Blayney MPS

Civil Design Report

130607-JAC-CV-RPT-1003 | 4

29 May 2024

NSW Health Infrastructure

Civil Design Report

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Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
Draft	31/05/23	Design Development – Civil Works Report	D. Silang	K. Lau	M. Serban	M. Serban
1	06/07/23	75% Design Development – Civil Report	D. Silang	K. Lau	M. Serban	M. Serban
2	09/08/23	For Tender – Civil Report	D. Silang	K. Lau	M. Serban	M. Serban
3	10/08/23	For Tender – Civil Report Reissue	D. Silang	K. Lau	M. Serban	M. Serban
4	29/05/24	Revised for HI	-	K.Lau	K.Lau	M.Serban

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Executive Summary

The Blayney MPS is a small rural health facility located in the Southern Sector of Western New South Wales (NSW). It is located on the corner of Osman Street and Martha Street.

The Blayney MPS redevelopment will aim to provide:

- Residential aged care accommodation providing care to aged care residents with high care needs including clients with dementia who have been assessed as suitable for an MPS. Blayney MPS also provides respite care for low and high care residents.
- Inpatient services that will provide low level acute care to patients including palliative care in line with the agreed role delineation.
- Emergency services including stabilisation and management in preparation for admission or transfer of care in line with level 1 role delineation.
- Imaging services including general x-ray with a visiting Radiographer onsite from the Cowra Health Service – two days a week.
- Western NSW LHD community health, outpatient/ambulatory services and Hospital in the Home (HiTH)

The purpose of this report is to document the civil components for the Blayney MPS redevelopment. These consist of access roads, pavement, drainage, and earthworks.

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Acronyms and abbreviations

[ACRONYM]	[Full Name]
St	Street
PMF	Probable Maximum Flood
LDF	Lane Distribution Factor
DF	Direction Factor
RAC	Residential Aged Care
MPS	Multi-Purpose Service
FPL	Floor Planning Level
FFL	Finish Floor Level
AEP	Annual Exceedance Probability Existing Conditions

1. Existing Conditions

1.1 Location

The existing hospital site is located on the corner of Martha Street and Osman Street. To the south of the hospital is Martha Street which continues as Mid Western Highway (A41). To the West of the hospital is Lee Hostel with access to Queen Street and residential buildings on the East and North of the site.

The main hospital entrance is on Osman Street with an existing carpark available on site. There is also on-street parking on Osman St adjacent to the hospital. The site generally slopes from West to East.

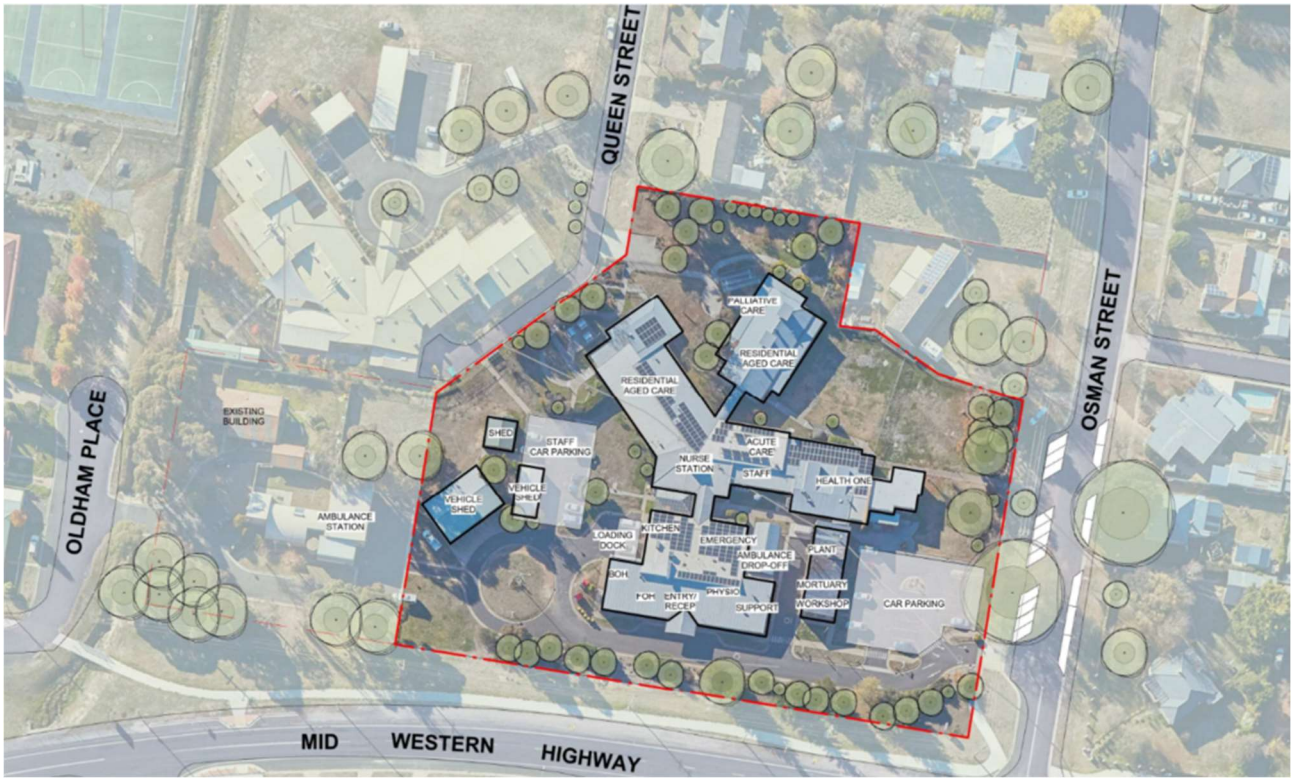


Figure 1: Existing Hospital Plan (Source: NBRS)

1.2 Geotechnical

1.2.1 Geology

According to the Desktop Preliminary (Stage 1) Site Investigation report (Ref: E35521PTrpt) by JK Environments, the Blayney MPS site is found to be underlain by Wombiana Formation Shale, typically consisting of buff to light coloured shale, siltstone, limestones, and fine-grained sandstones and marble. The Blayney volcanics are located approximately 305m to the south-west, which provide potential for asbestos to naturally occur. Further to the investigation, the site has been reported to be located within the Vittoria-Blayney soil landscape which are considered to have moderate erodibility with some higher local occurrences and low salinity.

1.2.2 Soil Contamination

Based on reviews and inspections made by JK Environments in their Desktop Preliminary (Stage 1) Site Investigation report (Ref: E35521PTrpt), JK Environments is of the opinion that there is potential for site contamination. There were potential contamination sources found such as fill material from unknown origin, onsite fuel storage, use of pesticides, hazardous building materials, naturally occurring asbestos, and off-site land uses. JK Environments state that the historical land uses and potential sources of contamination would

not prohibit the proposed development. However, further investigation of the contamination conditions is required based on the potential contamination sources identified and potential for contamination in future.

1.2.3 Groundwater

Based on the geotechnical investigation report, groundwater was found 0.85m below ground level at BH15 at the south-western corner of the development area, with groundwater seepage encountered during or on completion of various boreholes, ranging from depths between 0.85m to 1.4m.

1.3 Stormwater

The subject site of Blayney Hospital has three main sub-catchments discharging to three existing discharge points. Two of the discharge points are in Osman St and one discharge point to Queens St existing drainage system (shown in Figure 2 below).

Figure 2: Existing Sub-Catchments and Discharge Points

Stormwater runoff from the subject site discharging into Osman Street and Queen Street existing drainage systems is conveyed via the existing drainage pit and pipe systems to Stillingfleet Street existing drainage systems. This then discharges into a wetland located at the intersection of Stillingfleet Street and Lower Farm Street for detention and treatment before ultimately discharging to Belubula River.

1.3.1 Flooding

The following studies have been used for flood assessment:

- Blayney Flood Study -Flood Study Report prepared for Blayney Shire Council dated 15th June 2015 by Jacobs.
- Floodplain Risk Management Study and Floodplain Risk Management Plan for Blayney Final, prepared for Blayney Shire Council dated December 2016 by Jacobs
- Addendum to Blayney Flood Study- Update to Austalian Rainfall and Runoff 2019 Guidelines for Blayney Shire Council dated 10th February 2022 by Storm.

The PMF is defined in the Council flood study as the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection for the site against such an event.

The hospital side is currently under the PMF level with surrounding roads and adjacent buildings also within the flood zone. The overall building level of the hospital will need to be raised over 1m to meet the PMF requirements, with the surrounding areas also raised to meet the building level, which will require extensive earthworks. All access roads to the hospital will be blocked during the PMF event. Social and economic value will need to be considered should building levels be raised to PMF.

Typically, residential development would generally be based around the 1% AEP flood event plus an appropriate freeboard (typically 0.5m). The council is responsible for the determination of appropriate planning and development controls, including FPLs, to manage future flood risk to an acceptable level based on social, economic, and ecological, as well as flooding considerations. These controls should be cognisant of the relevant regional planning and any associated controls. The council is also responsible for responsible for risks of flooding and providing acceptable levels of safety within the community in accordance with the Emergency Servicing Act 1939.

Finished Surface Level (FSLs) for the building has been adopted from Blayney Flood Study, however council consultation and acceptable levels will need to be confirmed including emergency access during extreme flood events, and safe and orderly egress from development.

2. Proposed Development

2.1 Civil Works

2.1.1 Civil Design Criteria

2.1.1.1 Traffic Requirements

The main site access light vehicles for patients and visitors will continue to remain on Osman St with separated entry and exits. The existing main entrance driveway will be converted to entry access only, with the other Osman St access widened as an exit. The Osman St access to site will only cater for cars and ambulances.

Larger vehicles that require access to the hospital site such as servicing, waste and the fire brigade will utilise the Queen Street access. This will be a two-way access for entry and exit of the larger vehicles only as it provides the most direct and convenient access to the site area where the loading dock, ambulance bay and booster assembly will be located. The single-lane driveway to the ambulance station on the western side of the hospital will be retained.

For vehicle access strategy annotation containing traffic flows and vehicle type access provided by SCT Consulting, refer to Appendix E.

2.1.1.2 Vehicle Types

The vehicles that have been assessed to access the hospital site include the following:

Vehicle Type	Size (Length)	Access Points/Locations
Ambulance (non-bariatric)	6.5m	Oldham Place (west of hospital) entrance, Osman St entrance, Queen St exits only,
SRV	6.4m	Entire site accessible
HRV	12.5m	Queen St entry/exit only
MRV	8.8m	Queen St entry/exit., Osman St exit only
B99 Vehicle (Light Vehicle)	5.2m	Existing and new carparks, reception, Osman St entry and exit

Table 1: Approved Design Vehicle Types

2.1.1.3 Turning Paths

A turning path assessment has been undertaken and determined that the layout for each intersection and access road is adequate for their corresponding design vehicle. The main area where critical care with turning paths is evident is at the Queen St entrance/exit. Due to the two-way access at Queen St and the traffic being an SRV vehicle size at minimum, it will require at least a 3-point turn to change to the opposite direction.

The civil drawings in Appendix A highlight the turning radius path for each design vehicle.

2.1.2 Earthworks

The bulk cut and fill quantities based on the design surface over the natural surface only is found in Section 2.1.6.3 of this report. The natural surface does not consider pavement boxing or foundation excavations. There is a significant amount of net fill required due to matching the surrounding landscaping to the building levels.

The proposed levels are as below:

Project Area	1% AEP (plus freeboard)	PMF
Residential Aged Care (RAC)	874.65 AHD	875.65 AHD
Health One building	874.20 AHD	875.25 AHD

Table 2: Proposed Building Levels

The finished surfaced level is currently designed for the 1% AEP plus 500mm freeboard. Noting that the 1% AEP is based on the existing council flood maps, further discussion with council and flood modelling may be required for approval of the finished floor levels.

The RAC building requires approximately 1.3m cut in the south-west corner of the site and the Health One building requires approximately 1.2m fill on the north-east corner of the building adjacent the boundary.

Further information about the proposed earthworks can be found in the Earth Works Preliminary Analysis in Appendix B, which includes earthwork heatmaps which was used to further development the design.

2.1.3 Stormwater

2.1.3.1 Stormwater Drainage

The stormwater drainage strategy for the proposed development will utilise the existing Council stormwater drainage systems to carry runoff from the site to the existing wetlands for detention and water quality treatment at Stillingfleet St and Lower Farm St. The proposed drainage strategy is to install raingardens in the proposed carpark area of the hospital site to treat runoff (from carpark only) and provide two 10,000L rainwater tanks for stormwater harvesting and irrigation reuse of landscape areas. The provision of rainwater tanks and raingarden/biorention trench for the new carpark endeavours to enhance the use of water sensitive urban design elements and reduce pollutant loads carried by the stormwater runoff from the hospital site to the existing wetlands.

The stormwater drainage strategy drawing and memo for information is in Appendix A and Appendix C, respectively.

2.1.3.2 Erosion and Sediment Control

The proposed erosion and sediment control plan will be conducted in three stages throughout the construction of the new hospital site. The control measures that will be put in place such as barrier fence, sediment fence, catch drains, gravel filters, and an area for the stockpile will help mitigate and prevent soil erosion during construction and other sediments from the construction site washing into gutters, drains, and waterways.

The new RAC building will be required to remain accessible across all the stages of construction to allow for patients, staff, and visitors to enter and exit.

For the detailed construction staging and erosion and sediment control plans, refer to Appendix A.

2.1.4 Groundwater

The geotechnical investigation report recommends the installation of subsoil drains at a minimum of 0.3m below the subgrade levels to help manage the moisture seepage on the clay subgrade in the long term.

2.1.5 Flooding (PMF)

Jacobs has investigated the current PMF levels on Blayney Hospital based on the Blayney Shire Council Flood Study Report dated on the 15th of June 2015. The PMF depths range from 0.5m to 1m, using the latest survey level of RL 874.4 near RAC and RL 874.2 near Health One.

The PMF level is estimated to be at approximately RL 875.65 (RAC) and RL 875.25 (Health One) based on the flood depths indicated in the Jacobs Flood Study (2015).

Further PMF flood analysis is currently being carried out by GHD and findings from the assessment will be advised to Health Infrastructure.

2.1.5.1 Flood Mitigation Measures

The PMF flood analysis is currently being carried out by GHD and findings from the assessment will be advised to Health Infrastructure.

2.1.6 Access Roads

2.1.6.1 Land Configuration and Intersections

The Blayney MPS civil work consists of four one-way single lanes from Osman Street and Oldham Place entry access roads to the hospital. Exits include existing exit to Osman Street, and one two-way lanes from proposed/existing carpark to Queen St entry/exit. The following junctions along the hospital and carparks allow the right/left turn movement in the project site:

- Entry from Osman place – Left turn only toward the hospital reception.
- Entry from Osman Street – Right turn only toward the hospital reception and right turn movement to the proposed carpark.
- Exit from the hospital reception – Left/Right turn toward the loading zone/exit to Osman Street/Carparks.

The approved route for design vehicles refers to Table 1 in section 2.1.1.2.

2.1.6.2 Design Standards and Guidelines

The proposed road geometry has been designed in accordance with the following standards and guidelines:

- WBC Strategic Alliance – Guidelines for Engineering Works, 2009, Version 4
- Austroads Guide to Road Design - Part 3: Geometric Design
- AS 2890.1:2004 – Parking Facilities – Off-Street Parking
- R0300 – NSW RMS Kerb and Channel Series

Table 3: Geometric Design Criteria - Access Roads

Design Parameter	David Warren Road Value	Notes
Posted speed limit	30Km/h	
Design speed	40Km/h	

Design Parameter	David Warren Road Value	Notes
Minimum general traffic lane width	3.0m	Derived from WBC Strategic Alliance – Guidelines for Engineering Works, 2009, Version 4
Parking bay width	2.0m	Derived from WBC Strategic Alliance – Guidelines for Engineering Works, 2009, Version 4
Reaction time	1.5s	AustRoads Guide to Road Design – Part 3
Minimum K value crest	2.6	AustRoads Guide to Road Design – Part 3
Minimum K value sag	3.0	
Minimum Sight Distance	73m	Access Road assumption.
Minimum grade	0.5%	Derived from Drainage Design.
Maximum grade	2.5%	
Crossfall	-3% desirable	Typical values.
Cut and Fill batter slope	4H to 1 V on Fill 2H to 1V on Cut	Derived from Drainage Design.
Design Vehicle	6.5m Ambulance 6.4m SRV 12.5m HRV 8.8m MRV 5.2m B99	Assessed in the turning paths. Based on usage determined by Local Health District (LHD).
Verge widths	Match to existing	If there is no existing verge, refer to MIS06

Table 4: Geometric Design Criteria - Shared Path

Design Parameter	Value	Notes
Design speed	30km/h	
Minimum shared path width	2.5m	Design width measured.
Longitudinal Grade	Max 4.0%	Assumed.
Maximum Crossfall	Max 3.0%	Assumed.

