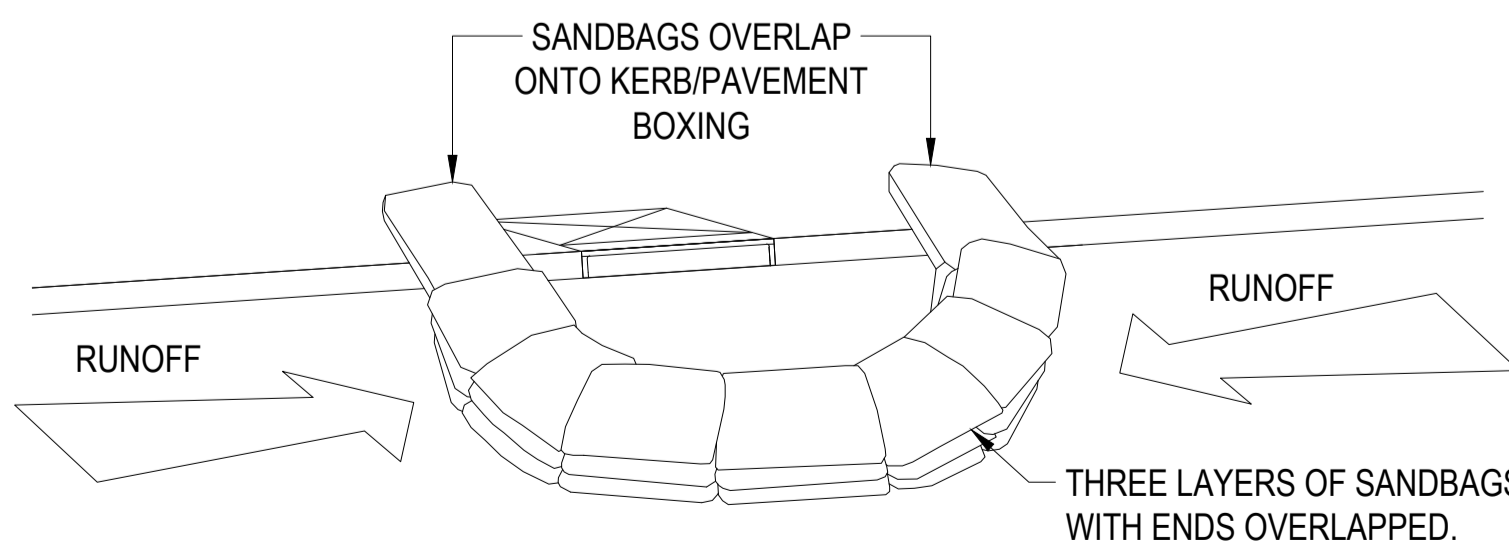
$$V = 10 \times C_v \times A \times R \text{ 80th ile, 5 day}$$
$$V = 10 \times 0.35 \times 0.92 \times 21.6$$
$$V = 70\text{m}^3$$

TOTAL BASIN VOLUME = SETTLING ZONE VOL. + SEDIMENT STORAGE ZONE VOL.

THE SEDIMENT STORAGE ZONE VOLUME SHALL BE CALCULATED AS 50% OF STORAGE VOLUME

$$\text{TOTAL BASIN VOLUME} = 70\text{m}^3 + 35\text{m}^3$$
$$\text{TOTAL BASIN VOLUME} = 105\text{m}^3$$

- FLOCCULATION SHOULD BE RPOVIDED TO BLUE BOOK (LANDCOM 2004)
- PUMP OUT SEDIMENT IN LINE WITH RECOMMENDATIONS OF BLUE BOOK (LANDCOM 2004)



