

Storm Water Management Plan

Cessnock Correctional Centre, NSW

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Prepared For: NBRS Architecture

Sydney Office
Level 3, 4 Glen Street
Milsons Point, NSW 2061 Australia

Meinhardt

Level 4, 66 Clarence Street
Sydney, NSW 2000

P. 02 9699 3088 | F. 02 9319 7508
www.meinhardtgroup.com

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REV	DATE	DETAILS
A	14.07.2016	DRAFT
B	15.08.2016	AMENDED REF DRAFT
C	23.08.2016	STORMWATER REPORT WITH DRAINAGE PLAN
D	15.09.2016	REVISED TO REFLECT DESIGN DEVELOPMENT
E	17.10.2016	REVISED TO REFLECT DESIGN DEVELOPMENT
F	18.10.2016	REVISED TO REFLECT DESIGN DEVELOPMENT

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1.0 General

Meinhardt has been engaged to undertake the civil engineering design for the redevelopment of the Cessnock Correctional facility in NSW. The proposals at the present time consist of a proposed 600-bed expansion (320 bed maximum security unit and a 280 bed minimum security unit), new car parks and external hard standing areas outside the front of the site. Additionally this Storm Water Management Plan will also discuss the proposed 400 bed unit which is to be located to the south-west of the existing facility. The 400 bed unit is known as the Rapid Build Prison (RBP). The 600 bed project and the RBP project will be procured separately.

The proposed access road will be constructed as part of the RBP project and will intersect with the existing Lindsay Street and will extend to the RBP project. Additional road will be constructed to facilitate access to the main prison to the north and to the associated external areas of both the existing 600 bed area and the RBP project.

2.0 Project Background

The site is located in Cessnock, NSW. Additional prisoner capacity needs to be provided by Corrective Services NSW in terms of accommodation and consequently any associated infrastructure works also need to be provided. This will include the new access road to serve both the RBP and the 600 bed expansion project.

Presently the RBP project is intended to complete prior to the 600 bed expansion project but having to consider the 600 bed expansion commencing prior to completion of the RBP. This will involve the coordination of services, utilities and drainage for the 600 bed expansion.

3.0 Standard and Guideline References

3.1 Relevant Council Standards, Corrective Services Specifications and Australian standards

3.1.1 The following documents by Cessnock City Council, Corrective Services and Australian standards have been used in determining the civil design elements for this project. If these documents are not relevant, then those detailed in Section 3.2 below have been referred to.

Cessnock Development Control Plan 2010: This document has been referred to because stormwater from the overall site will enter existing networks to the north, the west and the south.

Below are Cessnock City Council's specifications within the DCP 2010; these sections below are the relevant ones in relation to these projects;

7 Suggested Development Controls – Recommended stormwater Management, Flood Planning Controls and Creek Rehabilitation Measures

7.1 Recommended Stormwater Management Development Controls

7.1.1 Stormwater Management (Water Quality and Quantity)

- Water Quality

- Water Quantity

- Type 1 - End of Pipe treatment

- Type 2 - Water Sensitive Urban Design Approach

- Type 3 –

7.1.2 Stormwater Conveyancing Control

7.1.3 6.0 Stormwater Drainage Design

- Outlines Cessnock City Council's stormwater Drainage.

3.1.2 Corrective Services Enterprise Assets specification 2.10.4 Stormwater. This document states that all stormwater drainage systems shall be designed in accordance with the requirements of relevant Australian Standards and Local Council requirements.

3.1.3 AS3500 Plumbing and Drainage

3.2 Relevant Industry Standards and Guidelines

3.2.1 Australian Runoff Quality (ARQ)

This industry guideline is published by Institution of Engineers Australia (IEAust). It provides guidance on water sensitive issues and calculations for various water quality solutions.

3.2.2 Australian Rainfall and Runoff (AR&R, 1987)

This is a study produced by IEAust which contains solutions to Flood and Stormwater related issues Australia.

3.2.3 Managing Urban Stormwater (The Blue Book)

Document produced by New South Wales Government providing industry best practice and solutions to Erosion and Sedimentation Controls.

