



ENGINEERING

Stormwater Management Plan

**Baptcare Housing Development
Copernicus Way, Keilor Downs
Superlot Subdivision**

JOB NUMBER:	S54642 - 277074
CLIENT:	ClarkeHopkinsClarke Architects Pty Ltd
SITE:	Baptcare Keilor Downs, MELBOURNE, VIC 3038
DATE:	27 September 2021
REVISION:	2

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1. Introduction

FMG Engineering have been engaged by ClarkeHopkinsClarke Architects to prepare a stormwater management plan (SWMP) for the proposed 47-unit development at Copernicus Way, Keilor Downs. The application to subdivide the development site from the larger existing Baptcare owned site is to be submitted in September 2021.

This SWMP outlines the conceptual stormwater design for the proposed development and has been prepared to accompany a town planning application for the site being lodged with the DELWP.

This plan should ensure that the stormwater and drainage discharge from the development site meets current best practice performance objectives for stormwater, demonstrates the application of Water Sensitive Urban Design (WSUD) and complies with the intent of Brimbank City Council requirements.

1.1. Purpose

The purpose of this SWMP is to evaluate the quantity and quality of stormwater associated with the proposed development plan to demonstrate to Brimbank City Council and DELWP that an appropriate stormwater management strategy has been adopted.

The SWMP specifically addresses the following items for both the construction and operational phases of the development:

- Stormwater runoff volumes and detention (Stormwater Quantity); and
- Stormwater quality treatment measures (Stormwater Quality);

The following will be achieved with the correct application of this SWMP report:

- Appropriate standards to be maintained on all aspects of stormwater within the site,
- Pollution control to be maintained,
- Examination of the surrounding area and properties to ensure they will not be adversely affected nor unduly disrupted by stormwater, and
- Establishment of a unified, clear and concise stormwater management strategy.

1.2. Existing Site Conditions

Property Details

Address:	21A COPERNICUS WAY KEILOR DOWNS 3038
Lot and Plan Number:	Lot 1 PS712707
Zoning:	Commercial1 (C1Z)
Site Area:	0.9543 ha (approx.)

As shown in in Figure 1, the site has access from Thornhill Drive. The east boundary will be shared with an existing shopping centre carpark.



Figure 1 – Site Location Plan (indicative boundaries)

1.3. Development Summary

The site at 50s Gillwell Road, Lalor is to be developed with 47 affordable housing units. Dwellings types vary between 1, 2 and 3 bedroom homes with a mix of single and double storey configurations. For any planning permit applications made, this report will focus solely on the stormwater management strategy and management of the proposed development. A summary of the site is shown in Table 1.



Figure 2 – Proposed Development

1.4. Flooding

Reference to the VicPlan Planning Overlay mapping indicates that the development site (the southern part of the superlot subdivision) is not subject to any Special Building Overlays (SBO) or Land Subject to Inundation (LSIO), Flood Overlay (FO). The northern part of the superlot (which will not be part of the final southern subdivision) has a minor encroachment of a Special Building Overlay.

The contours in Thornhill drive indicate that the site could be prone to overland stormwater flows (originating external to the site) during extreme storm events. Appropriate measures should still be put in place to ensure the development does not flood in storm events and that a means of overland flow is maintained to the north of the site.

Figure 3 shows the planning – land management overlays relative to the proposed site



Figure 3 – Land Management overlays

1.5. Overland Flow Path

The site falls consistently from south to north. Overland flow from will be possible from Thornhill Drive into the site. Site grading will need to ensure that safe overland routes to the north are maintained through easements or through public open space.



Figure 4 – Overland Flow Paths

2. Stormwater Management

The stormwater management for the development will be based on water sensitive urban design (WSUD) principles and will be consistent with Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 2006). The following key items will be considered:

- Adequate drainage to ensure a free draining development.
- Pavement, road and drainage levels designed to ensure surrounding properties are not adversely affected.
- The discharge volumes of the development are stored to pre-development levels.
- The pollutant discharge from the site is minimised to meet Best Practice.

