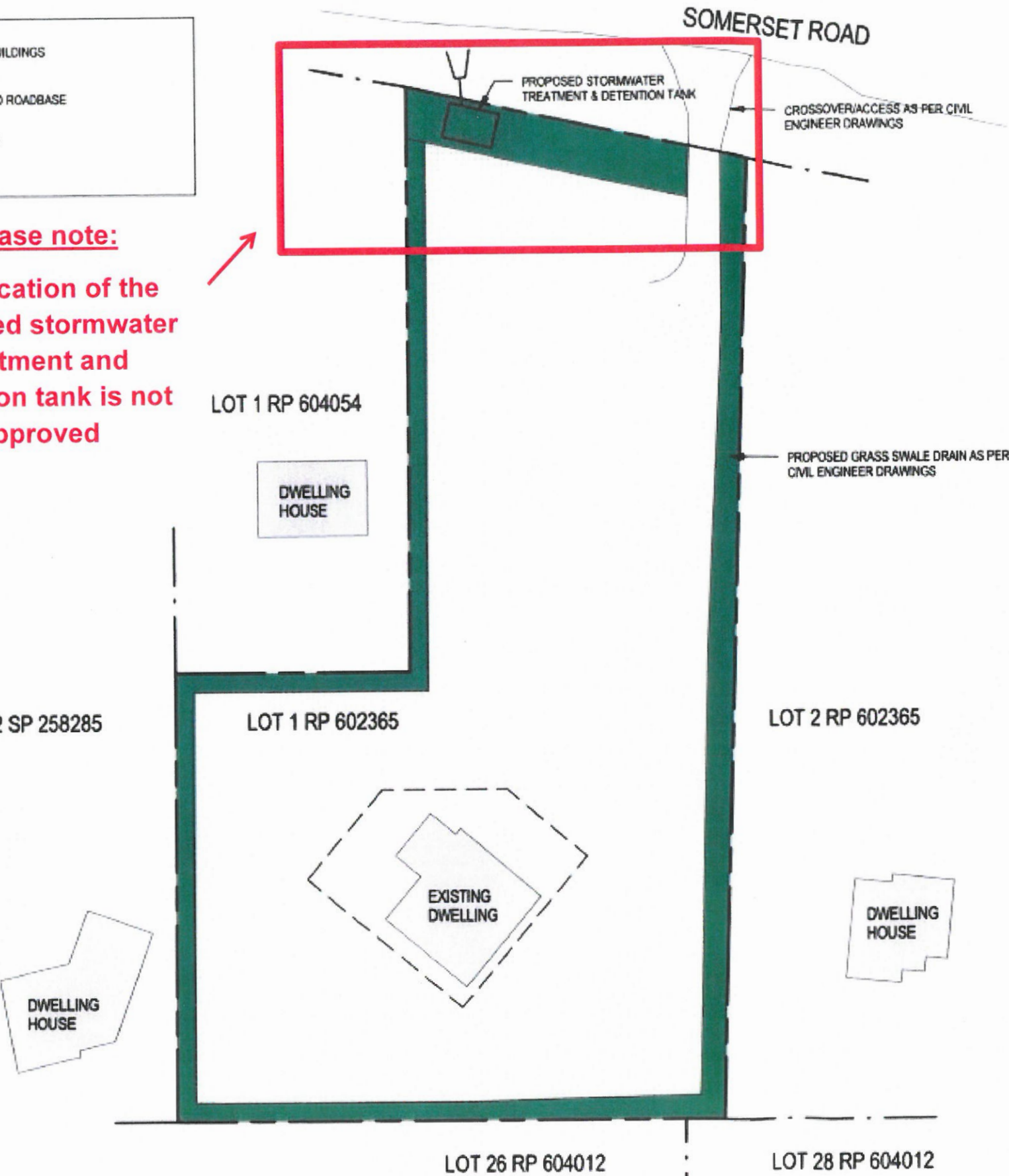


EXISTING BUILDINGS

COMPACTED ROADBASE

LANDSCAPE

**Please note:**  
The location of the proposed stormwater treatment and detention tank is not approved



AREA SCHEDULE - STAGE 1	
Site Area - WHOLE SUBJECT SITE =	10 610sqm
USE AREA (excludes residential area)=	9 739sqm (100%)
Building Height =	N/A
Existing Residential Area	
Residential area =	871sqm
Landscaped Area	
Landscaped area =	1 794sqm (18.4%)
Proposed Building	
Total GFA =	0sqm
Impervious Area	
Compacted road base =	7 945sqm
Total Impervious Area =	7 945 (81.6%)
Off-street Car Parking Spaces	0no
Site Cover =	0sqm (0%)

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with  
**Development Permit No.: D/194-2016**  
**Dated: 25 February 2019**

drawing title:  
SITE PLAN - STAGE 1

drawing no: SK-002



project:		DRAWING NOTED SCALES RELATE TO ALL DRAWINGS	
PROPOSED TRANSPORT DEPOT & WAREHOUSE			
location:		client:	
117 SOMERSET ROAD, GRACEMERE		EARTHWORK AUSTRALIA WIDE PTY LTD	

REVISION	DESCRIPTION	DATE
1	PRELIMINARY	08/02/11
2	PRELIM	27/02/14
3	PRELIM	14/03/2014
4	PRELIM	03/04/2014
5	REVISION	06/03/2014
7	PRELIM	08/03/2014

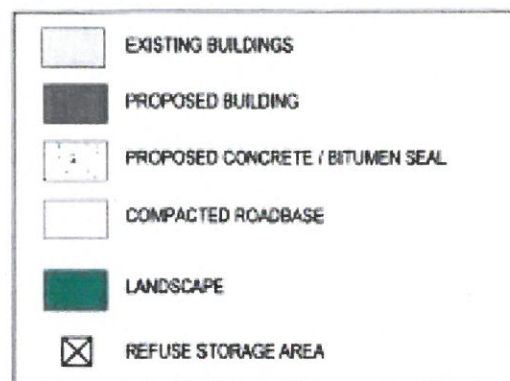
**PRELIMINARY SUBMITTAL PLANS**  
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NOTED SCALE: 1:100 DRAWING BY: D/194-2016

Design + Architecture

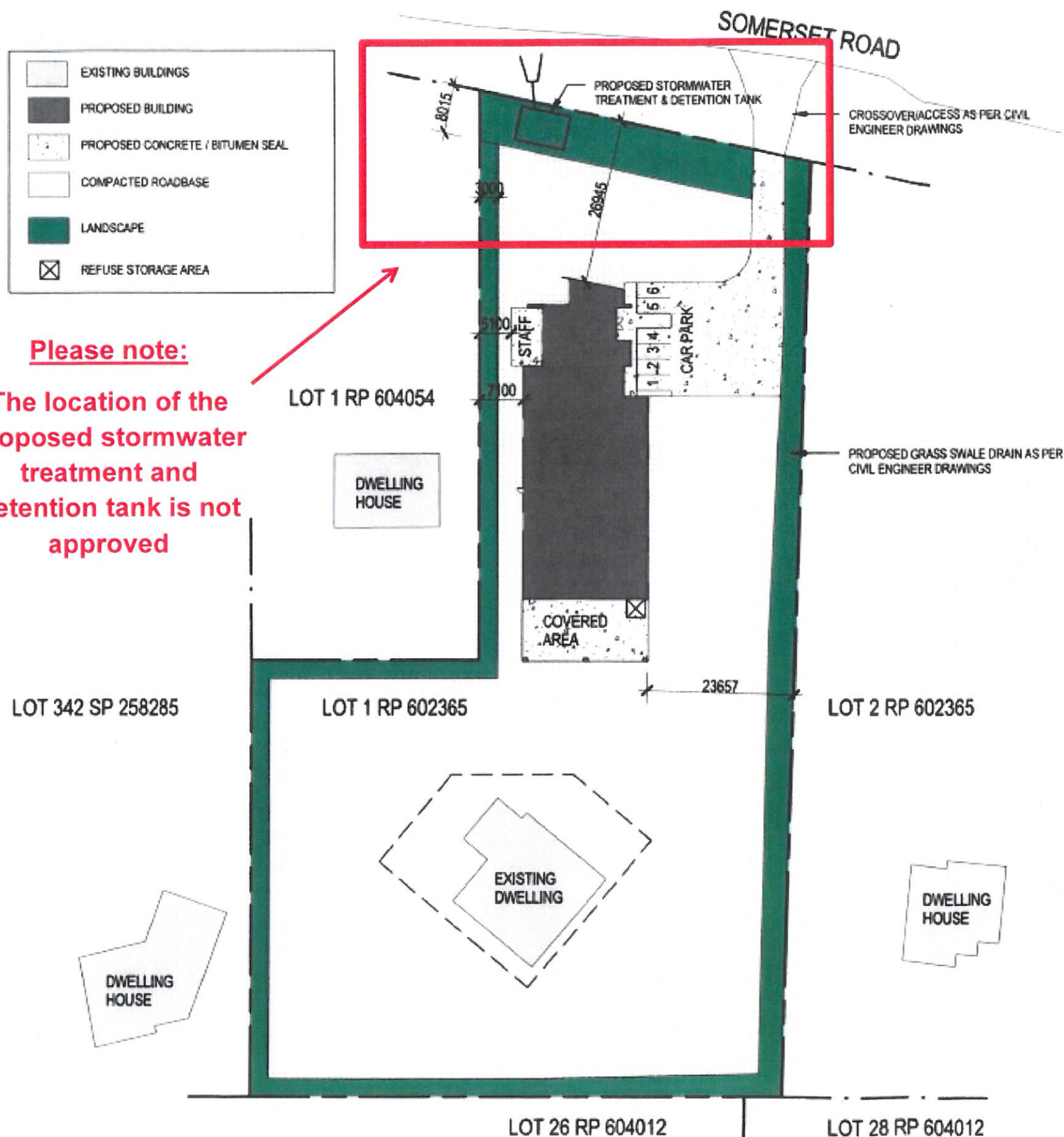
044 908 2924 design@designaa.com.au  
www.designaa.com.au reg no: 4610

ISSUED FOR PRELIMINARY		
project no:	scale:	rev:
FL-016	1:100	7
	date:	
	DEC 16	
	drawn:	
	CC	



**Please note:**

The location of the proposed stormwater treatment and detention tank is not approved

**AREA SCHEDULE - STAGE 2**

Site Area - WHOLE SUBJECT SITE =	10 610sqm
USE AREA (excludes residential area) =	9 739sqm (100%)
Building Height =	7.95m (1 storey with mezzanine level)
<b>Existing Residential Area</b>	
Residential area =	871sqm
<b>Landscaped Area</b>	
Landscaped area =	1 794sqm (18.4%)
<b>Proposed Building</b>	
Office GFA =	154sqm
Storage GFA =	39sqm
Workshop GFA =	654sqm
Amenities GFA =	40sqm
Mezzanine GFA =	78sqm
Total GFA =	965sqm
<b>Impervious Area</b>	
Compacted road base =	6 216sqm
Concrete/bitumen seal =	588sqm
Staff sealed area =	47sqm
Covered area (Proposed Building) =	202sqm
Total Impervious Area =	7 053 (72.4%)
<b>Off-street Car Parking Spaces</b>	6no
Site Cover =	1089sqm (11.2%)

**ROCKHAMPTON REGIONAL COUNCIL****APPROVED PLANS**

These plans are approved subject to the current conditions of approval associated with  
**Development Permit No.: D/194-2016**  
**Dated: 25 February 2019**

drawing title:  
**SITE PLAN - STAGE 2**

drawing no: **SK-003**



project:  
**PROPOSED TRANSPORT DEPOT & WAREHOUSE**  
 location:  
117 SOMERSET ROAD, GRACEMERE

client:  
EARTHWORK AUSTRALIA WIDE PTY LTD

REVISIONS  
 REVISION 7  
 DATE 09/12/2016

**PRELIMINARY PLANS**  
 These drawings are intended as preliminary only. They are not to be used for building applications, contract or construction purposes. The nature of preliminary plans is to provide a general indication of the proposed development and to be used for the purpose of obtaining a development permit. They are not to be used for any other purpose without the written consent of the designer. PTT LTD (ACTN 121 416 412)  
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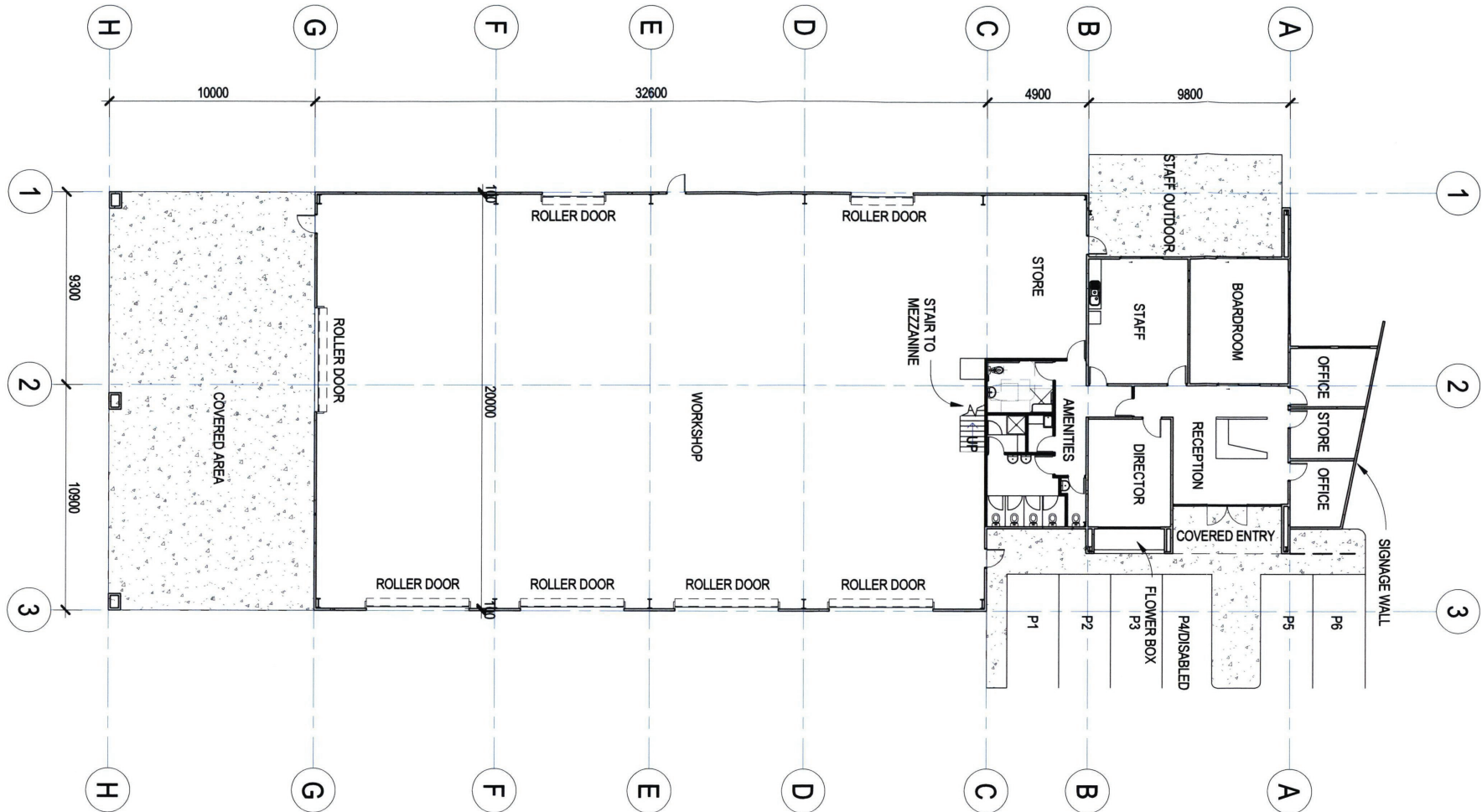
**Design + Architecture**  
 044 968 2924 design@designplus.com.au  
 www.designplus.com.au reg no: 4610

**ISSUED FOR PRELIMINARY**

project no: **FL-016**  
 scale: 1:100  
 date: **DEC 16**  
 author: **7**



1  
SK-006  
1:200 @ A3  
PROPOSED FLOOR PLAN



## ROCKHAMPTON REGIONAL COUNCIL

### APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

**Development Permit No.: D/194-2016**

**Dated: 25 February 2019**

drawing title:

FLOOR PLAN

drawing no: SK-004



project: **PROPOSED TRANSPORT DEPOT & WAREHOUSE**  
location: 117 SOMERSET ROAD, GRACEMERE  
client: EARTHWORX AUSTRALIA WIDE PTY LTD

A3 DRAWING NOTED SCALES RELATE TO A3 DRAWINGS

REVISION	DESCRIPTION	DATE
1	PRELIM	10/03/21
2	PRELIM	27/02/14
3	PRELIM	20/03/2014
4	PRELIM	24/03/2014
5	PRELIM	02/04/2014
7	PRELIM	08/12/2016

**PRELIMINARY SKETCH PLANS:**  
If the drawings are labelled and noted 'preliminary' below, they are not suitable for Building Application, tender or construction purposes.  
The nature of preliminary sketch plans are only for presenting the concept for the specific project to the client as is contained on the site sheet.