2.1.6.3 Models and Quantities

Below is the current Cut and Fill quantities based on the latest road design:

Table 5: Cut/Fill Summary (Based on Existing Levels)

Cut/Fill Summary (Based on Existing Levels)					
Location	**2D Area (m^2)**	**Cut Volume (m^3)**	**Fill Volume (m^3)**	**Net Volume (m^3)**	**Cut/Fill**
Footpath	403.456	90.92	16.04	-74.88	Cut
Access Road	2741.579	238.85	797	558.15	Fill
Parking Lot	560.177	182.14	0.01	-182.13	Cut
Building	2838.703	670.67	309.05	-361.62	Cut

Cut/Fill Summary (Based on Existing Levels)					
Landscaping	4455.039	902.82	801.17	-101.65	Cut
Project Site (TOTAL)	10998.954	2085.4	1923.27	-162.13	Cut

Note that cut/fill levels are for bulk earthworks only, allow for additional cut/fill volumes such as footings, pavement, tree removals and where residual soil is not encountered.

2.1.7 Pavement Design

The pavement design of the access road and new car park recommendations for Blayney Hospital follows the assumption that the traffic volume is 200 vehicles per day with 20% of heavy vehicles for access road and 5% for car parks. This is based on the advice provided by SCT Consulting from the review of Clinical Service Plan, the Workforce Plan, and an estimate of staff, visitors, and patients utilising the hospital grounds.

A granular pavement design with asphalt wearing course to match the existing pavement type of the access roads is considered for this project site due to the low traffic volume. However, for the loading dock area, a full depth asphalt pavement has been considered to carter for the turning movements of heavy vehicles that will be predominantly accessing the area.

It is to be noted that a consistent pavement thickness has been adopted for the access road and car park for ease of construction, due to their minimal difference in thickness. A 10mm tolerance has also been incorporated into the subbase layer in the granular pavement and the critical asphalt layer in the full depth asphalt pavement design.

2.1.7.1 Pavement Loadings

The adoption of an assumed 40-year design life coupled with the LDF of 1 and a DF of 1 for a one-way carpark and 0.5 for a two-way access road, the design traffic loading in Table 6 below is determined:

Table 6: Design Traffic Loading

Description	AADT	HV (%)	Design Years	N_{DT} (HVAG)	DESA
Access Roads	200	20	40	735000	3.23×10^5
Car Park	200	5	40	368000	1.62×10^5
Loading Dock	200	20	40	2205000	9.70×10^5

For further pavement design information, data, and calculations refer to Appendix D.

2.2 Structural Works

The structural foundation system is based on advice from JK Geotechnics Geotechnical Investigation Report that recommends footings should be founded on still residual clays, at a minimum depth of 1m below the current ground levels of the site. With the requirement to raise the hospital building above PMF, there are two proposed options for structural below:

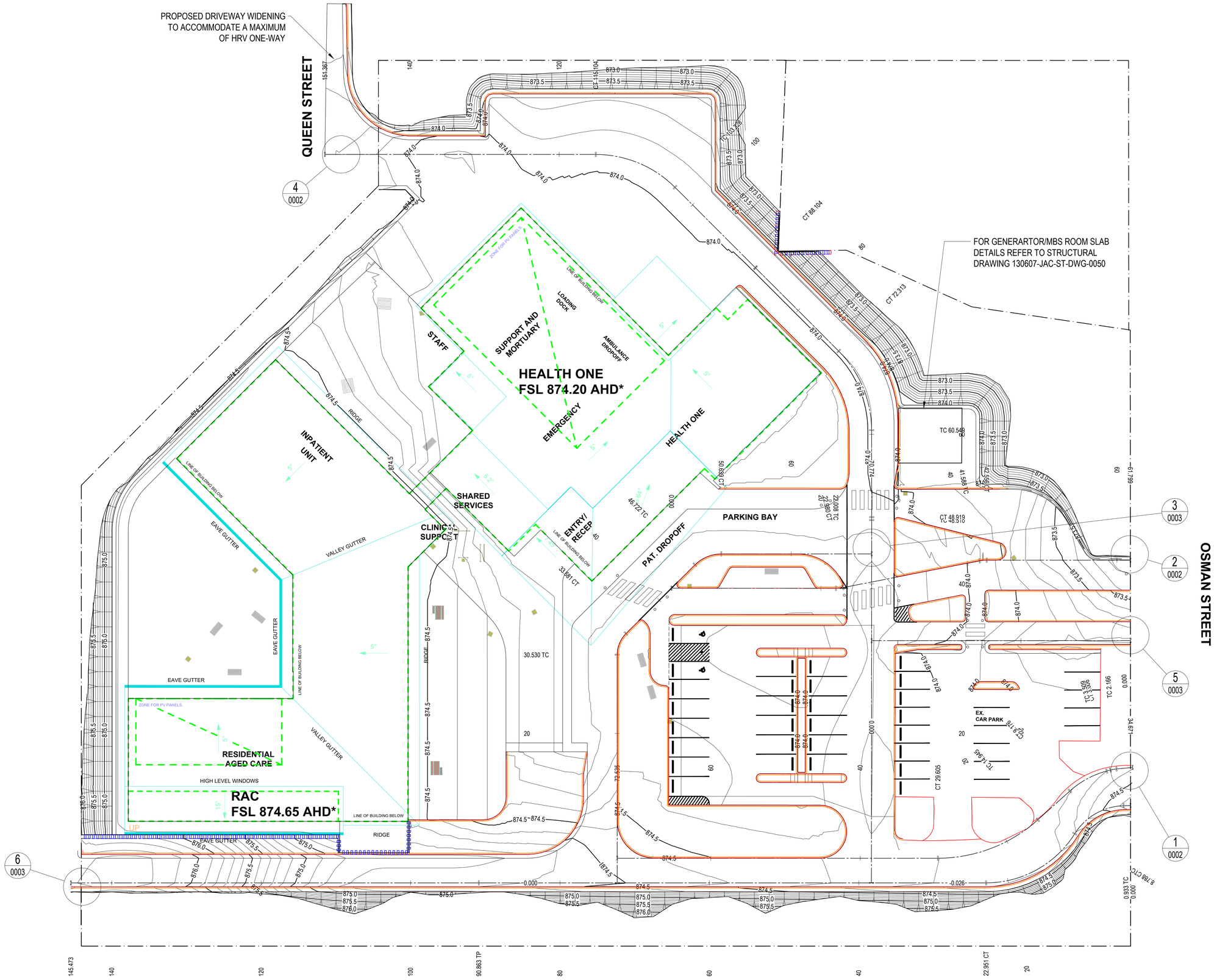
1. Raise building on engineered fill – this will not significantly impact the existing structural solution with the impact on costing relating to additional engineered fill and the external wall can extend down to the existing ground level to retain full under building (e.g., no batter required adjacent to existing buildings during construction staging). The additional fill may have adverse impact on future flood studies.

2. Raise building on piers – requires a significant change to ground floor structure and foundations including the costing of new structural elements. It is anticipated that fill will be required up to the edge of the building with retaining walls under building footprint. There are also possibilities of the ground

floor slab needing to be fire rated and maintenance issues from confined space void created under building.

For further details refer to Structures Design Development Report 130607-JAC-ST-RPT-1004.

Appendix A. Civil Drawings



LEGEND

- CIVIL WORKS
- BOUNDARY
- ARCHITECTURAL LAYOUT
- CONTOUR LINES 0.5m INTERVALS
- CONTOUR LINES 0.1m INTERVALS
- RETAINING WALL

NOTE:
*** FSL SUBJECTED TO APPROVAL**

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Issue

No.	Date	Description	Chkd
0	18.01.23	50% SCHEMATIC DESIGN ISSUE	K.L
1	17.02.23	100% SCHEMATIC DESIGN ISSUE	K.L
2	22.02.23	100% SCHEMATIC DESIGN ISSUE	K.L
3	10.05.23	DRAFT 50% DESIGN DEVELOPMENT	K.L
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Project
Blayney HS

at
3 OSman St, Blayney NSW 2799

for
Health Infastructure

Drawing Title
CIVIL WORKS
GENERAL ARRANGEMENT
PLAN

Scale 1 : 250@ A1

Drawing Reference
130607-JAC-CV-DWG-0001

Revision
5

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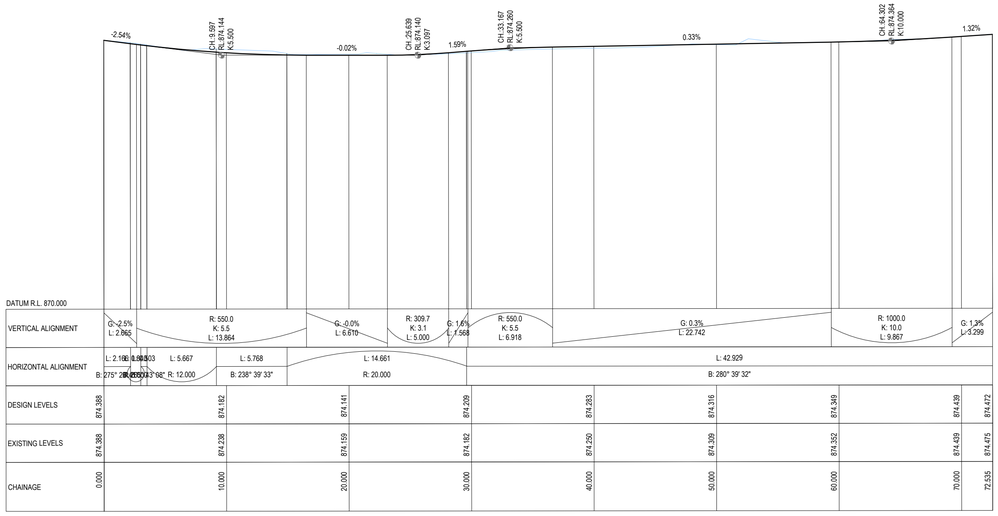

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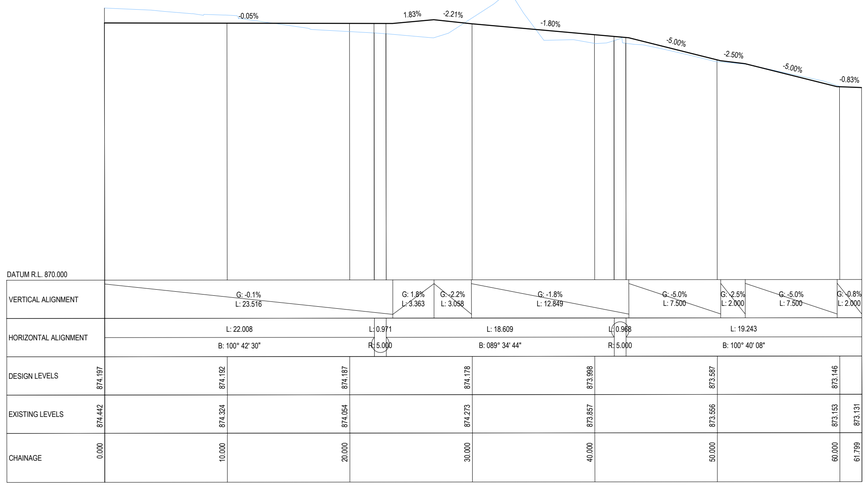

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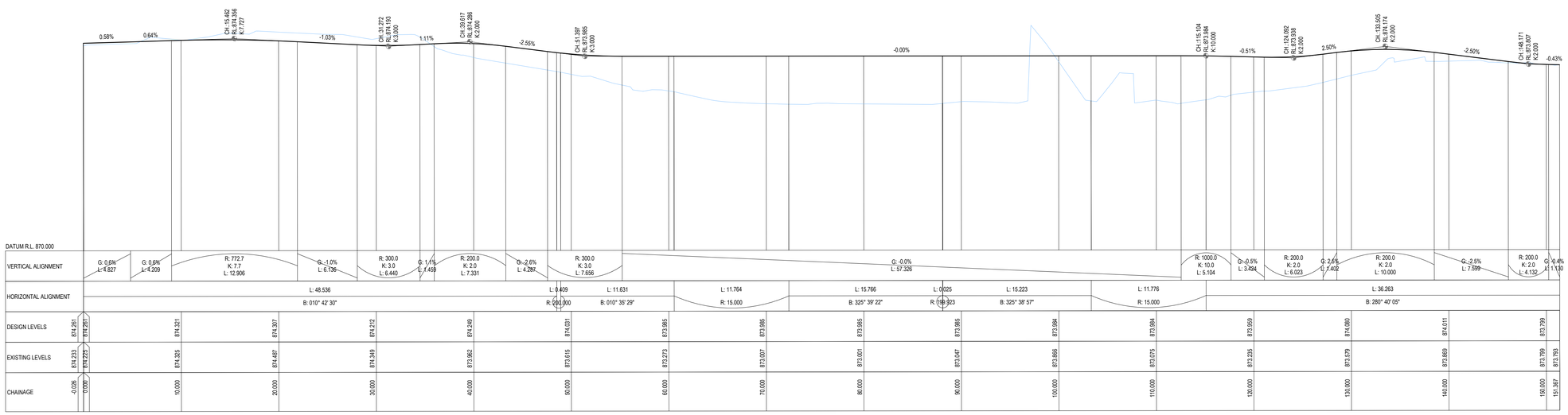

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Drawing Title
CIVIL WORKS
TYPICAL SECTIONS
SHEET 1

Scale 1 : 250@ A1

Drawing Reference
130607-JAC-CV-DWG-0002

Revision
2

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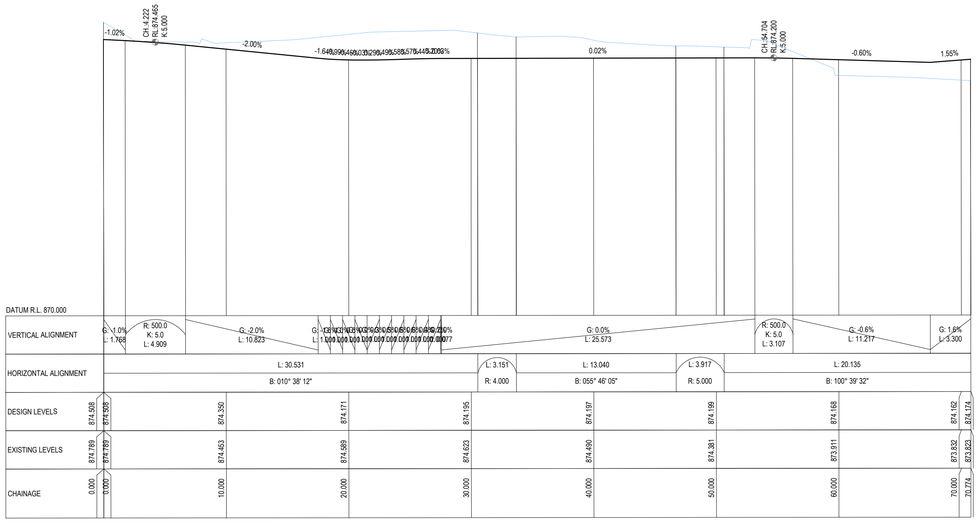

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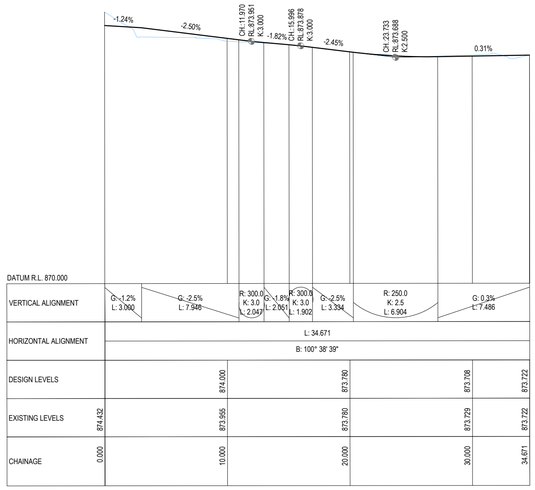

