ProjexPartners
PROJECT MANAGEMENT | ENGINEERING | PLANNING
Building community through our people

Stormwater Management Plan

LOT 30 SP305312
FIRST AVENUE
MAROOCHYDORE CITY CENTRE

Walker Corporation

June 2026

Rev C

Projex Partners Pty Ltd
Level 3
135 Horton Parade
Maroochydore Qld 4558

Our ref: 571-003

walker

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DOCUMENT ISSUE RECORD

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A	01/04/2026	Original Issue	MLH	KAP	DAB
B	15/06/2026	Updated architectural drawings	DAB	KAP	DAB
C	24/6/2026	Updated architectural drawings	KAP	KAP	DAB

Tables

Figures

Appendices

CERTIFICATION

Report Title	Stormwater Management Plan LOT 30 SP305312 FIRST AVENUE / SUNSHINE COAST PARADE MAROOCHYDORE CITY CENTRE	
Affected Properties	LOT 30 SP305312	
Street Address	First Avenue, Maroochydore QLD 4558	
RP Description	LOT 30 SP305312	
Prepared For	Walker Corporation	
Date	24/06/2026	
Revision No.	C	
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Signature		

1 INTRODUCTION

1.1 Background Information

Projex Partners have been engaged to prepare a Stormwater Management Plan (SMP) for submission to Economic Development Queensland (EDQ) as part of a Material Change of Use (MCU) application for the proposed development located at Lot 30 SP305512 on the corner of First Avenue and Sunshine Coast Parade, Maroochydore.

The subject site is located within the Maroochydore City Centre Priority Development Area (PDA) and is subject to the Maroochydore City Centre PDA Development Scheme administered by EDQ under the Economic Development Act 2012.

The proposed development comprises a multi-storey residential building including basement carparking and services level levels, podium-level car parking, and residential levels above, together with associated communal and landscaped areas, consistent with the proposed architectural drawings submitted with this MCU development application.

1.2 Scope of SMP

The objective of this SMP is to document the proposed stormwater management strategy for the development and demonstrate compliance with the applicable requirements of the Maroochydore City Centre PDA Development Scheme and PDA Guideline No. 13 – Engineering Standards.

This SMP will:

- Describe the existing site conditions and lawful point of discharge;
- Document the proposed stormwater quantity management approach, including minor and major drainage systems;
- Document the proposed stormwater quality treatment strategy;
- Assess flooding constraints and confirm proposed finished floor levels; and
- Demonstrate compliance with relevant engineering standards applicable within the PDA.

1.3 Referenced Documentation

- Maroochydore City Centre PDA Development Scheme;
- PDA Guideline No. 13 – Engineering Standards;
- Queensland Urban Drainage Manual (QUDM) 2017;
- Water by Design – MUSIC Modelling Guidelines;
- State Planning Policy 2017 (SPP);
- Sunshine Coast Council Flooding and Stormwater Management Guidelines, September 2020;
- Sunshine Coast Council Planning Scheme Policy – Development Works;
- Sunshine Coast Council Flood Information Search (Dated 04/03/2026); and
- Bureau of Meteorology Intensity–Frequency–Duration (IFD) data for Maroochydore.

2 PRE-DEVELOPMENT CONDITIONS

2.1 Location of Site

The development site is located at Lot 30 SP305512 on the corner of First Avenue and Sunshine Coast Parade, Maroochydore, within the Maroochydore City Centre Priority Development Area (PDA).

The site is bounded by Sunshine Coast Parade to the south, First Avenue to the west, Future Way to the North and “The Corso” development to the east. The site location is shown below in Figure 2-1.

Figure 2-1: Site Locality (QLD Globe, 2026)

2.2 Existing Site Characteristics

The site is currently a bitumen sealed car parking station. The site was previously formed as part of the broader Maroochydore City Centre bulk earthworks and trunk infrastructure works and is generally level with minor surface grading toward existing pits on the northern and southern boundaries.

The current surface condition primarily comprises a bitumen sealed hardstand with limited landscaped edges adjoining the road reserve. No permanent structures are currently located on the site. A site inspection undertaken by Projex Partners confirms the existing surface condition. Refer to Figure 2-2 below.

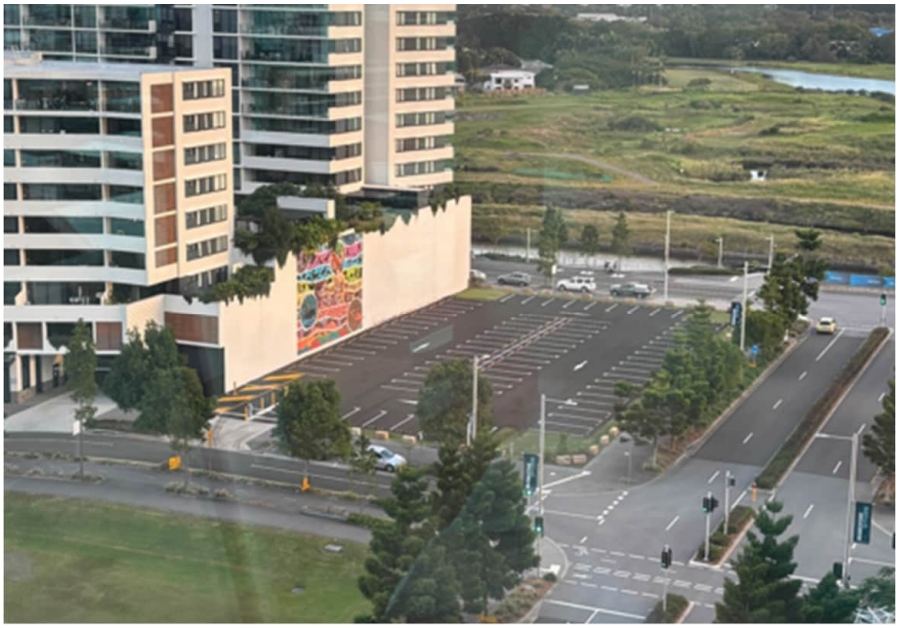


Figure 2-2: Northern Extent Conditions (June 2026)

2.3 Existing Drainage Infrastructure

Existing stormwater infrastructure is located within both the property boundary and the adjacent road reserves. Field inlet pits are located within the site on the northern and southern boundaries and currently function as lawful points of discharge (LPOD). These pits connect via underground reinforced concrete pipes (RCP) to Council's stormwater network within the surrounding road reserves.

Council stormwater mapping confirms the presence of reinforced concrete stormwater pipes ranging in diameter from approximately 600 mm to 1350 mm within First Avenue, South Sea Islander Way, Future Way and Sunshine Coast Parade. These pipes form part of the primary drainage network servicing the Maroochydore City Centre precinct.

The underground road drainage network conveys flows south along South Sea Islander Way and east along Sunshine Coast Parade before discharging to the trunk stormwater open drain located along Sunshine Coast Parade, forming part of the regional Maroochydore City Centre drainage system. An extract of Council's stormwater infrastructure mapping, including existing field inlet pits and downstream trunk drainage path is provided below in Figure 2-3.

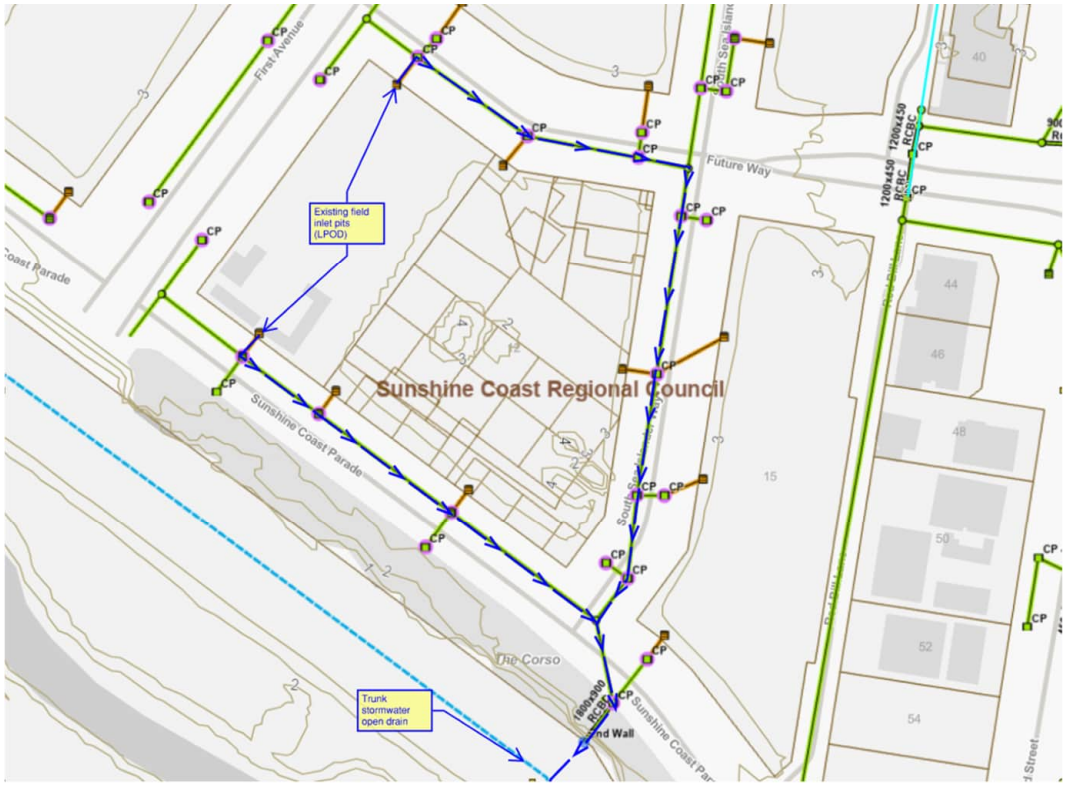


Figure 2-3: Existing Drainage Infrastructure (SCC MyMaps, 2026)

2.4 Lawful Point of Discharge

2.4.1 Existing Discharge Regime

The existing site catchments have been identified and are illustrated in Figure 2-4, enabling assessment of the current discharge regime.

The details are as follows:

- Surface runoff from the site drains via sheet flow toward the existing field inlet pits located within the property boundary.
- Collected flows discharge through 375mm reinforced concrete pipes into the Future Way and Sunshine Coast Parade drainage networks.

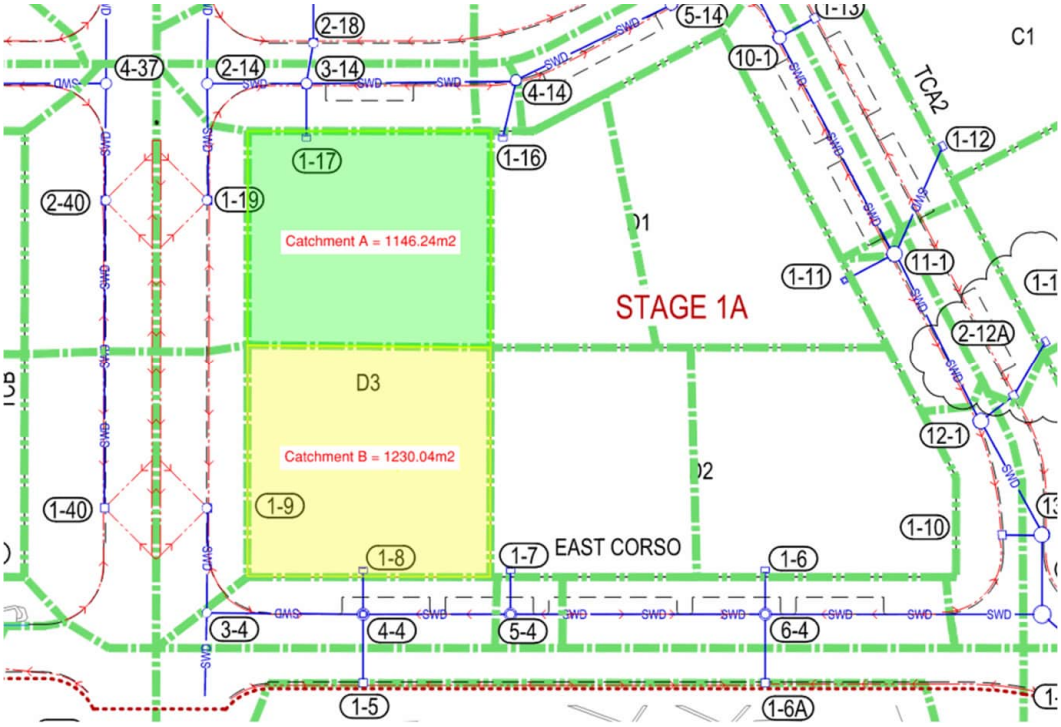


Figure 2-4: Existing Catchment Area Delineation

The existing discharge regime is shown in Figure 2-5 below.

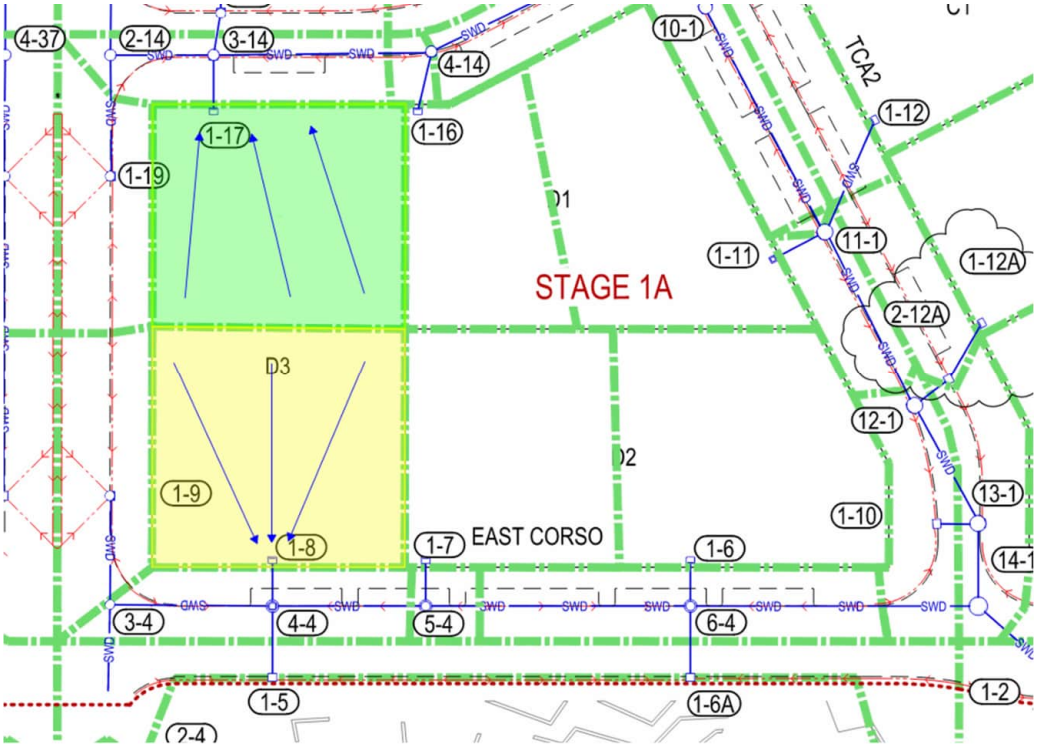


Figure 2-5: Existing Discharge Regime

2.4.2 Proposed Lawful Point of Discharge

The proposed development will discharge stormwater to the existing field inlet pits located within the property boundary, which form the lawful points of discharge (LPOD) for the site.

Stormwater generated from roof and podium areas will be collected via an internal piped drainage network and conveyed to these existing pits. The pits discharge via 375 mm reinforced concrete pipes into the Future Way and Sunshine Coast Parade stormwater drainage networks.

The proposed discharge locations correspond with the existing drainage infrastructure illustrated in Figure 2-5 above. Where required, the existing pits may be modified or relocated during detailed design to suit the final building footprint while maintaining the established discharge regime and downstream connection.

2.5 Flooding Assessment

Flooding characteristics for the site were reviewed using Sunshine Coast Council flood mapping and the Sunshine Coast Council Flood Information Search (Reference: Cer26/01839) included in ***Appendix B***. The flood information provided by Council is derived from the Maroochydore City Centre Stage 1 Local Flooding Technical Memorandum (Cardno, 2015 – Refer ***Appendix G***) which forms the basis of the flood modelling for the Maroochydore City Centre precinct.

Council's flood information search identifies that the site is affected by local drainage flooding associated with the Maroochydore City Centre drainage network, rather than regional riverine flooding. The flood search provides defined flood levels for the site based on a 1% Annual Exceedance Probability (AEP) event, including allowances for projected climate change conditions to the year 2100.

The relevant flood levels for the site are summarised in Table 2-1 below.

Table 2-1: Relevant Flood Levels (SCC Flood Information Search Cer26/01839)

Pit Identifier	1% AEP Flood Level (mAHD)	Regional Flood Level (mAHD)	Minimum Finished Floor Level (mAHD)
D3 1-17	3.36	2.92	3.66
D3 1-8	3.37	2.92	3.67

The minimum finished floor levels provided by Council incorporate the required freeboard allowance in accordance with the Sunshine Coast Planning Scheme and the Queensland Urban Drainage Manual (QUDM). These levels represent the minimum floor levels required to achieve the appropriate level of flood immunity for development within the flood hazard area.

The proposed development will adopt finished building floor levels that meet or exceed the minimum levels identified in the flood information search to ensure the development maintains appropriate flood immunity consistent with the broader Maroochydore City Centre precinct planning. Accordingly, the proposed development is not expected to result in any adverse flooding impacts on surrounding properties or the downstream stormwater network.

3 DEVELOPED CONDITIONS

3.1 Description of Proposed Development

The proposed development will involve the construction of a multi-storey residential tower comprising a basement level containing building services and carparking, ground floor access and carparking, four levels of podium car parking (Levels 01–04), a landscaped residential podium (Level 05), residential levels (Levels 06–27), penthouse apartments (Level 28) and rooftop recreation facilities (Level 29).

The development footprint will occupy the majority of the site and will result in a predominantly impervious post-development condition. The proposed layout is attached in ***Appendix A.***

3.2 Stormwater Drainage Infrastructure

The stormwater drainage infrastructure has been designed to satisfy the requirements of PDA Guideline No. 13 – Engineering Standards, SCC Planning Scheme Policies, QUDM and ARR guidance.

The drainage network should be sized to capture peak flow rates up to the 1% AEP storm event. The underground network will be designed to convey larger storm events than the minimum minor system requirement in order to maintain consistency with the broader Maroochydore City Centre master drainage framework and avoid the need for on-site detention.

To comply with applicable stormwater quality objectives and the Water by Design MUSIC Modelling Guidelines, a proprietary treatment train is proposed to treat stormwater runoff prior to discharge from the site. Further information on the proposed treatment train and modelling is provided in Section 6.

4 STORMWATER QUANTITY MANAGEMENT

4.1 Stormwater Quantity Analysis

Stormwater quantity analysis to determine pre and post development peak flow rates was undertaken using the Rational Method, as described in Section 4.3 of the Queensland Urban Drainage Manual (QUDM).

All catchment areas have been maintained to match the previous master-planning catchments as defined in Section 2.4. The internal building hydraulics should be designed to maintain these catchment areas with approximately 50% of flow directed towards both the northern and southern boundaries.

Rainfall intensities for each storm event were obtained using the Rainfall Intensity-Frequency-Duration (IFD) information provided by the Bureau of Meteorology (BoM). Predevelopment catchment areas were calculated using the previous master planning documentation. Post development catchment areas were developed using architectural site layouts. Time of concentration for pre and post development conditions were calculated per Section 4.6 of QUDM. Predevelopment time of concentrations were calculated using Friends equation. Post development time of concentrations were calculated using standard inlet times.

To comply with SCC *Flooding and Stormwater Management Guidelines (September 2020)*, an allowance of 20% was added to peak flow rates to account for future climate change rainfall intensities.

Rational Method calculations are included in ***Appendix D***. A summary of peak flow rates for the minor and major storm events (10% and 1% AEP) in both pre and post development conditions is provided in Table 4-1.

Table 4-1: Pre vs Post Development Peak Flow Rates Summary

Storm Event (AEP)	Pre-Development % Impervious	Post Development % Impervious	Pre-Development Peak Flow Rate (m^3/s)	Post Development Peak Flow Rate (m^3/s)
10%	20	90	0.100	0.158
1%	20	90	0.174	0.283

4.2 Minor Drainage System

As the site is located within the “Principal Centre Zone” under the SCC Planning Scheme, the underground drainage network should be designed to convey peak flows up to the 10% AEP storm event, however as previously discussed in section 3.2, the underground drainage network will be sized to capture the 1% AEP event. Captured stormwater will discharge to the proposed lawful points of discharge documented in Section 2.4.2.

4.3 Major Drainage System

Peak flow rates above the 10% AEP and up to the 1% AEP event will discharge to the underground stormwater network within the site and to the proposed Lawful Points of Discharge.

4.4 Detention Modelling

As the site characteristics will change from previous to impervious surfaces, increases in peak flow rates in post development conditions are anticipated. Stormwater from the site is proposed to discharge via the existing 375mm RCPs as detailed in Figure 2-5.

The drainage network downstream of the Lawful Points of Discharge flows to a major detention water body prior to discharge from the Maroochydore City Centre development. This water body has been designed to ameliorate flow volumes from the fully developed upstream catchments, including this development.

As there is no change to the developed use previously anticipated for these lots in the site-wide development planning and previous site-wide flood detention modelling, no on-site flow amelioration or detention is proposed.

5 FINISHED FLOOR LEVELS

Minimum finished floor levels for the proposed development will be adopted in accordance with the Sunshine Coast Council Flood Information Search (Cer26/01839) for the site, included in ***Appendix B***.

The flood information search provides the minimum development levels required to achieve the appropriate level of flood immunity for the site. These levels are derived from the Maroochydore City Centre Stage 1 Local Flooding Technical Memorandum (Cardno, 2015) which forms the basis of Council's adopted flood mapping for the Maroochydore City Centre precinct.

The flood search identifies minimum finished floor levels of 3.66 m AHD and 3.67 m AHD for the site based on the relevant drainage catchments. To provide a consistent level of flood immunity across the development, a minimum finished floor level of 3.67 m AHD should be adopted for the development.

The minimum finished floor levels specified by Council relate to habitable building floor levels required to achieve compliance with the applicable flood immunity provisions of the Sunshine Coast Planning Scheme. The proposed development will therefore adopt finished floor levels that meet or exceed 3.67 m AHD. The relevant flood levels extracted from the Flood Information Search are summarised in Table 5-1.

Table 5-1: Minimum Finished Floor Levels (extracted from SCC Flood Information Search Cer26 01839)

Lot / Catchment Identifier	Pit Identifier	Minimum Finished Floor Level (mAHD)
D3	1-17	3.66
D3	1-8	3.67

The 1% AEP (2100) Peak Flood Level is between 3.36m AHD and 3.37m AHD. The basement carpark ramp level has been established at RL 3.47m AHD, providing 100mm freeboard to the 1% AEP (2100) flood event level to reduce the potential for basement flooding.

6 STORMWATER QUALITY MANAGEMENT

6.1 Construction Phase Water Quality Issues

Water quality management is required to be implemented during the construction and operational phases of the development. Potential pollutants associated with the construction phase cannot be modelled due to the site-specific nature of the pollutant sources. The major pollutant of concern is suspended solids due to erosion associated with earthworks operations on site. Other pollutants of concern include hydrocarbons resulting from fuel and oil spills from construction equipment and vehicles and toxic materials from construction works. Potential pollutant export is largely dependent on-site management practices and varies throughout the construction phase depending on the construction activities being undertaken.

6.2 Erosion and Sediment Control

The construction contractor is required to prepare a construction phase Erosion and Sediment Control Plan (ESCP), to document the proposed ESC devices that will be utilised on site to minimise impacts associated with stormwater discharging from the site during construction and meet SCC water quality objectives.

6.3 Water Quality Objectives

Table 6-1 below documents the water quality objectives applied to developments within the Sunshine Coast Council area. These objectives were extracted from the State Planning Policy 2017.

Table 6-1: State Planning Policy Water Quality Targets

Pollutant	Reduction Requirement
Total Suspended Solids (TSS)	80% of average annual load
Total Phosphorus	60% of average annual load
Total Nitrogen	45% of average annual load
Gross Pollutants (GP)	90% of average annual load

6.4 Proposed Water Quality Treatment Train

A SQIDEP approved proprietary stormwater treatment device, AtlanFilter, will be implemented on the site to treat stormwater runoff prior to discharge. The SQIDEP approval certificate for the AtlanFilter system is included in ***Appendix E***.

The proposed AtlanFilter installation location can be seen on the indicative drainage layout in ***Appendix F*** and treats all site runoff prior to discharge. The AtlanFilter system will be installed offline from the primary stormwater drainage network using a diversion manhole located near the LPOD's. This configuration enables stormwater flows up to the treatment capacity of the device to be directed through the filtration system, while larger storm events bypass the treatment device and continue through the main drainage system. This arrangement protects the filtration cartridges from excessive hydraulic loading and ensures the long-term performance of the treatment system.

The proposed treatment system is capable of achieving the required State Planning Policy pollutant reduction targets without the need for upstream gross pollutant traps (GPTs). However, as a matter of best practice and to assist with ongoing operation and maintenance of the filtration system, upstream gross pollutant pre-treatment devices (e.g. pit insert basket systems) may be incorporated within the drainage network during detailed design to capture coarse debris and sediment prior to entering the filtration system.

6.5 MUSIC Modelling

Model for Urban Stormwater Improvement Conceptualisation (MUSICX) Version 1.40 was utilised to determine the requirements for the water quality treatment trains.

6.5.1 Rainfall Data

Six-minute rainfall data, obtained from eWater for station 40282 – Nambour DPI was used to develop the model. This station was recommended for use when modelling site in this area of the Sunshine Coast. The data for the station is documented below in Table 6-2.

Table 6-2: MUSIC Rainfall Data

Rainfall Station	Modelling Period	Annual Rainfall (mm)	Recording Interval (mins)
40282 – Nambour DPI	1/1/1989 – 31/12/1998	1527	6

6.5.2 Pollutant Export Parameters

The catchments were modelled using the Lumped Urban Residential catchment parameters. The pollutant export parameters for this node are documented below in Table 6-3. These values were obtained from Table 3.8 of the MUSIC Modelling Guidelines.

Table 6-3: Lumped Urban Residential Pollutant Export Parameters

Land Use	Flow Type	TSS log^{10} value		TP log^{10} value		TN log^{10} value	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Urban Residential	Baseflow Parameters	1.00	0.34	-0.97	0.31	0.20	0.20
	Stormflow Parameters	2.18	0.39	-0.47	0.32	0.26	0.23

6.5.3 Rainfall-Runoff Parameters

The MUSIC Rainfall-Runoff parameters for Urban Residential Sites are documented below in Table 6-4. These parameters were obtained from Table A1.2 of the MUSIC modelling guidelines.

Table 6-4: Rainfall Runoff Parameters

Parameter	Value
Rainfall Threshold (mm)	1
Soil Storage Capacity (mm)	500
Initial Storage Capacity (%)	10
Field Capacity (mm)	200
Infiltration Capacity Coefficient A	211
Infiltration Capacity Coefficient B	5.0
Initial Depth (mm)	50
Daily Recharge Rate (%)	28
Daily Baseflow Rate (%)	27
Daily Deep Seepage Rate (%)	0

6.5.4 Treatment Train

The node parameters that were entered into the MUSIC model are documented as part of the SQIDEP approval certificate (***Appendix E***) and were applied to this project.

