

Wagga Wagga Base Hospital Stage 3

Civil Design Report

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BONACCI

Bonacci Group (NSW) Pty Ltd
ABN 29 102 716 352
Level 6, 37 York Street
SYDNEY NSW 2000
Tel: +61 2 8247 8400
www.bonaccigroup.com

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1. EXECUTIVE SUMMARY

This report has been prepared as part of the SEAR's application requirement for the Ambulatory Care Building at Wagga Wagga base hospital. The report addresses the site stormwater drainage requirements and assesses the available flood data for flood risk to the proposed development.

The proposed stormwater drainage infrastructure is designed in accordance with Wagga Wagga City Council's Engineering Guidelines for Subdivisions and Developments, City of Wagga Wagga Council DCP, Australian Rainfall and Runoff, Australian Runoff Quality – a Guide to Water Sensitive Urban Design, Australian Standard AS3500 and all other relevant Australian Standards. The proposed site of the new ambulatory care building does not affect any existing major overland flow paths or major in-ground stormwater trunk lines. As the existing system in Edward St is undersized, site drainage is discharged into Docker Street stormwater network via a connection to the existing 525mm diameter pipe south of the existing hydrotherapy pool.

The proposed undercroft is below the level of the existing stormwater mains, therefore a pump out system is required to dispose of any water entering the basement. The ground floor is set at RL183.545. The 1 in 100 year ARI flood level does not enter the site. The nearest flood level is +179.90 AHD. The entrance to the carpark and other infrastructure such as electrical substations will need to consider this level in the planning of the facility. Existing drainage in the carpark to the north and the recently constructed carpark to the east is not to be altered.

It is envisaged that excess cut will result from the excavation of the semi basement carpark, however the earthworks do not extend significantly beyond the footprint of the new building. As part of the proposed new outdoor carpark (between Ambulatory Care Building and Harvey House, on Docker Street) works, one existing crossover will be retained as a two-way entry/exit driveway, while the second existing crossover immediately to the south will be demolished and traditional kerb and gutter, verge and footpath reinstated.

2. SITE DESCRIPTION

2.1. Location

The proposed development is located in the Wagga Wagga Base Hospital Campus, Wagga Wagga NSW. The campus is bordered by the Sturt Highway (Edward St) to the north, Docker St to the west, Rawson Lane to the south and low rise residential Yathong and Yabtree and Edward Streets. The location of the proposed Ambulatory Care Building (as part of Stage 3 works), is over the Old Hospital Building, Robinson House and Hydrotherapy Pool buildings and fronting Docker Street. The proposed development is located within the City of Wagga Wagga Council local government area.

