

STORMWATER MANAGEMENT PLAN

FOR A
INDUSTRIAL DEVELOPMENT

AT
LOT 12 CHRISTENSEN ROAD SOUTH, STAPYLTON

FOR
SPACEFRAME BUILDINGS PTY LTD

REF: 17167 - Stormwater Management Plan -Rev 02.docx





Client: Spaceframe Building Pty Ltd
Location: Christensen Rd, Stapylton

Final Issue Approval			
Date	Name	Signature	Document Status
26.10.17	Steen Chamberlain (RPEQ No: 15545)		Issue for Approval

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A - Approval	B - Building Approval	C - Construction	P - Preliminary
R - Revision	T - For Tender	X - Information	D-Draft

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1 INTRODUCTION

Civil Perspective Pty Ltd have been commissioned by Spaceframe Building Pty Ltd (Client) to prepare a Stormwater Management Report, for a proposed industrial development at Lot 12 Christensen Road, Stapylton. Refer Figure 1-1 below for the site locality.

This report has been prepared for submission to City of Gold Coast Council (COG) alongside an application for a Material Change of Use under the City of Gold Coast Council's current Planning Scheme. The development proposal involves the creation of 1 large industrial shed with associated carparking and landscaping within proposed Lot 12. This new industrial development has recently been approved for high impact industrial use however the Plan and Property number have yet to be released at the time of writing this report. The proposed development layout can be found in Appendix A of this report.



Figure 1-1 Site Locality (obtained 28.09.17 – Queensland Globe)

Stormwater management is an important element for all development. Long term impacts of stormwater runoff from developments can degrade natural environments. These impacts on receiving environments can be reduced through the effective management of stormwater runoff during and after development.

2 EXISTING SITE DETAILS

The proposed development footprint occupies one (1) land parcel within a larger parcel of land, properly described as:

Lot 334 on SP193431

Locality of Stapylton

The area of the site is approximately 0.63 Hectares.

The site under the City of Gold Coast Council Planning Scheme is located within the Woongoolba Flood mitigation catchment area. This means that the drainage capacity of the Woongoolba Flood Mitigation Scheme Area for rainfall events up to 1 in 10 year 72 hours is maintain and this capacity is not to be eroded due to development.

The topography of the site is currently unknown due to an existing survey unavailable at the time of writing this report. However, a sketch provided by Spaceframe Buildings Pty Ltd, from the industrial subdivision has been provided. The site slopes from north-west to south-east, ranging from RL11.250 to RL9.8160 respectively. A retaining wall has been constructed on the northern and western boundary of proposed Lot 12. It has been assumed that as part of the industrial development, grading of each proposed site will be as per the City of Gold Coast Subdivision standard and that no stormwater runoff from the adjacent sites will be occurring.

The current topography does slope towards the south, on to Christensen Road South and then ultimately into Sandy Creek. There is an existing bioretention basin constructed at the end of the road, in which all road drainage pits are discharging to for treatment. As part of the overall Stage 1 and Stage 2 industrial development, it is proposed to upgrade this area. It has also been assumed that the bioretention basin will be only treating the road runoff and all proposed development will require their own treatment system before discharging to the pit and pipe system in Christensen Road South, which is occurring in Stage 1 of the current development. The general location of the development is approximately 150m north of the bioretention basin and Sandy Creek.

The existing Lawful Point of Discharge (LPD) is the pit and pipe system in Christensen Road South, which conveys site runoff to Sandy Creek. It has been assumed that there is a drainage pit available on site that connect into this road system.

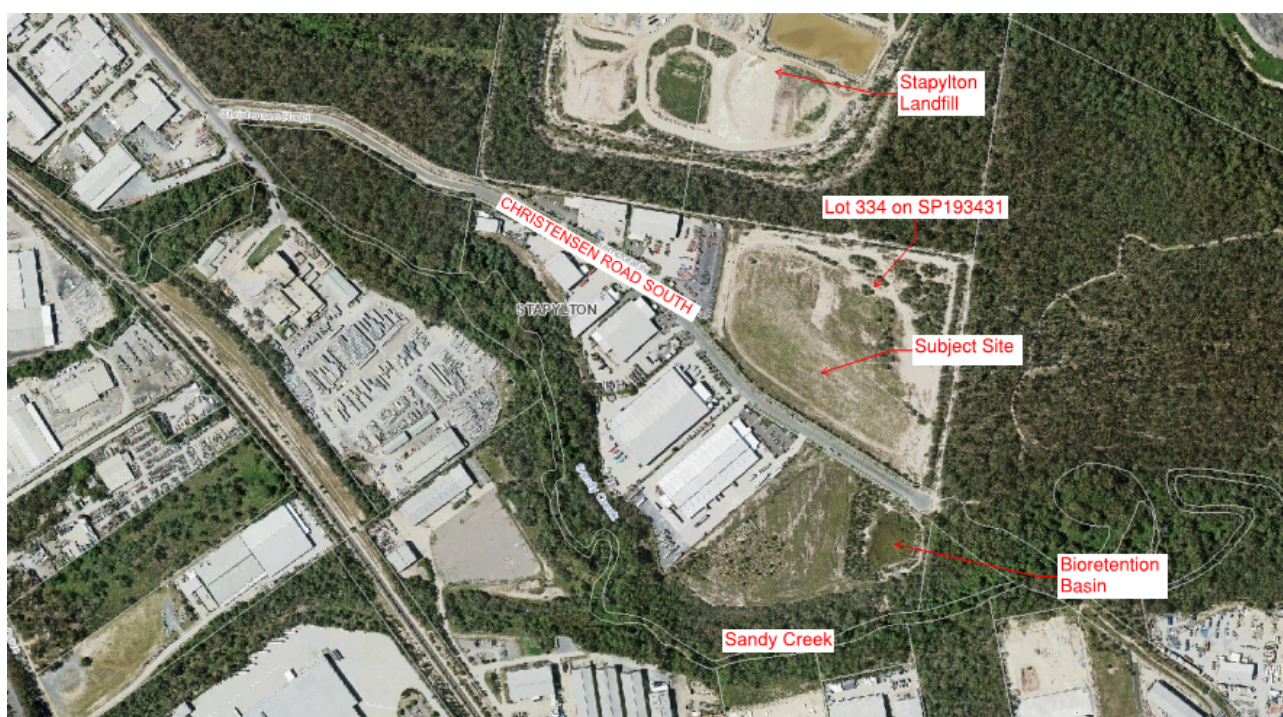


Figure 2-1 Aerial Photo (obtained 28.09.17 – COG Interactive Mapping)



Figure 2-2 Stormwater Infrastructure (obtained 28.09.17 – COG ArcGIS)

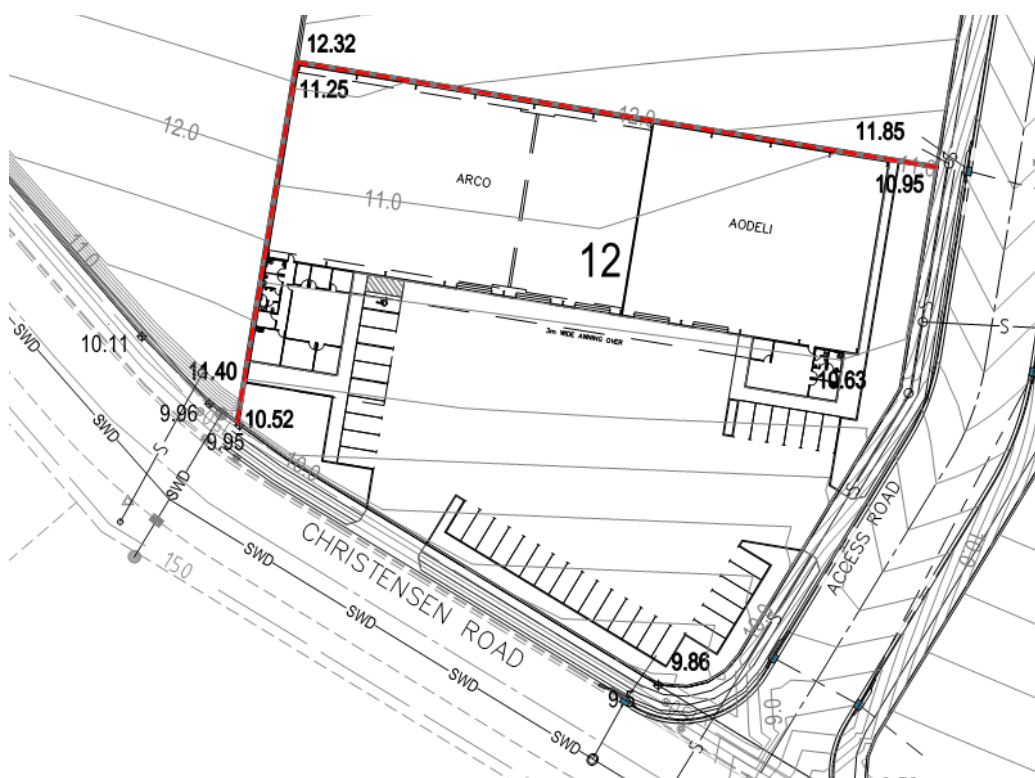


Figure 2-3 New Industrial Development Sketch (obtained 25.09.17 – Spaceframe Buildings Pty Ltd)



3 PROPOSED DEVELOPMENT

It is proposed to develop the site into an industrial complex, with one large shed split into 2 businesses, associated office area for each, car parking area and landscaping. The development layout has been conceived by Spaceframe Building Pty Ltd and is presented in Appendix B.

The proposed site, known as Lot 12, will be 6293m² in size in which access will be from Christensen Road South. As part of the overall subdivision in Stage 2, there will be new road constructed on the eastern boundary.

As part of this report, there has been assumption made regarding the site, due to limit information at the time of writing this report. It has been assumed that the site will have a field inlet available for connection to the existing stormwater infrastructure in Christensen Road South. It has also been assumed that there is no overland flow from adjacent properties, hence no consideration of other stormwater flows other than the site itself. The current bioretention area to the south-east was constructed as part of Stage 1 and it has been noted that the developments within Stage 1 do have water quality systems within their individual sites, however it seems that the bioretention area for stage 1 has capacity for detention. It has been assumed that as part of Stage 2 development that the same approach will be taken with Lot 12.

The current cadastral for proposed Lot 12 is currently unavailable through the City of Gold Coast mapping system. A general estimate of where the lot is, has been used.

4 WATER QUALITY MODELLING

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6 was used in combination with MUSIC Modelling Guidelines Version 1.0 (2010) to evaluate expected stormwater quality for the proposed development.

4.1 Model Objectives

The objective of the MUSIC model is to accurately represent the site and facilitate stormwater quality management. Stormwater quality management aims to protect the quality of receiving waters by limiting the quantity of stormwater pollutants discharged to the receiving environment as a result of urban development.

4.2 Water Quality Objectives

The water quality objectives summarised in Table 4-1 have been adopted from the State Planning Policy, July 2017.

Table 4-1 Water Quality Objectives

Minimum Reductions in Mean Annual Loads from Unmitigated Catchment			
Total Suspended Solids (TSS)	Total Phosphorus (TP)	Total Nitrogen (TN)	Gross Pollutants > 5mm
80%	60%	45%	90%

4.3 Rainfall Data

Stormwater runoff is simulated using historical rainfall data. Data from the Beenleigh Bowls Club, station number 40406, has been used from 1990 - 1999 to represent the climatic period which the MUSIC model is based.

A summary of the meteorological parameters used to simulate climate behaviour are presented in Table 4-2.



Table 4-2 Rainfall data and modelling periods

Input	Data Used in Modelling
Rainfall station	40406 – Beenleigh Bowls Club
Time step	6 minute
Modelling period	1/1/1990 - 31/12/1999
Mean annual rainfall (mm)	1152
Annual evapotranspiration (mm)	1491
Rainfall runoff parameters	Industrial
Pollutant export parameters	Industrial

Rainfall runoff and pollutant export parameters included as model inputs are in line with the MUSIC Modelling Guidelines Version 1.0 (2010).

4.4 Evapotranspiration Data

Dayboro Post Office evapotranspiration data was extracted from Table 3.1 of the MUSIC Modelling Guidelines Version 1.0 (2010), as detailed in Table 4-3.

Table 4-3 MUSIC Monthly Evapotranspiration Data (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
192	151	147	106	73	61	62	79	108	147	170	195

4.5 Catchment Description

To analyse the proposed development in MUSIC, the site was modelled using a split node approach, as summarised in Table 4-4. The MUSIC catchment plan included as Figure 4-1.

Table 4-4 Source Node Characteristics

Catchment ID	Area (ha)	Land use	Fraction Impervious (%)
Roof	0.30	Roof (Industrial)	100
Road	0.27	Road (Industrial)	100
Ground Level	0.06	Ground Level (Industrial)	0
TOTAL	0.63		

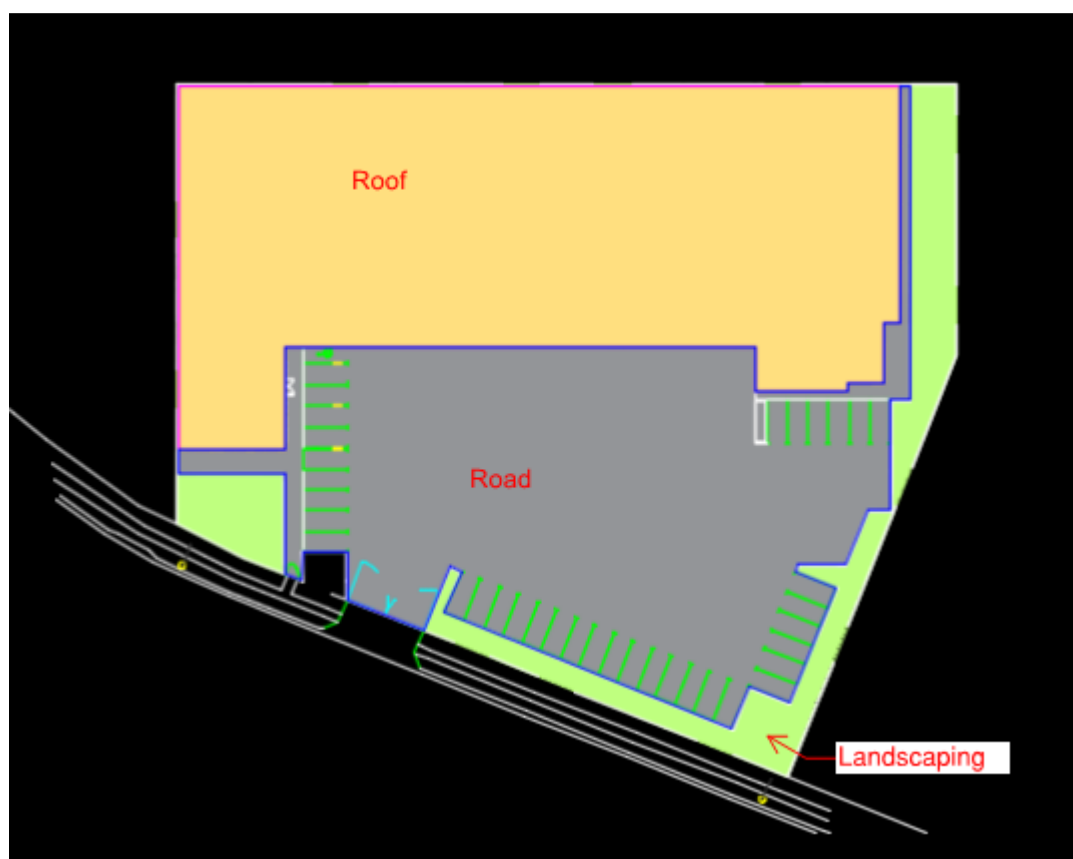


Figure 4-1 MUSIC Catchment Map

4.6 Rainfall Runoff Parameters

The rainfall runoff export parameters have been adopted from Table 3.7 of the MUSIC Modelling Guidelines Version 1.0, as summarised in Table 4-5.

