

Civil



TaylorThomsonWhitting

Stormwater Management Plan Tamworth Hospital

for Health Infrastructure

March 2011

111779

Taylor Thomson Whitting (NSW) Pty Ltd Consulting Engineers ACN 113 578 377

48 Chandos Street St Leonards NSW 2065 PO Box 738 Crows Nest 1585

T 61 2 9439 7288 F 61 2 9439 3146 ttwsyd@ttw.com.au www.ttw.com.au

This document is copyright and is the property of Taylor Thomson Whitting (NSW) Pty Ltd and must not be used without authorisation. © 2012 Taylor Thomson Whitting



Quality

ISO 9001

SAI GLOBAL

SYDNEY
CANBERRA
MELBOURNE
QEC 22375

TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION	3
2.0 DEVELOPMENT SITE	3
3.0 LOCAL TOPOGRAPHY	3
4.0 STORMWATER.....	4
5.0 PROPOSED DEVELOPMENT	5
6.0 PROPOSED CATCHMENTS.....	6
7.0 CATCHMENTS COMPARISON	7
8.0 STORMWATER RUNOFF ANALYSIS.....	8
9.0 STORMWATER RUNOFF CONTROLS.....	9
10.0 SUMMARY OF DEVELOPMENT IMPACT	9

1.0 INTRODUCTION

This stormwater management plan is submitted by Engineering Consultancy firm Taylor Thomson Whitting (TTW) who have been engaged by Health Infrastructure to investigate and design the storm water for the redevelopment of Tamworth Hospital. The purpose of this plan is to satisfy council requirements that the proposed development will not have an adverse impact on stormwater runoff for the existing site and the downstream catchment.

2.0 DEVELOPMENT SITE

The site is located north of Johnston Street in North Tamworth, NSW. The site is bounded by a quarry and to the east, with rural land to the northeast, north and northwest. Residential land lies to the west and south of the site. The site is currently occupied with a number of hospital buildings, residential property, car parking, roads and landscaping with a total area of approximately 21ha. An aerial image of the site is shown below in Figure 1.



Figure 1. Development Site

3.0 LOCAL TOPOGRAPHY

The local topography is generally sloping with ridges and valleys. Contours of the land can be seen in Figure 1, above. The surrounding land generally falls from north to south. There are two watercourses running parallel to the east and west of the site, both flowing in a southerly direction. Both watercourses have a number of tributaries, and discharge into the Peel River, located approximately 800m to the southwest of the site. The development site falls from northeast to southwest with an average grade of around 1 in 15 (6.5%).

4.0 STORMWATER

There is an existing stormwater network on site that drains the existing buildings, car parks and roads. This network has three outfalls; to the southeast, southwest and northwest. The existing stormwater network, along with the natural topography and outfall locations determine the sub-catchment areas within the site. Catchment 1 discharges to the eastern creek, whilst catchments 2 and 3 discharge to the western creek. A plan showing outfall locations and existing catchment areas is shown in Figure 2 below.