4.0 Purpose of this Report

The purpose of this report is to provide an overview of how the stormwater associated with the proposed 600 bed expansion, RBP and the existing buildings are to be discharged from site.

This report has split the proposed development areas into the following;

- Proposed Works within/adjacent to Existing Facilities
 - 320 bed maximum security unit
 - 280 minimum security unit
 - Mid sector Area (outside the front of the gatehouse)
 - Car parks
- Proposed Access Road
- Proposed Rapid Build Prison (RBP)

5.0 Authorities

The site is within the Local Government area of Cessnock City Council and the Water and Sewer authority is Hunter Water.

As such the storm water drainage design within the development will need to comply with the requirements of;
Cessnock City Council
Hunter Water
Corrective Services NSW

All storm water assets will remain the property of Corrective Services NSW and will need to be maintained in accordance with relevant requirements.

6.0 Storm Water Drainage Design

6.1 We have received 6no. sets of topographical survey information to date, namely;

- i. 16110 320 BED MAX TRIANGLES_Rev_2
- ii. 16110 CESSNOCK_TRIANGLES_FINAL
- iii. CES_survey_01-12-2006
- iv. CESSNK_H_01_04_SITE_GRND_SEWER
- v. 16110_DET_D 04/08/16
- vi. 160375c combined surfaces PSS and MP triangles only_REV1 (2)

The proposed development plans, at present, for the upgrade of the existing facilities have been taken from the NBRS drawings;

XREF-16168 Masterplan_009 DATED 05.08.2016

The proposed development plans, at present, for the RBP have been taken from the Meinhardt drawing ref. 116118 SK011 dated 05.09.2016 which has been produced in consultation with the relevant design parties associated with the RBP project. It is understood that the final layout plans for the RBP project are yet to be finalized.

Across the existing site it would appear that the various existing collection points and infrastructure associated with the storm water drainage ultimately allow the storm water to discharge to natural channels/dams/valleys around the site. Our designs, assume that the existing and/or relocated/enlarged basins around the site will act as Onsite Storm water Detention (OSD).

WAE information produced by CR Hutchison & Co Pty Ltd, drawing number 16781_5A Rev A on 28/11/2011 provides details of the existing prison facilities. Storm water flows generated from the existing infrastructure discharges to both the north and south of the overall site.

In general, the majority of the storm water from the existing buildings discharges to the north into the existing detention basin via pipes of max 225mm diameter under the perimeter wall, and then via larger pipes, 675mm dia

and 825mm dia. The outfall of this existing Basin is a 675mm dia that discharges water toward Kerlew Street and into natural causeway.

Storm water discharging south bound flows via 3no routes;

- (i) is collected into an existing swale and then travels overland, making its way to an existing pond on the southern boundary of the site adjacent to the golf course. Water from this pond then travels eastwards overland, along the site boundary, and onwards towards the culverts and stream outside of the main site entrance.
- (ii) is conveyed to the eastern site boundary via the existing detention basin (over which the 280 bed unit will be constructed) and then via a pipe network – outfall pipe 300mm dia discharging toward the boundary gate, sets of culvert and into natural causeway.
- (iii) is conveyed to the southern site/golf course boundary via a swale which appears to peter out, and the water then travels eastwards overland along the boundary and onwards towards the culverts and stream outside of the main site entrance.

6.2 320-bed maximum security unit

The proposed RL's of the buildings in this area have been provided by NBRS (architect) and currently range from 106.0 to 98.9. It is proposed that surface water from an additional 57,124m², area indicated in yellow hatching in attached plan (a combination of impermeable and permeable area) be discharged into the extended existing north basin which have an existing volume of 1,799m³ (basin 1).

The **additional** storage volume required approximately 700m³ which will require the expansion of the existing northern basin. This additional volume will be limited to discharge at the pre-development flow.

