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1/28 Market St
Mudgee NSW 2850
triaxial.au
1300 874 294

PROVISION OF CONSULTING ENGINEERING SERVICES

39 RIFLE RANGE ROAD, MUDGEE NSW 2850

STORMWATER MANAGEMENT REPORT

7 JUNE 2024

REFERENCE: TX17644.00-01.RPT.JM_REVA

Document Control:

Client	Arcstone Developments ARCO3 Pty Ltd		
Prepared By:	Triaxial Consulting Pty Ltd		
Report Author	Josh Maloney		
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Mid-Western Regional Council
Attn: The General Manager
86 MARKET STREET
MUDGEE NSW 2850

Dear Sir/Madam,

Re: Proposed Subdivision
39 Rifle Range Road, Mudgee NSW 2850
Stormwater Management Report
Triaxial Reference: TX17644.00-01.rpt.jm_RevA

(A) INTRODUCTION

This Stormwater Management Report (SMR) describes the stormwater management strategy for the proposed 17 lot residential subdivision at 39 Rifle Range Road, Mudgee. Specifically, the report discusses management of stormwater from the development, as required by councils DCP. The existing site and proposed plans are shown on engineering plans TX17644.00, they include:

- Construction of items for a residential subdivision, including:
    - Upgrade of Rifle Range Road for the frontage of the development.
    - New Internal Road from Rifle Range Road to the South of the block approximately 200m in length.
    - New internal sewer network.
    - New internal stormwater network.
    - New internal water network.
    - Minor diversion and channel work for upstream catchment through site.

(B) EXISTING STORMWATER INFRASTRUCTURE AND SITE CHARACTERISTICS

The existing site is agricultural land with no development present. The majority of the site is undeveloped with no existing drainage infrastructure internally. External drainage infrastructure includes a simple table drain along Rifle Range Road. There is a large culvert structure under Rifle Range Road at the Northwest corner of the block. The topography is such that generally there is a fall from the southern end of the property to the northwestern end, toward the street frontage. There are slight undulations across the site runoff in three main areas. Two major catchment areas, existing catchments 1 and 2 that flow through site from the south and west and continues along the western boundary to the northwest and out the culvert under Rifle Range Road. The third area, existing catchment 3, captures most of the internal site and directs

to the flows along the western boundary. The fourth and smallest area of runoff, existing catchment 4, collects from the northeast and directs to Rifle Range Road.

Existing catchment 1 is a large catchment upstream of the site and enters part way along the western boundary of site. Catchment is approximately 111 hectares in size.

Existing catchment 2 is a large catchment upstream of site that concentrates along the western boundary, entering site along the southern boundary. Catchment is approximately 60 hectares in size.

All flow from site and passing through site concentrates and flows into the Richards Street detention basin. The Richards Street detention basin is sized for the regional development according to Richards Street detention drawings prepared by Insites (Insites PTY LTD, 11.03.2013) that covers the different upstream zonings, this zoning covers the proposed subdivision area and has allowed for R2 zoning. As the detention basin has already allowed for this site we are not proposing to provide onsite detention as part of this development.