The treatment train used in the MUSIC model is shown below in Figure 6-1. Stormwater from each catchment is directed to a proprietary filtration system comprising two (2) AtlanFilter FIL-3.0 cartridges housed within a precast CircaVault chamber (approx. 3.7 kL capacity) prior to discharge to the legal point of discharge. The stormwater catchment areas used to generate the MUSIC nodes shown below are illustrated in Figure 2-4: Existing Catchment Area DelineationFigure 2-4 and are consistent with the existing drainage catchments. For MUSIC modelling purposes, the post-development catchments have been conservatively assumed to be 95% impervious, noting that landscaped areas within the podium and rooftop levels are constructed over structural slabs and drain via internal hydraulic systems rather than natural infiltration.

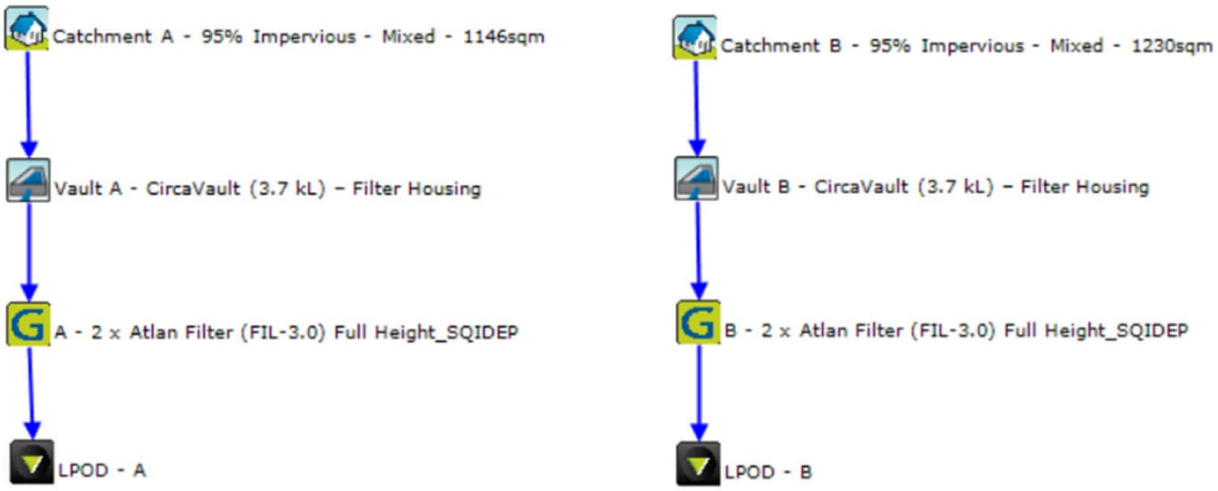


Figure 6-1: MUSIC Modelling Treatment Train

The MUSIC modelling results shown in Figure 6-2 demonstrate that the nominated AtlanFilter cartridges satisfy the SPP water quality targets.

	Sources		Residual Load		Percent Reduction	
	LPOD - A	LPOD - B	LPOD - A	LPOD - B	LPOD - A	LPOD - B
Flow (ML/yr)	1.544	1.657	1.544	1.657	0.002	0.001
Total Suspended Solids (kg/yr)	345.599	380.245	57.439	68.123	83.38	82.084
Total Phosphorus (kg/yr)	0.692	0.723	0.184	0.196	73.443	72.921
Total Nitrogen (kg/yr)	3.219	3.464	1.461	1.589	54.617	54.123
Gross Pollutants (kg/yr)	35.439	38.036	0	0	100	100

Figure 6-2: MUSIC Modelling Results

6.5.5 AtlanFilter Cartridges Maintenance and Whole of Life Information

The following information was provided by Atlan Stormwater regarding the lifecycle and maintenance frequencies of the AtlanFilter system.

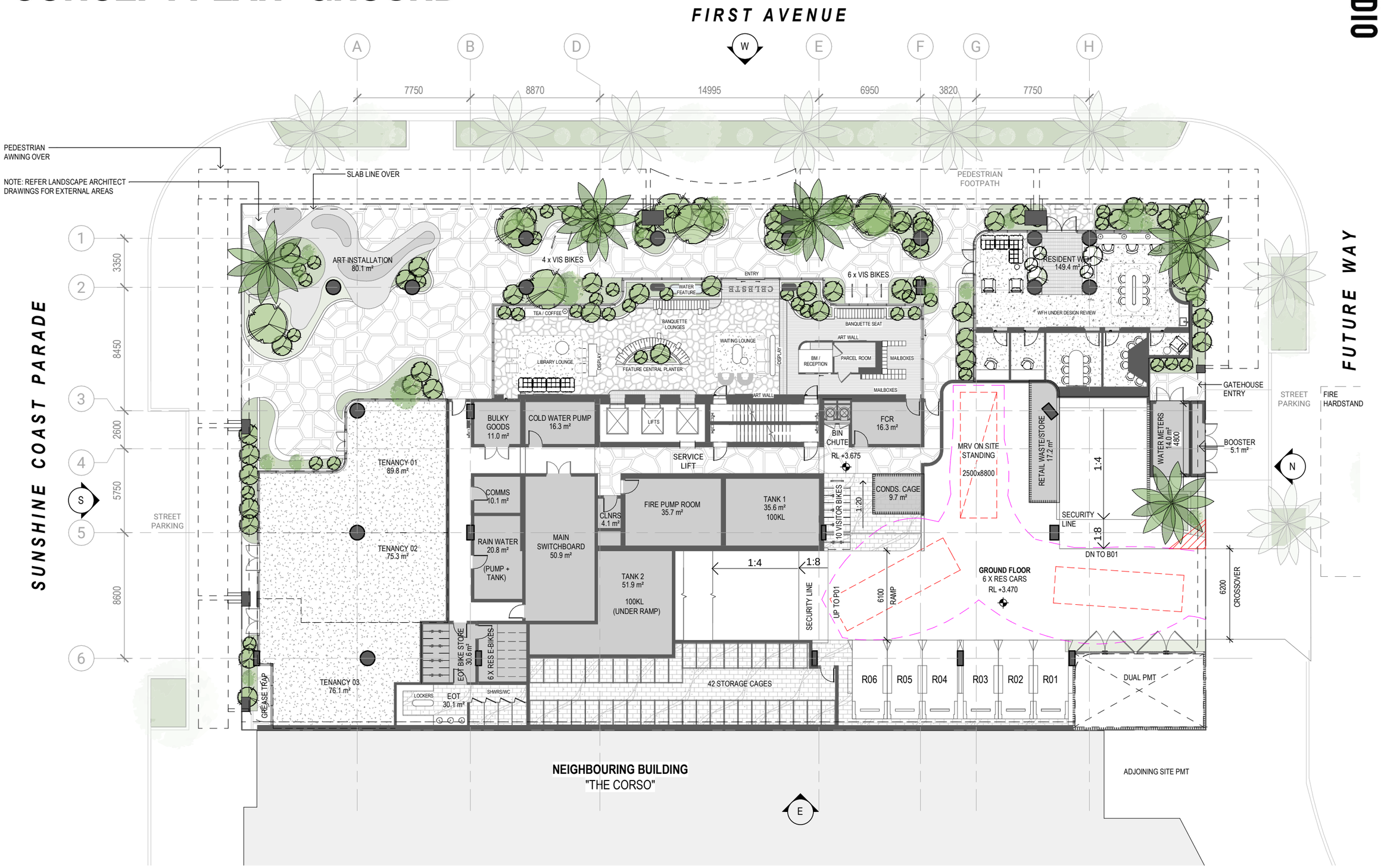
- The AtlanFilter system requires regular inspection and maintenance to ensure ongoing treatment performance.
- Quarterly inspections are recommended to visually assess the condition of the system, including sediment accumulation within the sump and the condition of the filter cartridges.
- Routine maintenance may be undertaken as required using vacuum truck equipment to remove accumulated sediment and gross pollutants from the vault sump.
- Filter cartridge replacement is typically required every 5–7 years, depending on pollutant loading, site conditions and inspection outcomes.

Maintenance activities should be undertaken by a suitably qualified contractor in accordance with the manufacturer's recommendations. The AtlanFilter Operation and Maintenance Manual is attached in ***Appendix D*** for detailed information on system operation and maintenance requirements.

APPENDIX A

Proposed Site Layout

CONCEPT PLAN - GROUND



0 2.5 5 7.5 10 12.5 m

SCALE 1:250 @ A3 SIZE

APPENDIX B

SCC Flood Search

Request Type

☐ Self-Assessable Dwelling

☒ All Other

Flood Information Search

This search is issued in response to an information request for a property which is located within the geographical boundaries of Sunshine Coast Council. This search is valid for 6 months from date of issue.

Applicant's Name	Projex Partners Pty Ltd	Issue Date	04 March 2026
Applicant's Address	PO Box 219 MAROOCHYDORE QLD 4558	Land Number	1523429
		Property Description	Lot 30 SP 305312
		Address	Sunshine Coast Pde MAROOCHYDORE QLD 4558
		Our Reference	Cer26/01839
Email Address	mathewharvey@projexpartners.com.au	Issuing Officer	DB042
		Your Reference	571-003

ENQUIRY DATE: 17/02/2026

REGISTERED OWNER(S) NAME: Walker 51 First Avenue Pty Ltd Tte

TABLE 1 - APPLICABLE VALUES REQUIRED TO COMPLY WITH BUILDING REGULATIONS:

Flood Hazard Area for Building Regulation Purposes – Minimum Design Floor Level **For the purposes of the QDC MP 3.5 (2012) & The Building Regulations S8.1 (2021). levels provided in this table for new buildings are a declaration of the Finished Floor Level requirements for Class 1 buildings built in all or part of the Flood Hazard Area**			
Minimum Design Floor Level	Please contact Development Services for development that is not Self-Assessable (refer to interpretative note 2)		
Source of Data	Technical Memorandum – Maroochydore City Centre Stage 1 Local Flooding (Cardno, 29 October 2015)		
Maximum Flow Velocity	Not Available	**Backwater or inactive flow area**	Velocity Not provided
Drainage Deficiency Area	No	**Drainage Deficient Area Not Filled (Refer Note 10)**	N/A

TABLE 2 - LEVELS RELEVANT TO THIS LOT:

Lot Identifier	Pit Identifier	1% AEP (at 2100) Peak Flood Level (m AHD)		Minimum Floor Level (mAHD)
		Local Drainage	Regional	
D3	1-17	3.36	2.92	3.66
D3	1-8	3.37	2.92	3.67

NOTES SPECIFIC TO THIS SEARCH

None Applicable

CLIMATE ASSUMPTIONS

The advice provided in this search is based upon standards relating to current and year 2100 climatic conditions and historically recorded flood events only. Year 2100 estimates include allowances for future climate conditions which specifically include increased rainfall intensity (20%) and higher mean sea level (0.8m).

T 0754757272 **F** 07 5475 7277 | mail@sunshinecoast.qld.gov.au
Locked Bag 72 Sunshine Coast Mail Centre Qld 4560 | **www.sunshinecoast.qld.gov.au**

Figure 1 - Flood Hazard Area for Building Regulation Purposes Map

The flood hazard area for building regulation purposes map is based on the defined flood event, but also includes additional buffer flood hazard areas which incorporate freeboard allowance, overland flow paths and street drainage. This map triggers the request for a flood information search from council, to obtain the flood level, floor level and velocity information relevant to the property. If building works are proposed within the Flood Hazard Area for Building Regulation Purposes (including the additional buffer area), then the declared flood level, velocity and finished floor level is required to comply with MP3.5.

Figure 2 - Regional Flooding Map

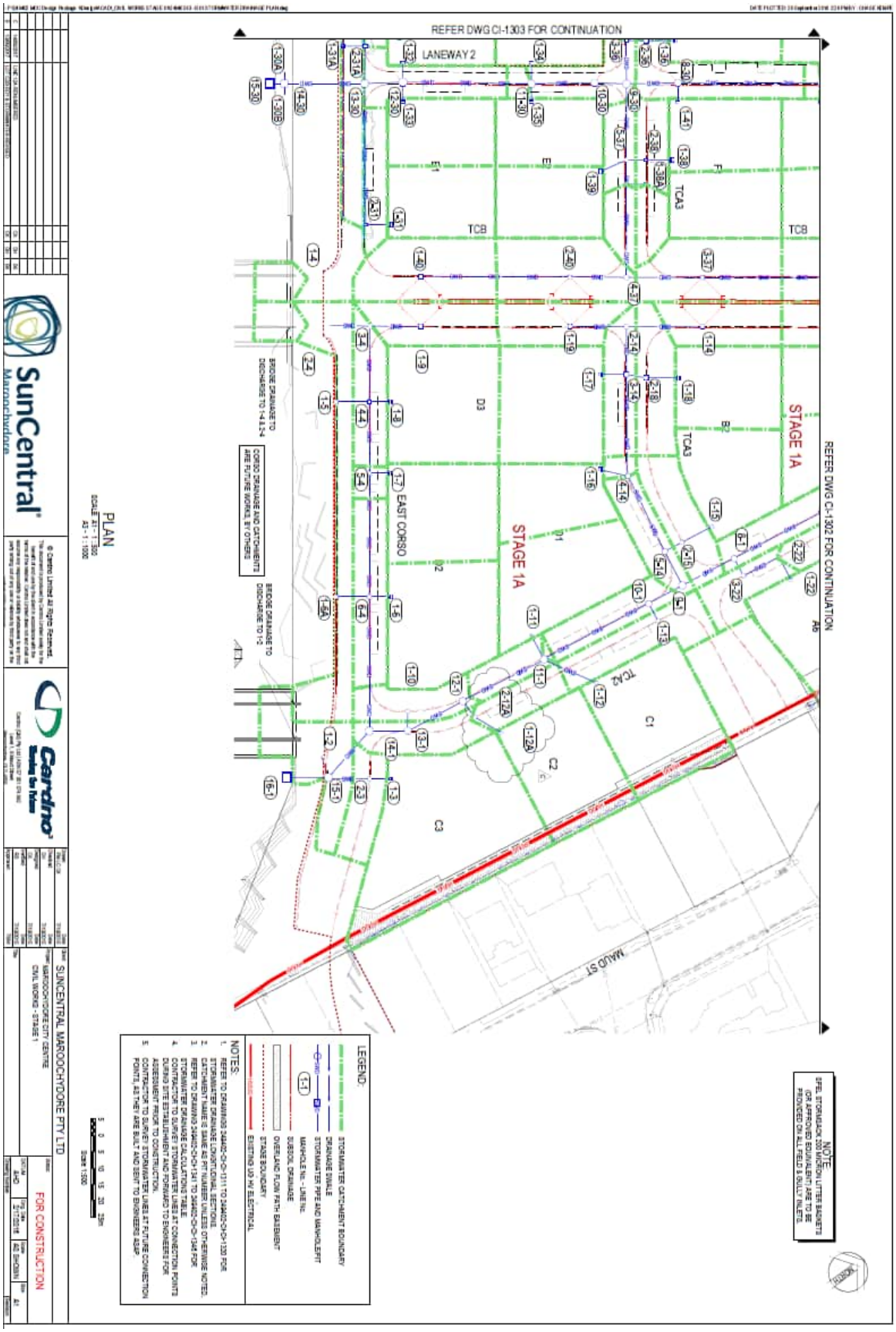


Figure 3 - Drainage Plan

INTERPRETATION NOTES FOR THIS SEARCH

1. Minimum finished floor levels are provided for residential land uses only in accordance with the criteria for self-assessable development in the Sunshine Coast Planning Scheme, 2014, Flood Overlay Code. For other types of development the flood overlay code of the planning scheme may assign a different event probability to the Defined Flood Event and specify different freeboard requirements. Refer to Table 8.2.7.3.3 of the Flood Overlay Code. In such instances a development application should already be lodged and the Development Services staff assisting with this application will provide guidance on the determination of minimum finished floor levels.
2. This search has not been prepared with knowledge of the date of construction or approval for development. It is incumbent upon the applicant, or the agent representing the applicant, in a purchasing situation to determine the date of approval for development in order to ascertain which of the minimum floor levels provided on this search are appropriate.
3. The absence of local flood mapping does not imply that the above property is not subject to localised stormwater flooding. Please be aware of the natural topography in your area and the location of drainage infrastructure. Water runoff which exceeds the capacity of the drainage system (if present) and/or concentrates in surface depressions and gullies can cause localised stormwater flooding which may not be identified in this search.
4. The MINIMUM DESIGN FLOOR LEVEL as required by the Flood Overlay Code of the Sunshine Coast Council Planning Scheme, 2014, is calculated as whichever is greater of either:
   (a) 500mm freeboard added to the Defined Flood Event Level (Regional, Riverine or Storm Tide) for the site; or
   (b) 300mm freeboard added to the Defined Flood Event Level (Drainage/Overland Flow) for the site as per the Queensland Urban Drainage Manual.
5. Surface water should be managed according to the requirements of the National Construction Code (Volume 2 and the ABCB Housing Provisions). In order to meet these requirements, the Floor Level may need to be higher than specified in this search.
6. Construction of all internal stormwater drainage must comply with the relevant sections of Australian Standard *AS/NZS 3500.3 – Plumbing and Drainage*.
7. Building certifiers should be aware that their certification requires them to ensure no unacceptable off-site or on-site impacts associated with the drainage of buildings or land.
8. If the property is located within a declared Drainage Deficient Area as shown on Figure 8.27 Drainage Deficient Areas of the Sunshine Coast Planning Scheme (2014) Flood Overlay Code the MINIMUM DESIGN FLOOR LEVEL may be returned as 'DDA Survey Required'. If so, refer Drainage Deficient Area requirements attachment for details.
9. If marked as "DDA Not Filled", Council advises that no record exists of this property previously satisfying DDA requirements of the Sunshine Coast Planning Scheme (2014) Flood Overlay Code or the relevant prior planning scheme(s). An attachment will be included with this search that provides detail on the filling and survey requirements.
10. For properties located adjacent to Lake Weyba or within 200m of the Pumicestone Passage, when calculating MINIMUM FINISHED FLOOR LEVEL an additional 300mm allowance for wave setup is added to the 500mm freeboard for properties. This results in a total freeboard of 800mm above the Defined Flood Level.
11. All buildings shall conform to the relevant Planning Scheme Code in the Sunshine Coast Regional Council, 2014.
12. Flood modelling is based on periodic aerial laser survey of the ground surface which filters out buildings and fences. Flow diversions caused by solid obstructions may not be identified in this search. Changes to surface levels and drainage may have altered the overland flow and flood behaviour within this property.
13. Council advises that if there are openings to basements these openings require a minimum level at least equal to the minimum finished floor level.
14. The levels and velocities provided on this search are derived from information relating to the flood hazard that is deemed most current and reliable at the time of search provision. This information may supersede flood information contained on the Sunshine Coast Regional Council Planning Scheme Flood Overlay (2014) which requires planning scheme amendment to maintain currency.
15. Section 8 of Building Regulations defines an inactive flow or backwater area to mean *all or part of a flood hazard area where the maximum flow velocity of water is not likely to be greater than 1.5m/s*. Council advises that velocity in some waterways, floodways and overland flow paths is less than 1.5m/s and would therefore meet this definition. Obstructing such flow paths is inherently problematic and likely to cause adverse impact. The declaration of a backwater area or inactive flow path should not be interpreted as acceptable to obstruct.
16. Additional information on the frequency and extent of flooding within this property can be found on Council's online mapping at: https://www.sunshinecoast.qld.gov.au/Development/Development-Tools-and-Guidelines/Sunshine-Coast-Mapping-MyMaps

DISCLAIMERS

Flood information provided by Council represents the best information available to Council. It should only be used as a guide to the extent of flooding on the property. This information may be inaccurate or incomplete and it is recommended that purchasers make their own local enquiries with regard to the flooding and drainage history of the site.

The flood level information supplied does not represent the highest possible flood level that could occur on this property. Statistics indicate that a flood of equivalent or greater magnitude than the defined flood event is possible and has a 1% chance of occurring in any given year and similarly a 50% chance of occurring within 70 years.

The absence of flood information does not imply that the property is not subject to flooding, simply that Council has no information for this property flooding. If the property has a history of flooding or drainage problems, Council recommends you seek professional advice on this matter.

GLOSSARY OF TERMS

Term	Definition
Applicant	The individual(s) requesting a flood search to be completed for a specified property.
Registered Owners	The individual(s) that are registered by Council as owning the property for which a flood search is requested.
AHD	The Australian Height Datum (AHD) is the reference level for defining reduced levels adopted by the National Mapping Council of Australia. The level of 0.0 m AHD is approximately mean sea level.
Defined Flood Event Level	A water level derived through mathematical modelling of the Defined Flood Event.
Defined Flood Event	Terminology consistent with Single State Planning Policy (SPP, 2013) which states “Defined Flood Event is the flood event adopted by a local government for the management of development in a particular area”. This may also be the defined storm tide event where the flood level of the storm tide exceeds the flood level of the freshwater flood event (at the AEP of the defined flood event).
Source of Information	Is a reference to the document summarising the results of the anticipated flooding relevant to this location.
Minimum Finished Floor Level	The minimum finished floor level calculated in accordance with the planning scheme flood overlay through the addition of the relevant freeboard to the Defined Flood Event Level. The minimum finished floor level on this search relates to a flooding requirement. In some instances town planning notation may also specify a minimum finished floor level. The applicant should ensure that a town planning notation search is also undertaken. The minimum finished floor level is the higher of the level provided on this search and a minimum finished floor level from a town planning notation.
AEP	Annual Exceedance Probability. The 1% AEP has a 1% chance of exceedance in any year.
Rainfall Intensity	The amount of rainfall occurring in a unit of time, usually expressed in millimetres/hour.
Mean Sea Level	A tidal datum; the arithmetic mean of hourly heights of the sea at the tidal station observed over a period of time (preferably 19 years). Source: BOM This is approximately 0.0 m AHD
Storm Tide	The elevation of water generated by a severe weather event such as an east coast low pressure system or tropical cyclone above the normal astronomical tide.
Tropical Cyclone	A tropical cyclone is a low-pressure system which is sufficiently intense to produce sustained winds of at least 63 km/h or greater and gusts in excess of 90 km/h near the centre.
Freeboard	A factor of safety usually expressed as a height above the adopted Defined Flood Level. A freeboard tends to compensate for factors such as wave action and historical and modelling uncertainties.
Flood Hazard Area	An area, whether or not mapped, designated by a local government as a natural hazard area (flood) in the Building Regulation 2021, section 8.
Drainage Flood	This flood type has a flood level derived from a stormwater drainage study with rainfall as the source of flooding. This is normally a local area study that incorporates elements of the stormwater network in the assessment. These studies can provide flood levels associated with overland flow beyond the flood extent shown derived from a Riverine\Creek flood study
Regional/Riverine	This flood type has a flood level derived from a Regional (Riverine or Creek) flood study with rainfall as the source of flooding. As these studies are for larger areas they only consider surface flows and not the sub surface drainage network. Often flows will be input into the flood model at ‘source points’ and thus overland flows are not represented for the whole catchment area.
Storm Tide Flood	This flood type has a flood level derived from a Storm Tide flood study with the ocean condition as the source of flooding.

APPENDIX C

Rational Method Calculations

AEP %	ARI (1 in _ year)	Frequency Factor (Fy)	I (mm/h) 1 in 10, 1hr	Fraction Impervious (Fi)	C10	Coefficient of Discharge (Cy)	I (mm/h)	Area (ha)	Q (m3/s)	CC Factor (+20%) (m3/s)	L/s
CATCHMENT EA (10mins)											
10%	10	1.00	74.2	0.20	0.70	0.7	181	0.1146	0.0403	0.0484	48.3994
5%	20	1.05				0.735	206		0.0482	0.0578	57.8386
2%	50	1.15				0.805	238		0.0610	0.0732	73.1874
1%	100	1.20				0.84	262		0.0701	0.0841	84.0706
CATCHMENT EB (10mins)											
10%	10	1.00	74.2	0.20	0.70	0.7	181	0.1230	0.0433	0.0519	51.9470
5%	20	1.05				0.735	206		0.0517	0.0621	62.0781
2%	50	1.15				0.805	238		0.0655	0.0786	78.5519
1%	100	1.20				0.84	262		0.0752	0.0902	90.2328
CATCHMENT PA (5mins)											
10%	10	1.00	74.2	0.90	0.88	0.88	226	0.1146	0.0633	0.0760	75.9722
5%	20	1.05				0.924	260		0.0765	0.0918	91.7717
2%	50	1.15				1.012	304		0.0979	0.1175	117.5215
1%	100	1.20				1.056	338		0.1136	0.1363	136.3465
CATCHMENT PB (5mins)											
10%	10	1.00	74.2	0.90	0.88	0.88	226	0.123	0.0680	0.0815	81.5408
5%	20	1.05				0.924	260		0.0821	0.0985	98.4984
2%	50	1.15				1.012	304		0.1051	0.1261	126.1357
1%	100	1.20				1.056	338		0.1220	0.1463	146.3405

APPENDIX D

SQID Operations and Maintenance Manuals

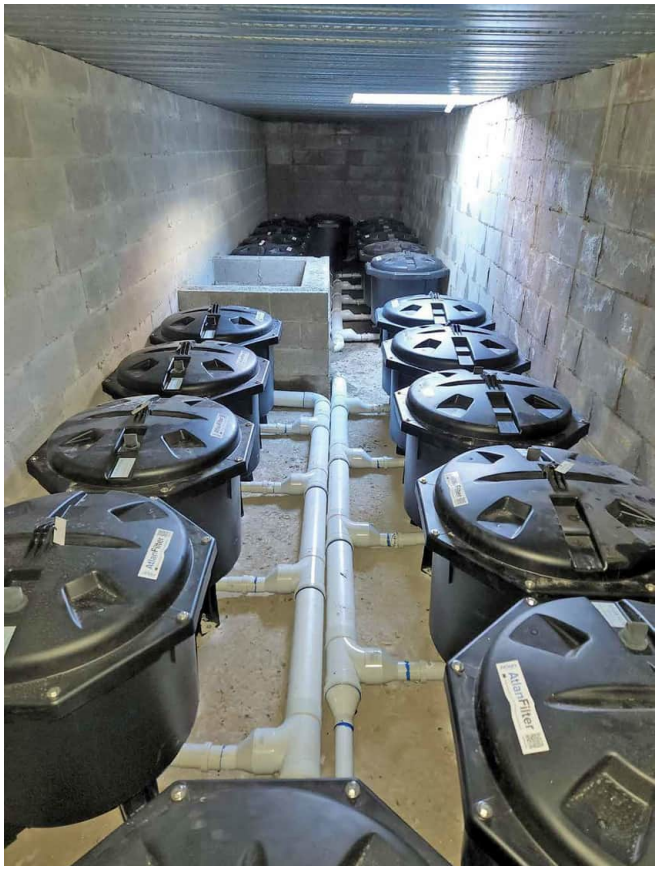
OPERATION & MAINTENANCE MANUAL

AtlanFilter

atlan.com.au

Atlan
STORMWATER

CONTENTS



INTRODUCTION

Understanding how to correctly and safely maintain the AtlanFilter is essential for the preservation of the filter's condition and its operational effectiveness. The AtlanFilter is a highly engineered stormwater filtration device designed to remove sediments, heavy metals, nitrogen and phosphorus from stormwater runoff.

The filters can be housed in either a concrete or fibreglass structure that evenly distributes the flow between cartridges.

Flow through the filter cartridges is gravity driven and self-regulating, which makes the AtlanFilter system a low maintenance, high performance stormwater treatment device.

This guide will provide the necessary steps that are to be taken to correctly and efficiently ensure the life of the AtlanFilter product.