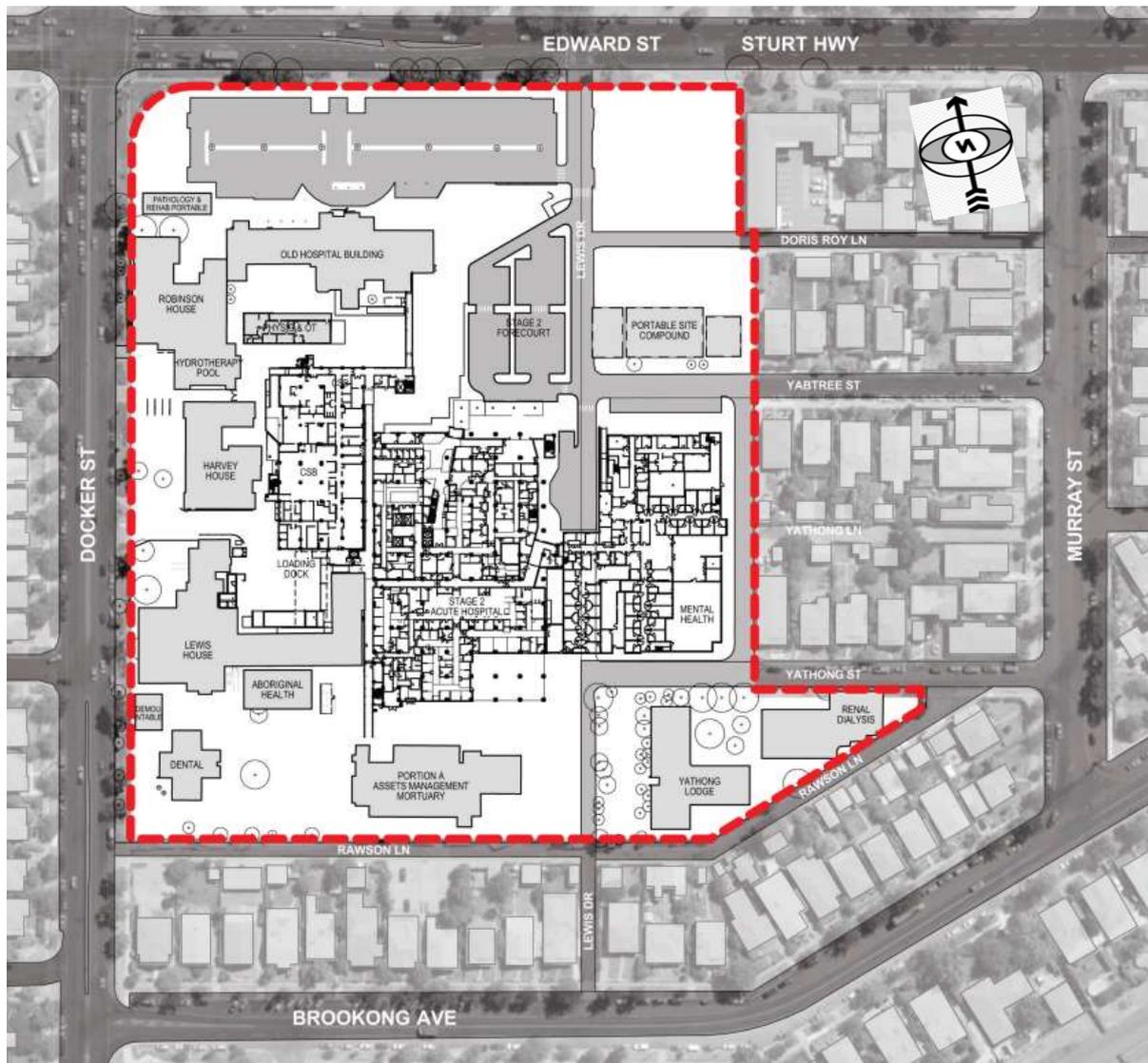


Figure 2-1: Aerial View of the existing Wagga Wagga Base Hospital Site

2.2. Topography

The Wagga Wagga Base Hospital Site generally slopes from a high point in the south-east corner to a low point on the north-west corner. The existing buildings generally drain to existing Council stormwater infrastructure on Edward and Docker Streets. In major storm events, overland flow occurs via the road network adjacent to Yathong Lodge, down Lewis Drive to Edward Street and then Docker Street to Wollundry Lagoon.

2.3. Existing Documentation

The following relevant existing documentation has been referenced for the proposed design:

- Architectural Plans by Martin & Ollmann, dated 15 March 2018,
- Survey Plan by Rivland Surveyors, dated 8 August 2014,
- Geotechnical Investigation (Ref: 72320.09) by Douglas Partners, dated 26 August 2014, and
- Wagga Wagga Floodplain Risk Management Plan by WMA, dated 1 May 2009.

3. PROPOSED DEVELOPMENT

The Wagga Wagga Base Hospital Stage 3 consists of a six storey Ambulatory Care Building, including a rooftop Plant Room, all above an undercroft parking level. Proposed development shall include a proposed outdoor carpark with an entrance/exit from Docker Street as well as accompanying landscape, pedestrian footpath and terrace areas. The Architectural site plan for the new building is shown in Figure 3-1 below.