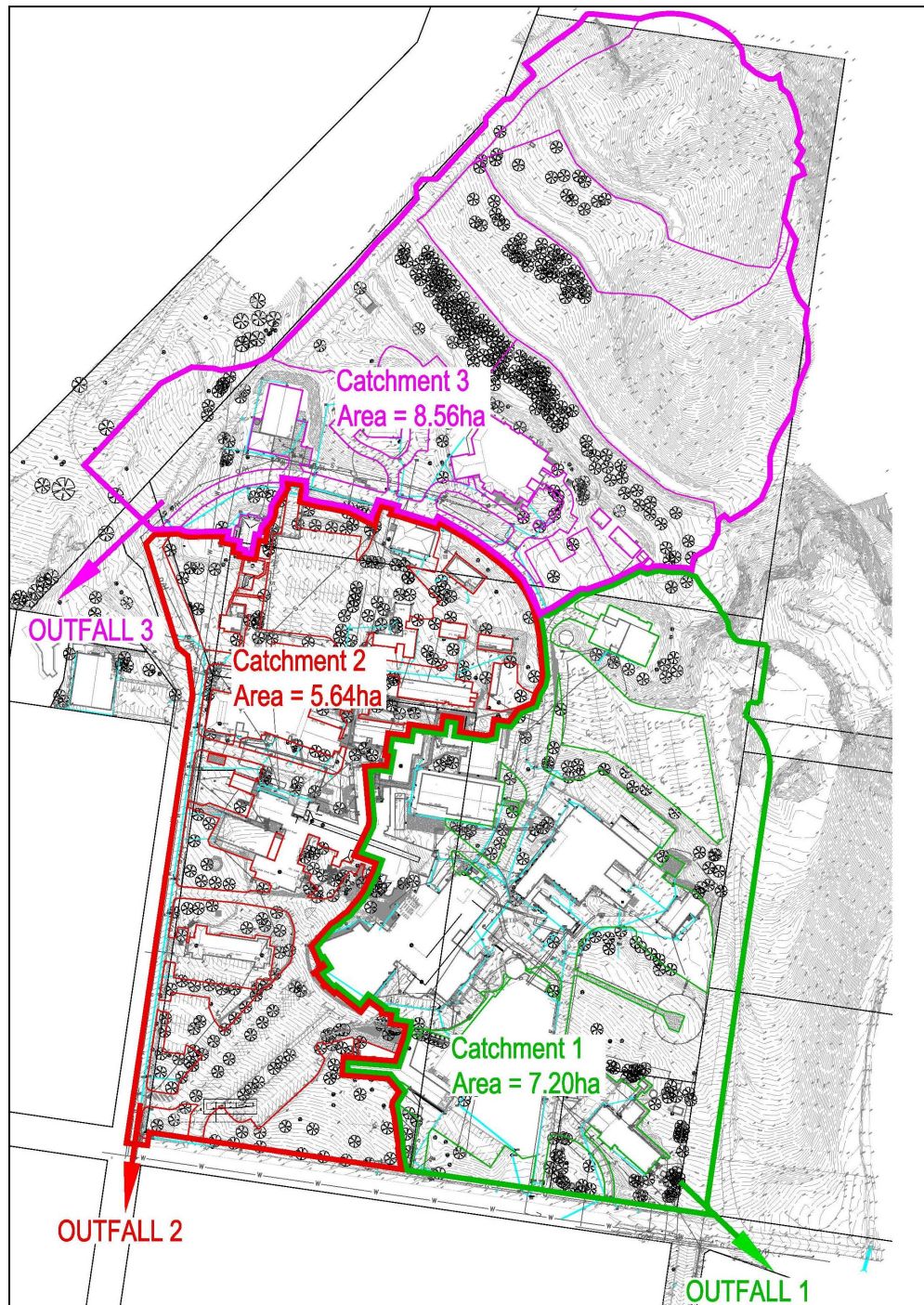


Figure 2. Existing Catchments

5.0 PROPOSED DEVELOPMENT

The proposed redevelopment of the site includes; demolition of existing buildings with new construction and reconfiguration of buildings, roads, car parks and landscaping. The proposed site plan is shown in Figure 3 below.

In terms of stormwater the effects of the development will change the characteristics of the catchments within the site. The design of the stormwater system will need to ensure that the development does not lead to;

- An increase in stormwater runoff from the site
- An increase in the risk of downstream flooding,
- An increase in the risk of on-site flooding

Following discussions with Tamworth Council regarding site runoff, Council have confirmed the following:

- The creek to the east of the site has adequate capacity and no detention is required for catchment 1.
- The creek to the west of the site is at capacity. Any increase in runoff from catchments 2 or 3 will need be detained on site, to ensure that post-development runoff does not exceed pre-development runoff.
- A catchment and runoff analysis is required to confirm pre and post development flows.