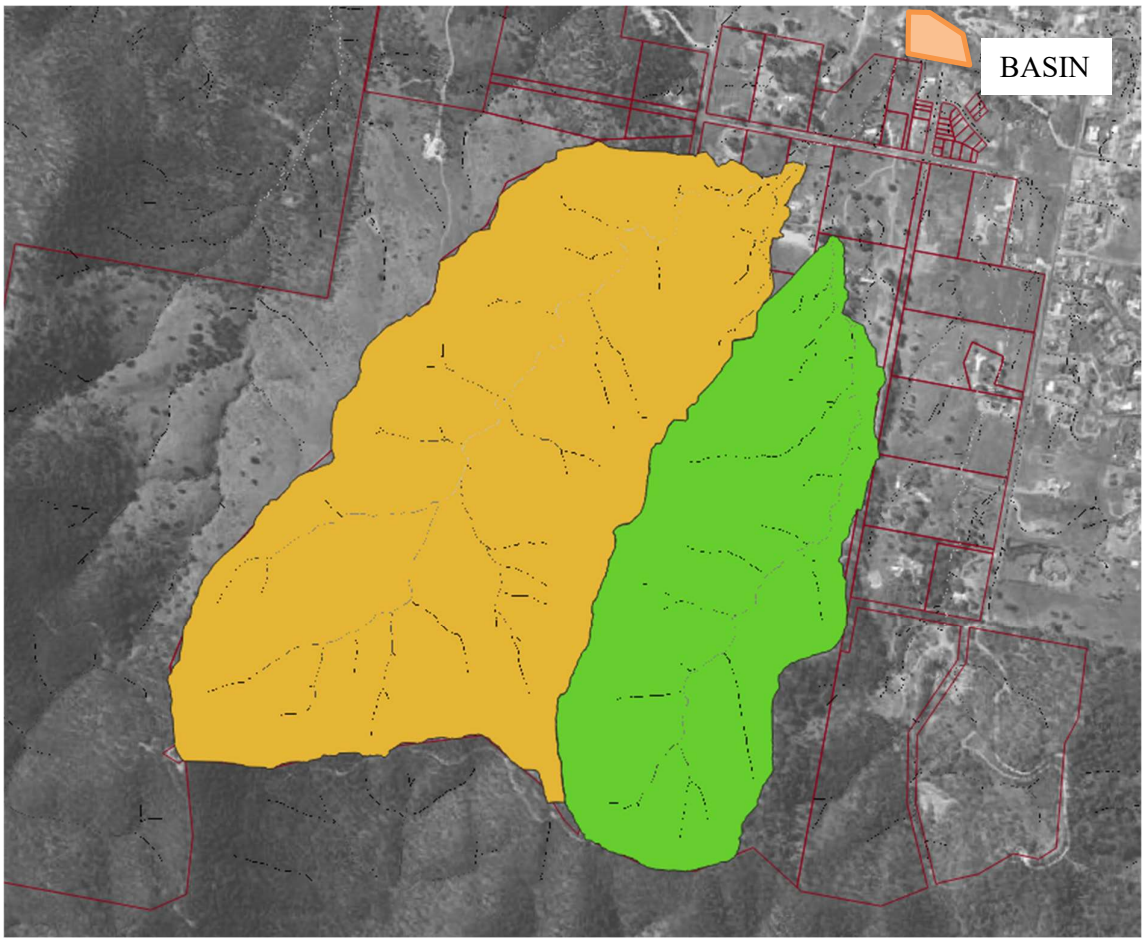

Figure 1. Upstream catchments, Catchment 1 green and Catchment 2 yellow.

(C) PROPOSED STROMWATER MANAGEMENT STRATEGY

The stormwater management strategy for the proposed subdivision is based on the council requirement of managing flows from site. The stormwater management strategy is shown in TX17644.00 [C7.00] and includes:

(i) Road kerb and gutter network to direct minor flows to the pit and pipe network following the road network and exiting into the upstream side of the Rifle Range Road Culvert.

(ii) Site swale/channel design to allow and promote flow along the western boundary of site, enhancing the existing natural contouring. Channel to account for entire upstream catchment.

(iii) Stormwater will discharge from the site following the main contouring and lay of the land. This includes lots one to four discharging to Rifle Range Road and being collected by the KIP to the east, this being accounted for in the design of the existing pipe network as shown on H876EG Nurrowin Estate plans (Insites PTY LTD, 31.07.2013). The remaining lots will direct flows to the channel along the western boundary.

(iv) Stormwater detention is managed by the Richards Street Regional detention basin as noted in (Insites PTY LTD, 11.03.2013).

(D) HYDROLOGY AND HYDRAULICS

The initial loss continuing loss (IL-CL), with reference to the current Australian Rainfall and Runoff, was used to determine the required flow rates for the internal stormwater network and overland paths flow paths and channels through site. A DRAINS model was developed using the IL-CL method in order to determine the site drainage system basic requirements and sizing of required overland flow paths. DRAINS model results for the channels through site shown in Appendix A, with catchment delineations as shown in Figure 1.

The following data and assumptions were used in evaluating the existing condition and proposed development condition:

- The existing site is approximately 40447m^2.
- The existing site land use consists of 100% grassed area (pervious).
- Catchment analysis has been split into internal and external elements. Internal analysis to design site and road drainage. External analysis to design channel flows through site.
- DRAINS model loss inputs derived from the local Mudgee Flood study (WMA water, 2021):
    - Initial Loss = 10mm.
    - Continuing Loss = 2.8mm/hr.
- DRAINS model design rainfall data downloaded from the Bureau of Meteorology (Commonwealth of Australia, 2023).
- DRAINS temporal patterns and preburst rainfall data from Australian Rainfall & Runoff Data Hub (Babister, Trim, Testoni, & Retallick, 2016).

- Upstream catchments counted as 100% pervious for the purpose of channel design.
- Existing Catchment 01 111 ha.
- Existing Catchment 02 60 ha.
- Site lot flow times calculated using Friends equation and ARR recommendations.
- External catchment times of concentration developed using the Pilgrim McDermott formula, results in appendix.