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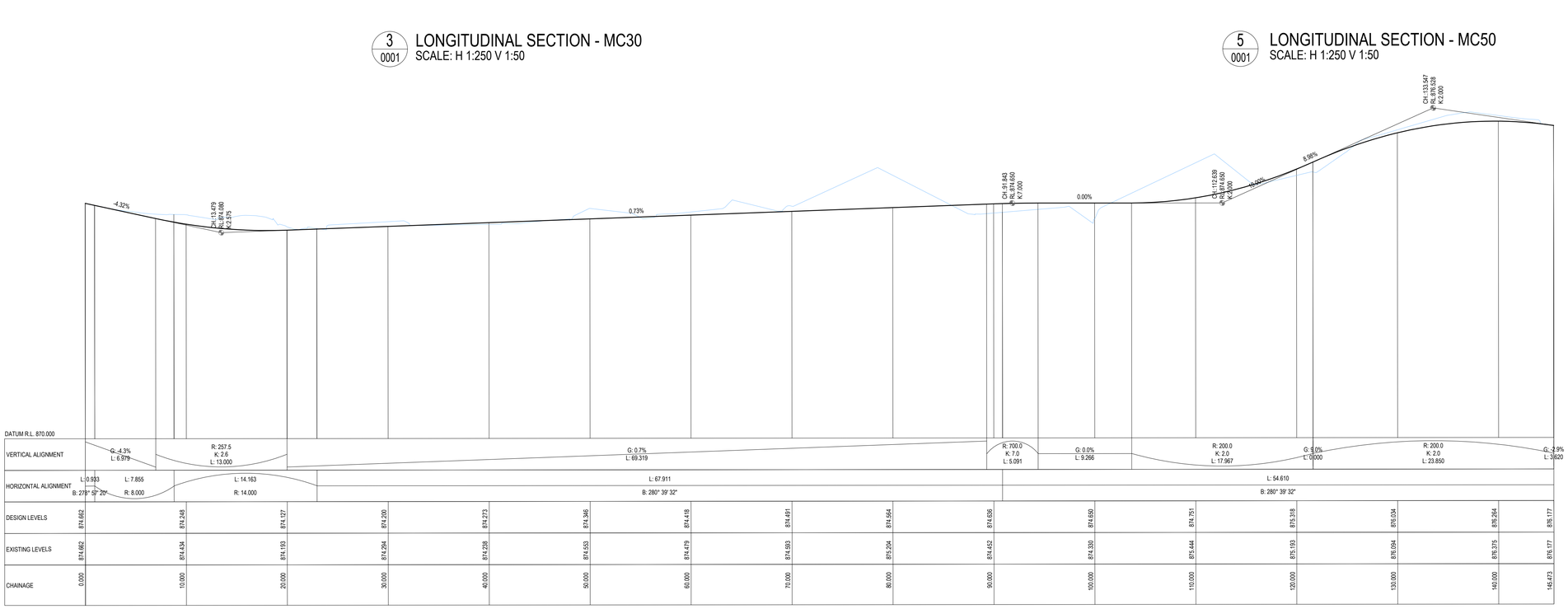

6 / 0001 LONGITUDINAL SECTION - MC60
SCALE: H 1:250 V 1:50

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Project
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Drawing Title
CIVIL WORKS
TYPICAL SECTIONS
SHEET 2

Scale 1 : 250@ A1

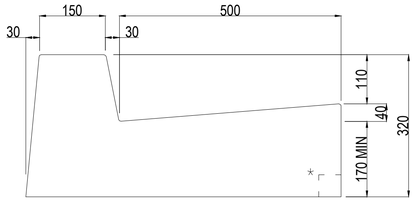
Drawing Reference
130607-JAC-CV-DWG-0003

Revision
2

0 10 20 30 40 50 60 70 80 90 100

DRAWING NOTE:

1. ALL KERBS ALONG ACCESS ROAD ARE DESIGNED AS A TYPICAL SA KERB.
2. PROPOSED CARPARK TO BE IN ACCORDANCE WITH AS1428.1 AND AS2890.1



* RECESS AT BASE OF KERB MAYBE REQUIRED FOR SUBBASE LAYER.

PROPOSED DRIVEWAY WIDENING TO ACCOMMODATE A MAXIMUM OF HRV ONE-WAY

RESTRICTED VEHICLES ONLY

GIVE WAY

PAVEMENT TYPE 3 - FULL DEPTH ASPHALT PAVEMENT CONFIGURATION FOR LOADING DOCK AREA

QUEEN STREET

KERB TYPE SA SEE NOTE 1

KERB TYPE SA SEE NOTE 1

FOR GENERARTOR/MBS ROOM SLAB DETAILS REFER TO STRUCTURAL DRAWING 130607-JAC-ST-DWG-0050

LOADING DOCK

SUPPORT AND MORTUARY

AMBULANCE DROPOFF

EMERGENCY

STAFF

KERB TYPE SM

HEALTH ONE

TYPE 1 - FOOTPATH

STOP

INPATIENT UNIT

SHARED SERVICES

CLINICAL SUPPORT

ENTRY/ RECEP

PARKING BAY

PAT. DROPOFF

TYPE 1 - FOOTPATH

TYPE 1 - FOOTPATH

GIVE WAY

GIVE WAY

GIVE WAY

GIVE WAY

ONLY

EX. CAR PARK

EXIT

ONLY

ENTRY

OSMAN STREET

RESIDENTIAL AGED CARE

UP

PAVEMENT TYPE 2 - GRANULAR PAVEMENT CONFIGURATION FOR ACCESS ROAD AND CAR PARK

PAVEMENT TYPE 2 - GRANULAR PAVEMENT CONFIGURATION FOR ACCESS ROAD AND CAR PARK

ONLY

ENTRY ONLY

MILL AND RESHEET

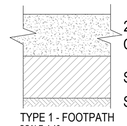
MILL AND RESHEET EXISTING CARPARK AND PROVIDE NEW LINE MARKINGS

NO ENTRY

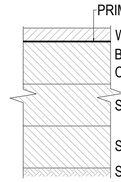
NO ENTRY

LEGEND

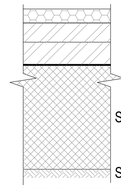
- CIVIL WORKS
- BOUNDARY
- ARCHITECTURAL LAYOUT
- PAVEMENT MARKING



TYPE 1 - FOOTPATH
SCALE 1:10



TYPE 2 - GRANULAR PAVEMENT CONFIGURATION FOR ACCESS ROAD AND CAR PARK
SCALE 1:10



TYPE 3 - FULL DEPTH ASPHALT PAVEMENT CONFIGURATION FOR LOADING DOCK AREA
SCALE 1:10

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Issue

No.	Date	Description	Chkd
0	10.05.23	DRAFT 50% DESIGN DEVELOPMENT	K.L
1	06.07.23	75% DESIGN DEVELOPMENT	K.L
2	09.08.23	FOR TENDER	K.L

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Project
Blayney HS

at
3 OSman St, Blayney NSW 2799

for
Health Infastructure

Drawing Title
CIVIL WORKS
PAVEMENT LAYOUT
PLAN

Scale 1 : 250@ A1

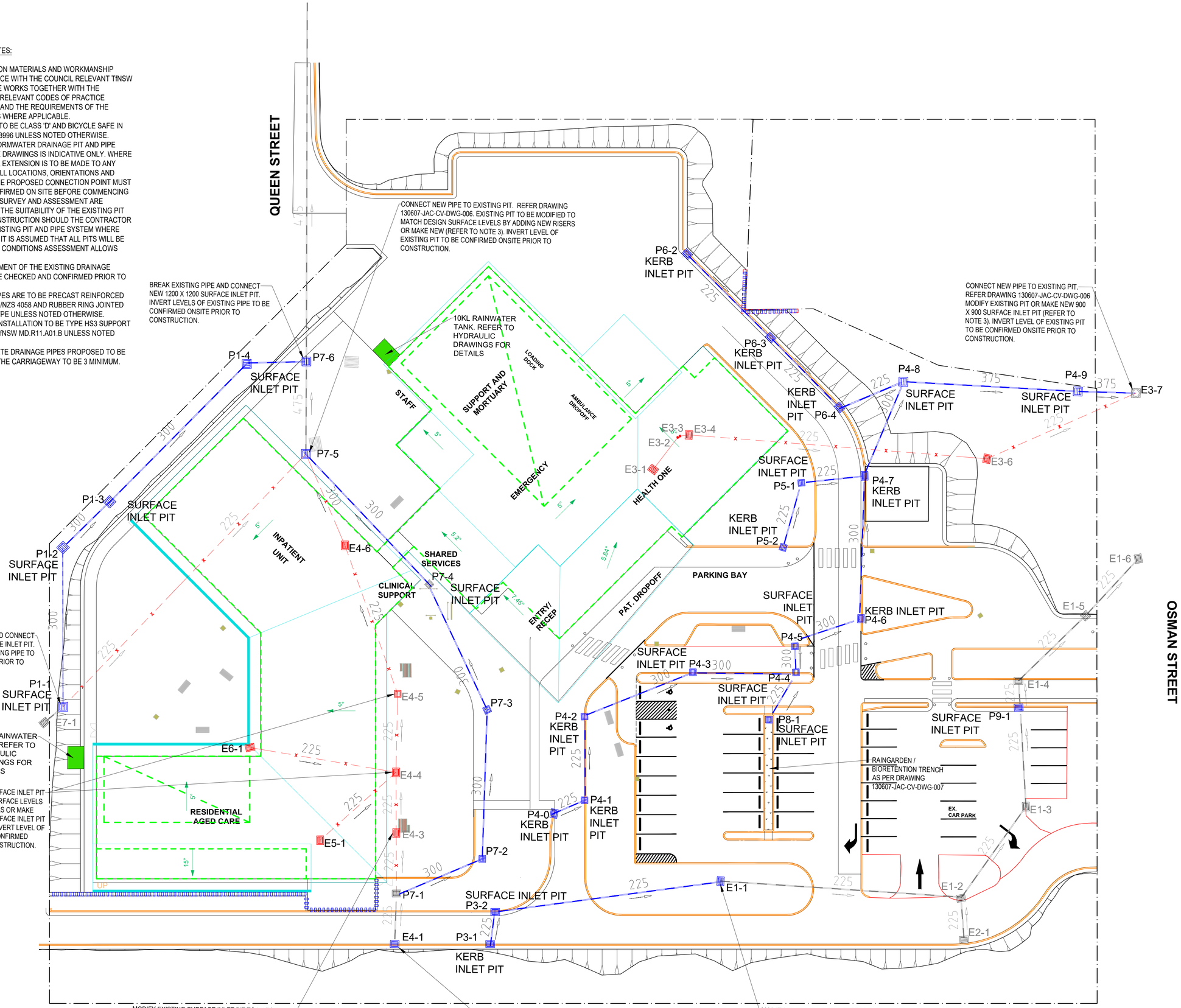
Drawing Reference
130607-JAC-CV-DWG-0004

Revision
2

0 10 20 30 40 50 60 70 80 90 100

GENERAL DRAINAGE NOTES:

1. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE COUNCIL RELEVANT TfNSW SPECIFICATION FOR THE WORKS TOGETHER WITH THE REQUIREMENTS OF ALL RELEVANT CODES OF PRACTICE REFERRED TO THEREIN AND THE REQUIREMENTS OF THE STATUTORY AUTHORIES WHERE APPLICABLE.
2. ALL GRATES ARE TO BE CLASS 'D' AND BICYCLE SAFE IN ACCORDANCE WITH AS 3996 UNLESS NOTED OTHERWISE.
3. THE EXISTING STORMWATER DRAINAGE PIT AND PIPE LAYOUT SHOWN ON THE DRAWINGS IS INDICATIVE ONLY. WHERE A NEW CONNECTION OR EXTENSION IS TO BE MADE TO ANY EXISTING PIT OR PIPE, ALL LOCATIONS, ORIENTATIONS AND REDUCED LEVELS AT THE PROPOSED CONNECTION POINT MUST BE SURVEYED AND CONFIRMED ON SITE BEFORE COMMENCING ANY WORK. CONDITION SURVEY AND ASSESSMENT ARE REQUIRED TO CONFIRM THE SUITABILITY OF THE EXISTING PIT AND PIPE PRIOR TO CONSTRUCTION SHOULD THE CONTRACTOR WISH TO REUSE THE EXISTING PIT AND PIPE SYSTEM WHERE APPLICABLE. HOWEVER IT IS ASSUMED THAT ALL PITS WILL BE MADE NEW UNLESS THE CONDITIONS ASSESSMENT ALLOWS OTHERWISE.
4. LOADING ASSESSMENT OF THE EXISTING DRAINAGE INFRASTRUCTURE TO BE CHECKED AND CONFIRMED PRIOR TO CONSTRUCTION.
5. ALL DRAINAGE PIPES ARE TO BE PRECAST REINFORCED CONCRETE PIPES TO AS/NZS 4058 AND RUBBER RING JOINTED SPIGOT AND SOCKET TYPE UNLESS NOTED OTHERWISE.
6. CONCRETE PIPE INSTALLATION TO BE TYPE HS3 SUPPORT IN ACCORDANCE WITH TfNSW MD.R11.A01.B UNLESS NOTED OTHERWISE.
7. ALL NEW CONCRETE DRAINAGE PIPES PROPOSED TO BE TRANSVERSE ACROSS THE CARRIAGEWAY TO BE 3 MINIMUM.



LEGEND

- EXISTING PIT TO BE RETAINED
- EXISTING PIPE TO BE RETAINED
- PIPE FLOW DIRECTION
- 375 PIPE DIAMETER
- PROPOSED KERB INLET PIT
- PROPOSED SURFACE INLET PIT
- PROPOSED PIPE
- EXISTING PITS TO BE REMOVED
- EXISTING PIPE TO BE REMOVED
- PROPOSED RAINGARDEN/ BIORETENTION TRENCH
- GRASSED SWALE
- RAINWATER TANK
- RETAINING WALL

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Blayney HS

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for
Health Infastructure

Drawing Title
CIVIL WORKS
DRAINAGE LAYOUT PLAN

Scale 1 : 250@ A1

Drawing Reference
130607-JAC-CV-DWG-0005

Revision
2

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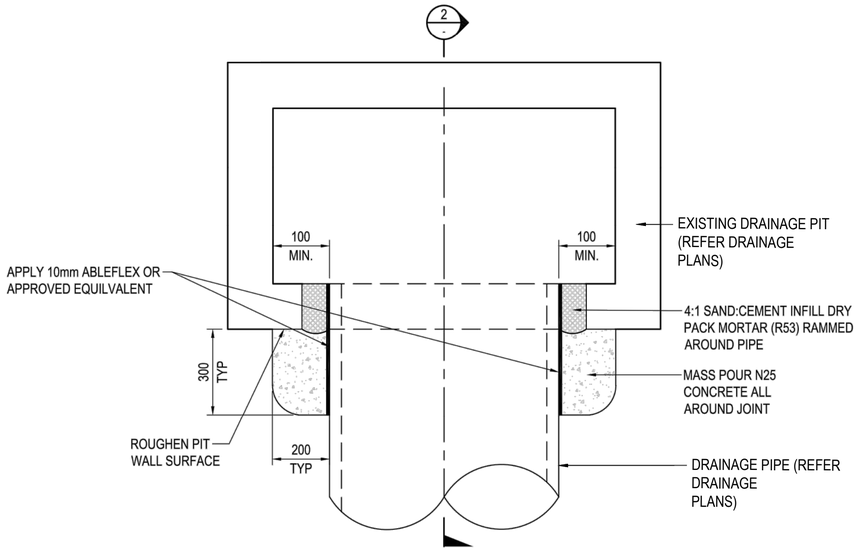
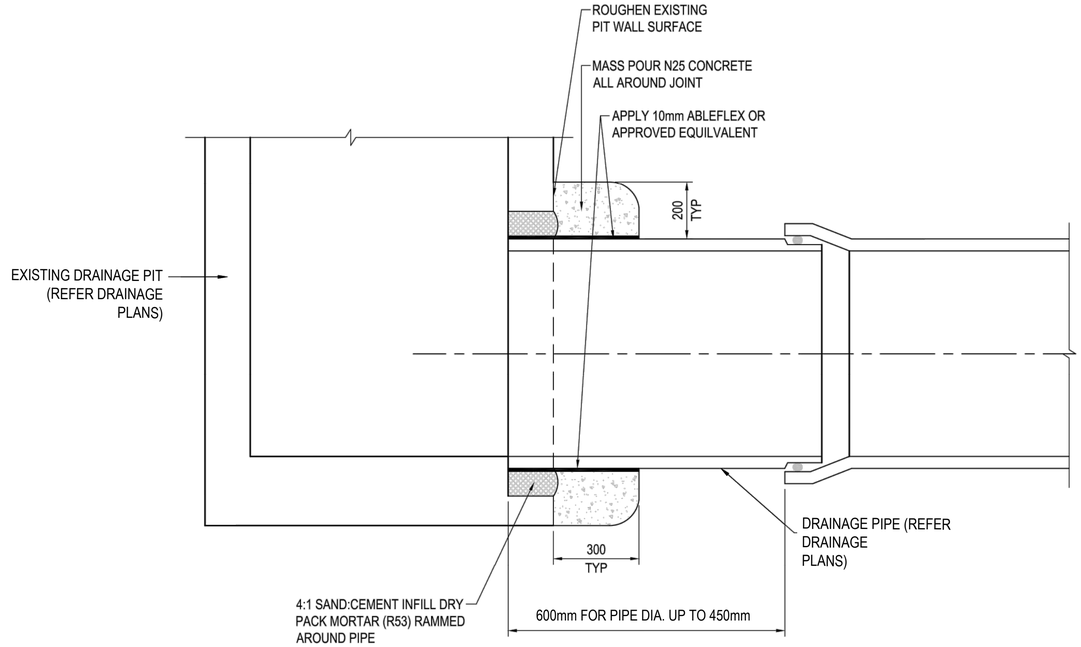