Figure 1 - AtlanFilters in a concrete chamber / vault

FEATURES

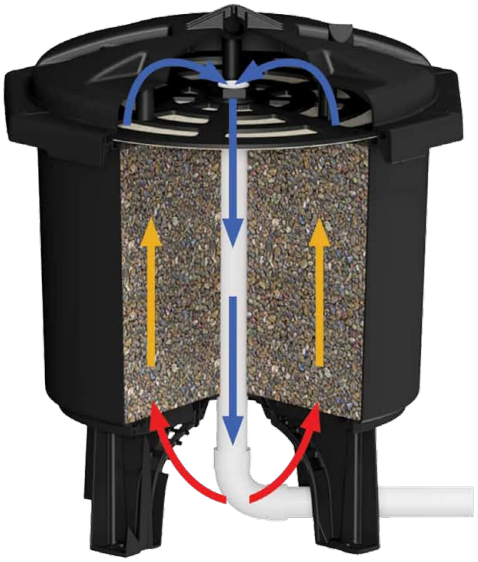


Figure 2 - Diagram of water flow through the AtlanFilter

The AtlanFilter has a patented design that facilitates influent flow over the entire surface area of the media, providing consistent pollutant removal within a small footprint.

The AtlanFilter provides highly effective media filtration using gravity flow conditions, without the need for moving parts or floating valves. This eliminates the risk of mechanical failure, such as stuck valves and seizing components during its service life. This provides highly robust treatment performance.

Hydraulic head provided by a suitably sized weir in the filter vault forces stormwater through the filter media via the inlet ports underneath the filter cartridge.

Refer to the table below for minimum head required for the AtlanFilter cartridges to assist in sizing the weir.

The water to be treated enters the AtlanFilter cartridge via an upwards direction as the water level builds up around the AtlanFilter. This ‘up flow’ reduces the amount of sediment that could enter the media cartridge, as the sediment is allowed to drop to the vault floor under gravity. Any remaining sediment in the water is introduced through the filter media under hydraulic pressure and is filtered.

Water is filtered through the media, where dissolved and particulate Total Nitrogen and Total Phosphorus are removed via reaction with the media, in addition to the removal of Total Suspended Solids / sediment.

AtlanFilter Media Self-Backwash feature

A one-way air release valve located at the top of the filter cartridge allows air to escape as the cartridge fills up with water. This creates a siphonic flow condition as the air is completely evacuated from inside the AtlanFilter cartridge. Siphonic flow conditions are maintained until such time the water level outside of the cartridge falls beneath the inlet ports underneath the filter. At this moment, the water level inside the AtlanFilter cartridge is higher than the surrounding water level.

The water inside the AtlanFilter cartridge is then expelled upon the break of the siphon, and the water flows down and out of the inlet ports under gravity, onto the vault floor.

This is a highly effective backwash of the media and allows the expulsion of a high proportion of sediment out from the AtlanFilter media. The expelled sediment can be removed either manually or with a vacuum from the vault floor.

This backwash effect allows the media to remain highly conductive and is the key to the industry leading longevity of the AtlanFilter cartridge system, which does not need replacement for at least 5 years, and typically will achieve up to 5-8 years of service (depending on catchment loading), subject to the AtlanFilter being regularly maintained in accordance with this guideline and in accordance with the specific needs of the catchment.

Figure 3 - Typical Outlet Weir Wall

FEATURES

Self Supporting Feet

Each AtlanFilter cartridge stands on 4 feet, which negates the need for the construction of a false floor in the vault. The feet are bolted to the vault floor with the supplied stainless steel angles and M10 bolts. The feet allow a clear height from the vault floor up to the inlet ports of 240mm. The absence of a false floor allows plenty of room for backwashed sediment to evacuate from underneath the cartridges and thereby avoid blocking the inlet ports to the AtlanFilter from sediment buildup. It is for this reason that Atlan recommended the sediment buildup not exceed 150mm above the vault floor, so as to avoid blocking the inlet ports of the AtlanFilter. Blockage of the inlet ports due to sediment accumulation in the vault floor will cause the AtlanFilter to go into bypass and be ineffective. Hence it is important to keep up to date with monitoring and maintaining the AtlanFilter vault.

Figure 5 - Underside of the AtlanFilter showing the screened inlet ports and the connection for the outlet pipe in the middle.

Figure 4 - AtlanFilter feet.

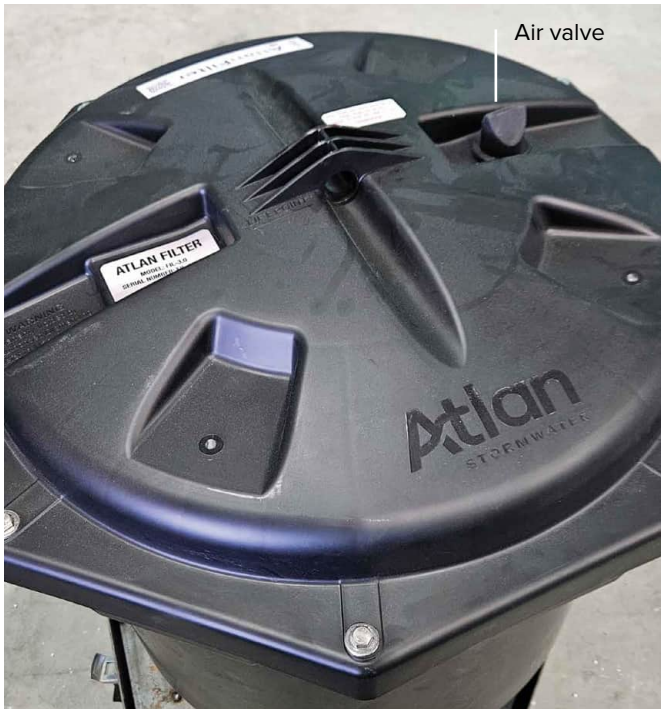


Figure 6 - the top of the AtlanFilter showing the location of the one way air valve.

SIZES

Atlan Stormwater manufactures two height cartridges for varying site constraints as shown below. Each cartridge is designed to treat stormwater at a flow rate of 1.5 litres per second and 3.0 litres per second for the half height cartridge (model no. FIL-1.5) and full-height cartridge (model no. FIL-3.0) respectively.

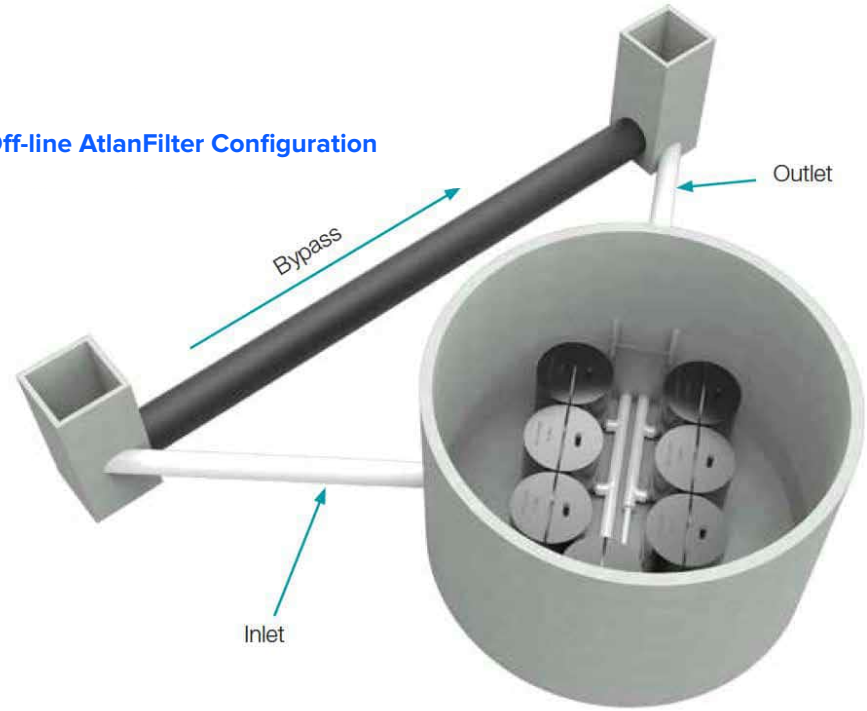
ATLANFILTER	STANDARD HEIGHT FIL-3.0	STANDARD HEIGHT - SHORT LEGS FIL-3.0.SF	HALF HEIGHT FIL-1.5	HALF HEIGHT - SHORT LEGS FIL-1.5.SF
Overall height	850mm	750mm	615mm	515mm
Diameter	726mm	726mm	726mm	726mm
Minimum head required	850mm	750mm	550mm	450mm
Treatment flow rate	3.0L/s	3.0L/s	1.5 L/s	1.5 L/s
Filter outlet diameter	50mm	50mm	50mm	50mm

SYSTEM CONFIGURATION

AtlanFilter cartridges are installed in concrete or fibreglass tanks commonly referred to as ‘vaults’. The vault selection and configuration are based on site characteristics and/or constraints; computational stormwater quality modelling; and selected AtlanFilter models. Typical AtlanFilter system configurations are shown below.

In-line AtlanFilter Configuration

Off-line AtlanFilter Configuration



HEALTH AND SAFETY

A. Personal health & safety

When carrying out the necessary installation operations of the AtlanFilter all contractors and staff personnel must comply with all current workplace health and safety legislation.

The below measures should be adhered to as practically as possible.

- Comply with all applicable laws, regulations and standards.
- All those involved are informed and understand their obligations in respect of the workplace health and safety legislation.
- Ensure responsibility is accepted by all employees to practice and promote a safe and healthy work environment.

B. Personal protective equipment/safety equipment

When carrying out the necessary installation operations of the AtlanFilter, wearing the appropriate personal protective equipment and utilising the adequate safety equipment is vital to reducing potential hazards.

Personal protective equipment / safety equipment in this application includes:

- Eye protection
- Safety apron
- Fluorescent safety vest
- Form of skin protection
- Puncture resistant gloves
- Steel capped safety boots
- Ear muffs
- Hard hat/s
- Sunscreen

C. Confined space

In the event access is required into the vault, confined space permits will be required which is not covered in this Guide. Typical equipment required for confined space entry include:

- Harness
- Gas detector
- Tripod
- Spotter

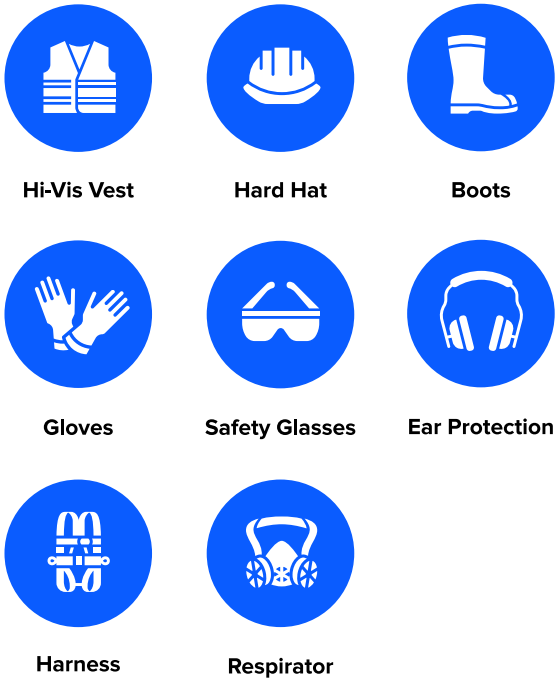
D. Traffic Control

It is not uncommon for Atlan Filter cartridges to be installed underneath trafficable areas. Minimum traffic control measures will need to be put in place in accordance with traffic control plans set out by respective local and state road authorities.

Vaults are to be treated as confined space.

Entry by permit only.

Monitor weather conditions prior to operation maintenance. Do not enter a vault during an episode of heavy rain as this can create a risk of drowning.



MAINTENANCE FREQUENCY

The AtlanFilter's design allows for a greater life span when frequently maintenance. Maintenance is broken up into three categories which include:

- Standard inspection
- General cleaning
- Cartridge replacement.

Standard Inspection

Standard inspections are conducted at regular four month intervals. At this time, an approved trained maintenance officer or Atlan representative shall undertake all measures outlined in Maintenance Procedure, Standard Inspection.

General Cleaning

At the end of each standard inspection, trigger measures will identify if general cleaning is required.

General cleaning will need to be executed immediate during standard inspections if the follow triggers are satisfied:

- Build-up of debris/pollutants within the vault greater than 150mm;
- Accumulation of debris/pollutants on the outlet chamber of the AtlanFilter vault;
- After large storm events, tidal or flooding impacts at the request of the owner;

Cartridge Replacement

Stormwater treatment is dependent on the effectiveness of the AtlanFilter cartridge system. As the AtlanFilter ages, pollutants will inundate the cartridge and ultimately reduce the treatment flow rate. At this point, a AtlanFilter flow test apparatus will be utilities to determine if replacement cartridges are required.

Based on the [site] concept modelling (MUSIC) and previous industry experience, we estimate the life of the AtlanFilter to be between 5 - 8 years (depending on catchment loading). As a minimum requirement, each AtlanFilter cartridge should be replaced within 10 years.

The life cycle of the AtlanFilter can be impacted if standard inspections and general maintenance is not undertaken in accordance with this operation and maintenance Guide.

Other factors that will affect the above life cycle of the AtlanFilter include:

- Installation of cartridge system during construction phase and impacted by construction sediment loads;
- Neglecting to install pre-treatment using an industry approved GPT or a surface inlet pit trash bag such as the Atlan StormSack.
- Unforeseen environmental hazards affecting the AtlanFilter functionality.

MAINTENANCE PROCEDURES

Stormwater pollutants captured and retained by the AtlanFilter system need to be periodically removed to ensure environmental values are upheld. All associated maintenance works is heavily dependent on the site's operational activities and generated stormwater pollutants. To ensure the longevity of the installed AtlanFilter treatment system, it is imperative that the procedures detailed in this Guide are followed and all appropriate measures are actioned immediately.

Standard inspection

The standard inspection requires personal experience of Atlan products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each AtlanFilter can be achieved at surface level without being deemed a confined space entry.

The standard inspection requires personal experience of Atlan products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each AtlanFilter can be achieved at surface level without being deemed a confined space entry.

Site Inspection Procedures

1. Implement pre-start safety measures

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected.

Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

2. Set-up gantry tripod above manhole

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the Atlan Filters.

Perform safety procedures ie. Attach harnesses etc. (if confined space).

3. Open manhole lid

Once you have set up the Gantry and ensured that the area is safe to operate in, you can proceed to open the manhole lid, using lid lifters.

4. Conduct gas tests

(If tank is classed confined space)

Once the lids have been removed to a safe distance to prevent tripping, you must then proceed to conduct gas tests. Perform necessary gas tests according to the confined space regulations.

5. Once confined space has been deemed safe to operate in, enter tank safely

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space

6. AtlanFilter system assessment

Perform a review of the AtlanFilter system using the AtlanFilter assessment report/checklist. Sign off and forward a copy of the report to property manager and Atlan representative.

7. Reinstate AtlanFilter system and disposal

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

8. Sign off and forward a copy of the report to property manager and Atlan representative

GENERAL CLEANING

Vacuum out of Filter tank, removal, and disposal of pollutants at the completion of a standard inspection, general cleaning may be deemed necessary immediately or scheduled for a future date. Steps undertaken for general cleaning should be in general accordance with the procedure outlined below but not limited.

1. Implement pre-start safety measures

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected.

Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

2. Set-up gantry tripod above manhole

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the AtlanFilters.

Perform safety procedures ie. attach harnesses etc. (if confined space).

3. Open manhole lid

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Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space

6. AtlanFilter system assessment

Perform a review of the AtlanFilter system using the AtlanFilter assessment report/checklist.

7. Pollutant removal from tank

Perform clean-up using a licenced vacuum truck contractor or wet/dry vacuum, depending on level of sediment built up and/or tank size.

8. Reinstate AtlanFilter system and disposal

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

9. Sign off and forward a copy of the report to property manager and Atlan representative

CARTRIDGE RECYCLING AND REPLACEMENT

AtlanFilter cartridges can be swapped out for new cartridges. The spent AtlanFilter cartridges can be collected from site and sent to Atlan Stormwater's facilities, where the spent media will be removed from the cartridge in factory conditions and disposed of in accordance with environmental regulations.

The AtlanFilter cartridge will be recharged with new media, thereby recycling and repurposing the cartridge.

AtlanFilter replacement procedures may vary depending on the configuration of the AtlanFilters, the type of vault and engineers' specs. Replacement instructions for manhole AtlanFilter systems and precast vault AtlanFilter systems are contained in this section.

At the completion of a standard inspection, AtlanFilter replacement may be deemed necessary immediately or scheduled for a future date. Steps undertaken for cartridge replacement should be in general accordance with the procedure outlined below but not limited.

1. Implement pre-start safety measures

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected.

Area in which work is to be carried out must be clean, safe and hazard free.

2. Set-up gantry tripod above manhole

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the AtlanFilters.

Perform safety procedures ie. attach harnesses etc. (if confined space).

3. Open manhole lid

Once you have sent up the gantry and ensured that the area is safe to operate in, you can proceed to open the manhole lid, using lid lifters.

4. Conduct gas tests

(If tank is classed confined space)

Once the lids have been removed to a safe distance to prevent tripping, you must then proceed to conduct gas tests. Perform necessary gas tests according to the confined space regulations.

5. Once confined space has been deemed safe to operate in, enter tank safely

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space procedures are followed.

6. Remove exhausted cartridges

Disconnect all internal pipe work from inside the vault. Unbolt anti-floatation measures and remove cartridges from the vault using Gantry Tripod method.

7. Pollutant removal

Using a wet/dry vacuum or sucker truck, suck out all the residual pollutant from the vault.

8. Install pipework and AtlanFilters

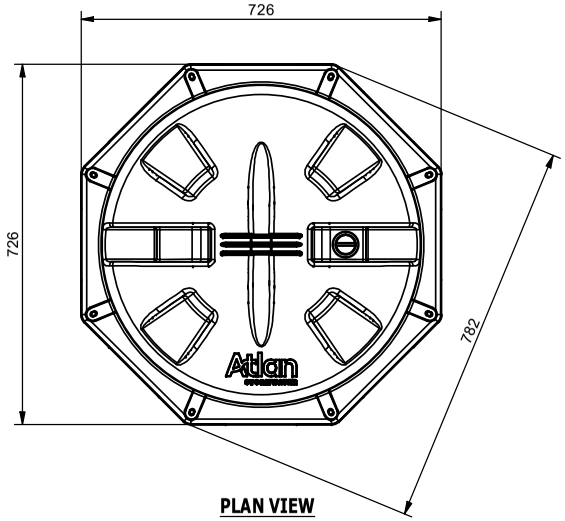
Please refer to the below standard install diagrams for the AtlanFilters. Then refer to your site specific drawings, as site requirements may require something different to the standard layout. Lower filters into tank, position into place, connect filter outlet pipework with the supplied fittings.

9. Install anti–floatation system

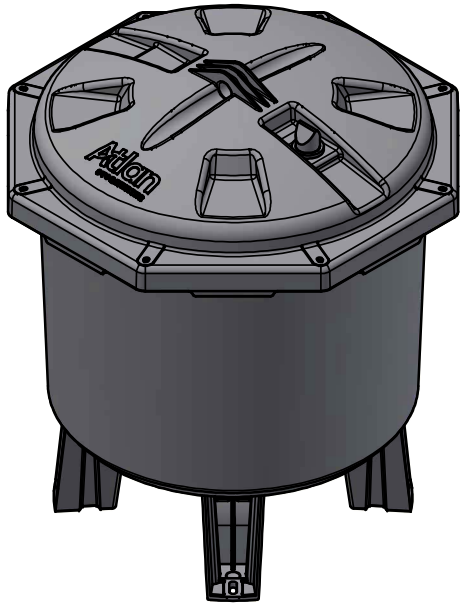
Please refer to the detailed drawings showing how the anti-floatation (anchor) bars are to be installed.

10. Sign off and forward a copy of the report to property manager and Atlan representative

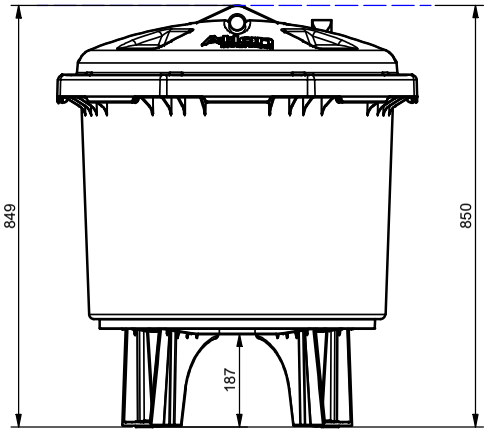
ATLAN FILTER - FIL-3.0
STANDARD HEIGHT



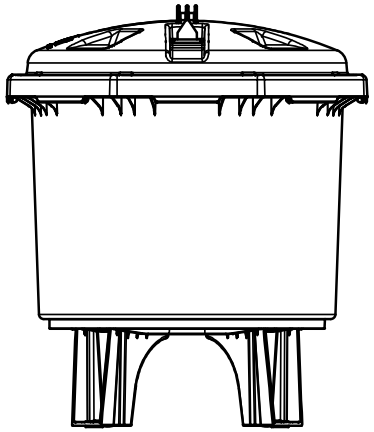
PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW



SIDE VIEW

ISSUED FOR CONSTRUCTION

TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

CLIENT:

Drawn P.Z.	Date 27/01/2025
Check	Date
Verified	Date
Approved	Date
Request No.	

REV	DATE	BY	DESCRIPTION	CHK
	27/01/2025	P.Z.	INITIAL RELEASE	

Atlan STORMWATER

PROJECT :

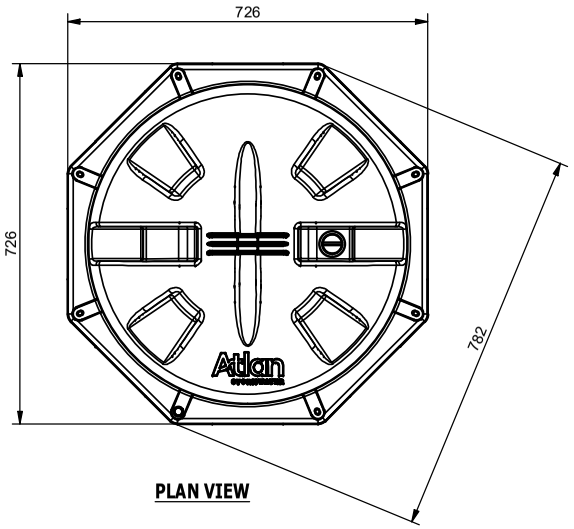
TITLE
ATLAN FILTER
FIL-3.0

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	

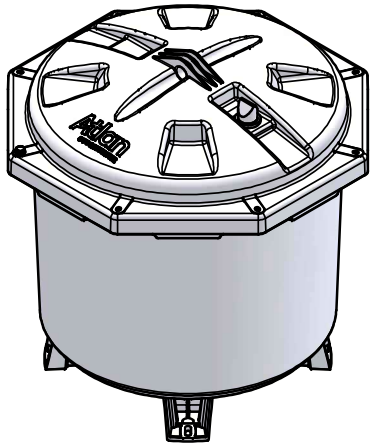
CUSTOMER CODE : | DWG No. FIL-3.0

C:\Users\smart\OneDrive\Documents\Vault\Designs\ATLAN\01 - STANDARDS\ATLAN FILTER\FIL-3.0\FIL-3.0.dw

ATLAN FILTER - FIL-3.0
STANDARD HEIGHT - SHORT LEGS



PLAN VIEW



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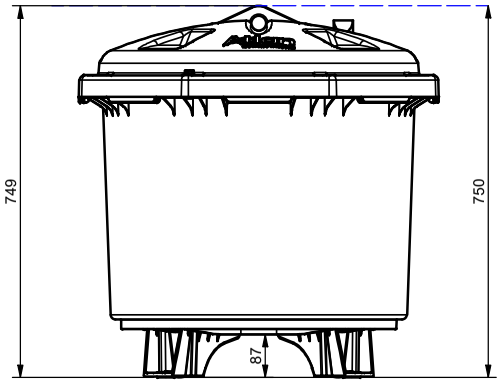
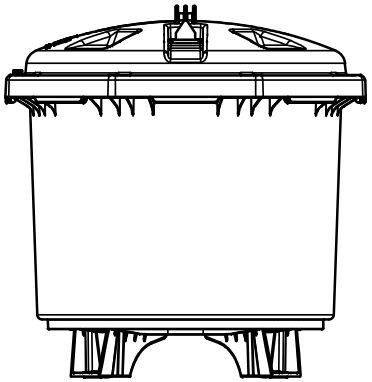


ELEVATION VIEW



SIDE VIEW

ISSUED FOR CONSTRUCTION

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TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

REV	DATE	BY	DESCRIPTION	CHK
	29/02/2024	P.Z.	INITIAL RELEASE	

CLIENT:

Drawn	P.Z.	Date 29/02/2024
Check		Date
Verified		Date
Approved		Date
Request No.		

Atlan STORMWATER

PROJECT :

TITLE
ATLAN FILTER - SHORT
FIL-3.0

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	

CUSTOMER CODE : | DWG No. FIL-3.0.SF

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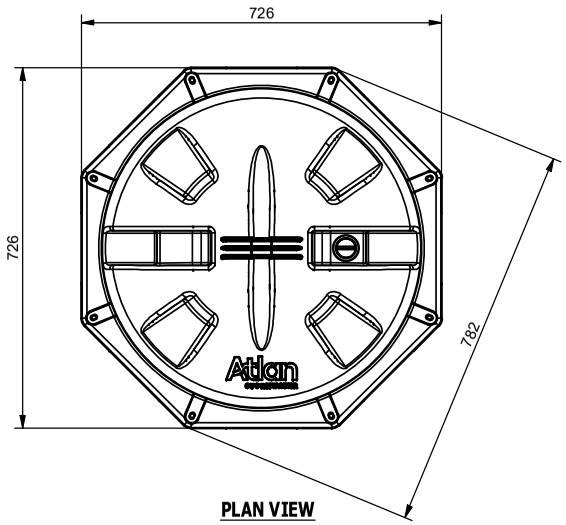

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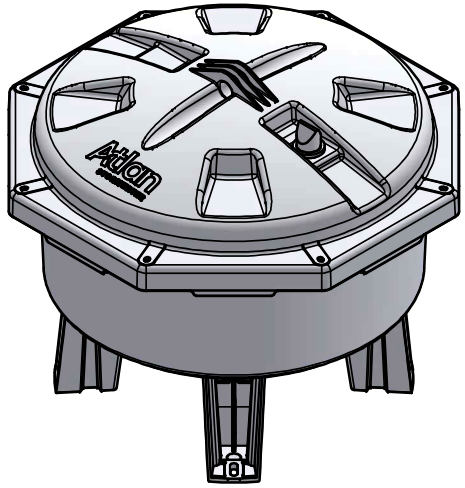

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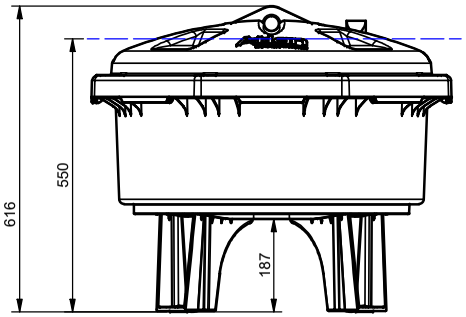

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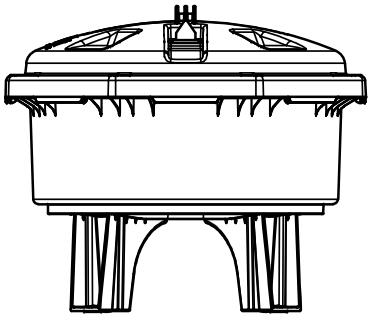

SIDE VIEW

TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

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REV	DATE	BY	DESCRIPTION	CHK
	27/01/2025	P.Z.	INITIAL RELEASE	

CLIENT:

Drawn	P.Z.	Date 27/01/2025
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Verified		Date
Approved		Date
Request No.		