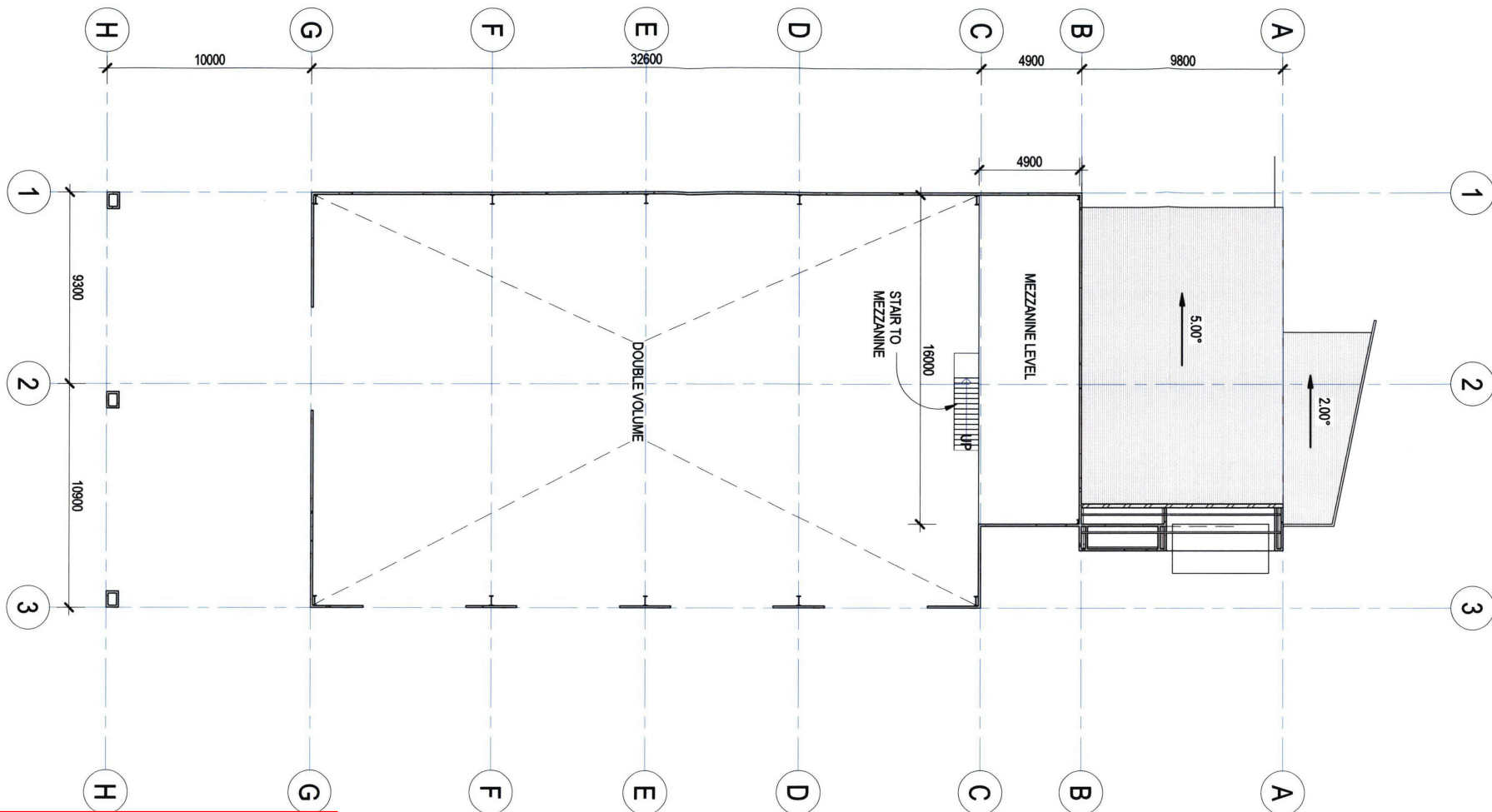
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ISSUED FOR PRELIMINARY		
project no:	scale	rev
FL-016	1:300	7
	date	
	DEC 16	
	drawn	
	CC	



1 MEZZANINE LEVEL  
SK-005  
1:200 @ A3



## ROCKHAMPTON REGIONAL COUNCIL

### APPROVED PLANS

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**Development Permit No.: D/194-2016**

**Dated: 25 February 2019**

drawing title:

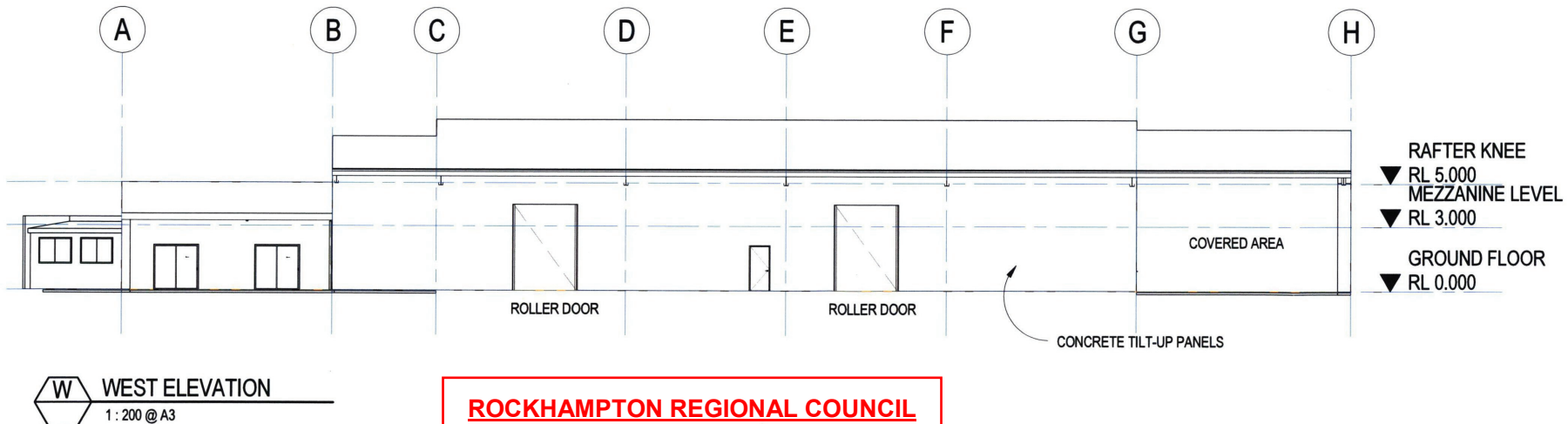
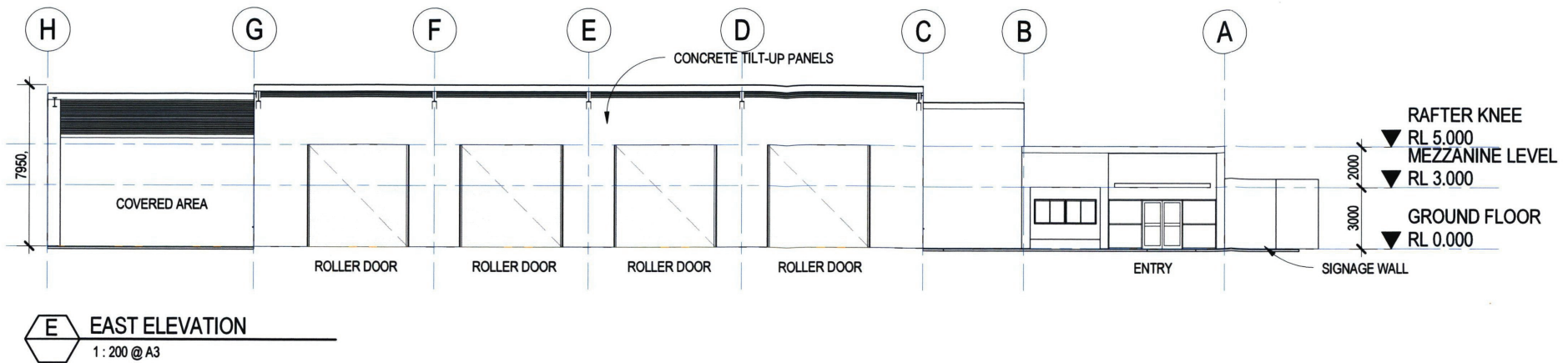
MEZZANINE LEVEL

drawing no: SK-005



<b>project:</b> <b>PROPOSED TRANSPORT DEPOT &amp; WAREHOUSE</b> <b>location:</b> 117 SOMERSET ROAD, GRACEMERE		<b>client:</b> EARTHWORX AUSTRALIA WIDE PTY LTD		<b>REVISIONS</b> REVISION 5 DESCRIPTION PRELIM DATE 02/04/2014 06/12/2016		<b>PRELIMINARY SKETCH PLANS</b> If the drawings are labeled and dated 'preliminary', below, they are not suitable for Building Applications, tender or construction purposes. The status of preliminary sketch plans are only for presenting the concept for the specific project to the client as indicated in the title sheet. <b>COPYRIGHT &amp; LIABILITY:</b> These drawings, concepts and designs are copyrighted and the property of design+architecture Pty Ltd (ACN 147 978 432). design+architecture accept no responsibility for the accuracy, completeness or electronic transfer of documents. NEVER SCALE OF DRAWING. IF IN DOUBT, ASK.		<b>Design + Architecture</b> abn: 8015978832 Pty Ltd 044 968 2924 design@designao.com.au www.designao.com.au reg no:4610		<b>ISSUED FOR PRELIMINARY</b> project no: FL-016 scale: 1:300 date: DEC 16 drawn: CC		rev: 7
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## ROCKHAMPTON REGIONAL COUNCIL

### APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

**Development Permit No.: D/194-2016**

**Dated: 25 February 2019**

drawing title:  
**ELEVATIONS**

drawing no: **SK-006**

project: <b>PROPOSED TRANSPORT DEPOT &amp; WAREHOUSE</b>	
location: 117 SOMERSET ROAD, GRACEMERE	client: EARTHWORK AUSTRALIA WIDE PTY LTD

REVISION	DESCRIPTION	DATE
1	PRELIMINARY	10/02/21
3	PRELIM	20/03/21/04
5	PRELIM	02/04/2014
7	PRELIM	06/12/2016

**PRELIMINARY SKETCH PLANS:**  
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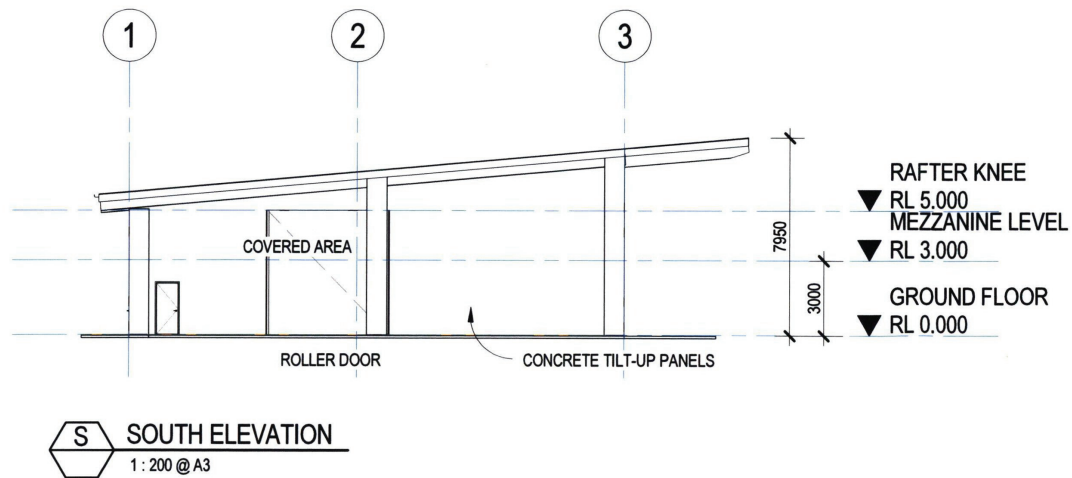
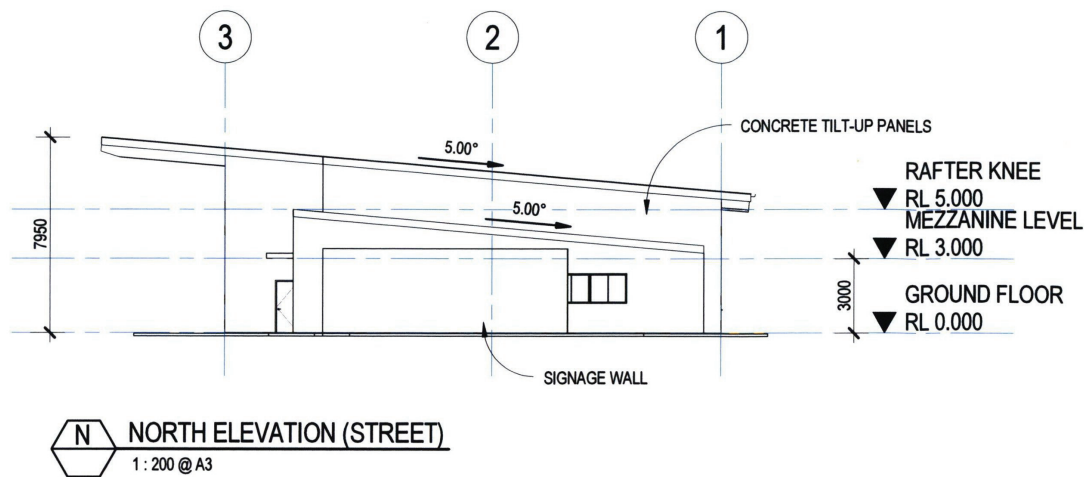
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ISSUED FOR PRELIMINARY		
project no: <b>FL-016</b>	scale: 1:200	rev: 7
	date: DEC 16	
	drawn: CC	