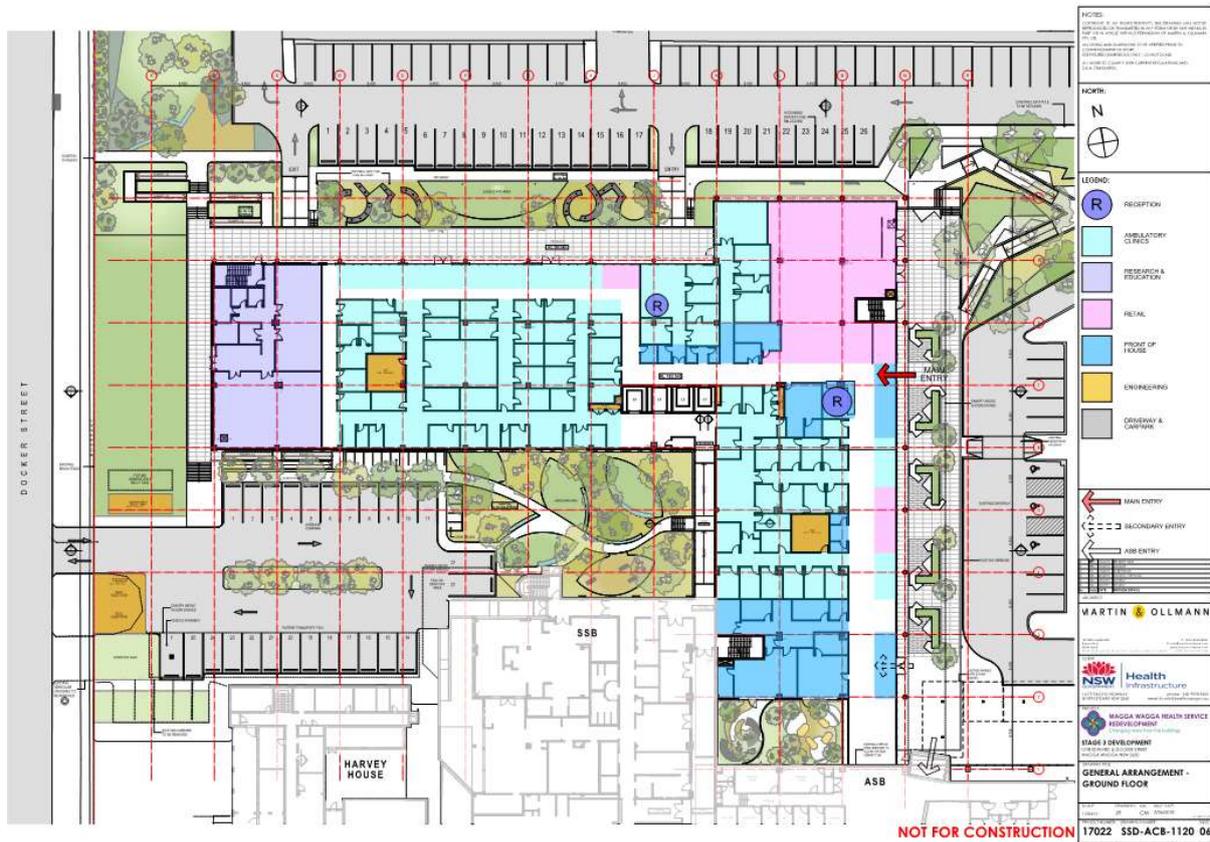


Figure 3-1: The Architectural Site Plan (by Martin & Ollmann)

3.1. Flood Impact Assessment

A flood study “Wagga Wagga Floodplain Risk Management Plan” has been produced by WMA on behalf of City of Wagga Wagga Council. This study confirms that the hospital campus is not flood affected. The flood information has also been verified through Inframaps, Council’s online GIS system. Inframaps output can be seen in Figure 3.2 below:

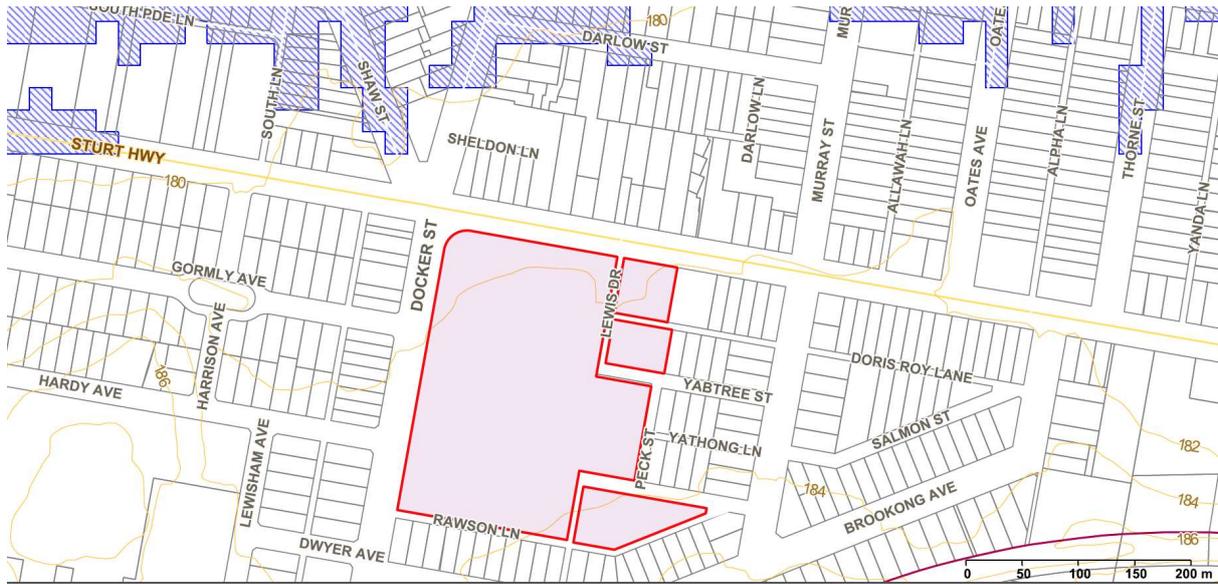


Figure 3-2: Inframaps Output showing the limit of the 100year ARI flood extent

The nearest design flood levels downstream at the intersection of Sturt Highway and Docker Street to the north-west of the site are as follows:

1% AEP RL179.90m AHD

The actual surface level at the intersection adjacent to the site is approximately RL180.50m AHD. The proposed ground floor level of the building is at RL183.545. This provides 3.65m freeboard above the 1% AEP flood level.

In summary the footprint of the proposed development is not located on flood affected land and therefore will not have an effect on the flood levels on adjacent properties. The Complete Overland Flow Study is provided in **Appendix D**.

3.2. Stormwater Drainage

3.2.1. Catchment Delineation

The proposed development is located within the Wagga Wagga Base Hospital Site and within the Murrumbidgee River floodplain. The Campus site is approximately 5.34 hectares. The proposed development site is approximately 0.763 hectares. The hospital campus ultimately drains to Wollundry Lagoon.

It is proposed to drain the new Ambulatory Care Building to Docker Street, to the existing 525 diameter Council pipe. Two (2) diversion lines have been constructed as part of early works, to enable the demolition of the existing buildings. The stormwater strategy for the site is shown in Drawing C031.

3.2.2. Hydrology and Hydraulics

The stormwater drainage systems have considered storms up to and including 100 year ARI (1% AEP) storm. The drainage network design recurrence interval is 1 in 10 ARI as per Table 4.3.1 City of Wagga Wagga Council Engineering Guidelines for Subdivisions and Development Standards 2017 for Industrial and Commercial Areas.

The hydrology and hydraulics of the proposed development are in accordance with City of Wagga Wagga Council DCP. Since the existing site is 100% impervious and the proposed development introduces deep soil and other landscape areas (totalling 18% of proposed development area), the site discharge is thus reduced and in compliance with Council's stormwater discharge requirements.