Atlan STORMWATER

PROJECT :

TITLE
ATLAN FILTER
FIL-1.5

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	

CUSTOMER CODE : | DWG No. FIL-3.0

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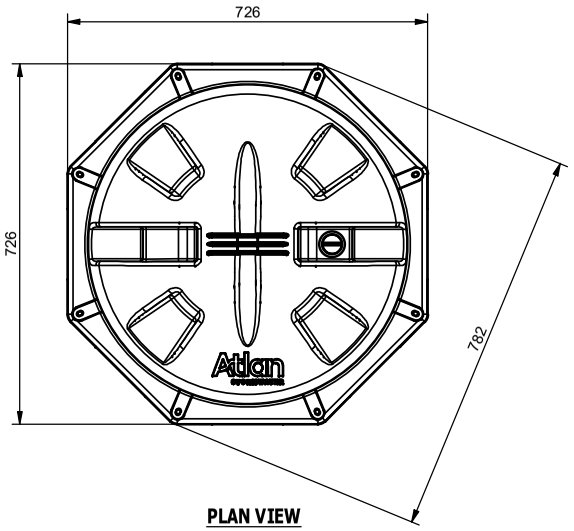
ATLAN FILTER - FIL-1.5
HALF HEIGHT - SHORT LEGS



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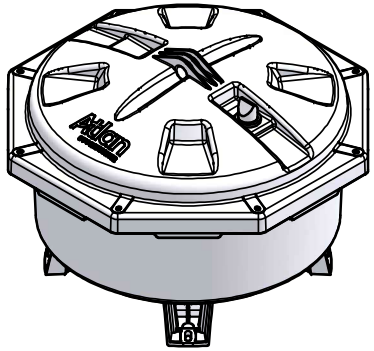

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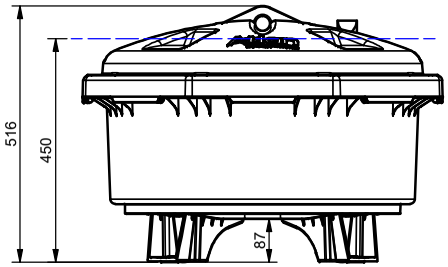

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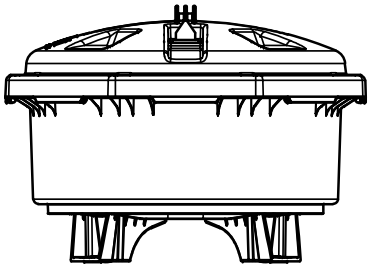

SIDE VIEW

TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

REV	DATE	BY	DESCRIPTION	CHK
	29/02/2024	P.Z.	INITIAL RELEASE	

CLIENT:

Drawn	P.Z.	Date	29/02/2024
Check		Date	
Verified		Date	
Approved		Date	
Request No.			

Atlan STORMWATER

PROJECT :

TITLE
ATLAN FILTER - SHORT
FIL-1.5

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	

CUSTOMER CODE : | DWG No. FIL-1.5.SF

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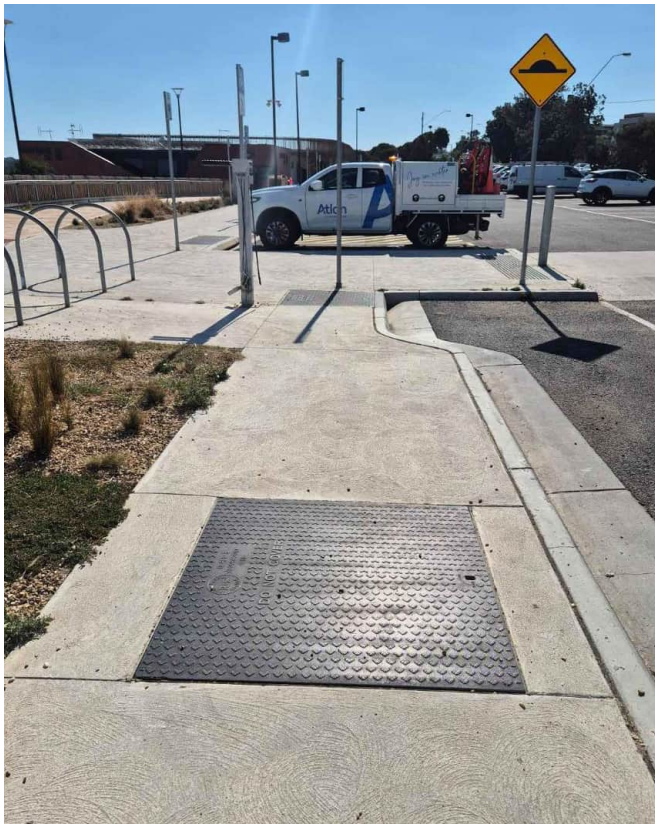

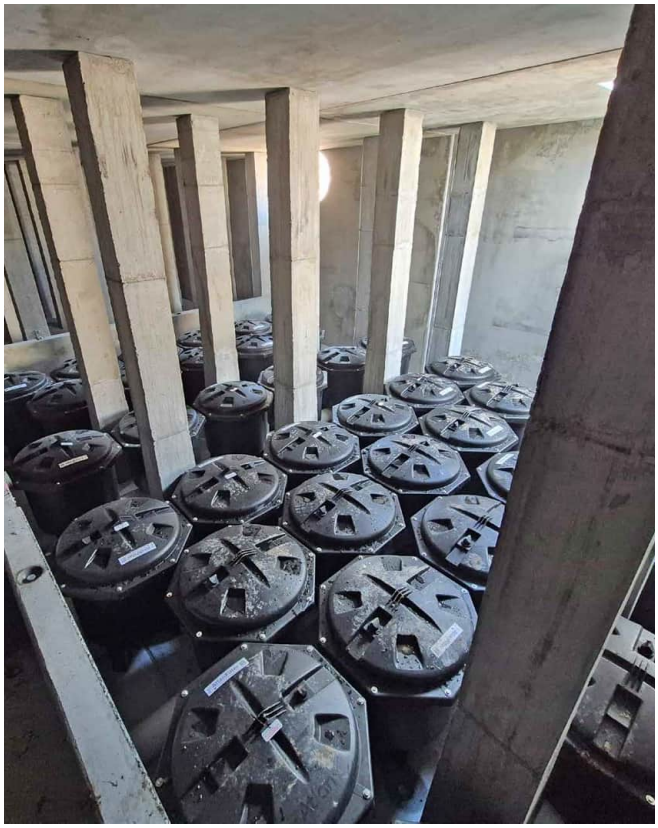

SITE EXIT & CLEAN UP

At the end of the scheduled maintenance, approved contractors or Atlan maintenance crew are required to reinstate the site to pre-existing conditions. Steps included but limited to are:

- Ensure all access covers are securely inserted back into their frames;
- Remove and dispose collected pollutants from the site in accordance with local regulator authorities;
- Retrieve all traffic control measures and maintenance tools; and
- Return all exhausted and/or damaged Atlan products to Atlan Stormwater to begin recycling program.

Joy in water

‘We believe clean waterways are a right not a privilege and we work to ensure a Joy in Water experience for you, with your children and grandchildren.’

Andy Hornbuckle

Atlan
STORMWATER

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100 Silverwater Rd,
Silverwater NSW 2128
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APPENDIX E

SQIDEP Certification for AtlanFilter

STORMWATER AUSTRALIA

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

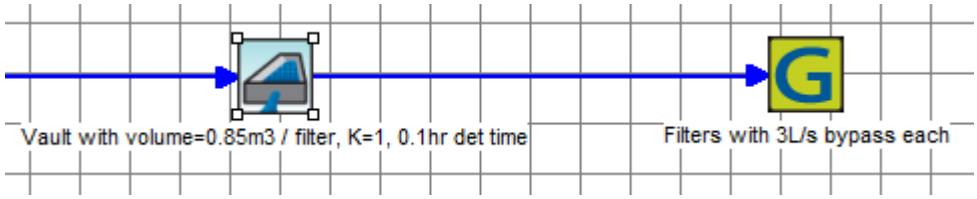
Applicant Name	**SPEL Stormwater Pty Ltd**
Applicant Address	**130 Sandstone Pl, Parkinson QLD 4115**
Phone Number	**+61 1300 773 500**
Email	**sales@spel.com.au**
Website	**www.spel.com.au**

Verified Technology	**SPELFilter**
Issue Date	**23 December 2022**
Reviewed Documents	• SPEL Body of Evidence application submission (Prepared by Drapper Environmental Consultants) • Statutory Declaration by Drapper Environmental Consultants • Hydrographs of compliant and partially compliant events at the Hilton Foods site showing inflow, outflow, rainfall and samples collected (42 items) • Sample collection and/or reset emails/site records at the Hilton Foods site (50 items) • Laboratory Chain of Custody forms, Quality Control reports, QC Compliance Reviews & Certificates of Analysis • Subsequent hydrograph plots for Hilton Foods site that included monitored outflow rates (and summary table of results) – (37 items), 17 October 2022.

Technology Information

Applicant's Verified Performance Claims	Treatable flow rate = 3 L/s per filter cartridge Total Suspended Solids (TSS) 85 % Total Phosphorus (TP) 74 % Total Nitrogen (TN) 59 % Total Petroleum Hydrocarbons 0 % Gross Pollutants 0 %

Maintenance performed during monitoring	None over 13 months

Verified method to model in MUSIC	Modelling a SPELFilter in MUSIC is as follows: 1. Use a detention basin node to represent the vault (with modified 'K' values and nominal detention time set to the treatment flow rate of the cartridges) 2. Use a generic node with the monitored pollutant reduction values and have a high flow bypass of 3 L/s per cartridge.  ● The input criteria for the node is; 1. Use a detention basin node to represent the vault ● with modified 'K' values with K=1 ● use size of 1m^2 per cartridge and 0.85m extended detention depth ● adopt a nominal detention time of 0.1 hours (plus or minus 10%). 2. Use a generic node with: ● a high flow bypass of 3 L/s per cartridge ● pollutant reductions of 85% for TSS ● pollutant reductions of 74% for TP ● pollutant reductions of 59% for TN. When entering the data into MUSIC the detention basin surface area and high flow bypass rate of the generic node is factored up depending on the number of filter cartridges proposed. All other values listed above remain the same (note: the *Notional Detention Time* is adjusted by changing the *Low Flow Pipe Diameter*).

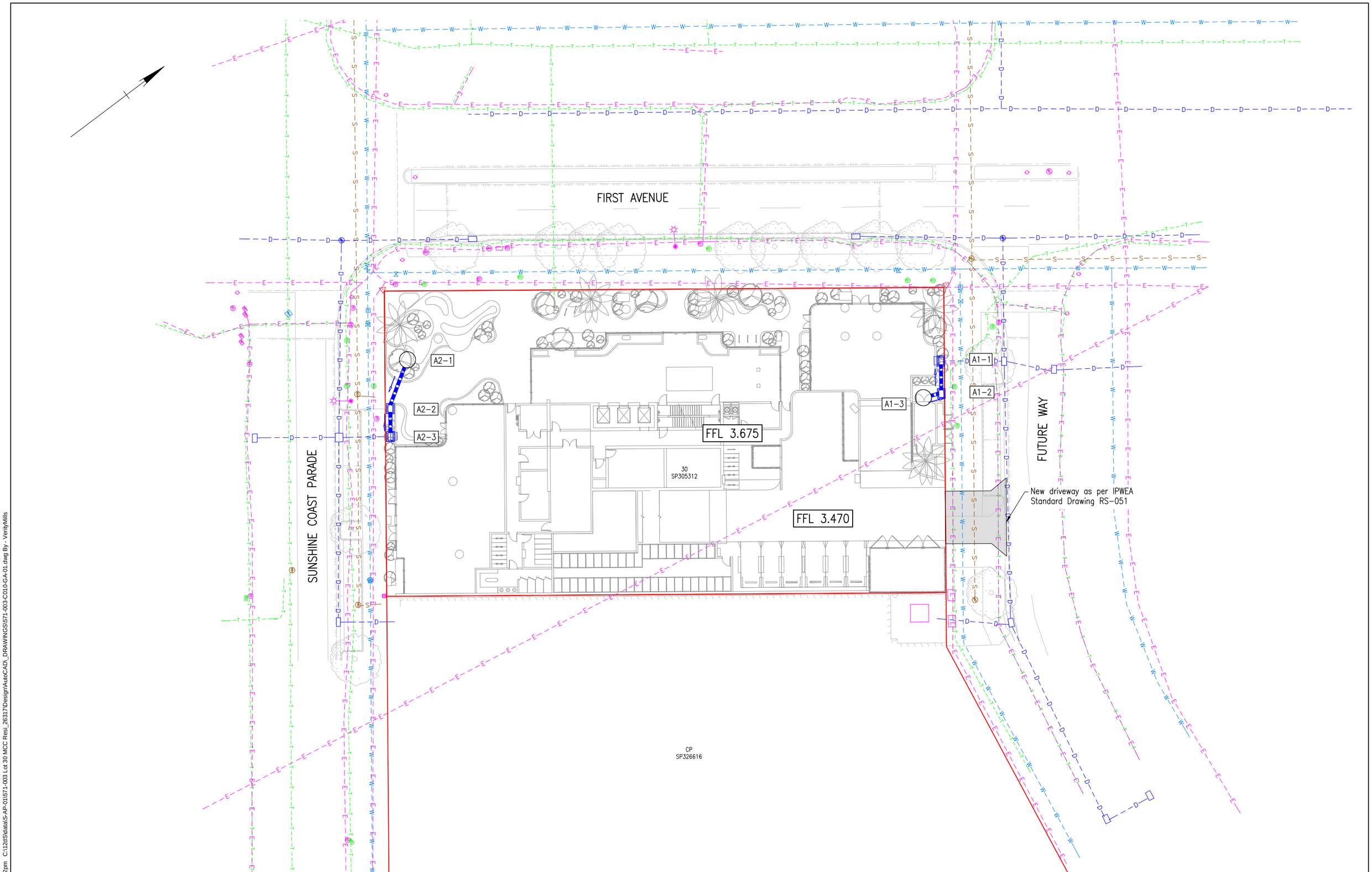
Conditions	The limitations of the acceptance of these claims include: ● Pit insert "Stormsacks" (for coarse material capture) are used for inlets upstream of the SPELFilter installation to ensure longevity of the filters ● Regular inspection & maintenance should be performed in accordance with the Manufacturer's Maintenance Plans.

Independent Reviewers	Dr Robin Allison Dr Ricky Kwan

Accepted by Governance Panel	22 December 2022
Accepted by Stormwater Australia Board	23 December 2022

APPENDIX F

Indicative Drainage Layout



ProjexPartners
PROJECT MANAGEMENT | ENGINEERING | PLANNING
Ph: 1300 789 214 www.projexpartners.com.au

CLIENT
walker

Rev.	Description	Date	Drawn	Design	Check	RPEQ No. & Initial
2	REVISED SURVEY AND ARCHITECTURAL	24/06/26	VJM	LDH	KAP	
1	ORIGINAL ISSUE	01/04/26	CRB	LDH	KAP	

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	No.	DATE
Civil	PRELIMINARY			

SCALE
1:200 0 2 4 6 8 A1
1:400 A3

LOT 30 RESIDENTIAL DEVELOPMENT

GENERAL ARRANGEMENT

DRAWING NUMBER 571-003-C010-GA-01
REVISION 2

APPENDIX G

Cardno MCC Stage 1 Flooding Tech Memo

Cardno
Shaping the Future

Technical Memorandum

Title	**Maroochydore City Centre** **Flooding and Stormwater Management Considerations for Stage 1**		
Client	Suncentral Maroochydore	Project No	249402
Date	26 August 2015	Status	Preliminary
Author	Nadia Guterres	Discipline	Civil Engineering
Reviewer	Darryl Hone	Office	Sunshine Coast

FLOODING AND STORMWATER MANAGEMENT

1. Summary

Stage 1 of the Maroochydore City Centre (MCC) development is PDA Precinct 3, which is the Core Business District area located to the north of Maud Canal. As part of Stage 1 works Maud Drain will realigned and constructed as a canal with increased flood conveyance capacity. The channel will be relocated further north at the eastern end of the site and further south at the western end of the site, so that the canal has a straighter configuration. The canal will be deepened to RL -2.0m AHD and will have a minimum width of 20 metres. From RL -2.0 to -0.5m AHD, 1 in 3 side slopes will be adopted. Above this level the canal will have vertical walls, and/or terraced walls, dependent on the landscape design and access. The typical surface levels adjacent to the canal will be around RL 3.3m AHD. The normal water surface level in the canal will typically vary between RL -0.33m AHD (MLWS) and RL 0.47m AHD (MHWS). A typical cross-section of the proposed canal is attached.

The current drain has a minimum level of RL -0.5m AHD at the eastern end of the site to around RL -1.2 mAHD at the western end. It has a bed width of around 10 metres and side slopes ranging from 1 in 3 to 1 in 5.

The current site where Stage 1 works are to take place consists of former golf course, club house and associated car parking. The majority of the existing Stage 1 area currently drains towards the north, where a stormwater inlet in the car park drains to an 825mm RCP. This connects northward to the underground stormwater drainage, which discharges to Cornmeal Creek at the end of Cornmeal Parade. The limited capacity of this stormwater drainage network has created urban flooding issues in the past. The MCC design will reduce the area that drains towards the north so that there is no increase in flows as a result of development. The current area of the site that drains towards the north is around 7.9 hectares, of which about 1.1 hectares is impervious. The ultimate design of Stage 1 will have around 0.55 hectares continuing to drain towards the north. This decrease in flows directed towards the north will result in a reduction of local flooding to the north of the site.

The *Cornmeal Creek Flood Study* (Cardno, 2013) was undertaken for Sunshine Coast Regional Council (SCRC) to inform the master planning for the site. In this study it was assumed that the majority of the Stage 1 area drainage would be re-directed towards Maud Canal. The increased capacity of the canal proposed as part of the MCC development ensured that there were no adverse flood impacts on adjacent properties. The results of the flood study showed that the MCC development resulted in reduction in peak water levels at Maud Street by up to 169mm.

Additional flood modelling has been conducted for the Stage 1 earthworks, to ensure that temporary diversion works and redirection of flows do not have an unacceptable impact on adjacent properties. The results of this analysis are provided in this Technical Note.

2. Flood Behaviour of Existing Site

In the existing case, flows from the urban catchment to the east of the site are conveyed west through Maud Drain and discharge into Cornmeal Creek downstream of Plaza Parade. Flood flows from south of Dalton Drive are conveyed in two directions: north into the golf course lake, and west beneath Maroochy Boulevard into Sunshine Cove Lake. Flood flows that enter the golf course eventually discharge via a swale along the north western boundary of the golf course, into Maud Drain near Plaza Parade, or they flow south-west to go back under Dalton Drive (near the intersection with Maroochy Boulevard), which then flows to the Sunshine Cove Lake. The majority of flood flows from the south do not overtop into Maud Drain, except for a small section at the eastern end of the site. This is due to the high southern bank, which is at levels of around RL 2.3 to 3.0m AHD, which is shown in Image 1 below. Flood flows in Maud Drain do not overtop the northern bank and therefore do not flow into the area that will be developed as part of Stage 1 works.

Image 1 Location of Existing Southern Bank

3. Flood Impacts during Stage 1 Works

The construction of Maud Canal during Stage 1 works will be conducted in a way that will ensure that flows from the east and south are not obstructed during construction. The existing channel will be retained while a temporary diversion channel is excavated and stabilised. A 15 metre wide overland flow path at RL 1.60m AHD will also be provided on the southern side of the temporary diversion drain, to direct flows from the south to existing low points in the north-west. A plan showing the proposed temporary diversion channel is attached. Once the temporary diversion drain is stabilised, works within the existing Maud Drain will be able to proceed. Stockpiling of excavation material will occur in existing flood free areas identified on the site.

The existing case TUFLOW flood model of the site set up for the *Cornmeal Creek Flood Study* (Cardno, 2013) was modified to take into account the temporary works required for Stage 1. For the flood

modelling it has been assumed that the section of Maud Drain undergoing excavation would not contribute to flood storage. The results of the analysis are attached. The TUFLOW analysis was able to demonstrate that Stage 1 temporary works can proceed with minimal flood impacts. There is a minor increase of around 30mm in the 1% and 39% Annual Exceedance Probability (AEP) peak water levels within the creek through Sunshine Plaza. No residential areas are affected. Given the temporary nature of these works, these impacts are considered acceptable. As shown in Figures 1 to 6, the residential area upstream of Maud Street will experience a reduction in peak flood levels for all AEP events.

The 1% AEP flood impact plot is also shown in Image 2. This image highlights areas that were dry and now are wet, or vice versa, in the 1% AEP event, with the temporary Stage 1 works in place. As shown by this image, the temporary works improve flooding for properties to the west and also for properties around Maud Street. The increase in inundation area around Sunshine Plaza is minimal. The difference in peak water levels in the 1% AEP event are shown in Figure 6.

In the 39% AEP event the flood extent around Sunshine Plaza is contained within the channels, so a minor increase is peak water level does not increase the area being inundated.

In the 1% AEP flood event none of the surrounding road crossings are overtopped, therefore the flood immunity of the roads is not reduced as part of Stage 1 works.

Image 2 1% AEP Stage 1 Temporary Works Flood Impact

4. Local Stormwater Drainage

A 675mm RCP runs along the eastern boundary of the site and drains into Maud Canal. The stormwater line drains local stormwater from Maud Street. This drainage line will be retained and a swale will be

constructed to convey any overland flow from this area, around Stage 1 works and towards Maud Canal. Similarly the existing stormwater drainage lines along the northern boundary of the site, that connect stormwater flows from Golf Street and Maud Street to the Cornmeal Parade drainage line will be retained.

For Stage 1, the internal stormwater network has been designed to have 5% AEP capacity. This is greater than the capacity required by the *Queensland Urban Drainage Manual* (QUDM), which specifies 10% AEP for commercial areas. Allowance for climate change has been made in the internal drainage design. The assumed tailwater level is the 5% AEP climate change storm tide level of RL 2.2m AHD. A 20 percent increase in rainfall intensity has also been allowed for in the design. In localised areas where overland flow paths are not able to be provided, the underground drainage network will be designed to have 1% AEP capacity. A duplicate 1% AEP capacity network will also be provided in these localised areas to account for the potential impact of blockage. This satisfies the requirements of QUDM, which stipulates that 100 percent blockage should be considered in severe events.

5. Flood Levels

The flood levels that have been used to define the minimum floor levels for the Stage 1 area are taken from the *Cornmeal Creek Flood Study* (Cardno, 2013), and are summarised below. They are based on *Planning Scheme Policy No.15: Maroochydore Principal Activity Centre Structure Plan*:

- 1% AEP Storm Surge level of RL 2.5m AHD + 819mm allowance for Mean Sea Level rise, i.e. RL 3.32m AHD. This is inclusive of 400mm of freeboard.
- 1% AEP Flood Level, including allowances for Climate Change (in 2100) + 400mm freeboard for residential, commercial and industrial buildings = RL 3.07m AHD. This is based on the 1% AEP climate change flood level in Maud Canal of RL 2.67m AHD.

The minimum floor level for the development within Stage 1 is therefore RL 3.32m AHD. However, to be consistent with future stages of the MCC development, **a minimum floor level of RL 3.5m AHD has been adopted.**

STORMWATER QUALITY

1. Summary

As part of Stage 1 works it is necessary to demonstrate that the stormwater quality objectives for the site, for this stage of works, can be achieved.

The overall stormwater quality strategy for the site is to use a combination of stormwater harvesting for irrigation, centralised treatment of upstream catchments entering the site and localised treatment of internal catchments. At Dalton Drive, approximately 291 hectares of urbanised area drains to the existing waterbody on the southern side of Dalton Drive and into Dalton Lake located within the site. By treating and reusing this water, significant reductions in pollutant loads can be achieved. As a weir at RL 1.4m AHD will ultimately be installed downstream of Dalton Drive this section of the lake will always contain freshwater. It is therefore suitable for use as irrigation water. The benefits of treating this external inflow and using it for stormwater harvesting include:

- Pollutant loads entering the Dalton Lake will be reduced, which will decrease the risk of algal blooms within the lake.
- Stormwater will be reused for irrigation, reducing the potable water demand of the site. It is proposed to use stormwater to irrigate open space areas proposed within Stage 3 works. The estimated irrigation demand for this area is 23 ML/year.
- By targeting external stormwater pollutant loads, less reduction of internal pollutant loads is required in order to meet the stormwater pollutant load reduction targets. This will allow for more flexibility within the urban design.

The stormwater treatment measures being considered within the public realm areas of the site include:

- Litter baskets in stormwater field inlets.

- End of line gross pollutant traps (GPTs) for areas where the installation of litter baskets is problematic.
- Porous pavement where suitable.
- Bio-retention street trees.
- Passively irrigated landscape areas.
- Bio-retention gardens or swales where suitable, such as in the median strip.
- Floating wetlands within the lake.

Litter baskets target the removal of gross pollutants, sediment, oil and grease. They also remove the nutrient load that is associated with these pollutants. Litter baskets are considered to be the most suitable method of removing gross pollutants within Stage 1. As the internal stormwater drainage network will be permanently backwatered from tidal inflows from Maud Canal, the design of an in-ground GPT would need to take these conditions into consideration for operation and maintenance. Due to the future infrastructure requirements for light rail, the area that is available for the installation of an in-ground GPT is limited at the downstream end of some of the stormwater drainage lines.

Litter baskets are able to be cleaned in-situ by vacuum hose attached to vacuum street sweeper trucks. They do not require confined space entry. As the litter baskets store the captured pollutants above standing water level, they reduce the potential breakdown of captured organic material. This reduces the potential for odour issues and the leaching of pollutants.

The design of the internal stormwater drainage will ensure that sufficient overflow capacity is provided if the litter basket is full.

2. Stage 1 Works

Stormwater harvesting is not proposed to commence during Stage 1 works. In order to meet the stormwater pollutant removal targets for this stage it is proposed to:

- Improve the treatment provided by the existing waterbody around Dalton Drive by installing floating wetlands. Installation of floating wetlands in this area would not require any modification during future stages. As a weir at RL 1.4m AHD will ultimately be installed downstream of Dalton Drive, this waterbody will always contain freshwater. Floating wetlands are currently being tested on local urban developments by the University of the Sunshine Coast.
- Provide litter baskets on all field inlets within the public realm.

Although not included in the MUSIC modelling (so as to allow flexibility within the landscape design), the following stormwater treatment measures will also be considered within Stage 1:

- Porous pavement where suitable.
- Passively irrigated trees and landscape areas.

Internal lots within Stage 1 will be responsible for providing their own stormwater treatment. It is expected that this will be provided via a combination of rainwater or stormwater harvesting (for example passive irrigation of vertical gardens) and proprietary treatment devices.

3. Stage 1 MUSIC Modelling

The Stage 1 works were modelled using MUSIC Version 6.10. The Stage 1 MUSIC source nodes included:

- Stage 1 Roads – 6.8 hectares, 80% impervious Commercial Road
- Stage 1 Open Space - 1.75 hectares, 60% impervious Commercial Road
- External Urban Catchment - 291 hectares, 50% impervious Urban

No stormwater harvesting was assumed for this stage of the works. The internal lots within Stage 1 were also not included in the modelling.

Typical stormwater treatment MUSIC nodes were used for the analysis. The treatment assumed for the litter baskets was 40 percent removal of Total Suspended Solids (TSS), 20 percent removal of Total Nitrogen (TN) and Total Phosphorus (TP) and 100 percent removal of Gross Pollutants (GP). Based on reported removal efficiencies from manufacturers, these removal rates are considered conservative. A high flow bypass of 11L/s for each litter basket was assumed, with one litter basket provided for every 0.25 hectares of catchment area. This was a conservative assumption as the preliminary number of litter baskets required is around 120.