PLAN - NEW PIPE CONNECTION TO EXISTING PIT

SCALE 1: 10



SECTION 2 / -

SCALE 1: 10

PIT SCHEDULE

Pit			SETOUT		INTERNAL		INLET		OUTLET		PIT		
Name	TYPE	STANDARD REFERENCE DRAWING	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH	REMARKS
E4-1	KERB INLET PIT	WBC009	708958.264	6286787.926	0.87	0.67			225	873.686	874.7	1.014	REFER NOTE ON DRAWING 130607-JAC-CV-DWG-0005
P1-1	SURFACE INLET PIT	WBC011	708920.231	6286826.717	0.9	0.9			300	873.284	875.433	2.148	
P1-2	SURFACE INLET PIT	WBC011	708924.189	6286847.712	0.9	0.9	300	873.178	300	873.158	874.998	1.84	
P1-3	SURFACE INLET PIT	WBC011	708931.453	6286852.582	0.9	0.9	300	873.114	300	873.094	874.772	1.678	
P1-4	SURFACE INLET PIT	WBC011	708952.952	6286867.332	0.9	0.9	300	872.959	300	872.939	874.372	1.433	
P7-6	SURFACE INLET PIT	WBC011	708960.862	6286866.149	0.9	0.9	300	872.899			874.307	1.47	REFER NOTE ON DRAWING 130607-JAC-CV-DWG-0005
P3-1	KERB INLET PIT	WBC009	708970.625	6286784.872	0.6	0.9			225	873.972	874.686	0.714	
P3-2	KERB INLET PIT	WBC009	708972.091	6286788.976	0.6	0.9	225	873.954	225	873.934	874.7	0.766	
E1-1	SURFACE INLET PIT	WBC011	709002.556	6286787.447	0.87	0.67	225	873.81			874.241	0.451	REFER NOTE ON DRAWING 130607-JAC-CV-DWG-0005
P4-0	KERB INLET PIT	WBC009	708982.294	6286800.486	0.9	0.6			225	873.222	874.995	1.772	
P4-1	KERB INLET PIT	WBC009	708986.636	6286801.481	0.6	0.6	225	873.199	225	873.179	874.2	1.02	
P4-2	KERB INLET PIT	WBC009	708988.707	6286812.505	0.6	0.6	225	873.123	300	873.103	875.06	1.957	
P4-3	KERB INLET PIT	WBC009	709004.101	6286815.647	0.6	0.6	300	873.023	300	873.003	874.2	1.197	
P4-4	KERB INLET PIT	WBC009	709017.671	6286813.08	0.6	0.6	300	872.933	300	872.485	874.2	1.715	
P4-5	KERB INLET PIT	WBC009	709018.18	6286816.546	0.6	0.6	300	872.467	300	872.447	874.2	1.753	
P4-6	KERB INLET PIT	WBC009	709027.571	6286818.537	0.6	0.9	300	872.397	300	872.377	874.605	2.228	
P4-7	KERB INLET PIT	WBC009	709031.577	6286837.268	0.6	0.9	300	872.277	300	872.257	874.431	2.174	
P4-8	SURFACE INLET PIT	WBC011	709039.019	6286848.711	0.9	0.9	300	871.89	375	871.89	872.691	0.801	
P4-9	SURFACE INLET PIT	WBC011	709061.784	6286843.099	0.9	0.9	375	871.77	375	871.77	872.347	0.577	
P5-2	KERB INLET PIT	WBC009	709019.085	6286829.864	0.6	0.6			225	873.311	874.783	1.472	
P5-1	SURFACE INLET PIT	WBC011	709023.077	6286837.913	0.9	0.9	225	873.221	225	873.201	874.192	0.99	
P6-2	KERB INLET PIT	WBC009	709013.718	6286870.892	0.6	0.9			225	873	875.194	2.194	
P6-3	KERB INLET PIT	WBC009	709022.641	6286857.834	0.6	0.9	225	872.92	225	872.9	874.718	1.818	
P6-4	KERB INLET PIT	WBC009	709029.986	6286846.906	0.6	0.9	225	872.77	225	872.77	874.389	1.619	REFER NOTE ON DRAWING 130607-JAC-CV-DWG-0005
P7-6	SURFACE INLET PIT	WBC011	708960.862	6286866.149	0.9	0.9	475	872.838	475	872.838	874.307	1.47	
P7-1	SURFACE INLET PIT	WBC011	708959.549	6286793.854	0.9	0.9	225	873.655	300	873.545	874.738	1.193	
P7-2	SURFACE INLET PIT	WBC011	708971.708	6286796.291	0.6	0.6	300	873.48	300	873.48	874.379	0.899	
P7-3	SURFACE INLET PIT	WBC011	708976.05	6286815.814	0.6	0.6	300	873.37	300	873.37	874.198	0.828	
P7-4	SURFACE INLET PIT	WBC011	708971.539	6286833.759	0.6	0.6	300	873.27	300	873.27	874.336	1.066	
P7-5	SURFACE INLET PIT	WBC011	708958.508	6286854.022	0.9	0.9	300	873.145	475	873	874.467	1.467	
P8-1	PRECAST GRATED INLET 900X900	WBC012	709012.94	6286807.523	0.9	0.9			225	872.578	873.8	1.222	
E1-1	SURFACE INLET PIT	WBC011	709002.556	6286787.447	0.87	0.67			225	873.79	874.241	0.451	REFER NOTE ON DRAWING 130607-JAC-CV-DWG-0005
9-1	KERB INLET PIT	WBC009	709046.354	6286802.684	0.9	0.6	225	873.062	225	873.062	873.7	0.638	
P1-1	SURFACE INLET PIT	WBC011	708920.231	6286826.717	0.9	0.9	225	873.304			875.433	2.148	

NOTES:

1. FOR GENERAL NOTES ON DRAWING NUMBER 130607-JAC-CV-DWG-0005

NOTES FOR PIT SCHEDULE

1. XY SETOUT TO PIT CENTRE
2. SETOUT LEVEL TO PIT COVER LEVEL
3. PIPES UNDER ACCESS ROADS TO BE MINIMUM CLASS 4 RCP OR QUIVALENT APPROVED.
4. PIPES NOT UNDER ROADS TO BE A MINIMUM CLASS 2 RCP OR EQUIVALENT APPROVED.

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Issue

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1	06.07.23	75% DESIGN DEVELOPMENT	K.L
2	09.08.23	FOR TENDER	K.L

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Project

Blayney HS

at

3 OSman St, Blayney NSW 2799

for

Health Infastructure

Drawing Title

CIVIL WORKS
STORMWATER AND DRAINAGE
TYPICAL DETAILS

Scale 1 : 250@ A1

Drawing Reference

130607-JAC-CV-DWG-0006

Revision

2

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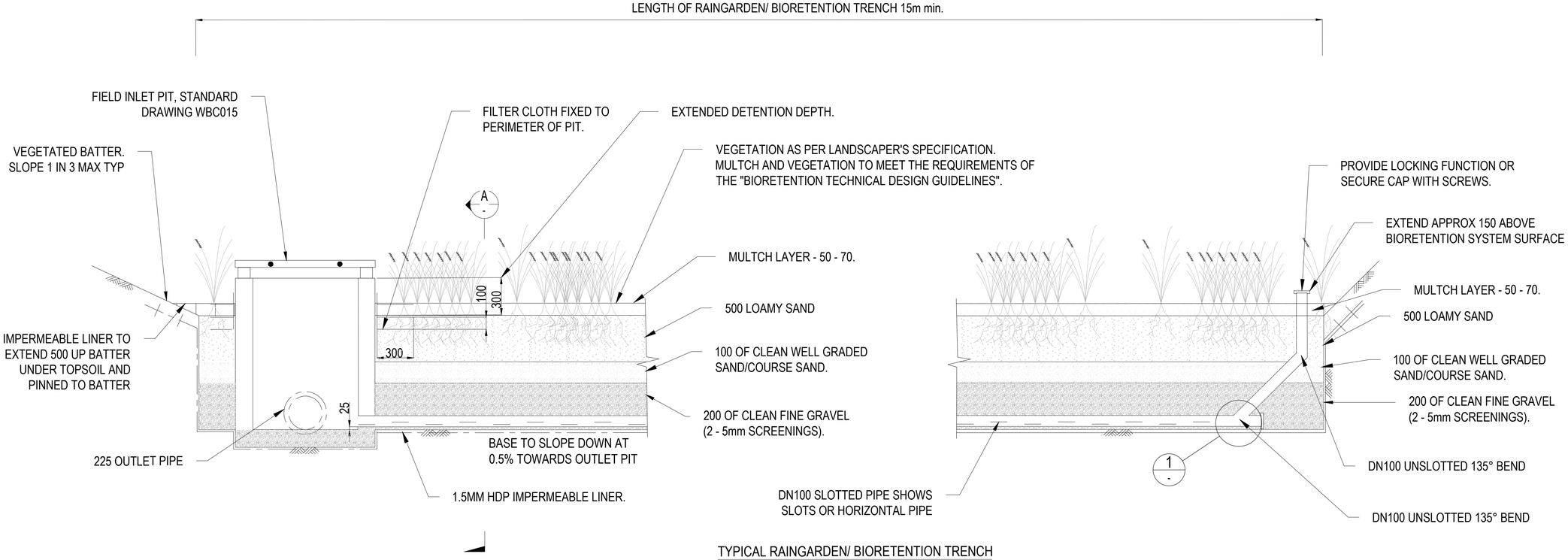
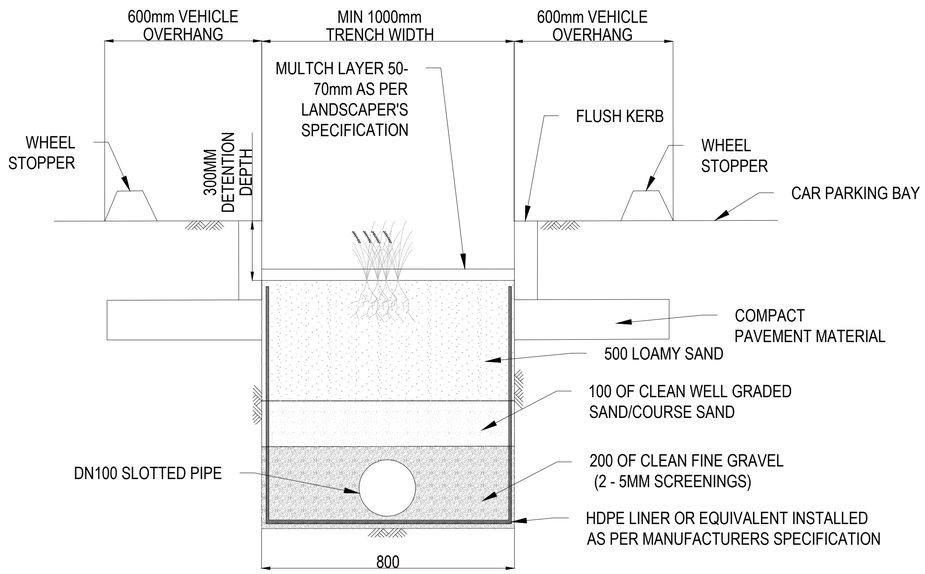


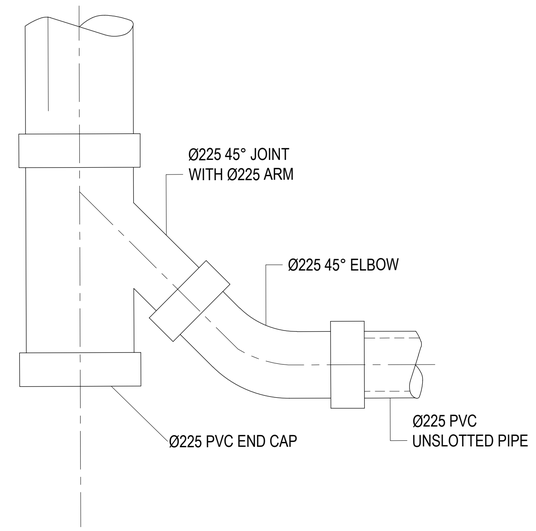
TYPICAL RAINGARDEN/ BIORETENTION TRENCH

LEGEND

- MULTCH LAYER 50 - 70
- 500 LOAMY SAND
- 100 OF CLEAN WELL GRADED SAND/COURSE SAND
- 200 OF CLEAN FINE GRAVEL (2-5mm SCREENINGS)



SECTION A
SCALE 1:50



DETAIL 1
SCALE 1:5 CV-DWG-0007

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. LINER IS NOT REQUIRED WHERE GEOTECHNICAL INSPECTION HAS DETERMINED IN-SITU MATERIAL PROVIDES SUFFICIENT IMPERMEABILITY.

WELLINGTON BLAYNEY CABONNE COUNCIL STRATEGIC ALLIANCE REFERENCE DRAWINGS

WBC009	STORMWATER - KERB INLET PIT CONFIGURATION
WBC010	STORMWATER - PIPE BEDDING
WBC011	STORMWATER - FOOTPATH SURFACE INLET PITS
WBC012	STORMWATER - SURFACE/SURCHARGE PITS
WBC015	STORMWATER - FIELD INLET AND INTERALLOTMENT PITS
WBC017	STORMWATER - SUBSOIL DRAINAGE LINES
WBC018	STORMWATER - SUBSOIL FLUSHOUT AND OUTLET STRUCTURES

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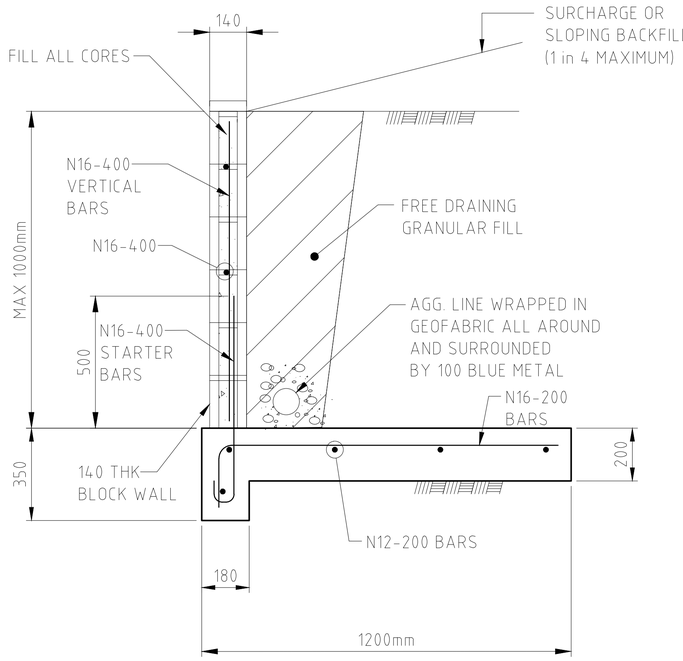
Drawing Title
CIVIL WORKS
DRAINAGE DETAILS

Scale 1 : 250@ A1

Drawing Reference
130607-JAC-CV-DWG-0007

Revision
2

0 10 20 30 40 50 60 70 80 90 100



TYPICAL RETAINING WALL DETAIL

NOTES

1. FOR GENERAL STRUCTURES, RETAINING WALL CONCRETE AND REINFORCEMENT REFER TO STRUCTURAL SERVICES GENERAL NOTES ON DRAWING NUMBER 130607-JAC-ST-DWG-0001

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Drawing Title
CIVIL WORKS
RETAINING WALL TYPICAL DETAILS