3.2.3. Permissible Site Discharge (PSD)

The permissible site discharge (PSD) for the proposed development area within the Hospital campus is limited to the existing discharge from the existing buildings and associated infrastructure. The existing site is 100% impervious while the proposed development introduces approximately 1370m² of new landscaped deep soil areas, thus reducing the impervious area of the development to 82%. As a result, the total site discharge is reduced.

3.3. Water Quality

The water quality treatment measure for the proposed Ambulatory Care Building is designed to satisfy all the requirements set by City of Wagga Wagga Council Development Control Plan 2010 and City of Wagga Wagga Council Engineering Guidelines for Subdivisions and Development Standards 2017. The City of Wagga Wagga Council's WSUD policies are merit based assessment considering the overall impact of the development on the community of Wagga Wagga. To demonstrate compliance, the following pollutant load reductions were targeted:

- a) Reduce the baseline annual pollutant load for litter and vegetation larger than 5mm by 90%;
- b) Reduce the baseline annual pollutant load for total suspended solids by 85%;
- c) Reduce the baseline annual pollutant load for total phosphorous by 65%; and
- d) Reduce the baseline annual pollutant load for total nitrogen by 45%.

Currently the site does not have any stormwater quality treatment measures. The proposed strategy provides water quality measures specifically for the new Ambulatory Care Building and associated infrastructure. The proposed water quality strategy for the site is described in detail below.

3.3.1. Water Quality Strategy

The proposed water quality treatment measures for the site are provided to reduce pollutant loads due to the proposed development. The water quality strategy for the new building incorporates a combination of stormfilters, enviropods, buffers and bioretention areas. The building roof drains to two (2) separate systems. The northern roof drains directly into the 3 no. stormfilters in the north. The northern terrace and landscaping drains to enviropods on ground floor and then discharges into 3 no. stormfilters before discharging into the existing carpark OSD. The Southern Portion of the roof drains to a 5 no. stormfilters before discharging to the existing Docker Street stormwater infrastructure. The open carpark and surrounding landscape flows to a bioretention system and then into the 5 no. stormfilter system before discharging to the existing Docker Street stormwater infrastructure. The south east outdoor space, court yard and awning along the east side of the building discharges into respective enviropods. A small area adjacent to the carpark is to bypass water quality treatment but the area flows through a buffer (vegetated land) prior to discharging off site. A table summary of the areas is shown below.

Table 3-1: Summary of Sub-catchments and Water Quality Measures for overall Site

Sub-catchments	Area (ha)	Impervious Fraction (%)	WSUD Treatment Measures	Comments
Roof north	0.229	100	Stormfilters	
South roof	0.121	100	Stormfilters	
North landscape & terrace	0.057	60	Stormfilters, enviropods	
East awning	0.054	100	Enviropod	

West landscape	0.052	35	Buffer	
Courtyard	0.022	35	Enviropod	
Carpark east	0.066	100	Bioretention, Stormfilters	Excludes bioretention area
Carpark west	0.078	90	Stormfilters	
Landscape	0.063	30	Bioretention, Stormfilters	
Bypass	0.011	50	Buffer	
Total	0.753			Area includes rounding and excludes bioretention surface area

The properties of the individual WSUD measures are provided in **Appendix B**.

3.3.2. Water Quality Model

The water quality strategy for the proposed site was established using *MUSIC* [Version 6.2] model. Wagga Wagga 6 minute rainfall and evapotranspiration data over a period of 5 years has been used in the *MUSIC* model. The Catchment summary along with WSUD measures for the site are already summarised in Table 3-1 above. A screen shot of *Music* [version 6.2] model representing the site is provided in the figure below.

The site is predominately silty clay sitting on dense sand as indicated by the borelog results from the *Geotechnical Investigation Report (Ref: 72320.09) by Douglas Partners*. The soil properties modelled in *MUSIC* shall therefore adopt the properties of "Silty Clay" in Table 4.4 and Table 4.5 of Sydney Catchment Authority 2012, *Using MUSIC in Sydney's Drinking Water Catchment, A Sydney Catchment Authority Standard*. The soil properties and pollutant generation parameters for the site is attached in **Appendix B**.

