RobertBirdGroup

Integrated Water Management Report for

Blacktown Mount Druitt Hospital Stage 2 Acute Services Building (Main Works Package) SSD

Issue: 2

Prepared For: Health Infrastructure

Project No.: 10684X

10th June 2016

Document No.: 10684X-HI RPT-C-SWMR-160601

bsi. ISO 9001 Quality Management

Report Amendment Register

Issue	Section & Page No.	Issue/Amendment	Author/ Initials		Project Engineer	Reviewer/ Initials		Date
1	-	Draft for comment	CR		CW	CW		01.06.2016
2		Issued for SSD	CR		CW	CW		10.06.2016

ISSUE ACCEPTED BY:

AUTHOR:

COLIN ROPE
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date: 10th June 2016

REVIEWER:

CHRIS WAITE
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date: 10th June 2016

Table of Contents

Appendices

1.0 Introduction

1.1 Purpose of Document

Robert Bird Group (RBG) has been engaged by Health Infrastructure to design the Civil Engineering works for the Blacktown Mount Druitt Hospital Stage 2 Expansion.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) that have been issued for this project and specifically Requirements 11 and 13, as follows:

11 - Utilities: "Prepare an Integrated Water Management Plan detailing any proposed alternative water supply, proposed end users of potable and non-potable water, demonstration of water sensitive urban design and water conservation measures."

13 – Drainage: "Provide details of the drainage associated with the proposal, including stormwater, drainage infrastructure and OSD, which shall be designed in consultation with Council and must avoid any adverse impacts on downstream properties."

This report supports a State Significant Development (SSD) Development Application (DA) submitted to the Minister for Planning and Environment pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Application seeks approval for the detailed design of the Stage 2 Acute Services Building (ASB) and associated site works.

A range of water management and drainage works are currently being constructed as part of an enabling works package of campus-wide infrastructure upgrades and services diversions. These upgrades were subject to a previous REF approval process.

A previous Stage 1 SSD DA has also been approved for the enabling works (bulk excavation and basement level shoring walls) for the Stage 2 ASB. The enabling works drawings are included in Appendix B.

The design and coordination of water supply and wastewater services is the responsibility of Warren Smith & Partners (WSP). WSP has provided advice for this report.

1.2 Site Description

The site is described as Lots 300, 301, 306, 308 DP15914, Lot 1 DP 128344, Lot 3 in DP71010 and Lot 1 in DP730307 at Blacktown Road, Blacktown and has an overall area of 12.335 hectares.

The site has frontage to Blacktown Road to the North and abuts residences on the other boundaries. It falls generally from south to north with an overall fall from approximately RL 72.50 AHD at the highest point on the southern boundary, to approximately RL 46.00m AHD at the lowest point on the northern boundary adjacent to Blacktown Road.

The site is currently occupied by the existing hospital, outpatient buildings and car parking areas.

1.3 Survey

The survey that has been used in the preparation of the report is:

- Blacktown Hospital Plan Showing Levels, Details, Contours and Services Drawing Number 116973500 Issue 03 prepared by Cardno Hard & Forester.

1.4 Project Scope

The scope of the Stage 2 development is generally described by the Business Case report by PWC and Health Infrastructure NSW, dated December 2015.

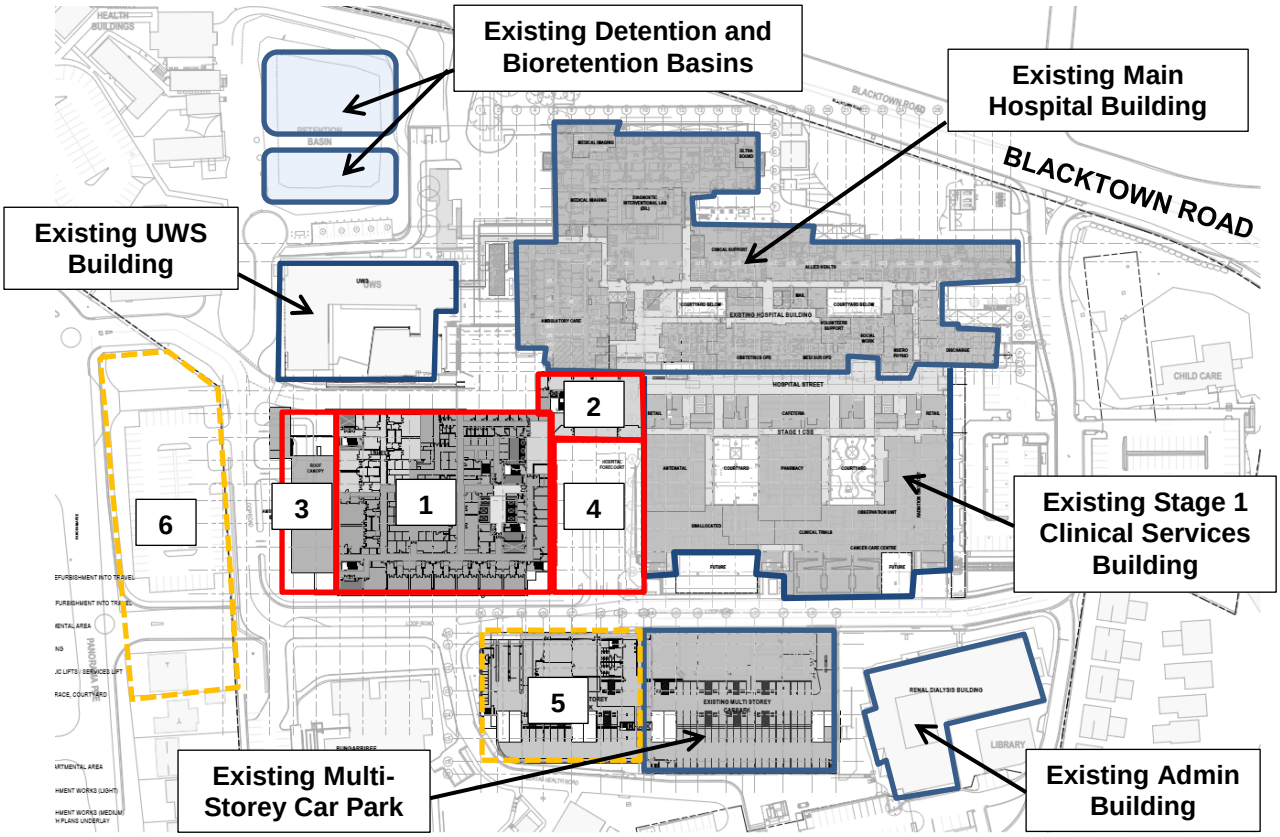


Figure 1.1 – Blacktown Hospital Site Plan

The works comprising this SSD DA are shown (outlined red) in Figure 1.1 and comprise:

1. A new Acute Services Building (ASB), located to the west of the Stage 1 Clinical Services Building;
2. An Atrium building connecting the new ASB with the other hospital buildings;
3. An ambulance bay and Emergency department drop off area; and
4. A patient drop-off area

Other planned future works which will be subject to separate development application processes are also shown in Figure 1.1 and comprise:

5. An extension to the existing multi-storey car park; and
6. At grade car parking and a new link road to the west of the site (subject to acquisition of private property)

It is noted that services diversions and roadworks are currently being carried out as part of an enabling works package and were subject to an REF approval process. These works include:

- Diversion and augmentation of existing stormwater infrastructure around the south and west of the Proposed Stage 2 ASB;
- Construction of a stormwater treatment bioretention basin; and
- Amplification of the existing stormwater detention basin

The design of the above stormwater measures allowed for the future construction of the Stage 2 ASB and associated works which are the subject of this SSD DA.

It is further noted that further enabling works for the Stage 2 ASB (the basement shoring walls and bulk excavation) have been the subject of a previous SSD DA approval in 2015.

2.0 Flooding

Due to its elevation the hospital site is not within a flood affected zone as confirmed by reference to Council flood maps, a copy of which is included in Appendix A

Internally road and car park levels and grades have been set to ensure no localised flooding of the existing and new buildings and also not to impact adversely on the adjoining properties

3.0 Stormwater Drainage Design

3.1 Overview

The stormwater enabling works (as part of the separate REF) address the need to divert the existing system which is being demolished where it traverse the Stage 2 site. Roof drainage from the proposed building will connect into this new stormwater system.