The proposed development has a total catchment area of approximately 9,543 m². For the purpose of water quality, the site is separated into 4 catchment types which are summarised in Table 1

Table 1: Stormwater Treatment

Area Description	Catchment Area	Discharge
Dwellings	2,608 m ²	To rainwater tanks (1,000L min. volume allocation for reuse) with overflows directed to internal stormwater drainage system discharge via LPD
Road Pavement	2,598m ²	Raingarden / bioswale within nature strip + minor catchments to stormwater trip with litter basket and filter
Driveways	987m ²	Permeable pavement at edge of driveway
Landscape	3,350m ²	Buffer Strip / bioswale within nature strip
Total	9,543 m²	

Runoff from the surrounding areas have not been considered in this analysis as the drainage systems for these areas will not be modified as part of the proposed development works. Catchment areas are shown in Appendix A.

3. Stormwater System On-site Water Quality Treatment

3.1. Music Model

The MUSIC model has been set up based on Melbourne Water guidelines.

Rainfall parameters are based on Melbourne with 6-minute steps.

The best practice water quality objectives based on the CSIRO (and Victorian Stormwater Committee) guidelines are:

- 80% retention of the typical urban annual load for Total Suspended Solids (TSS).
- 45% retention of the typical urban annual load for Total Phosphorus (TP).
- 45% retention of the typical urban annual load for Total Nitrogen (TN).
- 70% retention of the typical urban annual load for gross pollutants (litter).

The assumed discharge point to the existing drainage is shown in Appendix A. The results of the model are shown in Table 2

Table 2: MUSIC Model results

Standard	Pollution Reduction Target	Reduction Required	Results Achieved
Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO) 2006	Gross Pollutants	70%	100%
	TSS	80%	85.1%
	TP	45%	72.2%
	TN	45%	49.4%

The models for the above set of results are shown in Appendix A

4. On-site Detention System

The whole site has been considered as a single catchment discharging to the council drain located in neighbouring properties over the western site boundary. Appendix A shows the catchment area plan discharging to the LPD with the LPD shown in the stormwater drainage and level schematic in Appendix C.

4.1. Detention System

On-site detention has been proposed on site to restrict the flow to pre-development conditions for the LPD.

The permissible site discharge was modelled using an OSD4W model for a 5-year ARI design standard permissible site discharge and the on-site storage standard of 10-year ARI. Time of concentration for the catchment outlet is assumed to be 12 minutes with a time from site to outlet of 7 minutes (to be confirmed with council).

To calculate the on-site detention volume for the catchment discharging to the existing council drain, Brimbank City Council may nominate a permissible site discharge (PSD) but this will only be given when the LPD is received. Until then, it is assumed that the PSD will be calculated using OSD4W with the allowable discharge used to determine the required storage volume. Table 3 shows the preliminary OSD4W results with Appendix B showing the model print out.

Table3: OSD4W Model results

Catchment	PSD	Storage
Council Drainage	70.20 L/s	71.93 m ³ .

Stormwater pits and pipes within the road drainage system and tanks for each proposed lot are proposed to store the required volume of water. An orifice pit with the calculated orifice diameter is proposed to restrict the flow to permissible site discharge.

5. Stormwater Drainage Strategy and LPD nomination

The stormwater drainage strategy is comprised of the following key elements:

- Overland flow to the north and north east maintaining the existing routes
- Dwelling levels at approximately 300mm minimum above existing surface levels
- Connection to existing council stormwater drainage assets located over the western boundary in an existing drainage easement.
- Provide stormwater detention system for road areas through a combination of below ground detention chamber(s) near substation location and by oversizing the proposed stormwater drainage system
- Provide detention storage within dwelling water tanks for roof catchments (1,000 L each dwelling)
- Stormwater treatment will be primarily be at source treatment with a tertiary treatment pit and filter at the downstream end of the stormwater system within the site.
- Buffer strips / swales to receive road and landscape flows with conventional stormwater drainage providing redundancy and drainage capacity for 1 in 10 year ARI storm events (PSD from the site will be for 1 in 5 ARI events)
- The main stormwater drainage alignments are located to the side of the road which will minimise stormwater drainage crossings (allows direct connections from lots).
- Grated pits servicing buffer strips are located at low points which allow sufficient freeboard from dwelling finished floor levels.

Figure 5 – Stormwater and level schematic (refer Appendix for full sized plan)



The stormwater drainage and level schematic has been produced to inform the design intent for the development but is not intended to constrain further optimising of the building levels and drainage layout.