Scale 1 : 250@ A1

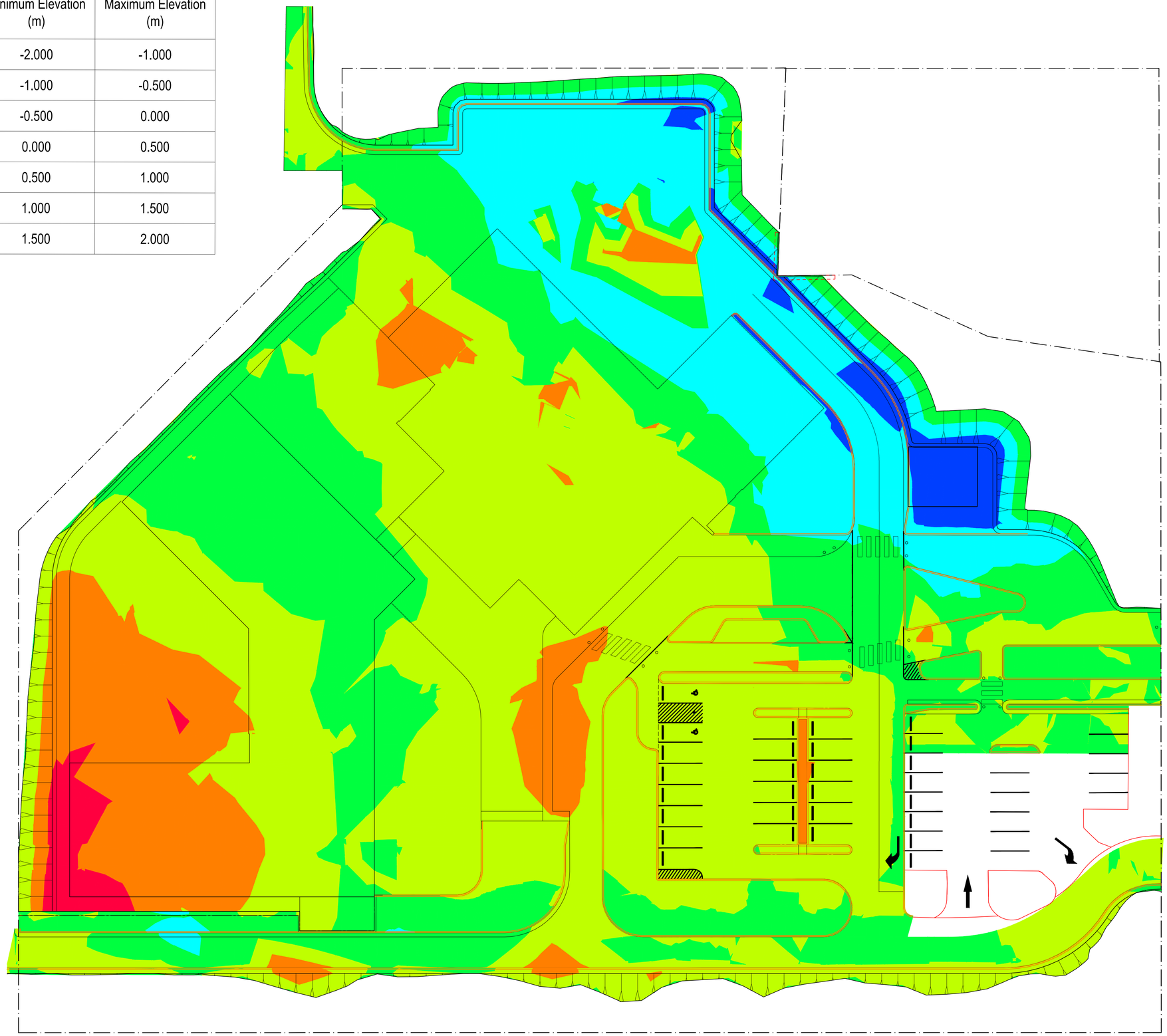
Drawing Reference
130607-JAC-CV-DWG-0008

Revision
1

0 10 20 30 40 50 60 70 80 90 100

Surface Analysis: Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)
1		-2.000	-1.000
2		-1.000	-0.500
3		-0.500	0.000
4		0.000	0.500
5		0.500	1.000
6		1.000	1.500
7		1.500	2.000



NOTES

1. ALLOW FOR ADDITIONAL CUT AND FILL REQUIREMENTS, E.G. IN AREAS OF EXISTING FOOTINGS, WHERE TREES ARE REMOVED AND WHERE RESIDUAL SOIL IS NOT ENCOUNTERED, AS NOTED ON STRUCTURAL DRAWINGS 13067-ST-DWG-0060, 0061 & 0070.

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Drawing Title
CIVIL WORKS
CUT AND FILL PLAN

Scale 1 : 250@ A1

Drawing Reference
130607-JAC-CV-DWG-0009

Revision
1

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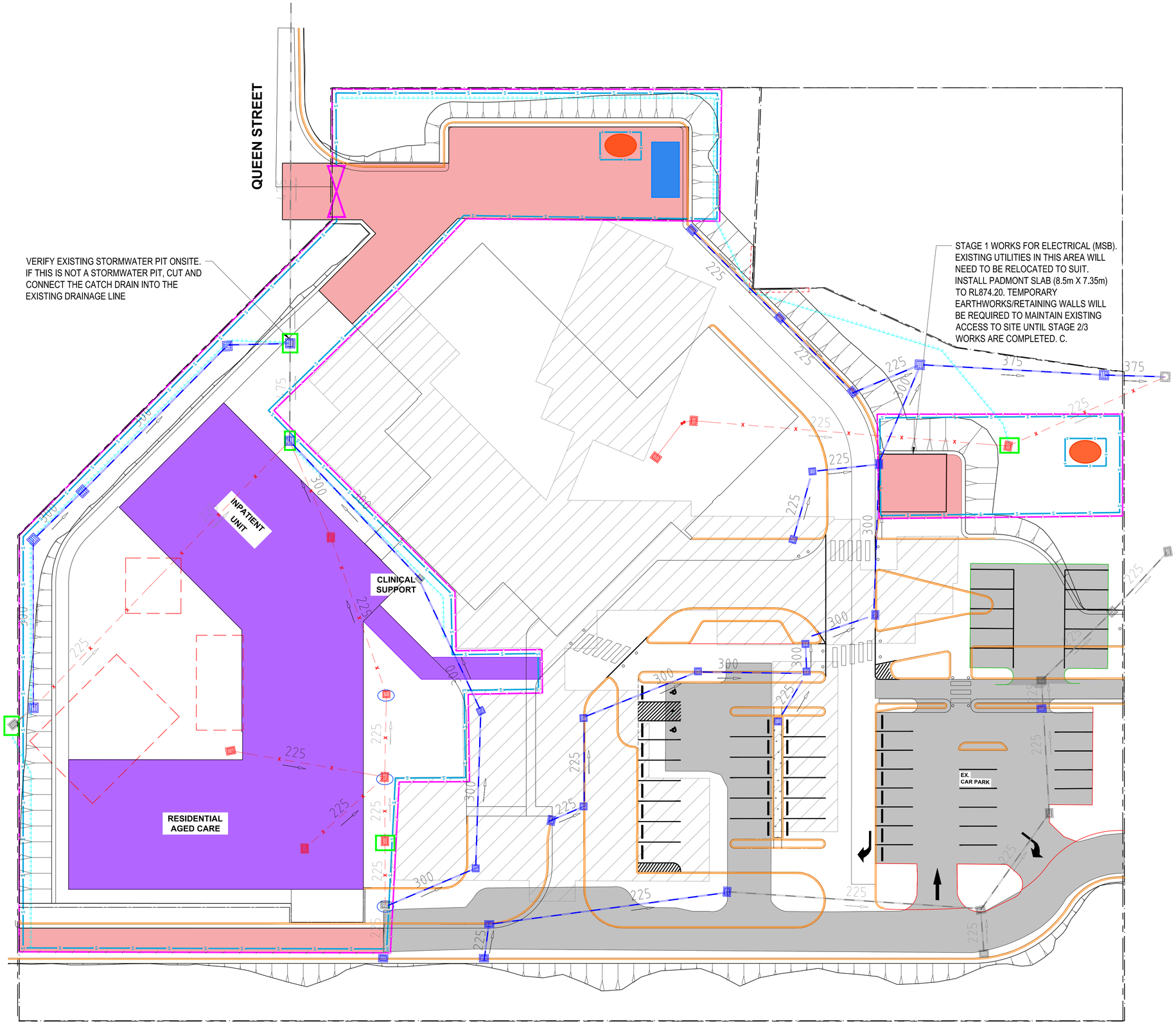

LEGEND

REFERENCE ONLY

- PROPOSED BOUNDARY

CONSTRUCTION STAGING

- EXISTING ROAD AND CARPARK
- ROAD AND CARPARK IN CONSTRUCTION
- ROAD AND CARPARK CONSTRUCTED
- EXISTING BUILDING
- EXISTING BUILDING DEMOLISHED
- NEW BUILDING IN CONSTRUCTION
- NEW BUILDING CONSTRUCTED

EROSION AND SEDIMENT CONTROL

- BARRIER FENCE
- SEDIMENT FENCE
- CATCH DRAIN
- GRAVEL FILTER / GEOTEXTILE SAUSAGE
- GEOTEXTILE INLET FILTER
- GATE
- SITE COMPUND
- STOCK PILE AREA

NOTES

1. EROSION AND SEDIMENT CONTROLS ARE INDICATIVE ONLY.
2. FURTHER TEMPORARY STAGING MAY BE REQUIRED AS CONSTRUCTION PROGRESSES.
3. EROSION SEDIMENT CONTROL MEASURES TO BE IN ACCORDANCE WITH BLAYNEY SHIRE COUNCIL DCP PART G.

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Issue

No.	Date	Description	Chkd
0	17.02.23	100% SCHEMATIC DESIGN ISSUE	K.L
1	22.02.23	100% SCHEMATIC DESIGN ISSUE	K.L
2	06.07.23	75% DESIGN DEVELOPEMENT	K.L
3	09.08.23	FOR TENDER	K.L

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Project

Blayney HS

at

3 Osman St, Blayney NSW 2799

for

Health Infastructure

Drawing Title

CIVIL WORKS
CONSTRUCTION STAGING &
EROSION AND SEDIMENT CONTROL
STAGE 1

Scale 1 : 250@ A1

Drawing Reference

130607-JAC-CV-DWG-0121

Revision

3

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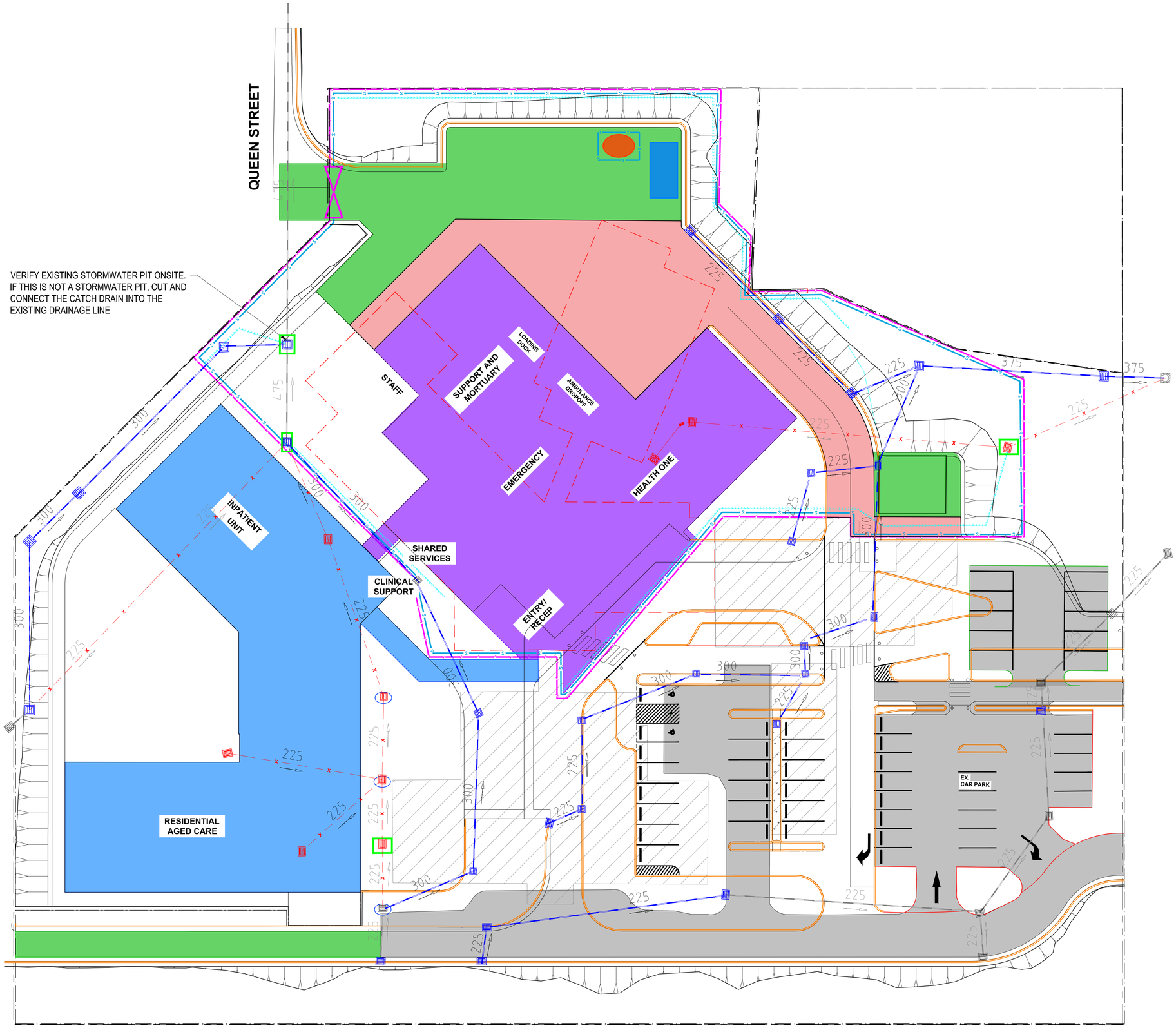

LEGEND

REFERENCE ONLY

- PROPOSED BOUNDARY

CONSTRUCTION STAGING

- EXISTING ROAD AND CARPARK
- ROAD AND CARPARK IN CONSTRUCTION
- ROAD AND CARPARK CONSTRUCTED
- EXISTING BUILDING
- EXISTING BUILDING DEMOLISHED
- NEW BUILDING IN CONSTRUCTION
- NEW BUILDING CONSTRUCTED

EROSION AND SEDIMENT CONTROL

- BARRIER FENCE
- SEDIMENT FENCE
- CATCH DRAIN
- GRAVEL FILTER / GEOTEXTILE SAUSAGE
- GEOTEXTILE INLET FILTER
- GATE
- SITE COMPUND
- STOCK PILE AREA

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Drawing Title

CIVIL WORKS
CONSTRUCTION STAGING &
EROSION AND SEDIMENT CONTROL
STAGE 2

Scale 1 : 250@ A1

Drawing Reference

130607-JAC-CV-DWG-0122

Revision

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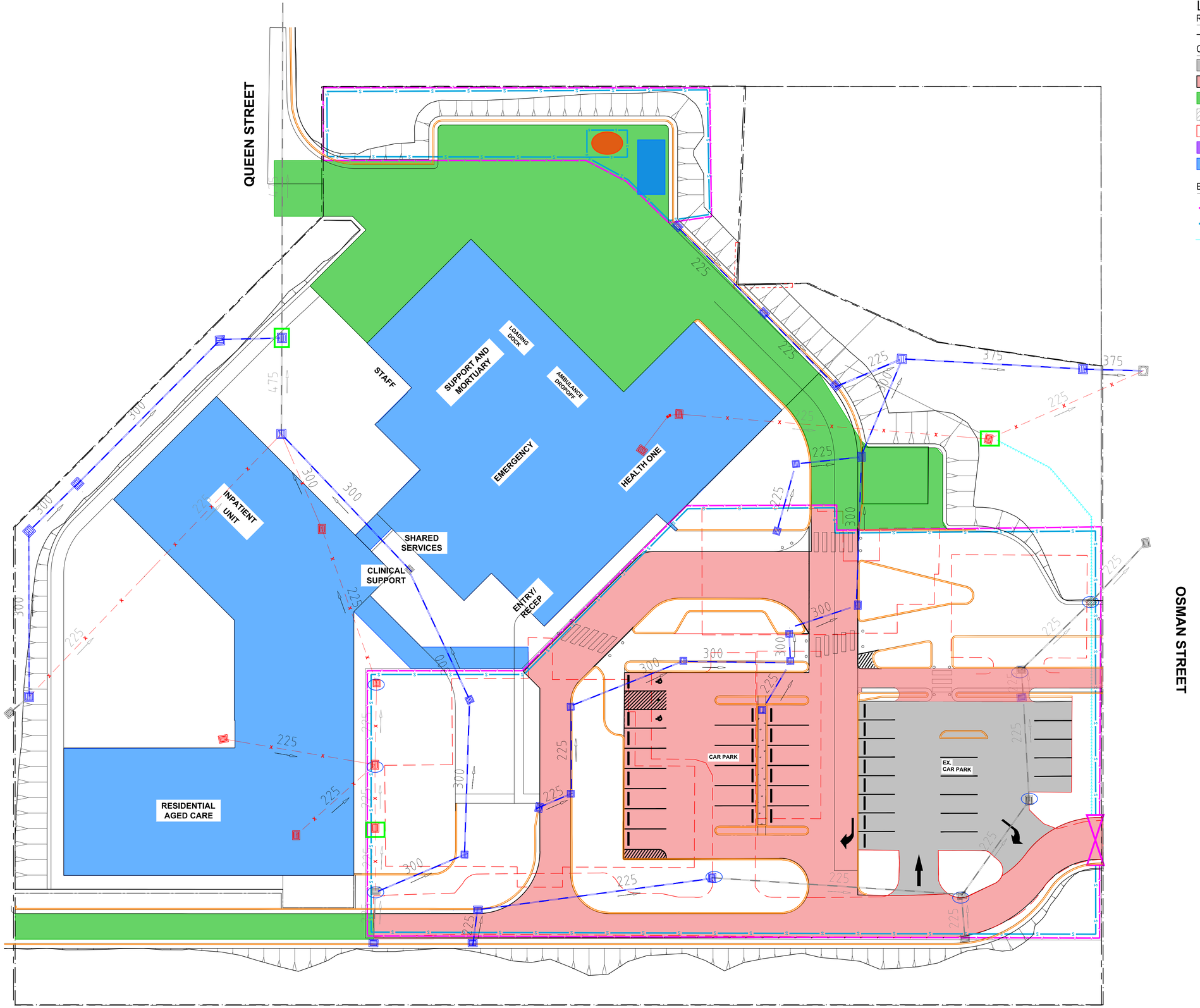

LEGEND

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NOTES

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2. FURTHER TEMPORARY STAGING MAY BE REQUIRED AS CONSTRUCTION PROGRESSES.
3. ACCESS TO HEALTH ONE BUILDING AND RESIDENTIAL AGED CARE BUILDING WILL NEED TO BE CONSIDERED FROM THE EXISTING CARPARK.
4. EROSION SEDIMENT CONTROL MEASURES TO BE IN ACCORDANCE WITH BLAYNEY SHIRE COUNCIL DCP PART G.