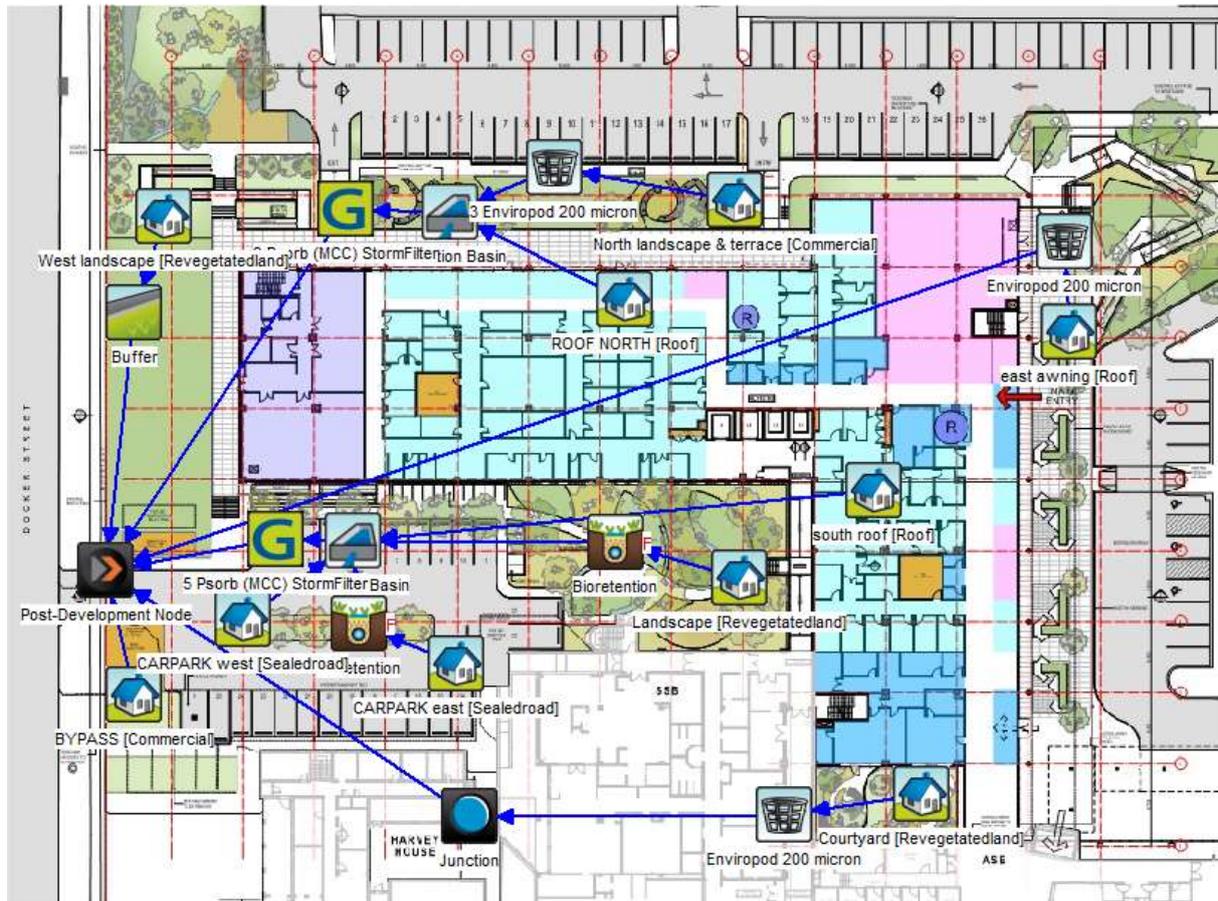
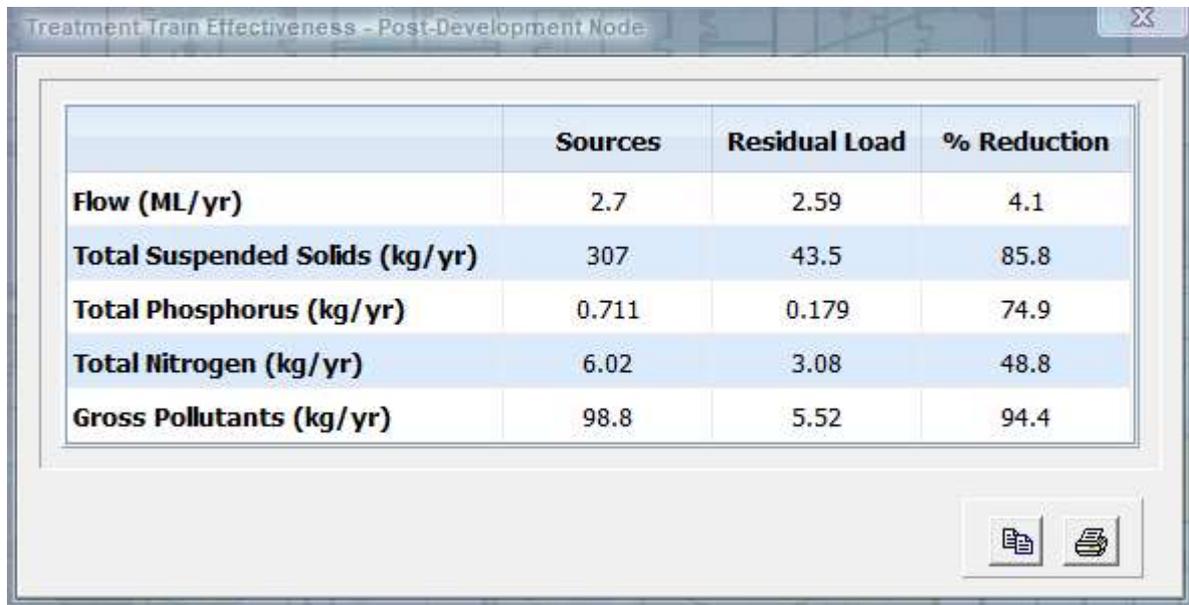