SANDBAG SEDIMENT TRAP - AT KERB SAG PIT

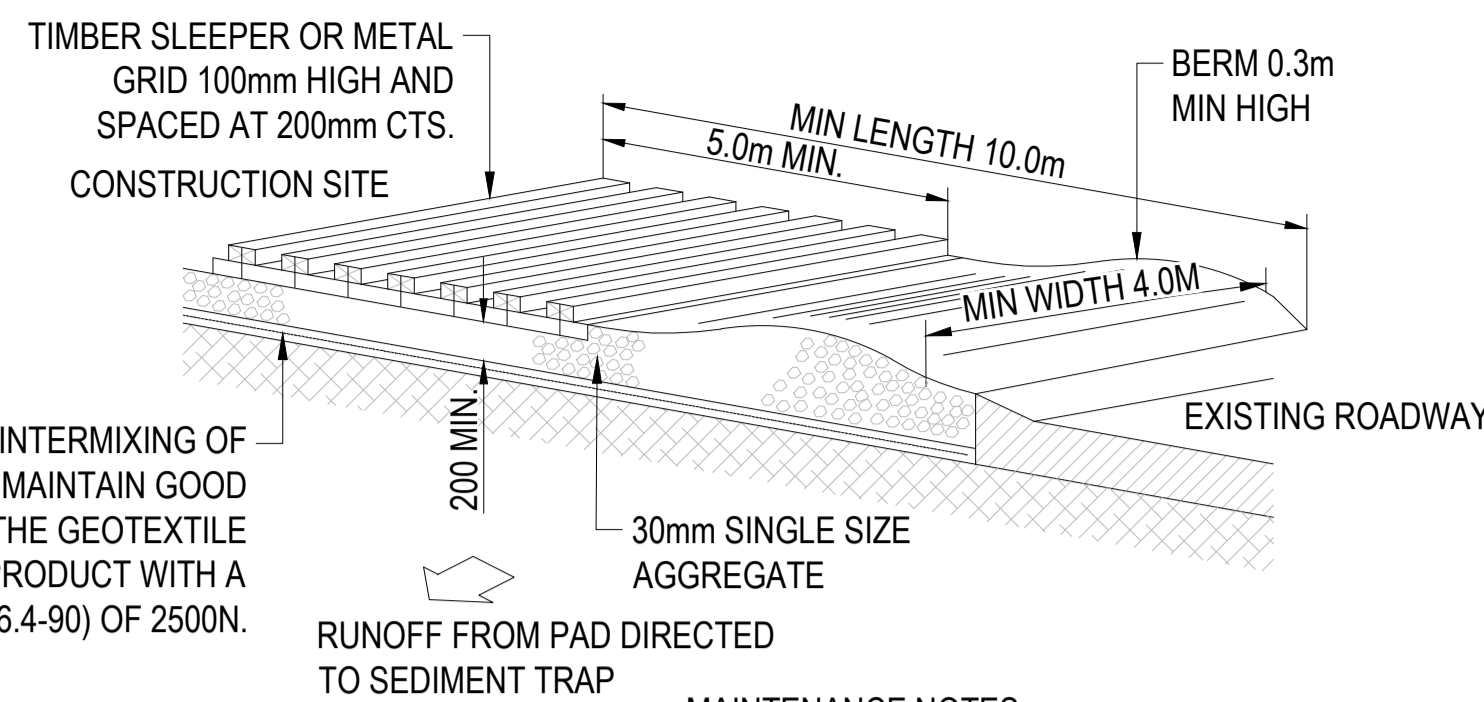
NOTE

ENSURE THAT ALL UTILITY ASSETS ARE MAINTAINED AND PROTECTED AT ALL TIMES IN THE VICINITY OF THE TEMPORARY CONSTRUCTION EXIT

GEOTEXTILE FABRIC DESIGNED TO PREVENT INTERMIXING OF SUBGRADE AND BASE MATERIALS AND TO MAINTAIN GOOD PROPERTIES OF THE SUB-BASE LAYERS. THE GEOTEXTILE MAY BE WOVEN OR NEEDLE PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500N.

CONSTRUCTION NOTES

1. STRIP TOPSOIL AND LEVEL SITE.
2. COMPACT SUBGRADE.
3. COVER AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
4. CONSTRUCT 200mm THICK PAD OVER GEOTEXTILE USING 30mm SINGLE SIZE AGGREGATE.
5. CONSTRUCT HUMPS IMMEDIATELY WITHIN BOUNDARY TO DIVERT WATER TO A SEDIMENT FENCE OR OTHER SEDIMENT TRAP WHERE THE SEDIMENT IS COLLECTED AND REMOVED.