The key issues addressed in the enabling works include:

- Diversion and upgrade of the stormwater network to the 1% AEP (1 in 100 year) storm event to capture the western catchments of the campus which includes the works associated with this SSD DA (refer to the catchment plan in Appendix A). The stormwater system is being diverted around the proposed Stage 2 ASB building to the detention basin north of UWS near Blacktown Road.

- In addition to improvements completed in Stage 1, the proposed diversion will further reduce the area of catchment that is directed to an existing pipe which passes under the UWS courtyard. The significant reduction will alleviate capacity and maintenance issues experience by UWS.

- Modification of the existing detention basin to a combined detention and bio retention basin has been designed to so that the developed western hospital catchment (including the Stage 2 ASB) meets current Water Sensitive Urban Design (WSUD) standards including the requirements of Blacktown City Council.

As a result of the above improvements being carried out as part of the enabling works, there is no requirement to carry out any further amplification works under the works comprising this SSD DA. The following sections therefore the detail design criteria used for the enabling works and how they relate to the ASB development.

3.2 Codes and Specifications

The stormwater design of the enabling works was carried out in accordance with the relevant local, state and national design guidelines (where not over-ridden by Blacktown City Council requirements) and Australian Standard Codes of Practice, including:

- Australian Rainfall and Runoff – A Guide to Flood Estimation, Volumes 1 and 2 (1987) – The Institution of Engineers, Australia.

- AS/NZS 3500.3.2 National Plumbing and Drainage Part 3.2: Stormwater Drainage – Acceptable Solutions.

- On-Site Stormwater Detention Handbook (Fourth Edition, December 2005) – Upper Parramatta River Catchment Trust.

- Managing Urban Stormwater – Soils and Construction Volume 1 (4th Edition, March 2004) – NSW Department of Housing.

- Blacktown City Council Engineering Guidelines for Development – 2005

- Blacktown City Council Development Control Plan 2015 Part J Water Sensitive Urban Design and Integrated Water Cycle Management.

3.3 Design Criteria

Stormwater management controls from Blacktown City Council's Engineering Guidelines and additional design considerations were addressed in the design of the enabling works and are summarised in Table 3.1.

STORMWATER MANAGEMENT CONTROL Item	Control or Design Objective
Minor and Major Storms (ARI)	Minor Storm – All new pipes and associated components designed to cater for the 20 year ARI storm east of the Bungarribee House car park turnoff and increasing to the 100 year ARI storm from in front of the Emergency Department through to the stormwater detention basin. Major Storm – All overland flow paths to be designed to cater for the 100 year ARI storm.
Determining Flow Rate – Hydrology and Hydraulics	Where the catchments are large and/or a higher confidence in the flow rate prediction is necessary, peak flow rate should be determined using runoff routing computer models. For this project DRAINS shall be used for hydrological modelling.
Pipe Velocities	Pipe velocities shall be between 0.5 m/s and 7.0 m/s and preferably between 1.0 m/s and 5.0 m/s during the design storm to ensure the flow is self-cleansing but not likely to cause scour.
Pit Blockage Factor	A pit blockage factor of 0.3 has been applied to all grated inlet pits in the hydrological models.
Pipe Grades	The minimum pipe grade shall be generally 1.0%, however under exceptional circumstances a grade of 0.5% may be permitted.
Overland Flow Paths	The design of the overland flow path must consider the velocity-depth hazard. For this project, depth x velocity values should not exceed 0.4 for reasons of pedestrian safety

Table 3.1 – Stormwater Management Controls and Design Objectives

3.4 On-Site Detention

On-site stormwater detention is a stormwater management measure designed to limit the peak stormwater flow from a site to either pre-development peak flows or a flow set by a regulatory authority. Blacktown Hospital is within the Upper Parramatta River Catchment, and stormwater detention measures for the area have been set by the Upper Parramatta River Catchment Trust (UPRCT) and adopted by Blacktown City Council.

The design parameters and methodology for on-site detention are set out in the Trust's On-Site Stormwater Detention Handbook (Fourth Edition, December 2005) and these base parameters are summarised as follows:

Overall Site Storage Requirement (SSR)	455 cu.m./hectare
Primary Site Reference Discharge (SRDL)	40 litres/second/hectare
Secondary Site Reference Discharge (SRDU)	150 litres/second/hectare

The existing detention basin is located between the UWS Building and Blacktown Road. It was constructed in the late 1990s as part of the original hospital development and is being upgraded as part of the enabling works. The storage volume of the upgraded basin is divided into an upper storage and a lower storage. The lower storage is controlled by a smaller sized orifice plate, so that peak discharges from the 1.5-year ARI storm are attenuated to acceptable levels. The upper storage is controlled by a second orifice plate. The two orifice plates thereby attenuate flows from major storms (eg 100-year ARI) to acceptable levels. The enabling works increase the capacity of the detention basin to approximately 2,800 m^3 to suit the extended western catchment area – a sketch showing the site catchments is included in Appendix A.

The proposed Stage 2 ASB development has also necessitated amplification and diversion of the piped network due to an increase of the western catchment to 6.03 hectares that will take in the stormwater from the original hospital building and UWS as well as the proposed Stage 2 ASB and adjacent roads and car parks. This work is also being undertaken as part of the enabling works package.

4.0 Water Sensitive Urban Design (WSUD)

4.1 Water Quality Objectives

Water Sensitive Urban Design (WSUD) measures are being provided in order to comply with SEARs requirement II, Utilities.

The WSUD design is in accordance with the Blacktown City Council Development Control Plan 2015 Part J Water Sensitive Urban Design and Integrated Water Cycle Management. These objectives are summarised in Table 4.1.

Stormwater Quality Management Targets	
Pollutant	**Proposed Target**
Total Suspended Solids (TSS)	85% reduction of average annual loads.
Total Phosphorous (TP)	65% reduction of average annual loads.
Total Nitrogen (TN)	45% reduction of average annual loads.
Gross Pollutants (>5mm)	90% reduction of average annual loads.
Areas of treatment	100% of all developed areas to be treated.

Table 4.1 – WSUD Objectives

4.2 WSUD Approach

Stormwater quality modelling has been undertaken for the site to quantify the WSUD measures required to meet the development controls. Water quality control will be achieved through the bioretention basin currently under construction as part of the enabling works.

Bioretention systems are vegetated soil media filters, which treat stormwater by allowing it to pond on the vegetated surface and slowly infiltrate downwards through the soil media. Treated water is collected via subsoil perforated pipes and routed to downstream waterways or storage facilities for reuse. They are effective in reducing the concentration of suspended solids (TSS), phosphorus (TP) and especially nitrogen (TN) via nutrient uptake and denitrification.

The bioretention system will consist of three sub-surface layers (refer Figure 4.1).

- **Filtration Layer** – The filtration layer is the main media through which water is filtered and treated. Typically, it consists of a sandy loam mix with a saturated hydraulic conductivity of 100mm/hr to 300mm/hr under compaction. The depth of media ranges from 600mm to 800mm, dependant on the vegetation and/or tree species selected;

- **Transition Layer** – The transition layer typically consists of coarse sand (particle size 1mm) and is installed to prevent the filtration media washing into the perforated subsoil drainage. A transition layer of 100mm to 150mm is recommended.

- **Drainage Layer** – The drainage layer is at the bottom of the bioretention system and is placed to encase the subsoil drainage pipe. The typical thickness is 150mm and is to be a fine gravel mix (particle size 2-5mm).

Treatment can be enhanced by creating temporary ponding (extended detention depth) over the filter media. This increases the amount of time that runoff can infiltrate and also increase the volume to be treated. Generally the extended detention depth is between 100mm to 300mm.

Vegetation plays an important role in the efficiency of bioretention systems. The surface is densely planted with grasses, sedges and select shrub or tree species, which acts to retard and distribute the flows across the filter media. Below ground the root zone of the plants is highly biologically active. As water passes through this zone, materials (both fine soils and soluble nutrients) can be physically trapped or be actively taken up by the plant roots of other plant biota (bacteria and fungi). The plant growth and death cycle also plays an important role, maintaining the soil structure and hydraulic conductivity of the media.