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Drawing Title
CIVIL WORKS
CONSTRUCTION STAGING &
EROSION AND SEDIMENT CONTROL
STAGE 3

Scale 1 : 250@ A1

Drawing Reference
130607-JAC-CV-DWG-0123

Revision
3

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Appendix B. Earthworks

Earthworks Preliminary Analysis

Date: 17 February 2023
Project name: Blayney Hospital
Project no: IA228800
Prepared by: Martin Yates

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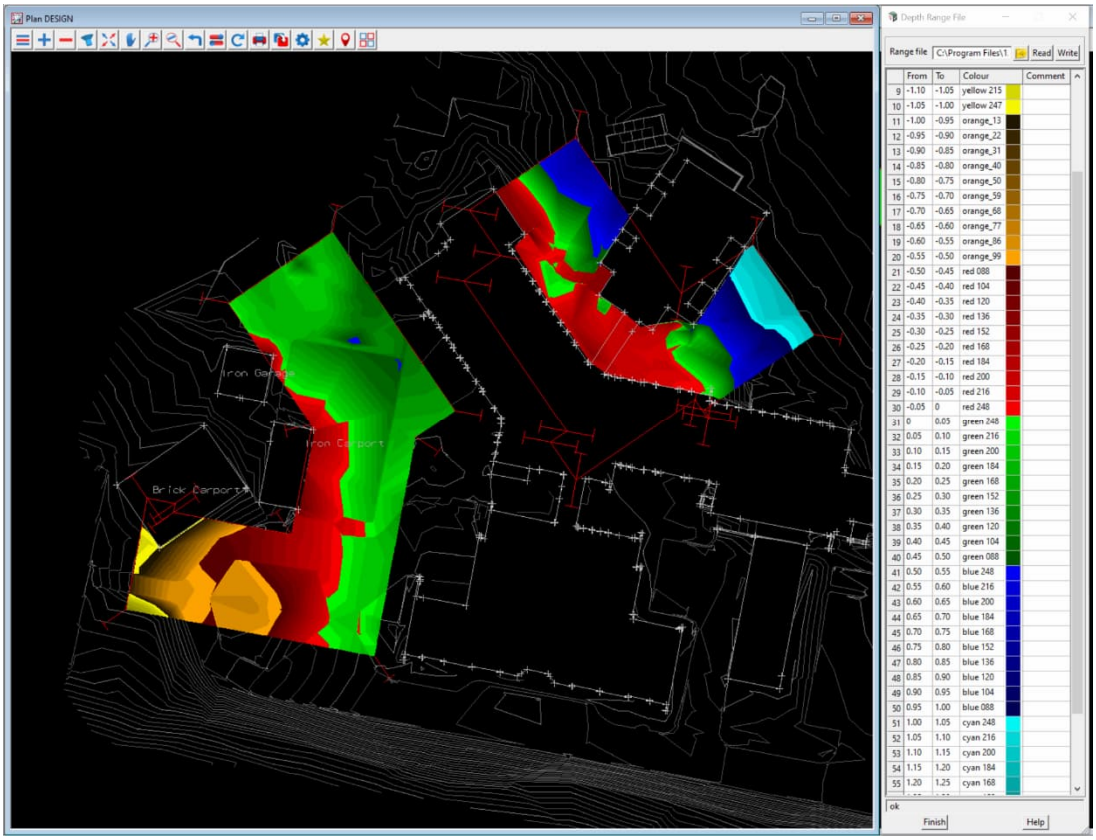
Please see below high level summary of key items for Blayney. This is a preliminary preliminary analysis only with the design still at a 2d strategic level.

- Proposed levels Residential Aged Care building FSL = 874.65 and Health One building FSL = 874.20. Footing depth is unknown at this stage.
- The proposed levels provide 0.45m height difference between buildings and approximately balance maximum cut and fill across the site, volume balance has not been reviewed at this stage.
- The image below highlights depth range for the proposed buildings compared to the existing surface levels. The Residential Aged Care building requires approximately 1.3m cut in the south-west corner of the site and the Health One buildings requires approximately 1.2m fill on the north-east corner of the building adjacent the boundary.

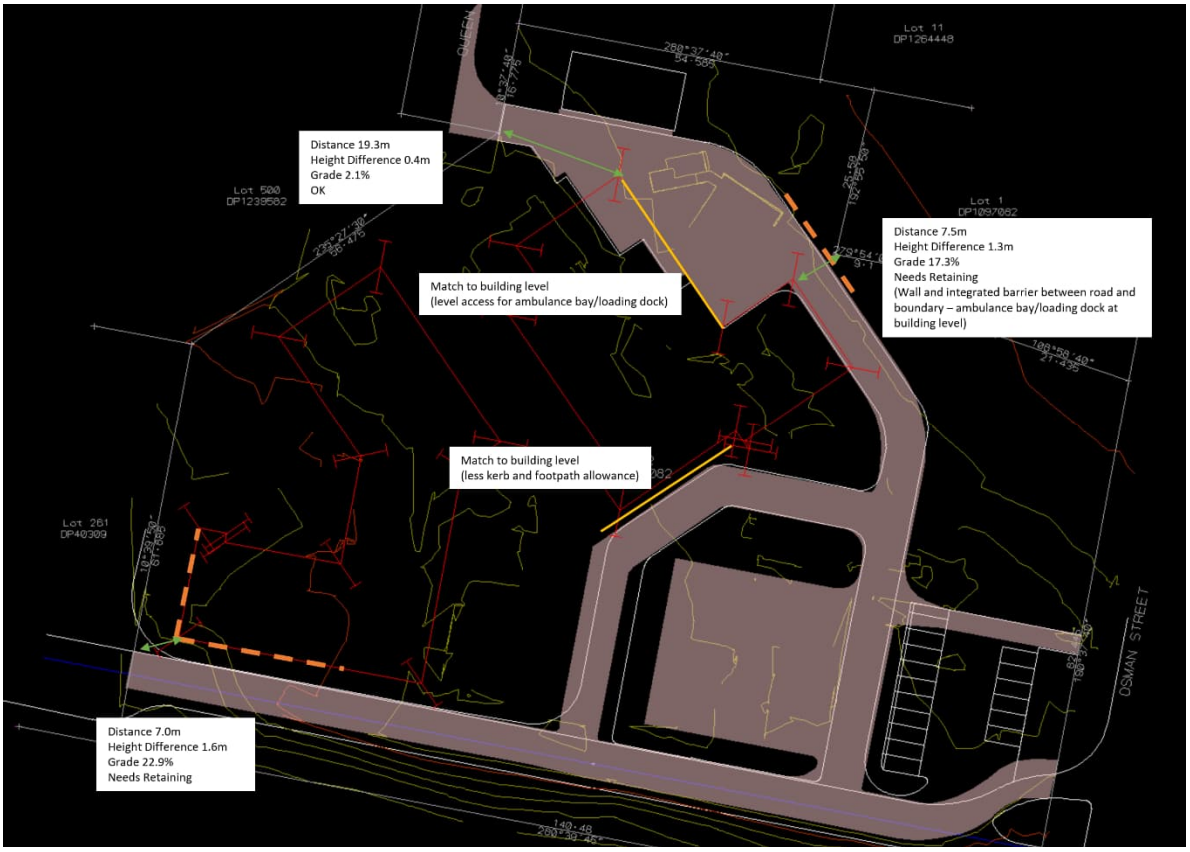


Key items for consideration

- South-west corner of site adjacent the Residential Aged Care building. The close proximity of the access road and building requires a retaining structure at this location to address the proposed 1.3m fill. The access road is constrained by the existing levels at the interface with the road off Oldham Place. Consideration is required for the proximity of a retaining structure to the edge of the proposed access road and for a potential circulating path around the building. There is approximately 2.3m between the proposed building roof line and the edge of the access road.

- Level access for ambulance bay/loading dock. It has been assumed that the pavement levels for the ambulance bay/loading dock will match the building FSL at the interface with the Health One building and grade away from the building at a maximum of 2.5%. This detail is to be further developed at the detailed design stage.

- Pinch point North-east of Health One building. The proposed location of the Health One building constrains the available space for a circulating roadway connecting the ambulance bay/loading dock and the main car park. At the corner of the site boundary there is approximately 7.5m offset (0.75m circulating path adjacent the building, 6.0m road, 0.75m residual to boundary) with a 1.3m difference in height. The surface level of the proposed new road is constrained by the ambulance bay/loading dock levels, with the height difference to the existing surface to be addressed by a retaining structure adjacent the boundary located in the 0.75m to the proposed new road. Assuming a 2.5% grade from the ambulance bay/loading dock interface, the proposed new road could be located approximately 0.3m below the building FSL with a residual of approximately 1.0m to be addressed via the retaining structure.



Appendix C. Stormwater Drainage Memo

Stormwater Assessment (Final)

Date: 9 August 2023
Project name: Blayney MPS
Project no: IA228800
Attention: Nick Crossingham
Company: APP
Prepared by: Rapula Regoeng

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New stormwater drainage systems and modification of existing drainage systems where required has been carried out to comply with the Wellington, Blayney and Cabonne Council (WBC) Strategic Alliance Guidelines for Engineering Works, Australian Standards and Austroads guidelines adopting design parameters tabled below.

Table 1: Summary of drainage design criterion

Criterion	Requirement	Source
Minor Drainage System	20% AEP	Section 3.3.1 of WBC Strategic Alliance Guidelines for Engineering Works
Major Drainage System	1% AEP	Section 3.3 of WBC Strategic Alliance Guidelines for Engineering Works
Flow width	2.5m for the minor drainage system 1m at intersections	Section 3.4.1.2 of WBC Strategic Alliance Guidelines for Engineering Works
Minimum pipe size	225mm for the minor drainage system 100mm for water quality elements	Section 3.8.4.3 of WBC Strategic Alliance Guidelines for Engineering Works
Pipe Class	SN1000 for UPVC Class 3 for RCP or FRC under carriageways/carpark	Manufacturer's specification
Minimum pipe cover	300mm absolute minimum cover 600mm under the kerb line	Sections 3.4.2.5 & 3.4.2.6 of WBC Strategic Alliance Guidelines for Engineering Works
Minimum pipe grade	1% where possible	Sections 3.4.2.4 of WBC Strategic Alliance Guidelines for Engineering Works AS3725
Minimum pipe velocity	0.6m/s for 1EY	AGRD Part 5A
Maximum pipe velocity	6m/s (absolute = 8m/s)	AGRD Part 5A
Pipe Installation Support	H2 trench installation within footpaths and HS2 trench installation under carriageway	Sections 3.4.2.1 of WBC Strategic Alliance Guidelines for Engineering Works AS3725
Freeboard	150mm for minor drainage systems 500mm for major drainage systems	Sections 3.3.1 and 3.4.1.2 of WBC Strategic Alliance Guidelines for Engineering Works
Maximum pit spacing	85m	Section 3.4.1.2 of WBC Strategic Alliance Guidelines for Engineering Works
Pit bypass flow	15% of the gutter flow	Section 3.4.1.2 of WBC Strategic Alliance Guidelines for Engineering Works

Velocity x depth factor	0.4m2/s	Section 3.4.1.2 of WBC Strategic Alliance Guidelines for Engineering Works
Channel lining	Concrete lined n = 0.013 Gabions n = 0.03 Grassed channel n = 0.035 Clear earth n = 0.02	Section 3.5.2 of WBC Strategic Alliance Guidelines for Engineering Works
Blockage factor	20% for on-grade 50% for sag pits	Section 3.4.1.3 of WBC Strategic Alliance Guidelines for Engineering Works
Drainage structures	All drainage elements including but not limited to kerb inlet pits and surface inlet pits	Council standard drawings and RTA standard drawings

In addition to broad stormwater objectives in Section 3.1 of WBC Strategic Alliance Guidelines for Engineering Works, the stormwater drainage design includes the following:

- Maintain existing stormwater flow direction and discharge points in Queens Street and Osman Street
- Include measures for the management of external overland flows along the Western boundary in order to minimise impact on the proposed buildings
- Maintain and utilise existing drainage systems at the existing the connection
- Retain and utilise existing drainage system where physically possible
- Provide water quality measures for the new carpark in order to maintain existing water quality and
- Provide two new rainwater tanks to enhance the mandate of stormwater harvesting and reuse for irrigation purposes.

The subject site has three main sub-catchments discharging to three existing discharge points, two discharge points in Osman Street and one discharge point in Queens Street existing drainage systems as shown in Figure 1 below. In the proposed condition, the stormwater design will maintain and utilise the existing discharge points, with minor reconfiguration of internal sub-catchments.

Figure 1: Existing Sub-catchments and Discharge Points

Stormwater runoff from the subject site discharging into Osman Street and Queens Street existing drainage systems is conveyed via the existing drainage pit and pipe systems to Stillingfleet Street existing drainage systems before discharging into a wetland located at the intersection of Stillingfleet Street and Lower Farm St, Figure 2 below, for detention and treatment before ultimately discharging to Belubula River.

Figure 2: Existing Council drainage systems

The stormwater strategy for the proposed development seeks to utilise the existing Council stormwater drainage systems to convey runoff from the site to the existing wetlands at the corner of Stillingfleet Street and Lower Farm Street for detention and water quality treatment. The development proposed to install raingardens in the new carpark to treat runoff from the carpark only and provide two 10 000L rainwater tanks for stormwater harvesting and reuse in irrigation of landscaped areas. It is expected that the provision of rainwater tanks and raingarden in the proposed carpark will enhance the use of water sensitive urban design elements and reduce pollutant loads carried by the stormwater runoff from the subject site to the existing wetlands where further treatment and detention will occur.

The peak stormwater runoff discharges from the subject site in the existing condition and in the post development condition are as tabled below.