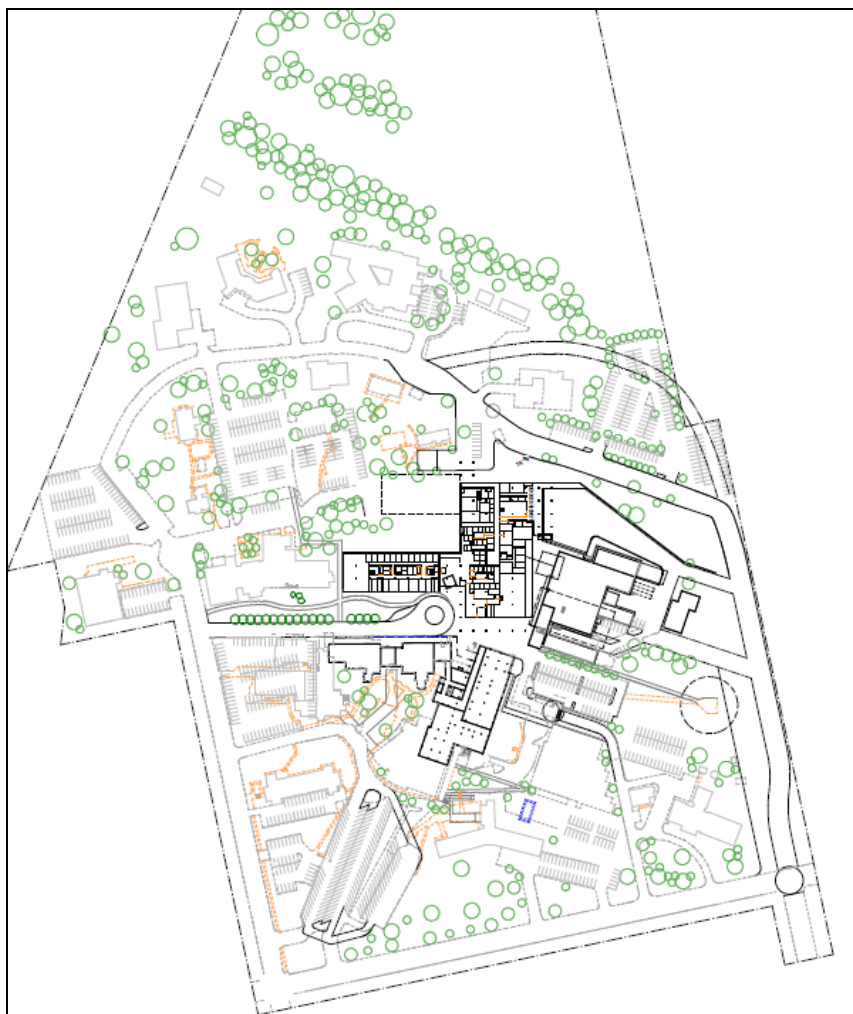


Figure 3. Proposed Site Plan

6.0 PROPOSED CATCHMENTS

The proposed development will alter the existing catchment characteristics. The characteristics that will change include, size, impervious area, and surface type. These changes will alter the surface runoff and measures need to be taken to ensure that the development does not have a negative impact on the runoff as detailed above. The proposed catchments are shown in Figure 4.