6. Limitations

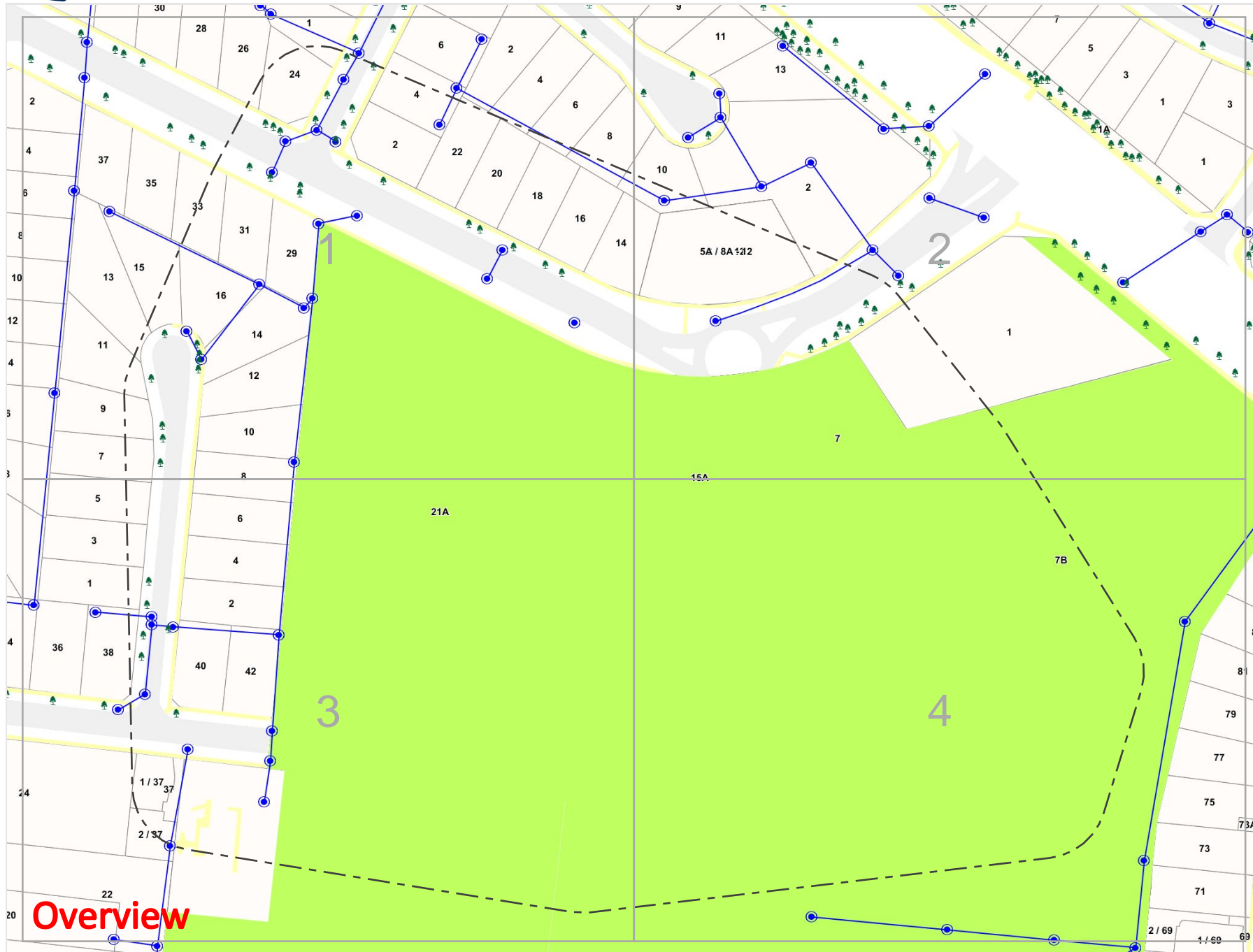
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Appendix A