Table 4-5 Rainfall-Runoff Parameters for Commerical/Industrial Source Nodes

Parameter	Urban Residential Land Use
Rainfall threshold (mm)	1
Soil storage capacity (mm)	18
Initial storage (% capacity)	10
Field capacity (mm)	80
Infiltration capacity coefficient a	243
Infiltration capacity exponent b	0.6
Initial depth (mm)	50
Daily recharge rate (%)	0
Daily baseflow rate (%)	31
Daily deep seepage rate (%)	0

(extracted from Table 3.7, Water by Design, 2010)

4.7 Pollutant Export Parameters

The pollutant export parameters have been adopted from Table 3.8 of the MUSIC Modelling Guidelines Version 1.0, as summarised in Table 4-6.

Table 4-6 Rainfall-Runoff Parameters for Urban Residential Source Nodes

Land Use	Flow Type		TSS log ¹⁰ values	TP log ¹⁰ values	TN log ¹⁰ values
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		Pollutant Source	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Roof	Baseflow	Industrial	N/A	N/A	N/A	N/A	N/A	N/A
	Stormflow	Industrial	1.30	0.44	-0.89	0.36	0.25	0.32
Road	Baseflow	Industrial	0.78	0.45	-1.11	0.48	0.14	0.20
	Stormflow	Industrial	2.43	0.44	-0.30	0.36	0.25	0.32
Ground Level	Baseflow	Industrial	0.78	0.45	-1.11	0.48	0.14	0.20
	Stormflow	Industrial	1.92	0.44	-0.59	0.36	0.25	0.32

4.6 Bioretention Systems

A bioretention system's primary function is to remove pollutants from stormwater prior to the stormwater being discharged from the site and ultimately into a local waterway.

Bio-retention systems operate by filtering stormwater through a prescribed soil media prior to being collected at the base of the system via perforated pipes located within a gravel drainage layer. During percolation through the soil media, pollutants are retained through fine filtration, adsorption and some biological uptake.

The vegetation on the surface of the soil media is vital to the overall performance of the system. In conjunction with facilitating pollutant removal, the species also need to be relatively hardy and tolerant of freely draining sandy soils and regular inundation.

It is proposed to split the impervious catchments into 3 different bioretention systems. Each system will treat different elements of the development.

The parameters utilised to analyse the bioretention filters are presented in Table 4-7.

Table 4-7 Bioretention Node Reporting Table

Parameter	Bio Basin 1	Bio Basin 2	Bio Basin 3
Surface Area (m ²)	30	25	30
Extended Detention Depth (m)	0.3	0.3	0.3
Filter Area (m ²)	30	25	30
Unlined Filter Media Perimeter (m)	20	20	22
Saturated Hydraulic Conductivity (mm/hr)	200	200	200
Filter Depth (m)	0.7	0.7	0.7
TN Content of Filter Media (%)	600	600	600
Orthophosphate Content of Filter Media mg/kg)	40	40	40
Is the Base Lined?	No	No	No
Vegetated with Effective Nutrient Removal Plants	Yes	Yes	Yes
Overflow Weir Width (m)	1.50	1.50	2.50
Exfiltration Rate (mm/hr)	0.0	0.0	0.0
Underdrain Present	Yes	Yes	Yes



Submerged Zone with Carbon Present	No	No	No
Confirmation that K and C* Remain Default	Yes	Yes	Yes

4.8 Modelling Results

The MUSIC model produced to analyse the proposed development, along with a screen shot of the results is shown in Figure 4-2. The results of the MUSIC analysis are reported in

Table 4-8. As can be seen, the proposed treatment train for the development is adequate in achieving the required pollutant load based reduction targets.

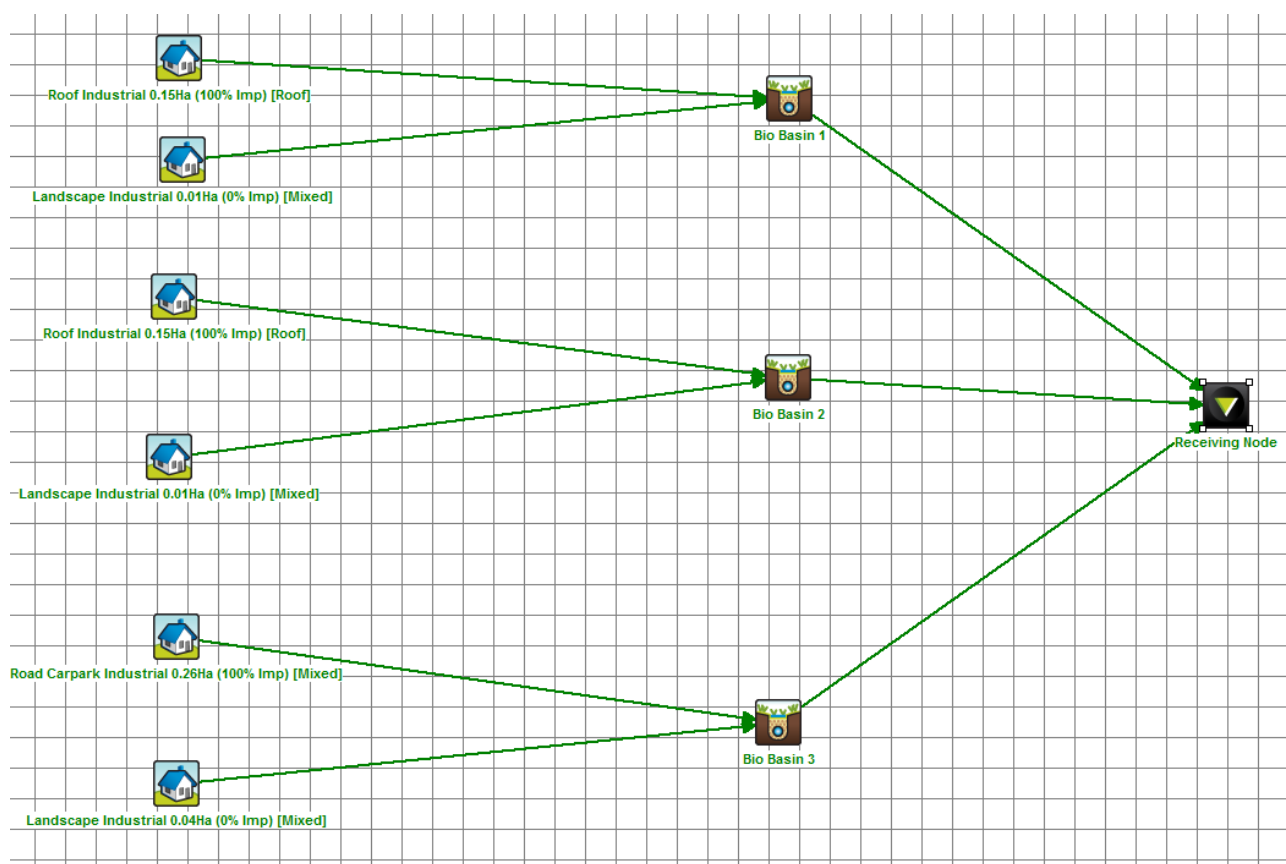


Figure 4-2 MUSIC Model Layout



Table 4-8 MUSIC Modelling Results

Pollutant	Reduction (%)	Objective (%)	Objective Achieved
TSS	82.4	80	Yes
TP	68.4	60	Yes
TN	54	45	Yes
Gross Pollutants	100	90	Yes

5 WATER QUANTITY MANAGEMENT

5.1 Introduction

The overall industrial subdivision has 2 stages, with stage 1 already constructed. As part of this Stage 1 construction, a bioretention area was installed. Documentation for Stage 1 indicates that the bioretention area does not support each site for water quality treatment, however it seems that the depth of the bioretention has capacity to detain each lot.

Within Stage 2 subdivision drawings, the road drainage system will be connected to Stage 1 drainage system, hence, discharging to the existing bioretention basin area. Upon further investigation, as part of Stage 2 subdivision design, the bioretention basin is being upgraded to allow for detention capacity and to ensure the discharge from this basin is in accordance with the Woongoolba Flood mitigation catchment area. This means that the drainage capacity of the Woongoolba Flood Mitigation Scheme Area for rainfall events up to 1 in 10 year 72 hours is maintain and this capacity is not to be eroded due to development.

As part of an assumption to this, the water quantity aspect for any stage 2 development will not require detention. Hence, proposed Lot 12 will not require detention due to the current stage 2 subdivision design and proposed bioretention upgrade associated with Stage 2.

6 CONSTRUCTION PHASE WATER QUALITY

During the construction phase, the potential exists for increases in the amount of pollutants, particularly sediment, exported from the site.

The completed Erosion Hazard Assessment form for the site is contained in Appendix C. The site is classified as Low Risk. It has therefore been necessary to prepare an Erosion and Sediment Control Plan as part of the Operational Works detailed design.

It will be required at detailed design to ensure the plan complies with the following best practice guidelines.

- IECA.2008, Best Practice Erosion and Sediment Control- Engineering Guidelines for Queensland Construction Sites.
- Institution of Engineers Australia.1996, Soil Erosion and Sediment Control, Engineering Guidelines for Queensland Construction Sites. June.
- Department of Environment and Resource Management. 2010, Urban Stormwater Quality Planning Guidelines.

It is considered that the completion of construction activities in accordance with the Erosion and Sediment Control Plan will minimise the nature of any adverse impacts during the construction phase.

The pollutants that would typically be generated during the construction of the proposed development are outlined in Table 6-1.



Table 6-1 Typically Generated Pollutants During Construction

Pollutant	Source
Litter	Paper, construction packing, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic Materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters (eg. from tile works)
pH altering substances	Acid Sulphate Soils, cement slurry.

Best practice measures will be utilised during the construction phase to minimise the potential impacts of the above-mentioned pollutants. These may include erosion and sediment control measures in general accordance with International Erosion Control Association 2008, Councils Erosion and Sediment Control Standard, and appropriate storage of materials and refuse.

7 SUMMARY & CONCLUSIONS

This SMP has been developed for the proposed industrial development at Lot 12 Christensen Road South, Stapylton. As part of the initial investigation into this development, there are a number of assumptions made in order to produce this report to date. It has been assumed that:

- Existing Bioretention area will be upgraded as part of Stage 2 development;
- The existing bioretention area will only allow for water quantity management, not water quality requirements, which is the same as Stage 1 development;
- Stage 2 will require upgrading of the existing bioretention area to allow for detention and to satisfy the Woongoolba Flood Mitigation Catchment area planning policy;
- No overland flow from adjacent properties will be entering Lot 12 and the discharge point for Lot 12 will be a field inlet pit on site, which connects to the road drainage system in Christensen Road;

A treatment train has been devised to ensure the relevant water quality objectives can be achieved for runoff exiting the site, and that pre-development peak flow rates can be maintained.

Based on this assessment, the following conclusions have been made:

- The relevant water quality objective for the site are load based reduction targets of:
 - TSS 80%,
 - TP 60%,
 - TN 45%, and
 - GP 90%.
- These water quality objectives can be achieved by implementing a bioretention and vegetated swale treatment train consisting.
- A total of 3 bioretention basins have been proposed, all with different parameters for treatment. Refer to Table 4-7 and Appendix A, SMP-002 for details.

Based on the above investigations, and in our opinion, we consider that the development of the subject site into an industrial shed and associated infrastructure can be readily undertaken as conceived on the enclosed drawings with little significant engineering constraints, and in general compliance with the City of Gold Coast Planning Scheme and other relevant codes.



The findings of this report are limited to the areas of interest, and to the detail required for submission of a Material Change of Use application to City of Gold Coast Council for the subject site, being Lot 12 (Plan and Property number unknown), Christensen Road South, Stapylton. Future detailed design (Operational Works) will be required prior to construction of the proposed development commencing.

8 LIMITATIONS AND CLOSURE

This report has been prepared by Civil Perspective Pty Ltd, under the direction of a Registered Professional Engineer of Queensland. This report has been tailored to investigate issues in the context of the proposal and at the area of interest, as denoted within. The information contained in this report is not to be used outside of the subject area.

It is to be noted that a number of assumptions have been made throughout this report to determine the final outcome. If the assumption within this report change in the future, this report will be null and void.

We consider that this report accurately reflects the conditions of the area of interest, at the time the study was undertaken. The results of this study should be reviewed if conditions or the proposal change in the future.

This report is only to be used in full and may not be used to support objectives other than those set out herein, except where written approval, with comments, are provided by Civil Perspective Pty Ltd.

Civil Perspective Pty Ltd accepts no responsibility for the accuracy of information supplied to them by second and third parties.



Appendix A – Engineering Drawing



DEVELOPMENT SUMMARY

SITE AREA	0.63 Ha
CAR PARK AREA	0.27 Ha
ROOF AREA	0.30 Ha
LANDSCAPING AREA	0.06 Ha

THESE PLANS HAVE BEEN PREPARED FOR INCLUSION IN A PRELIMINARY DEVELOPMENT APPLICATION. THE DESIGN IS CONCEPTUAL ONLY AND MAY CHANGE FOLLOWING THE PREPARATION OF DETAILED DESIGN. IT IS ANTICIPATED THAT A DETAILED DESIGN WILL BE PREPARED, GENERALLY IN ACCORDANCE WITH THE APPROVED CONCEPT DESIGN, AS PART OF A FUTURE APPLICATION FOR OPERATIONAL WORKS.

