New Maitland Hospital

State Significant Infrastructure – Stage 2

Civil Infrastructure Report

Multiplex

9 April 2019

181230

Rev 3

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Structural
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1. Executive Summary

1.1 Project Description

Health Infrastructure has committed to undertaking a Staged Infrastructure Application in accordance with Section 115ZD (1) of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the following works:

- Stage 1: Site clearance and preparatory works (approved under SSI9022)
- Stage 2: Design and construction of the hospital Main Works. (this application SSI9775)

Stage 2 includes the design and construction work generally comprising:

A new seven storey Acute Services Building, including:

- Emergency services
- Medical, surgical, paediatric and maternity services
- Critical care services for adults and babies, including a special care nursery
- Operating theatres, delivery suites and assessment rooms
- Palliative care and rehabilitation services
- Mental health services
- Satellite renal dialysis
- New chemotherapy services
- Oral health service
- A range of ambulatory care and outpatient clinics.
- Internal road network and car parking for staff, patients and visitors
- Signage
- Site landscaping and open space improvements
- Tree removal
- Utility and services connection and amplifications works.

1.2 Civil and Stormwater Design

Taylor Thomson Whitting (NSW) has been engaged by Multiplex to provide civil engineering and stormwater drainage management systems designs for the New Maitland Hospital Development.

This report covers the civil infrastructure and stormwater aspects relevant to the site based on information known at the time of report production.

Civil and stormwater design has been undertaken based on the site layout plans as developed by the site architect (BVN) and the design team, and incorporates the following design principals:

- Civil works and roadworks, including vehicular accesses and carparks, emergency vehicle access, loading docks, and pedestrian pathways have been designed to provide clearly defined, efficient and functional traffic and pedestrian movements on the site, for all anticipated users.
- Earthworks designs have been undertaken in coordination with the Contractor, architect and structural engineer, and take into account the landform and existing site materials, design of structure and footings, and to minimise earthworks cut and fill on the site.
- Stormwater has been designed to ensure that the requirements of the local Council (Maitland City Council) are met, that stormwater discharges from the site are not changed or detrimental to the surrounding areas, and that the site is accessible in minor and major rainfall events and is operational in extreme rainfall events.

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1.3 SEARS Requirements

The following requirements have been addressed in this report:

SSI 9975 Sears 6. Ecologically Sustainable Development:

With respect to works under the Civil and external stormwater designs, Water Sensitive Urban Design has been incorporated into the design as detailed is section 6 Water Quality Treatment.

SSI 9975 Sears 10. Sediment, Erosion and Dust Control Plan

Refer to Section 6.3 Sediment, Erosion and Dust Control

SSI 9975 Sears 14. Drainage

Refer to Section 5. Stormwater

SSI 9975 Sears 15. Flooding

Refer Section 4 Flood Impact Assessment

SSI 9022 Approval Conditions – Sch.2, Part B, Item.B9-B12, Requirements for Future Stages

With respect to works under the Civil and external stormwater designs, Water Sensitive Urban Design has been incorporated into the design as detailed is Section 6. Water Quality Treatment.

In relation to ensuring that the design of the of the future development is responsive to CSIRO Projected Climate Change, specifically “(c) more extreme rainfall events”, please refer to Section 5.2 Climate Change.

2. Introduction

This report details the proposed civil and stormwater design for the proposed development of the New Maitland Hospital, during both construction stage and operation phases.

The proposed development (main hospital building and on grade carparks) is in accordance with the architectural drawings prepared by BVN.

The areas in the below plans have been assessed and are included within this report.

FIGURE 2.1 - NEW MAITLAND HOSPITAL SITE LAYOUT (BVN SITE PLAN ARH-01A-AX0-002)

3. Existing Site

New Maitland Hospital is proposed on Lot 7314, DP1162607 and Part Lot 401 DP155237, within the former PGH Bricks site on Metford Road, Metford. The site is situated on the existing disused quarry site at the high point of the local topography. The site falls to all sides from approximately the centre of the proposed facility, with drainage discharging ultimately to the Hunter River north of the site via the Four Mile Creek tributary. The location of the proposed site is shown in Figure 3.1 and Figure 3.2.