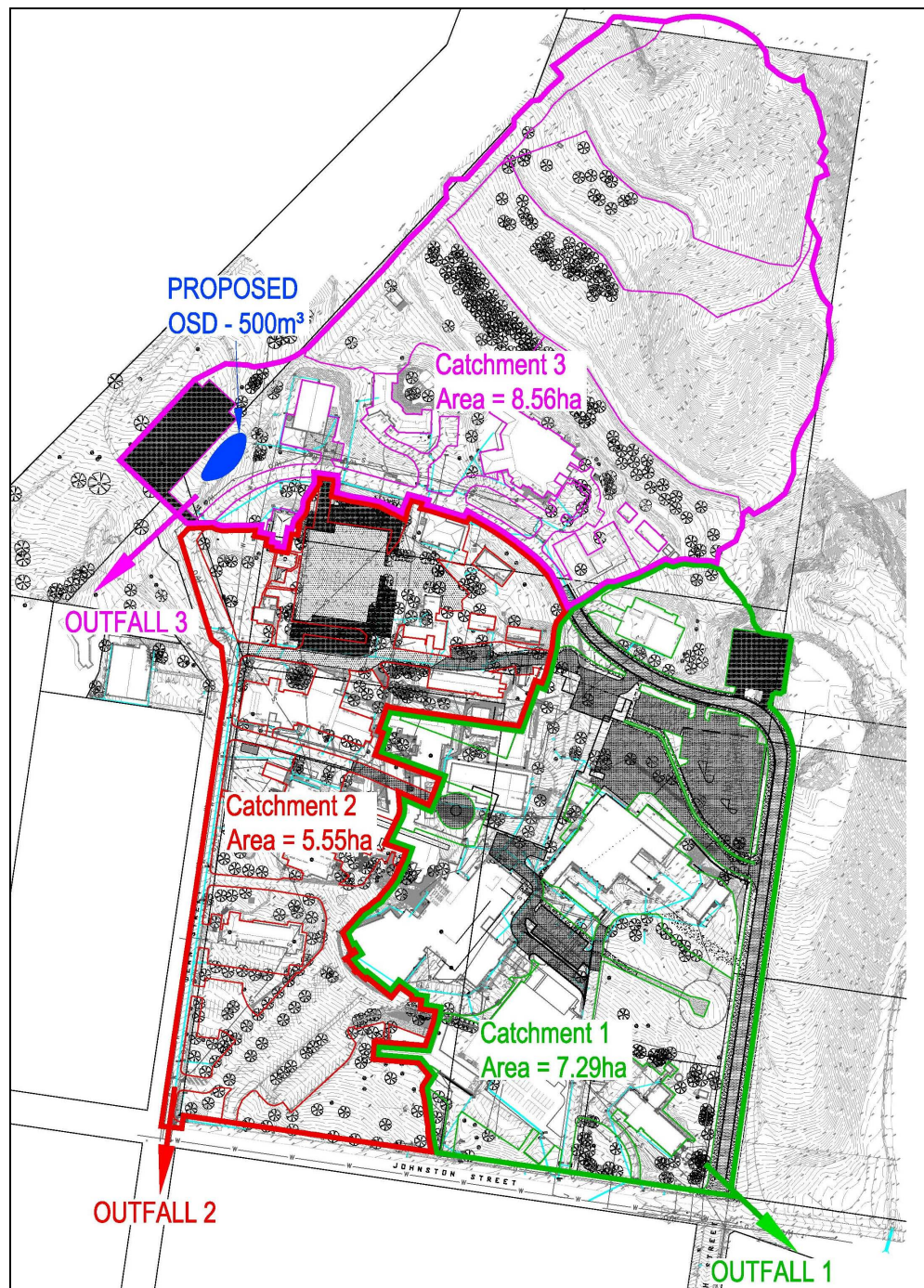


Figure 4. Proposed Catchments

7.0 CATCHMENTS COMPARISON

A comparison of the pre and post-development catchments has been made to ensure that any impacts on runoff are addressed as part of the stormwater management. A comparison of the catchments is shown in Table 1 below. A positive figure indicates an increase following the development, whilst a negative figure indicates a decrease.

Catchment	Area/m ²	Imp Area/m ²	Perm Area/m ²	%Imp
1	+900	+8400	-7500	+11
2	-900	-1400	500	-2
3	0	+2600	-2600	+3
TOTAL	+0	+9600	-9600	12

Table 1. Catchment Comparison Following Development

The proposed development will not change the total catchment area, however there will be an overall increase in impermeable area by 12%. Following development the separate catchments will change in the following way:

- Catchment 1 increases in area, and increases in impermeable area of 11%
- Catchment 2 decreases in area, and decreases in impermeable area of 2%
- Catchment 3 does not change in area, and increases in impermeable area of 3%

As mentioned in section 5 there must be no increase in runoff from catchments 2 or 3. Therefore due to the increase in impermeable area for catchment 3, on site detention is required.

8.0 STORMWATER RUNOFF ANALYSIS

For each catchment, stormwater runoff has been analysed using DRAINS for the 5 and 100 year ARI's, with multiple storm durations between 5 and 120 minutes. The proposed stormwater controls for catchment 3 have been chosen through an iterative process to ensure that there is no increase in runoff following the development for the various storms durations and ARI's.

A summary of the results for the various storms is included in Table 2, and a graph comparing pre and post development peak flows, is included in Figure 5. These results show that there is no increase in stormwater runoff from the site for the critical catchments (2 and 3) for the major or minor ARI.

Storm Duration	5 YEAR ARI RUNOFF (l/s)							
	Cat 1		Cat 2		Cat 3		TOTAL SITE	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
5min	0.55	0.57	0.45	0.44	0.33	0.26	1.33	1.27
10min	0.94	0.94	0.76	0.74	0.58	0.51	2.28	2.19
15min	1.16	1.20	0.90	0.87	0.64	0.64	2.70	2.71
20min	1.30	1.31	1.00	0.97	0.77	0.71	3.07	2.99
25min	1.33	1.34	1.02	1.00	0.81	0.75	3.16	3.09
30min	1.25	1.27	0.96	0.93	0.74	0.70	2.95	2.90
45min	1.13	1.18	0.85	0.83	0.75	0.70	2.73	2.71
60min	1.18	1.23	0.87	0.86	0.85	0.82	2.90	2.91
90min	1.03	1.10	0.78	0.76	0.66	0.65	2.47	2.51
120min	1.04	1.08	0.82	0.81	0.71	0.71	2.57	2.60
Storm Duration	100 YEAR ARI RUNOFF (l/s)							
	Cat 1		Cat 2		Cat 3		TOTAL SITE	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
5min	1.44	1.36	1.14	1.12	1.15	0.93	3.73	3.41
10min	2.20	2.10	1.77	1.36	1.72	1.36	5.69	4.82
15min	2.49	2.52	2.00	1.95	1.93	1.73	6.42	6.20
20min	2.73	2.73	2.15	2.11	2.10	2.02	6.98	6.86
25min	2.65	2.62	2.05	2.01	2.06	2.03	6.76	6.66
30min	2.51	2.50	1.95	1.91	1.98	1.93	6.44	6.34
45min	2.27	2.31	1.78	1.74	1.94	1.82	5.99	5.87
60min	2.26	2.29	1.73	1.70	2.16	1.99	6.15	5.98
90min	1.99	2.04	1.54	1.50	1.78	1.56	5.31	5.10
120min	1.92	1.96	1.50	1.47	1.89	1.64	5.31	5.07
	= Post-development Peak runoff for each catchment and ARI							
	= Pre-development Peak runoff for each catchment and ARI							