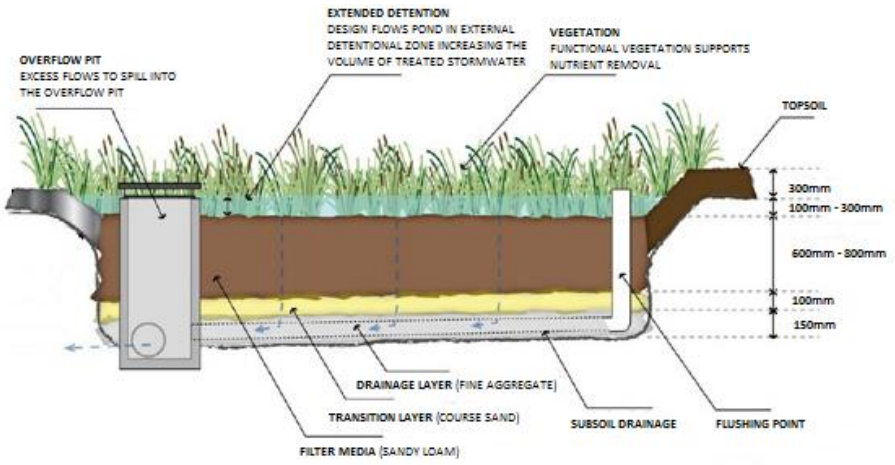


Figure 4.1 – Typical Section of a Bioretention System

4.3 Maintenance of Water Quality Treatment Devices

Water quality treatment devices require regular maintenance. An indicative maintenance plan for the bioretention basin is provided below.

- Routine inspection (3-6 monthly and after heavy rain), cleaning and maintenance of the bio-retention systems. Check inlets and overflow structures/drainage pipes for scour and sediment. Removal of litter, debris and sediment;
- Inspection of filter media porosity (3-6 monthly and after heavy rain). Check for accumulation of impermeable layer. Remove sediment and scarify;
- Over time, the filter media will accumulate fine sediments. The filter media should be replaced when its infiltration capacity is reduced due to binding. Typically, filtration media should be replaced every 5-7 years.

4.4 Stormwater Quality Outcomes

The stormwater quality outcomes from the MUSIC model are shown in Figure 4.2 and demonstrate compliance of the system with the WSUD objectives in Table 4.1. The modelled outcomes are:

- Total Suspended Solids (TSS) 89.8% (target 85%)
- Total Phosphorus (TP) 67.8% (target 65%)
- Total Nitrogen (TN) 58.6% (target 45%)
- Gross Pollutants 100% (target 90%)

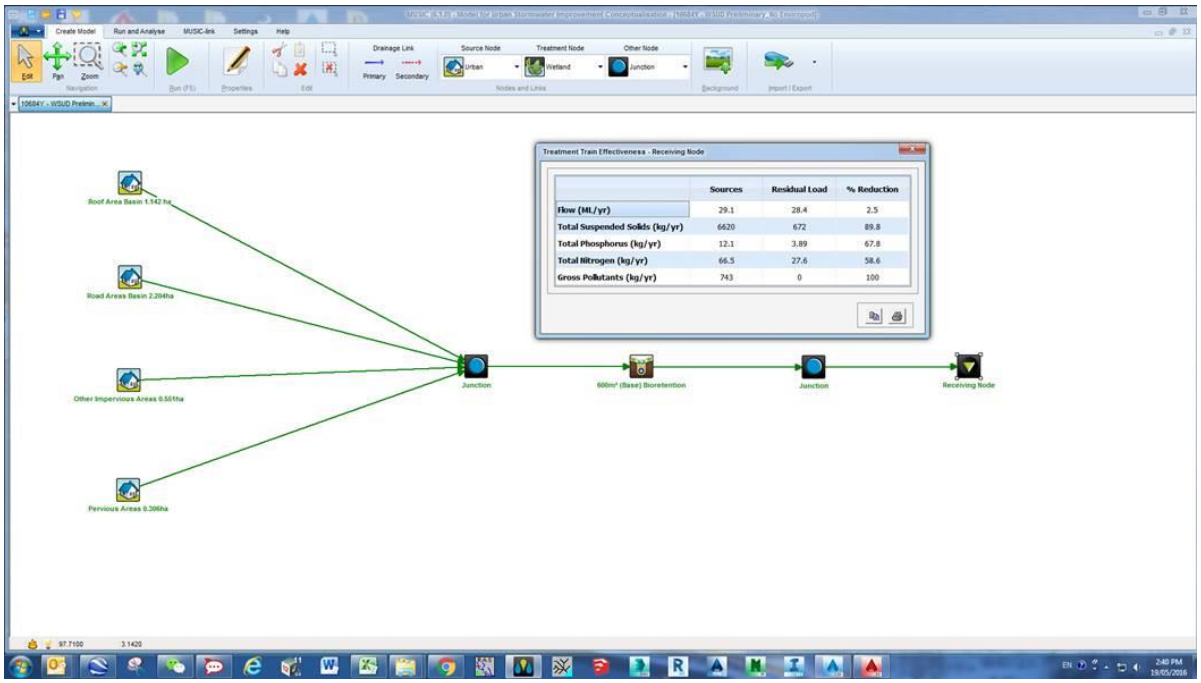


Figure 4.2 Stormwater Quality Outcomes - MUSIC Model

It is noted that the bioretention basin services a reduced western catchment of 4.2 Ha as the roof areas of the existing main hospital building and UWS building bypass the bioretention basin. This is the existing situation and these bypass areas are not the subject of this SSD DA.

5.0 Erosion and Sediment Control

The quality of stormwater discharge from the site during the construction stage will be managed using erosion and sediment control and surface water management measures in accordance with the Landcom guidelines – Managing Urban Stormwater Runoff: Soils and Construction ("Blue Book") and Blacktown City Council's DCP.

Erosion and sediment control measures for the excavation for the Stage 2 ASB have been designed as part of the enabling works for the shoring walls and bulk excavation package and will be maintained during the construction of the main building. These measures are shown on the enabling works drawings in Appendix B and include:

- Settling tanks/basins;
- Sediment fences at the downstream side of all excavations or disturbed surfaces;
- Surface water collection systems i.e. drains to collect construction site runoff and convey flows to control and treatment systems ;
- Shaker grid and wash down areas at vehicle entry points; and,
- Sediment protection devices on existing and proposed inlet pits.