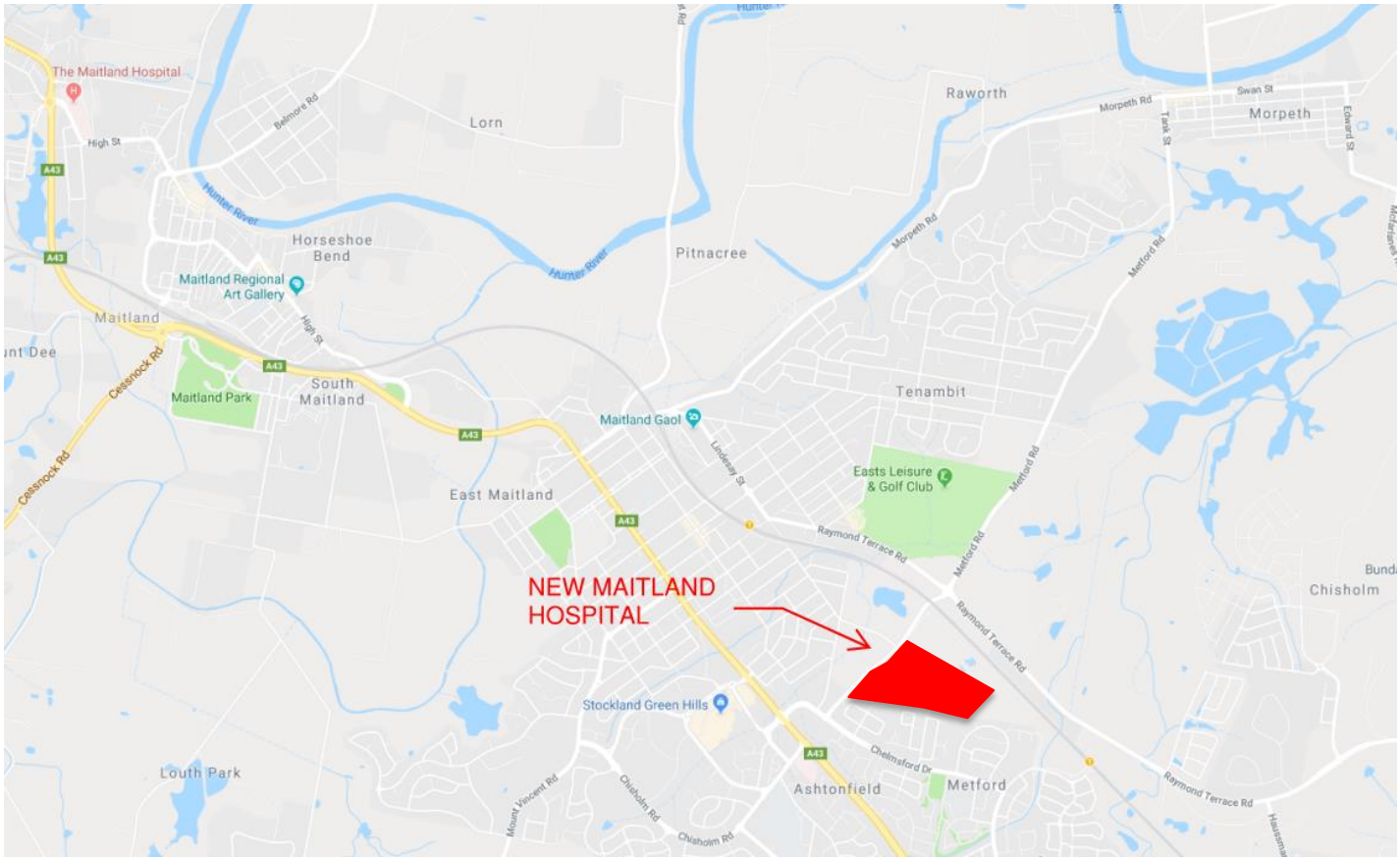


Figure 3.1 Locality Plan (Google Maps)

Figure 3.2 Aerial Photo 30/8/2018 (Nearmap)

4. Flood Impact Assessment

As part of the State Significant Infrastructure Application, an assessment of flood impacts was undertaken by Wood & Grieve Engineers. TTW have reviewed this report and the following documents in assessing the potential impacts on flooding and local drainage

The following reports are available and have been reviewed in this investigation:

- Hunter River (Branxton to Green Rocks) Flood Study, Maitland City Council, WMA Water, September 2010
- Hunter River Floodplain Risk Management Study and Plan, Final, Maitland City Council, WMA Water, November 2015

Based on these reports and the previous flood impact assessment, the highest regional flooding levels were ascertained at RL7.8m, being considerably lower than the minimum floor levels on the proposed development of RL15. It was noted in the Wood & Grieve Stormwater Management Plan that local catchment impacts did not exceed RL6.2 on the northern boundary of the site, and again this will not impact on floor levels or local catchment drainage.

Further, the development is proposed outside of the Hunter River Floodplain Storage or Flood Fringe areas, and as such will not impact on those flood levels.

No further analysis on regional flooding or local flooding has therefore been undertaken.