## ROCKHAMPTON REGIONAL COUNCIL

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These plans are approved subject to the current conditions of approval associated with

**Development Permit No.: D/194-2016**

**Dated: 25 February 2019**

drawing title:  
**ELEVATIONS**

drawing no: **SK-007**

project: **PROPOSED TRANSPORT DEPOT & WAREHOUSE**

location: 117 SOMERSET ROAD, GRACEMERE

client: EARTHWORK AUSTRALIA WIDE PTY LTD

revision 5  
7

description PRELIM PRELIM

date 02/04/2014 08/12/2016

**PRELIMINARY SKETCH PLANS:**  
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ISSUED FOR  
**PRELIMINARY**

project no:	scale	rev
FL-016	1:200	7
	date DEC 16	
	drawn CC	



# PROPOSED INDUSTRIAL DEVELOPMENT

## STAGE 1 - 117 SOMERSET ROAD

### GRACEMERE, QLD, 4702

#### GENERAL NOTES

- THIS IS A CAD DRAWING. DO NOT SCALE. TAKE FIGURED DIMENSIONS ONLY.
- ALL DIMENSIONS GIVEN ON THESE DRAWINGS ARE IN METERS UNLESS NOTED OTHERWISE.
- ALL WORK AND MATERIALS SHALL COMPLY WITH THE PROJECT DRAWINGS, SPECIFICATION AND CURRENT COUNCIL STANDARDS AND SPECIFICATIONS.
- ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE WORKPLACE HEALTH AND SAFETY ACT.
- PROVIDE TRAFFIC MANAGEMENT FOR THE DURATION OF CONSTRUCTION IN ACCORDANCE WITH "THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES"
- THE CONTRACTOR IS TO LOCATE, IDENTIFY AND ESTABLISH THE CONNECTIVITY OF ALL EXISTING SERVICES WITHIN THE LIMITS OF PROPOSED WORKS AND CONFIRM THIS INFORMATION WITH THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
- PROPERTY BOUNDARIES ARE SUBJECT TO CONFIRMATION BY FIELD SURVEY CARRIED OUT BY A REGISTERED SURVEYOR.
- ALL WORK SHALL BE JOINED NEATLY TO EXISTING FEATURES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL MEASURING DEVICES, SAFETY EQUIPMENT AND MACHINERY REQUIRED TO CARRY OUT INSPECTIONS/MEETINGS AS SPECIFIED OR REQUESTED BY THE ENGINEER.
- PROOF ROLLING NOMINATED SHALL BE CARRIED OUT USING A SINGLE AXLE HIGHWAY TRUCK WITH A REAR AXLE LOAD NOT LESS THAN 8 TONNES AND TYRES INFLATED TO 550kPa OR APPROVED EQUIVALENT. EQUIPMENT LABOUR AND LOADING REQUIRED FOR PROOF ROLLING IS TO BE PROVIDED BY THE CONTRACTOR.
- THE CONTRACTOR SHALL RESTORE ALL EXISTING AREAS TO BE MAINTAINED, TO THEIR ORIGINAL CONDITION UPON COMPLETION OF THE WORKS.
- THESE NOTES SHALL APPLY TO ALL PORTIONS OF THE WORKS.
- FOR SETOUT REFER TO CONSULTING ENGINEER FOR DIGITAL DATA.

#### Sheet List Table

Sheet Number	Sheet Title
000	COVER SHEET, SITE PLAN, LOCALITY PLAN, SCHEDULE OF DRAWINGS & GENERAL NOTES
SE001	EROSION AND SEDIMENT CONTROL PLAN
SE002	EROSION AND SEDIMENT CONTROL DETAILS
BE001	BULK EARTHWORKS PLAN
BE002	BULK EARTHWORKS SECTIONS
R001	SWEPT PATH ANALYSIS & VEHICLE ACCESS PLAN
SW001	STORMWATER DRAINAGE PLAN
SW002	STORMWATER DRAINAGE DETAILS
C001	PRE DEVELOPMENT STORMWATER CATCHMENT PLAN
C002	POST DEVELOPMENT STORMWATER CATCHMENT PLAN

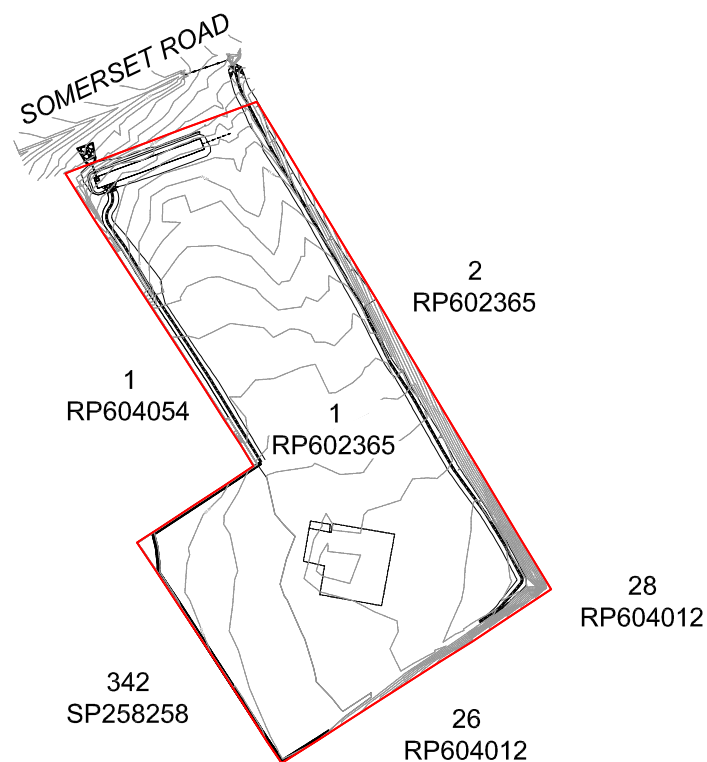
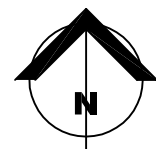
#### ROCKHAMPTON REGIONAL COUNCIL

#### APPROVED PLANS

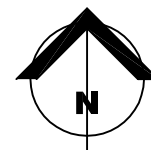
These plans are approved subject to the current conditions of approval associated with

**Development Permit No.: D/194-2016**



**Dated: 25 February 2019**



**SITE PLAN**  
SCALE 1:1000 (A1)



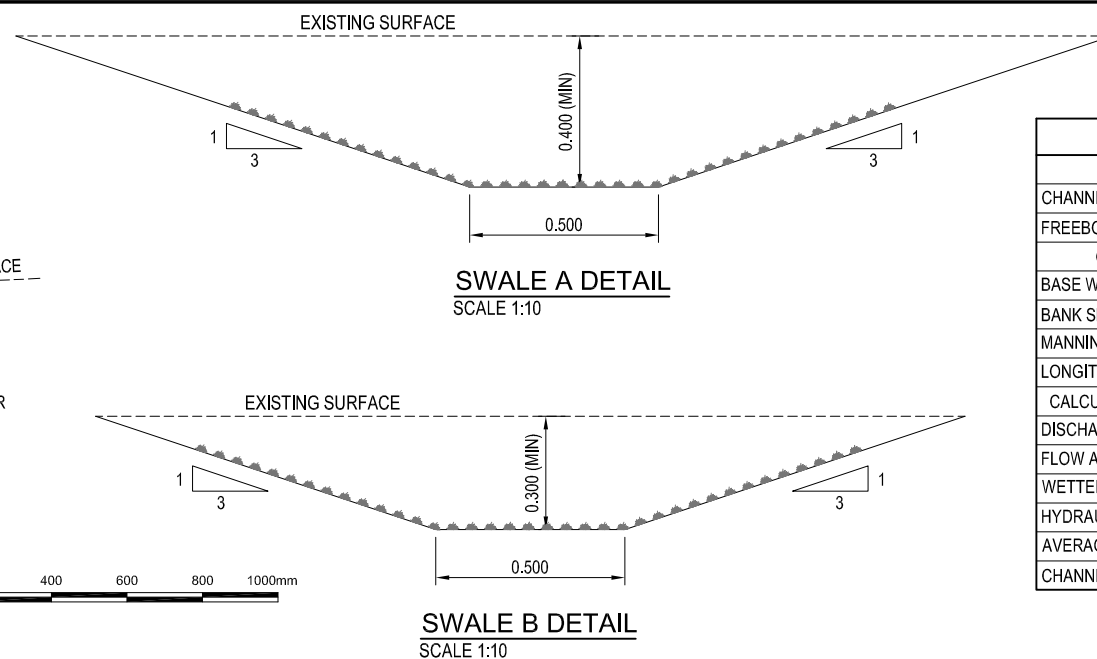
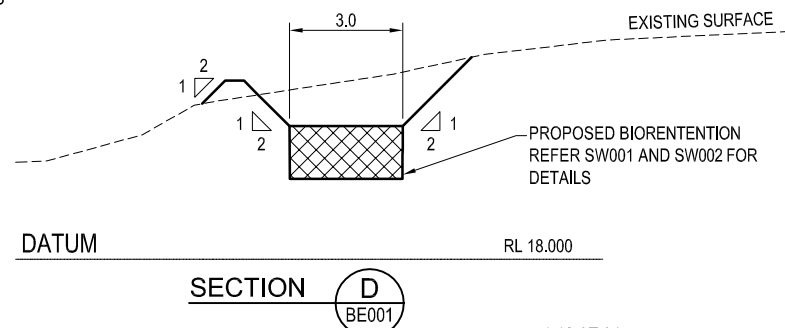
**LOCALITY PLAN**  
N.T.S

			 <b>CIVIL ENGINEERS + HYDRAULIC ENGINEERS + PROJECT MANAGERS</b> Level 6, 34 East Street Rockhampton City Q. 4700 Phone: 07 4922 5019 Fax: 07 5580 9133 Email: admin@knobelconsulting.com.au PO Box 5364 Red Hill, Rockhampton Q. 4701 ABN: 33 071 435 202 W: www.knobelconsulting.com.au	CLIENT EARTHWORX AUSTRALIA WIDE PTY LTD		DESIGN JH	DRAWN JP	APPROVED AP	TITLE COVER SHEET, SITE PLAN, LOCALITY PLAN, SCHEDULE OF DRAWINGS & GENERAL NOTES	PROJECT NO. <b>K2696</b>	
A	13.12.16	ISSUED FOR OPERATIONAL WORKS APPROVAL		PROJECT PROPOSED INDUSTRIAL DEVELOPMENT 117 SOMERSET ROAD GRACEMERE, QLD, 4702		A.R.PIANTA - R.P.E.Q. NUMBER 10423				DWG NO. <b>000</b>	ISSUE <b>A</b>
ISSUE No.	DATE	AMENDMENT				SIGNED 		DATE 13.12.16	SCALE 1:1000 AT A1 1:2000 AT A3 0 20 40 60 80 100m		

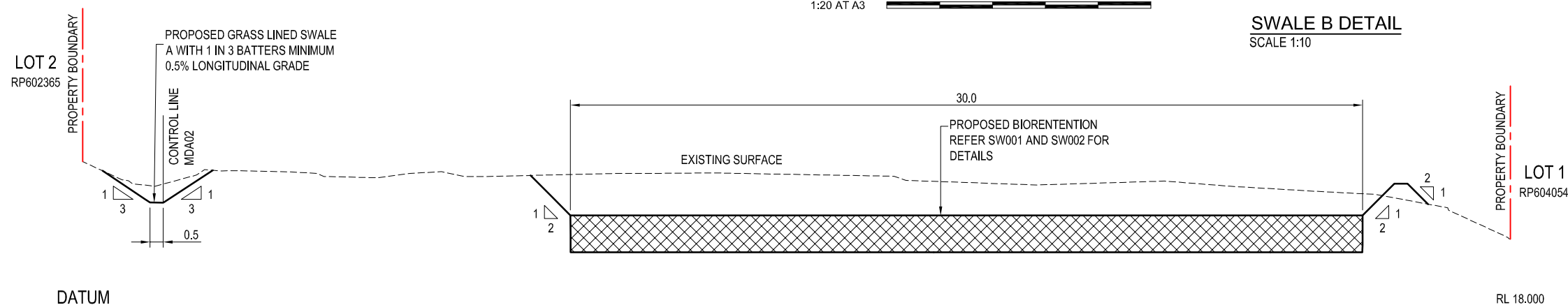




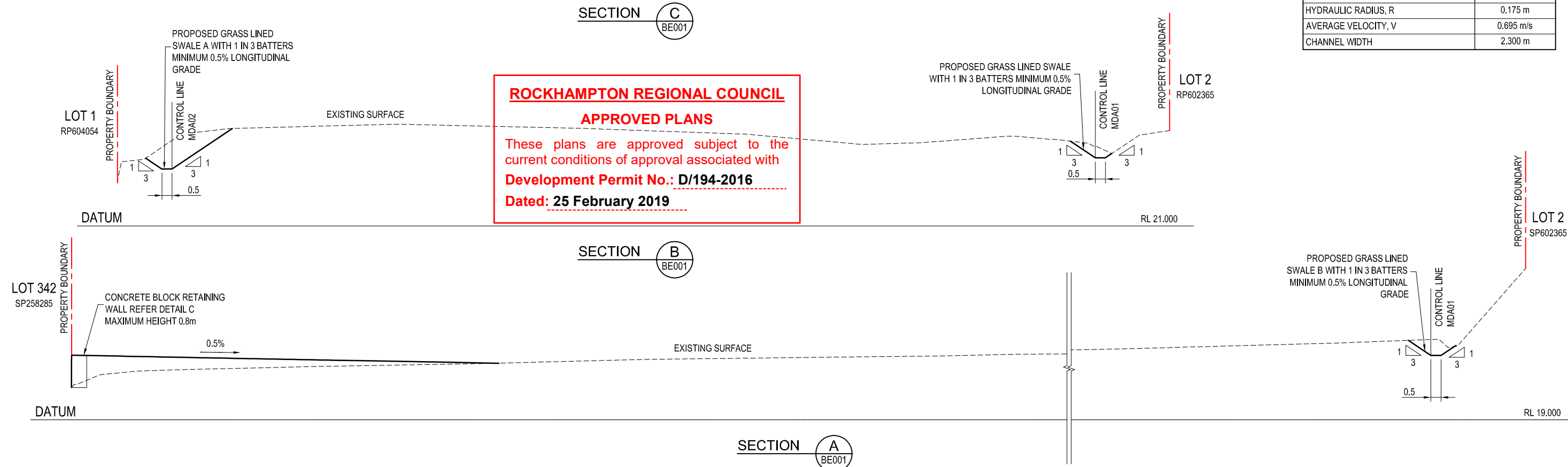






MANNINGS - SWALE A	
VARIABLE	
CHANNEL DEPTH, d	0.40 m
FREEBOARD	0
CHANNEL CONFIGURATION	
BASE WIDTH, W	0.50 m
BANK SLOPE	1 in 3
MANNINGS ROUGHNESS, n	0.045
LONGITUDINAL GRADE, S	0.015 m/m
CALCULATED FLOW CHARACTERISTICS	
DISCHARGE, Q	0.683 m <sup>3</sup> /s
FLOW AREA, A	0.680 m <sup>2</sup>
WETTED PERIMETER, Wp	3.030 m
HYDRAULIC RADIUS, R	0.224 m
AVERAGE VELOCITY, V	1.004 m/s
CHANNEL WIDTH	2.900 m

