

Concept Stormwater Management Plan

45 Marion St & 56 Turner St, Thirlmere

Lot 60 & 24 DP 21549

Proposed 23 Lot Residential Subdivision for David Green Properties Pty Ltd c/- Precise Planning Pty Ltd

&

5-35 Marion St, Thirlmere

Lot 54,56,58 DP 21549 & Lot 2 DP1188841

Proposed 96 Lot Residential Subdivision for Kevin Morris c/- Precise Planning Pty Ltd

LGA: Wollondilly Shire Council

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1. Purpose and Scope of Plan

1.1 Purpose and Scope

The purpose and scope of this Concept Stormwater Management Plan (CSMP) is to clearly outline the conceptual stormwater drainage layout, quantity management through OSD measures and quality management through Water Sensitive Urban Design (WSUD) treatment measures.

The subject sites are for the land development projects for David Green Properties at 45 Marion St and Kevin Morris at 5-35 Marion St. This report is to be read in conjunction with the plan sets 18030-1459-101 to 110 for 45 Marion St and 18030-1281-201 to 214 for 5-35 Marion St.

2. Project Overview

2.1 45 Marion St & 56 Turner St, Thirlmere – 23 Lot Residential Subdivision

This portion of the land development consists of 1.94ha under Lot 60 DP 21549, proposed to be subdivided into 23 lots with internal roads and drainage, plus a shoulder pavement widening with kerb & gutter construction to the existing road pavement along Marion St.

The site is slightly undulated with a relatively consistent fall from the south-eastern to north-western corner at approx. 3%, with RLs ranging from AHD 291 to 296 across the Marion St West Precinct (5-35 & 45 Marion St). There are currently no buildings constructed on the property and is lightly vegetated with a mixture of mature trees and grass.

As this is the downstream section of the overall development to the Marion St West, the whole of development OSD tank, in the form of an underground tank will be sited within the footprint of the proposed cul-de-sac to Road 2. Numerous water treatment measures will also be introduced in the vicinity of the OSD tank, including an in-line GPT upstream of the OSD tank and Stormfilter Cartridges within the OSD tank.

In addition to the downstream OSD and water treatment measures, all lots within the overall development are to have at source detention, in the form of a roof fed 7.5kL rainwater tanks.

2.2 5-35 Marion St, Thirlmere – 96 Lot Residential Subdivision

This portion of the land development consists of 7.43ha under Lots 54,56,58 DP 21549 & Lot 2 DP 1188841, proposed to be subdivided into 96 lots with internal roads and drainage, plus a shoulder pavement widening with kerb & gutter construction to the existing road pavement along Marion St.

The site is slightly undulated with a relatively consistent fall from the south-eastern to north-western corner at approx. 3%, with RLs ranging from AHD 294 to 306 across the Marion St West Precinct (5-35 & 45 Marion St). There are currently no buildings constructed on the property and is lightly vegetated with a mixture of mature trees and grass.

As this is the upstream section of the overall development to the Marion St West Precinct (5-35 & 45 Marion St), the OSD tank and water quality measures constructed downstream at 45 Marion St will

also service the stormwater from this subject site at 5-35 Marion St. The requirement of each lot to have at source detention, in the form of a roof fed 7.5kL rainwater tanks, will be extant.

3. Conceptual Stormwater Drainage Layout

3.1 Catchment Overview

The stormwater drainage catchments can be found on plans 18030-1459-107 to 108 for 45 Marion St and 18030-1281-210 to 211 for 5-35 Marion St. As the surrounding land has already been developed and due to the site's topography, the catchments are relatively contained within the subject land, excluding a half road reserve portion of the existing Marion St, running north to south. The overall development catchment is 10ha, of which 0.63ha consists of Marion St.

3.2 Pit & Pipe Network

The pit and pipe network layout can be found in plans 18030-1459-106 for 45 Marion St and 18030-1281-208 to 209 for 5-35 Marion St. Hydraulic design has been undertaken to ensure that the network conveys the 10% AEP minor storm events with overland flow paths catering for 1% AEP major storm events.