Catchment Area / Council DBYD plan / site survey





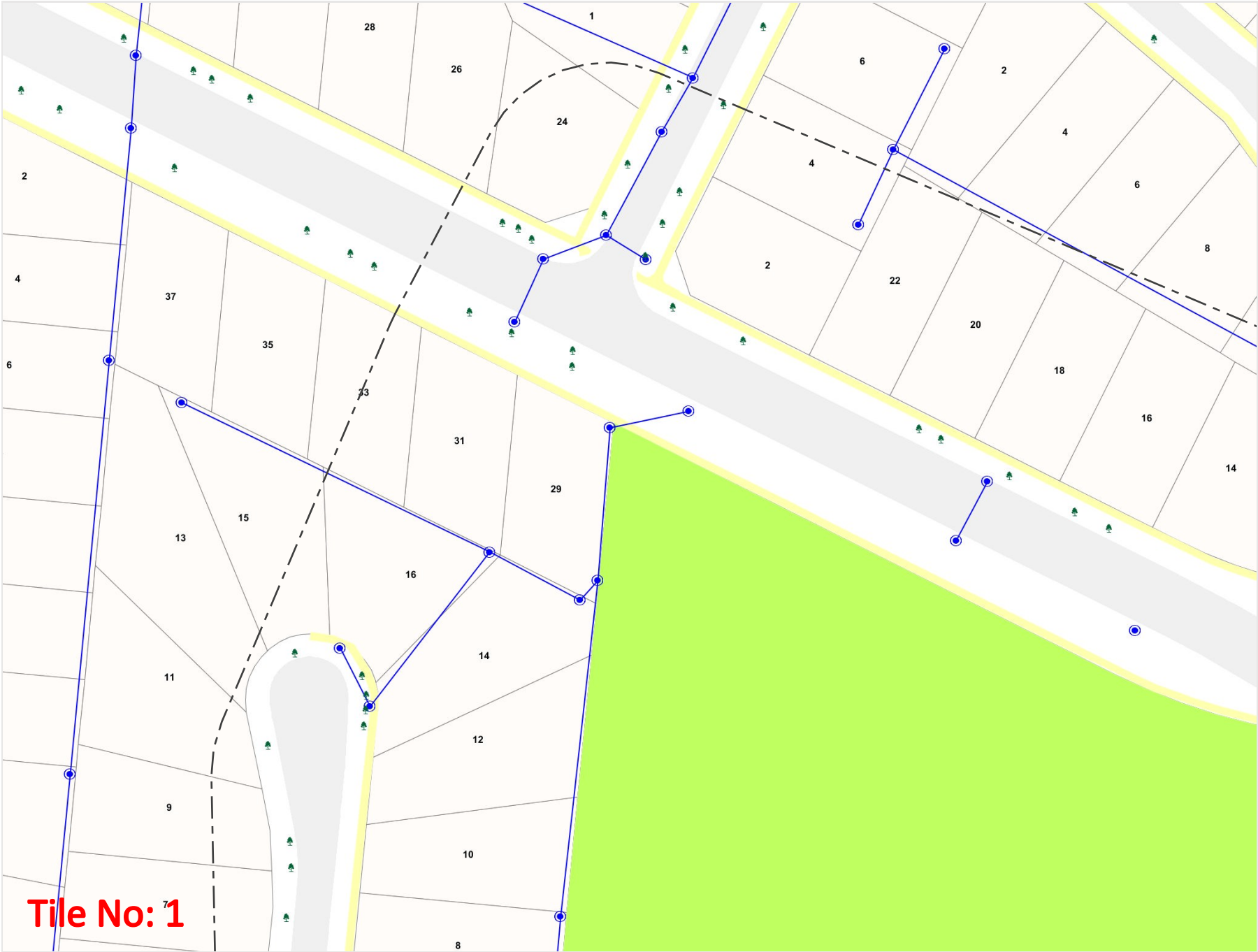
Legend








-  Trees
-  Stormwater Pipes
-  Stormwater Pits
-  Parking Sensors
-  Conservation Zones
-  Native Vegetation
-  Footpaths