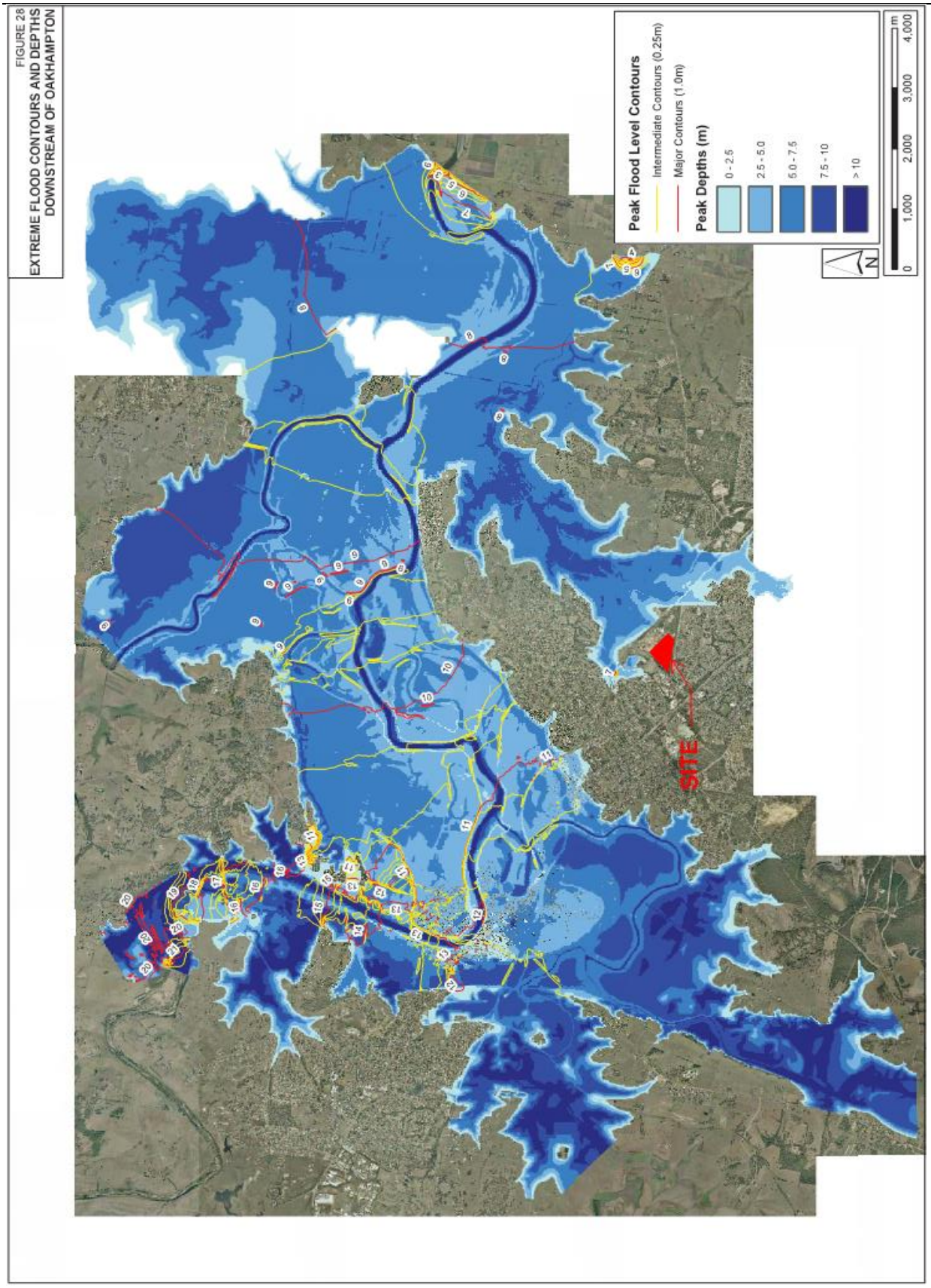


Figure 4.1 Extreme Flood Levels. (Hunter River (Branxton to Green Rocks) Flood Study)

5. Stormwater

Maitland City Councils Development Control Plan (DCP) and Manual of Engineering Standards define the requirements for the control, treatment and discharge of stormwater from development sites within the Council area. This DCP, along with relevant Australian Standards, and industry guides have been used as the basis for the design of the proposed stormwater system.

5.1 Authority Requirements

Conveyance

Maitland City Council require the following design principals, and that stormwater drainage systems shall be designed to achieve the following goals:-

- An underground “minor system” of conduits that eliminates inconvenience to traffic and pedestrians.
- An overland “major system” that conveys stormwater flows within suitable velocity/depth limits, generally located within public land, or where approved or unavoidable, within private land covered by an easement.
- Detention of stormwater flows that mimics natural, pre-developed flows for all storm events up to and including the 100 year ARI event.
- Retention of stormwater flows to achieve target water quality standards.
- Control of stormwater flows to minimise the impacts of erosion and sediment in the environment.
- Consideration of upstream and downstream catchments in their ultimate developed state to achieve a total system which does not adversely affect existing systems or properties within the flow path and catchment.
- Minimisation of the maintenance burden of Council
- Enhancement of the urban landscape.
- Employment of principles of Water Sensitive Urban Design and Stormwater Reuse.