Lots that do not discharge directly to the road kerb have been serviced using inter-allotment drainage networks, ensuring that a maximum of 10 lots are serviced within the one branch.

Detailed design will need to be undertaken to confirm all details including but not limited to pipe sizing, class, inverts, cover and pit configuration.

4. Stormwater Quantity Modelling

4.1 Objectives and Method of Modelling

The development stormwater quantity objectives are based on the Wollondilly Shire Council (WSC) Engineering Design Specification 2016, which requires:

- OSD that is sized to ensure post development discharge is the same or less than pre development discharge for storm events up to and including the 1% AEP major storm events.
- The underground pit & pipe system area designed to convey flows from the 10% AEP minor storm events.
- The overland flow paths are designed to convey flows from the 1% AEP major storm events.

The hydrological and hydraulic modelling undertaken for the development was via the software DRAINS using the ILSAX method of analysis. The rainfall data was drawn from the data hub at the ARR2016 website <http://data.arr-software.org/>. The rainfall data for Thirlmere was drawn from a station at the latitudinal and longitudinal coordinates, -34.2052387 & 150.5148843.

Rainfall events analysed are highlighted in the table below from ARR2016 (up to 2-hour duration):

Frequency Descriptor	EY	AEP (%)	AEP (1 in x)	ARI	
Very Frequent	12				
	6	99.75	1.002	0.17	
	4	98.17	1.02	0.25	
	3	95.02	1.05	0.33	
	2	86.47	1.16	0.5	
	1	63.21	1.58	1	
Frequent	0.69	50	2	1.44	
	0.5	39.35	2.54	2	
	0.22	20	5	4.48	
	0.2	18.13	5.52	5	
	0.11	10	10	9.49	MINOR EVENT
	0.05	5	20	20	
Rare	0.02	2	50	50	
	0.01	1	100	100	MAJOR EVENT
	0.005	0.5	200	200	
Very Rare	0.002	0.2	500	500	
	0.001	0.1	1000	1000	
	0.0005	0.05	2000	2000	
	0.0002	0.02	5000	5000	
Extreme			↓		
			PMP/ PMPDF		

4.2 DRAINS Modelling Outcomes

Modelling and analysis of the pre and post development flows, with the major and minor events shown in the respective plan sets 18030-1459-107 for 45 Marion St and 18030-1281-210 for 5-35 Marion St, conclude that for the 1% AEP storm events require a storage capacity of 2025m³ for the underground OSD tank. Additionally, low and high flow circular orifice plates are required at varying levels to control the flow discharge from the OSD tank. Details can be found in the respective plan sets. All pre and post development discharge flows have been met for the minor and major storm events.

Detailed design will need to be undertaken to confirm all details including but not limited to rainwater tank sizing, basin area, depth, volume confirmation, layout, inlet, chamber, weir, orifice and downstream outlet configurations.