Scale: 1:2050
Expires: 11 Jan 2021

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

- Legend**
-  Trees
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Legend

-  Trees
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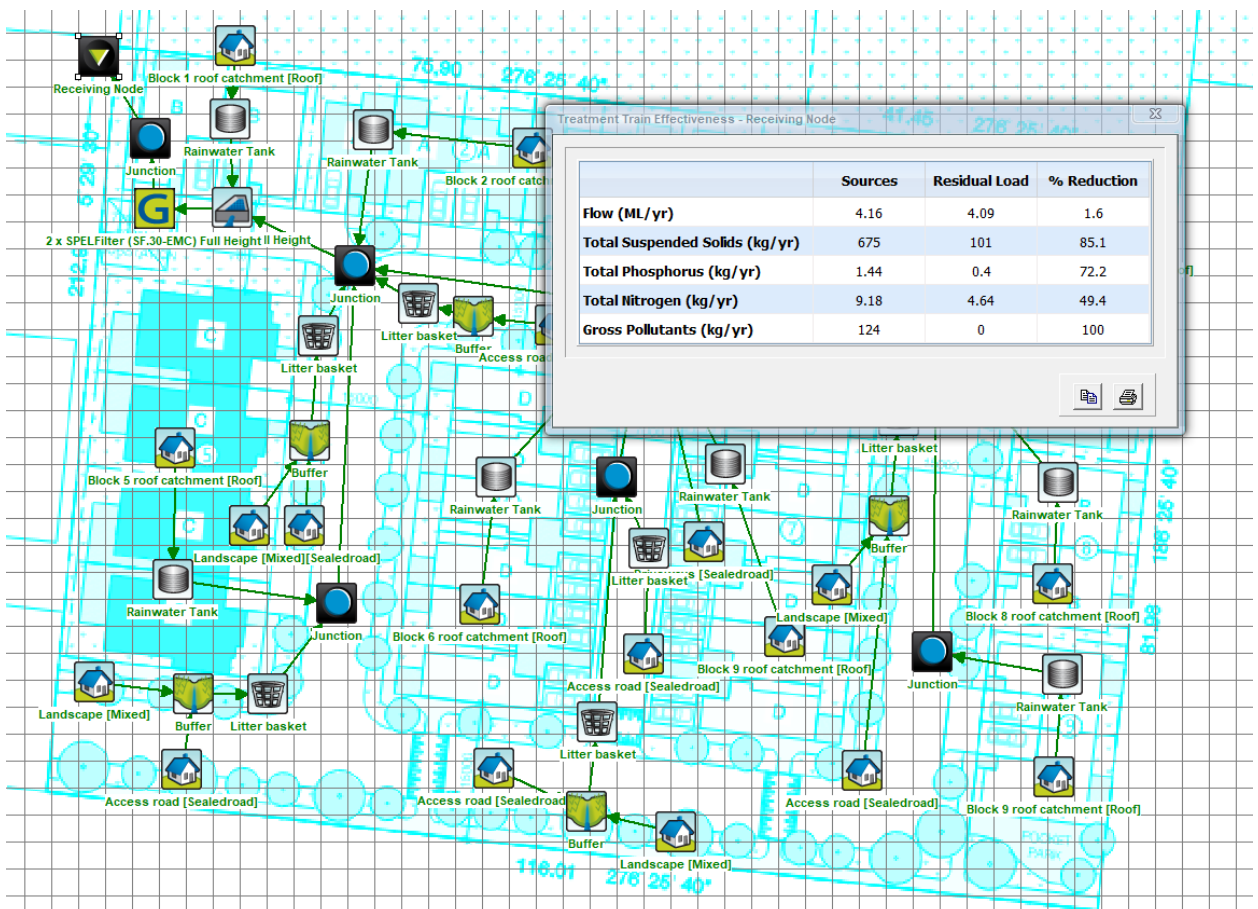
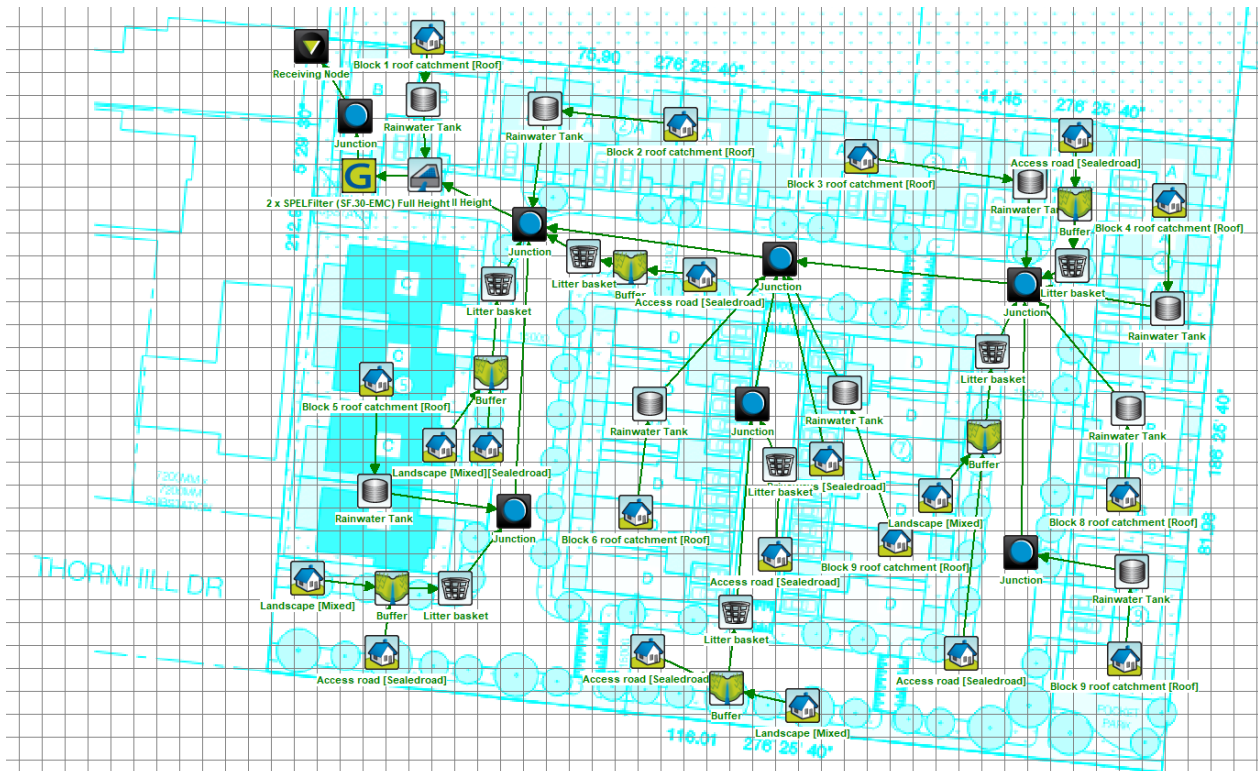
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Tile No: 3