FOR APPROVAL

26 October 2017

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Rev	Date	Description	By	Chk



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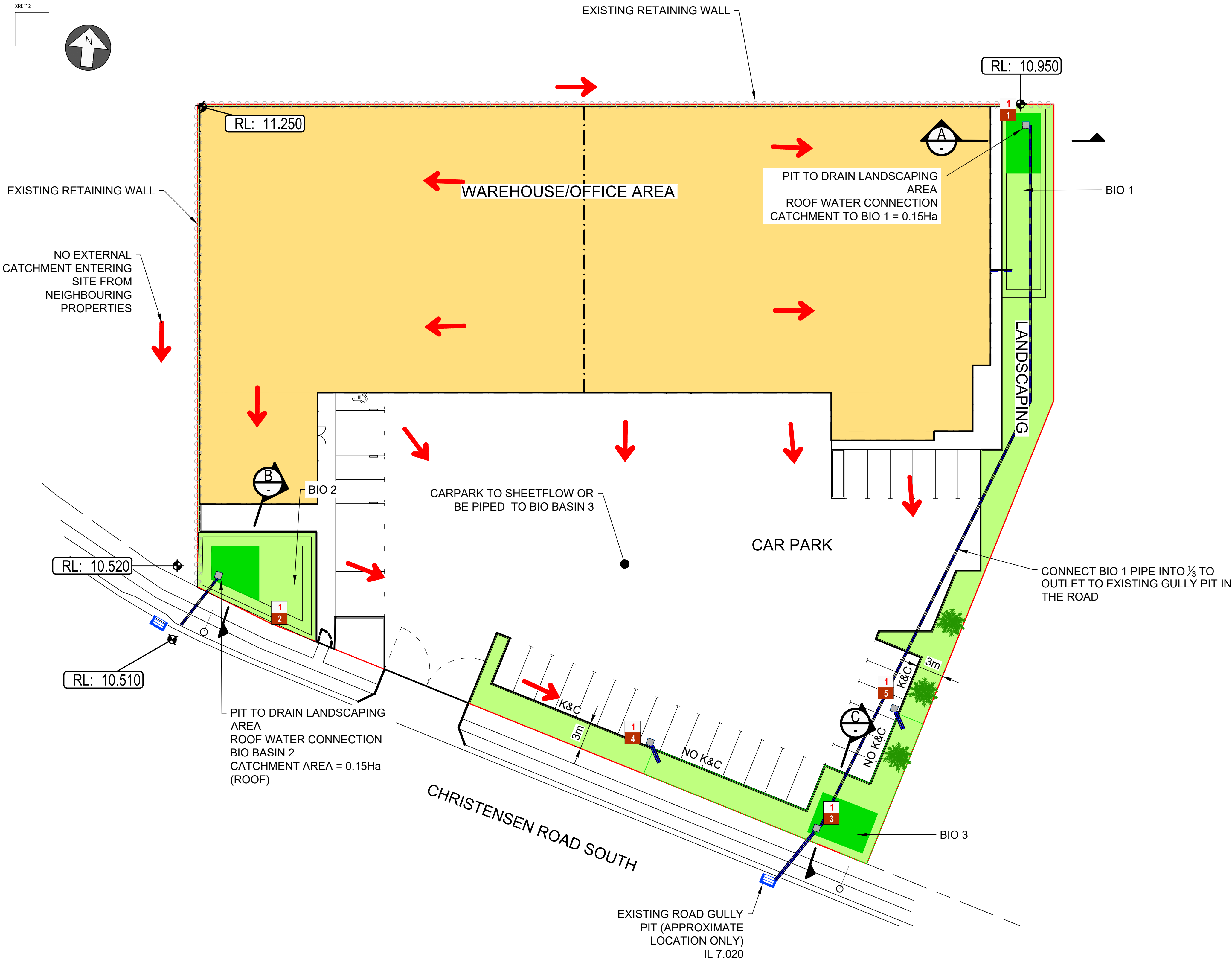
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SURVEY INFORMATION		Drawing No:
Provided by:		Date:
ARCHITECTURAL INFORMATION		Drawing No: 3682-SK00-6
Provided by: Spaceframe Building Pty Ltd		Date: 04/09/17

Client: SPACEFRAME BUILDING PTY LTD
Project Name: PROPOSED INDUSTRIAL DEVELOPMENT LOT 12 CHRISTENSEN ROAD SOUTH STAPYLTON, QLD

Discipline: CIVIL	Status: FOR APPROVAL
Designed By: ARC	Checked By: SC
Project No: 17167	Drawn By: ARC
Approved By: SC	
Scale at A1: REFER DRAWING	

Title: STORMWATER MANAGEMENT PLAN LOCALITY PLAN	
Drawing No: 17167-SMP01	Revision: 02



PRELIMINARY STORMWATER MANAGEMENT LAYOUT PLAN
SCALE: 1:250

BIO BASIN 1	
PARAMETERS	VALUE
TREATMENT AREA	0.15Ha - ½ ROOF AREA
QUALITY - FILTER AREA	30m²
DETENTION - VOLUME	64m³
EXTENDED DETENTION DEPTH	0.3m
DEPTH OF BASIN (EXCLUDING EXTENDED DETENTION DEPTH)	0.5m
BATTERS	1:1 - RETAINING WALL
RISER	600x600 DOMED RISER
WEIR	3.0m LONG

BIO BASIN 2	
PARAMETERS	VALUE
TREATMENT AREA	0.15Ha - ½ ROOF AREA
QUALITY - FILTER AREA	25m²
DETENTION - VOLUME	64m³
EXTENDED DETENTION DEPTH	0.3m
DEPTH OF BASIN (EXCLUDING EXTENDED DETENTION DEPTH)	0.5m
BATTERS	1:4 TO RETAINING WALL FROM EDGE OF FILTER
RISER	600x600 DOMED RISER
WEIR	2.50m LONG

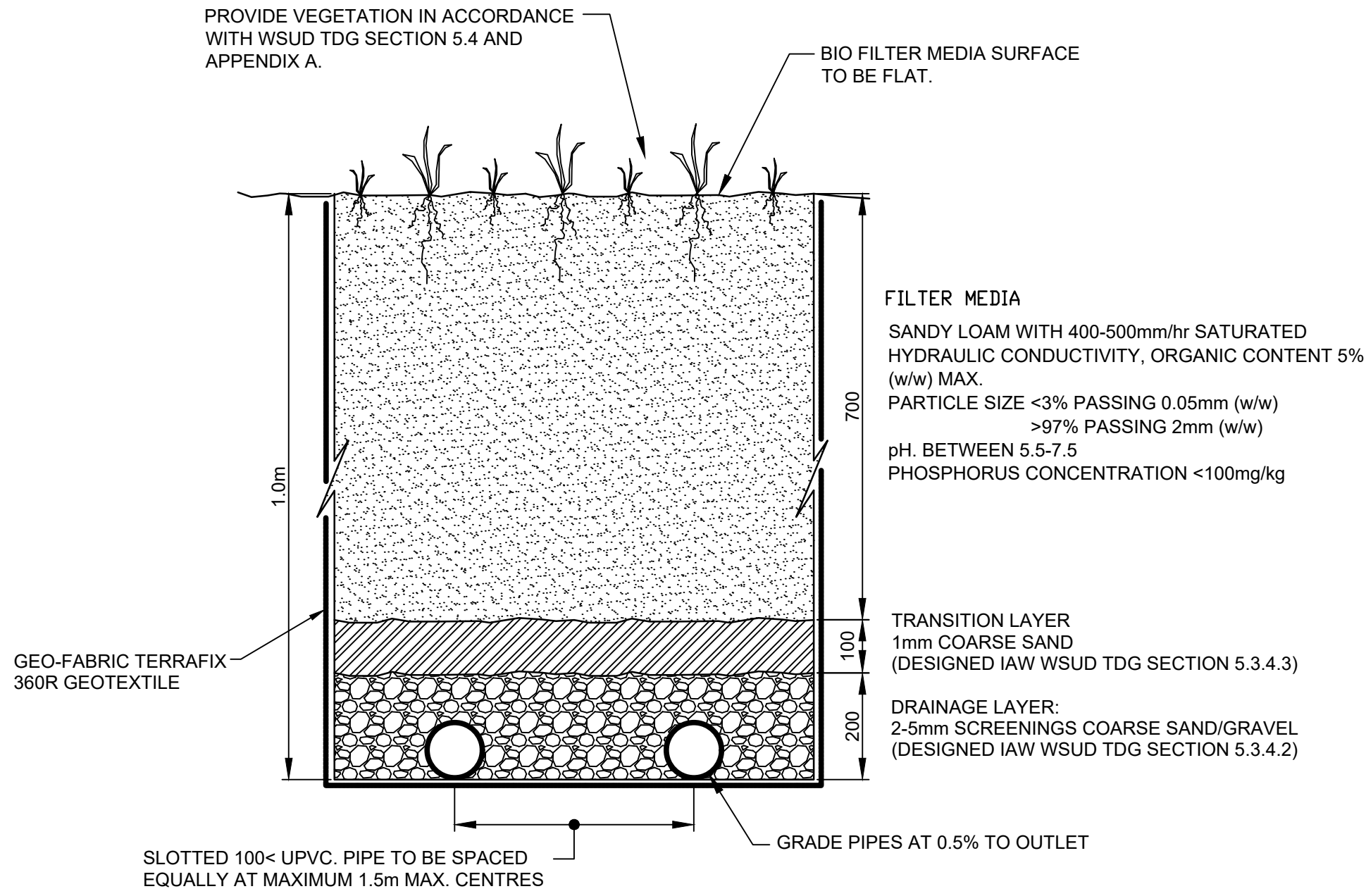
BIO BASIN 3	
PARAMETERS	VALUE
TREATMENT AREA	0.27Ha - 100% CAR PARK AREA
QUALITY - FILTER AREA	30m²
DETENTION - VOLUME	64m³
EXTENDED DETENTION DEPTH	0.3m
DEPTH OF BASIN (EXCLUDING EXTENDED DETENTION DEPTH)	0.5m
BATTERS	1:4 TO RETAINING WALL FROM EDGE OF FILTER
RISER	600x600 DOMED RISER
WEIR	3.0m LONG

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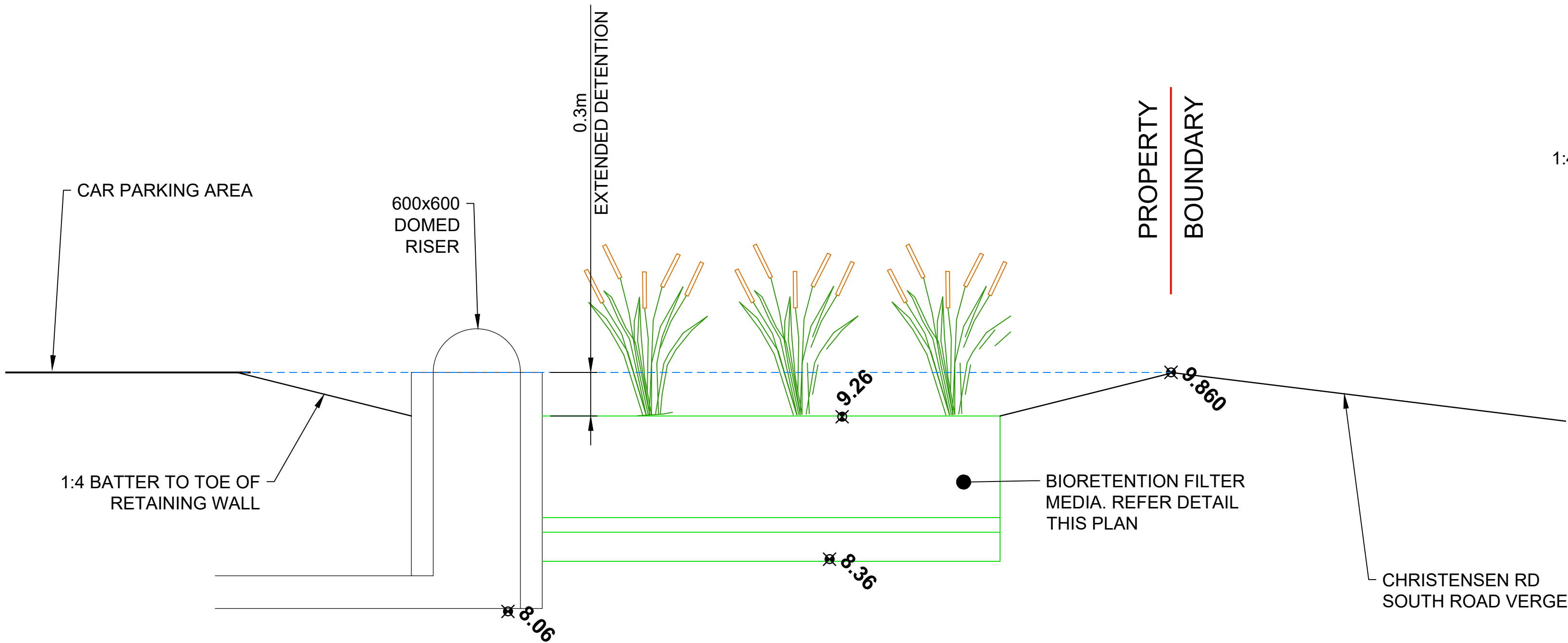
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0226.10.17ISSUE FOR APPROVALACSC 0105.10.17ISSUE FOR APPROVALACSC RevDateDescriptionByChk					CIVIL PERSPECTIVE CIVIL ENGINEERING CONSULTANT Unit 2D, Bld 2, 2-4 Flinders Pde North Lakes Q 4509 www.civilperspective.com.au 020409173682-SK00-604/09/17 Scale 1:250 @A1 020409173682-SK00-604/09/17 Scale 1:100 @A1 ARCHITECTURAL INFORMATION Provided by: Spaceframe Building Pty Ltd Drawing No: 3682-SK00-6 Date: 04/09/17					Client: SPACEFRAME BUILDING PTY LTD Project Name: PROPOSED INDUSTRIAL DEVELOPMENT LOT 12 CHRISTENSEN ROAD SOUTH STAPYLTON, QLD Discipline: CIVIL Designed By: ARC Checked By: SC Project No: 17167 Status: FOR APPROVAL Approved By: SC Scale at A1: REFER DRAWING The concepts and information contained in this document are the copyright of Civil Perspective. Use or copying of the document in whole or in part without the written permission of Civil Perspective constitutes an infringement of copyright. Do not scale drawings, IF IN DOUBT, ASK!					Title: STORMWATER MANAGEMENT PLAN PRELIMINARY LAYOUT PLAN Drawing No: 17167-SMP02 Revision: 02									
RPEQ Name: Sign: Date:					RPEQ No: Date:					Drawing No: 3682-SK00-6 Date: 04/09/17					Drawing No: 17167-SMP02					Revision: 02				

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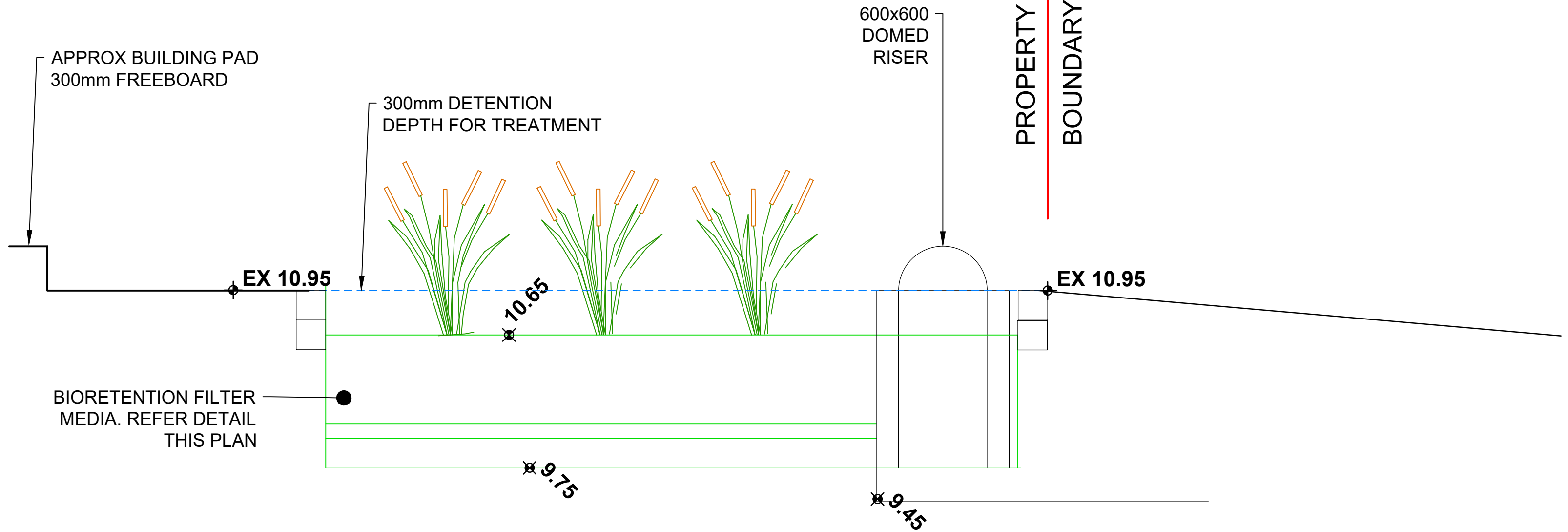