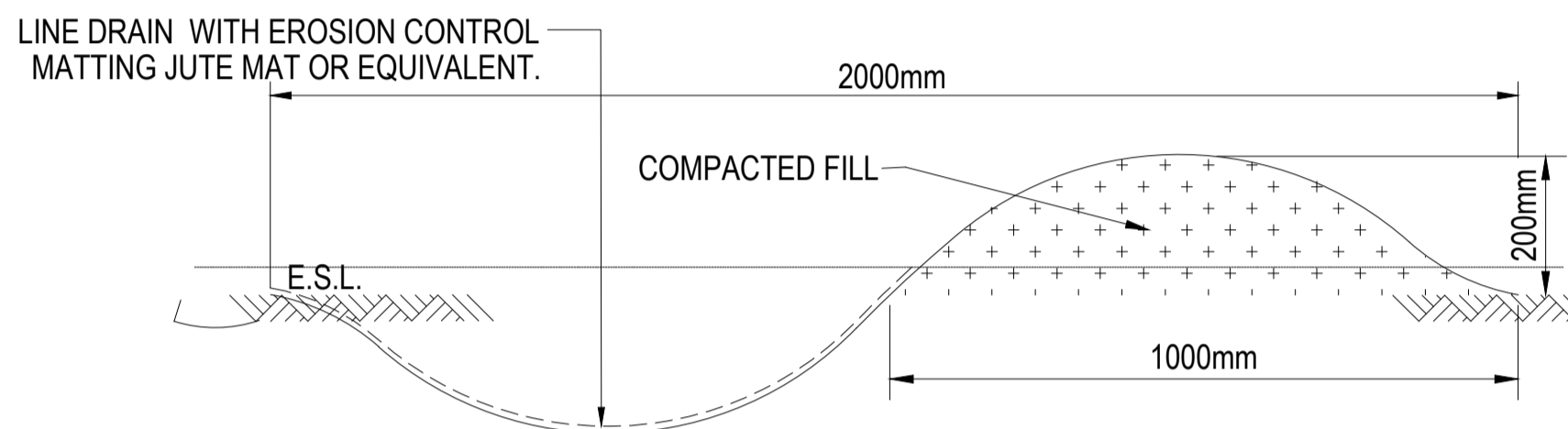


MAINTENANCE NOTES

THE EXIT SHALL BE MAINTAINED IN A CONDITION WHICH PREVENTS TRACKING OR FLOWING OF SEDIMENT OFF THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL GRAVEL AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED OFF THE CONSTRUCTION SITE MUST BE REMOVED IMMEDIATELY.