The following table summarised the Council requirements for stormwater conveyance systems for the proposed development:

DRAINAGE COMPONENT	CONVEYANCE	DESIGN PARAMTER	DESIGN REQUIREMNT
Formalised Drainage	In Ground Piped	Minor Drainage System	10 year ARI
	Piped Access Road Crossings	Major Drainage System	100 year ARI
	Overland	Major Drainage System	100 year ARI
Open Channels	Overland	Freeboard	300mm from top of channel
	Overland	10	500mm to adjacent floor levels
Swales	Overland	Velocity x Depth	<0.4

Table 5.1 Council Requirements

It is noted that whilst Maitland City Council refer to the rainfall intensities of Australian Rainfall and Runnoff 1987, the modelling of the stormwater on the project has been undertaken in the updated Australian Rainfall and Runoff 2016 version. As such, rainfall events that infrastructure is designed for is in relation to an Annual Exceedance Probability rather than a return period. As such, major stormwater has been designed for the 1% AEP rather the equivalent 100 year ARI rainfall event. Minor drainage systems have been designed for the 5% AEP event.

On Site Detention

Maitland City Council guidelines state:

- Stormwater runoff shall be designed so that peak discharges from new development are not increased beyond that of the pre-development environment for nominally the critical 1, 10 and 100 year ARI storm events.
- Where a basin is located in a flood plain the design should achieve its maximum elevation (RL) to limit inundation by flood waters. The lowest desirable level of the spillway should aim to be higher than the 20 year ARI event in the flood plain.
- All basins should incorporate permanent Gross Pollutant Traps (GPT), to collect silt, trash and litter from the road drainage system.
- The minimum slope of a dry basin floor should be 2%.
- The overflow weir shall have the capacity to maintain the 100 year ARI event.
- Temporary water depth calculated for the 20 year ARI event shall be limited to a maximum depth of 1.2m.

5.2 Climate Change

With the use of increased rainfall intensity for determining capacity of stormwater drainage system, the drainage design has inbuilt capacity to cater for long term rainfall increases due to climate change and is responsive to the CSIRO projected impacts of climate change.. The minor drainage system as designed caters for the 5% AEP rainfall event in piped systems, which is a 20% increased rainfall intensity over the required 10% AEP design rainfall. All major drainage systems have allowed for the current 1% AEP, with unrestricted overflows diverted away from buildings if capacity in exceeded.

All overland flow paths for greater rainfall events have been designed with free unrestricted outlets and increases in rainfall intensity and more extreme rainfall events are factored in to this design.

5.3 Stormwater Conveyance Design

The proposed design of the stormwater system for the development includes both minor and major stormwater conveyance systems, consisting of conventional pit and pit drainage networks within roads and car parks. Stormwater is captured, detained, treated and discharged to the same locations as the current pre developed site, ensuring that there are no adverse impacts on downstream receiving environment as a result of the development. The stormwater design is shown in Appendix A to this report.

A traditional pit and pipe network of kerb inlet pits, surface inlet pits, and concrete stormwater pipes is proposed, with inlet pits at approximately 40m spacing on road to minimise kerb flows and provide for ease of access through pedestrian routes and car parks. The stormwater network discharges via On Site Detention basins or tanks at each of the 3 main sub-catchments on the site, and flows are restricted to reduce site discharges to no greater then the current site. Drainage network sizing at the crossings of entry road for staff, public and ambulance/emergency vehicles has been designed to ensure no inundation in rainfall events up to and including the 100 year ARI, enabling the facility to operate in these major weather events.

The roof drainage proposed is a syphonic downpipe system. Energy break pits will be incorporated into the stormwater network by the Hydraulics consultants prior to discharge to the stormwater network to reduce discharge velocities/energy conveyance into the remaining stormwater network.

On site detention (OSD) is provided to each of the three main sub catchments of the development, and site discharges are via existing open channels. The eastern portion of the site will discharge via the existing open channels and wetlands system. Discharges to the west of the site will be to the existing open channel and Council stormwater culverts under Metford Road.

On the eastern catchment of the site the carpark, road and building drainage will discharge to a large combined OSD and Water Quality basin. On western side of the site the carpark, roads and western side of the building will discharge via an OSD tank built below the south western car park and proprietary water quality treatment devices. The carpark area to the north of the site will likely be drained via the use of bio swales between parking aisles, and on site detention built under or adjacent the carpark.