Appendix B

MUSIC Model Results / OSD4W Detention Storage Calculation



OSD4W Detention Storage Calculation

Q10 to Q5 detention storage

3. AREAS (sq.m.) & RUN-OFF COEFFICIENTS

Total Site area : 9543

4. EXISTING SITE DETAILS

Aes1 : 9543 Ces1 : 0.35
Aes2 : 0 Ces2 : 0.90
Aes3 : 0 Ces3 : 0.90
Aes4 : 0 Ces4 : 0.30
Weighted C - site Cew : 0.35

5. PROPOSED SITE DETAILS

Aps1 : 2608 Cps1 : 1.00
Aps2 : 2598 Cps2 : 0.90
Aps3 : 987 Cps3 : 0.90
Aps4 : 3350 Cps4 : 0.30
Weighted C - site Cpw : 0.72
Uncontrolled portion(s) UPfrac : 0.00

6. CATCHMENT TIMES (minutes)

Time of concentration : 12.00
Travel time from discharge point
to catchment outlet : 5.00

7. OSD DESIGN

Flow Control Device : Orifice
Storage type : Pipe
Rainfall zone : MELBOURNE
ARI for OUTFLOW (years) : 5
ARI for STORAGE (years) : 10
Qptot (L/s) : 58.46
Qu (L/s) : 0.00
Qp (L/s) : 0.00
Calculated PSD (L/s) : 70.20
Nominated PSD (L/s) : -----
Adopted PSD (L/s) : 70.20

8. STORAGE DETAILS

Volume (cub.m.) : 71.93
Time to fill storage (mins) : 19.1
Time to empty storage (mins) : 30.0
Critical storm duration (mins) : 25.9

9. STORM DURATIONS & RAINFALL INTENSITIES

PSD Duration : 12.0 min. Intensity : 63.0 mm/hr
MAX. STORAGE Duration : 25.9 min. Intensity : 46.6 mm/hr