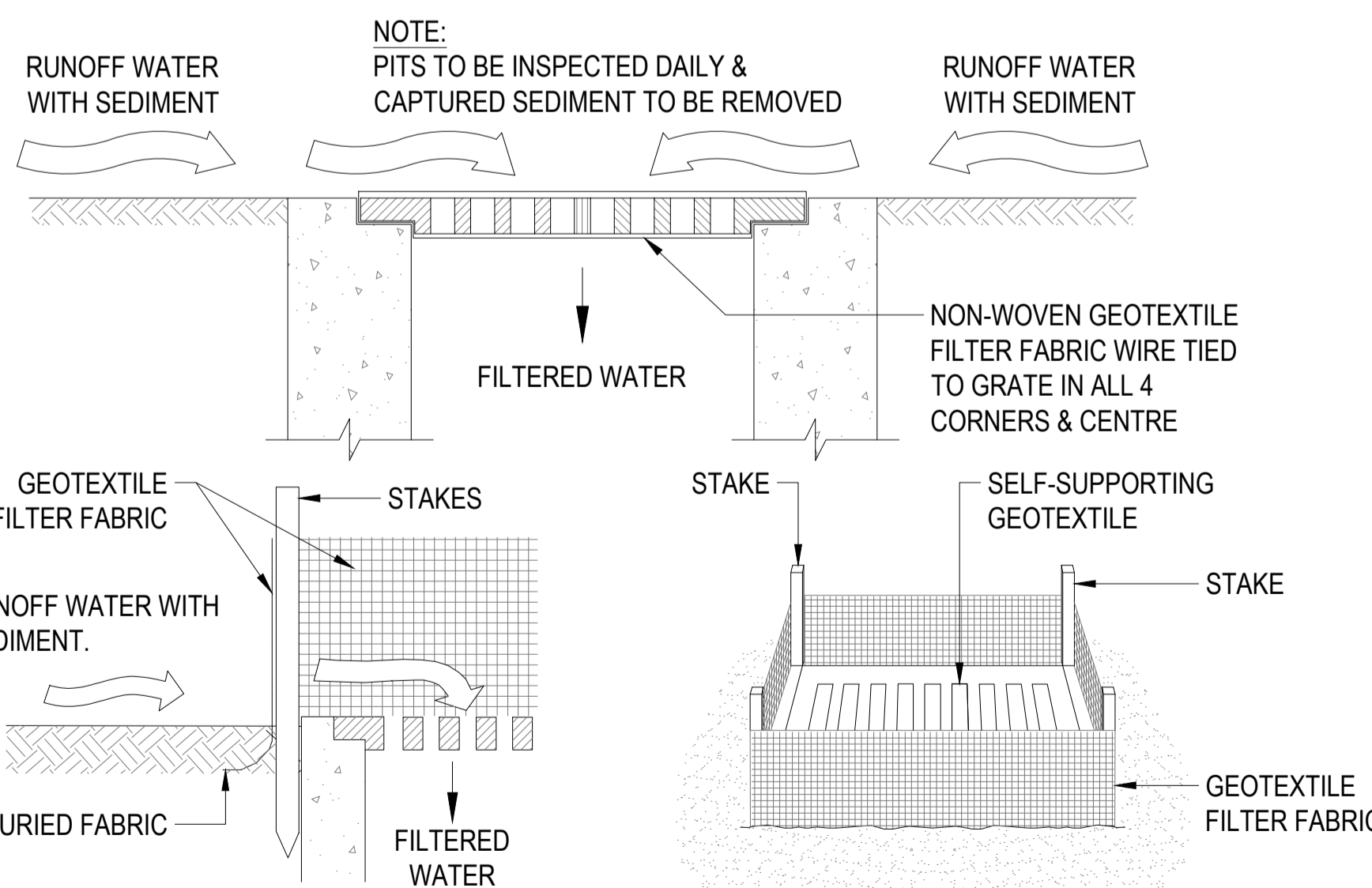
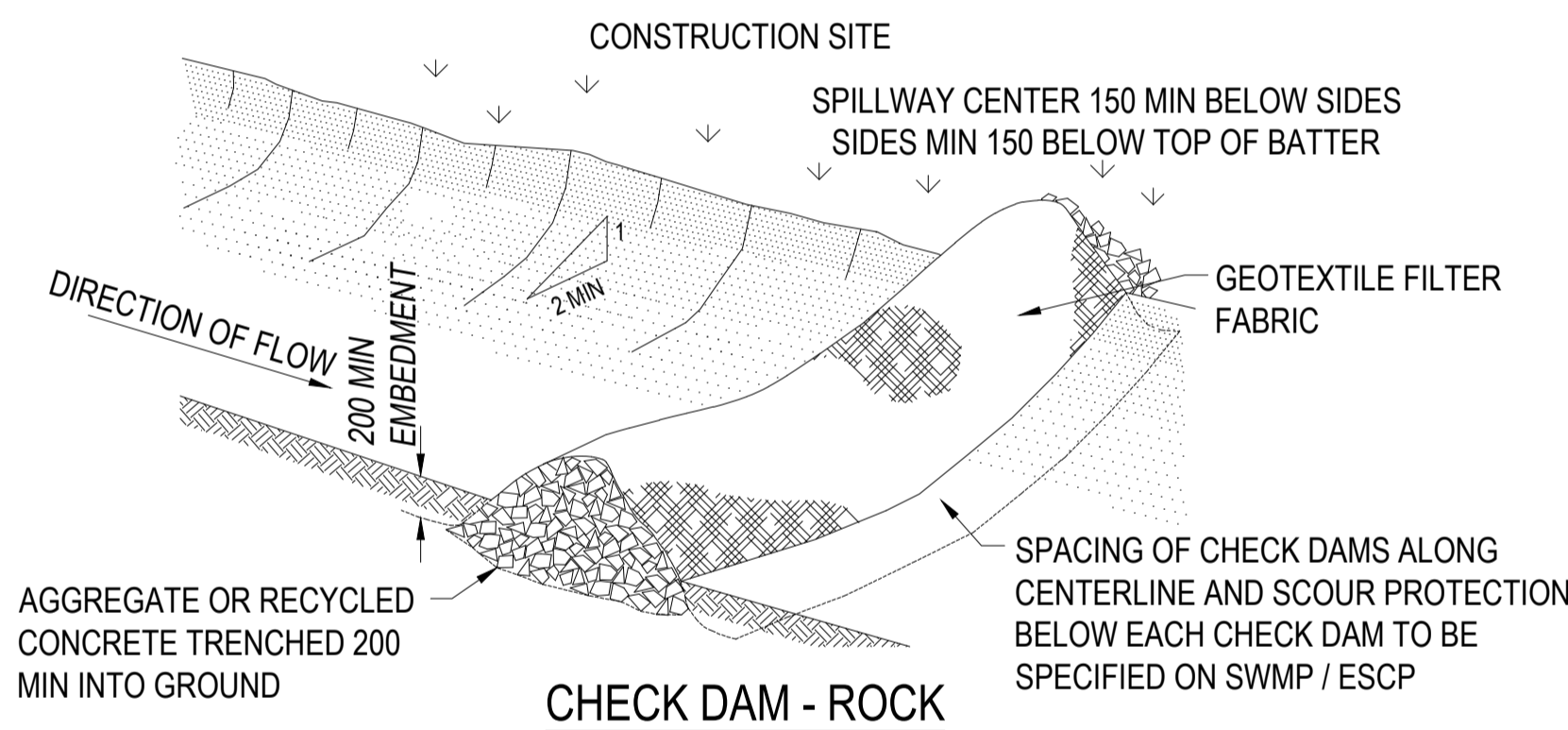
TEMPORARY STABILISED CONSTRUCTION EXIT

N.T.S.



CUT-OFF DRAIN - 2.0m WIDE

N.T.S.



GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP

N.T.S.

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ISSUE DATE SUBJECT VALIDN.