6.0 Water and Wastewater Management

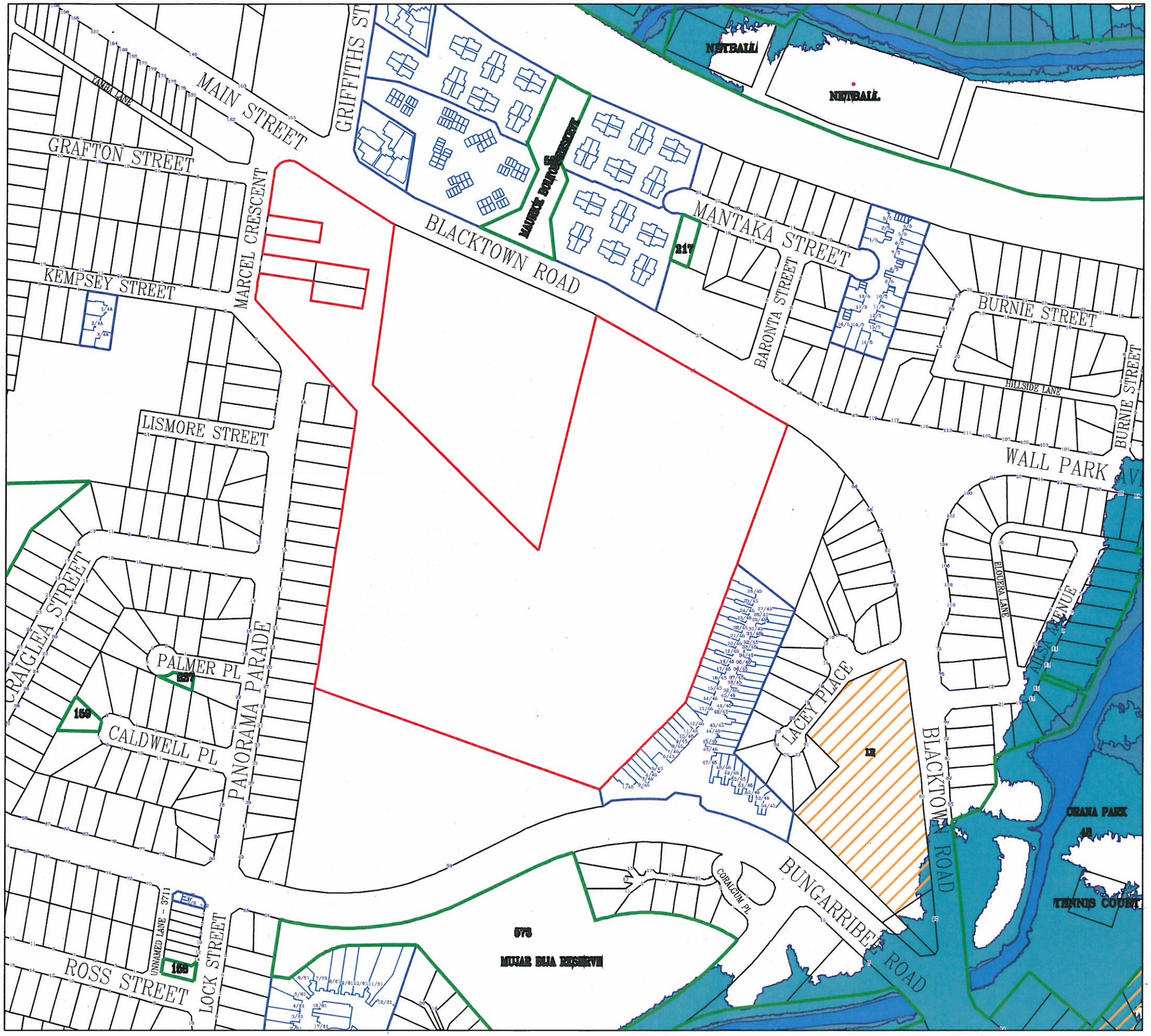
6.1 Potable Water Demand Reduction

Opportunities exist for reducing the demand and load on local water and wastewater infrastructure that contribute to improving water cycle management in order to comply with SEARs (requirement II, Utilities). Several options for consideration by the design team are provided below for further investigation in design development stages.

The following potable water demand reduction strategies will be incorporated:

- Selection of water efficient fixtures with appropriate WELS ratings shall be used;
- Installation of pulse water meters (to Sydney Water standards) for all major uses of water for data collection and water-leak detection; and,
- Selection of drought tolerant landscape elements that require low irrigation water demand.

Appendix A
Flood Map and Catchment Plan



Plot Date: 15/04/2014

LEGEND

- Lot Parcel.Coverage
- Lot Parcel.Coverage – Strata Unit
- Lot Parcel.Coverage – Torrens Title
- Strata Development Coverage.Coverage – Registered
- Reserve Coverage.Registered Coverage
- Local Government Area.Boundary
- Places Of Interest – Council.Coverage
- Places Of Interest – Council.Places Of Interest Location – Council
- Flood Extents.High Flood Risk Precinct
- Flood Extents.Low Flood Risk Precinct
- Flood Extents.Medium Flood Risk Precinct
- Flood Local.Minor Coverage

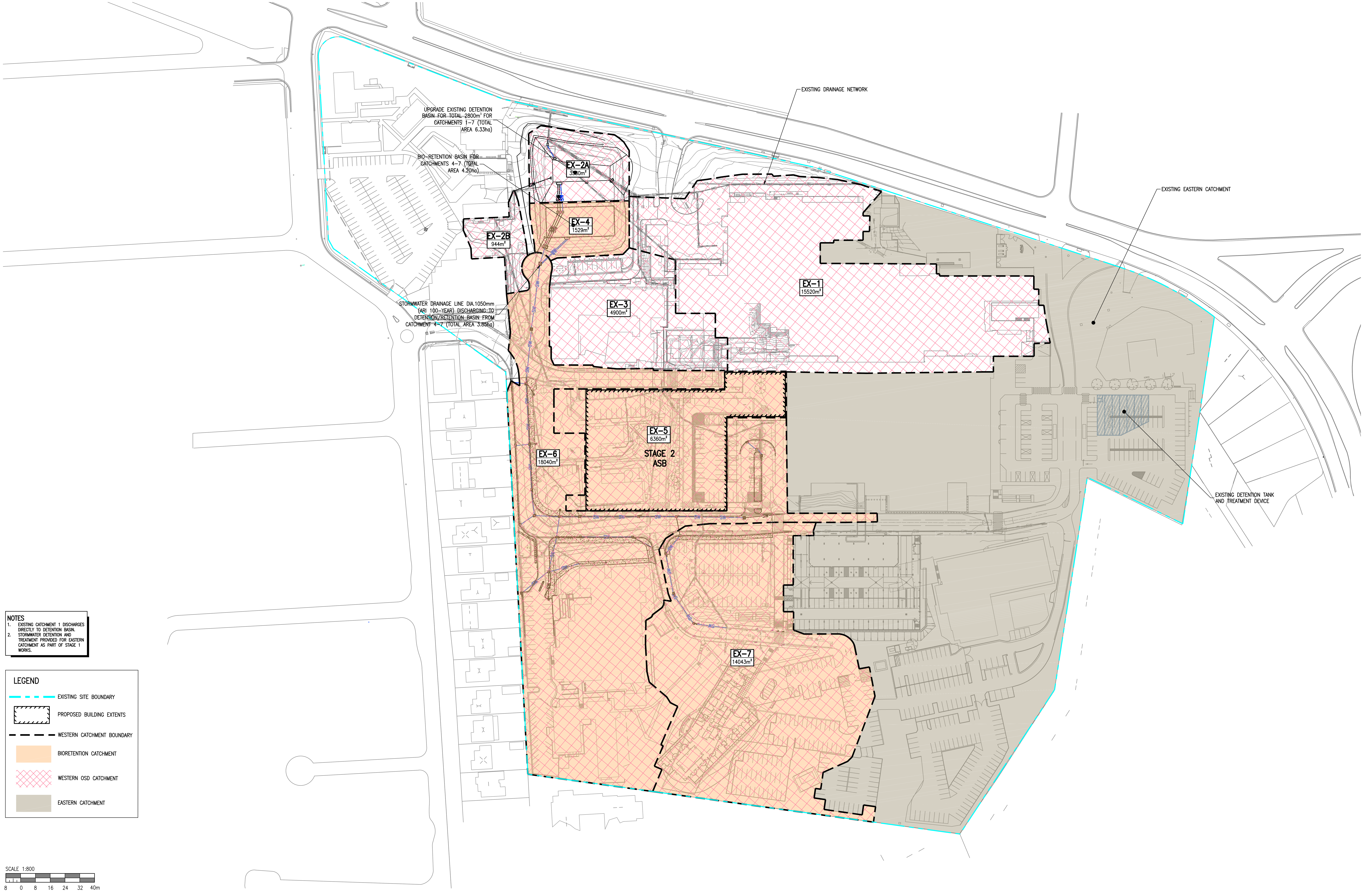
0m 60m 120m 180m 240m

nation provided is indicative only and should not be relie without further certification by Blacktown City Council.

BlacktownCityCouncil

Plotted by: admingis

NOTE: Do not scale from this map. Use D.P. information for accurate dimensions.



DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REV.	DATE	REV'WD BY	APP'D BY	APP'D P.DIR	AMENDMENT
1	30.05.16	CH	CR		PRELIMINARY ISSUE

Date generated 12.04.16
Drawn M.CLAVEL
Design C.HUANG
Checked C.WAITE
Approved C.ROPE
Scale AS SHOWN

CONSULTANT

Structural, Civil & Construction Engineering Consultant
RobertBirdGroup
SYDNEY OFFICE:
Robert Bird Group Pty Ltd
PO Box A2309
Sydney South, NSW 1235
Level 11
151 Castlereagh St
Sydney NSW 2000
Ph. (02) 8246 3200
ACN 010 580 248
Web Site: www.robertbird.com

PROJECT MANAGER

JOHNSTAFF

PRINCIPAL

NSW Health Infrastructure
NSW Health Western Sydney Local Health District

PROJECT

BLACKTOWN AND MT DRUITT HOSPITALS REDEVELOPMENT - STAGE 2

BLACKTOWN CAMPUS: BLACKTOWN ROAD, NSW 2148

FOR INFORMATION

CIVIL

DRAWING TITLE
BR2 - MT DRUITT STAGE 2 - MAIN WORKS

STORMWATER CATCHMENT PLAN

SCALE (@B1) AS NOTED
PROJECT No. 10684Y
DRAWING No. SKC-BR2-CV-DG-0001
REVISION 1

B1

Appendix B
Enabling Works Drawings

LEGEND

- EXISTING SITE BOUNDARY
- EARLY WORKS EXTENTS
- EXISTING BUILDING EXTENTS
- PROPOSED MINOR CONTOUR
- 146.60 PROPOSED MAJOR CONTOUR
- 146.60 EXISTING MAJOR CONTOUR
- PROPOSED BULK EARTHWORKS PAD OUTLINE
- BEL 54.55 PROPOSED BULK EARTHWORKS LEVEL

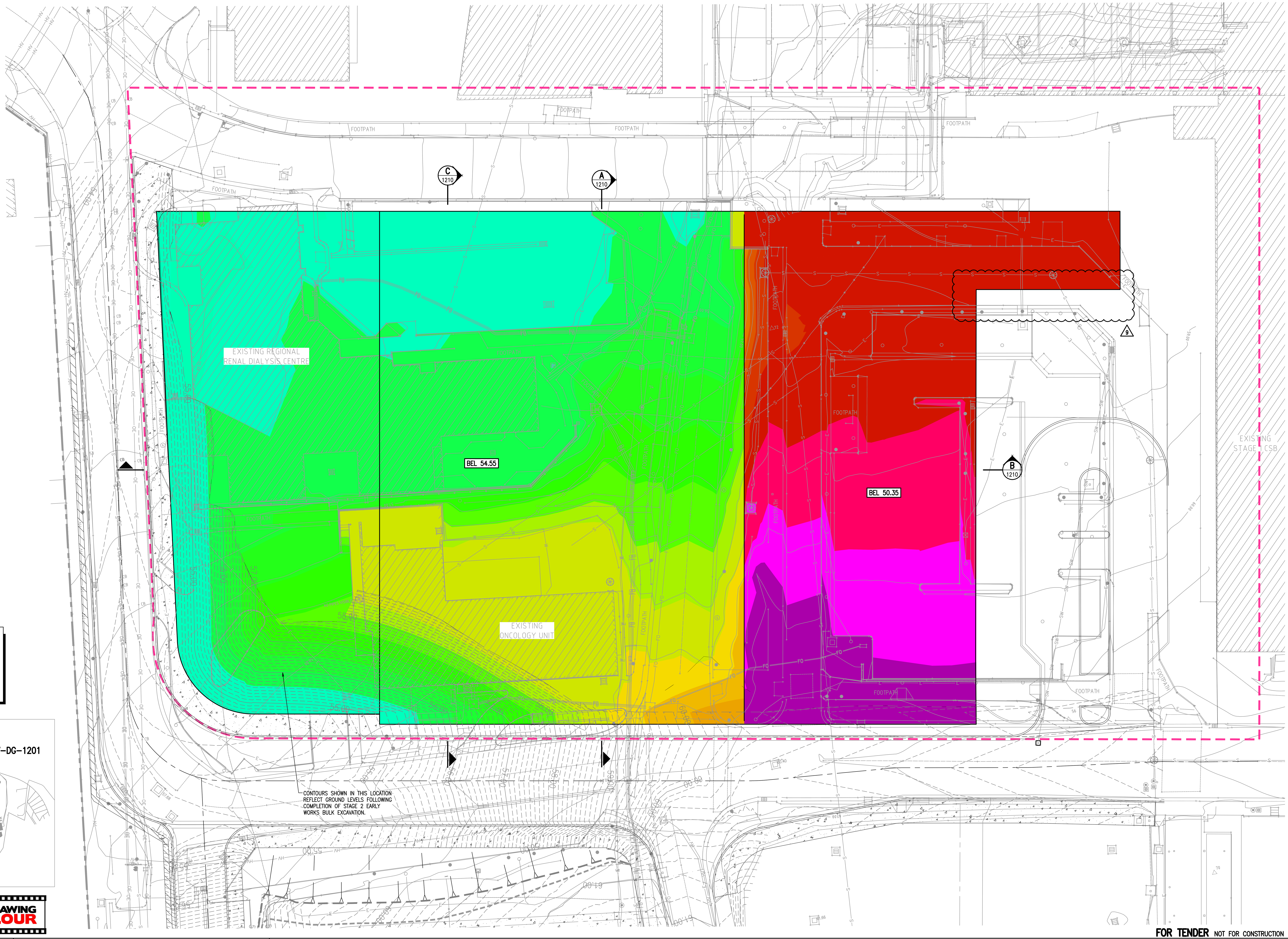
CUT FILL DEPTH RANGES

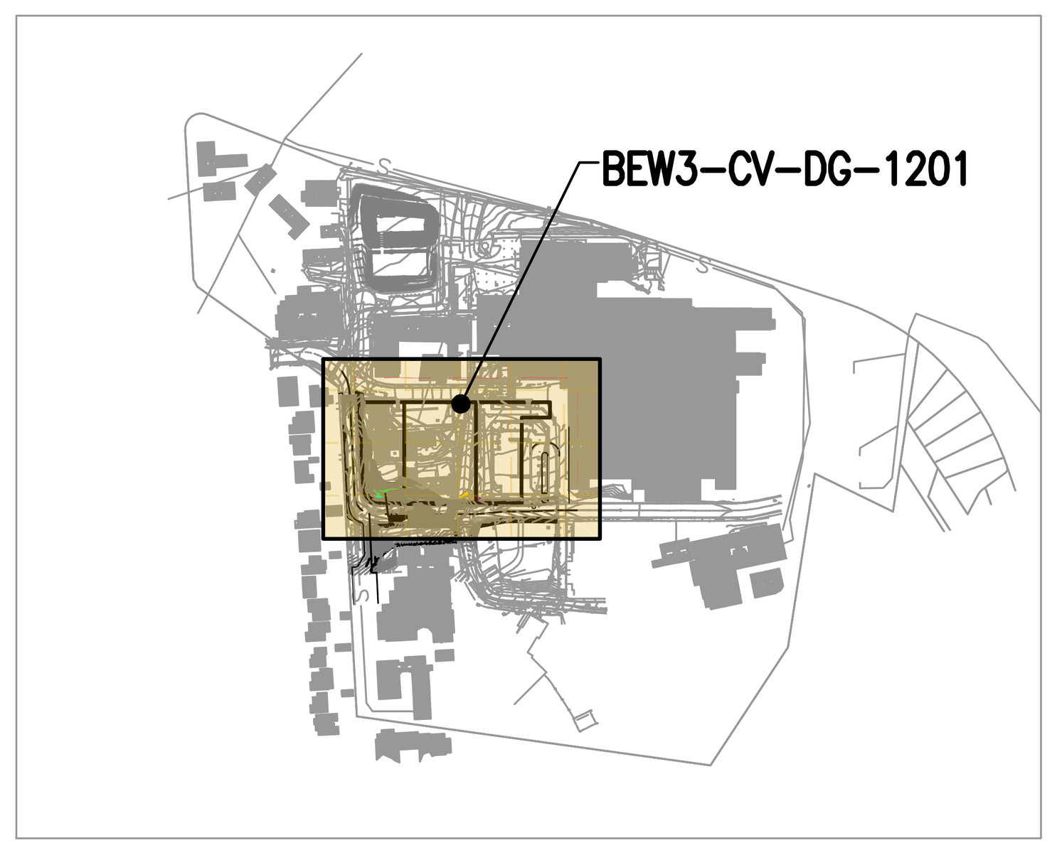
Lower_value		Upper_value		Colour
−999	to	−9.5	m	
−9.5	to	−9.0	m	
−9.0	to	−8.5	m	
−8.5	to	−8.0	m	
−8.0	to	−7.5	m	
−7.5	to	−7.0	m	
−7.0	to	−6.5	m	
−6.5	to	−6.0	m	
−6.0	to	−5.5	m	
−5.5	to	−5.0	m	
−5.0	to	−4.5	m	
−4.5	to	−4.0	m	
−4.0	to	−3.5	m	
−3.5	to	−3.0	m	
−3.0	to	−2.5	m	
−2.5	to	−2.0	m	
−2.0	to	−1.5	m	
−1.5	to	−1.0	m	
−1.0	to	−0.5	m	
−0.5	to	0.0	m	

ESTIMATED CUT VOLUME = 29,901m^3
ESTIMATED FILL VOLUME = 0m^3
9

NOTES

1. BULK EARTHWORKS ANALYSIS DOES NOT ACCOUNT FOR TOPSOIL, EXISTING SLABS OR BULKING FACTORS.
2. TEMPORARY CONSTRUCTION BATTERS ARE NOT ACCOUNTED FOR.
3. BELs ASSUME A 200mm SLAB DEPTH AND 50mm BLINDING LAYER FROM FINISHED FLOOR LEVELS.