BIO-RETENTION MEDIA TYPICAL CROSS SECTION



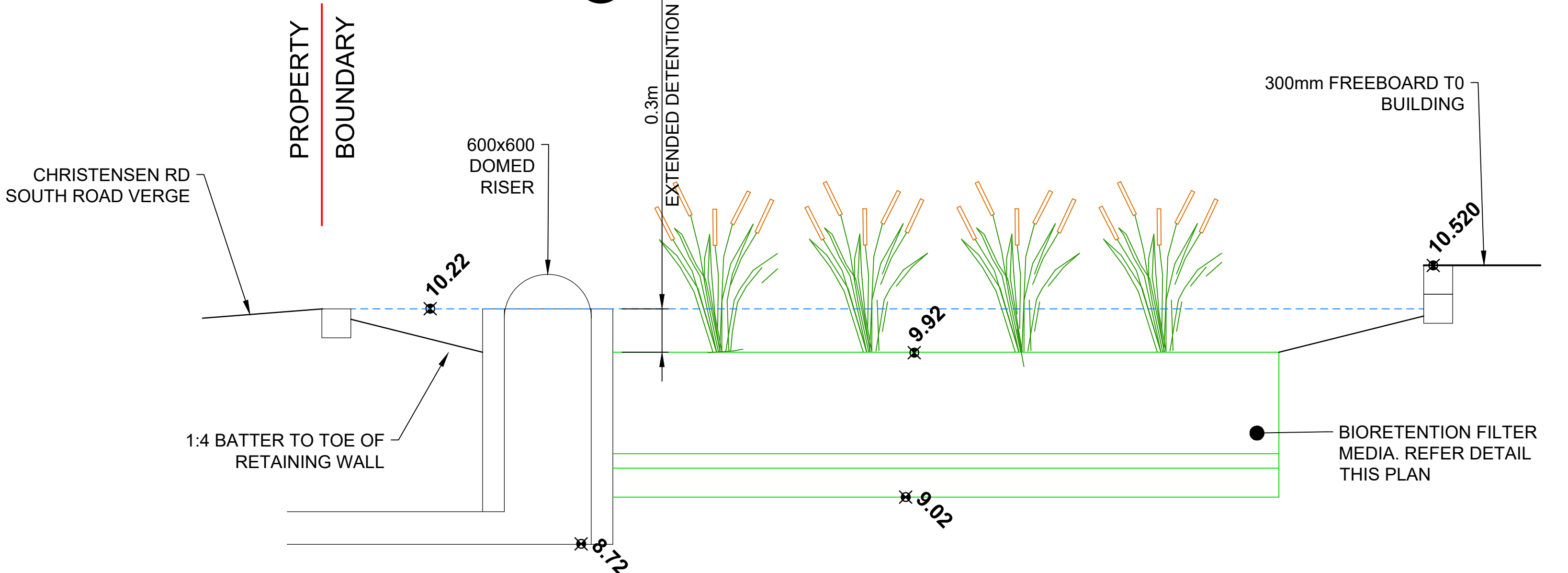
BIO BASIN 3
PRELIMINARY TYPICAL SECTION

SECTION C
SCALE 1:25



BIO BASIN 1
PRELIMINARY TYPICAL SECTION

SECTION A
SCALE 1:25



BIO BASIN 2
PRELIMINARY TYPICAL SECTION

SECTION B
SCALE 1:25

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0 2 4 6m
Scale 1:100 @A1

0 5 10 15m
Scale 1:250 @A1

SURVEY INFORMATION

Provided by: _____ Date: _____

ARCHITECTURAL INFORMATION

Provided by: Spaceframe Building Pty Ltd Date: 04/09/17

Client: SPACEFRAME BUILDING PTY LTD

Project Name: PROPOSED INDUSTRIAL DEVELOPMENT LOT 12 CHRISTENSEN ROAD SOUTH STAPYLTON, QLD

Drawing No: 3682-SK00-6
Date: 04/09/17

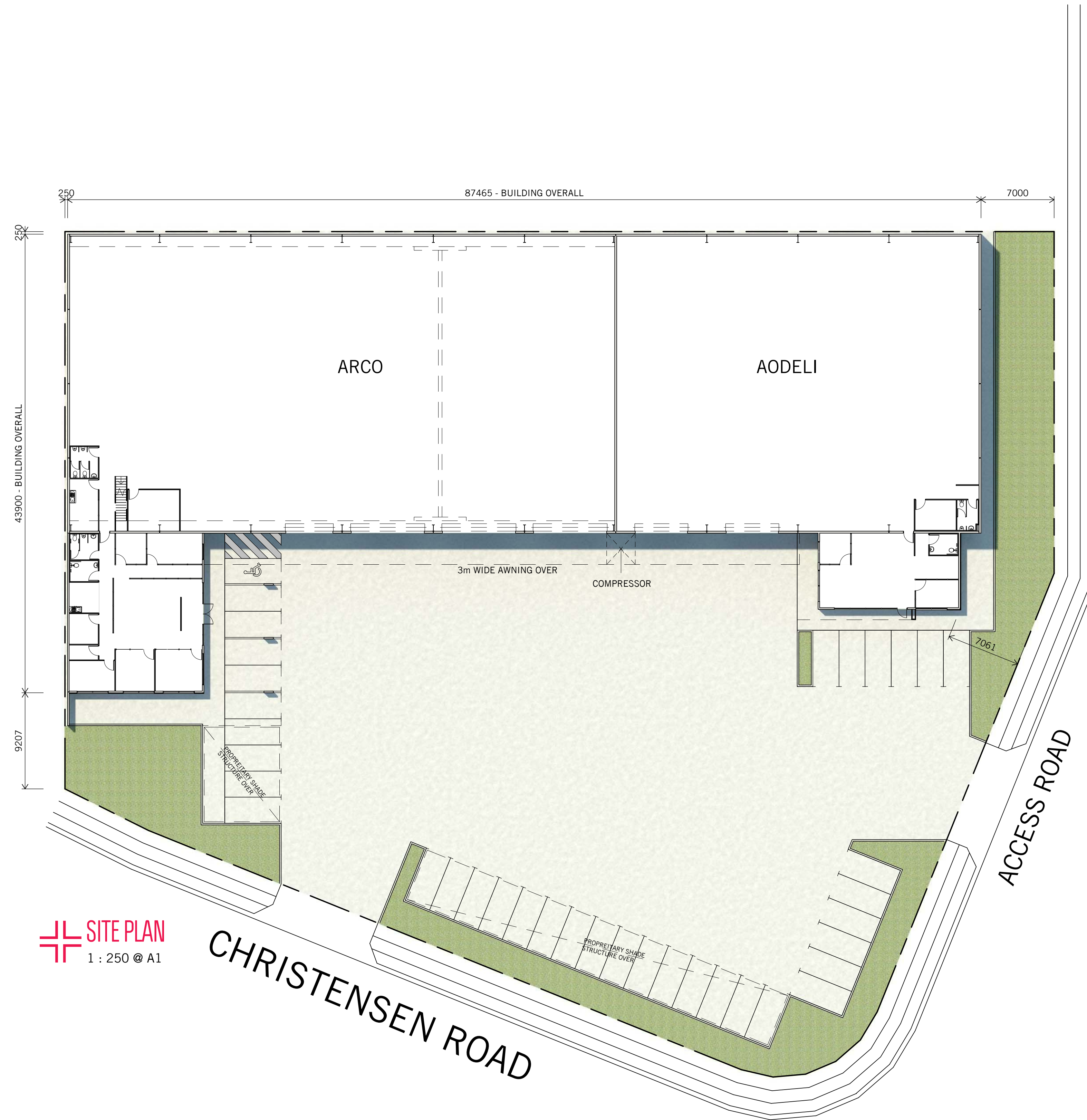
Discipline: CIVIL	Status: FOR APPROVAL
Designed By: ARC	Checked By: SC
Project No: 17167	Drawn By: ARC
Approved By: SC	
Scale at A1: REFER DRAWING	

Title: STORMWATER MANAGEMENT PLAN PRELIMINARY BASIN DETAIL	
Drawing No: 17167-SMP03	Revision: 02



Appendix B – Architectural Drawings

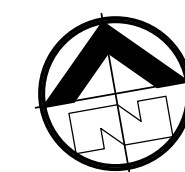




SITE PLAN
1 : 250 @ A1

CHRISTENSEN ROAD

ACCESS ROAD



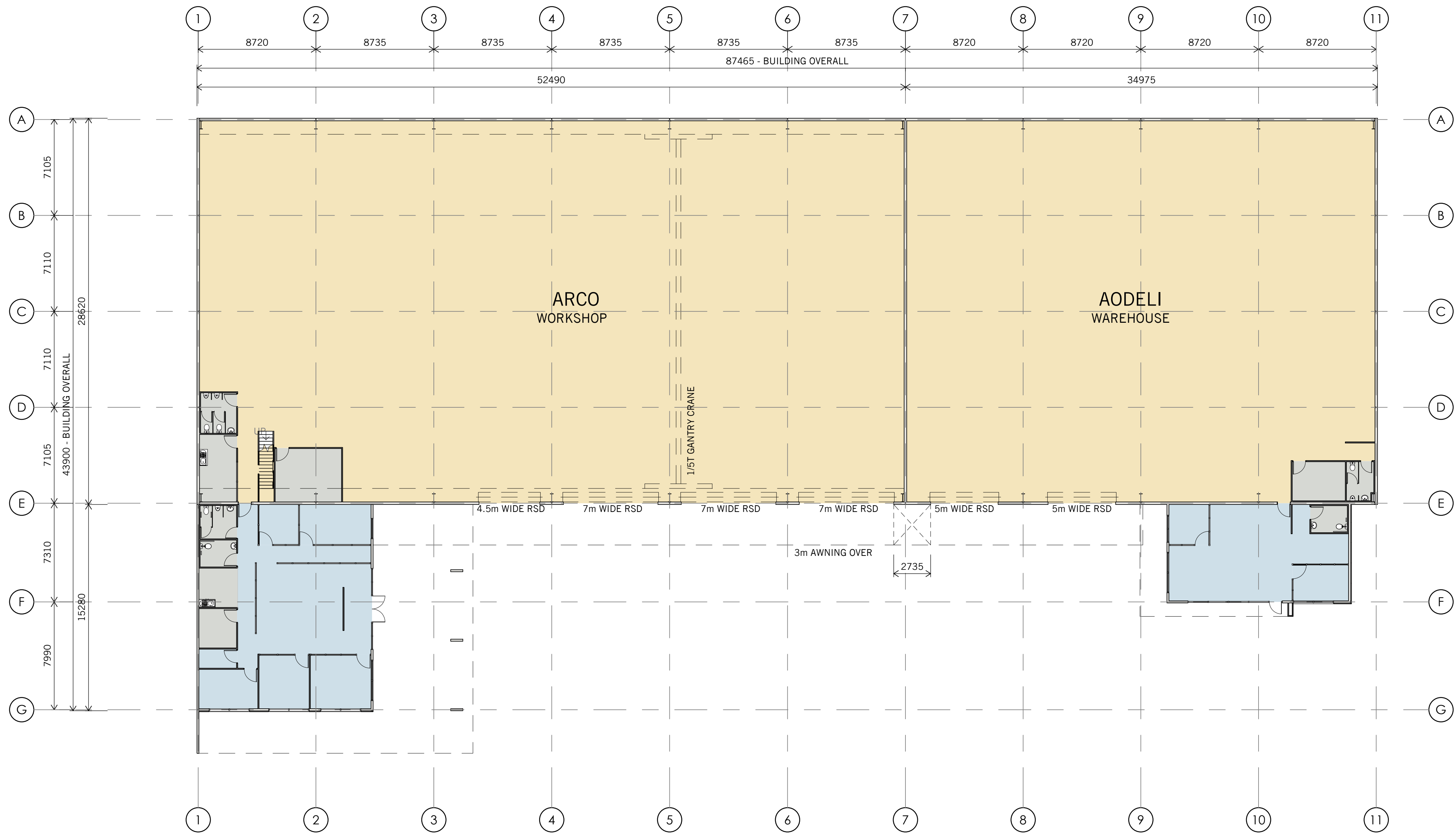
SITE PLAN
ARCO + AODELI
CHRISTENSEN ROAD
STAPVLTON QLD 4207
DWG N° 3682-SK01-7 by HAL
DATE 04/09/2017

SITE INFORMATION

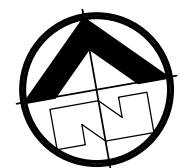
LOT 12	6,293 m ²
GROSS LEASABLE AREA	2,820 m ²
AODELI	
Office	100 m ²
Warehouse	1,000 m ²
	1,100 m ²
ARCO	
Mezzanine Office	20 m ²
Office	200 m ²
Workshop	1,500 m ²
	1,720 m ²
TOTAL CARPARKS	37
LANDSCAPING 10%	632 m ²