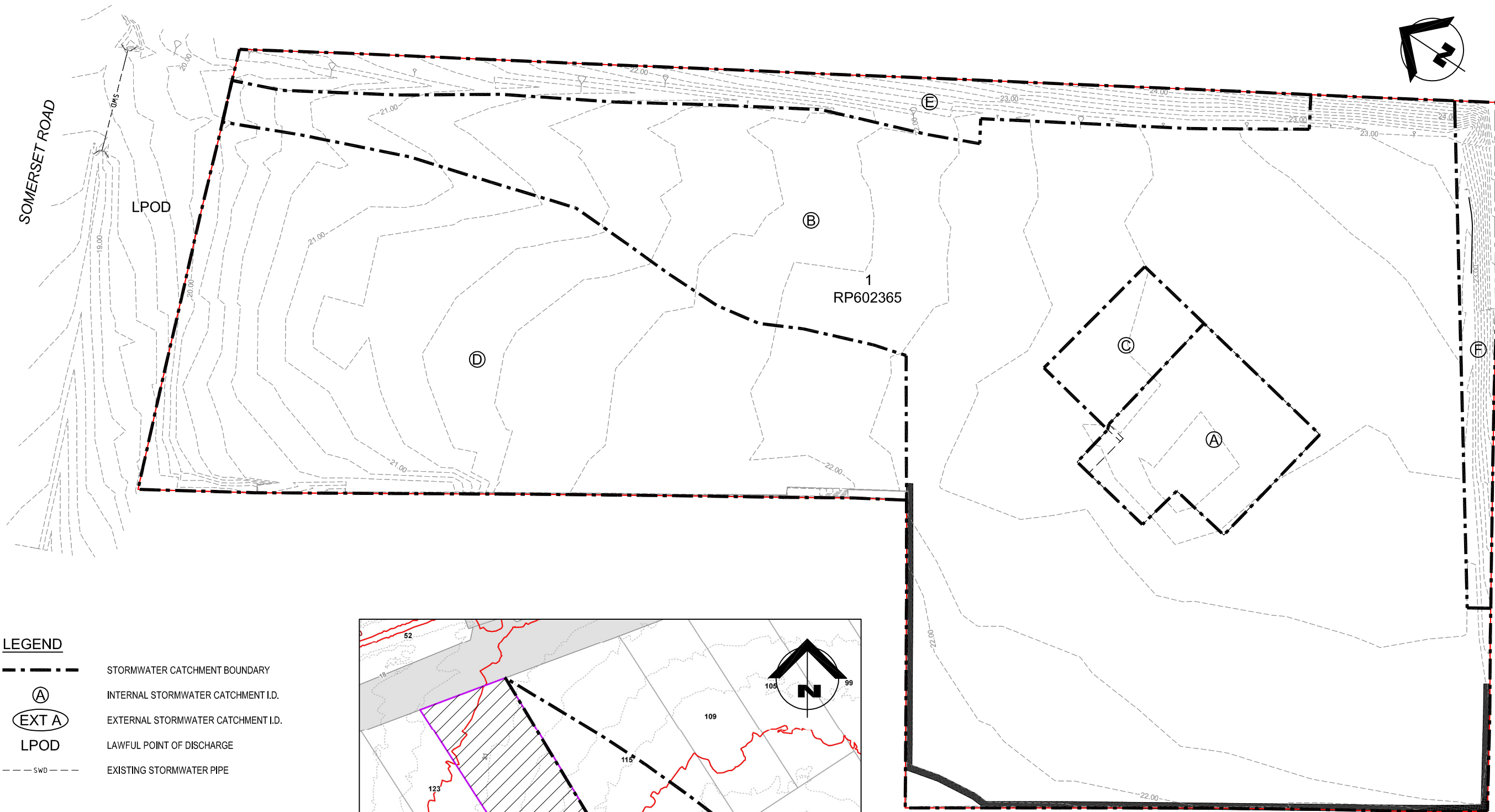


MANNINGS - SWALE B	
VARIABLE	
CHANNEL DEPTH, d	0.30 m
FREEBOARD	0.00 m
CHANNEL CONFIGURATION	
BASE WIDTH, W	0.50 m
BANK SLOPE	1 in 3
MANNINGS ROUGHNESS, n	0.045
LONGITUDINAL GRADE, S	0.010 m/m
CALCULATED FLOW CHARACTERISTICS	
DISCHARGE, Q	0.292 m³/s
FLOW AREA, A	0.420 m²
WETTED PERIMETER, Wp	2.397 m
HYDRAULIC RADIUS, R	0.175 m
AVERAGE VELOCITY, V	0.695 m/s
CHANNEL WIDTH	2.300 m



			 <b>KNOBEL CONSULTING</b> CIVIL ENGINEERS + HYDRAULIC ENGINEERS + PROJECT MANAGERS  Level 6, 34 East Street Rockhampton City Q 4700 Phone: 07 4922 5019 Fax: 07 5580 9133 Email: admincq@knobelconsulting.com.au  PO Box 5364 Red Hill, Rockhampton Q 4701 ABN: 33 071 435 202 W: www.knobelconsulting.com.au	CLIENT		DESIGN	DRAWN	APPROVED	TITLE		PROJECT NO.				
				EARTHWORX AUSTRALIA WIDE PTY LTD		JH	JP	AP	BULK EARTHWORKS SECTIONS		K2696				
				PROJECT		A.R.PIANTA - R.P.E.Q. NUMBER 10423					DWG NO.	ISSU			
				PROPOSED INDUSTRIAL DEVELOPMENT		 13.12.16 SIGNED _____ DATE _____			SCALE 1:100 AT A1 (1:200 AT A3)		0	2.5	5	7.5	10m HOR
A	13.12.16	ISSUED FOR OPERATIONAL WORKS APPROVAL		117 SOMERSET ROAD					1:50 AT A1 (1:100 AT A3)		0	1.25	2.5	3.75	5m VERT
ISSUE No.	DATE	AMENDMENT	GRACEMERE, QLD, 4702								BE002		A		



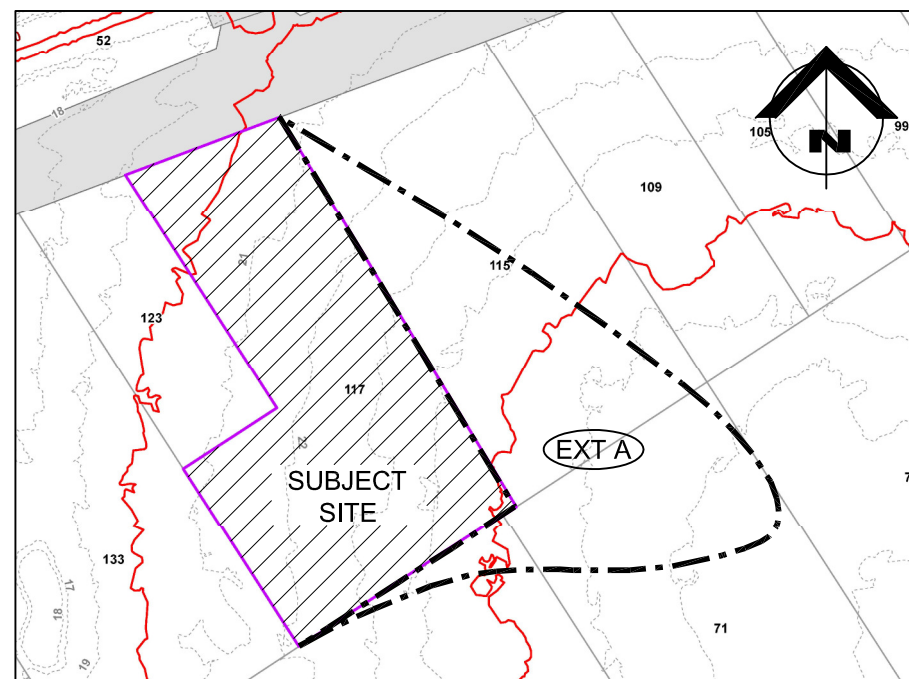


#### LEGEND

- STORMWATER CATCHMENT BOUNDARY
- (A) INTERNAL STORMWATER CATCHMENT I.D.
- (EXT A) EXTERNAL STORMWATER CATCHMENT I.D.
- LPOD LAWFUL POINT OF DISCHARGE
- SWD --- EXISTING STORMWATER PIPE

#### STORMWATER CATCHMENT TABLE

STORMWATER CATCHMENT I.D.	CATCHMENT TYPE	AREA (m <sup>2</sup> )
A	EXISTING BUILDING	383
B	GRAVEL	6301
C	TURF	172
D	DIRT	2905
E	DIRT	605
F	DIRT	244
TOTAL		10610
EXT A		9501



EXTERNAL CATCHMENT PLAN  
1:1250 AT A1

#### ROCKHAMPTON REGIONAL COUNCIL

#### APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

**Development Permit No.: D/194-2016**

**Dated: 25 February 2019**



Level 6, 34 East Street  
Rockhampton City Q. 4700  
Phone: 07 4922 5019  
Fax: 07 5580 9133  
Email: admin@knobelconsulting.com.au

PO Box 5364 Red Hill,  
Rockhampton Q. 4701  
ABN: 33 071 435 202  
W: www.knobelconsulting.com.au

CLIENT  
EARTHWORX AUSTRALIA WIDE PTY LTD

PROJECT  
PROPOSED INDUSTRIAL DEVELOPMENT  
117 SOMERSET ROAD  
GRACEMERE, QLD, 4702

DESIGN  
JH

DRAWN  
JP

APPROVED  
AP

A.R.PIANTA - R.P.E.Q. NUMBER 10423

SIGNED  
13.12.16

DATE

TITLE  
PRE DEVELOPMENT STORMWATER CATCHMENT PLAN

SCALE  
1:250 AT A1  
1:500 AT A3

0 5 10 15 20m

PROJECT NO.

K2696

DWG NO.

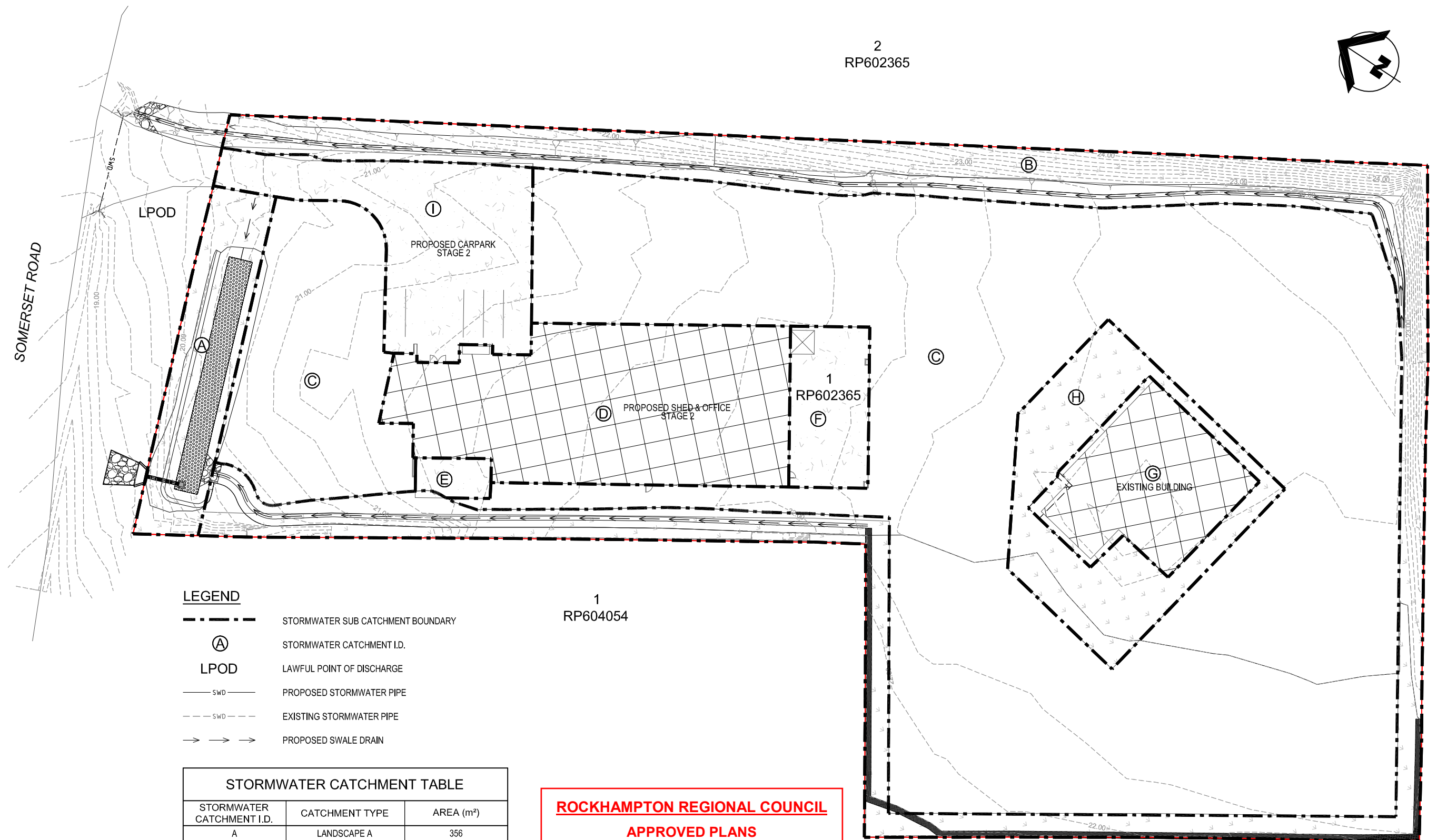
C001

ISSUE

A

ISSUE No.	DATE	AMENDMENT
A	13.12.16	ISSUED FOR OPERATIONAL WORKS APPROVAL





LEGEND

- STORMWATER SUB CATCHMENT BOUNDARY
- Ⓐ STORMWATER CATCHMENT I.D.
- LPOD LAWFUL POINT OF DISCHARGE
- SWD — PROPOSED STORMWATER PIPE
- - - SWD - - - EXISTING STORMWATER PIPE
- → → PROPOSED SWALE DRAIN

STORMWATER CATCHMENT TABLE		
STORMWATER CATCHMENT I.D.	CATCHMENT TYPE	AREA (m²)
A	LANDSCAPE A	356
B	LANDSCAPE B	1958
C	COMPACTED GRAVEL	5731
D	PROPOSED BUILDING	887
E	PROPOSED CONCRETE	47
F	PROPOSED CONCRETE	202
G	EXISTING BUILDING	383
H	EXISTING GRASS	487
I	PROPOSED CONCRETE	559
TOTAL		10610

**ROCKHAMPTON REGIONAL COUNCIL**  
**APPROVED PLANS**  
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**Dated: 25 February 2019**


**KNOBEL CONSULTING**  
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Rockhampton City Q. 4700  
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ABN: 33 071 435 202  
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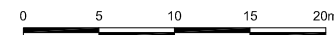
CLIENT  
EARTHWORX AUSTRALIA WIDE PTY LTD