Figure 3-3: A Schematic Diagram of the Music Model.

3.3.3. Water Quality Results

The results of MUSIC modelling show that the pollutant removal rate achieves pollutant reduction targets provided in [section 3.3](#). The results from the MUSIC model are shown as a screen shot below.



The screenshot displays a window titled "Treatment Train Effectiveness - Post-Development Node". It contains a table with the following data:

	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.7	2.59	4.1
Total Suspended Solids (kg/yr)	307	43.5	85.8
Total Phosphorus (kg/yr)	0.711	0.179	74.9
Total Nitrogen (kg/yr)	6.02	3.08	48.8
Gross Pollutants (kg/yr)	98.8	5.52	94.4

At the bottom right of the window, there are icons for printing and saving.

Figure 3-4: Music model Results

4. SUMMARY

The civil design described in this report complies with Wagga Wagga City Council's Engineering Guidelines for Subdivisions and Developments, City of Wagga Wagga Council DCP, Australian Rainfall and Runoff, Australian Runoff Quality – a Guide to Water Sensitive Urban Design, Australian Standard AS3500, all other relevant Australian Standards and best-practice principles.

The proposed stormwater strategy for this development, demonstrates compliance with City of Wagga Wagga Council water quantity requirements by limiting stormwater discharge to the site permissible discharge rate for the proposed development.

The proposed water quality improvement measures (demonstrated in [Section 3.3](#)) improve the existing stormwater quality conditions and fulfil all the requirements of City of Wagga Wagga Council's Water Sensitive Urban Design (WSUD) principles.

The proposed stormwater management strategy for the proposed development, demonstrates that it improves the existing stormwater drainage system by significantly reducing stormwater pollution and improving the overall water quality for the site.

Appendix A
Concept Stormwater Management Plan