**space
frame**

DESIGN + CONSTRUCT SOLUTIONS



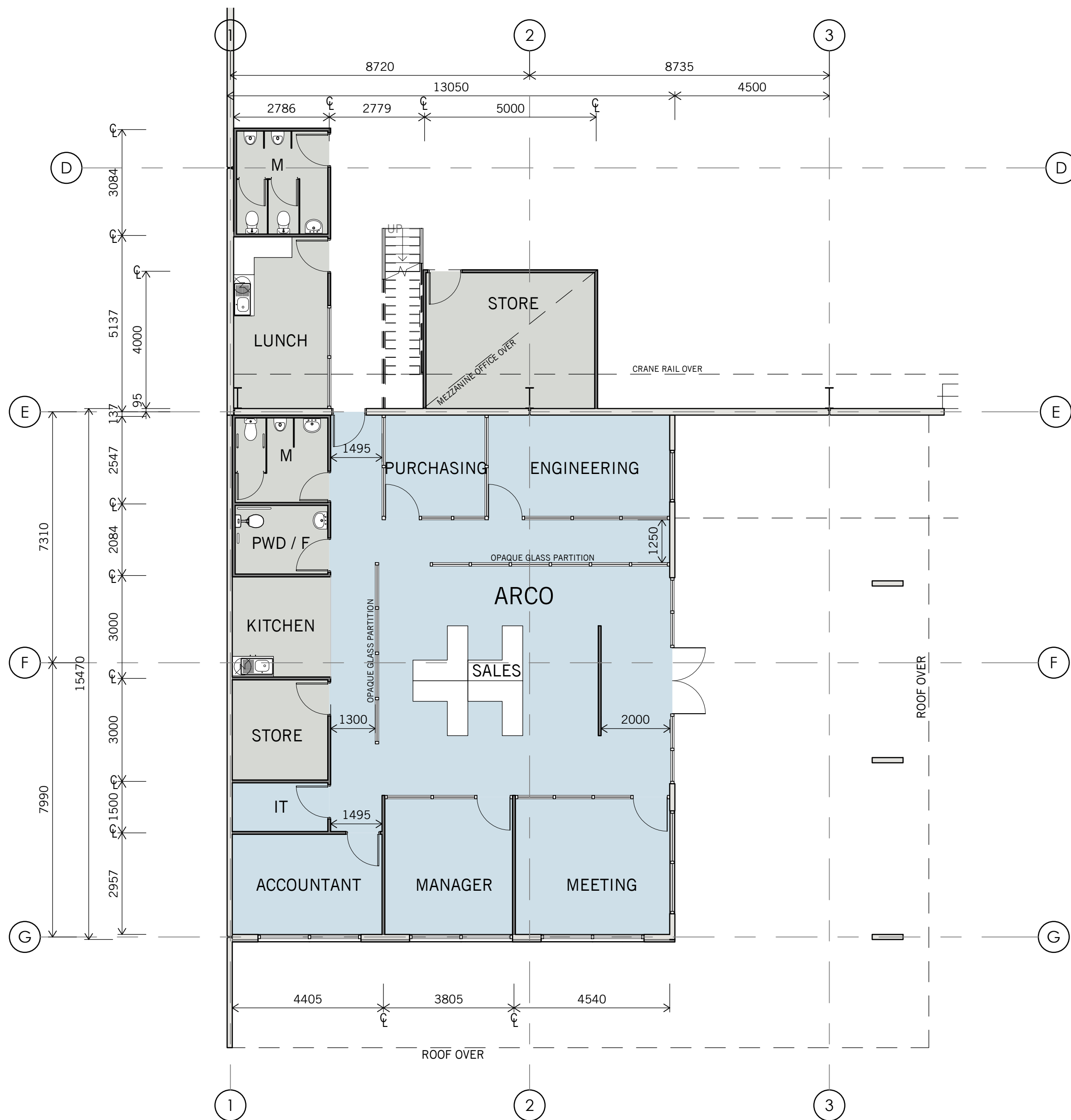
GROUND FLOOR PLAN
1 : 200 @ A1



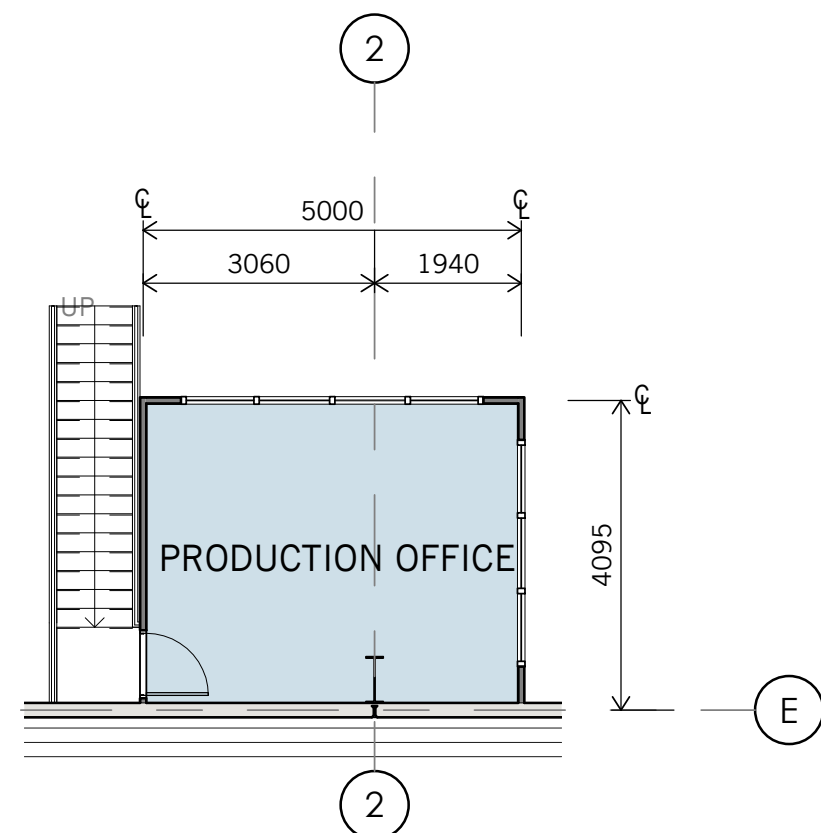
OVERALL FLOOR PLAN
ARCO + AODELI
CHRISTENSEN ROAD
STAPVLTON QLD 4207
DWG N° 3682-SK02-4 by HAL
DATE 04/09/2017

BUILDING INFORMATION	
GROSS LEASABLE AREA	2,820 m²
AODELI	
Office	100 m ²
Warehouse	1,000 m ²
	1,100 m ²
ARCO	
Mezzanine Office	20 m ²
Office	200 m ²
Workshop	1,500 m ²
	1,720 m ²

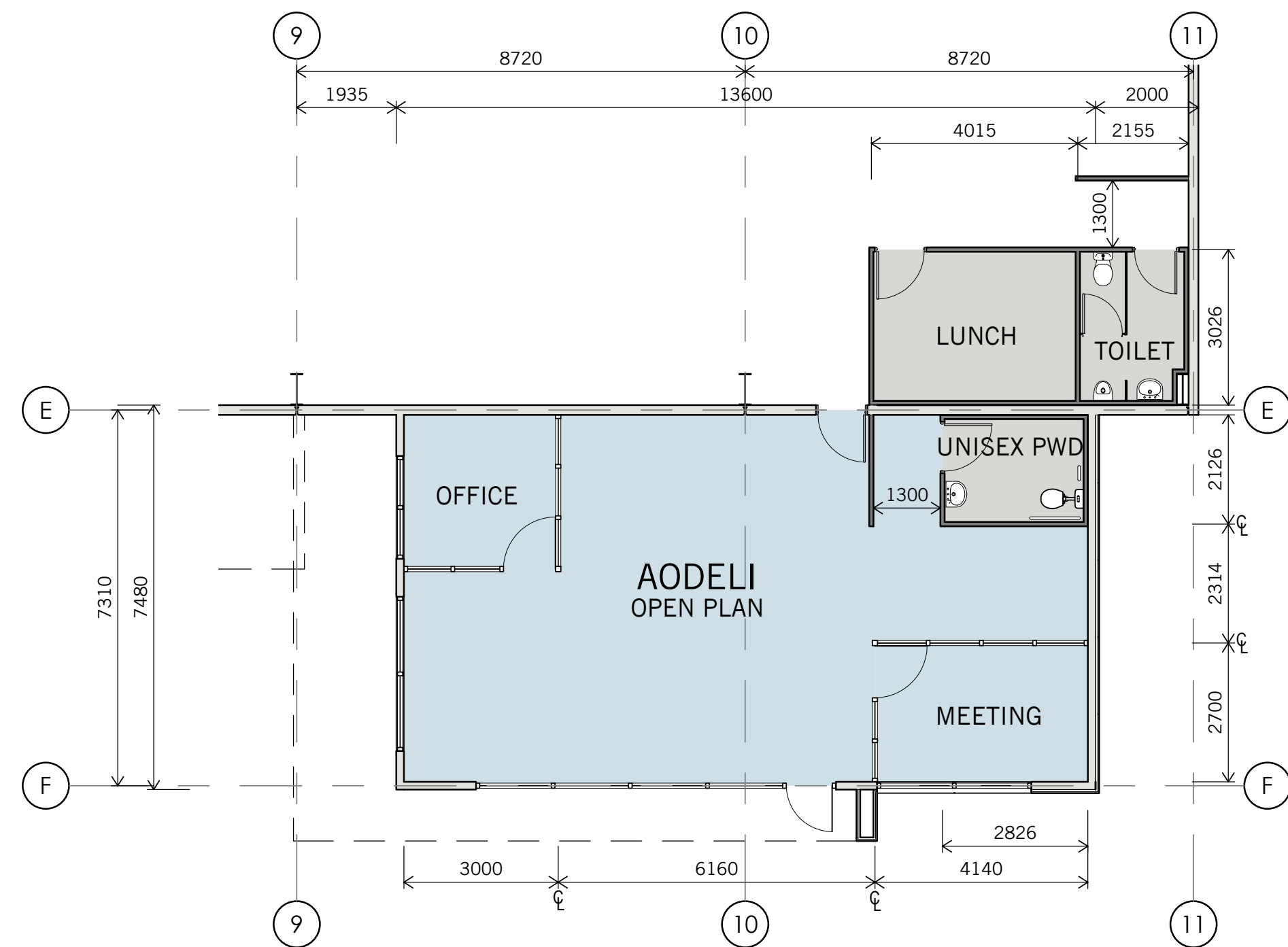
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DESIGN + CONSTRUCT SOLUTIONS



GROUND FLOOR PLAN (ARCO OFFICE)
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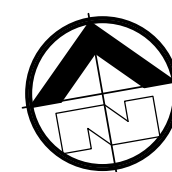
MEZZANINE PLAN (ARCO OFFICE)
1 : 100 @ A1



GROUND FLOOR PLAN (AODELI OFFICE)
1 : 100 @ A1

BUILDING INFORMATION

GROSS LEASABLE AREA	2,820 m ²
AODELI	
Office	100 m ²
Warehouse	1,000 m ²
	1,100 m ²
ARCO	
Mezzanine Office	20 m ²
Office	200 m ²
Workshop	1,500 m ²
	1,720 m ²



DETAIL FLOOR PLANS
ARCO + AODELI
CHRISTENSEN ROAD
STAPVLTON QLD 4207
DWG N° 3682-SK03-3 by HAL
DATE 04/09/2017

**space
frame**
DESIGN + CONSTRUCT SOLUTIONS

EAVES
9000

FIRST FLOOR
3700

GROUND FLOOR
0

CHRISTENSEN RD. ELEVATION

1 : 200 @ A1

EAVES
9000

FIRST FLOOR
3700

GROUND FLOOR
0

NORTH ELEVATION

1 : 200 @ A1

EAVES
9000

FIRST FLOOR
3700

GROUND FLOOR
0

EAST ELEVATION

1 : 200 @ A1

EAVES
9000

FIRST FLOOR
3700

GROUND FLOOR
0

WEST ELEVATION

1 : 200 @ A1

ELEVATIONS
ARCO + AODELI
CHRISTENSEN ROAD
STAPVLTON QLD 4207
DWG N° 3682-SK04-4 by HAL
DATE 04/09/2017

space
frame
DESIGN + CONSTRUCT SOLUTIONS



TEMPLATE REVISION : B

4/09/2017 12:47:59 PM J:\1 Projects\1 Prospective Projects\1 Current\03682-ARCO (PR)\8 CAD\3682.rvt

PERSPECTIVE
ARCO + AODELI
CHRISTENSEN ROAD
STAPVLTON QLD 4207
DWG N° 3682-SK05-3 by HAL
DATE 04/09/2017

**space
frame**
DESIGN + CONSTRUCT SOLUTIONS



Appendix C – Healthy Waters Code Assessment

TABLE 9.4.5-2 HEALTHY WATERS CODE – FOR ASSESSABLE DEVELOPMENT

STORMWATER QUALITY		
PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	COMMENTS
PO1 Development Appropriately manages stormwater quality to: (a) Protect natural ecosystems; (b) integrate stormwater treatment into the urban landscape; (c) protect water quality; (d) reduce runoff and peak flows; and (e) meet the water quality objectives and environmental values for Queensland waters.	AO1.1 Where development is: (a) for a dwelling house, dual occupancy or multiple dwelling on a lot less than 5000m²; or (b) light industry or business activity on a lot less than 2500m² it complies with the 'Deemed to comply' requirements detailed in the Stormwater quality management guidelines in SC6.9 City Plan policy – Land development guidelines.	N/A
	AO1.2 Where development is: (a) for a dwelling house, dual occupancy or multiple dwelling on a lot equal to or more than 5000m² but less than 1.25 ha; or (b) light industry or business activity on a lot equal to or more than 2500m² but less than 1.25 ha; it complies with the 'Deemed to comply' requirements detailed in the Stormwater quality management guidelines in SC6.9 City Plan policy – Land development guidelines.	Yes
	AO1.3 Where development is not listed in AO1 a Stormwater Quality Management Plan is prepared by a suitably-qualified person in accordance with the Stormwater quality management guidelines in SC6.9 City Plan	N/A
STORMWATER QUANTITY		
PO2 Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.	AO2 A stormwater quantity management plan is prepared by a suitably qualified person and demonstrates:	N/A As noted in report, Quantity for this site is not required due to downstream basin catering for this



	(a) achievable stormwater quantity control measures for discharge during both the construction and operational phases of development designed in accordance with the Queensland Urban Drainage Manual (QUDM) unless subject to specific requirements of SC6.9 City Plan policy – Land development guidelines; (b) on-site detention systems that are designed to restrict peak outflows for Q2, Q5, Q10, Q20 Q50 and Q100 to pre-development conditions.	This is an assumption made based on Stage 1 development requirements
WOONGOOLBA FLOOD MITIGATION SCHEME CATCHMENT AREA		
PO3 In the Woongoolba Flood Mitigation Scheme Catchment Area, shown on the Water catchments and dual reticulation overlay map, peak outflow and its timing for Q2, Q5 and Q10 for rainfall events up to 72 hours does not change as a result of development.	AO3 No acceptable outcome provided.	N/A Was developed as part of the overall subdivision
PROTECTION OF NATURAL FLOWS (DISCHARGE)		
PO4 Construction and operational activities avoid or minimise adverse impacts of altered stormwater quality and quantity.	AO4 Development achieves the Frequent Flow Management and Waterway Stability Management design objectives as stated within Chapter 2 – Section 2.4.2 of the Urban Stormwater Quality Planning Guidelines 2010. Note: A site Stormwater Quality and Quantity Management Report prepared by a suitably qualified person is Council's preferred method required to be submitted to Council to address this Acceptable outcome. The intent in the above guidelines (Urban Stormwater Quality Planning Guidelines 2010) can be achieved by adopting Water Sensitive Urban Design (WSUD) concepts within the development.	YES WSUD is required for this site, bioretention basin proposed
WASTEWATER MANAGEMENT		
PO5 Development does not discharge wastewater to receiving waters or areas external to the site unless	AO5 Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP)	N/A



demonstrated to be the best-practice environmental management for that site and takes into consideration: (a) the applicable water quality objectives for the receiving waters; and (b) the potential adverse impact on ecosystem health of receiving waters.	is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following: (a) wastewater type; (b) climatic conditions; (c) water quality objectives; (d) best-practice environmental management; (e) waste management hierarchy; and (f) the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that: (i) avoids wastewater discharge to waterways; or (ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to waterways is minimised through re-use, recycling, recovery and treatment for disposal to sewer, surface water and groundwater.	
EROSION AND SEDIMENT CONTROL (ESC)		
PO6 Development does not cause erosion or allow sediments to leave the site.	AO6 An Erosion hazard assessment completed in accordance with the criteria in Table 9.4.5-3 is undertaken to establish the level of risk for soil erosion and sediment pollution to the environment. Where the Erosion hazard assessment has a risk score less than or equal to 10: A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.	YES Please find below the Risk Assessment for the site. The site is <10. Erosion and Sediment Control is covered within this report as a general guideline only.