PROJECT  
PROPOSED INDUSTRIAL DEVELOPMENT  
117 SOMERSET ROAD  
GRACEMERE, QLD, 4702

DESIGN JH	DRAWN JP	APPROVED AP
A.R.PIANTA - R.P.E.Q. NUMBER 10423		
		13.12.16
SIGNED		DATE

TITLE  
POST DEVELOPMENT STORMWATER CATCHMENT PLAN

SCALE  
1:250 AT A1  
1:500 AT A3



PROJECT NO.  
**K2696**

DWG NO. <b>C002</b>	ISSUE <b>A</b>
------------------------	-------------------

ISSUE No.	DATE	AMENDMENT
A	13.12.16	ISSUED FOR OPERATIONAL WORKS APPROVAL



DRIVEWAY CROSSOVER  
TO BE CONSTRUCTED  
AS COMPACTED  
ROADBASE & SEALED  
ONCE SOMERSET ROAD  
UPGRADED - REFER  
R001 FOR DETAILS

SOMERSET ROAD

MS1

BIO-RETENTION BASIN

DSP

1  
RP602365

1  
RP604054

EXISTING BUILDING

28  
RP604012

26  
RP604012

### SEDIMENT AND EROSION CONTROL NOTES

- CONSTRUCTION IS TO BE PROGRAMMED TO PROVIDE INSTALLATION OF PERIMETER LANDSCAPING / SURFACE TREATMENTS AS EARLY AS PRACTICAL.
- THE CONTRACTOR'S WORKS PROGRAM IS TO BE REVIEWED AT THE PRESTART MEETING. ALTERATIONS TO THE PROGRAM MAY BE REQUIRED TO ENSURE SATISFACTORY EROSION AND SEDIMENT CONTROL.
- SAFETY ISSUES MUST BE CONSIDERED AND MONITORED FOR EACH DEVICE TO THE SATISFACTION OF THE SUPERINTENDENT.
- SEDIMENT FENCE FILTER FABRIC IS TO BE APPROVED BY THE ENGINEER. FILTER CLOTH AND SHADE CLOTH IS NOT TO BE USED.
- SEDIMENTATION MANAGEMENT DEVICES SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES AND MAINTAINED AT A SUITABLE LEVEL/ CONDITION THROUGHOUT CONSTRUCTION.
- SEDIMENT FENCES ARE TO BE CLEANED OUT WHEN CAPACITY IS REDUCED BY 30%.
- DRAINAGE STRUCTURE PROTECTION IS TO BE CLEANED FOLLOWING EACH SIGNIFICANT RUNOFF PRODUCING STORM.
- ACCESS TO THE SITE IS TO BE PROVIDED BY THE CONTRACTOR. APPROVAL IS TO BE OBTAINED FROM COUNCIL FOR THE LOCATION OF THE SITE ACCESS POINT AND WASH DOWN AREA WHICH IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. ACCESS TO AND FROM THE SITE IS TO BE VIA THE SHAKEDOWN FACILITY ONLY. ALL VEHICLES ARE TO BE WASHED DOWN PRIOR TO LEAVING THE SITE.
- THE CONTRACTOR SHALL PROVIDE TEMPORARY DRAINAGE CONTROLS TO DIVERT FLOW FROM UNDISTURBED AREAS AROUND DISTURBED AREAS AND DIRECT FLOW FROM DISTURBED AREAS TOWARD CONTROL DEVICES.
- PONDED RAINFALL SHALL BE PUMPED THROUGH A SEDIMENT FENCE LOCATED ON THE SITE BEFORE DISCHARGING INTO THE DOWNSTREAM STORMWATER SYSTEM.
- STRAW BALES USED IN SEDIMENT DEVICES ARE TO BE REPLACED AFTER A MAXIMUM SERVICE PERIOD OF 6 WEEKS.
- A PHOTOGRAPHIC RECORD OF SEDIMENT AND EROSION CONTROL DEVICES AND THE IMMEDIATE DOWNSTREAM STORMWATER SYSTEM, IS TO BE CARRIED OUT ON A FORTNIGHTLY CYCLE AND AFTER EACH MAJOR STORM EVENT. CARRY OUT CORRECTIVE AND PREVENTATIVE ACTION, AS REQUIRED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE OF SEDIMENT AND EROSION CONTROL DEVICES. ALL DEVICES ARE TO BE INSPECTED AT LEAST WEEKLY AND AFTER SIGNIFICANT RUNOFF PRODUCING STORMS.
- IF EROSION AND SEDIMENT CONTROL DEVICES HAVE BEEN FOUND TO BE DEFICIENT OR FAILED IN SERVICE DUE TO UNFORESEEN CIRCUMSTANCES, CORRECTIVE ACTION IS TO BE UNDERTAKEN BY THE CONTRACTOR IMMEDIATELY, WHICH MAY INCLUDE AMENDMENTS/ADDITIONS TO THE ORIGINAL EROSION CONTROL PLANS. SUCH ADDITIONS OR AMENDMENTS ARE TO BE APPROVED BY THE SUPERINTENDENT.
- SEDIMENTATION MANAGEMENT DEVICES ARE TO BE MAINTAINED BY THE CONTRACTOR, AS NOTED AND DETAILED, UNTIL APPROVAL HAS BEEN GRANTED BY THE ENGINEER FOR THEIR REMOVAL. THE CONTRACTOR IS TO REMOVE AND DISPOSE OF THESE DEVICES OFF SITE.

### LEGEND

- / — SF — SEDIMENT FENCE
- SFW — SEDIMENT FENCE WEIR
- SEP STABILISED ENTRY/EXIT POINT
- MS1 WATER QUALITY MONITORING STATION
- DSP DRAINAGE STRUCTURE PROTECTION  
REFER DWG SE002 FOR DETAILS

342  
SP258258

**ROCKHAMPTON REGIONAL COUNCIL**

**APPROVED PLANS**

These plans are approved subject to the  
current conditions of approval associated with  
**Development Permit No.: D/194-2016**  
**Dated: 25 February 2019**

**KNOBEL CONSULTING**  
CIVIL ENGINEERS + HYDRAULIC ENGINEERS + PROJECT MANAGERS

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PROJECT  
PROPOSED INDUSTRIAL DEVELOPMENT  
117 SOMERSET ROAD  
GRACEMERE, QLD, 4702

DESIGN  
JH

DRAWN  
JP

APPROVED  
AP

A.R.PIANTA - R.P.E.Q. NUMBER 10423

SIGNED  
13.12.16

DATE

TITLE  
EROSION AND SEDIMENT CONTROL PLAN

SCALE  
1:250 AT A1  
1:500 AT A3

0 5 10 15 20m

PROJECT NO.

K2696

DWG NO.

SE001

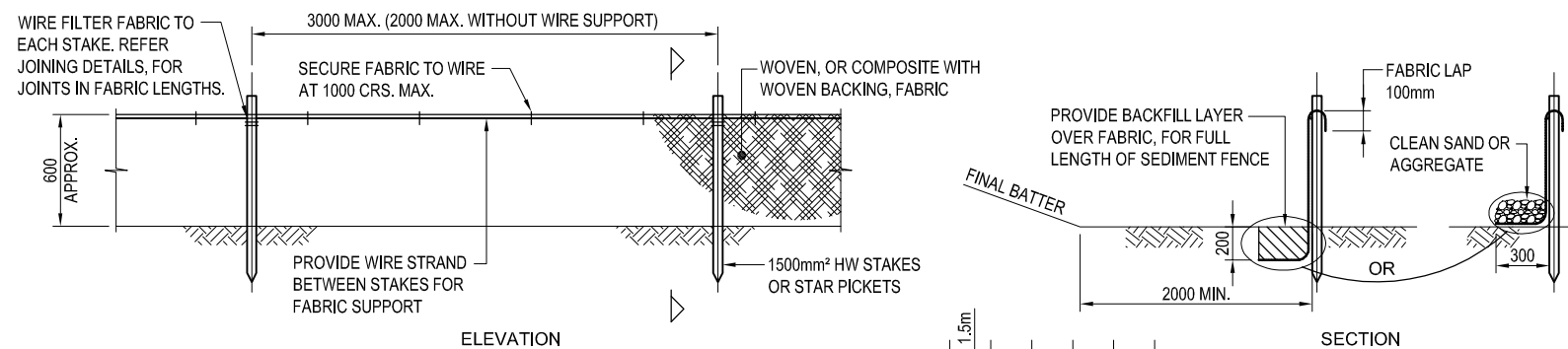
ISSUE

A

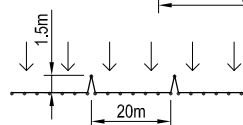
A 13.12.16 ISSUED FOR OPERATIONAL WORKS APPROVAL

ISSUE No. DATE AMENDMENT



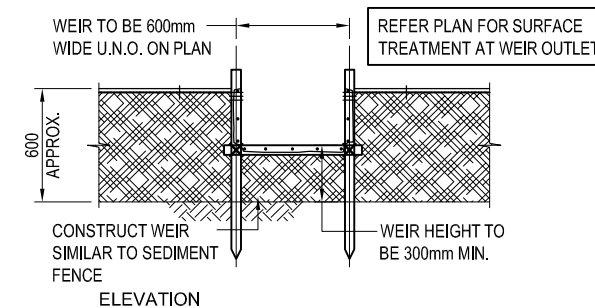


NOTE: INSTALL 1.5m (MIN.) DEEP 'RETURNS' AT 20m SPACING (MAX.) ON UPSLOPE SIDE OF FENCELINE (5-10m MAX SPACING IF FENCE ALIGNED AT ANGLE TO CONTOUR). EG:



### SEDIMENT FENCE DETAILS

N.T.S. DENOTES SEDIMENT FENCE. REFER PLAN FOR LOCATION AND EXTENTS.



### SEDIMENT FENCE WEIR

N.T.S. DENOTES SEDIMENT FENCE WEIR, REFER PLAN FOR LOCATION AND EXTENTS.

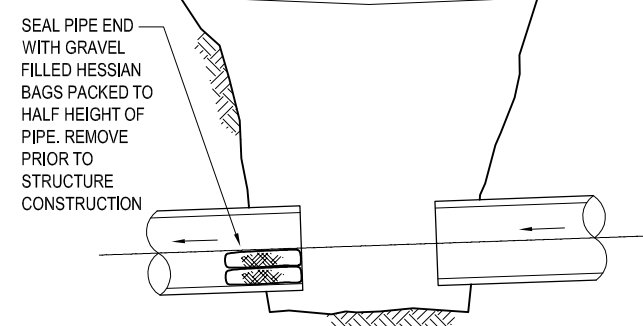
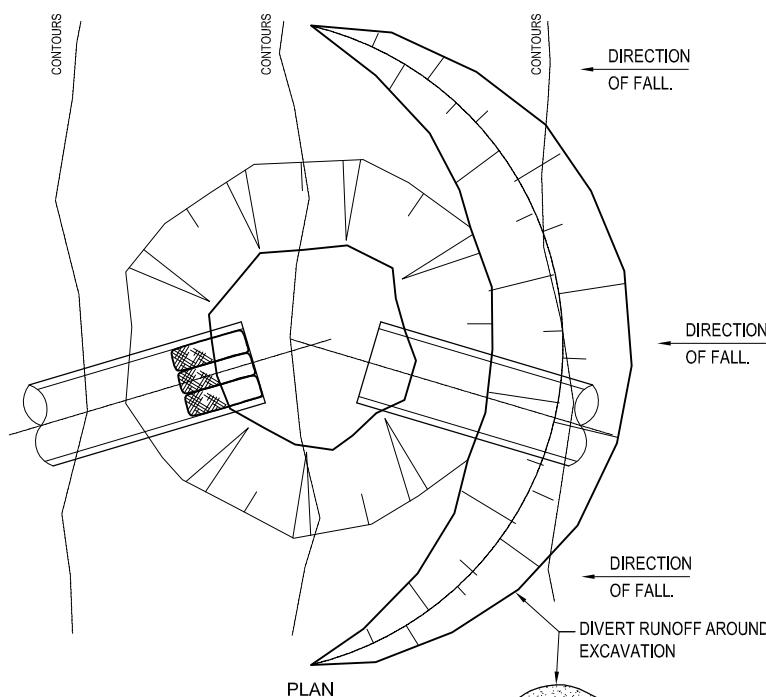
## ROCKHAMPTON REGIONAL COUNCIL

### APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

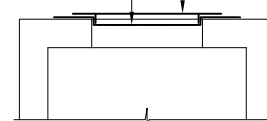
Development Permit No.: D/194-2016

Dated: 25 February 2019



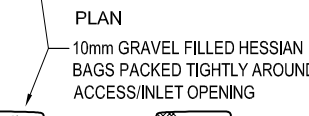
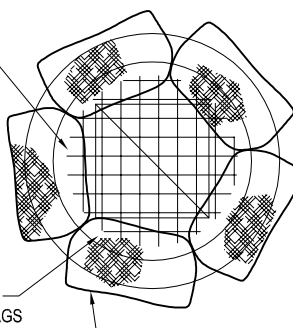
STAGE 1  
EXCAVATION AND PIPE INSTALLATION

GEOFABRIC OR APPROVED EQUIVALENT SEAL BETWEEN TOP SLAB OPENING AND TEMPORARY COVER

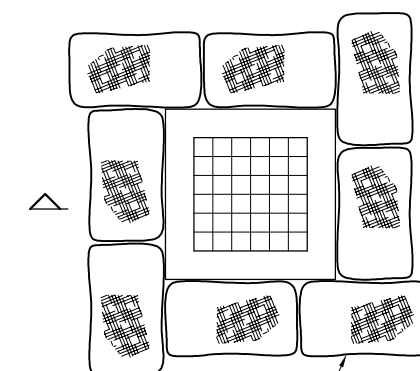


ACCESS CHAMBER

PROVIDE APPROVED GRATED COVER WITH MAXIMUM OPENINGS OF 100 x 100mm (OFFCUT REINFORCING MESH OR APPROVED EQUIVALENT)

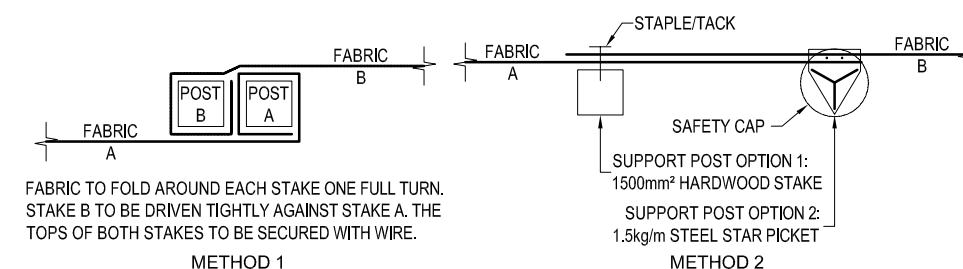


INLET STRUCTURE



INLET STRUCTURE

STAGE 3  
STRUCTURE COMPLETE

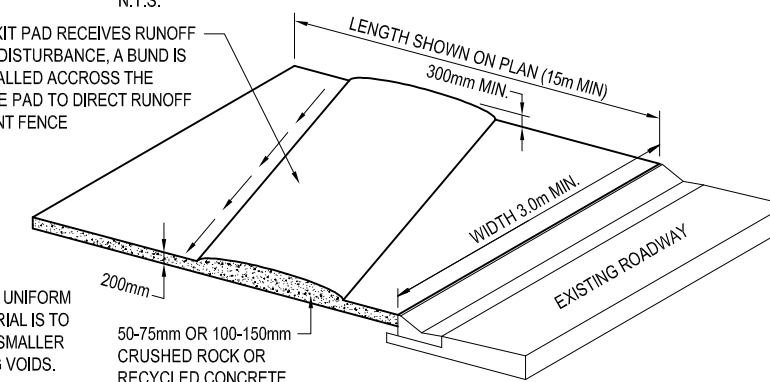


### SEDIMENT FENCE FABRIC JOINING DETAILS

N.T.S.

