Storm Water Management Plan

South Coast Correctional Centre, NSW

Project No. 115577
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1.0 General

Meinhardt has been engaged to undertake the civil engineering design for the redevelopment of the South Coast Correctional facility in Nowra, NSW. The proposals at the present time consist of a proposed 160-bed maximum security unit to the south, a 200-bed unit in the north west, new car park in the north east and various new and refurbished buildings and infrastructure throughout the existing campus. The perimeter road and security features will be extended around the new 160 bed unit.

2.0 Project Background

The site is located in Nowra, 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.

The existing prison facilities are to remain operational during the proposed expansion and upgrade works.

3.0 Purpose of this Report

The purpose of this report is to provide an overview of how the storm water associated with the proposed new areas of the prison is to be discharged from the site.

At this stage of the project, detailed storm water drainage systems have been designed for the 160-bed maximum security unit to the south and the new car park in the north east. For all other areas of proposed development for the campus, no calculations have been produced to determine any on-site storm water detention system requirements, and no water quality measures have been investigated.

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

- 160 bed maximum security unit area (incl. proposed perimeter road)
- 200 bed unit
- Car park
- Internal areas

4.0 Authorities

The site is within the Local Government area of Shoalhaven City Council.

As such the storm water drainage design within the development will need to comply with the requirements of;

- Shoalhaven City Council
- Corrective Services NSW
- Any relevant Australian Standards

All storm water assets, including on-site detention tanks (if required) will remain the property of Corrective Services NSW and will need to be maintained in accordance with relevant requirements.

5.0 Storm Water Drainage Design

5.1 Existing Information

Topographical survey information for the site was recieved from Allen Price & Scarratts which was issued on 31 May 2016. The survey covered the majority of the proposed extension and new building works.

The proposed development plans at present for the site have been taken from the Guymer Bailey Architects drawings;

2253-AR-AA-01 to 2253-AR-AA-09

It is the above data that we have analysed to produce the contents of this report.

It would appear that the various existing collection points and infrastructure associated with the stormwater drainage consist of four sedimentation detention basins. These are located to the south-west, north-west, north-east and south-east of the existing prison campus. These four basins then discharge into Nowra Creek, which has tributaries that flow both on the east and west of the site in a northerly direction.

Within the existing maximum security area at the present, the western half of this area discharges into the south-west basin, and the eastern half discharges to the south-east basin. The remainder of the western half of the prison facilities discharges into the north-west detention basin, and the eastern half of the facilities discharge into the north-east basin.

All the existing roof water currently collects into 2no. 1 million litre rain water tanks for water re-use. Any excessive flows into these tanks overspill into the adjacent basins if necessary. The detention basins are designed to be sedimentation basins, ie they will always remain wet to allow the settlement of particles and solids, prior to discharge from the basin.

5.2 160-bed maximum security unit

Hydrologic and Hydraulic modelling has been undertaken in this area in order to design the stromwater system to any relevant authority requirements. This includes a pit and pipe system designed to the peak 1 in 20 Year ARI storm, and a 1 in 100 Year ARI storm with overland flow. Due to the obstruction of overland flows from the concrete security wall, all pipes leaving the maximum security area have been designed to take the 1 in 100 Year ARI storm.

The proposed RL's of the buildings in this area have been set by Meinhardt in collaboration with Guymer Bailey at 52.5 and 51.9. It is proposed that the western part of this area (that will include all the proposed buildings) will discharge to a new detention/sedimentation basin to be constructed in the vicinity of the existing south-west detention basin. The storage volume for this new basin will be 850 m3, with a slotted 375mm discharge control pipe and a 5m wide overflow weir set 300mm below the top of the basin embankment. The roof water from the proposed buildings will discharge to a rainwater tank within the maximum security complex (capacity approx. 60,000 litres) with an overflow eventuating into the new basin. This basin has been designed to attenuate post-development flows to existing for the peak duration for all storm events up to and including the 100 Year ARI storm (which also allows for the roof water runoff from the buildings generated in this storm event).

It is proposed that the eastern part of this area (that includes the external areas) will discharge beyond the new perimeter wall along the eastern boundary and into an adjacent watercourse (Nowra Creek). Stormwater modelling has determined that attenuation of these flows is not required due to the current discharge from this area being generated from a larger catchment area than the area of the proposed catchment.