	Where the Erosion hazard assessment has a risk score greater than 10: A conceptual erosion and sediment control plan (ESCP) is prepared by a suitably qualified person for Council approval in accordance with the Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.	
--	---	--



Table 9.4.5-3: Erosion hazard assessment

Controlling factor	Points	Score
Average slope of the whole site prior to operational works		
Slope less than 2%	0	
More than or equal to 2% but less than 5%	1	1
More than or equal to 5% but less than 10%	2	
More than or equal to 10% but less than 15%	4	
More than or equal to 15%	5	High risk
Soil type (to be disturbed)		
Gravels and sandy soils	1	
Sandy loam	2	2
Clays on flood plains	3	
Shallow soils on slopes	4	
Clays on slopes greater than 5% / imported fill or untested fill	5	High risk
Anticipated duration of site disturbance		
Duration less than 2 weeks	0	
More than 2 weeks but less than 3 months	2	2
More than 3 months but less than 6 months	4	
More than 6 months	5	High risk
Anticipated erosive rainfall risk during site disturbance		
Low (monthly average rainfall less than 45 mm)	0	0
Moderate (monthly average rainfall 46 - 100 mm)	1	
High (monthly average rainfall 101 - 225 mm)	2	
Very high (monthly average rainfall 226 - 1500 mm)	4	
Extreme (monthly average rainfall more than 1500 mm)	5	High risk
Off-site sediment control (down-slope of the soil disturbance)		
Score 1 point if there is no purpose-built sediment trap (e.g. sediment basin, gross pollutant trap or purpose-built wetland).	1	1
Run-off entering the site		
Score 1 point if stormwater run-off is not diverted from entering the site or away from soil disturbance.	1	
Extent of site disturbance		
Score 2 points if the building works requires reshaping of the ground surface.	2	
Total Score		6
Note: High erosion risk - if score 11 or greater, or five for any factor.		

This Erosion Hazard Assessment form is adapted from the Best Practice Erosion and Sediment Control, International Erosion Control Association (Australasia), IECA 2008 Appendix H - Building Sites, the Brisbane City Council Erosion Hazard Assessment Form and Attachment 2 to the QDC Draft Part 16 Erosion and Sediment Control.

Assessment of Urban Infrastructure

LOT 334 CHRISTENSEN ROAD, YATALA

within
GOLD COAST CITY COUNCIL

for

MS PROJECTS

Project 17-209



icubed consulting
innovation ingenuity inspiration
ABN 89 106 675 156

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c o n s u l t i n g



Prepared By	Travis Smith
Released By	Travis Smith
Date	18 October 2017
Job Number	17-209
Document Name	17-209-AI
Version	1.0

Approved for release by:

Travis Smith
RPEQ 16400
18 October 2017

STATEMENT OF LIMITATION

Data and conclusions of this report are the findings and opinions of icubed consulting and are not an expressed or implied representation, warranty or guarantee. This report has been prepared for MS Projects.



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3.	Existing Urban Infrastructure	6
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7.	Water	6
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1. Introduction

icubed consulting have been commissioned to provide an engineering assessment of available urban infrastructure required to sustain the proposed industrial development. The proposed development site is located at Lot 334 SP193431 Christensen Road, Yatala.

This report has been prepared following the completion of a comprehensive site evaluation by this office which included reviews of;

- Records from site visits completed by this office in October 2017
- DBYD advice
- GCCC Historical Flood Records
- Development plans

This report summarises the findings of this investigation.

2. Location

The subject site is described as Lot 334 on SP193431 and is located at Christensen Road, Yatala. The general site location and the study area are indicated in Figures 1 and 2 respectively.

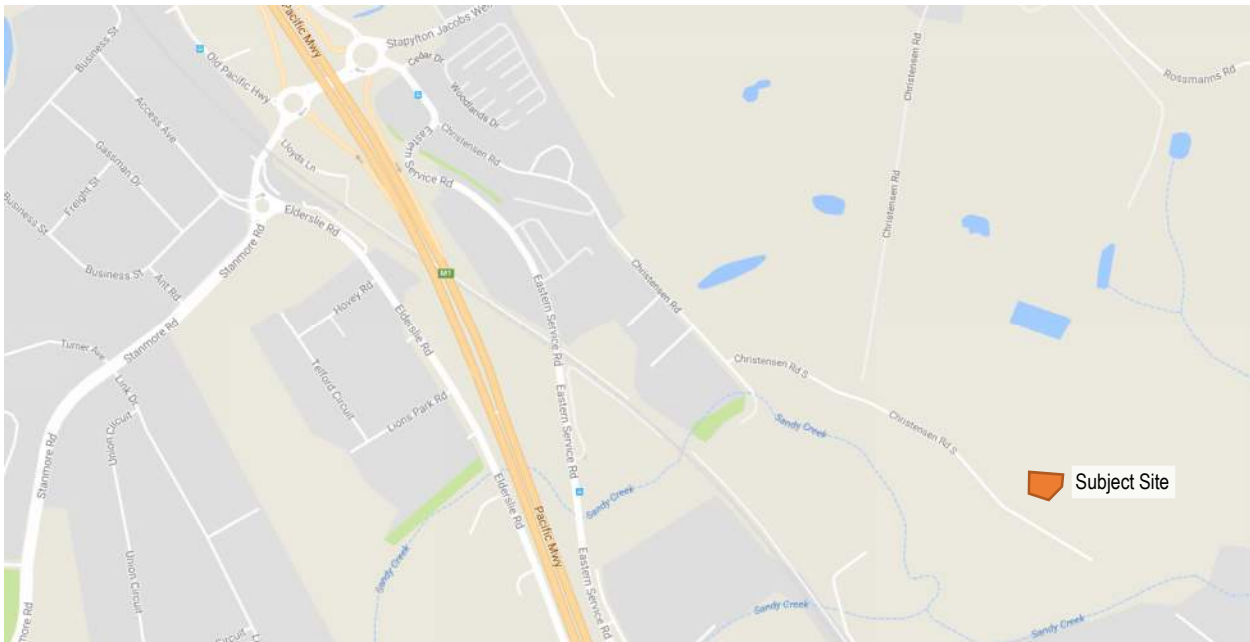


Figure 1 – Site Locality Plan – Copyright Google Maps



Figure 2 – Aerial Photo – Copyright Google Maps

3. Existing Urban Infrastructure

The proposed industrial development is located within an existing industrial subdivision. The existing developments within the area are currently serviced by all urban reticulated services and the proposed development can be serviced by the existing infrastructure, as discussed in below.

4. Flooding

The site is within the sandy Creek Catchment within Gold Coast City Council, and Flood Mapping indicates that the property has not been identified as being susceptible to flooding. Refer Appendix C for Flood Mapping.

5. Earthworks and Stormwater

The subject site has an average grade of approximately 2.0% from North to South to the Christensen Road Frontage.

The development will be connected to the existing stormwater system within Christensen Road via an existing property connection (Manhole 1/5b).

The existing stormwater line along Christensen Road consists of stormwater pipes between 1.35m and 1.65m diameter. The development is within the existing catchment stormwater system and therefore no alteration is required.

Refer Appendix B for details of the stormwater network.

6. Sewerage

There is an existing 225mm diameter sewer pipe along the southern side of Christensen Road which will adequately provide sewerage service to the proposed development. A cross road connection will need to be constructed. Refer Appendix B for details of the sewer network.

7. Water

There is an existing 150mm diameter water main on Christensen Road which will adequately provide water reticulation service to the proposed development. Refer Appendix B for details of the water network.

8. Power

The site is currently serviced by an underground powerline along the southern side of Christensen Road. As part of the development an underground property connection will be required. Refer Appendix B for details of the underground power network.

9. Communications

The site is currently serviced by a Telstra line in Christensen Road with a number of pits along the frontage. Refer Appendix B for details of the communications network.

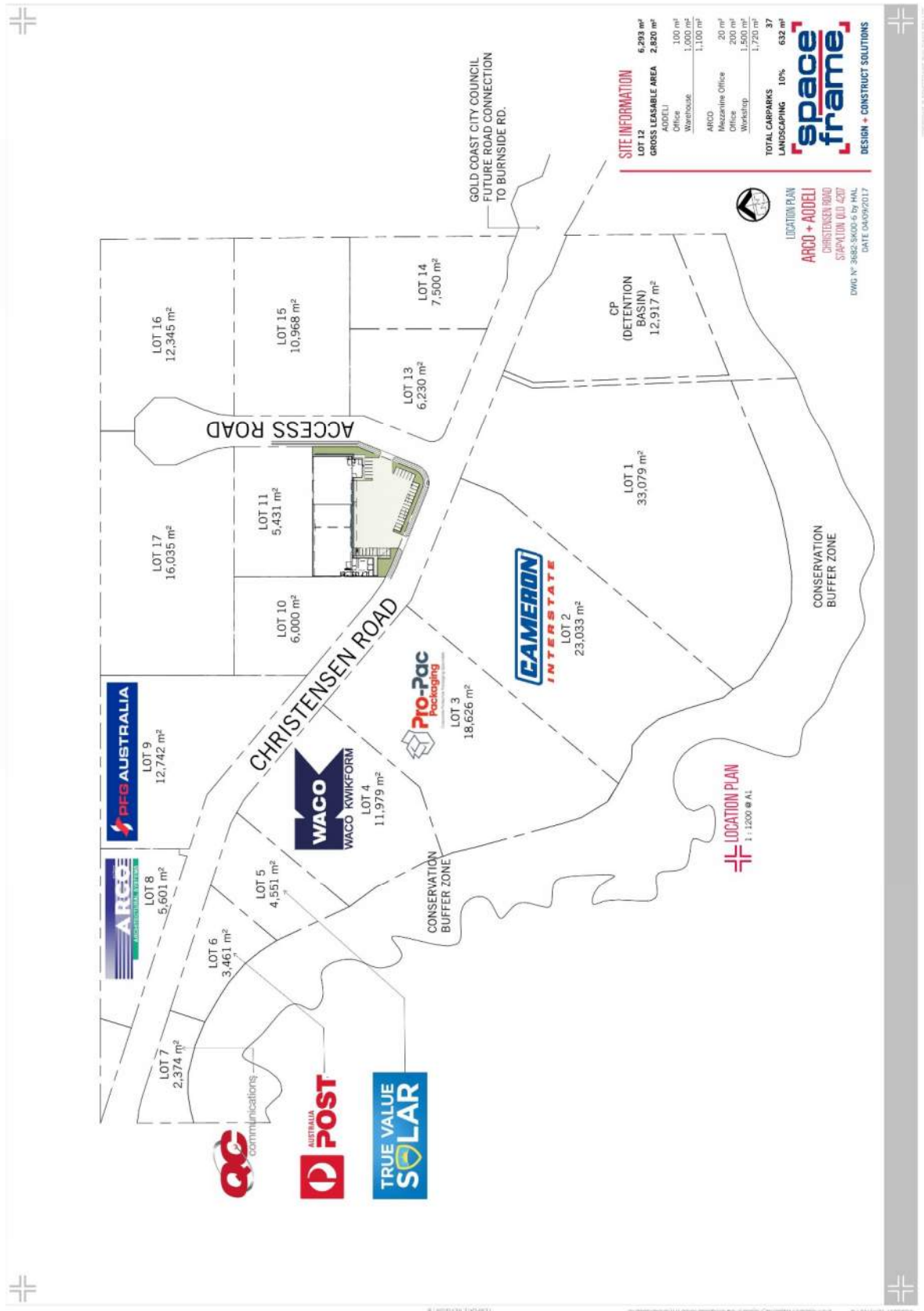


10. Conclusion

icubed consulting has assessed the proposed development in relation to Gold Coast City Council's requirements. The proposed development is considered to be able to be adequately serviced in accordance with the requirements of Planning Scheme and subject to connections in accordance with the relevant statutory authority requirements. We see no reason why the proposed development should not be approved with reasonable and relevant conditions in respect of providing for connection to existing services.



Appendix A – Drawings







Appendix B – As Constructed Service Records

ROADWORKS AND DRAINAGE NOTES

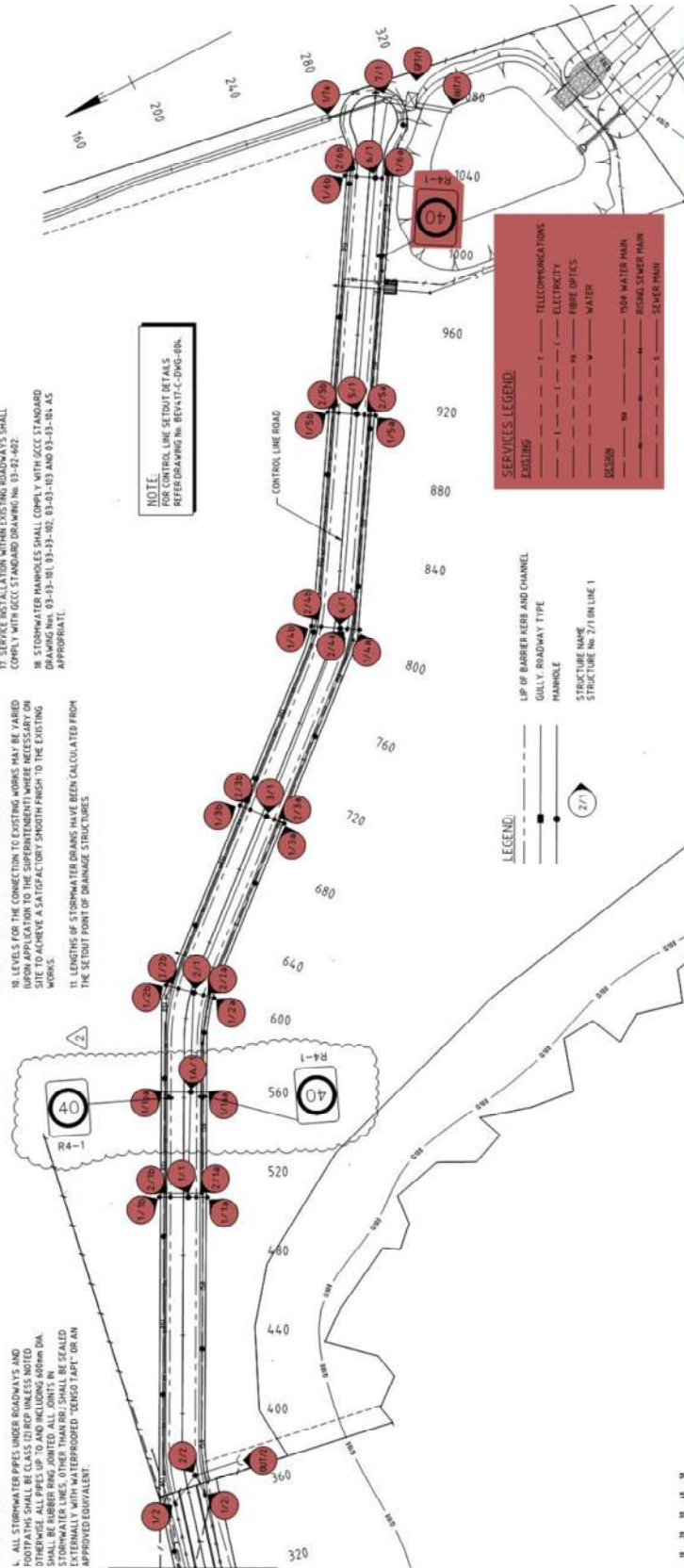
- NOTWITHSTANDING THE LIMITS OF CUTTING AND FILLING SHOWN ON THE DRAWINGS, THE ACTUAL LIMITS SHALL BE DETERMINED ON SITE BY THE SUPERINTENDENT DURING CONSTRUCTION.
- ROAD CONSTRUCTION WITHIN THE SITE (BETWEEN CH 340 AND 800) SHALL COMPLY WITH THE INDUSTRIAL COLLECTOR STREET CROSS SECTION AS DETAILLED ON GCCC STANDARD DRAWING No. 03-02-02. THE SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE DESIGN OF THE ROADWAY AND DRAINAGE. THE ROADWAY SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-02. THE DRAINAGE SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03. THE ROADWAY SHALL BE CONSTRUCTED UNDER ALL KERB AND CHANNEL.
- ROAD CONSTRUCTION EXTERNAL TO THE SITE (CH 0 TO 340) SHALL COMPLY WITH TYPICAL SECTION AS SHOWN ON BEV417-C-DWG-004.
- ALL STORMWATER PIPES UNDER ROADWAYS AND FOOTPATHS SHALL BE CLASS 400 UNLESS NOTED OTHERWISE. THE PIPES SHALL BE 150mm DIA. THE PIPES SHALL BE RUBBER LINED JOINTED ALL JOINTS IN STORMWATER LINES OTHER THAN RRI SHALL BE SEALED EXTERNALLY WITH WATERPROOFED "DENSOTEAP" OR AN APPROVED EQUIVALENT.