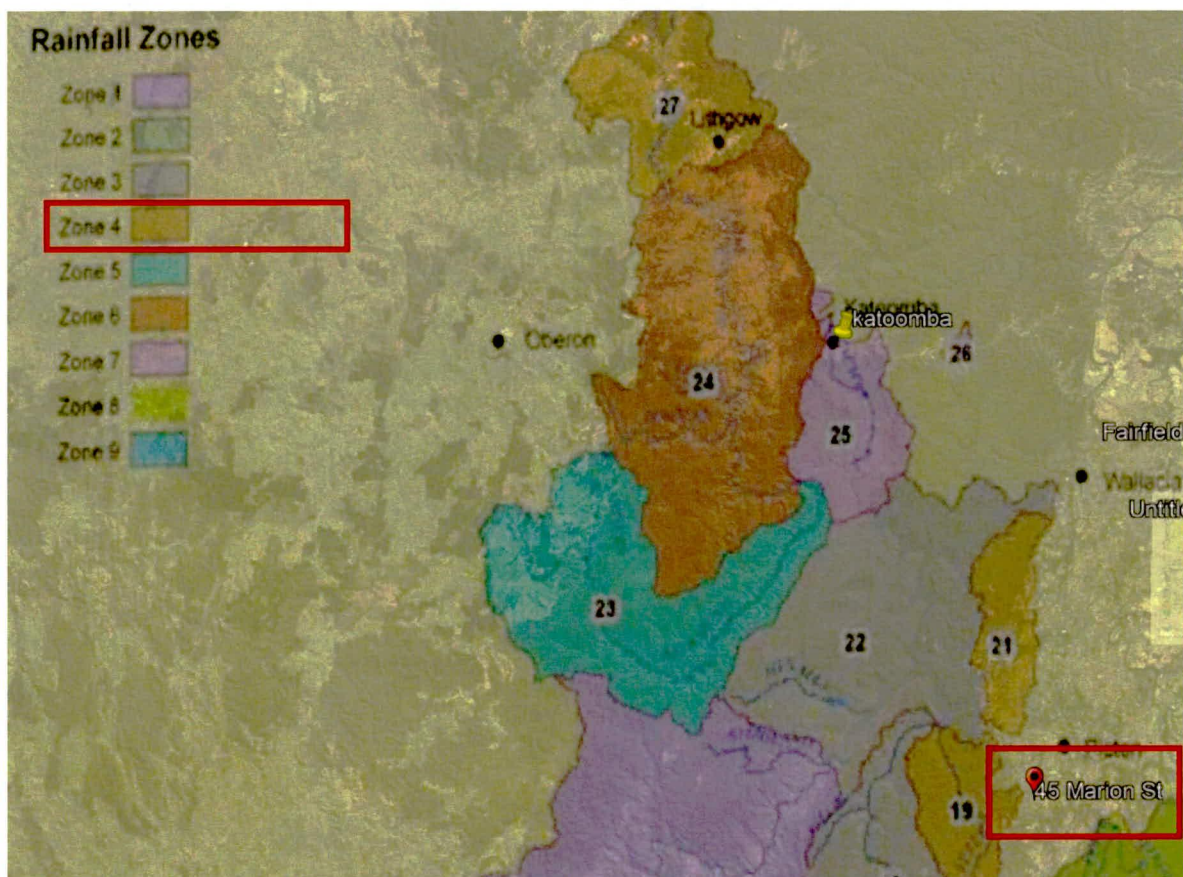
5. Stormwater Quality Modelling

5.1 Objectives and Method of Modelling

The development stormwater quality objectives are based on the Wollondilly Shire Council (WSC) Engineering Design Specification 2016, which requires the following reduction targets from pre to post development flows:

- 80% Total Suspended Solids (TSS)
- 45% Total Phosphorus (TP)
- 45% Total Nitrogen (TN)
- 70% Gross Pollutants (GP)

The modelling software utilised to analyse the treatment train effectiveness of the proposed water treatment measures was MUSIC Version 6.3. The rainfall and PET data utilised for the modelling was provided by Water NSW, via Ocean Protect, from a station at Corang, NSW, which is near the subject site, see the map below.



The treatment measures and treatment train effectiveness of these measures can be found in plans 18030-1459-108 for 45 Marion St and 18030-1281-211 for 5-35 Marion St. The outline of treatment measures are as follows:

- Each individual lot has a 7.5kL roof fed rainwater tank, which also incorporates an annual re-use of 25kL/lot/year.
- Immediately upstream of the whole of development OSD tank, a VC-100 Ocean Protect (or similar) GPT is installed to primarily remove GP's from the pit & pipe network.
- Within the OSD tank a chamber containing 125 x Ocean Protect 690mm Stormfilter Cartridges will be installed to treat TN, TP and TSS.

The effectiveness of the above measures has been modelled as follows:

- Total Suspended Solids (TSS) – 86.7% reduction – target met
- Total Phosphorus (TP) – 74.7% reduction – target met
- Total Nitrogen (TN) – 45.2% reduction – target met
- Gross Pollutants (GP) – 99.5% reduction – target met

Detailed design will need to be undertaken to confirm all details including but not limited to basin rainwater tank sizing, reuse, GPT sizing, stormfilter cartridge sizing, quantity and chamber layout.