5.3 200-bed unit

The stormwater system in this area has been analysed to provide an optimum drainage solution. The proposed RL's of the buildings in this area will be confirmed, but it is proposed that the stormwater generated in this area of the site will discharge to the exiting sedimentation/detention basin in the north-west, which will require enlargement in volume and elongation of the spillway to account for the additional impervious area created. This enlargement will also account for additional impervious area from the new perimeter road to be extended around the 200 Bed Unit, the addition of a new sterile zone to the existing minimum security zone and any works within internal areas.

The trunk drainage from the existing development to the north-west basin will be relocated to travel around the proposed 200 Bed unit.

5.4 Car Park

The proposed RL's in the car park area to be located in the north east of the site have been set by Meinhardt and have been set with reference to the existing car park levels, the existing levels of the adjacent basin and the location of proposed Building R.

It is proposed that the storm water generated in this area of the site will discharge to the exiting detention basin in the north-east, which will require an increase in volume to attenuate flows to that of the predevelopment scenario. In addition the existing overflow weir will need to be increased in length to prevent overtopping of the basin wall. The increase in storage volume of this existing basin will be an additional 750 m3, which is designed to attenuate additional surface water generated from the increased car park area and proposed Building R in addition to the increase in impervious area from expansion of the existing minimum security sterile zone and any works within the internal areas.
As discussed, the existing overflow weir will need to be increased in length to prevent overtopping of the basin wall, and the proposal is to extend the current length of the weir by an additional 4m.

5.5 Internal areas

The proposed development areas within the existing campus area comprise of the modification and expansion of existing buildings in addition to the construction of new buildings in pervious areas. Work within existing building

footprints will not have an effect of surface water flows; however expansions to existing buildings and construction of new buildings onto previously pervious areas will increase stormwater runoff.

Building H1 will require enlargement of the existing stormwater system to take additional flows into the existing South-West sedimentation/detention basin. The South-West basin will require enlargement in volume and elongation of the spillway to account for the additional impervious area created by the roof and external pavements.

Building G1 (expansion of building G) and Building Z will require enlargement of the existing stormwater system to take additional flows into the existing South-East sedimentation/detention basin. The South-East basin will require enlargement in volume and elongation of the spillway to account for the additional impervious area created by the additional roof areas.

Building W+ (expansion of building W), Building I will require enlargement of the existing stormwater system to take additional flows into the existing North-West sedimentation/detention basin. As discussed in Section 5.3 the additional impervious area has been accounted for in the basin enlargement.

Building M+ will require enlargement of the existing stormwater system to take additional flows into the existing North-East sedimentation/detention basin. As discussed in Section 5.4 the additional impervious area has been accounted for in the basin enlargement.

6.0 Water Quality

Water quality modelling has been undertaken for the development. The software MUSIC was used to model the proposed development and design any required water quality treatment devices. Shoalhaven City Council requires new developments to meet pollutant reduction targets as can be found in the table below.

Table 1 - Shoalhaven City Council Water Quality Treatment Targets

Pollutant	% Post Development Average Annual Load Reduction
Gross Pollutants	90
Total Suspended Solids	85
Total Phosphorus	65
Total Nitrogen	45

Various measures have been put in place in order to meet water quality treatment targets which include;

- Rainwater Tank for water re-use
- Sedimentation basins (New basin in addition to the enlargement of existing basin(s))
- Vegetated swales
- Bio-retention

The basic principles are that the existing detention basins around the site appear to be designed as sedimentation basins and therefore have some water quality features. Any further or enhanced water quality features will be introduced around the site accordingly.

7.0 Erosion and Sediment Control

During construction activities, water quality control is 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 Shoalhaven 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. The Civil Engineering drawings that will be produced during the design phase will address these issues.

8.0 Water re-use

At this stage of the project there is a requirement for rainwater tanks for grey water use. Roof water from the proposed buildings is designed to be diverted to such facilities to meet any requirements.

Rainwater harvesting within the proposed 160 bed maximum security area has been designed for use in toilet flushing for all cells.