- FOOTPATHS TO BE TOPSLOPED 10mm THICK AND TURFED BETWEEN KERB AND FOOTPATH AND FOR TWO TURF STRIPS ADJACENT TO FOOTPATH BETWEEN FOOTPATH AND PROPERTY BOUNDARY.
- FOOTPATHS TO BE TOPSLOPED 10mm THICK AND TURFED BETWEEN KERB AND FOOTPATH AND FOR TWO TURF STRIPS ADJACENT TO FOOTPATH BETWEEN FOOTPATH AND PROPERTY BOUNDARY.
- THE CONTRACTOR SHALL INITIALLY EXCAVATE THE PAVEMENT TO THE DEPTH OF THE SUBGRADE. THE SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE DESIGN OF THE ROADWAY AND DRAINAGE. THE ROADWAY SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-02. THE DRAINAGE SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03. THE ROADWAY SHALL BE CONSTRUCTED UNDER ALL KERB AND CHANNEL.

- THE PAVEMENT SHALL CONFORM TO GCCC STANDARD REQUIREMENTS AS DESCRIBED WITHIN GCCC DEVELOPMENT GUIDELINES. THE PAVEMENT SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-02. THE DRAINAGE SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03. THE ROADWAY SHALL BE CONSTRUCTED UNDER ALL KERB AND CHANNEL.
- THE PAVEMENT SHALL CONFORM TO GCCC STANDARD REQUIREMENTS AS DESCRIBED WITHIN GCCC DEVELOPMENT GUIDELINES. THE PAVEMENT SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-02. THE DRAINAGE SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03. THE ROADWAY SHALL BE CONSTRUCTED UNDER ALL KERB AND CHANNEL.
- THE PAVEMENT SHALL CONFORM TO GCCC STANDARD REQUIREMENTS AS DESCRIBED WITHIN GCCC DEVELOPMENT GUIDELINES. THE PAVEMENT SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-02. THE DRAINAGE SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03. THE ROADWAY SHALL BE CONSTRUCTED UNDER ALL KERB AND CHANNEL.

- ALL GULLY PITS TO BE CHANNEL LIP IN ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03 UNLESS NOTED OTHERWISE.
- REFER TO GCCC STANDARD DRAWING No. 03-02-03 FOR ALL DETAILS. SUPPORT FOR CONCRETE PIPES TO BE 150mm WIDE CONCRETE FOOTPATHS SHALL BE PROVIDED WITHIN THE ROADWAY. THE SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE DESIGN OF THE ROADWAY AND DRAINAGE. THE ROADWAY SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-02. THE DRAINAGE SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03. THE ROADWAY SHALL BE CONSTRUCTED UNDER ALL KERB AND CHANNEL.
- PAVEMENT CONSTRUCTION AT CONNECTION OF NEW PAVEMENT TO EXISTING PAVEMENT SHALL COMPLY WITH GCCC STANDARD DRAWING No. 03-02-03.
- 150mm WIDE CONCRETE FOOTPATHS SHALL BE PROVIDED WITHIN THE ROADWAY. THE SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE DESIGN OF THE ROADWAY AND DRAINAGE. THE ROADWAY SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-02. THE DRAINAGE SHALL BE DESIGNED TO ACCORDANCE WITH GCCC STANDARD DRAWING No. 03-02-03. THE ROADWAY SHALL BE CONSTRUCTED UNDER ALL KERB AND CHANNEL.
- SERVICE CONDUIT ROAD CROSSINGS WHERE SPECIFIED SHALL COMPLY WITH GCCC STANDARD DRAWING No. 03-02-04.
- SERVICE INSTALLATION WITHIN EXISTING ROADWAYS SHALL COMPLY WITH GCCC STANDARD DRAWING No. 03-02-05.
- STORMWATER HANDSHELS SHALL COMPLY WITH GCCC STANDARD DRAWING No. 03-02-06 AND 03-02-07 AS APPROPRIATE.

NOTE:
FOR CONTROL LINE SETOUT DETAILS
REFER DRAWING No. BEV417-C-DWG-004.



FOR CONSTRUCTION

INDUSTRIAL ESTATE
CHRISTENSEN ROAD, YATALA
ROADWORKS AND DRAINAGE
SHEET 2 OF 2

BEV417-C-DWG-005 2

1:1000 (A1)
AM FRANKOSA

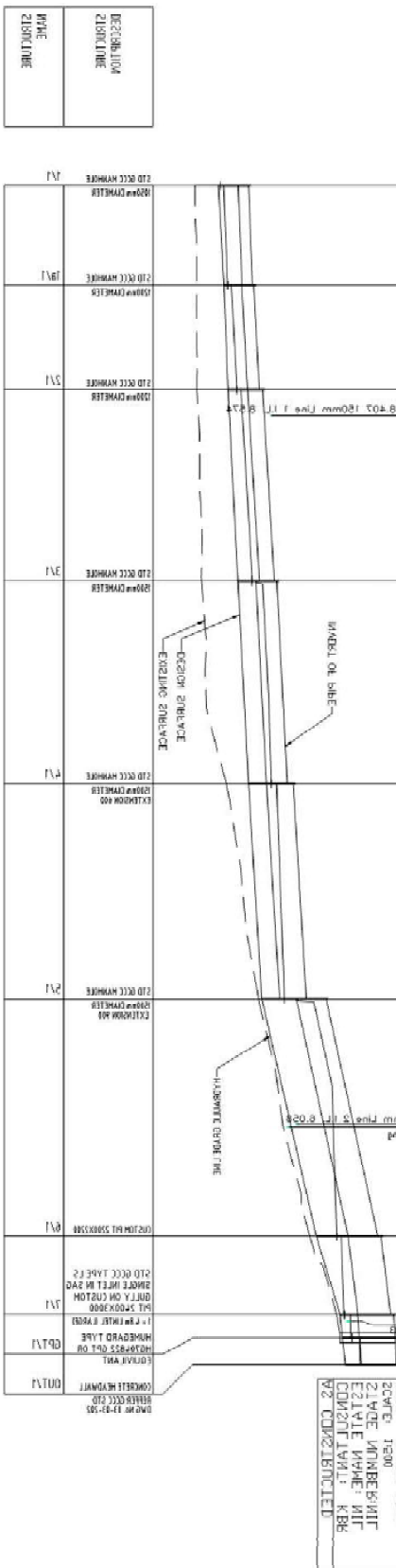
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04.10.20
10.08.20

1. STORMWATER REVISION
2. FOR CONSTRUCTION

BURNSIDE DEVELOPMENTS PTY LTD
99 ANNERLEY ROAD
WOOLLOONGABBA QLD 4102

17.10.17 12:44

OC ROBERT	BT
D WERNER	SW
1 BOERIS	TV
1 BOERIS	TV

[illegible]





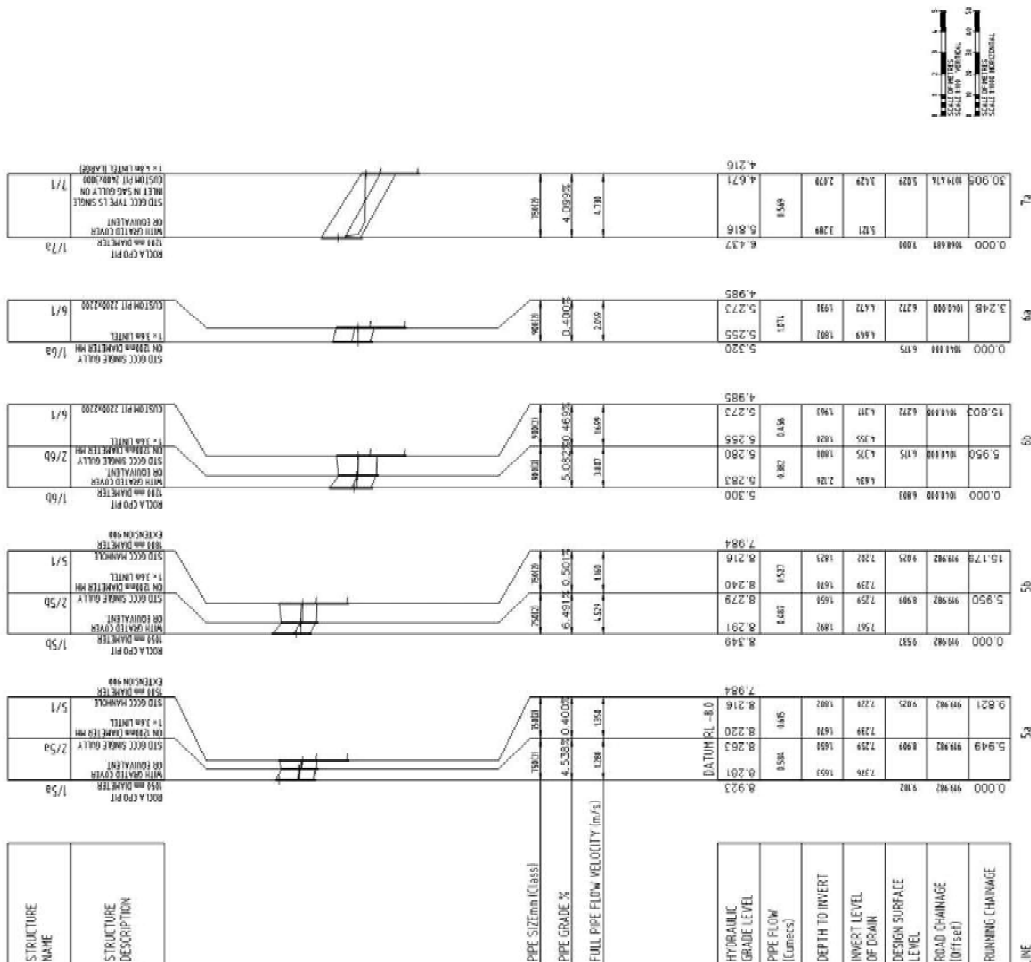
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CONSULTANT: KBR
ESTATE NAME: NIL
STAGE NUMBER: NIL
SCALE: 1:500
DATE: AUGUST 2006
REVISIONS
REVISION NUMBER: 1

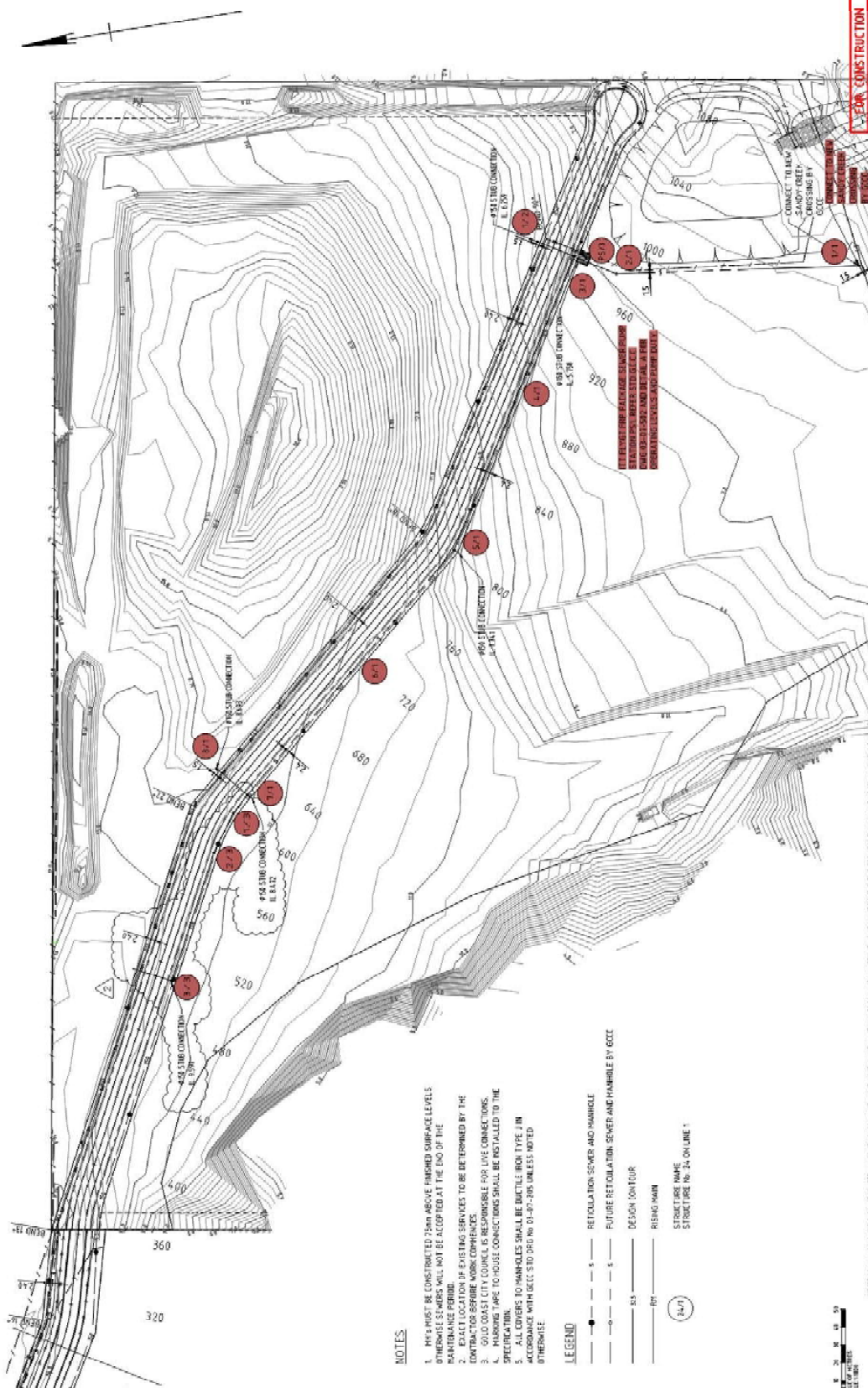
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CHRISTENSEN ROAD, YATALA
DRAINAGE LONGITUDINAL SECTIONS
SHEET 3 OF 3