Table 2. Peak Flows For 5yr and 100yr ARI.

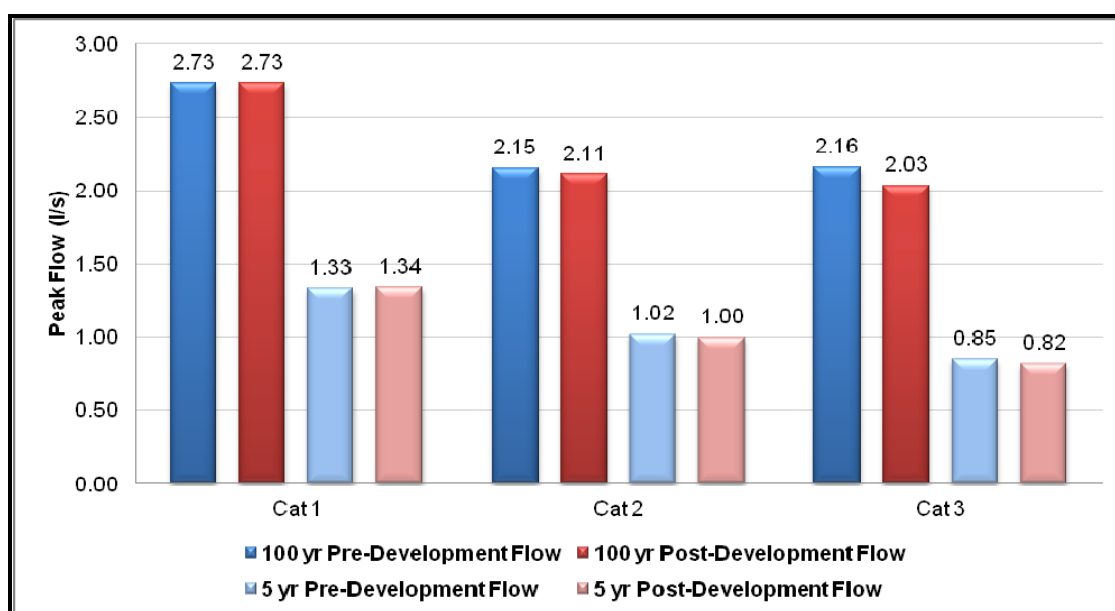


Figure 5. Comparison of Catchment Peak Flows

9.0 STORMWATER RUNOFF CONTROLS

To ensure that peak flows are not increased following the development, the following controls are included as part of the stormwater management plan;

Catchment 1:

- No change in 100yr peak flow, less than 1% increase in 5yr peak flow.
- No stormwater controls are required as directed by Tamworth Council

Catchment 2:

- Reduction in catchment area and impermeable reduces peak runoff by 2% for both 100yr and 5yr ARI.
- No stormwater controls are therefore required.

Catchment 3:

- Create on-site detention with storage volume from of 500m3.
- Use 740mm diameter orifice plate to control flow.
- These controls reduced peak runoff by 20% for 100yr, and 3% for 5yr ARI.
- Introduce an overland flow channel between the detention basin and settling basin, and also introduce a dispersion channel, at the outfall from catchment 4, to reduce downstream erosion.

10.0 SUMMARY OF DEVELOPMENT IMPACT

The proposed development alters the catchment characteristics and increases the impervious areas of the site. This naturally results in an increase in surface water runoff from the site that could potentially lead to an increase in the risk of downstream flooding. As part of the stormwater management controls will be implemented to ensure that;

- The peak runoff from the site is not increased.
- The risk of downstream and on-site flooding is reduced
- The quality of the stormwater runoff is improved.

Prepared by:
**TAYLOR THOMSON WHITTING
(NSW) PTY LTD**



Eirian Crabbe
Senior Civil Engineer

Authorised by:
**TAYLOR THOMSON WHITTING
(NSW) PTY LTD**



Stephen Brain
Technical Director