6.3 280-bed minimum security unit

The proposed RL's of the buildings in this area have been provided by NBRS and range from 95.0 to 91.0. It is proposed that the storm water generated in this area of the site will discharge southwards. Currently there is an existing detention basin situated in the area of the proposed 280 bed unit, and therefore it is proposed that this detention basin will be relocated further south (to the south of Alunga Avenue and the new proposed access road) avoiding potential conflicts with other drainage and services etc.

This relocated basin will need to be increased in size over its current capacity. The proposed basin 2 required storage capacity of approximately 6000m³ which was calculated for an event of 1 in 100 yr.

Therefore, basin 2 was designed to store stormwater from soon to be decommissioned existing basin as it will be replaced by 280 bed area. Please refer to green hatching from plan attached

6.4 Mid sector Area (outside the front of the gatehouse)

The proposed RL's in this area have been provided by NBRS and it is proposed that the storm water generated in this area of the site will discharge to the south, to the new basin discussed in Section 6.3 of this report.

The proposed storm water generated from the New Admin building of this project along with the proposed carpark and surface runoff are to be discharged to both proposed swale and overland flow and into existing storm water course way.

In order to minimise the use of storm water drainage pipes, swales will be incorporated alongside the proposed access road to allow water to be conveyed to basin 2. The proposed access road will also be used as a channel to direct stormwater water runoff to swales and eventually Basin 2.

Existing storm water drainage in this area will be diverted and connected into the proposed system.

6.5 Car parks

The proposed RL's in this area have been provided by NBRS and range from 100.30 to 90.26. The concept for these car parks is that they will be tiered and separated by a series of blockwork retaining walls. It is proposed that the storm water generated in this area of the site will discharge to the south, under access road and toward basin 2.

6.6 Access Road

The proposed access road will act as a channel directing stormwater runoff and discharge into multiple grate inlet and eventually in basin 2.

6.7 RBP

This project can be considered in 2 parts. Main platform area and the external area.

6.7.1 PLATFORM AREA

This is the main part of the project and the surface water from this area will be discharge to Oakly Creek dam to the west. Discharge flow rate must maintain a pre-development discharge flow rate as agreed with Cessnock City Council by using detention basin.

6.7.2 EXTERNAL AREAS

These are ancillary buildings, areas and car parks associated with RBP, located directly east of the platform area.

It is the intention that these impermeable and permeable areas be discharged toward the southern boundary of the site and is restricted to pre-development discharged flow rate. This proposed solution will mimic the current status quo and may need detention basin which will be located south of RBP car park.

6.7.3 FURTHER ASSESSMENT

The drainage design of the Cessnock Corrective Centre and RBP is yet to be finalized. Further assessment of drainage design including requirements to maintain pre-development flow rate will be undertaken during detailed design. Stormwater drainage will comply with all relevant standards and guidelines as outlined at section 3.0

7.0 Water Quality

Cessnock City Council's DCP 2010, for Best Management Practice (BMP) Cessnock City Council recommends water quality objectives of:

- Suspended Solids (TSS) 80% retention of the developed average annual load
- Total Phosphorus (TP) 45% retention of the developed average annual load
- Total Nitrogen (TN) 45% retention of the developed average annual load

According to Cessnock City Council DCP 2010, MUSIC Modelling is recommended to determine the stormwater quality prior to it being discharged into natural watercourse.

MUSIC modelling will be undertaken and several highly effective water filtration techniques will be employed. These are listed below:

- Bioretention System
 - Is a hydrologic routing of stormwater flow through a system which treats stormwater runoff through bioretention as well as controlling stormwater discharged?
- Swale
 - Swales improve water quality prior to discharge by removing suspended solids. Plans will be produced for this scheme detailing stormwater treatment devices and MUSIC modelling outputs.

8.0 Erosion and Sediment Control

During construction activities for both projects, water quality control will be achieved by deposition and trapping of silts and clays which often have nutrients attached to their surfaces during the construction process.

Erosion & Sediment Controls during construction activities for this development will be in accordance with Cessnock City Council's Guidelines. By the implementation of the sediment & erosion control plan for the site, a significant portion of nutrients can be removed from stormwater runoff during construction.

9.0 Water re-use

Rainwater tanks will not be implemented for the 600-bed project.