IF ENTRY/EXIT PAD RECEIVES RUNOFF FROM SOIL DISTURBANCE, A BUND IS TO BE INSTALLED ACROSS THE AGGREGATE PAD TO DIRECT RUNOFF TO SEDIMENT FENCE

NOTE: ROCK IS TO BE UNIFORM SIZE. IE. MATERIAL IS TO NOT CONTAIN SMALLER ROCKS FILLING VOIDS.



### STABILISED ENTRY/EXIT POINT

N.T.S. OR APPROVED EQUIVALENT

DENOTES STABILISED ENTRY/EXIT POINT, REFER PLAN FOR LOCATIONS.

ACCESS CHAMBER / INLET STRUCTURE  
N.T.S.

DSP DENOTES DRAINAGE STRUCTURE PROTECTION, REFER PLAN FOR LOCATION & EXTENTS.



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JH

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JP

APPROVED  
AP

A.R.PIANTA - R.P.E.Q. NUMBER 10423

SIGNED

13.12.16

DATE

TITLE  
EROSION AND SEDIMENT CONTROL DETAILS

SCALE  
1:5 AT A1  
1:10 AT A3

0 100 200 300 400 500mm

PROJECT NO.  
K2696

DWG NO.  
SE002

ISSUE  
A

ISSUE No.	DATE	AMENDMENT
A	13.12.16	ISSUED FOR OPERATIONAL WORKS APPROVAL



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# STORMWATER MANAGEMENT PLAN

---

**Proposed Industrial Development  
Lot 1 on RP602365  
117 Somerset Road, Gracemere**

**for Earthworx Australia Wide Pty Ltd**

**ROCKHAMPTON REGIONAL COUNCIL**

**APPROVED PLANS**

These plans are approved subject to the  
current conditions of approval associated with

**Development Permit No.: D/194-2016**

**Dated: 25 February 2019**

14<sup>th</sup> December 2016

File No: K2696-0004/A

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## DOCUMENT CONTROL SHEET

<b>Title:</b>	STORMWATER MANAGEMENT PLAN
<b>Document No:</b>	K2696-0004/A
<b>Original Date of Issue:</b>	2 <sup>nd</sup> May 2014
<b>Project Manager:</b>	Aaron Pianta
<b>Author:</b>	Jamie Lee
<b>Client:</b>	Earthworx Australia Wide Pty Ltd
<b>Client Contact:</b>	Gideon Genade – Reel Planning CQ
<b>Client Reference:</b>	Proposed Industrial Development
<b>Synopsis:</b>	This <i>Stormwater Management Plan</i> describes the existing site characteristics, and corresponding stormwater quantity and quality management controls to be implemented during the operation phase of the development.

Reviewed by RPEQ	Reg. No.	Signed	Date
Aaron Pianta	10423		14 <sup>th</sup> December 2016

Revision/Checking History			
Revision No	Date	Checked By	Issued By
Original	2 <sup>nd</sup> May 2014	Aaron Pianta	Jamie Lee
Revision A	14 <sup>th</sup> December 2016	Aaron Pianta	Jamie Lee

Distribution		
Recipient	No of Copies	Method
Gideon Genade – Reel Planning CQ	1	PDF

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## 1.0 INTRODUCTION

### 1.1 Background

Knobel Consulting Pty Ltd has been commissioned by Earthworx Australia Wide Pty Ltd to prepare a *Stormwater Management Plan* (SWMP) to facilitate a Material Change of Use (MCU) Application for a proposed industrial development situated at 117 Somerset Road, Gracemere.

The purpose of this report is to demonstrate that the proposed development can comply with the current Rockhampton Regional Council (RRC) Policies and Codes in regard to water quantity and quality and discharge runoff to a lawful point of discharge.

### 1.2 Objectives

This SWMP details the conceptual planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development.

This SWMP aims to:

- Establish the required performance criteria for the proposed stormwater quantity and quality improvement systems;
- Provide a conceptual design of stormwater infrastructure including stormwater quality improvement devices and stormwater quantity management controls;
- Ensure the quality of stormwater discharging from the proposed development does not adversely impact on the water quality and ecological values of downstream watercourses;
- Ensure stormwater runoff is conveyed through the site to a lawful point of discharge in accordance with QUDM; and
- Provide reporting and monitoring mechanisms whereby the performance of this system can be measured enabling identification of corrective actions/alterations required to ensure the above mentioned objectives are maintained.

This SWMP has been prepared in accordance with the IEAust, (National Committee on Water Engineering), *Australian Runoff Quality (Draft)*, *Capricorn Municipal Development Guidelines (2007)*, *State Planning Policy 2016* and *Queensland Urban Drainage Manual (2013)*.

### 1.3 Description of the Subject Site

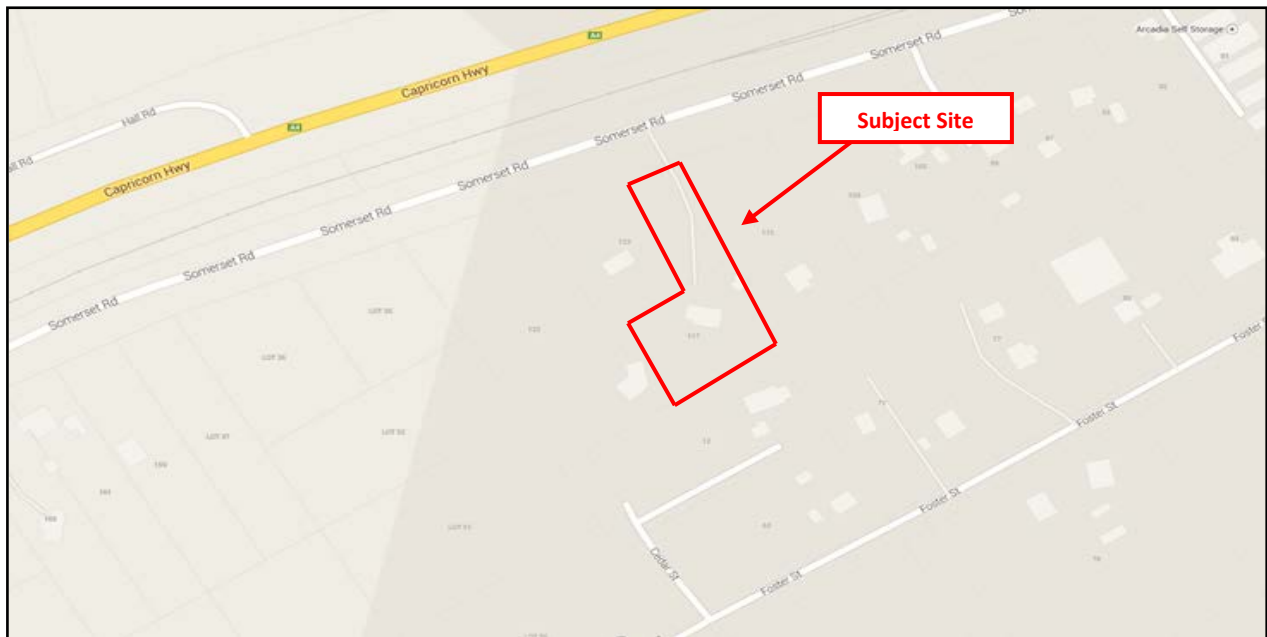
#### 1.3.1 Location

The subject site consists of an area of 10,610 m<sup>2</sup>, with details as summarised in Table 1 and as located in Figure 1.

**Table 1: Site Description**

Developer/Consultant	Property and Location	
Owner/Developer	Lot and Property Description	Address
EARTHWORX AUSTRALIA WIDE PTY LTD	Lot 1 on RP602365	117 Somerset Road, Gracemere





**Figure 1:** Site Location Plan (Modified from maps.google.com)

### 1.3.2 Site Topography

The site grades from the southern boundary towards Somerset Road at approximately 2.0%. The site batters up to neighbouring properties along the eastern and southern boundary and site levels range from 18.7mAHD to 25.0mAHD. For further details refer to the Hoffmann Surveyors, *Detail Survey of Lot 1 RP602365*, Ref: H14017 included as Appendix A.

### 1.3.3 Vegetation and Land Use

The subject site currently consists of a single dwelling, gravel driveway and concrete slab. The remainder of the site is compacted soil. An aerial photo of the site is displayed in Figure 2.



**Figure 2:** Aerial Photograph of the Site (Modified from nearmap.com)



### 1.3.4 Rainfall

Rainfall intensity data for the subject site has been extracted from Bureau of Meteorology *Rainfall IFD Data System* in accordance with IEAust, *Australian Rainfall and Runoff (1987)*.

The extracted data is as follows:

**Table 2: Rainfall Data**

$2_{yr} I_{1hr}$ :	44.12 mm/hr;
$2_{yr} I_{12hr}$ :	8.00 mm/hr;
$2_{yr} I_{72hr}$ :	2.30 mm/hr;
$50_{yr} I_{1hr}$ :	79.44 mm/hr;
$50_{yr} I_{12hr}$ :	17.06 mm/hr;
$50_{yr} I_{72hr}$ :	5.63 mm/hr;
$F_2$ :	4.22;
$F_{50}$ :	17.46; and
$G$ :	0.22

## 1.4 Description of Development

The ultimate development shall contain a proposed vehicle depot which shall consist of a shed, concrete carparking area, compacted roadbase for heavy vehicle manoeuvring & parking and landscaping.

The associated operational works is for Stage 1 which shall consist of covering the designated area with compacted roadbase & perimeter landscaping. Stormwater detention & water quality will be constructed for the ultimate scenario as part of Stage 1.

Refer to Design & Architecture Site Plan – Stage 1 (Ref: FL-016-SK002/7) & Site Plan – Stage 2 (Ref: FL-016-SK003/7) included as Appendix B.

## 2.0 SITE HYDROLOGY AND HYDRAULICS

### 2.1 Background

The following sections define the parameters of the sites hydraulics. The Rational Method has been applied to define flow rates at and through the subject site. Ground level and roof runoff from the proposed development will be directed to the table drain on Somerset Road constituting a Lawful Point of Discharge.

### 2.2 Pre Development

#### 2.2.1 Coefficient of Runoff

A coefficient of runoff (Cyear) was calculated for the site using the fraction impervious method specified in QUDM. A fraction impervious factor of 0.38 is applied in accordance with the existing layout. This was calculated using a fraction impervious of 0.0 for bare earth 0.5 for gravel and 1.0 for the shed roofs and concrete. This equates to a C10 value of 0.76, taken from Table 4.05.3(a) (QUDM). Refer to Knobel Consulting Pty Ltd, *Pre Development Stormwater Catchment Plan* (Ref: K2696/C001/A) included as Appendix C.

#### 2.2.2 Time of Concentration

Friends Equation ( $t_c = (107nL^{0.333})/S^{0.2}$ ) from QUDM has been applied for a sheet length of 170 metres at 2.0% over a gravel surface ( $n=0.0275$ ), equating to a travel time of 14 minutes.

#### 2.2.3 Design Flow Rates

Design storm flow rates have been calculated for standard ARI storm events using rainfall intensity values from the BOM-IFD programme for Gracemere. The Rational Method ( $Q = 2.78 \times 10^{-3} CIA$ ) has been used to calculate the design flow rates for the site.



The calculated existing development peak flows on the subject site are presented in Table 3:

**Table 3: Pre Development Flow Rates**

Average Recurrence Interval	ARI	1	2	10	100
Coefficient of Runoff	C	0.61	0.65	0.76	0.92
Area of Catchment (ha)	A	1.06	1.06	1.06	1.06
Average Rainfall Intensity (mm/h)	I	71	92	135	213
Peak Flow Rate (m <sup>3</sup> /s)	Q	0.128	0.176	0.302	0.577

## 2.3 Post Development

### 2.3.1 Coefficient of Runoff

A coefficient of runoff (C<sub>year</sub>) was calculated for the site using the fraction impervious method specified in QUDM. A fraction impervious factor of 0.50 is applied in accordance with the proposed layout. This was calculated using a:

- Fraction impervious of 0.0 for landscaping
- 0.5 for gravel
- 1.0 for the shed roof and concrete areas.

This equates to a C<sub>10</sub> value of 0.82, taken from Table 4.05.3(a) (QUDM). Refer to Knobel Consulting, *Post Development Stormwater Catchment Plan* (Ref: K2696/C002/A) included as Appendix D.

### 2.3.2 Time of Concentration

Friends Equation ( $t_c = (107nL^{0.333})/S^{0.2}$ ) from QUDM has been applied for a sheet length of 170 metres at 1.0% over a gravel surface (n=0.0275), equating to a travel time of 14 minutes.

### 2.3.3 Design Flow Rates

Design storm flow rates have been calculated for standard ARI storm events using rainfall intensity values from the BOM-IFD programme for Gracemere. The Rational Method ( $Q = 2.78 \times 10^{-3} CIA$ ) has been used to calculate the design flow rates for the site.

The calculated proposed development peak flows on the subject site are presented in Table 4:

**Table 4: Post Development Flow Rates**

Average Recurrence Interval	ARI	1	2	10	100
Coefficient of Runoff	C	0.66	0.70	0.82	0.98
Area of Catchment (ha)	A	1.06	1.06	1.06	1.06
Average Rainfall Intensity (mm/h)	I	71	92	135	213
Peak Flow Rate (m <sup>3</sup> /s)	Q	0.138	0.190	0.326	0.615



## 2.4 External Catchments

An external catchment enters the site along the eastern boundary. The catchment is shown on the Knobel Consulting Pty Ltd, *Pre Development Stormwater Catchment Plan* (Ref: K2696/C001/A). All design calculations have assumed ultimate development of the external catchment for a Q100 rainfall event.

### 2.4.1 Coefficient of Runoff

A coefficient of runoff (C<sub>year</sub>) was calculated for the external catchment using the fraction impervious method specified in QUDM. The catchment land use is Commercial / Industrial which equates to a fraction impervious of 0.9 (QUDM, Table 4.05.1). From Table 4.05.3(a) in QUDM this results in a C<sub>10</sub> value of 0.96, calculated based on a 10 year ARI rainfall intensity (<sup>1</sup>I<sub>10</sub> mm/hr) of 64 mm/hr.

With reference to QUDM Table 4.05.2, applying the frequency factors for the standard storms of 10 and 100 years results in the following post development coefficients of runoff as shown in Table 5:

**Table 5: Coefficient of Runoff - External Catchment A**

C <sub>10</sub>	C <sub>100</sub>
0.96	1.0

### 2.4.2 Time of Concentration

Friends Equation ( $t_c = (107nL^{0.333})/S^{0.2}$ ) from QUDM has been applied for sheet flow for a length of 95 metres at 6.0% over an average grassed surface (n=0.035), equating to a travel time of 12 minutes.