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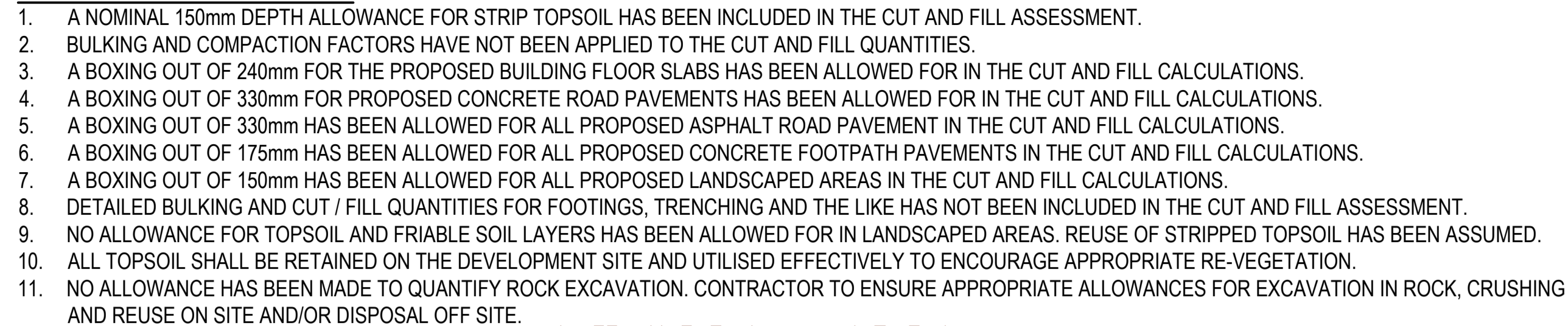
PHASE
TENDER

DRAWN	SCALE	SHEET SIZE	ORIGIN DATE
JK	AS SHOWN	A1	AUG 2022

DESCRIPTION

SOIL EROSION AND SEDIMENT CONTROL DETAILS

PROJECT No	DRAWING No	REVISION
130734-ACOR-CI	03-301	G



CUT / FILL QUANTITIES - OVERALL	
TOTAL CUT	-17555m³
TOTAL FILL	2765m³
TOTAL BALANCE (EXCLUDING STRIPPED SURFACE)	-14790m³ (CUT)
CUT / FILL QUANTITIES - STAGE 1	
TOTAL CUT	-15195m³
TOTAL FILL	1255m³
TOTAL BALANCE	-13940m³ (CUT)
CUT / FILL QUANTITIES - STAGE 2	
TOTAL CUT	-2360m³
TOTAL FILL	1510m³
TOTAL BALANCE	-850m³ (CUT)
CUT QUANTITIES - 150mm STRIPPED SURFACE	
TOTAL CUT	-2100m³

CUT				FILL			
-8	to	-6.5	m	0.00	to	0.25	m
-6.5	to	-5	m	0.25	to	0.5	m
-5.00	to	-4.00	m	0.50	to	0.75	m
-4.00	to	-3.00	m	0.75	to	1.00	m
-3.00	to	-2.50	m	1.00	to	1.50	m
-2.50	to	-2.00	m	1.50	to	2.00	m
-2.00	to	-1.50	m	2.00	to	2.50	m
-1.50	to	-1.00	m	2.50	to	3.00	m
-1.00	to	-0.75	m	3.00	to	4.00	m
-0.75	to	-0.50	m	4.00	to	5.00	m
-0.50	to	-0.25	m	5.00	to	6.5	m
-0.25	to	0.00	m	6.5	to	8	m

AUTHORISED FOR ISSUE	DIRECTOR
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PROJECT MANAGER



STRUCTURE & CIVIL



1/33 HERBERT ST,
ST LEONARDS, NSW 2065
T 9438 5098

LANDSCAPE ARCHITECT



3 BAPTIST ST,
REDFERN, NSW 2016
T 8332 5600

ARCHITECT



T +612 9319 2955
ABN: 48 942 921 969
Nominated Architects:
Andrew Hipwell 6562
Daniel Beekwilder 6192

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PROJECT

COWRA HOSPITAL
REDEVELOPMENT
CNR LIVERPOOL AND BRISBANE ST
COWRA NSW

ACOR JOB NO.

NA230222

PHASE

TENDER

DRAWN	SCALE	SHEET SIZE	ORIGIN DATE
JK	1:200	A1	AUG 2022

DESCRIPTION

BULK EARTHWORKS PLAN SHEET 1

PROJECT No	DRAWING No	REVISION
130734-ACOR-C	04-101	H



2

31

STAG

4

5

6

7

SCALE 1:200 @ A1
SCALE 1:400 @ A3



FIRST FLOOR
BEL 332.260

A diagram illustrating the relationship between 'FIRST FLOOR' and 'GROUND FLOOR' levels. A vertical line with an upward-pointing arrow is labeled 'FIRST FLOOR'. A horizontal line intersects this vertical line, and below it, another horizontal line is labeled 'GROUND FLOOR'. The area between the two horizontal lines is shaded pink.