External catchment discharge through site during the 1% Annual Exceedance Probability (AEP) storm through site:

- Catchment 01 – 19.6m^3/s
- Catchment 02 – 11.1m^3/s

Minimum dimensions of the trapezoidal channel:

- All batters 1:6
- For channel from Rifle Range Rd Culvert to approximately 70m into site
    - 16.2m wide at top of channel.
    - 0.85m deep.
    - 6m wide base.
- For channel from approximately 70m into site to the southern boundary:
    - 10.4m wide at top of channel.
    - 0.7m deep.
    - 6m wide base.

Internal site drainage primarily consists of houses discharging to roadside kerbing. Site drainage network to be kerb inlet pits connected by a 375mm diameter reinforced concrete pipes. Outlet and connection to council stormwater network is to be via headwall to the rifle range road culvert with appropriate scour protection.

(E) CONCLUSION

This Stormwater Management Report has been prepared to support the development application for the proposed 17 lot subdivision at 39 Rifle Range Rd, Mudgee.

No onsite detention required with detention requirements covered by the Richards Street Regional detention basin.

Upstream catchments through site managed by grass channel/swales through site.

Site stormwater network complying with Mudgee DCP, AS3500.3 and ARR Guidelines.

A civil engineering strategy for the site has been developed which provides a best fit solution within the constraints of the existing landform and proposed layout.

Yours faithfully

TRIAXIAL CONSULTING

JOSHUA MALONEY
Civil Engineer

References

Babister, M., Trim, A., Testoni, I., & Retallick, M. (2016). *ARR Data Hub*. Retrieved from Australian Rainfall & Runoff: https://data.arr-software.org/

Commonwealth of Australia. (2023, October 17). *Design Rainfall Data System (2016)*. Retrieved from Bureau of Meteorology: http://www.bom.gov.au/water/designRainfalls/revised-ifd/

Insites PTY LTD. (11.03.2013). *Richard Street Detention Basin (I257EG E1)*. Mudgee.

Insites PTY LTD. (31.07.2013). *Nurrowin Estate (H876EG)*. Mudgee.

WMA water. (2021). *Mudgee Flood Study (118033)*. Sydney.

Appendix A

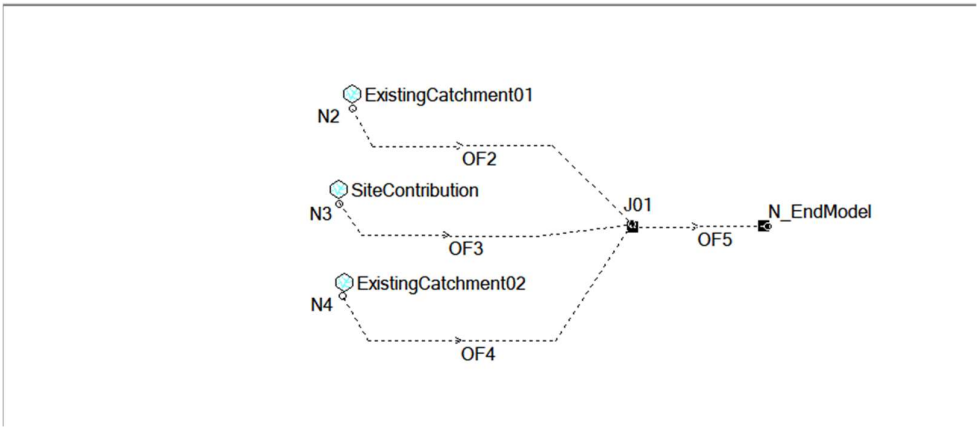

FIGURE 1
DRAINS model layout.

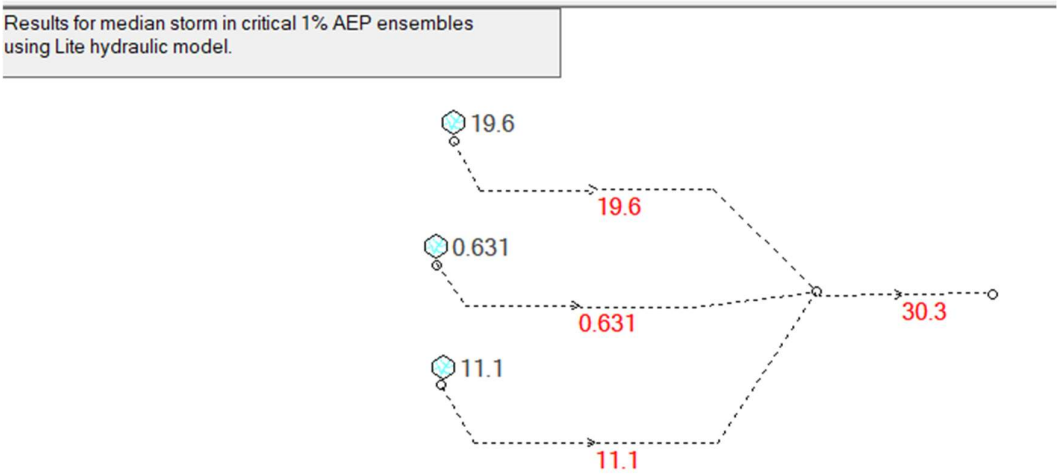

FIGURE 2
1% AEP DRAINS model results for channel design.