### 2.4.3 Design Flow Rates

The calculated post development peak flows for this subject site are presented in Table 6:

**Table 6: External Catchment Flow Rates**

Catchment ID		A
Average Recurrence Interval	ARI	100
Coefficient of Runoff	C	1.0
Area of Catchment (ha)	A	0.95
Average Rainfall Intensity (mm/h)	I	213
Peak Flow Rate (m <sup>3</sup> /s)	Q	0.601

These flows will be diverted around the proposed development and collected within a proposed swale drain along the eastern boundary and will then be discharged to LPOD with no adverse effects on the proposed development. For the location of the proposed swale drains refer to the Knobel Consulting Pty Ltd, *Stormwater Drainage Plan* (Ref: K2696/SW001A) included as Appendix E.

## 3.0 STORMWATER QUANTITY ASSESSMENT

### 3.1 Background

The development of land will potentially increase peak flow rates from the subject site due to increased impervious areas and a reduced critical time of concentration. The following section provides details of an onsite detention system ensuring there will be no adverse impacts associated with the increased runoff rate on downstream properties and infrastructure.



### 3.2 Objective

The following objective has been set for stormwater discharge from the site and proposed development:

- No net increase in peak flows from the subject site for all events up to the Q100 storm event during the post developed condition.

This objective shall be achieved by detaining site runoff within the development.

### 3.3 Hydraulic Model

A calculation of the required detention volume to mitigate any increase in total site discharge rates has been made using the DRAINS software programme. DRAINS modelling has been adopted to ensure that the detention tank volume is designed with a higher degree of confidence.

The model was developed comprising of a single catchment discharging to LPOD. The 2, 10 and 100 year ARI storm events were analysed for all standard durations ranging from 5 minutes to 120 minutes. As the DRAINS model has been run using the Rational Method rainfall generation method, the peak flow rate targets have been calibrated to the peak flow rates calculated using the Rational Method. It was determined that the 20 minute storm is the critical duration for the combined peak site discharge for both the pre development and post development scenarios.

### 3.4 Detention Volume

Detention volume will be provided within the bio retention basin. The basin size and outlet pipe diameters were adjusted to ensure the developed site as a whole does not discharge stormwater at levels exceeding the existing site's discharge rates.

The following detention storage parameters were found to achieve the target mitigated pre development flow rates:

**Table 7: Detention Tank Parameters**

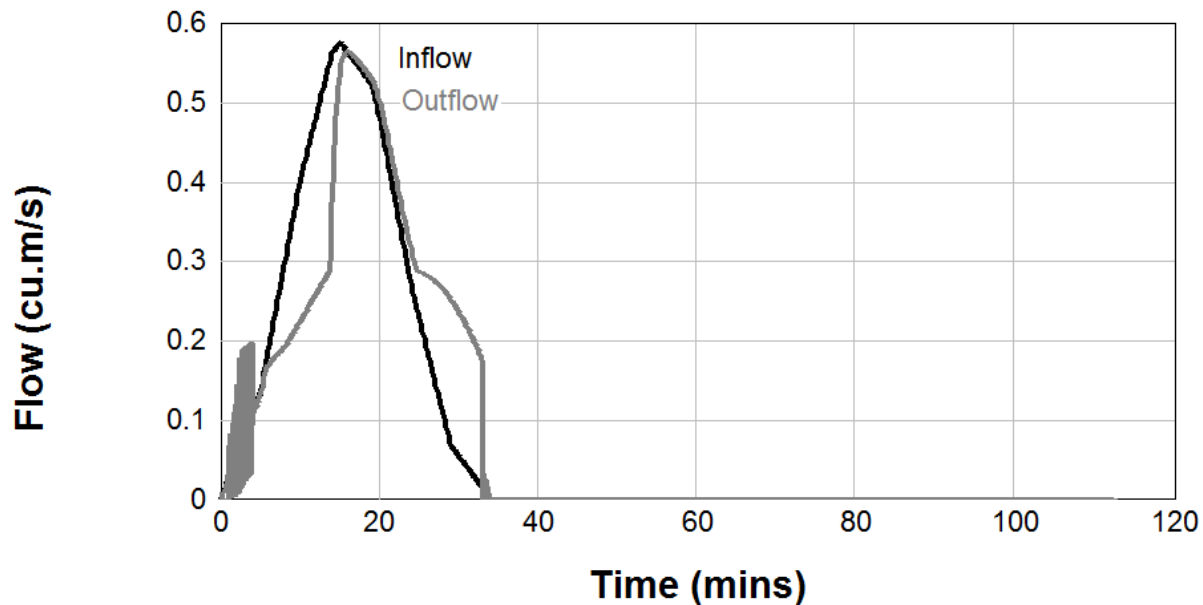
Detention Surface Area	150 m <sup>2</sup>
Detention Basin Outlet Level	19.06 m AHD
Detention Depth	0.40 m
Detention Volume	60 m <sup>3</sup>
Base Outlet Pipe Diameter	375 mm
Orifice on Base Outlet Pipe	346 mm

The 20 minute design storm was the critical storm event for determining the required volume within the tank. A comparison of the DRAINS pre development, post development and mitigated flow rates based on the above arrangement is shown in the table below followed by the hydrograph for the critical duration of the Q<sub>100</sub> storm event.

**Table 8: Comparison of DRAINS Pre Development, Post Development and Mitigated Flow Rates**

Average Recurrence Interval	2	10	100
Pre Development Flow Rate (m <sup>3</sup> /sec) (DRAINS)	0.218	0.352	0.564
Post Development Flow Rate (m <sup>3</sup> /sec) (DRAINS)	0.225	0.363	0.576
Mitigated Flow Rate (m <sup>3</sup> /sec)	0.218	0.282	0.564





**Figure 3: Mitigated Post Development Flow Rates for 100 year ARI 20 minute duration storm event**

The detention arrangement can be seen to effectively mitigate the post development flows in all storms.. For Basin location and details, Refer to Knobel Consulting Pty Ltd, *Stormwater Drainage Details* (Ref: K2696/SW002/A) included as Appendix F.

A copy of the DRAINS model used in this report can be made available to Council upon request.

## 4.0 STORMWATER QUALITY ASSESSMENT

### 4.1 Background

The development of land has the potential to increase the pollutant loads within stormwater runoff and downstream watercourse and environment. During the construction phase of the development, disturbance to the existing ground has the potential to significantly increase sediment loads entering downstream drainage systems and watercourses. The operational phase of the development will potentially increase the amount of sediments and nutrients washing from the site.

The following sections describe construction and operational phase controls and water quality modelling of the proposed treatment train in compliance with Council guidelines.

### 4.2 Construction Phase

#### 4.2.1 Key Pollutants

During the construction phase a number of key pollutants have been identified for this development. Table 9 illustrates the key pollutants that have been identified.



**Table 9: Key Pollutants, Construction Phase**

Pollutant	Sources
<b>Litter</b>	Paper, construction packaging, food packaging, cement bags, material off cuts.
<b>Sediment</b>	Exposed soils and stockpiles during earthworks and building works.
<b>Hydrocarbons</b>	Fuel and oil spills, leaks from construction equipment and temporary car park areas.
<b>Toxic Materials</b>	Cement slurry, asphalt primer, solvents, cleaning agents, and wash waters (eg, from tile works).
<b>Acids or Alkaline substances</b>	Acid sulphate soil, cement slurry and wash waters.

#### 4.2.2 Sediment and Erosion Controls

Sediment and erosion control devices (S&EC) employed on the site shall be designed and constructed in accordance with IECA Australasia *Best Practice Erosion & Sediment Control Guidelines* (2008).

Details of the proposed controls are shown on Knobel Consulting Pty Ltd, *Erosion & Sediment Control Plan* (Ref: K2696/SE001/A) included as Appendix F.

#### PRE CONSTRUCTION

- Stabilised site access/exit on Somerset Road;
- Sediment fences to be located along the contour lines downstream of disturbed areas;
- Diversion drains to divert clean runoff around the construction site;
- Educate site personnel to the requirements of the Erosion and Sediment Control Plan.

#### CONSTRUCTION

- Maintain construction access/exit, sediment fencing, catch drains and all other existing controls as required;
- Progressively surface and revegetate finished areas as appropriate.

During construction, all areas of exposed soils allowing dust generation are to be suitably treated. Treatments will include mulching the soil and watering. Road access is to be regularly cleaned to prevent the transmission of soil on vehicle wheels and eliminate any build up of typical road dirt and tyre dusts from delivery vehicles.

Adequate waste disposal facilities are to be provided and maintained on the site to cater for all waste materials such as litter hydrocarbons, toxic materials, acids or alkaline substances.

### 4.3 Operational Phase

The following section describes the preliminary design of the Stormwater Quality Improvement Devices (SQID's) that form a treatment train for the operational phase of the development that complies with State Planning Policy 2013 water quality objectives as follows:

- 85% reduction in Total Suspended Sediment (TSS)
- 60% reduction in Total Phosphorus (TP)
- 45% reduction in Total Nitrogen (TN)
- 90% reduction in litter (sized 5 mm or greater)

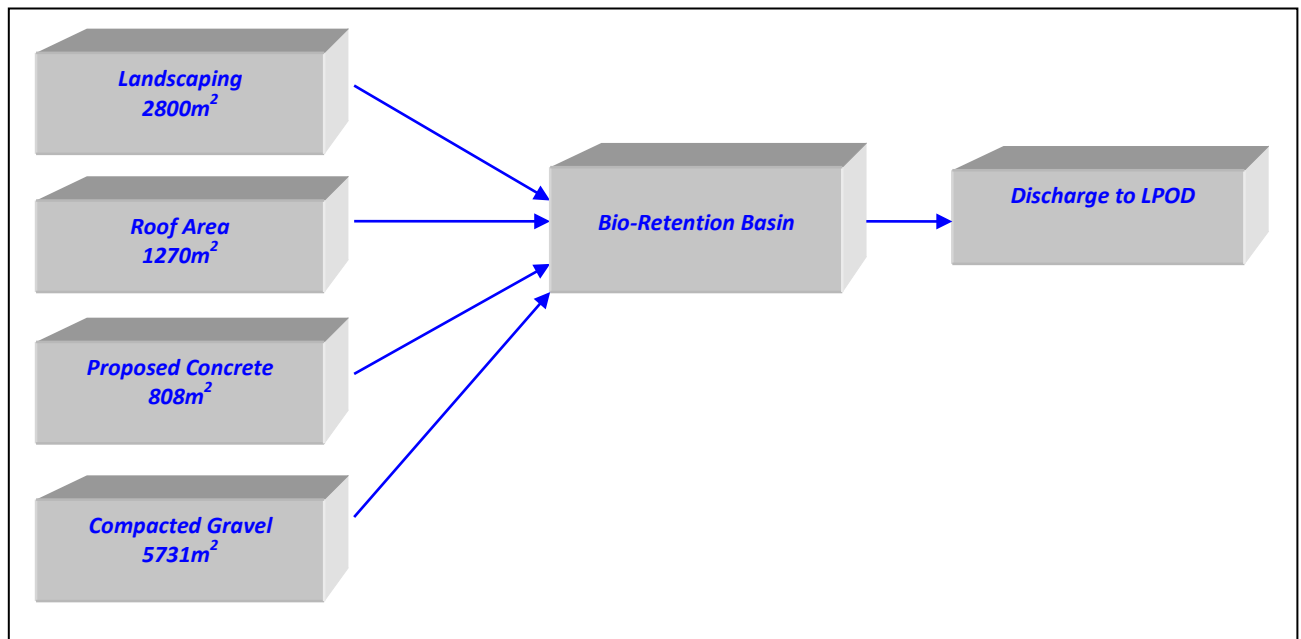
To assess the quantities of pollutants discharging from the site the water quality modelling package MUSIC v5.1 has been applied. MUSIC Modelling Parameters and delineated data have been sourced from the Healthy Waterways MUSIC Modelling Guidelines.

### 4.4 Operational Phase Stormwater Quality Improvement Devices

A bio-retention tank has been included in the design to meet the Council's water quality objectives. Runoff generated on the ground level will ultimately be collected by various field inlets with sediment basket inserts which will be located throughout the site. Runoff will then be discharged into the proposed bio-retention tank for final treatment before being discharged to the LPOD. The locations of the field inlets and bio-retention tank can be seen



in Knobel Consulting Pty Ltd, *Stormwater Drainage Plan* (Ref: K2696/P003/A). A flow chart of the proposed stormwater quality treatment train is shown in Figure 3.



**Figure 4: Operational Phase Treatment Train**

The proposed will reduce the amount of sediments and nutrients discharging from the proposed development.

Table 10 illustrates the treatment train effectiveness of the proposed SQID's.

**Table 10: Treatment Train Effectiveness of Proposed SQID**

Parameter	Post	Post Mitigated	Reduction	Water Quality Objectives
Flow (ML/yr)	5.47	4.05	26.1 %	-
TSS (kg/yr)	616	92.4	85.0 %	85 %
TP (kg/yr)	2.01	0.453	77.5 %	60 %
TN (kg/yr)	11.9	4.74	60.1 %	45 %
GP (kg/yr)	87.8	0	100 %	90 %

The results demonstrate that the proposed SQID meet the intended water quality objectives for flow, suspended solids, phosphorous and nitrogen levels.

#### 4.5 Operational Phase Maintenance Requirements

The proposed stormwater management devices will require maintenance and monitoring to ensure that they function as designed. The following section provides an outline of the necessary maintenance tasks for the proposed devices.



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## 5.0 CONCLUSIONS

---

This *Stormwater Management Plan* (SWMP) details the planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development.

The proposed development will result in an increase in runoff compared to the pre developed site. The report outlines a successful mitigation strategy for the post development flow rates, demonstrating that there will be no adverse impacts to the downstream properties.

Knobel Consulting Pty Ltd has adopted a water sensitive urban design (WSUD) approach to managing the stormwater runoff from the proposed development by treating stormwater runoff within the SQID's. Through the use of these SQID's it can be seen to satisfy the performance outcomes outlined in Queensland Government *State Planning Policy April 2016*.