GROUND FLOOR
BEL 327.360

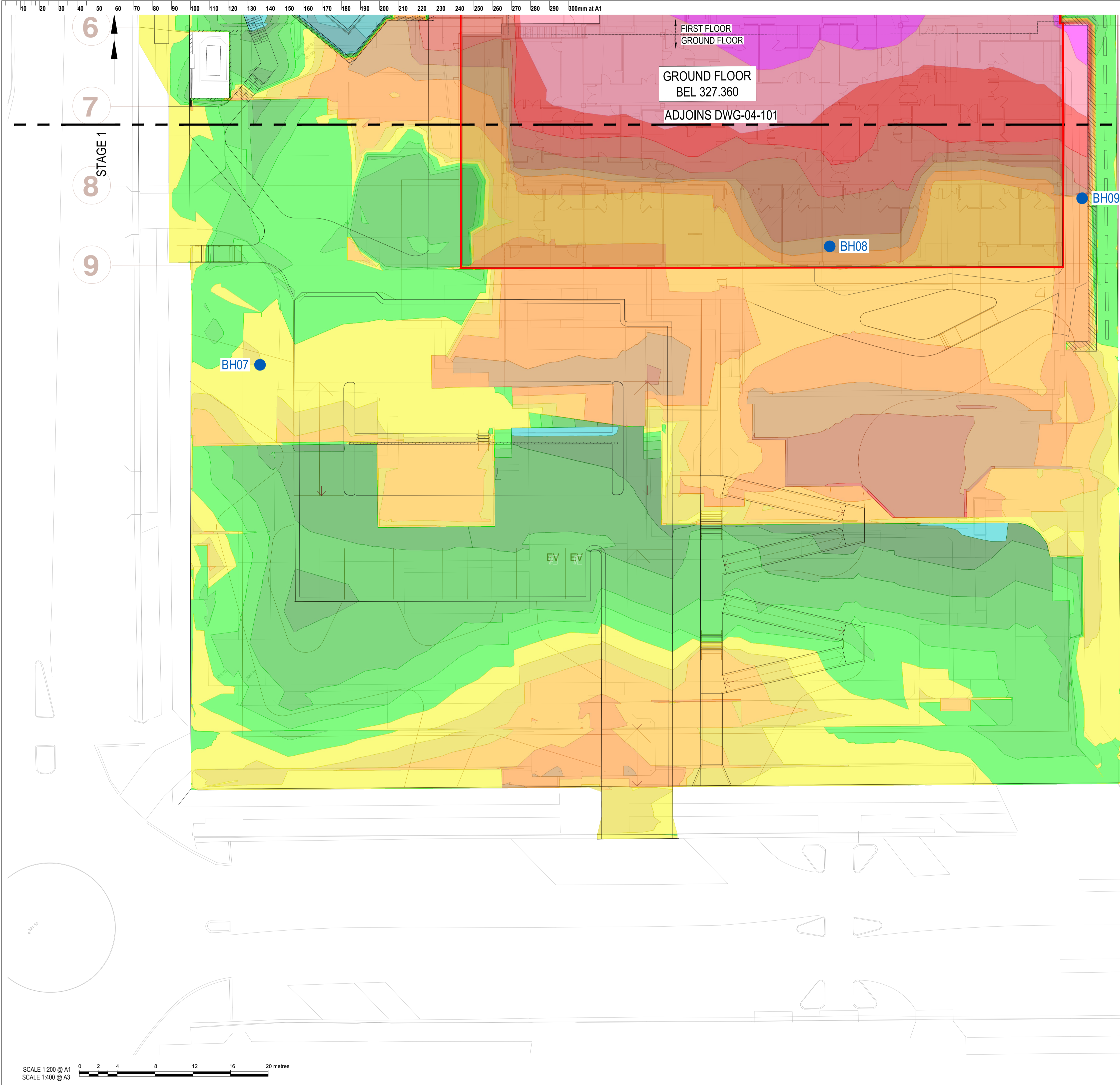
ADJOINS DWG-04-102

CARLETON STREET

NA DRIVE

THIS DRAWING IS INTENDED
TO BE PRINTED IN COLOUR

BH09



This drawing should be read in conjunction with all relevant contracts, specifications and drawings. Dimensions are in millimetres. Levels are metres. Do not scale off drawings. Use figured dimensions only. Check dimensions on Site. Report discrepancies immediately.