Total peak flows of each of the catchments are as calculated via DRAINS and shown in Table 5.2 and Table 5.3 as follows:

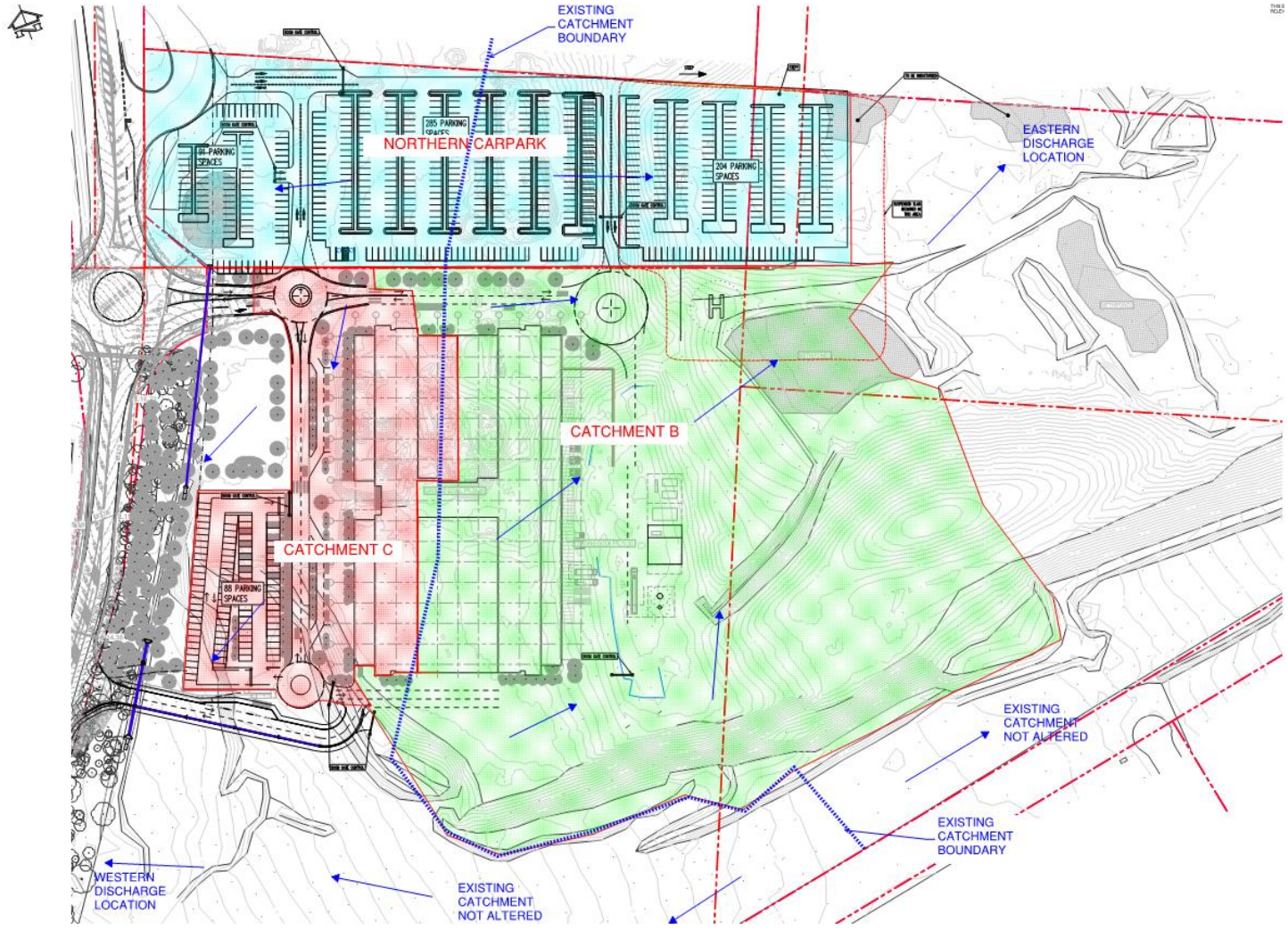


Figure 4.1 – Catchment Plan

Table 4.2 Stormwater peak flows of Catchment B

Catchment B (Eastern Catchment)			
OSD Volume (cu.m)	650		
Catchment Area (ha)	4.70		
	50% AEP	10% AEP	1% AEP
Pre Development Flows (cu.m/s)	0.583	1.27	2.38
Post Development Flows (cu.m/s)	0.597	1.29	2.55
Post Development with OSD Flows (cu.m/s)	0.476	0.87	1.88

Table 5.3 Stormwater peak flows of Catchment C

Catchment C (South Western)			
OSD Volume (cu.m)	300		
Catchment Area (ha)	1.23		
	50% AEP	10% AEP	1% AEP
Pre Development Flows (cu.m/s)	0.153	0.332	0.623
Post Development Flows (cu.m/s)	0.232	0.473	0.795
Post Development with OSD Flows (cu.m/s)	0.153	0.124	0.303

To complete the stormwater designs, final layout of building/s, roof downpipe discharge locations, hardstand pavements, layout of northern carpark, and landscaped areas needs to be confirmed, along with restriction of vegetation clearing in the location of the eastern bio retention/OSD basin is required.

6. Water Quality Treatment

6.1 Authority Requirements

Maitland City Council requires that the quality of stormwater runoff from new developments minimise potential adverse effects generated from the development on the downstream environment. This includes treating water runoff prior to its discharge to remove pollutants.