10. ZERO IMPACT VOLUME

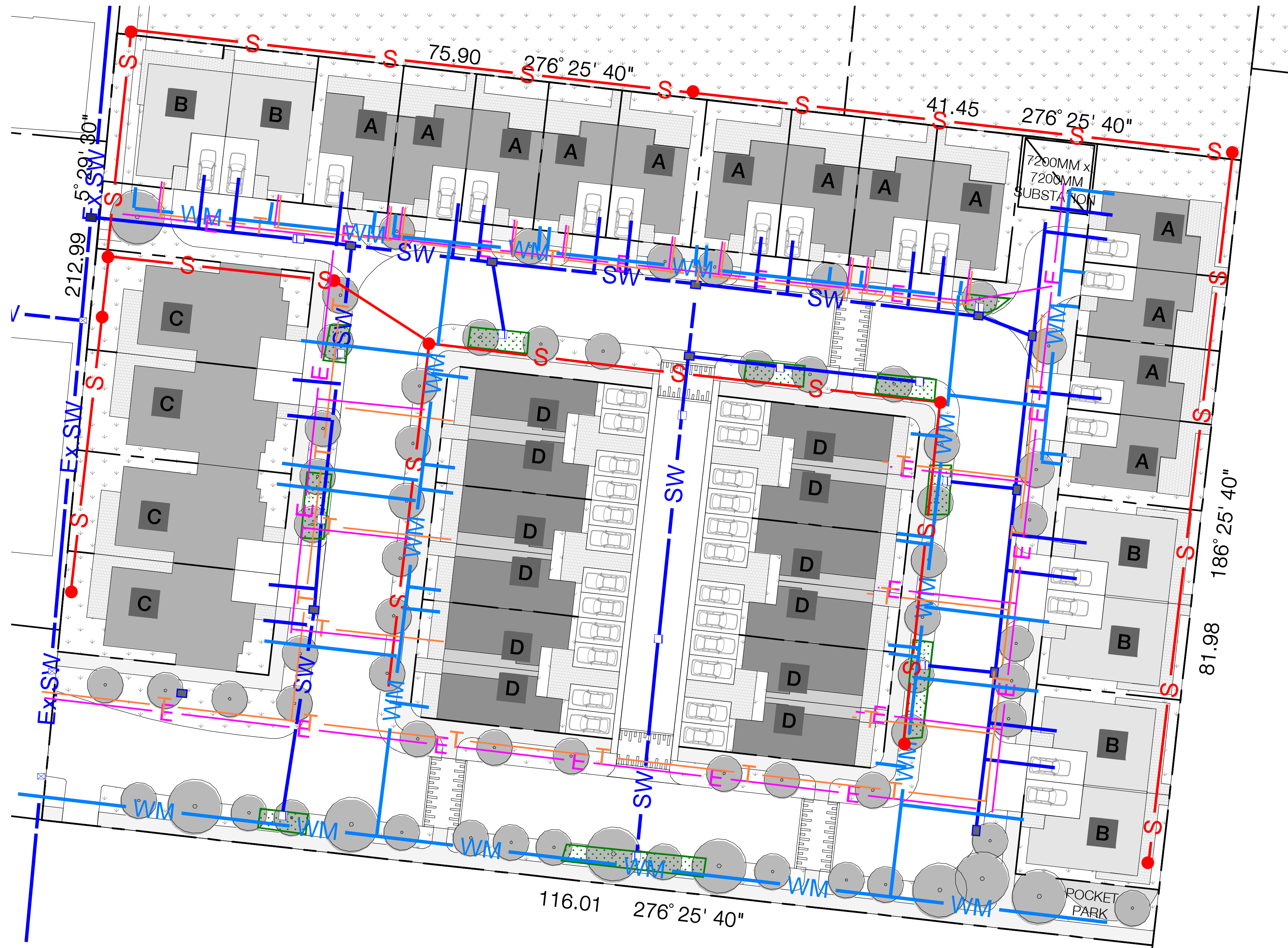
The additional runoff volume generated by the site redevelopment is 91.7 cub.M.

Q100 post development storage to Q5 post development storage volume is 95.61 m³. Should overland flow routes to the north not be acceptable to council this increased storage volume could be provided.

Appendix C

Stormwater drainage schematic to demonstrate design intent and LPD options

Stormwater and services coordination concept



COORDINATION PLAN IS INDICATIVE ONLY. SERVICES ALIGNMENTS AND DESIGN ARE TO BE DOCUMENTED BY THE RELEVANT SERVICES CONSULTANT. FINAL ALIGNMENTS WILL BE SHOWN ON OVERALL SERVICES PLANS AS PART OF THE CIVIL PLAN SET

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BAPTCARE

PROJECT TITLE

BAPTCARE HOUSING DEVELOPMENT KEILOR DOWNS

SITE ADDRESS

COPERNICUS WAY, KEILOR DOWNS VIC 3038

DRAWING TITLE

STORMWATER AND SERVICES COORDINATION

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