NOTES

AUTHORISED FOR ISSUE DIRECTOR

SIGN OFF DATE		
P1	21.09.22	ISSUE FOR COORDINATION
P2	04.10.22	ISSUE FOR COORDINATION
A	18.11.22	DRAFT SCHEMATIC DESIGN
B	15.12.22	ISSUE FOR MAIN WORKS REF
C	15.12.22	SCHEMATIC DESIGN
D	19.12.22	SCHEMATIC DESIGN
E	24.01.23	DRAFT 70% DETAILED DESIGN
F	14.02.23	DRAFT 70% DETAILED DESIGN
G	02.03.23	ISSUE FOR TENDER
H	13.12.23	RE-ISSUE FOR REF

ISSUE DATE SUBJECT VALIDN

CLIENT



PROJECT MANAGER



STRUCTURE & CIVIL



LANDSCAPE ARCHITECT



ARCHITECT



PROJECT
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REDEVELOPMENT
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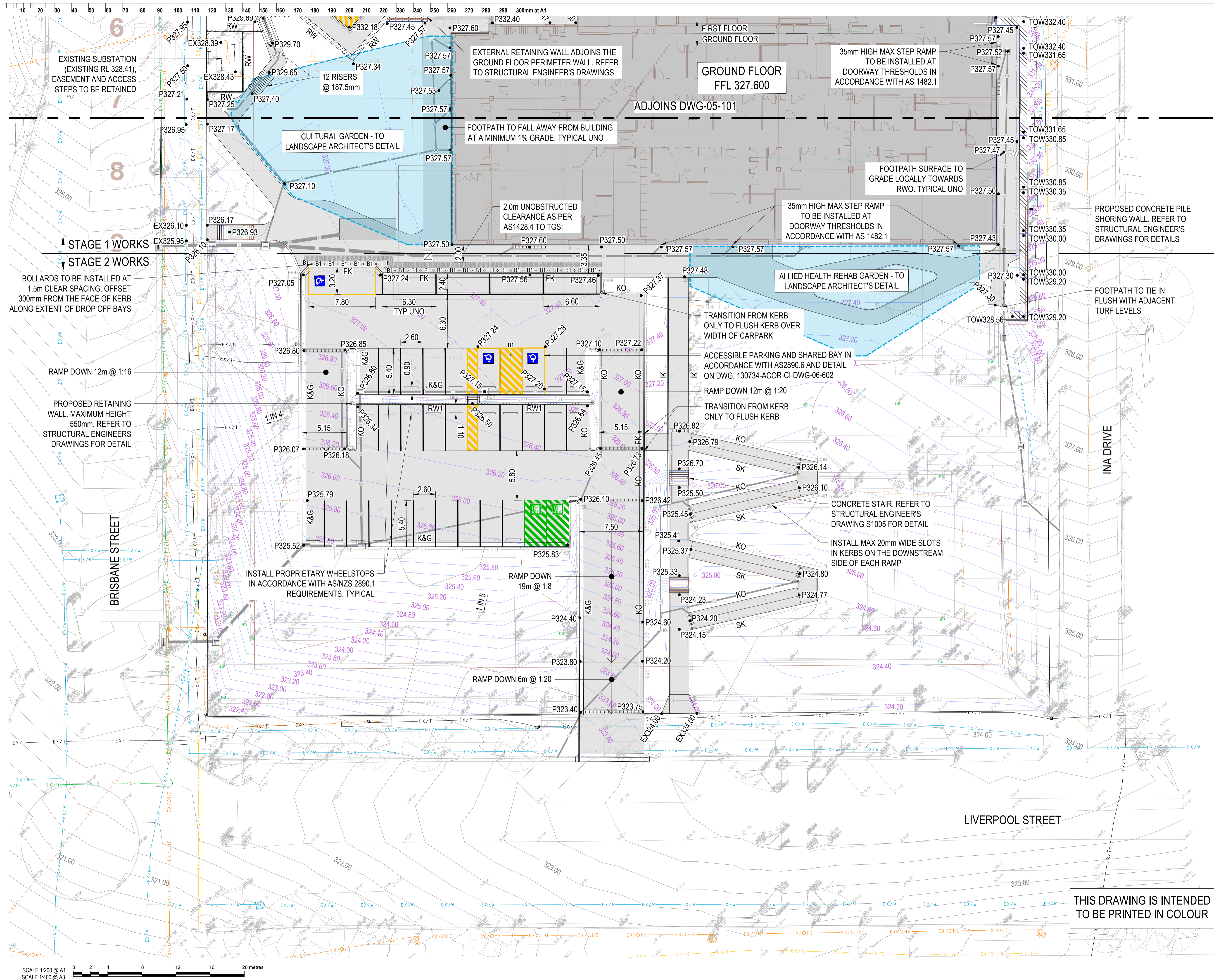
DESCRIPTION
BULK EARTHWORKS PLAN
SHEET 2