The following table identifies the requirements for pollution retention goals for the site"

Table ~~5~~6.1 Water Quality Treatment Requirements

Pollutant	Load Reduction Target
Total Suspended Solids	80%
Gross Pollutants (>5mm)	70%
Total Phosphorus	45%
Total Nitrogen	45%
Oil and Grease	90%

6.2 Water Quality Treatment Design

Water quality treatment devices and water sensitive urban design features will be incorporated into the stormwater network to provide the required reduction in pollutant and nutrient loads. As much as possible, bio filtration methods will be included in the treatment train to reduce maintenance burdens and increase efficiencies, with prefiltration via gross pollutant traps (GPT's) or in pit filtration devices such as enviropods. Typical treatment chain is as below

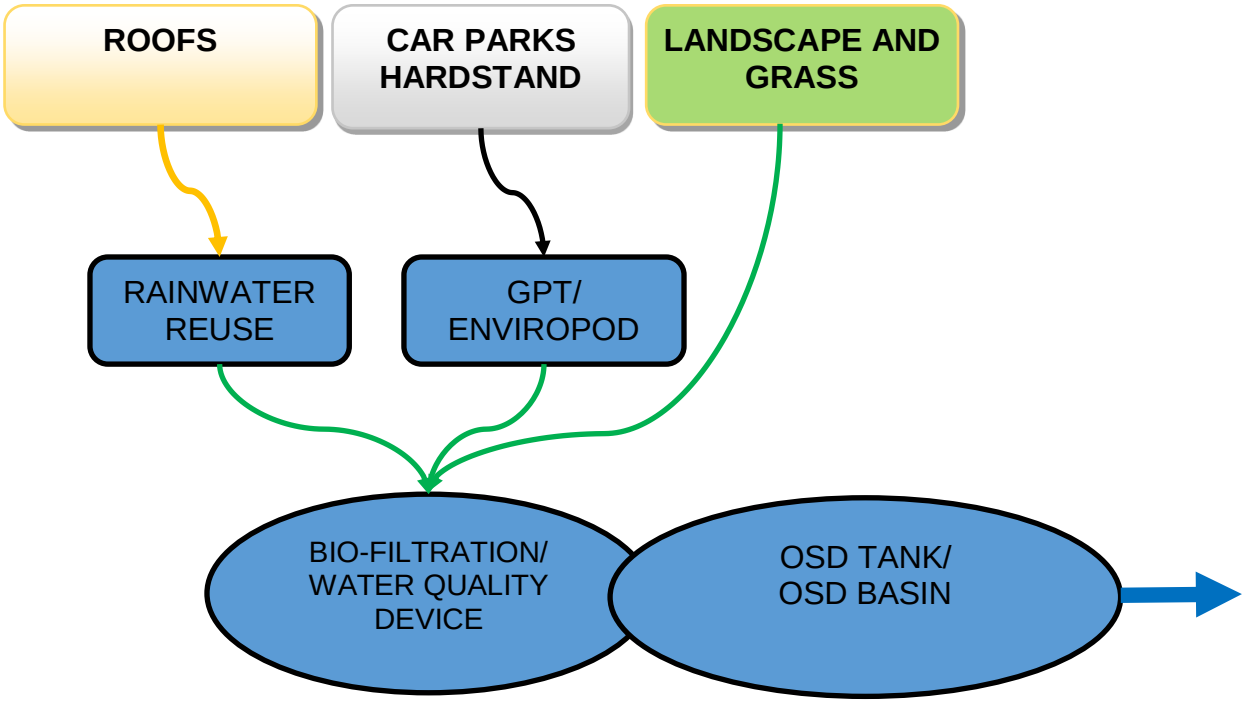


Figure 6.1 - Proposed Water Quality Treatment Chain

6.3 Sediment, Erosion and Dust Controls

Council and Department of a soil and erosion control plan in accordance with NSW Department of Housing Managing Urban Stormwater, 3rd Edition, August 1998, Soils and Construction “Blue Book” has been prepared as drawing TTW-CIV-DWG-GX0-002 and. TTW-CIV-DWG-GX0-003 included with this report.

The Soil and Water Management Plan has been based on providing Sediment basins on the downslope side of each section of the development due to the presence of potentially dispersive soils on the site (as evidenced in the Douglas Partners Geotechnical Report). A series of catch drains will convey sediment laden runoff from disturbed areas during the construction phase to these sediment basins. Sediment basins have been sized to cater for the 7 day rainfall depth event, allowing sufficient time after rainfall events to treat and remove sediment from captured water prior to discharge to local watercourses.