SCALE 1:200
2 0 2 4 6 8m

PRINT DRAWING IN COLOUR

FOR TENDER NOT FOR CONSTRUCTION

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REV.	DATE	REVW'D BY	APP'D BY	APP'D P.DIR	AMENDMENT
9	21.04.16	SM	CR		ISSUED FOR TENDER
8	15.04.16	SM	CR		ISSUED FOR TENDER
7	12.04.16	SM	CR		ISSUED FOR TENDER
6	21.03.16	LAR	CR		ISSUED FOR SSD
5	19.02.16	LAR	CR		ISSUED FOR TENDER
4	04.12.15	LAR	CR		ISSUED FOR TENDER
3	05.11.15	LAR	CR		RENUMBERED FROM BIN2−CV−DG−1201
2	06.10.15	LAR	CR		ISSUED FOR SSD REVISIONS
1	29.09.15	LAR	CR		ISSUED FOR SSD

Date generated 21.04.16
Drawn S.MANANDHAR
Design L.RUSSELL
Checked C.WAITE
Approved C.ROPE
Scale VALUE

CONSULTANT

Structural, Civil & Construction Engineering Consultant
RobertBirdGroup
SYDNEY OFFICE:
Robert Bird Group Pty Ltd
PO Box A2309
Sydney South, NSW 1235
Level 11
151 Castlereagh St
Sydney NSW 2000
Ph. (02) 8246 3200
ACN 010 580 248
Web Site: www.robertbird.com

PROJECT MANAGER

pwc

PRINCIPAL

NSW Government Health Infrastructure
NSW Government Health Western Sydney Local Health District