As the existing waterbody provides treatment similar to a pond, this treatment node was included in the base case. The pond was modelled as having a 2.5ha surface area, storage volume of 50ML and extended detention depth of 0.3 metres. Only treatment in addition to that already provided by the pond would therefore be included in the developed case. The floating wetland was modelled as a wetland with a 50ML inlet pond. The storage surface area was conservatively modelled as the actual proposed area of floating macrophytes. The treatment efficiency of floating wetlands should be significantly greater due to the increased biological surface area in contact with water.

The treatment efficiency of floating wetlands is currently being tested. Once this testing is completed, specific MUSIC nodes will be made available from which the required treatment area can be verified. Using standard wetland treatment nodes it was found that floating wetland of 100m^2, coupled with the litter baskets could provide enough treatment to meet all of the stormwater quality pollutant reduction targets. However, preliminary site investigations have determined that a wetland area of around 300m^2 would be required to target all inflow points in the waterbody. It is therefore recommended that this larger area be installed during Stage 1 works. The installation of a solar powered recirculation pump is also recommended for the downstream section of the waterbody. The establishment time for floating wetlands is 6 to 12 months. The preliminary locations for the floating wetlands are attached.

If the litter baskets are not installed, then sufficient treatment is provided by the floating wetland for all pollutants with the exception of gross pollutants. Therefore the assumed treatment efficiency of litter baskets for the removal of TSS, TP and TN does not need to be relied upon in order to meet the pollutant reduction targets for Stage 1.

The MUSIC results are summarised in Table 1 below. The third column shows the pollutant loads relating to Stage 1 public realm areas. The fifth column shows the pollutant load removal targets for Stage 1 public realm areas. As shown by the last columns, as external loads are also being treated, more than 100 percent of Stage 1 pollutant loads are being removed for TSS and TP.

Table 1 Stage 1 MUSIC Model Results

Pollutant	Pollutant Load (kg/yr)		Total Pollutant Load After Treatment (kg/yr)	Pollutant Removal Required for Stage 1 (kg/yr)	Total Pollutant Removal Achieved Without Litter Baskets (kg/yr)	Total Pollutant Removal Achieved With Litter Baskets (kg/yr)
	External Catchment (After Pond Treatment)	Stage 1 Public Realm Areas (No Treatment)				
Total Suspended Solids	328000	**42300**	222500	**33840 (80%)**	133000 (>100%)	147800 (>100%)
Total Phosphorous	774	**72.3**	655	**43 (60%)**	179 (>100%)	191 (>100%)
Total Nitrogen	5130	**338**	5188	**152 (45%)**	220 (65%)	280 (83%)
Gross Pollutants	23.8	**2410**	114	**2169 (90%)**	0 (0%)	2319 (96%)

4. Future Stages

The treatment efficiency of the floating wetlands is currently being tested by the University of the Sunshine Coast. Preliminary results show that observed removal rates are significantly higher than those provided by standard wetland MUSIC nodes, which were adopted for this analysis. Using the specific MUSIC nodes that will be created as part of this work, the treatment provided for Stage 1 will be able to be verified.

If floating wetlands are found to be efficient, then they should be adopted for future stages. Additional floating wetlands could be installed in the existing waterbody as well as within areas of the proposed Dalton Lake. These floating wetlands would need to be planted with different vegetation that was able to tolerate brackish conditions. They would be positioned near stormwater culvert inlets into the lake. The depths of the lake in these areas would be limited to 1.6 metres, so that the treatment provided by the floating wetlands was maximised. An added benefit of having floating wetlands installed on the culvert inlets is that some treatment will also be provided for the lake re-circulation water that will be pumped into the lake. The floating wetlands will also provide for some fish habitat areas.

The expanded use of floating wetlands would remove the requirement to construct a wetland and bio-retention treatment system in the parkland area within Stage 3 works. If the floating wetlands are found not to be sufficiently effective, then a wetland and bio-retention treatment system within the Stage 3 parkland area will be required. This will need to be sized to also compensate for Stage 1 works.

The waterbody will also be used for stormwater harvesting, with the intake located upstream of the weir proposed to the north of Dalton Drive. The water used for irrigation will therefore be freshwater.

The waterbody has an area of 2.5 hectares, and a minimum level of RL -10m AHD. Preliminary water balance modelling in MUSIC was conducted using 50 years of daily rainfall data. This demonstrated that if a maximum drawdown of 300mm was allowed, then the waterbody could provide around 98 percent of the irrigation demand of 23 ML/year, which is the approximate irrigation demand for Stage 3. Therefore there is potential to use this waterbody to provide for additional non-potable demands. A reliability of around 87 percent can be achieved for a demand of 100 ML/year.

Additional preliminary MUSIC modelling has been conducted to take into account all future development of public realm areas, including Stage 1 works. The additional MUSIC nodes included:

- Stage 2 Entertainment Facility – 3.4 hectares, 100% impervious Commercial Roof
- Stage 3 Open Space – 5.3 hectares, 20% impervious, Commercial Ground
- Stage 3 Roads – 1.8 hectares, 80% impervious, Commercial Road
- Future Open Space – 1.3 hectares, 20% impervious Urban Ground
- Future Roads – 7.5 hectares, 80% impervious, Urban Road

Runoff from all areas, with the exception of open space, was assumed to be treated via litter baskets on all field inlets. For the purposes of MUSIC modelling, each litter basket was assumed to treat 0.25 hectares. The open space areas were assumed to be treated by grassed swales. The storage surface area of the wetland was increased and a re-use of 23ML/year was assumed.

The results of MUSIC modelling found that pollutant removal targets could be achieved if:

- The floating wetland area for external catchment treatment is maintained as per Stage 1 requirements.
- Floating wetland area of at least 200m^2 is provided within Dalton Lake near culvert inlets into the lake.
- Stormwater harvesting is used to irrigate Stage 3 open space, i.e. 23 ML/year.
- Litter baskets are installed on all field inlets.

It should be noted that although not included in the MUSIC modelling, additional stormwater treatment will be provided within public realm areas, as outlined in Section 1.

The results of the MUSIC modelling are summarised in Table 2. The removal targets are achieved for all pollutants with the proposed stormwater treatment strategy in place.

Table 2 Future Stages Preliminary MUSIC Model Results

Pollutant	Pollutant Load IN (kg/yr)		Total Pollutant Load After Treatment (kg/yr)	Pollutant Removal Required for All Public Realm Areas (kg/yr)	Pollutant Removal Achieved (kg/yr)
	External Catchment (After Pond Treatment)	All Public Realm Areas (No Treatment)			
Total Suspended Solids	326000	**100000**	255500	**80000 (80%)**	170500 (>100%)
Total Phosphorous	777	**184**	738	**110 (60%)**	228 (>100%)
Total Nitrogen	5130	**933**	5595	**420 (45%)**	468 (50%)
Gross Pollutants	23.8	**6960**	113.8	**6264 (90%)**	6870 (99%)

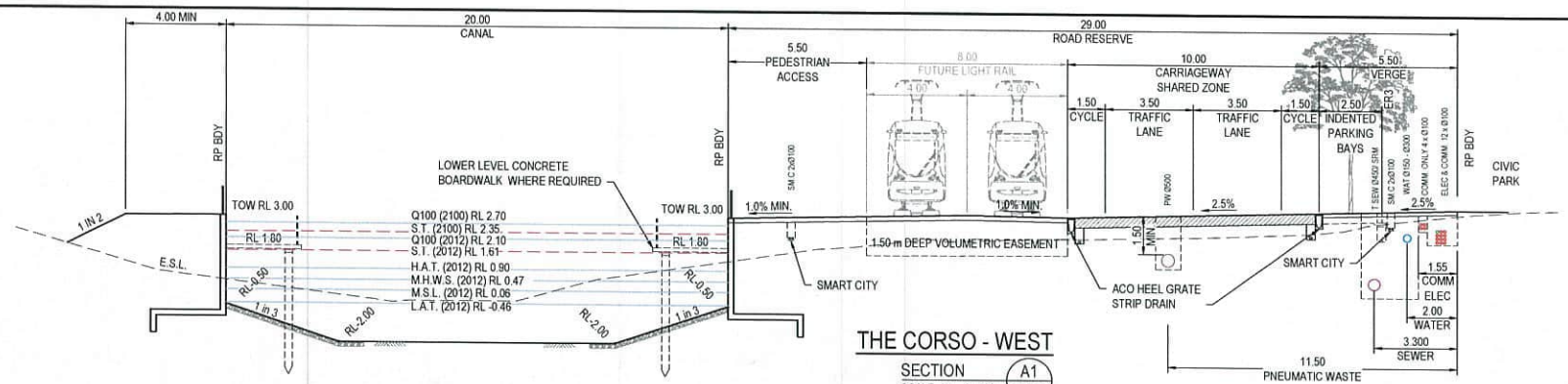
It should be noted that additional MUSIC modelling will be completed for future stages to verify the required floating wetland areas, once a specific MUSIC node becomes available.

There is potential to further increase the removal of stormwater pollutants from the public realm. This could be achieved through:

- Increased stormwater harvesting for non-potable uses throughout the site.
- Increased floating wetlands installed in the upstream waterbody.
- Rainwater harvesting for toilet flushing for the Entertainment and Convention Centre.
- Inclusion in MUSIC of the treatment that will be provided by landscape stormwater treatment measures.

5. Treatment of Internal Lots

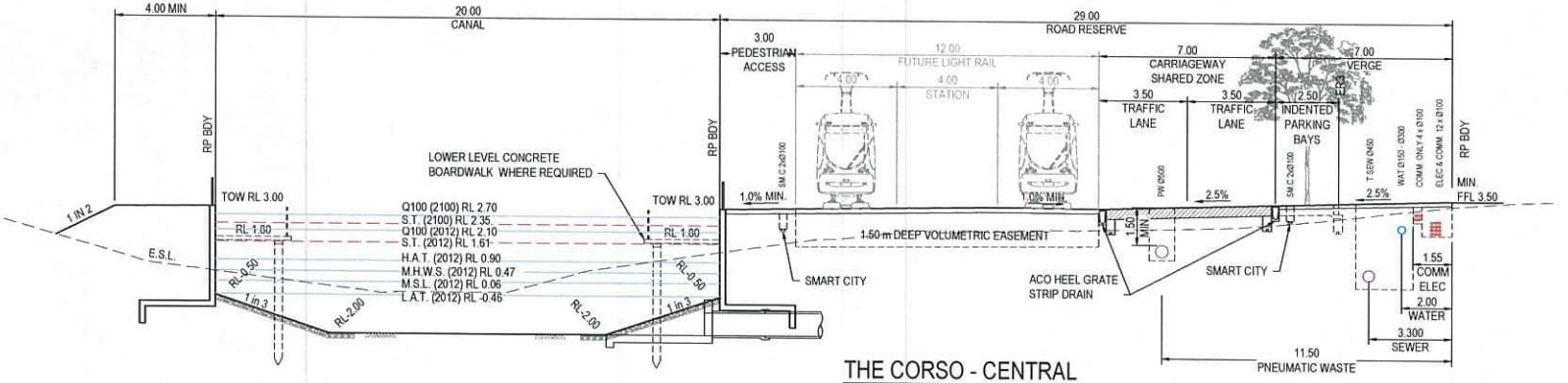
It has been assumed that internal lots for Stage 1 and all future stages will be responsible for providing their own stormwater treatment. It is expected that this will be provided via a combination of rainwater or stormwater harvesting and proprietary treatment devices.



THE CORSO - WEST

SECTION A1 (SK011)

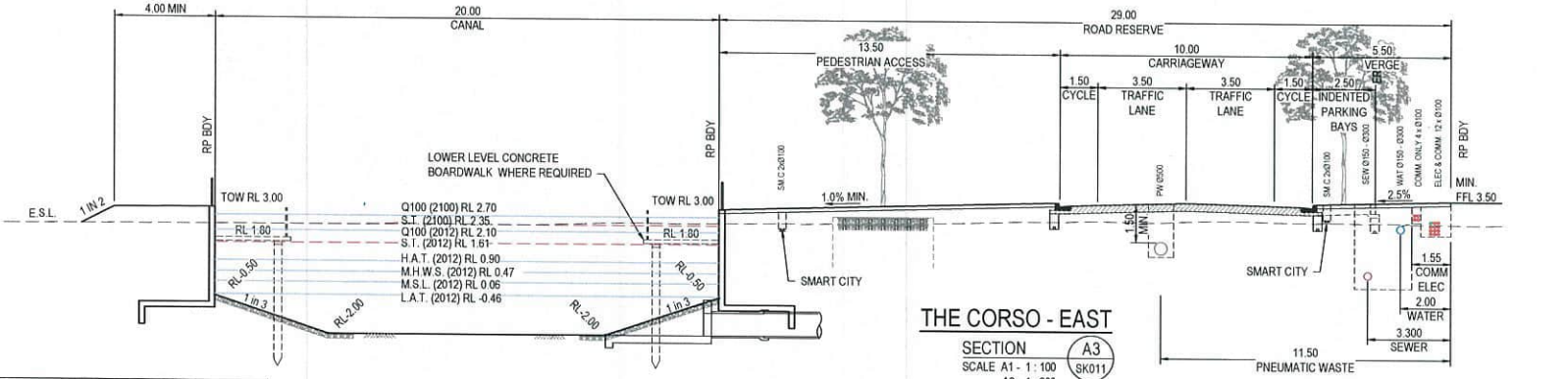
SCALE A1 - 1 : 100
A3 - 1 : 200



THE CORSO - CENTRAL

SECTION A2 (SK011)

SCALE A1 - 1 : 100
A3 - 1 : 200



THE CORSO - EAST

SECTION A3 (SK011)

SCALE A1 - 1 : 100
A3 - 1 : 200

1 0 1 2 3 4 5m
Scale 1:100

LEGEND	
TIDE	DESCRIPTION
S.T.	STORM TIDE
H.A.T.	HIGHEST ASTRONOMICAL TIDE
M.H.W.S.	MEAN HIGH WATER SPRINGS
M.S.L.	MEAN SEA LEVEL
S.W.L.	STANDING WATER LEVEL
L.A.T.	LOWEST ASTRONOMICAL TIDE

TYPICAL CROSS SECTIONS

SCALE A1 - 1 : 100
A3 - 1 : 200

WORK IN PROGRESS
FOR DESIGN DEVELOPMENT PURPOSES ONLY

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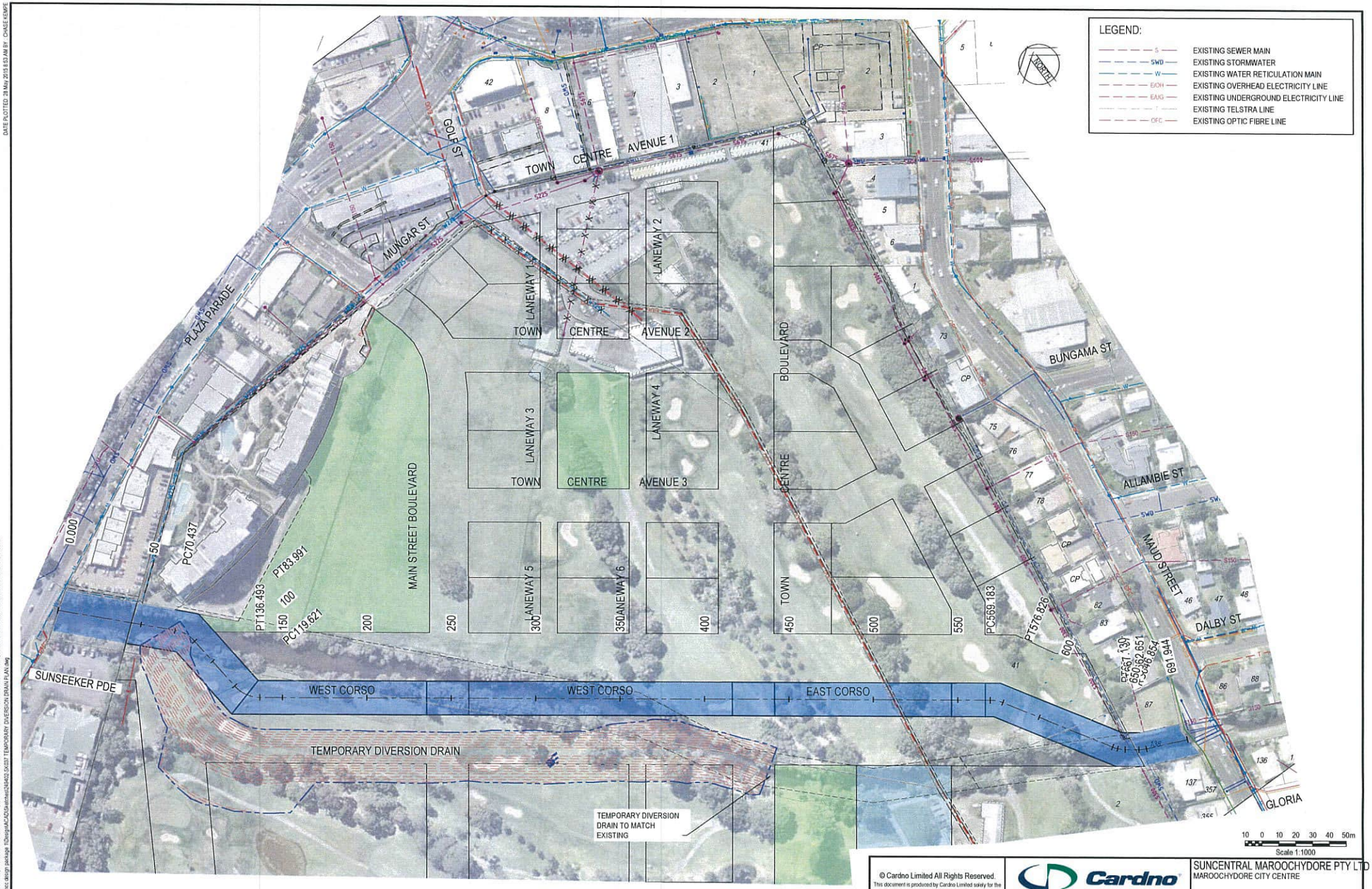
MAROOCHYDORE CITY CENTRE

ROADWORKS TYPICAL SECTIONS - SHEET 1

DATUM	Date	Scale	Size
AHD	22/07/2015	AS SHOWN	A1

Drawing Number: 249402-SK012
Revision: -



PLAN
SCALE A1 - 1 : 1000
A3 - 1 : 2000

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TEMPORARY DIVERSION DRAIN PLAN

DATUM	Date	Scale	Size
AHD	28/05/2015	AS SHOWN	A1

Drawing Number: 249402-SKSK037
Revision: -

LEGEND:

STAGE BOUNDARY

PLAN

SCALE A1 - 1 : 1250
A3 - 1 : 2500

12.5 0 12.5 25 37.5 50 62.5m

Scale 1:1250

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STAGING PLAN

DATUM	Date	Scale	Size
AHD	29/07/2015	AS SHOWN	A1

Drawing Number: 249402-SK150
Revision: 1

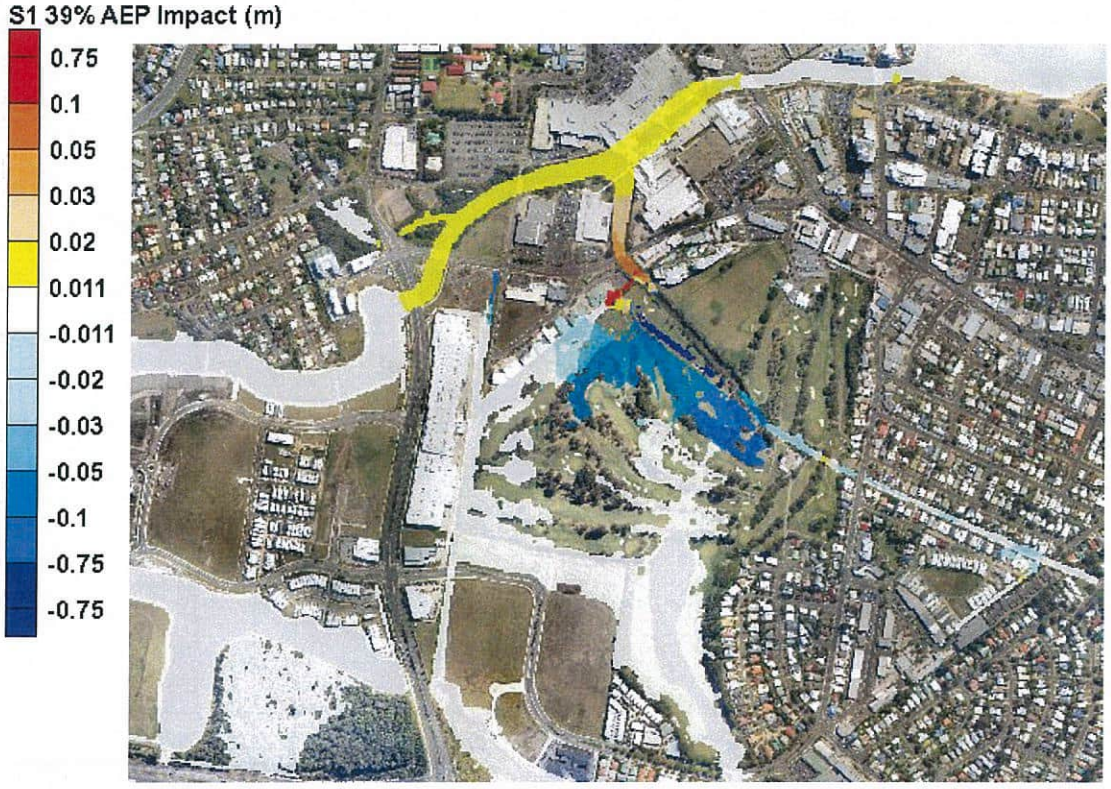


Figure 1 Stage 1 Temporary Works 39% AEP Flood Impact

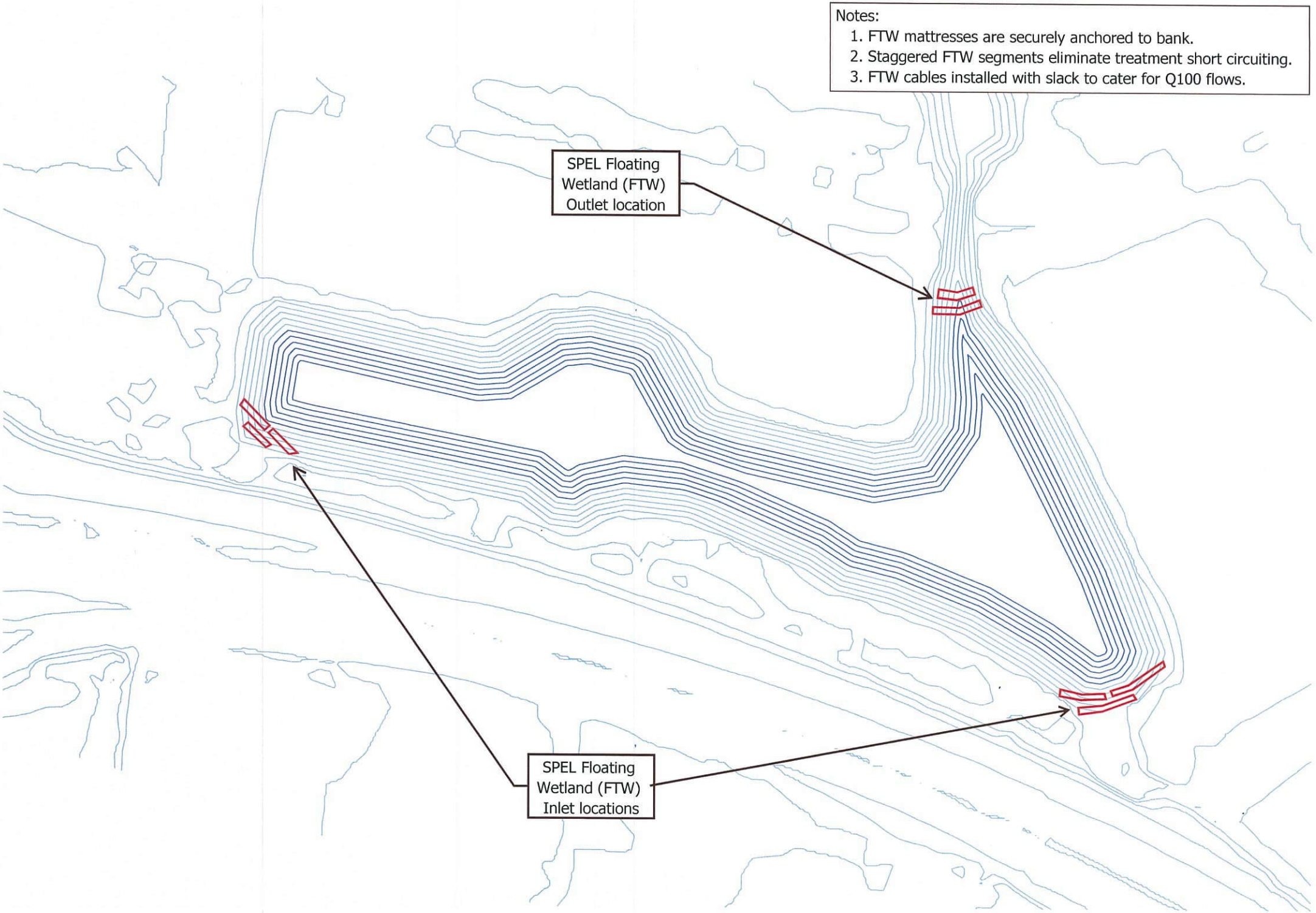
Figure 2 Stage 1 Temporary Works 18% AEP Flood Impact

Figure 3 Stage 1 Temporary Works 10% AEP Flood Impact

Figure 4 Stage 1 Temporary Works 5% AEP Flood Impact

Figure 5 Stage 1 Temporary Works 2% AEP Flood Impact

Figure 6 Stage 1 Temporary Works 1% AEP Flood Impact


Notes:
1. FTW mattresses are securely anchored to bank.
2. Staggered FTW segments eliminate treatment short circuiting.
3. FTW cables installed with slack to cater for Q100 flows.
SPEL Floating Wetland (FTW) Outlet location
SPEL Floating Wetland (FTW) Inlet locations

Technical Memorandum

Title	**Maroochydore City Centre Stage 1 Local Flooding**		
Client	Suncentral Maroochydore	**Project No**	249402
Date	29 October 2015	**Status**	Preliminary
Author	Nadia Guterres	**Discipline**	Civil Engineering
Reviewer	Darryl Hone	**Office**	Sunshine Coast

1. Summary

Given the flat nature of the Stage 1 works and the locations of raised intersections which would block overland flow paths, detailed two-dimensional flood analysis was conducted to ensure that the proposed road and internal drainage design would be sufficient to convey stormwater flows during major flood events. The purpose of this analysis was to:

> Determine the 100 year ARI local flood levels throughout Stage 1 and the corresponding floor levels for each lot.

> Determine the impact of complete blockage of stormwater gully and field inlets to ensure that the freeboard provided to minimum floor levels was sufficient.

> Determine whether the peak depths within the road reserve during major flood events complied with the requirements of QUDM.

> Determine if any areas required additional drainage infrastructure.

The proposed stormwater drainage has been designed to have 5% Annual Exceedance Probability (AEP) capacity using 12d. This drainage design was then transferred into TUFLOW for analysis of the major 1% AEP storm event.

2. Methodology

The TUFLOW model was set up using the following methodology:

> The 1% AEP rainfall was increased by 20% to account for the potential impact of climate change.

> The Duration Independent Storm (DIS) was used, with a time step of 5 minutes. The DIS method converts peak rainfall intensities from various storm duration into the one temporal pattern.

> A 0.5m grid size was adopted so that the road reserve was captured in sufficient detail.