Dust suppression and erosion controls to minimise erosion from construction vehicles/traffic and wind, will include vehicle wash downs, utilisation of water carts to supress dust during construction activities, and ongoing dust monitoring of the site. Further controls such as locating material stockpiles away from sensitive areas, staging construction works to minimise extent of disturbed surfaces, early revegetation of completed surfaces, and imposing speed limits on all site vehicles will further reduce dust generation and impacts.

7. Stormwater Discharge to Council Stormwater and Local Watercourses

The hospital development is proposed at the high point in the local catchment with discharges proposed to the south west to Council piped stormwater network, and to the north to the local upper tributaries of the Hunter River.

The discharge point to the south west of the site is via an existing grass swale drain connected to a drainage culvert under Metford Road. It is proposed to reshape the upper reaches of this swale and discharge directly.

To the east of the site, existing low points in the topography form natural overland flow paths and swale drains diverting stormwater to a large wetland area prior to the discharge below the main northern railway line.

The design seeks to minimise the impact on the receiving environment and via OSD provided on the site will not discharge any additional stormwater runoff, therefore not impacting on capacity of downstream open channels, pits and pipes, and natural watercourses.

8. Roads and Pavements

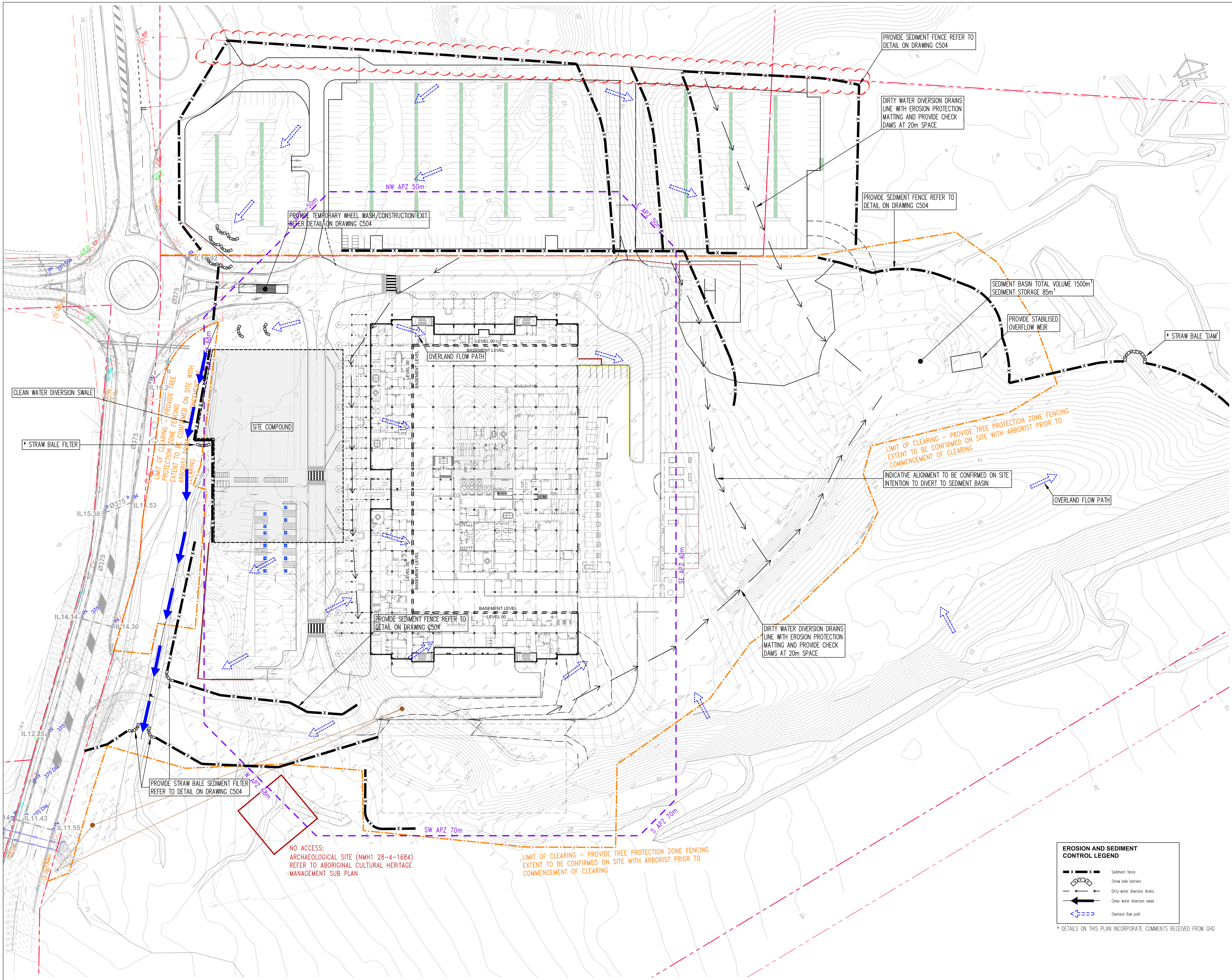
The proposed development will provide for entry and exit to the site for staff, visitor and patients to the hospital, along with emergency services access and delivery. Carparks will be provided for both staff and visitors on both the western side and a proposed future northern carpark for a total of 679 vehicles at the commencement of hospital operations. A separate dedicated ambulance entry road and ambulance bay will be provided to enter the hospital at ground level on the southern face of the proposed development. Loading docks for delivery's and back of house operations will be accessed to the rear /western side of the development to access direct to Lower ground floor and the external plant area.