PROJECT

BLACKTOWN AND MT DRUITT HOSPITALS REDEVELOPMENT - STAGE 2

BLACKTOWN CAMPUS: BLACKTOWN ROAD, NSW 2148

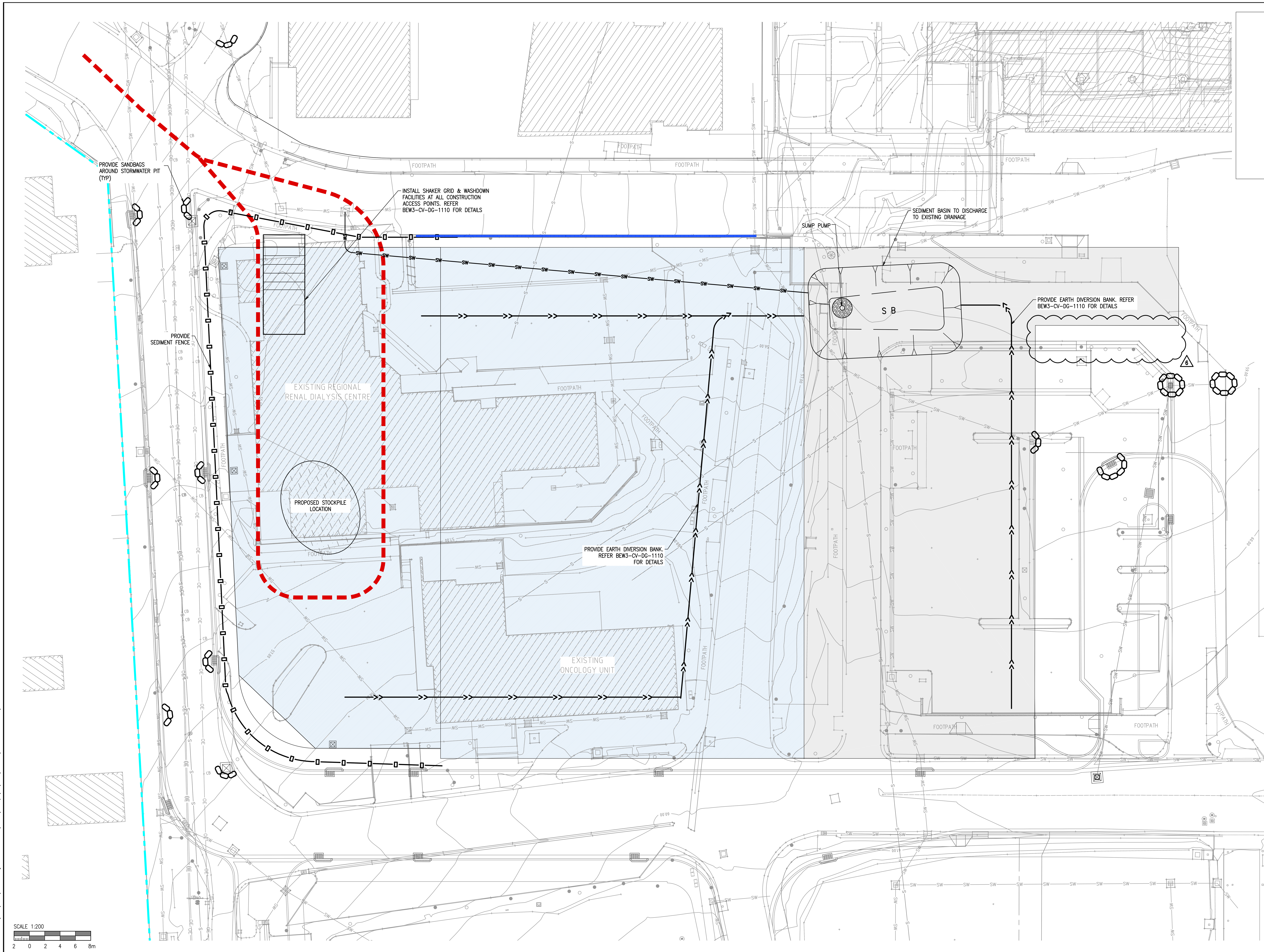
CIVIL

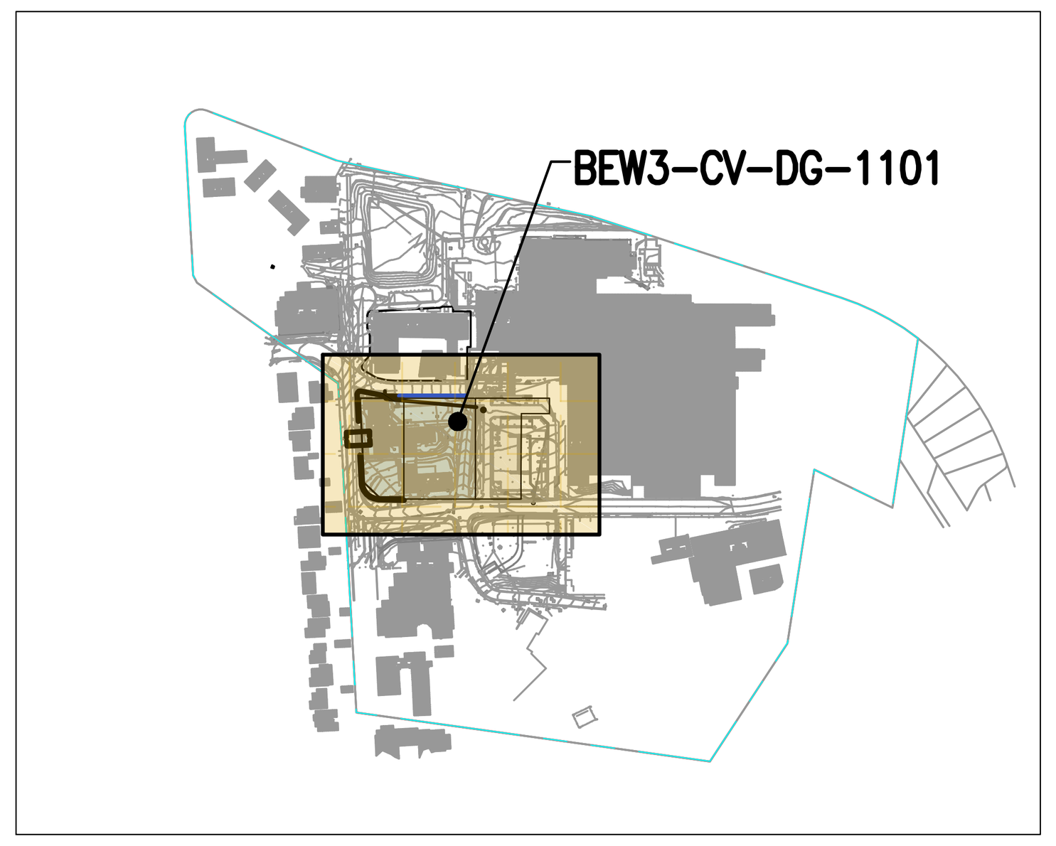
DRAWING TITLE
BEW3 - PACKAGE 3 - EARLY WORKS - BULK EXCAVATION & SHORING

BULK EARTHWORKS PLAN

SCALE (@B1) VALUE
PROJECT No. 10684Y
DRAWING No. BEW3-CV-DG-1201
REVISION 9

B1





LEGEND

- EXISTING SITE BOUNDARY
- EXISTING BUILDING EXTENTS
- PROPOSED CONSTRUCTION ACCES VEHICLE PATH
- PROPOSED SEDIMENT FENCE
- PROPOSED EARTH DIVERSION BANK WITH CATCH DRAIN
- PROPOSED TEMPORARY STORMWATER LINE
- PROVIDE TEMPORARY SANDBAGS AROUND PITS TO EXISTING GRATED PITS DOWNSTREAM OF CONSTRUCTION WORKS.
- PROPOSED SUMP PUMP
- SETTLING/SEDIMENTATION BASIN (LANDCOM DETAIL SD6-4)
- SHAKER GRID AND WASH DOWN FACILITY
- PROPOSED STOCKPILE
- EARTHWORKS EXCAVATION LEVEL 1 OUTLINE
- EARTHWORKS EXCAVATION LEVEL 2 OUTLINE

NOTES

1. REFER BEW3-CV-DG-1110 FOR EROSION & SEDIMENT CONTROL NOTES & DETAILS.
2. THE LOCATION OF THE PROPOSED DETENTION BASINS AND CONTROL MEASURES IS A BROAD INDICATION ONLY OF WHAT WILL BE REQUIRED. THE MEASURES WILL BE DEPENDENT ON THE CONSTRUCTION AND EXPOSED EARTHWORKS STAGING, SEPARATION OF CONSTRUCTION AND HOSPITAL TRAFFIC AND THE CONSTRAINTS OF EXISTING AND NEW SERVICES.
3. DIVERSION BUNDS AND THE DETENTION BASIN ARE TO BE SIZED IN ACCORDANCE WITH BLUE BOOK REQUIREMENTS.
4. ACCORDING TO THE STAGING FILTER SOCKS ARE TO BE PROVIDED AROUND DOWNSTREAM STREET INLET PITS.

FOR TENDER NOT FOR CONSTRUCTION

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REV.	DATE	REVW'D BY	APP'D BY	APP'D P.DIR	AMENDMENT
6	21.04.16	LAR	CR		ISSUED FOR TENDER
5	12.04.16	LAR	CR		ISSUED FOR TENDER
4	19.02.16	LAR	CR		ISSUED FOR TENDER
3	04.12.15	LAR	CR		ISSUED FOR TENDER
2	05.11.15	LAR	CR		RENUMBERED FROM BIN2-CV-DG-1101
1	29.09.15	LAR	CR		ISSUED FOR SSD

Date generated 21.04.16
Drawn S.MANANDHAR
Design L.RUSSELL
Checked C.WAITE
Approved C.ROPE
Scale 1:200

CONSULTANT

Structural, Civil & Construction Engineering Consultant
RobertBirdGroup
SYDNEY OFFICE:
Robert Bird Group Pty Ltd
PO Box A2309
Sydney South, NSW 1235
Level 11
151 Castlereagh St
Sydney NSW 2000
Ph. (02) 8246 3200
ACN 010 580 248
Web Site: www.robertbird.com

PROJECT MANAGER

pwc

PRINCIPAL

NSW Health Infrastructure
NSW Health Western Sydney Local Health District

PROJECT

BLACKTOWN AND MT DRUITT HOSPITALS REDEVELOPMENT - STAGE 2
BLACKTOWN CAMPUS: BLACKTOWN ROAD, NSW 2148

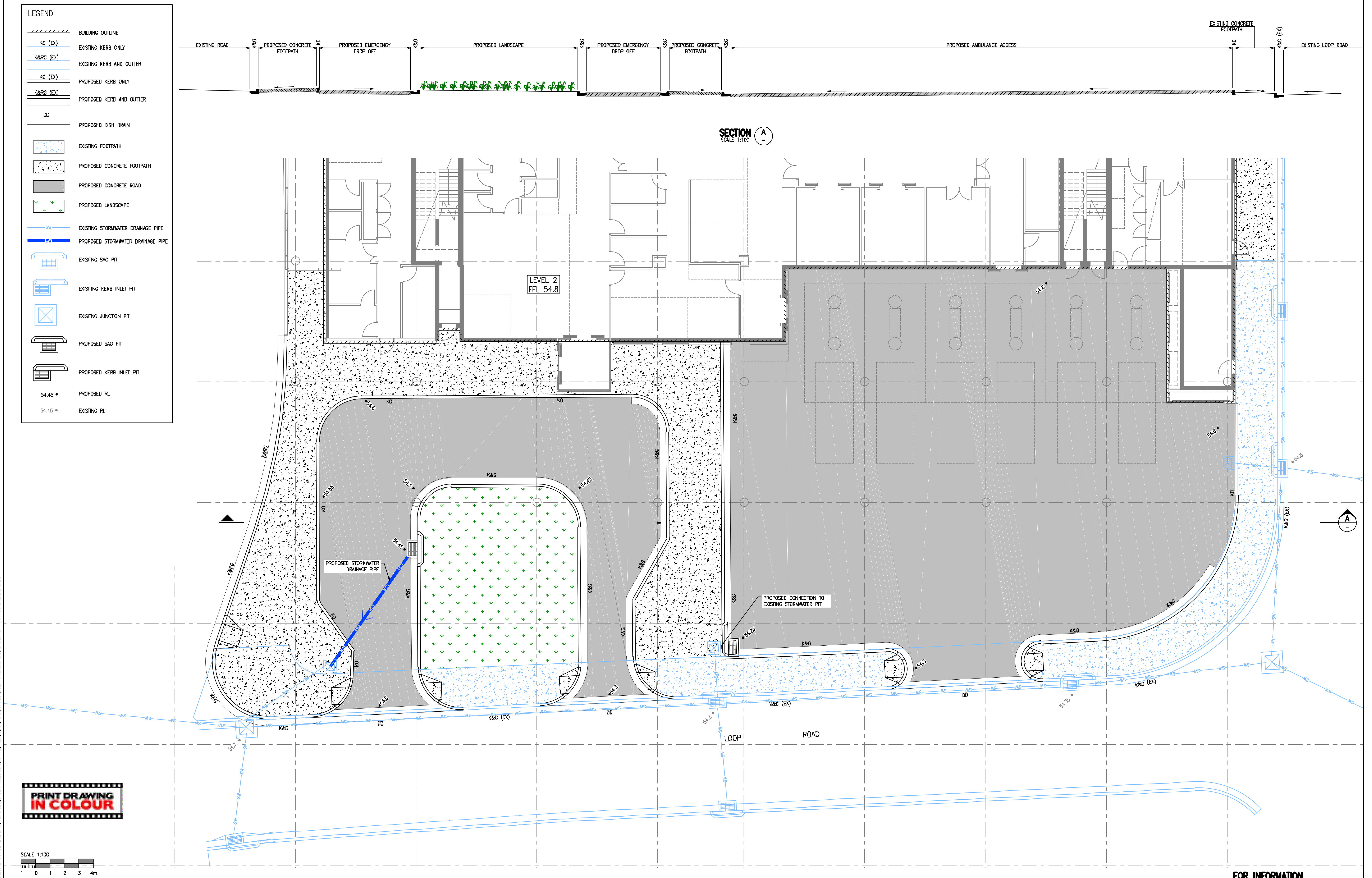
CIVIL

DRAWING TITLE
BEW3 - PACKAGE 3 - EARLY WORKS - BULK EXCAVATION & SHORING
EROSION & SEDIMENT CONTROL PLAN

SCALE (@B1) 1:200
PROJECT No. 10684Y
DRAWING No. BEW3-CV-DG-1101
REVISION 6

B1

Appendix C
Main Works Drawings



FOR INFORMATION

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REV.	DATE	REVWD BY	APPD BY	APPD P.DIR	AMENDMENT
0	10.06.16	CW	CR		SCHEMATIC DESIGN ISSUE