Table 2: Peak stormwater discharges occurring in the existing condition

Outlet Points	Existing Contributing Catchment				
	Area	Total Impervious Area		$Q_{20\ \%\ AEP\ peak\ flows}$	$Q_{1\ \%\ AEP\ peak\ flows}$
	Ha	Ha	%	L/s	L/s
Queen Street Sub-catchment	0.79	0.47	60	98.0	216.0
Osman Street Sub-catchment, Existing Pit 4-1	0.33	0.18	55	37.0	85.0
Osman Street Sub-catchment, Existing Pit 6-1	0.55	0.28	50	58.0	139.0
Total	1.67				

Table 3: Peak stormwater discharges occurring in the post development

Outlet Points	Post Development Contributing Catchment				
	Area	Total Impervious Area		$Q_{20\ \%\ AEP\ peak\ flows}$	$Q_{1\ \%\ AEP\ peak\ flows}$
	Ha	Ha	%	L/s	L/s
Queen Street Sub-catchment	0.76	0.50	65	101.0	216.0

Osman Street Sub-catchment, Existing Pit 4-1	0.38	0.19	50	41.0	96.0
Osman Street Sub-catchment, Existing Pit 6-1	0.52	0.34	65	68.0	144.0
Total	1.67				

As shown in Tables 2 and 3 above, peak flows discharging to each of the three existing connection points in the post development condition is about the same as the peak flows in the existing condition and it is expected that no onsite detention or upgrade of the existing external stormwater drainage systems will be required as a result of the proposed hospital redevelopment. Peak flows are maintained by reconfiguring the inter-allotment sub-catchments such that the total impervious areas contributing to each of the discharge points in the post development is about the same as the total impervious area to each discharge points in the existing condition.

A review of Blayney flood studies, viz. Addendum to Blayney Flood Study – Update to Australian Rainfall and Runoff 2019 Guidelines prepared for Blayney Shire Council dated 10th February 2022 by Storm Consulting and Blayney Flood Study -Flood Study Report prepared for Blayney Shire Council dated 15th June 2015 by Jacobs indicates that Blayney Hospital is located withing the overland flow path of runoff cascading from the catchment west of the Hospital.

The 2015 Blayney flood study indicated the development site inundated in a 20%AEP event and above due to the overland flows from the catchment west of the hospital as shown in refer Figures 3 and 4 below.

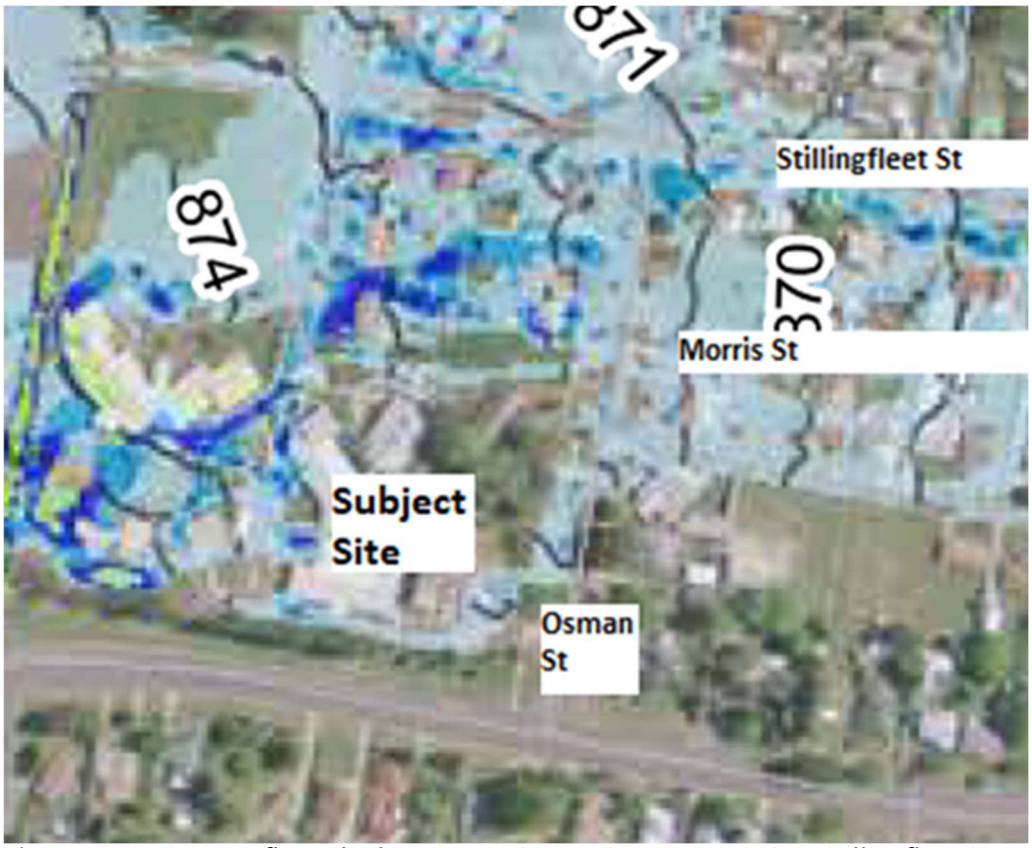

Figure 3: Existing gap flows discharging via Osman Street, Morris St & Stillingfleet St in a 20% AEP event Reference: Appendix D of Blayney Flood Study -Flood Study Report prepared for Blayney Shire Council dated 15th June 2015 by Jacobs.

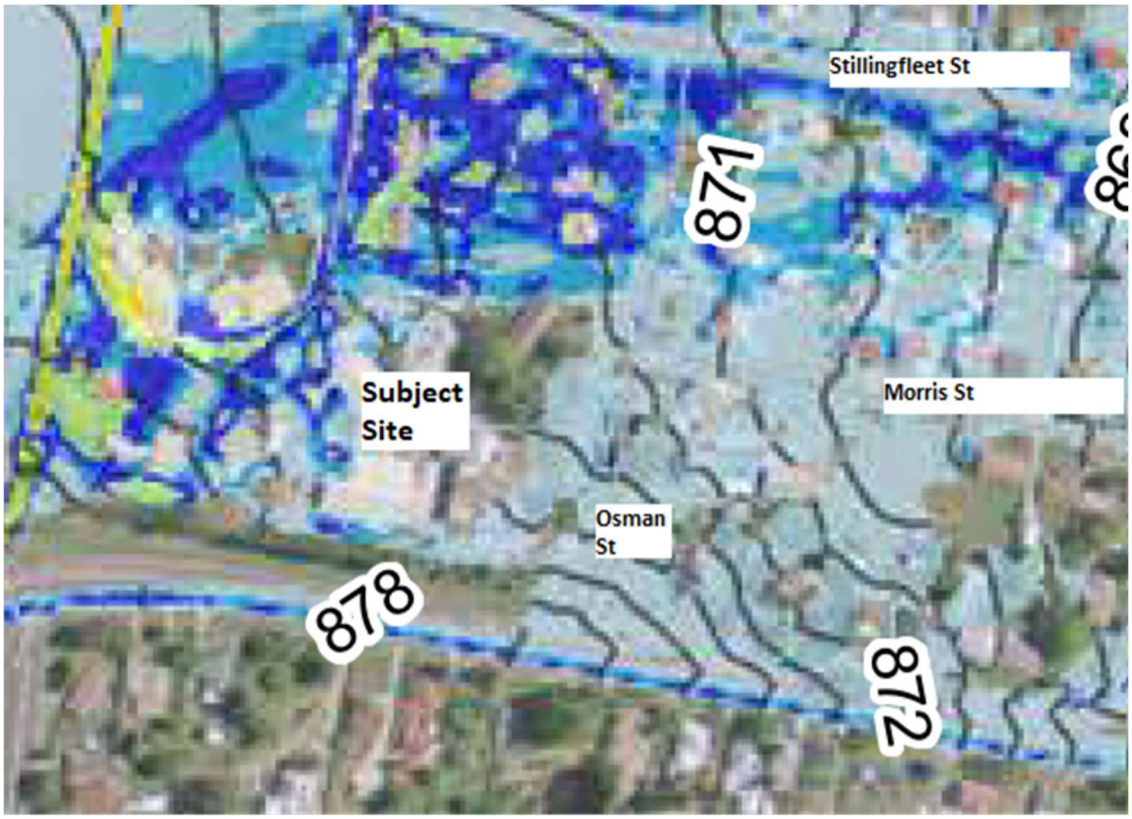

Figure 4: Existing gap flows discharging via Osman Street, Morris St & Stillingfleet St in a 1% AEP event
Reference: Appendix D of Blayney Flood Study -Flood Study Report prepared for Blayney Shire Council dated 15th June 2015 by Jacobs

Water quality measures proposed for the hospital redevelopment includes raingardens for the new carpark, grassed swale for the access roads and two 10 000 L rainwater tanks for harvesting roof water and reuse in irrigation of landscaped area. The water quality measures have been proposed to comply with the water quality objective of maintaining existing water quality of receiving waters in Section 3.1 WBC Strategic Alliance Guidelines for Engineering Works. Review of the water quality outputs from the development site using MUSIC software indicates that the proposed water quality measures are sufficient to treat runoff from the site to better quality than in the existing condition as shown below and therefore complies with the water quality objective of WBC Strategic Alliance Guidelines for Engineering Works.

Table 4: Summary of Treatment Train Efficiencies in the Existing and Post Development Conditions

	Source		Residual Load		% Reduction	
	Pre dev.	Post Dev.	Pre dev.	Post Dev.	Pre dev.	Post Dev.
Flow (ML/yr)	15.8	15.7	15.8	15.6	0	0.637
Total Suspended Solids (kg/yr)	2.84E+03	2.20E+03	2.84E+03	1.93E+03	0	12.3
Total Phosphorus (kg/yr)	6.26	4.97	6.26	4.57	0	8.05
Total Nitrogen (kg/yr)	44	40.2	44	38.5	0	4.23
Gross Pollutants (kg/yr)	404	382	404	255	0	33.2

Appendix D. Pavement Design Memo and Calculations

Blayney Hospital Redevelopment Road and Car Park Pavement Design

Date:	22 March 2023
Project name:	Blayney Hospital Redevelopment
Project no:	IA228800
Prepared by:	Kai Zheng
Reviewed by:	Brendan Bennett
Revision no:	B
Copies to:	Kathy Lau and Dana Silang

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1. Introduction

This technical memorandum has been prepared for the pavement design of the access road and new car park for the Blayney Hospital Redevelopment in regional New South Wales. Figure 1 below shows the access roads and the proposed new car park for the hospital redevelopment:

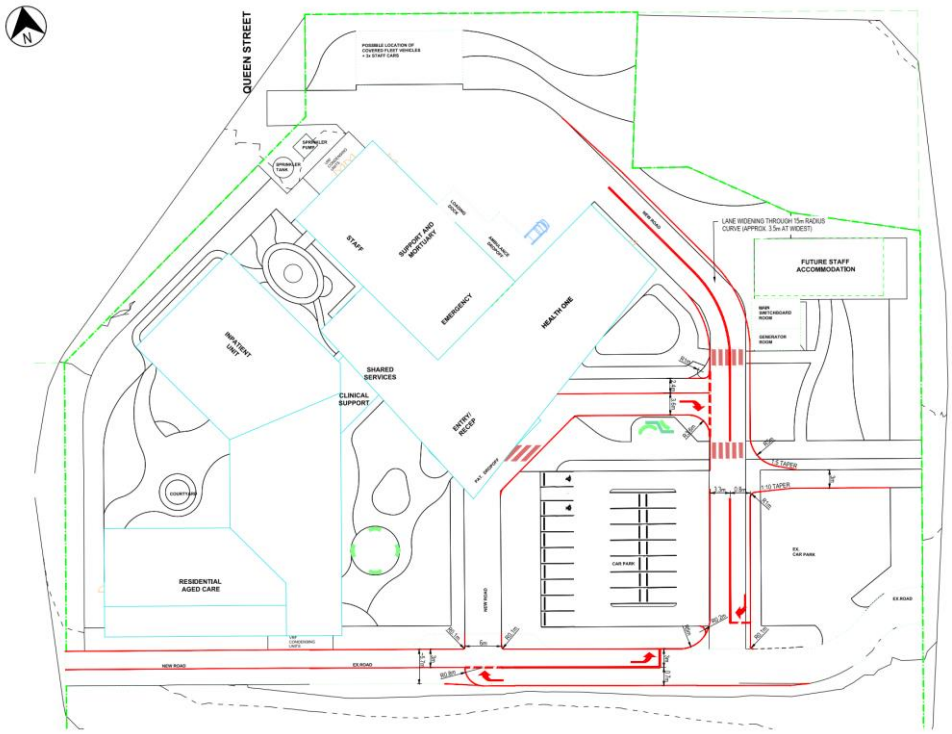


Figure 1: Access Roads for the Blayney Hospital Redevelopment

This document presents the results of the pavement recommendation for the access roads and new car park.

2. Standards, References and Guidelines

The following standards, references and guidelines are applicable for this project:

- Austroads Guide to Pavement Technology Part 2 (AGPT02): Pavement Structural Design – November 2019
- Roads and Maritime Supplement to Austroads Guide to Pavement Technology Part 2: Pavement Structural Design

3. Assumptions

The following assumptions have been made for the pavement design purpose:

- Traffic volume is assumed to be 200 vehicles per day with 20% of heavy vehicles for access road and 5% for car park based on the advice provided by SCT Consulting from review of Clinical Service Plan, the Workforce Plan and an estimate of staff, visitors, and patients

4. Design Traffic Loading

Due to the low traffic volume anticipated for the hospital, the traffic load distribution for a Local Access Road with Buses from Austroads Table O 4 is considered suitable for this case, with the following factors to be used in determining the design traffic loading:

N_{HVAG} = 2.06 ESA/HVAG = 0.44 ESA/HV = 0.91

With the adoption of a 40 years design life (assumed), Lane Distribution Factor (LDF) of 1 and a Direction Factor (DF) of 1 for an one-way car park and 0.5 for a two way access road, the design traffic loading in Table 1 below is determined:

Table 1 – Design Traffic Loading

Description	AADT	HV (%)	Design Years	N_{DT} (HVAG)	DESA
Blayney Hospital Redevelopment – Access Road	200	20%	40	735000	3.23×10^5
Blayney Hospital Redevelopment – Car Park	200	5%	40	368000	1.62×10^5
Blayney Hospital Redevelopment – Loading Dock	200	20%	40	2205000	9.70×10^5

Noting that it is assumed the design life of the new pavement is 40 years.

Due to the constant turning movement of heavy vehicle at the proposed loading dock, a multiplier of 3 has been applied in estimating design traffic for the loading dock based on AGPT02.

5. Asphalt Modulus

The asphalt modulus is used for the design of the full depth asphalt pavement for the loading dock area where frequent turning movement of heavy vehicles are anticipated. The following asphalt modulus is adopted for the full depth asphalt pavement:

Asphalt Mix Type	Binder	Design Speed for Asphalt Characterisation (km/hr)	WMAPT (Degree) based on AGPT Part 2 Appendix B	Adjusted Mix Modulus (MPa)
AC10	A15E	10	19	2,800
AC14	C450	10	19	4,000

Refer to Appendix B for asphalt modulus calculation.

6. Subgrade

Design subgrade CBR of 5 was determined in accordance with the Geotechnical Investigation Report by JK Geotechnics under Section 4.6. The four-day soaked CBR test report in Table B of the Geotechnical Investigation Report also indicated that the subgrade has a swell percentage of 1%. Based on Roads and Maritime Supplement to Austroads Guide to Pavement Technology Part 2: Pavement Structural Design at this location, a 10-day soaked CBR test is required due to the annual rainfall greater than 800mm as per Section 5.6.2. However, at this stage, it is assumed that no expansive soil is present (swell <2.5%) and no working

platform / capping layer is required, but it is recommended that a 10-day soaked CBR test is to be undertaken to confirm the assumption prior to work commencement.

7. Groundwater Level

Based on the geotechnical investigation report, ground water was found 0.85m below ground level at BH15 at the south-western corner of the development, with groundwater seepage encountered during or on completion of various boreholes, ranging from depths between 0.85m to 1.4m. The geotechnical investigation report recommended to install subsoil drain at least 0.3m below the subgrade levels to help manage the moisture seepage on the clay subgrade in the long term.

8. Pavement Design

A granular pavement design with asphalt wearing course to match existing pavement type is considered for this project due to the low traffic volume. However, for the loading dock area, , a full depth asphalt pavement has been considered to cater for the turning movement of heavy vehicle in the area.

The pavement configurations have been designed in accordance with the Austroads Guide to Pavement Technology – Part 2 – Pavement Structural Design (Figure 12.2).

The following pavement configuration in Table 2 and 3 below are recommended, with calculations for both access road and car park contained in Appendix A and the CIRCLY output in Appendix C.

It should be noted that a consistent pavement thickness has been adopted for the access road and car park, due to their minimal difference in thickness for ease of construction. A 10mm tolerance has also been incorporated into the subbase layer in the granular pavement and the critical asphalt layer in the full depth asphalt pavement.