Pavements have been designed based on a 20 year design life in accordance with AustRoads Guide to Road Design, Volume 4, and will include asphalt surfaced flexible pavements for roads, carparks, and loading docks. All pavement surfacing in Asphalt will be designed for a 7 year surfacing life.

Table 9.1 Pavement Design Parameters

	Design Traffic for 20 year life	Pavement Thickness	Pavement Surfacing
Entry Roads, Bus Routes and Roundabouts	$1x10^6$ ESA's	50mm AC10 100mm DGB20 300mm DGS40	AC14HD
Carparks and Light Duty Roads	$5x10^4$ ESA's	50mm AC10 120mm DGB20 220mmDGS40	AC10
Loading Docks	$5x10^5$ ESA's	50mm AC14 150mm DGB20 200mm Cement stabilised base. Min 4% by weight cement.	AC14 PMB or Multigrade

9. Appendix A – Civil Design Drawings


PROVIDE SEDIMENT FENCE REFER TO DETAIL ON DRAWING C504
DIRTY WATER DIVERSION DRAINS LINE WITH EROSION PROTECTION MATTING AND PROVIDE CHECK DAMS AT 20m SPACE
PROVIDE SEDIMENT FENCE REFER TO DETAIL ON DRAWING C504
PROVIDE TEMPORARY WHEEL WASH/CONSTRUCTION EXIT REFER DETAIL ON DRAWING C504
NW APZ 50m
SEDIMENT BASIN TOTAL VOLUME 1500m³ SEDIMENT STORAGE 85m³
PROVIDE STABILISED OVERFLOW WEIR
* STRAW BALE 'DAM'
CLEAN WATER DIVERSION SWALE
SITE COMPOUND
OVERLAND FLOW PATH
* STRAW BALE FILTER
LIMIT OF CLEARING - PROVIDE TREE PROTECTION ZONE FENCING EXTENT TO BE CONFIRMED ON SITE WITH ARBORIST PRIOR TO COMMENCEMENT OF CLEARING
INDICATIVE ALIGNMENT TO BE CONFIRMED ON SITE INTENTION TO DIVERT TO SEDIMENT BASIN
OVERLAND FLOW PATH
SE APZ 40m
PROVIDE SEDIMENT FENCE REFER TO DETAIL ON DRAWING C504
DIRTY WATER DIVERSION DRAINS LINE WITH EROSION PROTECTION MATTING AND PROVIDE CHECK DAMS AT 20m SPACE
PROVIDE STRAW BALE SEDIMENT FILTER REFER TO DETAIL ON DRAWING C504
NO ACCESS: ARCHAEOLOGICAL SITE (NMH1 28-4-1684) REFER TO ABORIGINAL CULTURAL HERITAGE MANAGEMENT SUB PLAN
SW APZ 70m
S APZ 70m
LIMIT OF CLEARING - PROVIDE TREE PROTECTION ZONE FENCING EXTENT TO BE CONFIRMED ON SITE WITH ARBORIST PRIOR TO COMMENCEMENT OF CLEARING
EROSION AND SEDIMENT CONTROL LEGEND
Sediment fence
Straw bale barriers
Dirty water diversion drains
Clean water diversion swale
Overland flow path
* DETAILS ON THIS PLAN INCORPORATE COMMENTS RECEIVED FROM GHD

FOR CONSTRUCTION

TTW Taylor Thomson Whitting
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C101

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
1	19.12.18	ISSUE FOR CROWN CERTIFICATE
2	22.01.19	ISSUE FOR CROWN CERTIFICATE
3	22.01.19	ISSUE FOR CROWN CERTIFICATE
A	18.02.19	FOR CONSTRUCTION
B	28.03.19	FOR CONSTRUCTION
C	01.04.19	FOR CONSTRUCTION

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NEW MAITLAND HOSPITAL

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TTW PROJECT NUMBER
181230

DRAWING KEY
Metford Rd

TRUE NORTH | PROJECT NORTH

SCALE
1:500 @A0 DO NOT SCALE
0 10 20 Meters

DRAWN BY: WW CHECKED BY: -
DESIGNED BY: AH APPROVED BY: SB

STATUS
FOR CONSTRUCTION

DRAWING
EROSION AND SEDIMENT CONTROL PLAN

DRAWING NUMBER: TTW-CIV-DWG-GX0-C102
ISSUE: C