



Proposed Development – Raymond Terrace HealthOne.

Jacaranda Avenue, Raymond Terrace,

Stormwater Management Plan

for

**Hunter New England Local Health
District**

April 2012

MPC Project Ref: 11-179

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1. Background Information

1.1 Preamble

The proposed development is a Health Service facility located at the corner of Swan and Jacaranda Streets, Raymond Terrace (Lot 22 D.P. 1088281.- refer to **Appendix A** for site plans). The proposed redevelopment includes the following:

- New two storey Medical Centre and proposed new carparks and accessways. Total Site area is approximately 5300m² with a roof area of approximately 1500m²

1.2 Stormwater Management Plan

In devising this Stormwater Management Plan for the proposed development the following issues have been addressed:

- Water Quality Management
- Stormwater Management (detention)
- Stormwater Harvesting (source controls - infiltration)

The stormwater and environmental management philosophy employed in the Stormwater Management Plan is discussed in Section 3.0.

As well as permanent water management controls, construction phase controls are also addressed, in section 5.0.

In preparing this Stormwater Management Plan review has been undertaken with Port Stephens Council Development Control Plans (DCP).

1.3 Background Information

From review of Council's DCP, we understand the following is required:

- that on-site stormwater harvesting (source control - infiltration) measures would be required for the new impermeable surface of the proposed development ;
- That site discharge from the developed site is not increased from the undeveloped site
- that on-site detention is required for all storms up to and including the 1 in 100 year storm event. The detention is proposed to be provided as aboveground carpark storage.

2. Site and Catchment Details

2.1 The Site

Appendix A shows the site layout for the proposed staged development.

At present the proposed site is approximately 5300m² and generally falls west with an elevation of approximately RL 5.5m AHD at the eastern side to an approximate elevation of RL of 3.3m AHD on the western side.

Existing drainage is primarily judged to occur by surface flow to the west and eventually into the existing roadside drainage swale on Swan Street. Site survey information has been provided by de Witt Consulting.

The site does not contain any rivers or creeks themselves, and we understand that flows from residential catchment areas directly around the site are conveyed through the council drainage network to suitable discharge locations.

3. Stormwater and Environmental Management Philosophy

In preparing this Stormwater Management Plan we have consulted with Council officers in relation to stormwater. The requirements to be addressed are as follows:

- Ensure that the rate of rainwater runoff from the pre-developed site is not increased for the developed condition for all storms up to and including the 1 in 100 years ARI event.
- Allow for sediment control systems for any contaminated water from new paved areas that may be able to enter detention systems. Several proprietary pollution control systems will be incorporated into the stormwater management system where appropriate.
- Employ suitable stormwater harvesting measures (source controls). This is primarily achieved for this site using infiltration trenches and permeable paving and will allow for low storm events to have water disperse into the existing soil.
- Ensure that overland flow in the event of a choked or blocked piped system does not impact on neighbouring properties or other buildings on the site.

4. Proposed Stormwater Management Facilities

4.1 Preamble

Section 4.2 gives an outline of the nature and function of stormwater management facilities to be incorporated in the proposed development.

Section 4.3 discusses the design storm events for which the stormwater management system is provided.

The site area is shown in **Appendix A**. The location and operation of stormwater management facilities for the catchment is discussed in Section 4.4.

On going maintenance and monitoring of the stormwater management system is discussed in Section 4.5.

4.2 Nature and Function of Stormwater Management Facilities

The stormwater management plan is shown in **Appendix C**. The principal stormwater management components and their function are listed below:

- a). The proposed works consists of redevelopment of the entire site as identified on the stormwater plans in Appendix A. Stormwater systems are designed to cater for roof and hardstand area with all remaining areas being fully landscaped. For the purposes of analysis the site is considered as a single catchment as outlined in **Appendix B1**.
- b). Roof rainwater will be directed through a new pipe/pit system and into aboveground carpark detention areas identified on the plans. Water harvesting through using infiltration trenches and permeable paving is proposed.
- c). Detention facilities, as well as sediment and pollution control measures, will be incorporated into the network using conventional orifice control pits for controlled release outflow facilities to limit flows to that of the existing pre-developed state. As such stormwater quality for the existing site will not be compromised by the proposed development (refer **Appendix B1**);

4.3 Design Storm Events

Stormwater detention facilities will be designed to cater for all storms up to and including the 1 in 100 year ARI event.

4.4 Site Catchment Area

The site details are approximately as follows:

- Site Area = 5300 m²
- Existing Impermeable Roof Area = 0 m²
- Existing Impermeable Hardstand Area = 0 m²
- Developed Impermeable Roof area = 1500 m²
- Developed Impermeable Hardstand area = 2900 m²

4.4.1 Stormwater Harvesting

To acknowledge stormwater re-use on the site we are proposing that the run-off from the new impervious roof areas and hardstand areas is to be directed into infiltration trenches and through permeable paving zones in the main carpark.

4.4.2 Stormwater Detention

Stormwater detention is proposed to collect water from the developed sites impermeable surfaces. The detention facilities proposed are to include carpark surface detention with outflow control systems to control flows to that of the pre-developed site for storms up to and including the 1 in 100 year event. Refer **Appendix B1** for specific outflow details and calculations.