> The road reserve areas were modelled using rainfall on grid. No rainfall losses were assumed

> The runoff from the surrounding lots was directed towards the underground drainage network. As the roof drainage is likely to have 5% AEP capacity, flows in excess of this capacity were directed as inflows onto the road surface. No rainfall losses were assumed.

> The tailwater level in the canal was assumed to be 2.35m AHD. This is the 1% AEP storm tide level with potential climate change included. Storm tide levels are to be used in preference to

storm surge levels as wave runup is not included as it is not a factor in protected waterways such as Maud Canal.

> The tailwater level for the existing northern drainage system was assumed to be equal to the obvert of the existing pipe.

> The road reserve was modelled with a Manning's roughness of 0.02.

> For the design scenario the blockage factors for field and gully inlets as specified by QUDM were assumed.

> For the blockage scenario all inlets were blocked by 100%. Roof water drainage (to 5% AEP capacity) was still assumed to be able to enter the drainage network.

> The manhole losses were automatically calculated by TUFLOW using the Engelhund Method.

3. Results

The preliminary results of the analysis identified areas where additional inlets would be required. Once these modifications were made to the design the results showed that:

> The depth of flooding in the 1% AEP climate change design event was less than 250mm in all areas of the proposed development.

> Once complete blockage of inlets was included the increase in peak water levels was less than 300mm in all areas of the site. As freeboard of 300mm above the 1% AEP local flood level is required for minimum floor levels based on the requirements of QUDM, this confirmed that all lots would have sufficient flood immunity for the major local flood event. For the majority of the site the increase was less than 100mm, with 95% of impacts being less than 200mm.

> The peak depth-velocity (dV) product for the 1% AEP design flood event was extremely low in all areas, with a maximum of around 0.05m^2/s. This indicates that flood hazards to motorists and pedestrians will be minimal.

The preliminary proposal for drainage design within Stage 1 nominated that areas where overland flow paths were blocked would have a duplicate drainage network with 1% AEP capacity. The results of this analysis have shown that even if all inlets are completely blocked that the peak water levels will not be increased by more than the specified minimum freeboard of 300mm. This is because there are some alternate flow paths available for areas around the raised intersections. It has therefore been deemed not necessary to provide a dual drainage network for these areas.

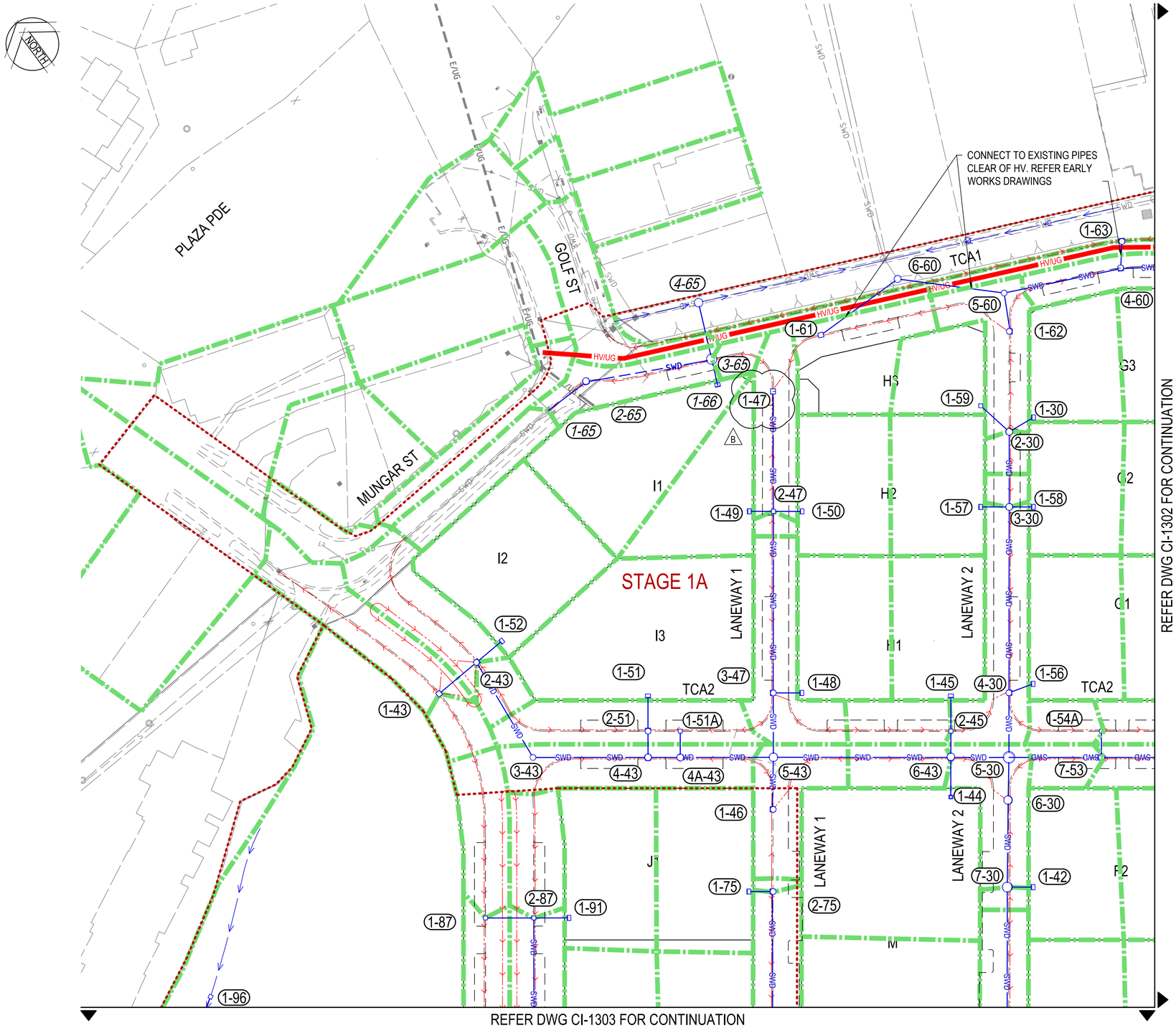
The results of the TUFLOW modelling are shown in the attached figures.

The minimum floor level for each lot, as specified by the manhole number relating to the roof drainage inlet point, is summarised in Table 1. A freeboard of 300mm above the 1% AEP flood level with climate change has been specified to comply with QUDM. The minimum floor levels required are all higher than those obtained using the 1% AEP climate change storm surge level, i.e. 3.32m AHD. The minimum floor levels in Table 1 were obtained by adding 300mm to the maximum design flood level along the street frontage of each lot.

Table 1 Minimum Floor Levels for each lot

LOT No.	PIT No.	MINIMUM FLOOR LEVEL (mAHD)	FREEBOARD WITH COMPLETE BLOCKAGE (mm)	LOT No.	PIT No.	MINIMUM FLOOR LEVEL (mAHD)	FREEBOARD WITH COMPLETE BLOCKAGE (mm)
A1	1-64	3.89	299	**G2**	1-55	3.86	292
A2	1-60	3.89	299	**G2**	1-58	3.87	300
A3	1-26	3.74	248	**G3**	1-30	3.85	397
A4	1-25	3.70	222	**G3**	1-53	3.90	300
A5	1-24	3.70	244	**H1**	1-45	3.86	290
A6	1-22	3.66	248	**H1**	1-48	3.89	285
B1	1-23	3.69	206	**H2**	1-50	3.88	294
B1	1-27	3.69	203	**H2**	1-57	3.87	300
B2	1-15	3.60	179	**H3**	1-59	3.92	300
B2	1-18	3.68	213	**H3**	1-61	3.87	284
C1	1-12	3.67	258	**I1**	1-49	3.88	296
C2	1-12A	3.56	159	**I1**	1-65	3.32*	590
C3	1-3	3.71	300	**I1**	1-66	3.79	294
D1	1-11	3.60	187	**I2**	1-52	3.74	300
D1	1-16	3.59	175	**I3**	1-51	3.97	300
D2	1-6	3.58	237	**J1**	1-75	3.80	215
D2	1-7	3.52	263	**J1**	1-91	3.97	300
D3	1-17	3.66	238	**J2**	1-90	3.78	267
D3	1-8	3.67	257	**J2**	1-92	3.70	186
E1	1-31	3.66	215	**K1**	1-81	3.77	245
E1	1-33	3.60	184	**K1**	1-85	3.63	118
E2	1-35	3.63	162	**K2**	1-80	3.70	175
E2	1-39	3.70	227	**K2**	1-83	3.63	180
F1	1-38	3.69	210	**L1**	1-32	3.60	182
F1	1-41	3.70	226	**L1**	1-84	3.63	180
F2	1-37	3.70	199	**L2**	1-34	3.74	254
F2	1-42	3.72	217	**L2**	1-86	3.72	209
G1	1-54	3.74	245	**N**	1-76	3.77	247
G1	1-56	3.82	297	**N**	1-79	3.67	147

** Based on 1% AEP Strom Surge Level*



PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

NOTE:
SPEL STORMSACK 200 MICRON LITTER BASKETS (OR APPROVED EQUIVALENT) ARE TO BE PROVIDED ON ALL FIELD & GULLY INLETS.

LEGEND:

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE SWALE
- STORMWATER PIPE AND MANHOLE/PIT
- 1-1 MANHOLE No. - LINE No.
- SUBSOIL DRAINAGE
- OVERLAND FLOW PATH EASEMENT
- STAGE BOUNDARY
- HV/UG EXISTING UG HV ELECTRICAL

NOTES:

1. REFER TO DRAWINGS 249402-CI-CI-1311 TO 249402-CI-CI-1320 FOR STORMWATER DRAINAGE LONGITUDINAL SECTIONS.
2. CATCHMENT NAME IS SAME AS PIT NUMBER UNLESS OTHERWISE NOTED.
3. REFER TO DRAWING 249402-CI-CI-1341 TO 249402-CI-CI-1346 FOR STORMWATER DRAINAGE CALCULATIONS TABLE.
4. CONTRACTOR TO SURVEY STORMWATER LINES AT CONNECTION POINTS DURING SITE ESTABLISHMENT AND FORWARD TO ENGINEERS FOR ASSESSMENT PRIOR TO CONSTRUCTION.
5. CONTRACTOR TO SURVEY STORMWATER LINES AT FUTURE CONNECTION POINTS, AS THEY ARE BUILT AND SENT TO ENGINEERS ASAP.

5 0 5 10 15 20 25m
Scale 1:500

Rev.	Date	Description	Des.	Verif.	Appd.
B	30/05/2018	STRUCTURE 1-47 LOCATION UPDATED	CK	DH	BK
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

SunCentral Maroochydore

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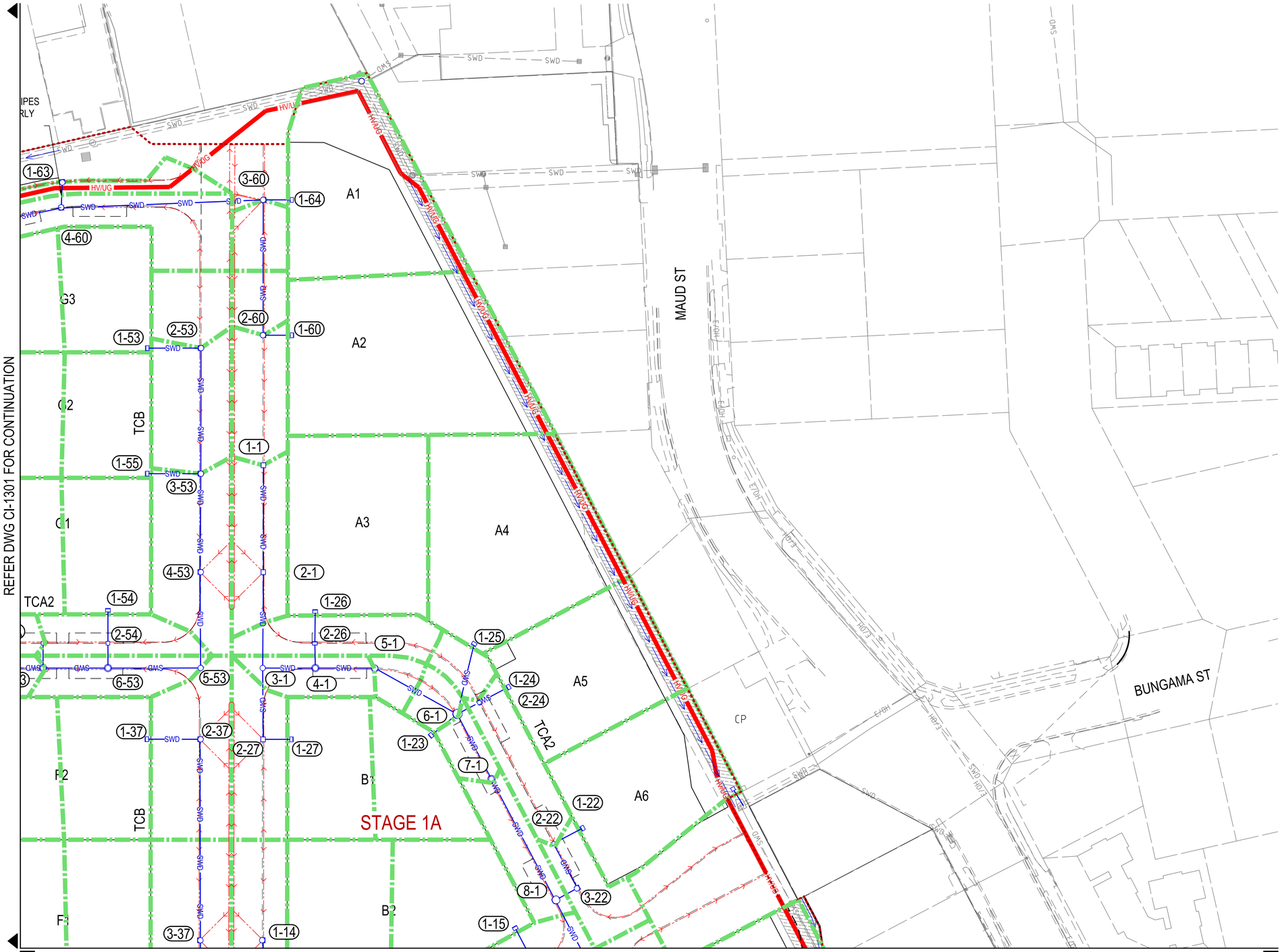
Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved		7884 DATE: 1/03/2017

Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE CIVIL WORKS - STAGE 1
Status: FOR CONSTRUCTION
Title: STORMWATER DRAINAGE PLAN - SHEET 1

DATUM	Orig. Date	Scale	Size
AHD	17/02/2016	AS SHOWN	A1

Drawing Number: 249402-CI-1301
Revision: B

REFER DWG CI-1301 FOR CONTINUATION



REFER DWG CI-1304 FOR CONTINUATION

PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

NOTE:
SPEL STORMSACK 200 MICRON LITTER BASKETS (OR APPROVED EQUIVALENT) ARE TO BE PROVIDED ON ALL FIELD & GULLY INLETS.

NORTH

LEGEND:

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE SWALE
- STORMWATER PIPE AND MANHOLE/PIT
- 1-1 MANHOLE No. - LINE No.
- SUBSOIL DRAINAGE
- OVERLAND FLOW PATH EASEMENT
- STAGE BOUNDARY
- HV/UG EXISTING UG HV ELECTRICAL

NOTES:

1. REFER TO DRAWINGS 249402-CI-CI-1311 TO 249402-CI-CI-1320 FOR STORMWATER DRAINAGE LONGITUDINAL SECTIONS.
2. CATCHMENT NAME IS SAME AS PIT NUMBER UNLESS OTHERWISE NOTED.
3. REFER TO DRAWING 249402-CI-CI-1341 TO 249402-CI-CI-1346 FOR STORMWATER DRAINAGE CALCULATIONS TABLE.
4. CONTRACTOR TO SURVEY STORMWATER LINES AT CONNECTION POINTS DURING SITE ESTABLISHMENT AND FORWARD TO ENGINEERS FOR ASSESSMENT PRIOR TO CONSTRUCTION.
5. CONTRACTOR TO SURVEY STORMWATER LINES AT FUTURE CONNECTION POINTS, AS THEY ARE BUILT AND SENT TO ENGINEERS ASAP.

5 0 5 10 15 20 25m
Scale 1:500

Rev.	Date	Description	Des.	Verif.	Appd.
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

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Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved		7884
		DATE: 1/03/2017

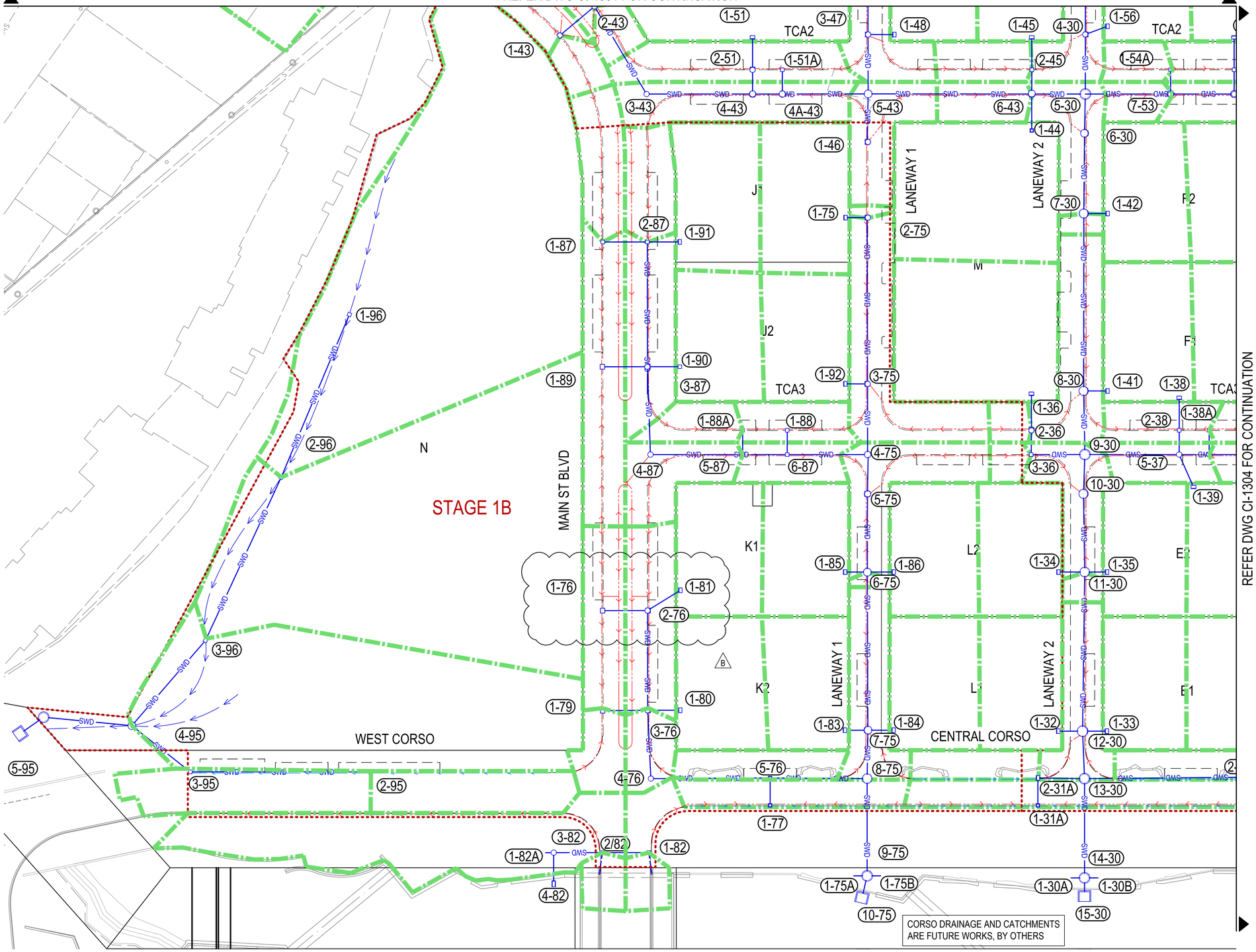
Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE
CIVIL WORKS - STAGE 1
Title: STORMWATER DRAINAGE PLAN - SHEET 2

Status: FOR CONSTRUCTION

DATUM	Orig. Date	Scale	Size
AHD	2/17/2016	AS SHOWN	A1

Drawing Number: 249402-CI-1302
Revision: A

REFER DWG CI-1301 FOR CONTINUATION



NOTE:
SPEL STORMSACK 200 MICRON LITTER BASKETS (OR APPROVED EQUIVALENT) ARE TO BE PROVIDED ON ALL FIELD & GULLY INLETS.

CORSO DRAINAGE AND CATCHMENTS ARE FUTURE WORKS, BY OTHERS

LEGEND:

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE SWALE
- SWD — SWD — STORMWATER PIPE AND MANHOLE/PIT
- 1-1 — MANHOLE No. - LINE No.
- SUBSOIL DRAINAGE
- OVERLAND FLOW PATH EASEMENT
- STAGE BOUNDARY
- HV/UG — EXISTING UG HV ELECTRICAL

NOTES:

1. REFER TO DRAWINGS 249402-CI-CI-1311 TO 249402-CI-CI-1320 FOR STORMWATER DRAINAGE LONGITUDINAL SECTIONS.
2. CATCHMENT NAME IS SAME AS PIT NUMBER UNLESS OTHERWISE NOTED.
3. REFER TO DRAWING 249402-CI-CI-1341 TO 249402-CI-CI-1346 FOR STORMWATER DRAINAGE CALCULATIONS TABLE.
4. CONTRACTOR TO SURVEY STORMWATER LINES AT CONNECTION POINTS DURING SITE ESTABLISHMENT AND FORWARD TO ENGINEERS FOR ASSESSMENT PRIOR TO CONSTRUCTION.
5. CONTRACTOR TO SURVEY STORMWATER LINES AT FUTURE CONNECTION POINTS, AS THEY ARE BUILT AND SENT TO ENGINEERS ASAP.

5 0 5 10 15 20 25m
Scale 1:500

PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

Rev.	Date	Description	Des.	Verif.	Appd.
B	14/09/2018	MAIN ST BLVD PITS REVISED	CK	DH	TH
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

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Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved		7884
		DATE: 1/03/2017

Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE
CIVIL WORKS - STAGE 1
Title: STORMWATER DRAINAGE PLAN - SHEET 3

Status: FOR CONSTRUCTION

DATUM	Orig. Date	Scale	Size
AHD	17/02/2016	AS SHOWN	A1

Drawing Number: 249402-CI-1303
Revision: B

REFER DWG CI-1302 FOR CONTINUATION

REFER DWG CI-1303 FOR CONTINUATION

LANEWAY 2

STAGE 1A

STAGE 1A

EAST CORSO

MAUD ST

TCA2

TCA3

TCA3

TCB

TCB

A6

B2

C1

C2

C3

D1

D2

D3

E1

E2

F3

BRIDGE DRAINAGE TO DISCHARGE TO 1-4 & 2-4

CORSO DRAINAGE AND CATCHMENTS ARE FUTURE WORKS, BY OTHERS

BRIDGE DRAINAGE TO DISCHARGE TO 1-2

NOTE:
SPEL STORMSACK 200 MICRON LITTER BASKETS (OR APPROVED EQUIVALENT) ARE TO BE PROVIDED ON ALL FIELD & GULLY INLETS.

LEGEND:

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE SWALE
- SWD — SWD STORMWATER PIPE AND MANHOLE/PIT
- 1-1 MANHOLE No. - LINE No.
- SUBSOIL DRAINAGE
- OVERLAND FLOW PATH EASEMENT
- STAGE BOUNDARY
- HV/UG EXISTING UG HV ELECTRICAL

NOTES:

1. REFER TO DRAWINGS 249402-CI-CI-1311 TO 249402-CI-CI-1320 FOR STORMWATER DRAINAGE LONGITUDINAL SECTIONS.
2. CATCHMENT NAME IS SAME AS PIT NUMBER UNLESS OTHERWISE NOTED.
3. REFER TO DRAWING 249402-CI-CI-1341 TO 249402-CI-CI-1346 FOR STORMWATER DRAINAGE CALCULATIONS TABLE.
4. CONTRACTOR TO SURVEY STORMWATER LINES AT CONNECTION POINTS DURING SITE ESTABLISHMENT AND FORWARD TO ENGINEERS FOR ASSESSMENT PRIOR TO CONSTRUCTION.
5. CONTRACTOR TO SURVEY STORMWATER LINES AT FUTURE CONNECTION POINTS, AS THEY ARE BUILT AND SENT TO ENGINEERS ASAP.

PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

5 0 5 10 15 20 25m
Scale 1:500

Rev.	Date	Description	Des.	Verif.	Appd.
C	14/06/2017	LINE 12A RENUMBERED	CK	DH	BK
B	13/06/2017	LOT C2/3 BDY & STORMWATER REVISED	CK	DH	BK
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

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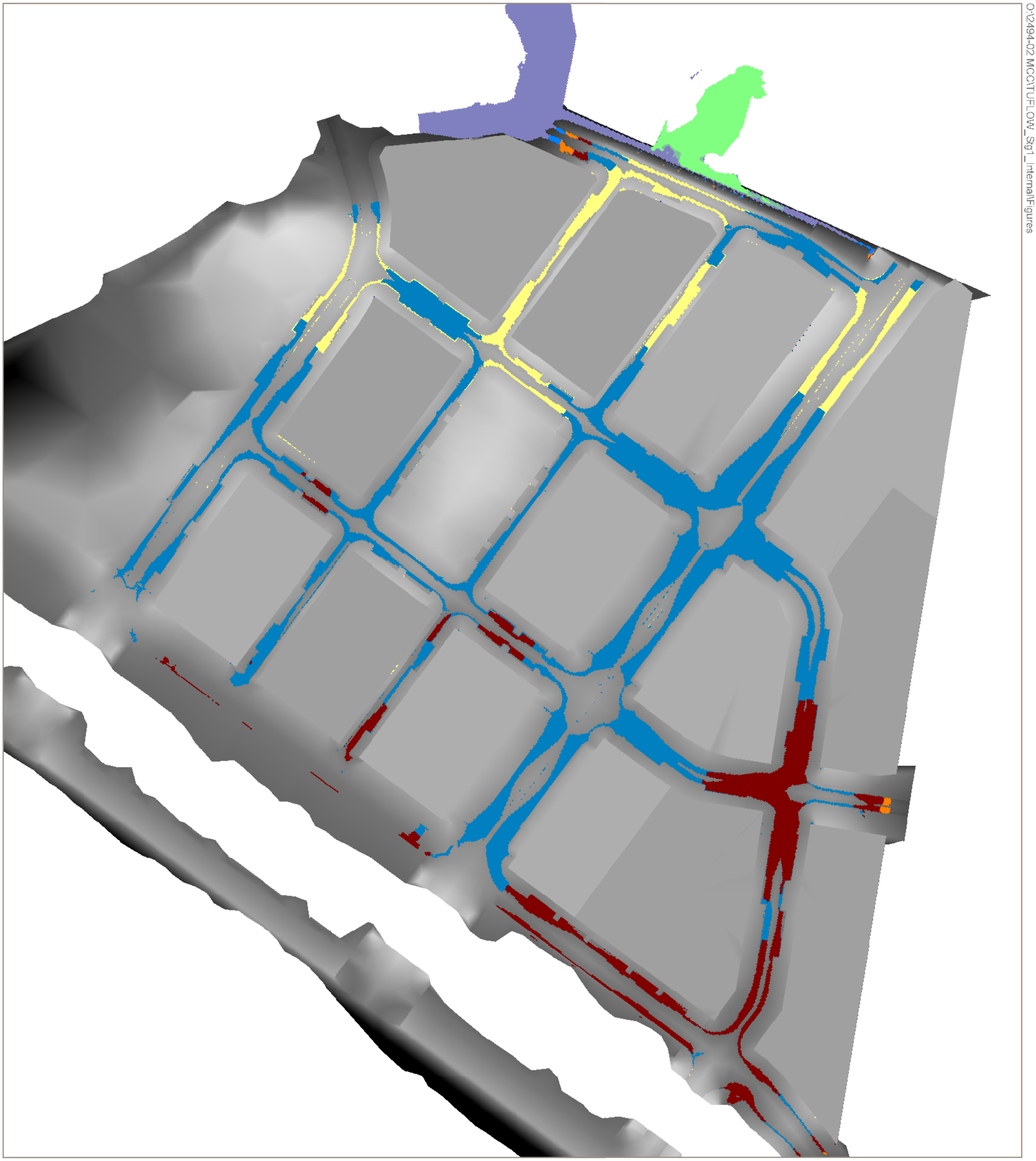
Web: www.cardno.com.au

Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved	7884	DATE: 1/03/2017

Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE CIVIL WORKS - STAGE 1
Title: STORMWATER DRAINAGE PLAN - SHEET 4
Status: FOR CONSTRUCTION
DATUM: AHD | Orig. Date: 2/17/2016 | Scale: AS SHOWN | Size: A1
Drawing Number: 249402-CI-1304
Revision: C



Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Peak Water Level (mAHD)

- 2.00 to 2.25
- 2.25 to 2.50
- 2.50 to 2.75
- 2.75 to 3.00
- 3.00 to 3.25
- 3.25 to 3.50
- 3.50 to 3.75

Figure 1

1% AEP Design Peak Flood Level with Climate Change

Stage 1 Internal Drainage

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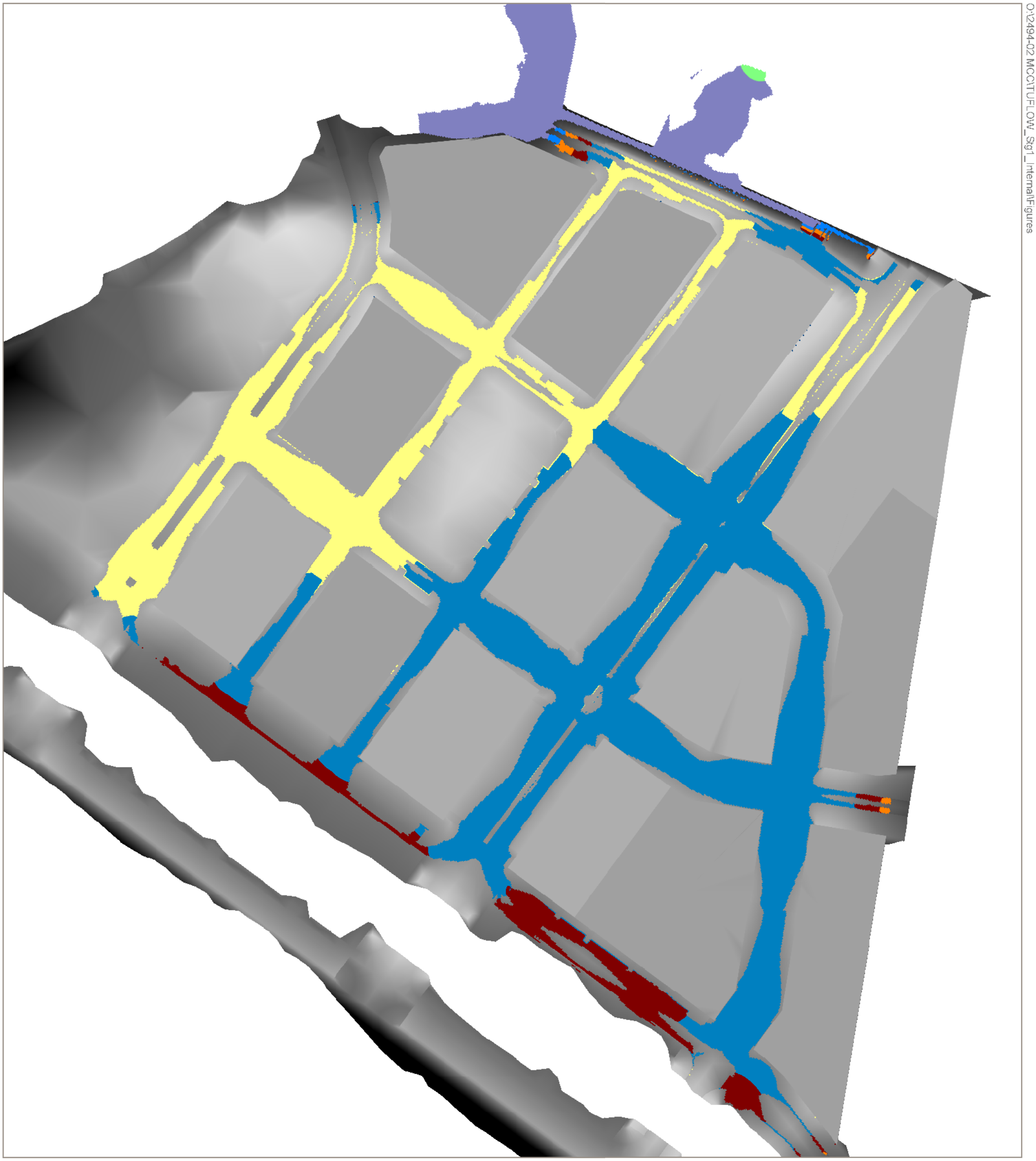
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006, Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722



Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Peak Water Level (mAHD)

- 2.00 to 2.25
- 2.25 to 2.50
- 2.50 to 2.75
- 2.75 to 3.00
- 3.00 to 3.25
- 3.25 to 3.50
- 3.50 to 3.75

Figure 2

1% AEP Peak Flood Level with Climate Change and Complete Inlet Blockage

Stage 1 Internal Drainage

Cardno
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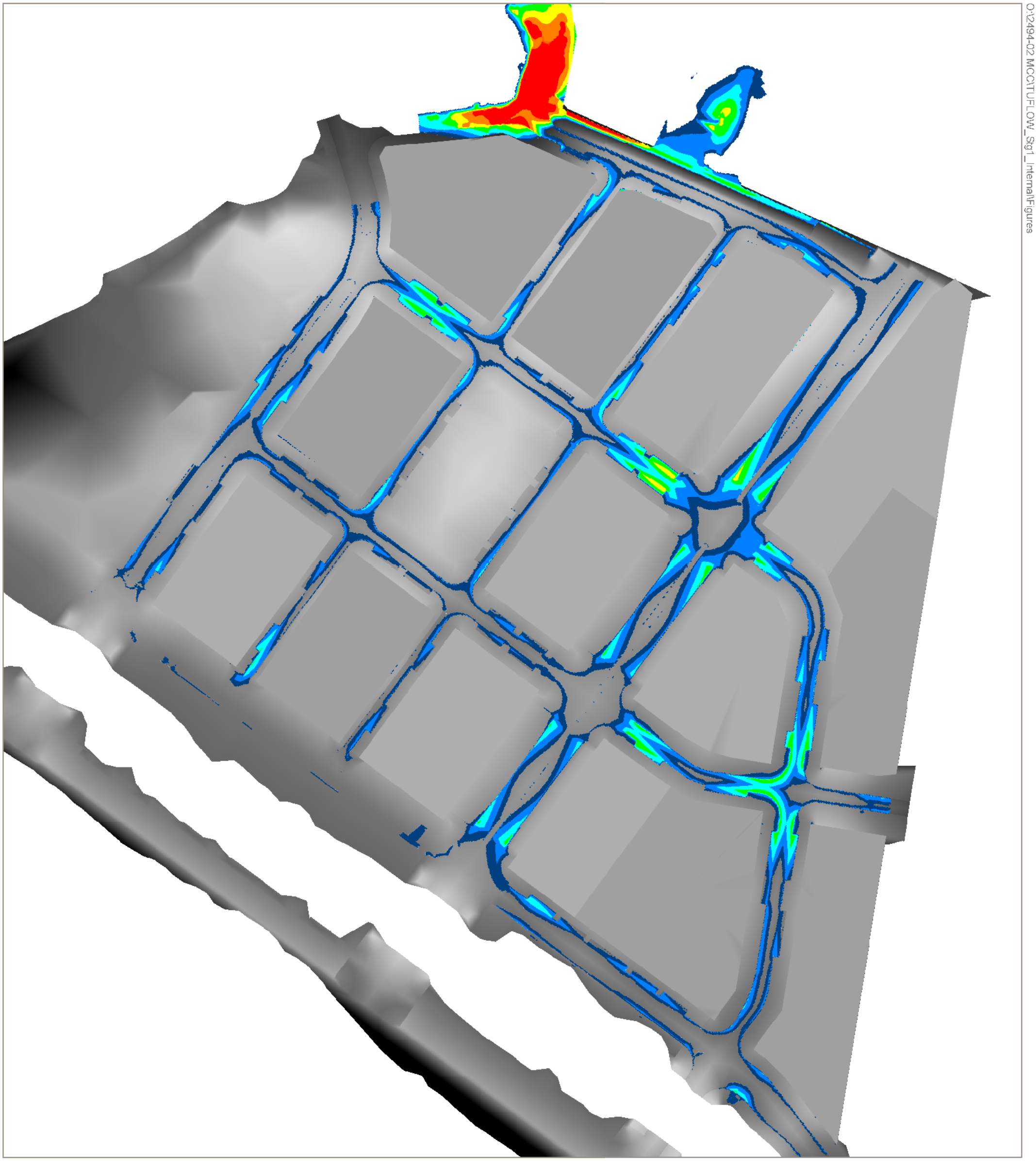
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006, Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722

O:\2494-02 MCC\TUFLOW_Stg1_Internal\Figures



Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Depth (m)

- 0.00 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- 0.20 to 0.25
- 0.25 to 0.30
- 0.30 to 0.50

Figure 3

1% AEP Design Peak Depth with Climate Change

Stage 1 Internal Drainage

Cardno
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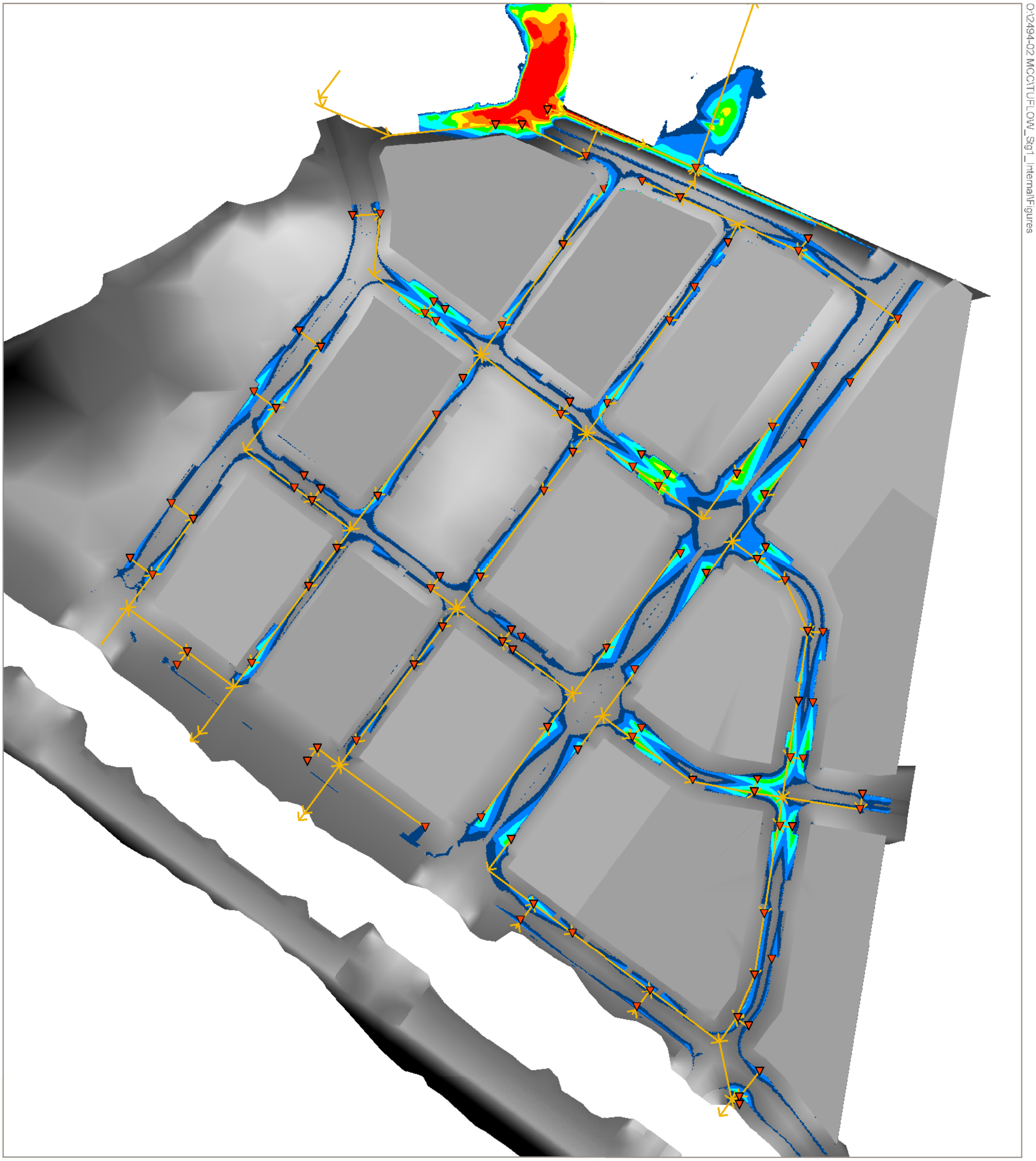

O:\2494-02 MCC\TUFLOW_Stg1_Internal\Figures

Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Depth (m)

- 0.00 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- 0.20 to 0.25
- 0.25 to 0.30
- 0.30 to 0.50

Inlet Pits

Stormwater Drainage

Figure 4

1% AEP Design Peak Depth with Climate Change

Stage 1 Internal Drainage

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Technical Memorandum

Title	**Maroochydore City Centre Stage 1 Local Flooding**		
Client	Suncentral Maroochydore	**Project No**	249402
Date	29 October 2015	**Status**	Preliminary
Author	Nadia Guterres	**Discipline**	Civil Engineering
Reviewer	Darryl Hone	**Office**	Sunshine Coast

1. Summary

Given the flat nature of the Stage 1 works and the locations of raised intersections which would block overland flow paths, detailed two-dimensional flood analysis was conducted to ensure that the proposed road and internal drainage design would be sufficient to convey stormwater flows during major flood events. The purpose of this analysis was to:

> Determine the 100 year ARI local flood levels throughout Stage 1 and the corresponding floor levels for each lot.

> Determine the impact of complete blockage of stormwater gully and field inlets to ensure that the freeboard provided to minimum floor levels was sufficient.

> Determine whether the peak depths within the road reserve during major flood events complied with the requirements of QUDM.

> Determine if any areas required additional drainage infrastructure.

The proposed stormwater drainage has been designed to have 5% Annual Exceedance Probability (AEP) capacity using 12d. This drainage design was then transferred into TUFLOW for analysis of the major 1% AEP storm event.

2. Methodology

The TUFLOW model was set up using the following methodology:

> The 1% AEP rainfall was increased by 20% to account for the potential impact of climate change.

> The Duration Independent Storm (DIS) was used, with a time step of 5 minutes. The DIS method converts peak rainfall intensities from various storm duration into the one temporal pattern.

> A 0.5m grid size was adopted so that the road reserve was captured in sufficient detail.

> The road reserve areas were modelled using rainfall on grid. No rainfall losses were assumed

> The runoff from the surrounding lots was directed towards the underground drainage network. As the roof drainage is likely to have 5% AEP capacity, flows in excess of this capacity were directed as inflows onto the road surface. No rainfall losses were assumed.

> The tailwater level in the canal was assumed to be 2.35m AHD. This is the 1% AEP storm tide level with potential climate change included. Storm tide levels are to be used in preference to

storm surge levels as wave runup is not included as it is not a factor in protected waterways such as Maud Canal.

> The tailwater level for the existing northern drainage system was assumed to be equal to the obvert of the existing pipe.

> The road reserve was modelled with a Manning's roughness of 0.02.

> For the design scenario the blockage factors for field and gully inlets as specified by QUDM were assumed.

> For the blockage scenario all inlets were blocked by 100%. Roof water drainage (to 5% AEP capacity) was still assumed to be able to enter the drainage network.

> The manhole losses were automatically calculated by TUFLOW using the Engelhund Method.

3. Results

The preliminary results of the analysis identified areas where additional inlets would be required. Once these modifications were made to the design the results showed that:

> The depth of flooding in the 1% AEP climate change design event was less than 250mm in all areas of the proposed development.

> Once complete blockage of inlets was included the increase in peak water levels was less than 300mm in all areas of the site. As freeboard of 300mm above the 1% AEP local flood level is required for minimum floor levels based on the requirements of QUDM, this confirmed that all lots would have sufficient flood immunity for the major local flood event. For the majority of the site the increase was less than 100mm, with 95% of impacts being less than 200mm.

> The peak depth-velocity (dV) product for the 1% AEP design flood event was extremely low in all areas, with a maximum of around 0.05m^2/s. This indicates that flood hazards to motorists and pedestrians will be minimal.

The preliminary proposal for drainage design within Stage 1 nominated that areas where overland flow paths were blocked would have a duplicate drainage network with 1% AEP capacity. The results of this analysis have shown that even if all inlets are completely blocked that the peak water levels will not be increased by more than the specified minimum freeboard of 300mm. This is because there are some alternate flow paths available for areas around the raised intersections. It has therefore been deemed not necessary to provide a dual drainage network for these areas.

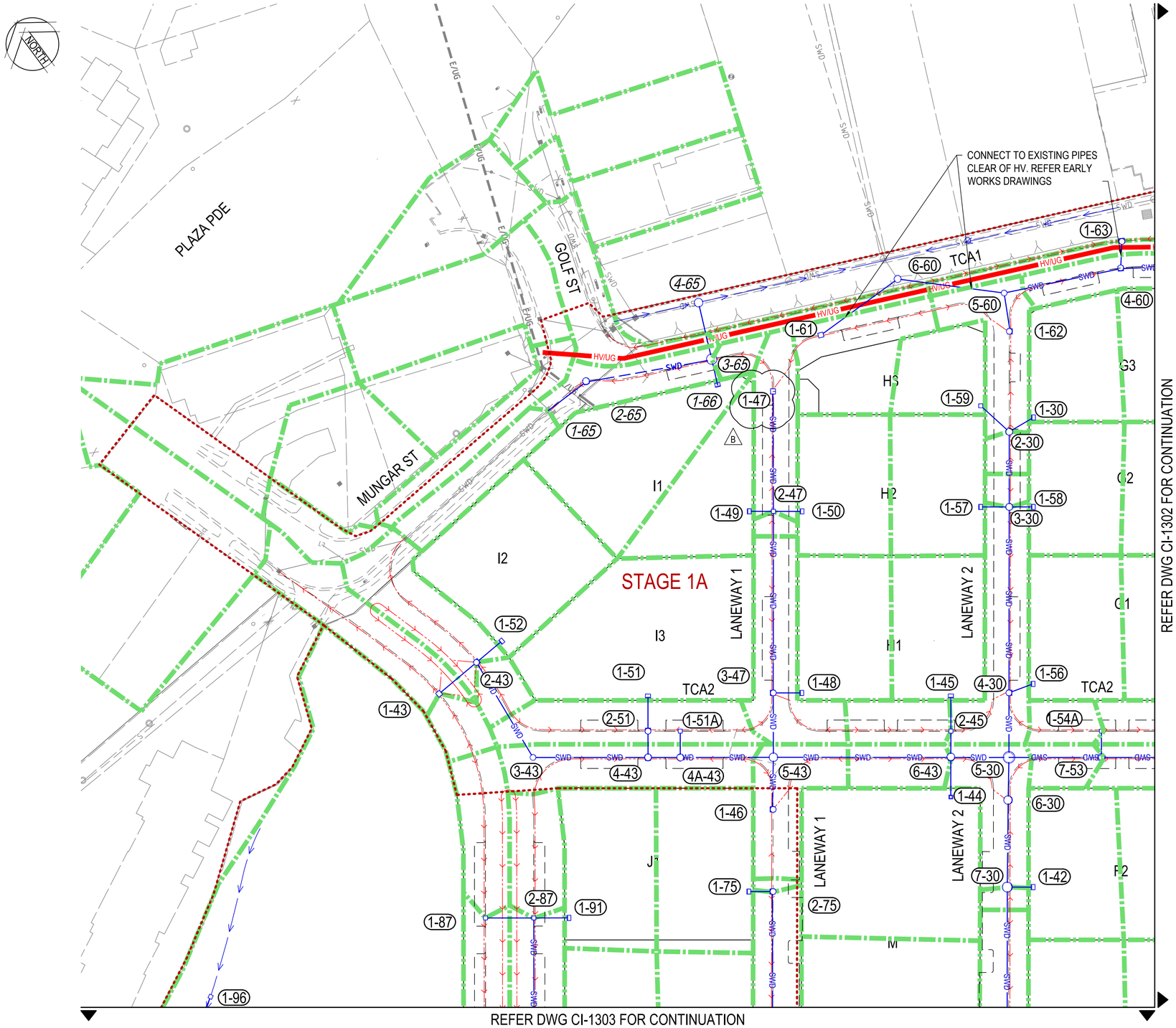
The results of the TUFLOW modelling are shown in the attached figures.

The minimum floor level for each lot, as specified by the manhole number relating to the roof drainage inlet point, is summarised in Table 1. A freeboard of 300mm above the 1% AEP flood level with climate change has been specified to comply with QUDM. The minimum floor levels required are all higher than those obtained using the 1% AEP climate change storm surge level, i.e. 3.32m AHD. The minimum floor levels in Table 1 were obtained by adding 300mm to the maximum design flood level along the street frontage of each lot.

Table 1 Minimum Floor Levels for each lot

LOT No.	PIT No.	MINIMUM FLOOR LEVEL (mAHD)	FREEBOARD WITH COMPLETE BLOCKAGE (mm)	LOT No.	PIT No.	MINIMUM FLOOR LEVEL (mAHD)	FREEBOARD WITH COMPLETE BLOCKAGE (mm)
A1	1-64	3.89	299	**G2**	1-55	3.86	292
A2	1-60	3.89	299	**G2**	1-58	3.87	300
A3	1-26	3.74	248	**G3**	1-30	3.85	397
A4	1-25	3.70	222	**G3**	1-53	3.90	300
A5	1-24	3.70	244	**H1**	1-45	3.86	290
A6	1-22	3.66	248	**H1**	1-48	3.89	285
B1	1-23	3.69	206	**H2**	1-50	3.88	294
B1	1-27	3.69	203	**H2**	1-57	3.87	300
B2	1-15	3.60	179	**H3**	1-59	3.92	300
B2	1-18	3.68	213	**H3**	1-61	3.87	284
C1	1-12	3.67	258	**I1**	1-49	3.88	296
C2	1-12A	3.56	159	**I1**	1-65	3.32*	590
C3	1-3	3.71	300	**I1**	1-66	3.79	294
D1	1-11	3.60	187	**I2**	1-52	3.74	300
D1	1-16	3.59	175	**I3**	1-51	3.97	300
D2	1-6	3.58	237	**J1**	1-75	3.80	215
D2	1-7	3.52	263	**J1**	1-91	3.97	300
D3	1-17	3.66	238	**J2**	1-90	3.78	267
D3	1-8	3.67	257	**J2**	1-92	3.70	186
E1	1-31	3.66	215	**K1**	1-81	3.77	245
E1	1-33	3.60	184	**K1**	1-85	3.63	118
E2	1-35	3.63	162	**K2**	1-80	3.70	175
E2	1-39	3.70	227	**K2**	1-83	3.63	180
F1	1-38	3.69	210	**L1**	1-32	3.60	182
F1	1-41	3.70	226	**L1**	1-84	3.63	180
F2	1-37	3.70	199	**L2**	1-34	3.74	254
F2	1-42	3.72	217	**L2**	1-86	3.72	209
G1	1-54	3.74	245	**N**	1-76	3.77	247
G1	1-56	3.82	297	**N**	1-79	3.67	147

** Based on 1% AEP Strom Surge Level*



PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

NOTE:
SPEL STORMSACK 200 MICRON LITTER BASKETS (OR APPROVED EQUIVALENT) ARE TO BE PROVIDED ON ALL FIELD & GULLY INLETS.

LEGEND:

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE SWALE
- STORMWATER PIPE AND MANHOLE/PIT
- 1-1 MANHOLE No. - LINE No.
- SUBSOIL DRAINAGE
- OVERLAND FLOW PATH EASEMENT
- STAGE BOUNDARY
- HV/UG EXISTING UG HV ELECTRICAL

NOTES:

1. REFER TO DRAWINGS 249402-CI-CI-1311 TO 249402-CI-CI-1320 FOR STORMWATER DRAINAGE LONGITUDINAL SECTIONS.
2. CATCHMENT NAME IS SAME AS PIT NUMBER UNLESS OTHERWISE NOTED.
3. REFER TO DRAWING 249402-CI-CI-1341 TO 249402-CI-CI-1346 FOR STORMWATER DRAINAGE CALCULATIONS TABLE.
4. CONTRACTOR TO SURVEY STORMWATER LINES AT CONNECTION POINTS DURING SITE ESTABLISHMENT AND FORWARD TO ENGINEERS FOR ASSESSMENT PRIOR TO CONSTRUCTION.
5. CONTRACTOR TO SURVEY STORMWATER LINES AT FUTURE CONNECTION POINTS, AS THEY ARE BUILT AND SENT TO ENGINEERS ASAP.