Date generated 10.06.16 | Drawn M.CLAVEL | Design C.ROPE | Checked C.WAITE | Approved C.ROPE | Scale AS SHOWN

CONSULTANT
Structural, Civil & Construction Engineering Consultant
Robert Bird Group

PROJECT MANAGER
JOHNSTAFF

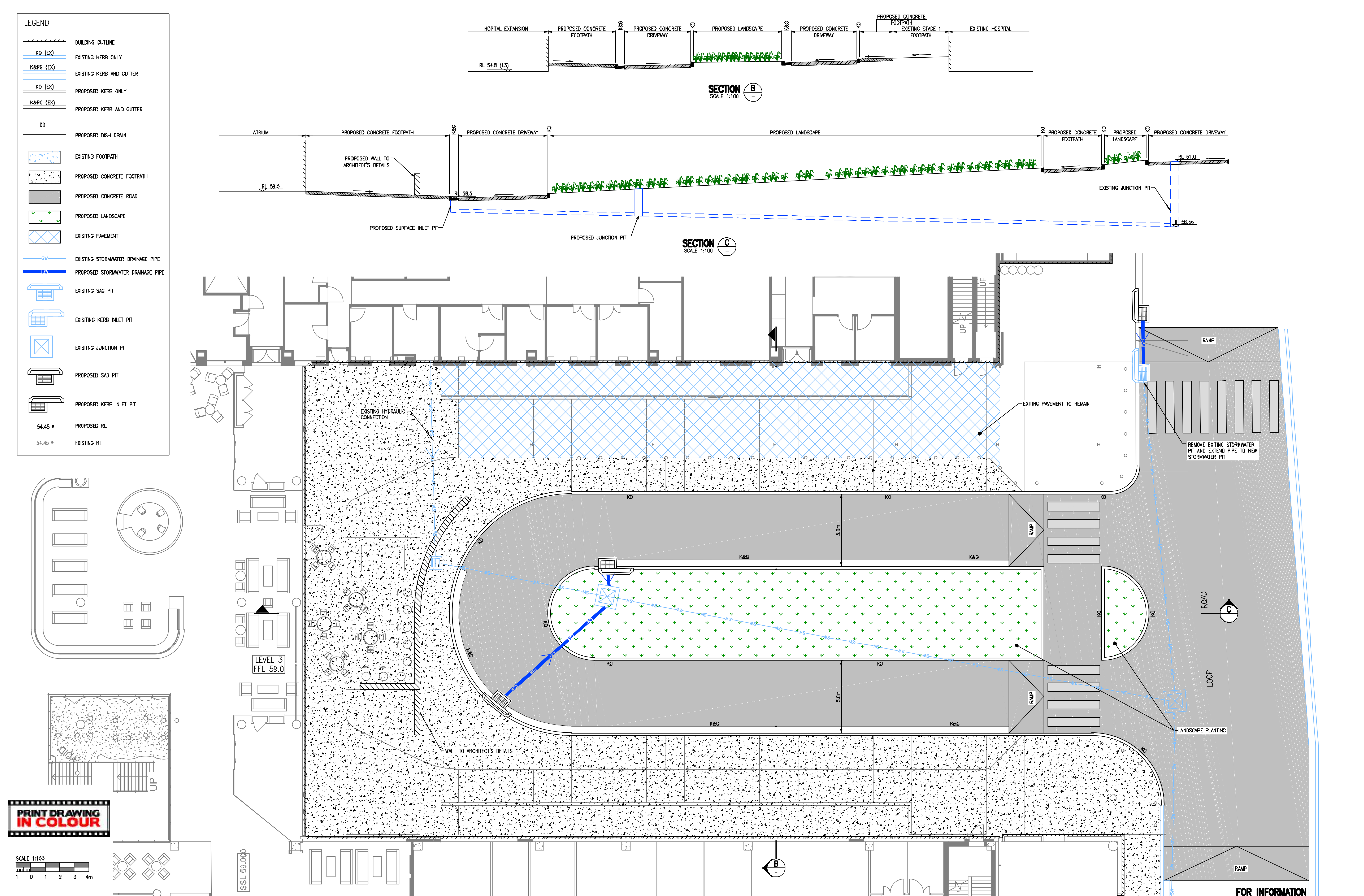
PRINCIPAL
NSW Health Infrastructure
NSW Health Western Sydney Local Health District

PROJECT
BLACKTOWN AND MT DRUITT HOSPITALS REDEVELOPMENT - STAGE 2
BLACKTOWN CAMPUS: BLACKTOWN ROAD, NSW 2148

CIVIL
DRAWING TITLE
BS2 - STAGE 2 DEVELOPMENT - ASB NEW BUILD
GENERAL ARRANGEMENT PLAN – SHEET 1 OF 2

SCALE (@B1) AS NOTED
PROJECT No. 10684Y
DRAWING No. BS2-CV-DG-0 01
REVISION 0

B1



Disclaimer: Robert Bird Group Pty Ltd ACN 010 580 248 and its related entities ("RBG") do not warrant the accuracy, currency or completeness of any information or data supplied or transferred by electronic means. You are responsible for verifying that any information or data supplied or transferred by electronic means matches the information or data supplied in hard copy form. To the extent permitted by law, you release RBG from any liability for any loss or damage however caused arising from any use of this information or data supplied or transferred by electronic means.

Unless agreed otherwise by Robert Bird Group Pty Ltd ("RBG") ACN 010 580 248 in writing, intellectual property rights in any information or data supplied or transferred to you (including copyright in all text, graphics, logos, icons, sound recordings and software) are owned by, or licensed to, RBG. Other than for purposes authorised by RBG in writing, you must not copy, adapt, reproduce, store, publish or communicate any information or data supplied or transferred by electronic means without RBG's prior written permission. © Robert Bird Group Pty Ltd 2011

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REV.	DATE	REVW'D BY	APP'D BY	APP'D P.DIR	AMENDMENT
0	10.06.16	CW	CR		SCHEMATIC DESIGN ISSUE

Date generated 10.06.16
Drawn M.CLAVEL
Checked C.WAITE
Design C.ROPE
Approved C.ROPE
Scale AS SHOWN

CONSULTANT
Structural, Civil & Construction Engineering Consultant
Robert Bird Group

PROJECT MANAGER
JOHNSTAFF

PRINCIPAL
NSW Health Infrastructure
NSW Health Western Sydney Local Health District

PROJECT
BLACKTOWN AND MT DRUITT HOSPITALS REDEVELOPMENT - STAGE 2
BLACKTOWN CAMPUS: BLACKTOWN ROAD, NSW 2148

CIVIL
DRAWING TITLE
BS2 - STAGE 2 DEVELOPMENT - ASB NEW BUILD
GENERAL ARRANGEMENT PLAN – SHEET 2 OF 2

SCALE (@B1) AS NOTED
PROJECT No. 10684Y
DRAWING No. BS2-CV-DG-0[illegible] 02
REVISION 0

B1

RobertBirdGroup

Sydney Office

Robert Bird Group Pty Ltd
ABN 67 010 580 248 ACN 010 580 248

Level 11
151 Castlereagh Street
Sydney NSW 2000
PO Box A2309
Sydney South NSW 1235
Australia

P: +61 (0) 2 8246 3200
F: +61 (0) 2 8246 3201

www.robertbird.com