4.5 Maintenance of Stormwater Management Facilities

Maintenance of concrete pits, pipes and paved flow paths will be minimal as they are generally self-cleansing, and hence only involve very occasional cleaning. Regular inspections of control systems should be carried out to ensure satisfactory performance of the drainage systems proposed. Sediment/pollution control pits and any proprietary pollution control devices will be provided prior to entering detention or retention facilities.

5. Construction Phase Erosion and Sediment Controls

The construction phase approach adopted for this site will incorporate principles recommended by the NSW Department of Housing, namely:

- Plan for erosion and sediment control concurrently with engineering design and in advance of earthworks proper assessment of site constraints and integration of the various needs;
- Minimise the area of soil exposure;
- Conserve the topsoil where possible;
- Control water flow from the top of the development area, through the works and out the bottom of the site, for example,
 - divert clean runoff above denuded areas
 - minimize slope gradient and length
 - keep runoff at non-erodible velocities
 - trap soil and water pollutants
- Rehabilitate disturbed lands quickly.

A preliminary design of erosion and sediment controls for the overall site development is shown in **Appendix D**. Controls will be specified to be provided on the site prior to and during all earthworks in accordance with EPA Site Work Practices. Features of the construction phase erosion and sediment controls adopted for this site include:

- Prevention of sediment and polluted runoff water from entering the existing adjacent watercourse. This involves the provision of silt fences, catch drains and sediment traps.
- Control of actual and potential soil erosion – grassing and stabilization of embankments and drainage outlets where required.
- Stabilised stockpile areas to prevent wind and water erosion.
- Scour protection at discharge locations.
- Stabilised site access to provide a firm base for vehicle entry/exit and to prevent the main access from becoming a source of sediment.

6. Summary

This stormwater management plan has been prepared by MPC Consulting Engineers for Hunter New England Local Health District for the proposed development at Raymond Terrace, and the systems outlined in this report address the requirements of Port Stephens Councils DCP

For further information in relation to this stormwater management plan please contact the undersigned.

Signed:



DEREK PRENTICE

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Director

Date:

April 2012

Appendix A

Site Catchment Plan

(Refer to full size drawings for clarity)

Appendix B

B1 Stormwater Detention Calculations

B1 - STORMWATER DETENTION CALCULATIONS

Landscaped areas of the site are considered to act as existing, yet their percentage pervious area has been accounted for in the stormwater calculations provided in sizing the detention tanks. Any infiltration has been ignored for the purposes of sizing the detention system.

The site catchment has been analysed for detention sizing purposes using computer program RARE Version 1.53 which calculates the pre and post development discharge based on the rational method using AR&R kinematic wave equations for times of concentration. Variations to the co-efficient of runoff for intensity 10yr 1hr < 70mm/hr are automatically calculated using triangular hydrographs.

Stormwater detention has been provided based on the following calculations, and is proposed to be stored as surface detention in carpark areas.

Outflow from the detention areas will be by way of orifice plate chokes for 1 in 5 year, 1 in 20 year, and 1 in 100 year storm events as required. Drainage profiles allowing for overflow in a fully blocked design case will also be provided with all overflow directed off the site.

Port Stephens Council have advised that the 1 in 100 year flood level is RL5.1

The input into RARE is as follows:

Site Area = 5300m² – Developed Site Area = **4500 m²**

% through OSD = 60%

% Impervious pre-developed = 0%

% Impervious post-developed = 100%

Flow Length = 70m, Slope = 3.6%, Roughness = 0.2

ARI	Pre- Developed				Post-Developed				Q (out) l/s	Vol (m ³)
	Tc	C	I (mm/hr)	Q (l/s)	Tc	C	I (mm/hr)			
5	15	0.40	87	43	15	0.86	87		5	46
10	14	0.42	104	54	14	0.91	104		7	53
20	13	0.44	127	69	13	0.95	127		9	64
50	12	0.48	161	96	12	1.00	161		16	76
100	11	0.50	192	118	11	1.00	192		23	80

For a 1 in 100 year storm event, it is intended to provide 80m³ of storage in an aboveground surface detention system with an outflow control chamber utilising multiple orifice plate chokes. Firstly orifice plates for 1 in 5yr choke discharging at 5l/s. The volume of 46m³ is achieved at approximately RL5.29. Secondly for 1 in 20 year choke additional orifice control pit and plates will be provided at higher level discharging a total of 9l/s. The volume of 64m³ is achieved at approximately RL5.33. For the 1 in 50year storm no additional chokes are required. The 1 in 100year volume will be fully detailed and discharge through a final choke at 23l/s with a blocked system spillway discharging water off the site.(refer details).

Detention tank surface area details are detailed on the stormwater plans with the 1 in 100yr water level being achieved at approximately RL5.34 AHD. Additional surface detention volume has been detailed by MPC up to an RL of 5.35.

Overall site discharge for design storm events is shown in the following table:

ARI	Q (out) l/s Detention Basin	Q (out) l/s Un-detained Site Area	Q (out) l/s Total Developed Site
5	5	38	43
10	7	47	54
20	9	60	69
50	16	80	96
100	23	95	118

Appendix C

Stormwater Management Plan

(Refer to full size drawings for clarity)

Appendix D

Erosion and Sediment Control

(Refer to full size drawings for clarity)