BEV417-C-DWG-011

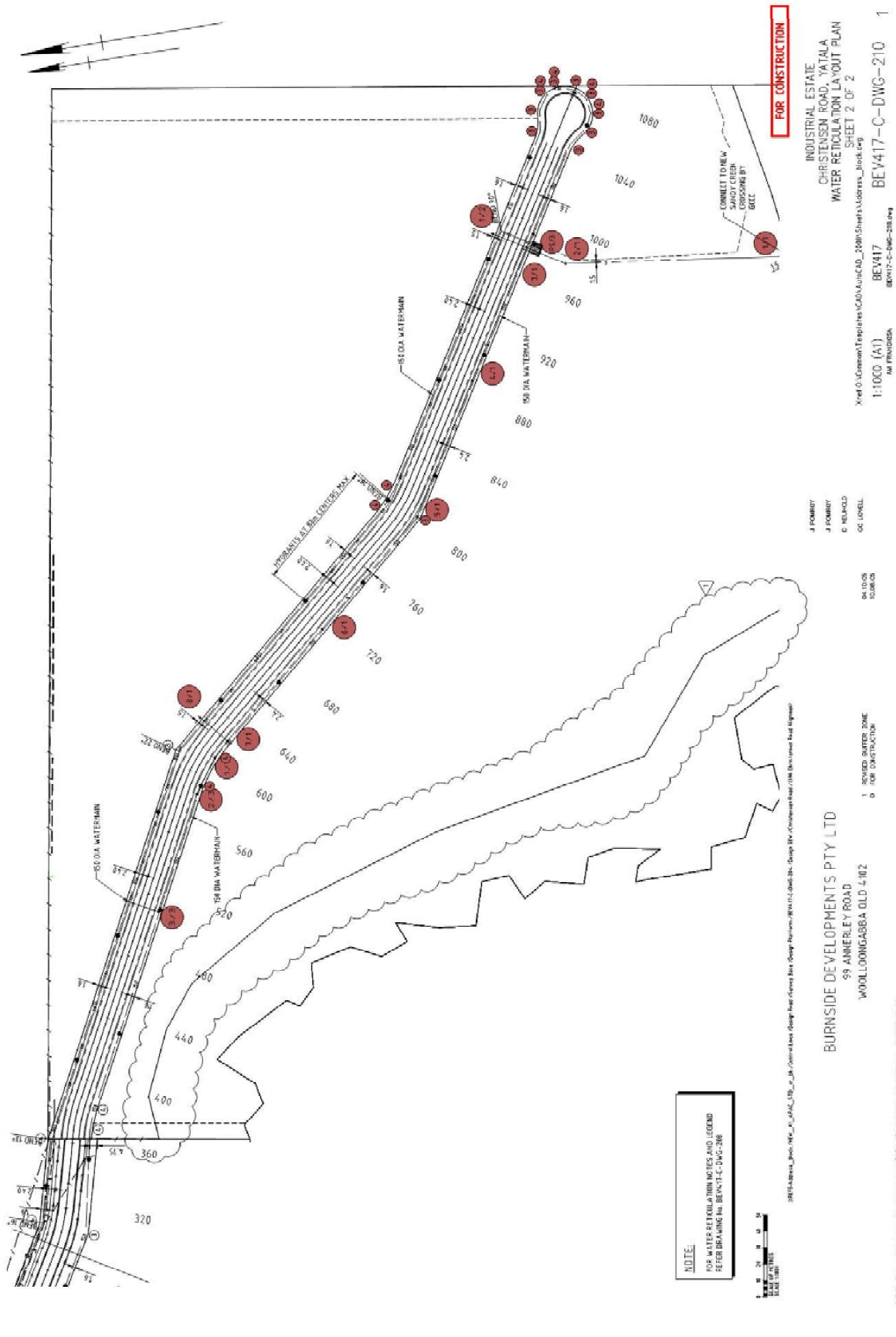
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JW THOMPSON

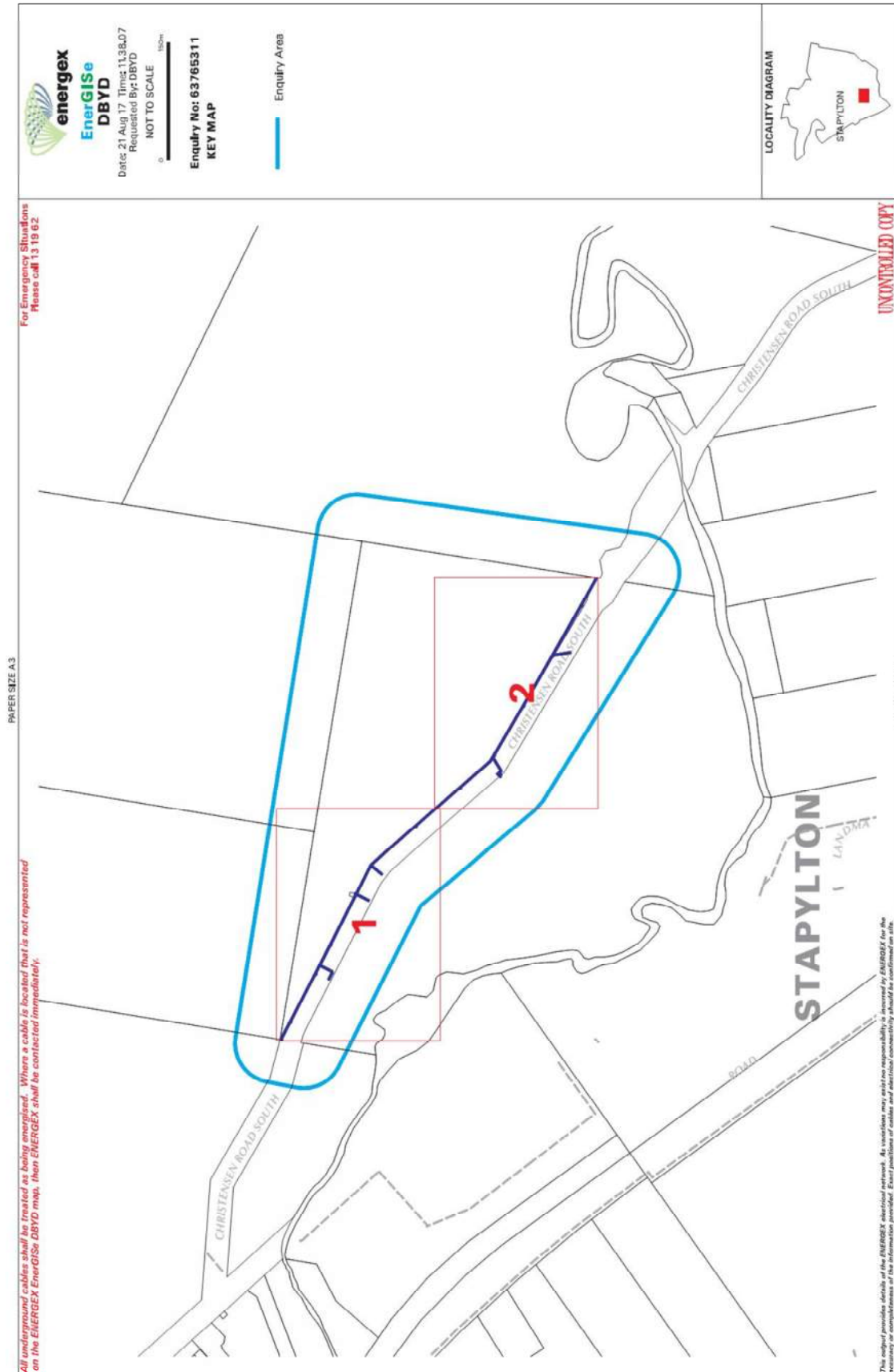
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JW THOMPSON

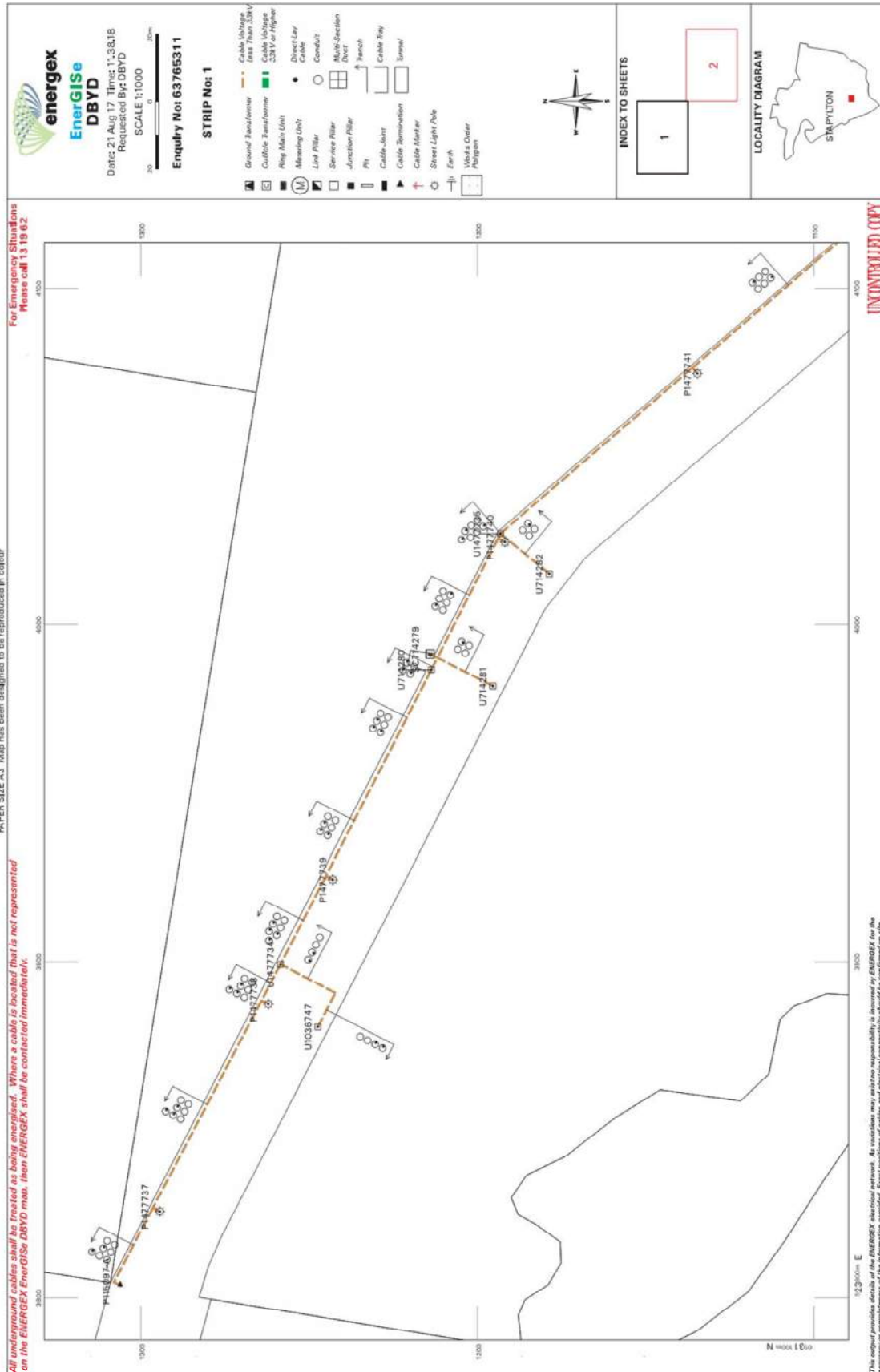




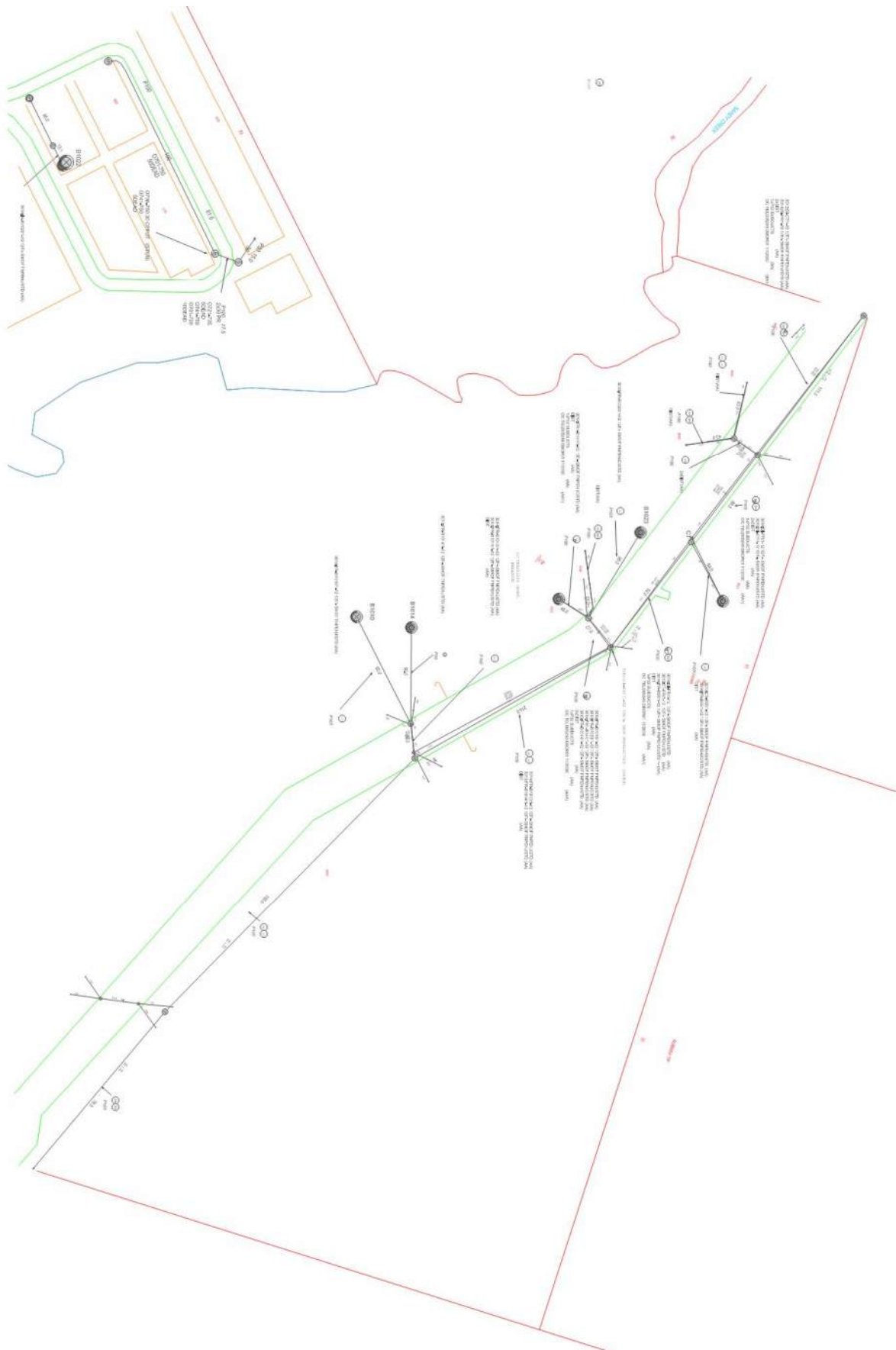














Appendix C – Flood Report



City Plan

Date: 17/10/2017



GOLD COAST™

Legend

polygonLayer	
Override 1	
 GCCC Boundary	
Surrounding Councils Labels	
Adjacent Councils	
 <all other values>	
 Brisbane; Ipswich; Logan; Redland; Scenic Rim	
 NSW; Tweed	
 Flood assessment required	
 GCCC Boundary	
 Suburb Boundary Lines	
 NSW Tweed	
 Unit numbers	
 Suburbs Labels	
 Major Roads	
 Minor Roads	
 Waterway Labels	
ADJACENT_LGA	
 Brisbane City Council; Ipswich City Council; Logan City Council; Redland City Council; Scenic Rim Regional Council	
 Tweed Shire Council	
 Ocean Labels	

- + Railway (Brisbane - Robina Line)
- ☐ Latest property boundaries

City Plan

Date: 17/10/2017

GOLD COASTTM