Table 2 – Granular Pavement Configuration for Access Road and Car Park

Carriageway Pavement Layer	Thickness (mm)
Wearing Course – AC10 C450	40
7mm Low Cutter Seal with Primer (C240 Binder)	-
Base Course – Class 2 DGB20 Category D	120
Subbase – DGS20	120
Subbase – DGS20 (Critical Layer)	120
Subgrade CBR	5%
Total Thickness	400

Table 3 – Full Depth Asphalt Pavement Configuration for Loading Dock Area

Carriageway Pavement Layer	Thickness (mm)
Wearing Course – AC10 A15E	40
Intermediate Course – AC14 C320	55
Intermediate Course – AC14 C320 (Critical Layer)	60
7mm Low Cutter Seal with Primer (C240 Binder)	-
Selected Material Zone	300
Subgrade CBR	5%
Total Thickness	455

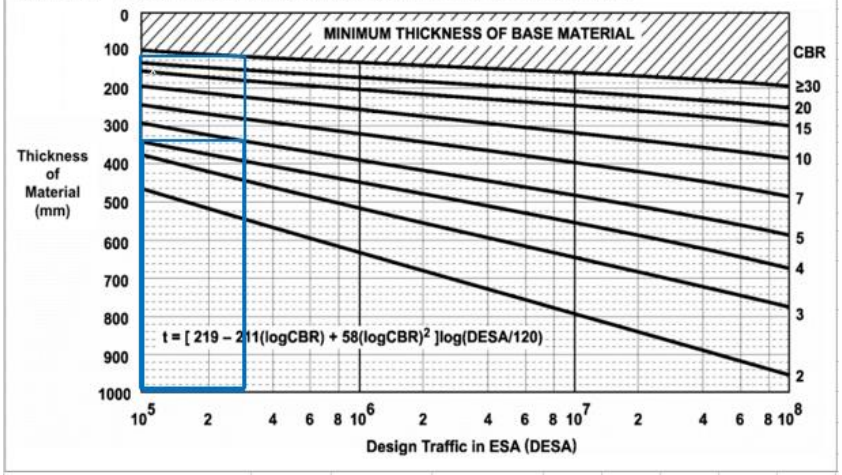
Appendix A – Granular Pavement Design Calculation

Design Traffic Calculation																
ID	Description	AADT (estimated)	HV average (%)	Number of HV, AADTHV at Hospital Opening	DF	N_{HVAG}	LDF	R (%)	P (Years)	CGF	N_{DT} (HVAG)	N_i (HV)	N_{HV} (HV)	N_{DT} (HVAG)	ESA / HVAG	DESA
1	Blayney Hospital Redevelopment - Access Road	200	20.0%	40	0.5	2.06	1.0	1.00	40	48.89	7.35E+05	2.00E+01	3.57E+05	7.35E+05	0.44	3.23E+05
2	Blayney Hospital Redevelopment - Loading Dock	200	20.0%	40	0.5	2.06	1.0	1.00	40	48.89	2.21E+06	2.00E+01	3.57E+05	2.21E+06	0.44	9.70E+05
3	Blayney Hospital Redevelopment - Car Park	200	5.0%	10	1.0	2.06	1.0	1.00	40	48.89	3.68E+05	1.00E+01	1.78E+05	3.68E+05	0.44	1.62E+05

Note:
1. AADT provided is for in and out traffic movements
2. Car park is one way only
3. A multiplier of 3 has been applied in estimating design traffic for high stress area for turning movements within the loading dock.

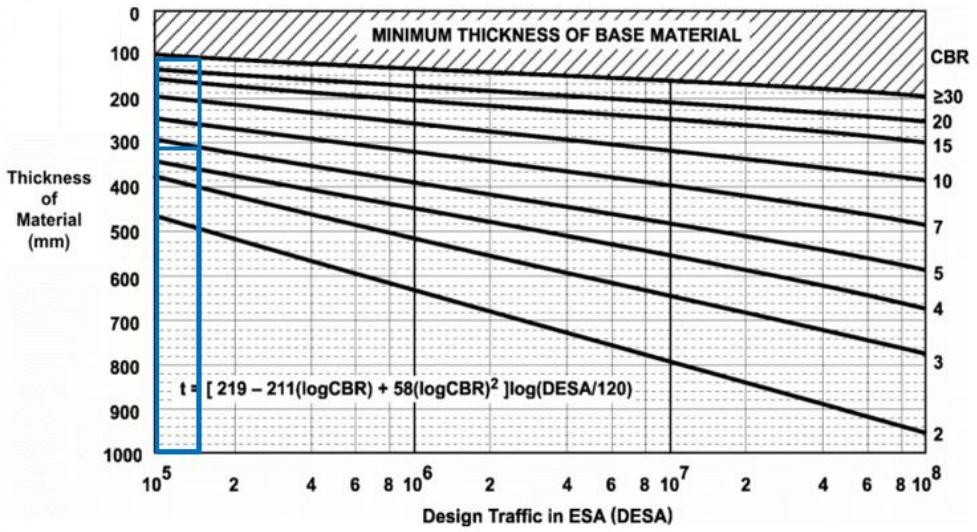
PAVEMENT CONFIGURATION - ACCESS ROAD					
LAYER	MIN. THICKNESS	DESIGN REQUIREMENT*	MATERIAL	BINDER RATE / COMPACTION	DESCRIPTION
Wearing Course	-	40	AC10 C450	-	40mm AC10 C450
Base (thickness, material, compaction)	120	120	Class 2 DGB20 Category D	102% compaction	120 mm thickness Class 2 DGB20 Category D material compacted to 102% compaction
Sub-base (thickness, material, compaction)	230	240	DGS20	100% compaction	240 mm thickness DGS20 material compacted to 100% compaction
TOTAL THICKNESS	350	400 mm			

Figure 8.4: Design chart for granular pavements with thin bituminous surfacing



PAVEMENT CONFIGURATION - CAR PARK					
LAYER	MIN. THICKNESS	DESIGN REQUIREMENT*	MATERIAL	BINDER RATE / COMPACTION	DESCRIPTION
Wearing Course	-	40	AC10 C450	-	40mm AC10 C450
Base (thickness, material, compaction)	110	110	Class 2 DGB20 Category D	102% compaction	110 mm thickness Class 2 DGB20 Category D material compacted to 102% compaction
Sub-base (thickness, material, compaction)	210	220	DGS20	100% compaction	220 mm thickness DGS20 material compacted to 100% compaction
TOTAL THICKNESS	320	370 mm			

Figure 8.4: Design chart for granular pavements with thin bituminous surfacing



Appendix B – Asphalt Modulus Calculation

DESIGN ASPHALT MODULUS

Project details:	Blayney Hospital Full Depth Asphalt for Loading Dock
Date:	31 March 2023
Designer:	Kai ZHeng
AC Modulus version:	6B (01 March 2018)
Design references:	Roads and Maritime Supplement to Austroads Part 2 Roads and Maritime asphalt and material specifications Austroads Part 2: Pavement Structural Design (AGPT02-17)

Inputs

Mix type:	AC10
Binder grade:	A15E
Modulus adjustment factor:	0.75
Total binder content (by mass):	5.7%
Binder absorption:	0.3%
Binder density:	1.043 tonnes/m3
Insitu air voids:	6.0%
Combined bulk density of mineral aggregate:	2.65 tonnes/m3
Bitumen penetration at 25° C (0.1 mm):	31 (after RTFO)
Bitumen viscosity at 60° C:	970 Pa.s (after RTFO)
Loading speed:	10 km/h
WMAPT:	19.0° C

Results

Time of loading:	0.10 seconds
Bitumen T800 pen:	58.1° C
Bitumen Penetration Index:	-0.4
Binder stiffness:	32.0 MPa
Binder volume:	11.9%
Aggregate volume:	82.1%
Nominal mix modulus:	2,816 MPa
Adjusted mix modulus:	2,800 MPa
CIRCLY (k) value:	0.004475

DESIGN ASPHALT MODULUS

Project details:	Blayney Hospital Full Depth Asphalt for Loading Dock
Date:	31 March 2023
Designer:	Kai ZHeng
AC Modulus version:	6B (01 March 2018)
Design references:	Roads and Maritime Supplement to Austroads Part 2 Roads and Maritime asphalt and material specifications Austroads Part 2: Pavement Structural Design (AGPT02-17)

Inputs

Mix type:	AC14
Binder grade:	C450
Modulus adjustment factor:	1
Total binder content (by mass):	5.2%
Binder absorption:	0.3%
Binder density:	1.043 tonnes/m3
Insitu air voids:	6.0%
Combined bulk density of mineral aggregate:	2.65 tonnes/m3
Bitumen penetration at 25° C (0.1 mm):	31 (after RTFO)
Bitumen viscosity at 60° C:	970 Pa.s (after RTFO)
Loading speed:	10 km/h
WMAPT:	19.0° C

Results

Time of loading:	0.10 seconds
Bitumen T800 pen:	58.1° C
Bitumen Penetration Index:	-0.4
Binder stiffness:	32.0 MPa
Binder volume:	10.9%
Aggregate volume:	83.1%
Nominal mix modulus:	4,228 MPa
Adjusted mix modulus:	4,000 MPa
CIRCLY (k) value:	0.003637

Appendix C – CIRCLY Output for Full Depth Asphalt

CIRCLY - Version 7.0 (1 February 2022)

Job Title: Blayney Hospital Loading Dock Pavement Design (High Stress)

Design Method: Austroads 2017

NDT (cumulative heavy vehicle axle groups over design period): 2.21E+06

Traffic Load Distribution:

ID: LTR - O4
Name: Lightly-Trafficked Roads - O4 - local access with buses
ESA/HVAG: 0.443

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/ Ref. stress	Exponent
1	ESA750-Full	ESA750-Full	Vertical Force	92.1	0.75	0.00
2	SAST53	SAST53	Vertical Force	102.4	0.80	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA750-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA750-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA750-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA750-Full	1	1965.0	0.0	1.00E+00	0.00
1	SAST53	1	0.0	0.0	1.00E+00	0.00
2	SAST53	1	2130.0	0.0	1.00E+00	0.00

Details of Layered System:

ID: Ash Foam Title: Asphalt over foamed bitumen surface

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	AC10 A15E	Iso.	2.80E+03	0.40			
2	rough	AC14 C450	Iso.	4.00E+03	0.40			
3	rough	SMZ CBR=15	Aniso.	7.00E+01	0.00	7.00E+01	3.50E+01	0.00
4	rough	Sub_CBR5	Aniso.	5.00E+01	0.45	3.45E+01	2.50E+01	0.45

Performance Relationships:

Layer No.	Location	Material ID	Component	Perform. Constant	Perform. Exponent	Shift Factor
1	bottom	AC10 A15E	ETH	0.004475	5.000	6.0
2	bottom	AC14 C450	ETH	0.003637	5.000	6.0
3	top	SMZ CBR=15	EZZ	0.009150	7.000	
4	top	Sub_CBR5	EZZ	0.009150	7.000	

Reliability Factors:
Project Reliability: Austroads 95%

Layer No.	Reliability Factor	Material Type
1	6.00	Asphalt
2	6.00	Asphalt
3	1.00	Subgrade (Selected Material) (Austroads 2017)
4	1.00	Subgrade (Austroads 2017)

Details of Layers to be sublayered:
Layer no. 3: Austroads (2004) sublayering

Strains:

Layer No.	Thickness	Material ID	Axle	Unitless Strain
1	40.00	AC10 A15E		
			SADT(80):	4.380E-05 (Compressive)
			SAST(53):	6.284E-05 (Compressive)
2	105.00	AC14 C450		
			SADT(80):	2.439E-04
			SAST(53):	2.240E-04
3	300.00	SMZ CBR=15		
			SADT(80):	8.423E-04
4	0.00	Sub_CBR5		
			SADT(80):	5.274E-04

Results:

Layer No.	Thickness	Material ID	Axle Group	CDF
1	40.00	AC10 A15E		Compressive
2	105.00	AC14 C450	Total:	9.707E-01
			SAST:	4.742E-01
			SADT:	4.880E-01
			TAST:	0.000E+00
			TADT:	8.619E-03
			TRDT:	0.000E+00
			QADT:	0.000E+00

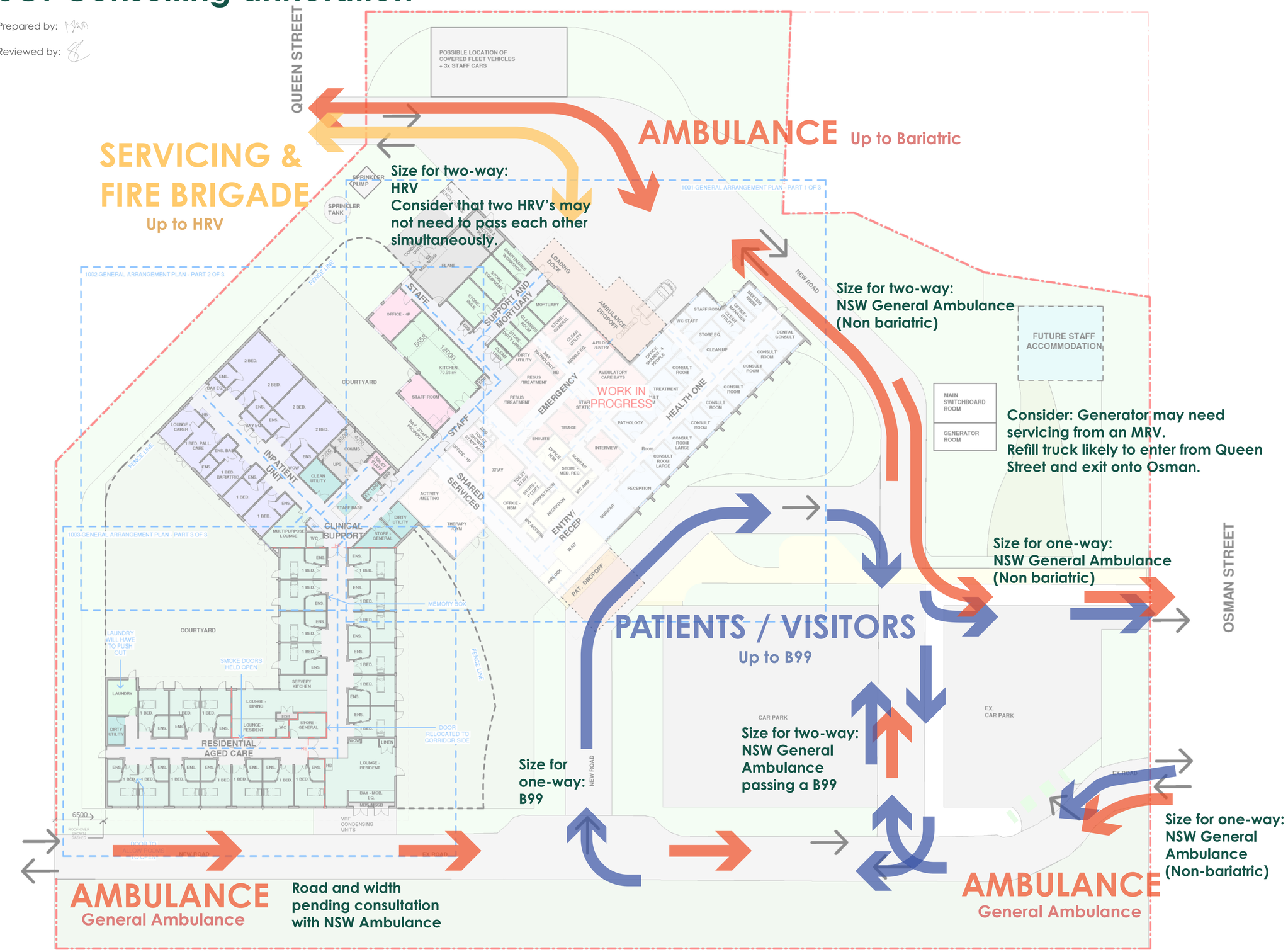
3	300.00	SMZ CBR=15	Total:	5.488E-02
4	0.00	Sub_CBR5	Total:	2.069E-03

Appendix E. Vehicle Access Strategy Annotation

Vehicle access strategy 2022-12-21
SCT Consulting annotation

Prepared by:

Reviewed by:



- CLINICAL SUPPORT
- CORRIDOR
- EMERGENCY SERVICES
- ENTRY /RECEP /ADMIN
- HEALTHONE
- IPU
- NON CLINICAL SUPPORT
- PLANT
- RAC
- SHARED SERVICES
- STAFF AMENITIES

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Issue

No.	Date	Description	Chkd

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Sydney
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Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Project
Blayney HS

at
3 Osman St, Blayney NSW 2799

for
Health Infrastructure

Drawing Title
OVERALL FLOOR PLAN

Scale 1:250 @ A1

Drawing Reference
130607-NBRS-AR- DWG-1000

Revision

0 2.5m 5m 7.5m 10m 12.5m 15m 17.5m 20m 1:250