5 0 5 10 15 20 25m
Scale 1:500

Rev.	Date	Description	Des.	Verif.	Appd.
B	30/05/2018	STRUCTURE 1-47 LOCATION UPDATED	CK	DH	BK
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

SunCentral Maroochydore

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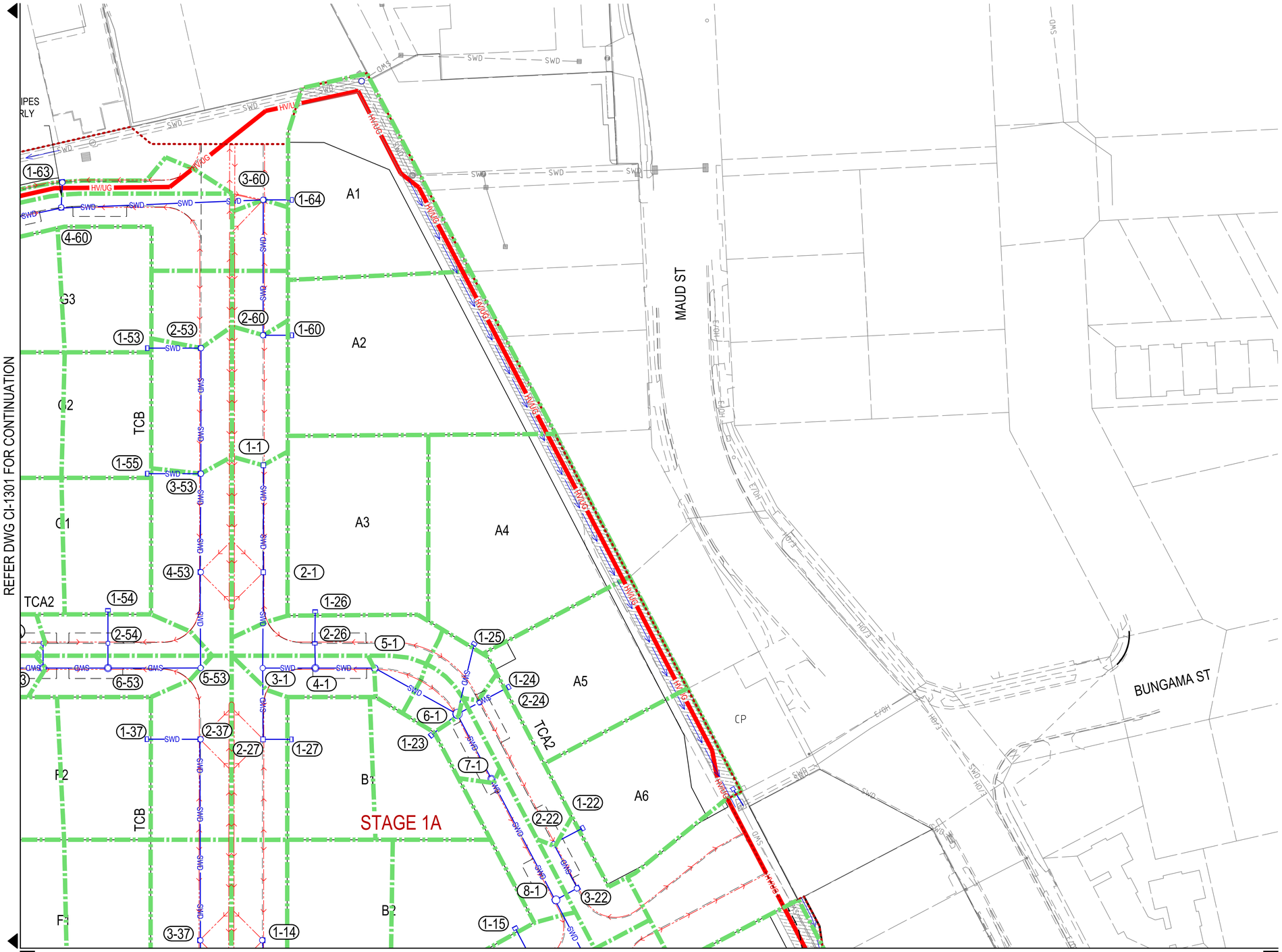
Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved		7884 DATE: 1/03/2017

Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE CIVIL WORKS - STAGE 1
Status: FOR CONSTRUCTION
Title: STORMWATER DRAINAGE PLAN - SHEET 1

DATUM	Orig. Date	Scale	Size
AHD	17/02/2016	AS SHOWN	A1

Drawing Number: 249402-CI-1301
Revision: B

REFER DWG CI-1301 FOR CONTINUATION



REFER DWG CI-1304 FOR CONTINUATION

PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

NOTE:
SPEL STORMSACK 200 MICRON LITTER BASKETS (OR APPROVED EQUIVALENT) ARE TO BE PROVIDED ON ALL FIELD & GULLY INLETS.

NORTH

LEGEND:

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE SWALE
- STORMWATER PIPE AND MANHOLE/PIT
- 1-1 MANHOLE No. - LINE No.
- SUBSOIL DRAINAGE
- OVERLAND FLOW PATH EASEMENT
- STAGE BOUNDARY
- HV/UG EXISTING UG HV ELECTRICAL

NOTES:

1. REFER TO DRAWINGS 249402-CI-CI-1311 TO 249402-CI-CI-1320 FOR STORMWATER DRAINAGE LONGITUDINAL SECTIONS.
2. CATCHMENT NAME IS SAME AS PIT NUMBER UNLESS OTHERWISE NOTED.
3. REFER TO DRAWING 249402-CI-CI-1341 TO 249402-CI-CI-1346 FOR STORMWATER DRAINAGE CALCULATIONS TABLE.
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5 0 5 10 15 20 25m
Scale 1:500

Rev.	Date	Description	Des.	Verif.	Appd.
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

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Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved		7884
		DATE: 1/03/2017

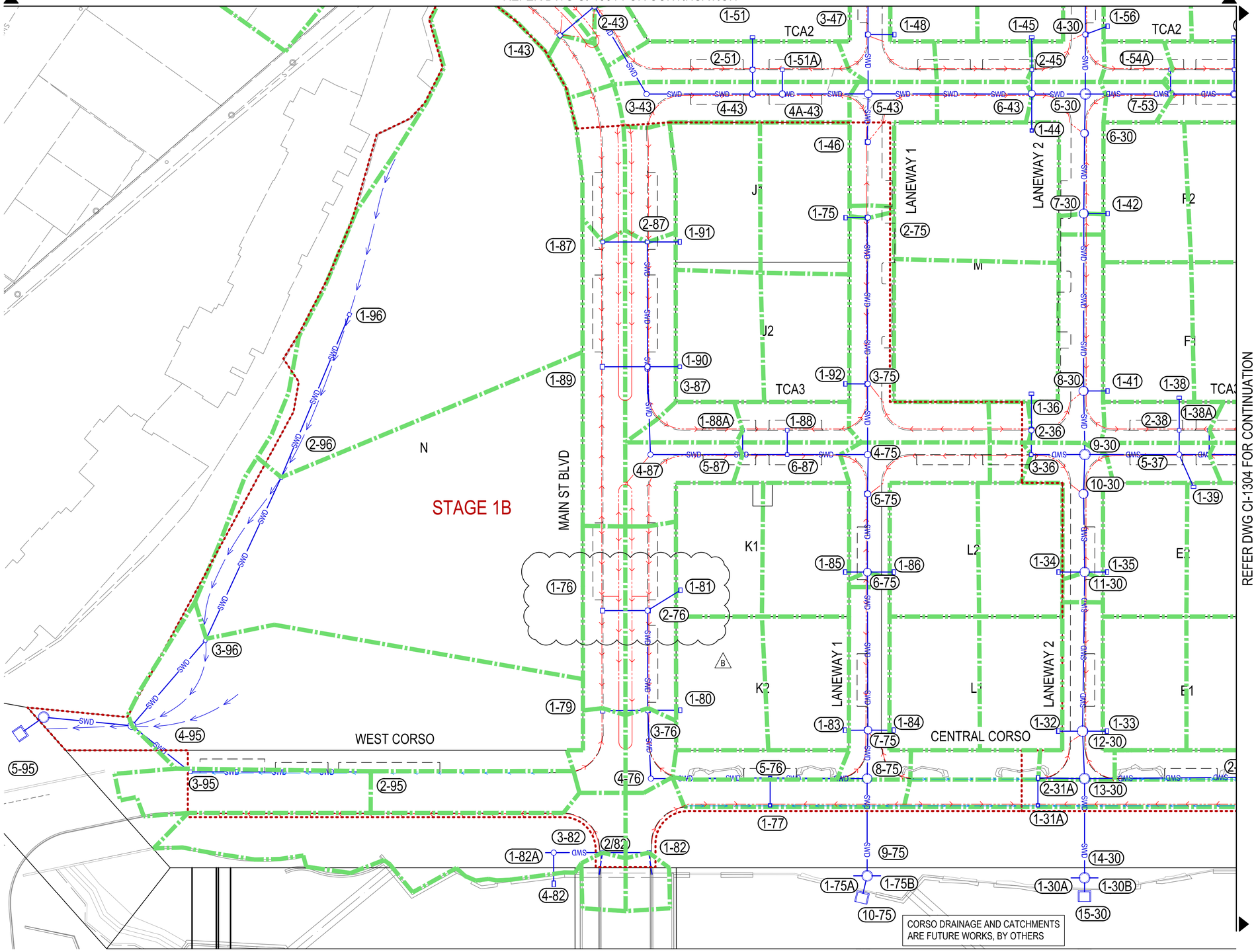
Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE
CIVIL WORKS - STAGE 1
Title: STORMWATER DRAINAGE PLAN - SHEET 2

Status: FOR CONSTRUCTION

DATUM	Orig. Date	Scale	Size
AHD	2/17/2016	AS SHOWN	A1

Drawing Number: 249402-CI-1302
Revision: A

REFER DWG CI-1301 FOR CONTINUATION



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CORSO DRAINAGE AND CATCHMENTS ARE FUTURE WORKS, BY OTHERS

LEGEND:

- STORMWATER CATCHMENT BOUNDARY
- DRAINAGE SWALE
- SWD — SWD — STORMWATER PIPE AND MANHOLE/PIT
- 1-1 — MANHOLE No. - LINE No.
- SUBSOIL DRAINAGE
- OVERLAND FLOW PATH EASEMENT
- STAGE BOUNDARY
- HV/UG — EXISTING UG HV ELECTRICAL

NOTES:

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5 0 5 10 15 20 25m
Scale 1:500

PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

Rev.	Date	Description	Des.	Verif.	Appd.
B	14/09/2018	MAIN ST BLVD PITS REVISED	CK	DH	TH
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

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Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved		7884
		DATE: 1/03/2017

Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE
CIVIL WORKS - STAGE 1
Title: STORMWATER DRAINAGE PLAN - SHEET 3

Status: FOR CONSTRUCTION

DATUM	Orig. Date	Scale	Size
AHD	17/02/2016	AS SHOWN	A1

Drawing Number: 249402-CI-1303
Revision: B

REFER DWG CI-1302 FOR CONTINUATION

REFER DWG CI-1303 FOR CONTINUATION

LANEWAY 2

STAGE 1A

STAGE 1A

EAST CORSO

MAUD ST

TCA2

TCA3

TCA3

TCB

TCB

A6

B2

C1

C2

C3

D1

D2

D3

E1

E2

F3

BRIDGE DRAINAGE TO DISCHARGE TO 1-4 & 2-4

CORSO DRAINAGE AND CATCHMENTS ARE FUTURE WORKS, BY OTHERS

BRIDGE DRAINAGE TO DISCHARGE TO 1-2

NOTE:
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PLAN

SCALE A1 - 1 : 500
A3 - 1 : 1000

5 0 5 10 15 20 25m
Scale 1:500

Rev.	Date	Description	Des.	Verif.	Appd.
C	14/06/2017	LINE 12A RENUMBERED	CK	DH	BK
B	13/06/2017	LOT C2/3 BDY & STORMWATER REVISED	CK	DH	BK
A	24/03/2017	ISSUED FOR CONSTRUCTION	CK	DH	BK

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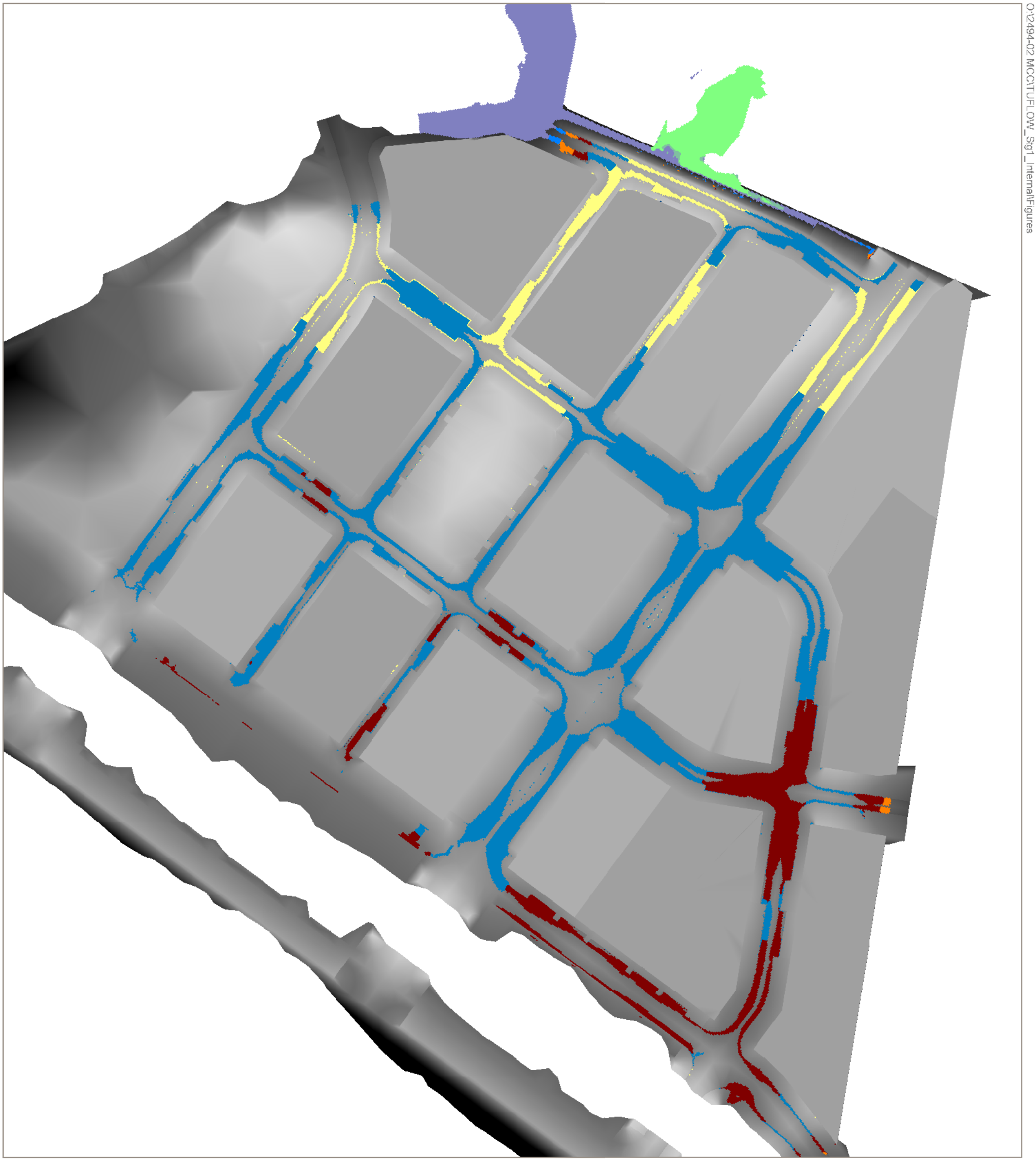
Drawn	PM LC CK	Date 7/10/2015
Checked	DH	Date 7/10/2015
Designed	CK	Date 7/10/2015
Verified	RB	Date 7/10/2015
Approved	7884	DATE: 1/03/2017

Client: SUNCENTRAL MAROOCHYDORE PTY LTD
Project: MAROOCHYDORE CITY CENTRE CIVIL WORKS - STAGE 1
Title: STORMWATER DRAINAGE PLAN - SHEET 4
Status: FOR CONSTRUCTION
DATUM: AHD | Orig. Date: 2/17/2016 | Scale: AS SHOWN | Size: A1
Drawing Number: 249402-CI-1304
Revision: C



Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Peak Water Level (mAHD)

- 2.00 to 2.25
- 2.25 to 2.50
- 2.50 to 2.75
- 2.75 to 3.00
- 3.00 to 3.25
- 3.25 to 3.50
- 3.50 to 3.75

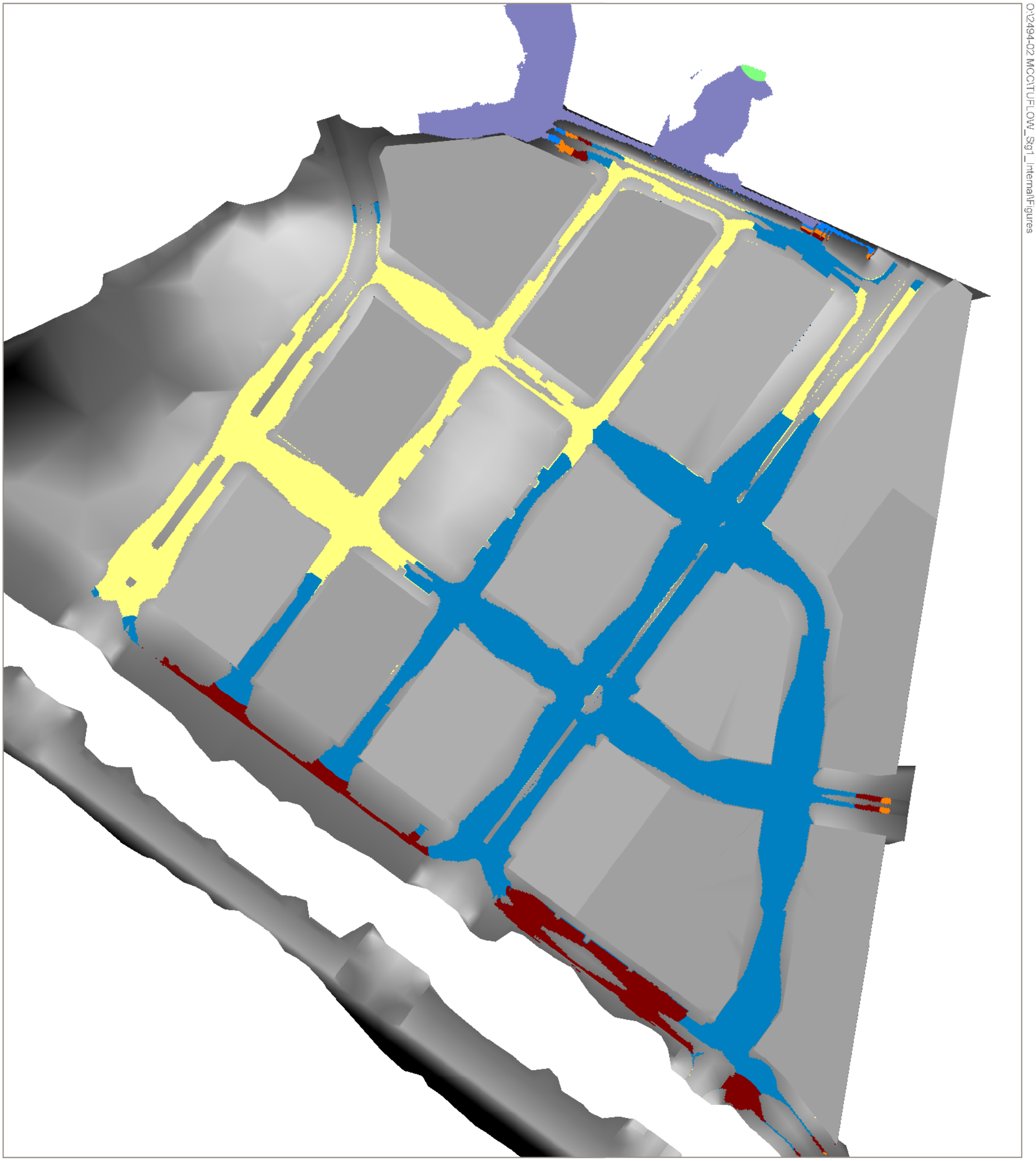
Figure 1

1% AEP Design Peak Flood Level with Climate Change

Stage 1 Internal Drainage

Cardno
Shaping the Future

Cardno (QLD) Pty Ltd | ABN 57 051 074 992
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006, Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722



Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Peak Water Level (mAHD)

- 2.00 to 2.25
- 2.25 to 2.50
- 2.50 to 2.75
- 2.75 to 3.00
- 3.00 to 3.25
- 3.25 to 3.50
- 3.50 to 3.75

Figure 2

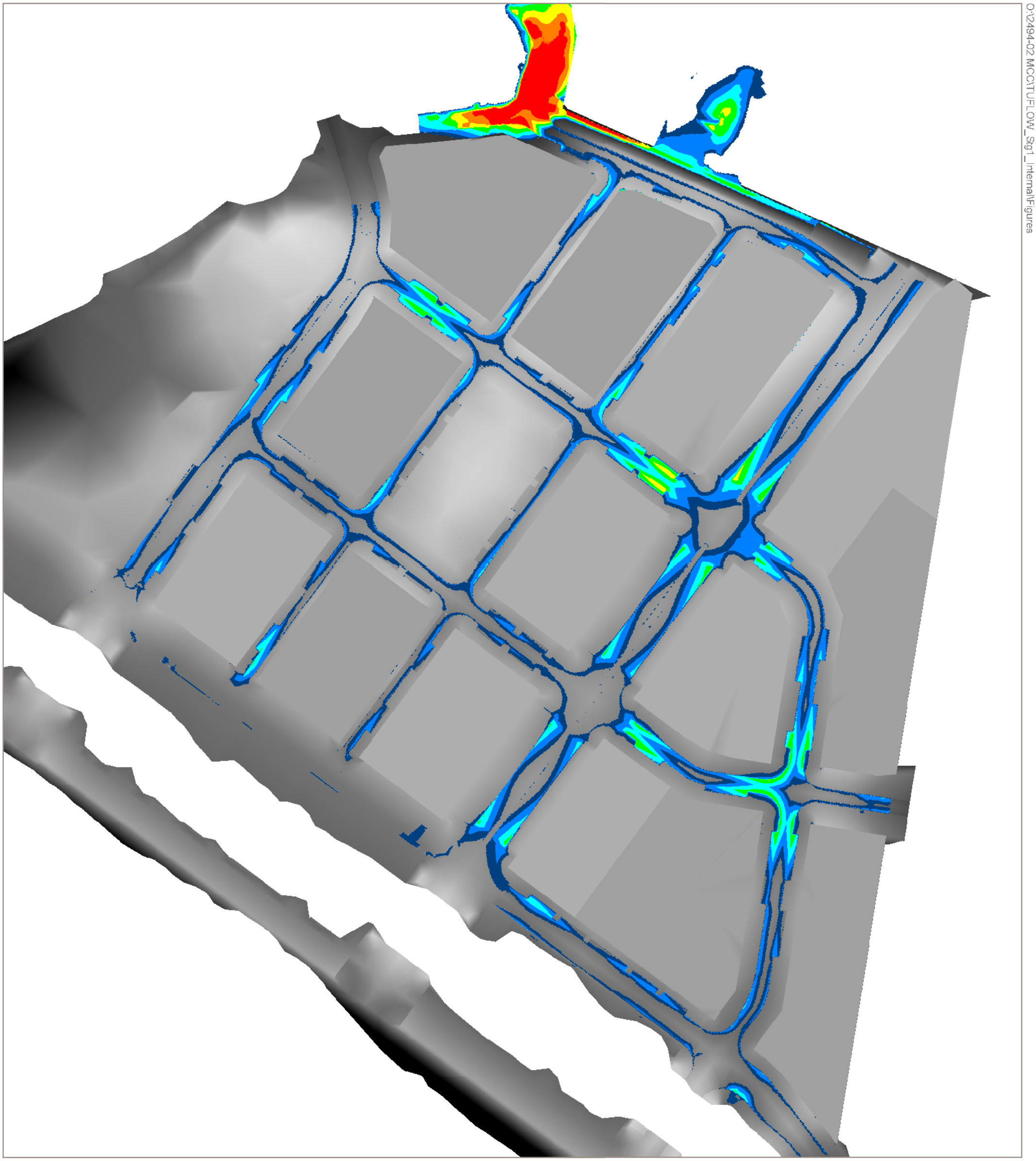
1% AEP Peak Flood Level with Climate Change and Complete Inlet Blockage

Stage 1 Internal Drainage

Cardno
Shaping the Future

Cardno (QLD) Pty Ltd | ABN 57 051 074 992
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006, Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722

O:\2494-02 MCC\TUFLOW_Stg1_Internal\Figures



Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Depth (m)

- 0.00 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- 0.20 to 0.25
- 0.25 to 0.30
- 0.30 to 0.50

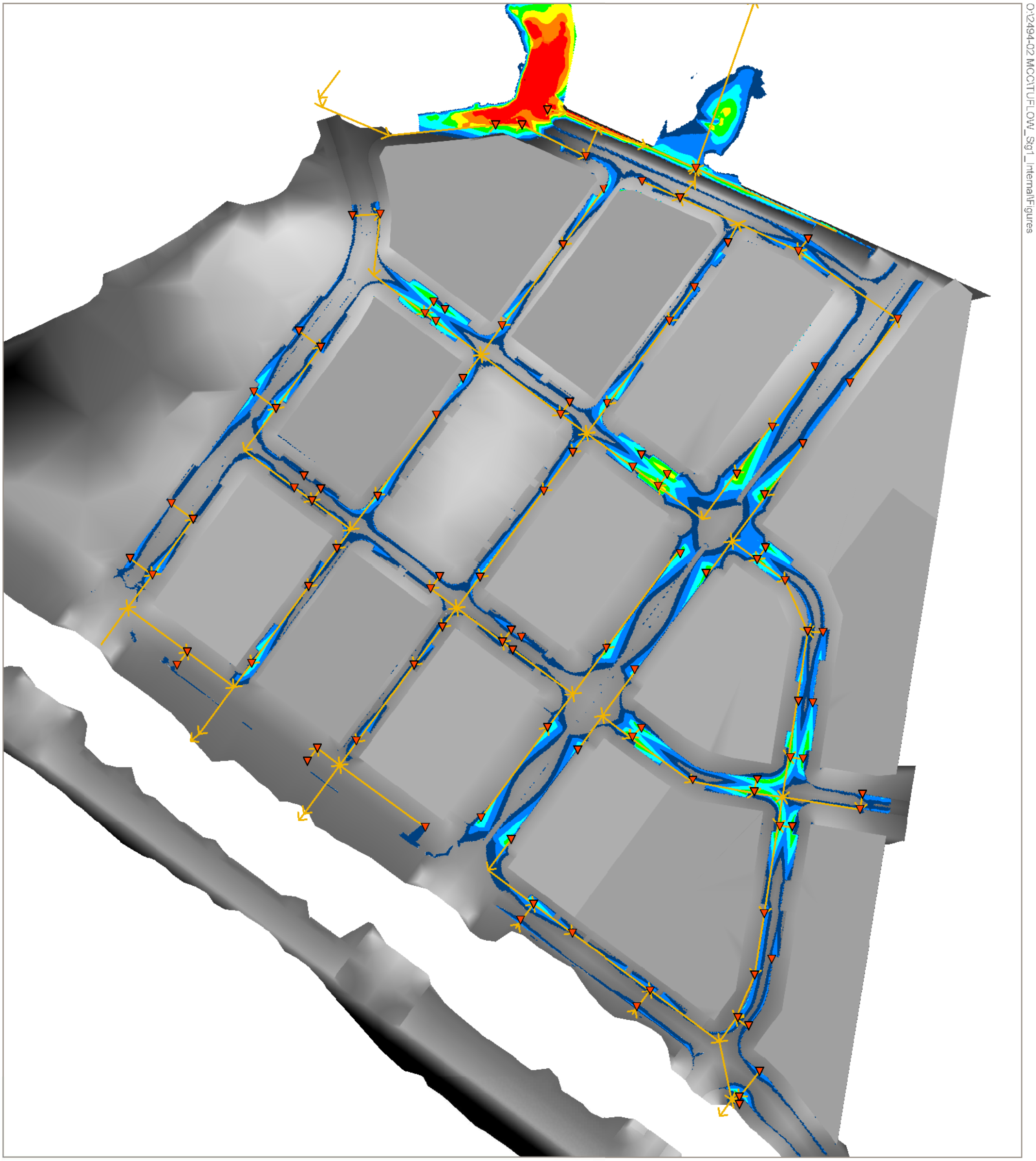
Figure 3

1% AEP Design Peak Depth with Climate Change

Stage 1 Internal Drainage

Cardno
Shaping the Future

Cardno (QLD) Pty Ltd | ABN 57 051 074 992
Level 11, North Tower, 515 St Pauls Terrace
Locked Bag 4006, Fortitude Valley QLD 4006
Tel: 07 3369 9822 Fax: 07 3369 9722



O:\2494-02 MCC\TUFLOW_Stg1_Internal\Figures

Scale: 1:1,500

15 0 15 30 45

Metres

N W E S

SHEET	A3
Project No:	2492-02
Date:	30 October 2015
Revision Number:	
Designed by:	
Client Name:	SunCentral Maroochydore

Depth (m)

- 0.00 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- 0.20 to 0.25
- 0.25 to 0.30
- 0.30 to 0.50

Inlet Pits

Stormwater Drainage

Figure 4

1% AEP Design Peak Depth with Climate Change

Stage 1 Internal Drainage

Cardno
Shaping the Future

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APPENDIX H

MUSIC Model (Issued Separately)