STORMWATER CALC'S AND PROGRAM INPUTS
39 Rifle Range Rd, Mudgee, NSW

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SITE LOCATION:	39 Rifle Range Road, Mudgee - Mid Western Regional Council										
			Co-Ord	-32.605	149.570						
Area											
	Total Site Area		4.0447	ha							
			40447	m2							
Restrictions and Requirements											
	Stormwater Connection Points										
	Invert Culvert Under Road					493.41	m	A.H.D.		West	
	KIP Rifle Range Road					494.864	m	A.H.D.	Invert Wa›	East	
	Site Stormwater Network										

20% AEP Site Network
Up to 1% AEP Overland Flow - Both External and Site

STORMWATER CALC'S AND PROGRAM INPUTS
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DRAINS Hydrological Model

Initial Loss (IL) Continuing Loss (CL)

Pervious Intial Loss*	10	mm	* Mudgee Flood Study 2021 Section 9.1.1
Pervious Continuing Loss**	2.8	mm/h	** Mudgee Flood Study 2021 Section 9.1.2
Impervious Initial Loss #	1	mm	# ARR Book5 Section 3.5.3.1.2
Impervious Continuing Loss #	0	mm/h	

DRAINS Other

Onsite SAG blockage factor * 0.5 *0.5 typical for road networks

Catchments

Catchmen	Area Total		
c_01	111	ha	Upstream big comes into the site halfway through west bdy
c_02	59.5	ha	Upstream catchment into south boundary

Refer to Stormwater Report

Time of Concentration

Time Of Concentration - Pilgrim McDermott

$t_c = 0.76A^{0.38}$ (hours)

where

- t_c is time of concentration in hours
- A is catchment area in km^2.

Existing Catchment 01

A =	1.11	km2
tc =	0.7907448	hrs
	47.444686	mins

Existing Catchment 02

A =	0.6	km2
tc =	0.6259088	hrs
	37.554529	mins

Channel Design

Min Design Slope 4 %

Channel design will need to be bigger from about the 90m from the front boundary to the bigger one

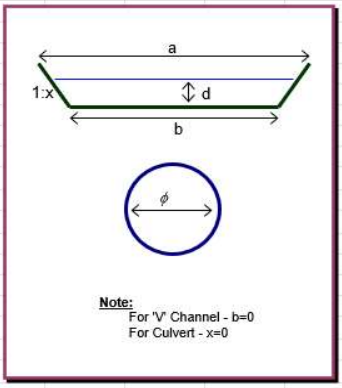
Upper Channel

Manning's Equation

$$Q = \frac{1}{n} \times A \times R^{2/3} \times s^{1/2}$$

Channel Type	(ALT+0252)	n
Concrete Pipe (full)		0.012
Concrete Culvert		0.012
Grassed 'V' Channel		0.040
Grassed Trapezoidal	✔	0.040
Other		0.060

Q =		(m^3/sec)	x =	6	
n =	0.040		b =	2	(m)
A =	4.340	(m^2)	ϕ =		(m)
P =	10.516	(m)	d =	0.700	(m)
R =	0.413	(m)	a =	10.400	(m)
s =	4	(slope, %)			
Q =	12.029	(m^3/sec)	d =	0.700	(m)
Vel =	2.772	(m/sec)	Vxd =	1.940	(m^2/sec)
	10.0	kM/hr			



Side Entry Channel

Manning's Equation

$$Q = \frac{1}{n} \times A \times R^{2/3} \times s^{1/2}$$

Channel Type	(ALT+0252)	n
Concrete Pipe (full)		0.012
Concrete Culvert		0.012
Grassed 'V' Channel		0.040
Grassed Trapezoidal	✔	0.040
Other		0.060

Q =		(m^3/sec)	x =	6	
n =	0.040		b =	6	(m)
A =	9.435	(m^2)	ϕ =		(m)
P =	16.341	(m)	d =	0.850	(m)
R =	0.577	(m)	a =	16.200	(m)
s =	4	(slope, %)			
Q =	32.711	(m^3/sec)	d =	0.850	(m)
Vel =	3.467	(m/sec)	Vxd =	2.947	(m^2/sec)
	12.5	kM/hr