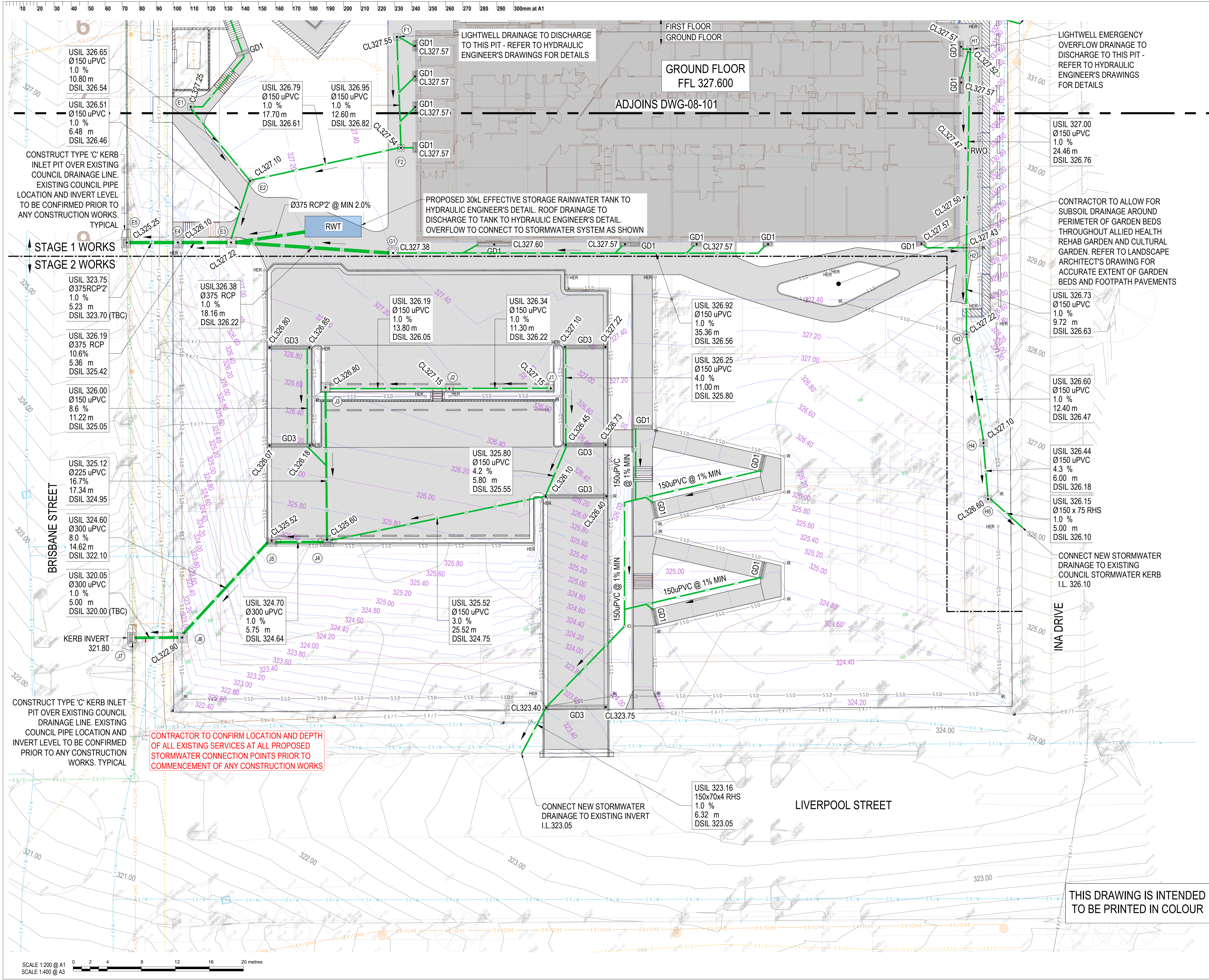
PROJECT No	DRAWING No	REVISION
130734-ACOR-CI	04-102	H

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SCALE 1:200 @ A1
SCALE 1:400 @ A3







THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT CONTRACTS, SPECIFICATIONS AND DRAWINGS. DIMENSIONS ARE IN MILLIMETRES. LEVELS ARE METRES. DO NOT SCALE OFF DRAWINGS. USE FIGURED DIMENSIONS ONLY. CHECK DIMENSIONS ON SITE. REPORT DISCREPANCIES IMMEDIATELY.

NOTES

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P1	21.09.22	ISSUE FOR COORDINATION	NP
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ISSUE DATE SUBJECT VALIDN.

CLIENT

NSW Health Infrastructure

PROJECT MANAGER

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STRUCTURE & CIVIL

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LANDSCAPE ARCHITECT

SITE IMAGE 3 BAPTIST ST, REDFERN, NSW 2016 T 8332 5600

ARCHITECT

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COWRA HOSPITAL REDEVELOPMENT

CNR LIVERPOOL AND BRISBANE ST COWRA NSW

ACOR JOB NO. NA230222

PHASE

TENDER

DRAWN	SCALE	SHEET SIZE	ORIGIN DATE
JK	AS SHOWN A1	AUG 2022	

DESCRIPTION

STORMWATER MANAGEMENT PLAN - SHEET 2

PROJECT No	DRAWING No	REVISION
130734-ACOR-CI	08-102	G

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