APPENDIX

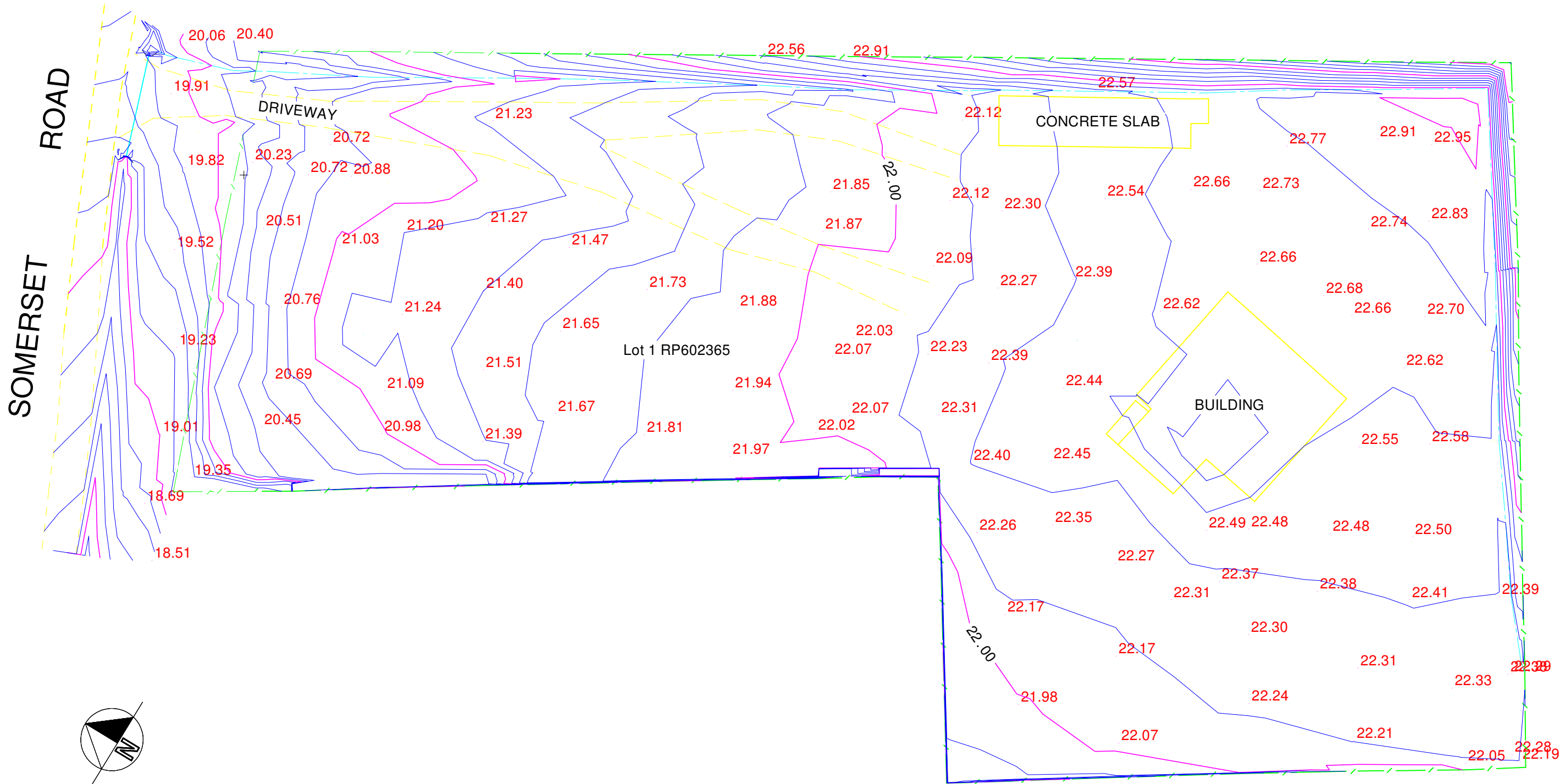
**A**

Hoffman Surveyors

*Detail Survey of Lot 1 RP602365*

(Ref: H14017)





<p>Scale 1:500 - Lengths are in Metres.</p>		<p>Meridian: <b>MGA94</b></p> <p>Vertical Datum: <b>A.H.D</b></p> <p>RL of Origin: <b>19.592</b></p> <p>Derived from: <b>PSM 134444</b></p>		<p>Plan of:</p> <p><b>Detail Survey of Lot 1 RP602365</b></p> <p><b>117 Somerset Road, Gracemere</b></p>		<p><b>HOFFMANN SURVEYORS</b> SURVEY CONSULTANTS A.B.N. 98 124 394 378</p> <p>ROCKHAMPTON 37-39 WITHERS ST. NTH ROCKHAMPTON QLD .... 4701 Ph (07) 4922 3834</p> <p>LONGREACH MERINO ARCADE EAGLE ST. QLD .... 4730 PH (07) 4658 2323</p> <p>Email: rockhampton@hoffmannsurveyors.com.au</p>		<p>Drawn: <b>A Morcom</b></p> <p>Date: <b>10-02-2014</b></p> <p>Surveyed: <b>J Robinson</b></p> <p>Date: <b>05-02-2014</b></p>	<p>Locality: <b>Gracemere</b></p> <p>Parish: <b>GRACEMERE</b></p> <p>County: <b>Livingstone</b></p> <p>Ref. No. <b>H14017</b></p>	<b>A3</b>
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0 50 mm 100 mm 150 mm



## APPENDIX

# B

## Design and Architecture

### *Site Plan – Stage 1*

(Ref: FL-016-SK-002/7)

and

### *Site Plan – Stage 2*

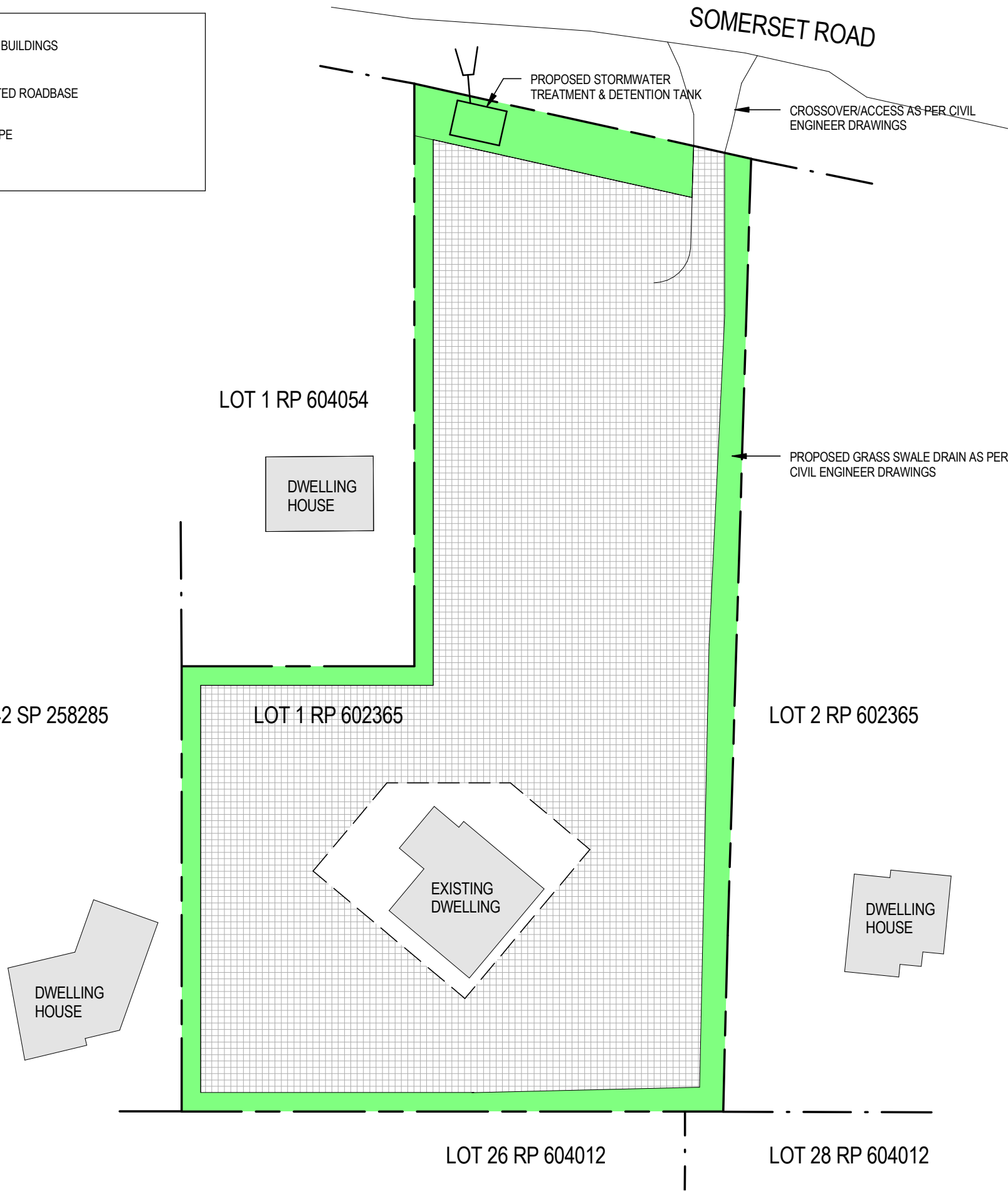
(Ref: FL-016-SK-003/7)



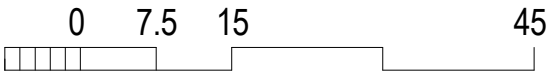
EXISTING BUILDINGS

COMPACTED ROADBASE

LANDSCAPE



AREA SCHEDULE - STAGE 1	
Site Area - WHOLE SUBJECT SITE =	10 610sqm
USE AREA (excludes residential area)=	9 739sqm (100%)
Building Height =	Nil
<b>Existing Residential Area</b>	
Residential area =	871sqm
<b>Landscaped Area</b>	
Landscaped area =	1 794sqm (18.4%)
<b>Proposed Building</b>	
Total GFA =	0sqm
<b>Impervious Area</b>	
Compacted road base =	7 945sqm
Total Impervious Area =	7 945 (81.6%)
<b>Off-street Car Parking Spaces</b>	0no
Site Cover =	0sqm (0%)

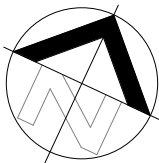


drawing title:

SITE PLAN - STAGE 1

drawing no:

SK-002



project:

PROPOSED TRANSPORT DEPOT & WAREHOUSE

location:

117 SOMERSET ROAD, GRACEMERE

client:

EARTHWORX AUSTRALIA WIDE PTY LTD

A3 DRAWING

NOTED SCALES RELATE TO A3 DRAWINGS

REVISION	DESCRIPTION	DATE
1	PRELIMINARY	10/02/21
2	PRELIM	27/02/14
4	PRELIM	24/03/2014
5	PRELIM	02/04/2014
6	REVISION	05/12/2014
7	PRELIM	08/12/2016

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Design + Architecture

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reg no:4610

ISSUED FOR

PRELIMINARY

project no:

FL-016

scale

1 : 750

date

DEC 16

drawn

CC

rev

7



EXISTING BUILDINGS

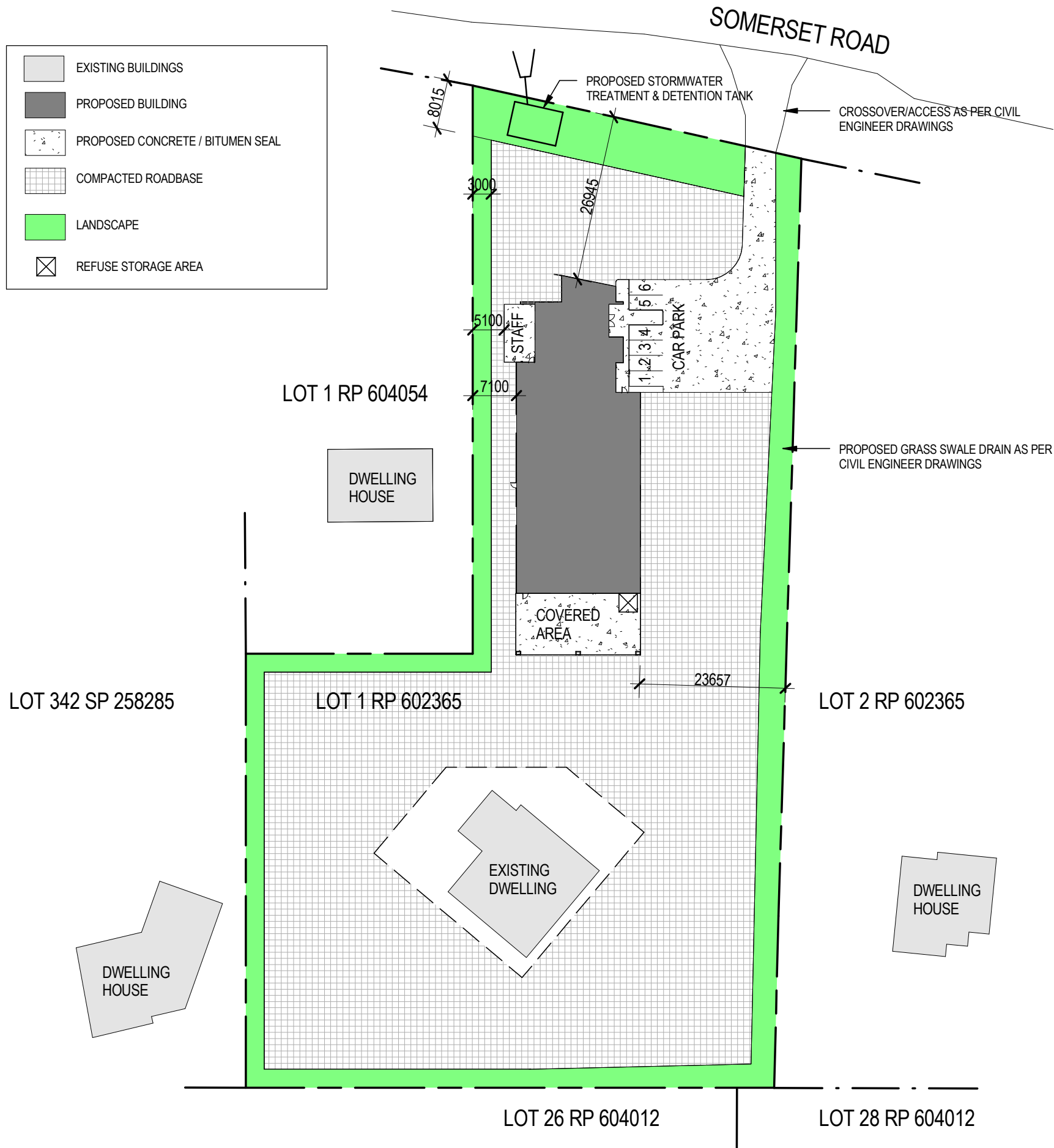
PROPOSED BUILDING

PROPOSED CONCRETE / BITUMEN SEAL

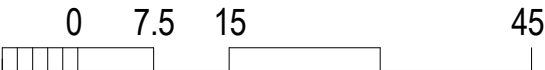
COMPACTED ROADBASE

LANDSCAPE

REFUSE STORAGE AREA

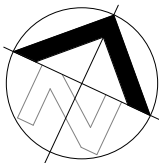


AREA SCHEDULE - STAGE 2	
Site Area - WHOLE SUBJECT SITE =	10 610sqm
USE AREA (excludes residential area)=	9 739sqm (100%)
Building Height =	7.95m (1 storey with mezzanine level)
<b>Existing Residential Area</b>	
Residential area =	871sqm
<b>Landscaped Area</b>	
Landscaped area =	1 794sqm (18.4%)
<b>Proposed Building</b>	
Office GFA =	154sqm
Storage GFA =	39sqm
Workshop GFA =	654sqm
Amenities GFA =	40sqm
Mezzanine GFA =	78sqm
Total GFA =	965sqm
<b>Impervious Area</b>	
Compacted road base =	6 216sqm
Concrete/bitumen seal =	588sqm
Staff sealed area=	47sqm
Covered area (Proposed Building) =	202sqm
Total Impervious Area =	7 053 (72.4%)
<b>Off-street Car Parking Spaces</b>	<b>6no</b>
Site Cover =	1089sqm (11.2%)



drawing title:  
SITE PLAN - STAGE 2

drawing no: SK-003



project: PROPOSED TRANSPORT DEPOT & WAREHOUSE	
location: 117 SOMERSET ROAD, GRACEMERE	client: EARTHWORX AUSTRALIA WIDE PTY LTD

REVISION	DESCRIPTION	DATE
7	PRELIM	08/12/2016

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www.designnaa.com.au reg no:4610

ISSUED FOR PRELIMINARY		
project no: FL-016	scale 1 : 750 date DEC 16 drawn Author	rev 7

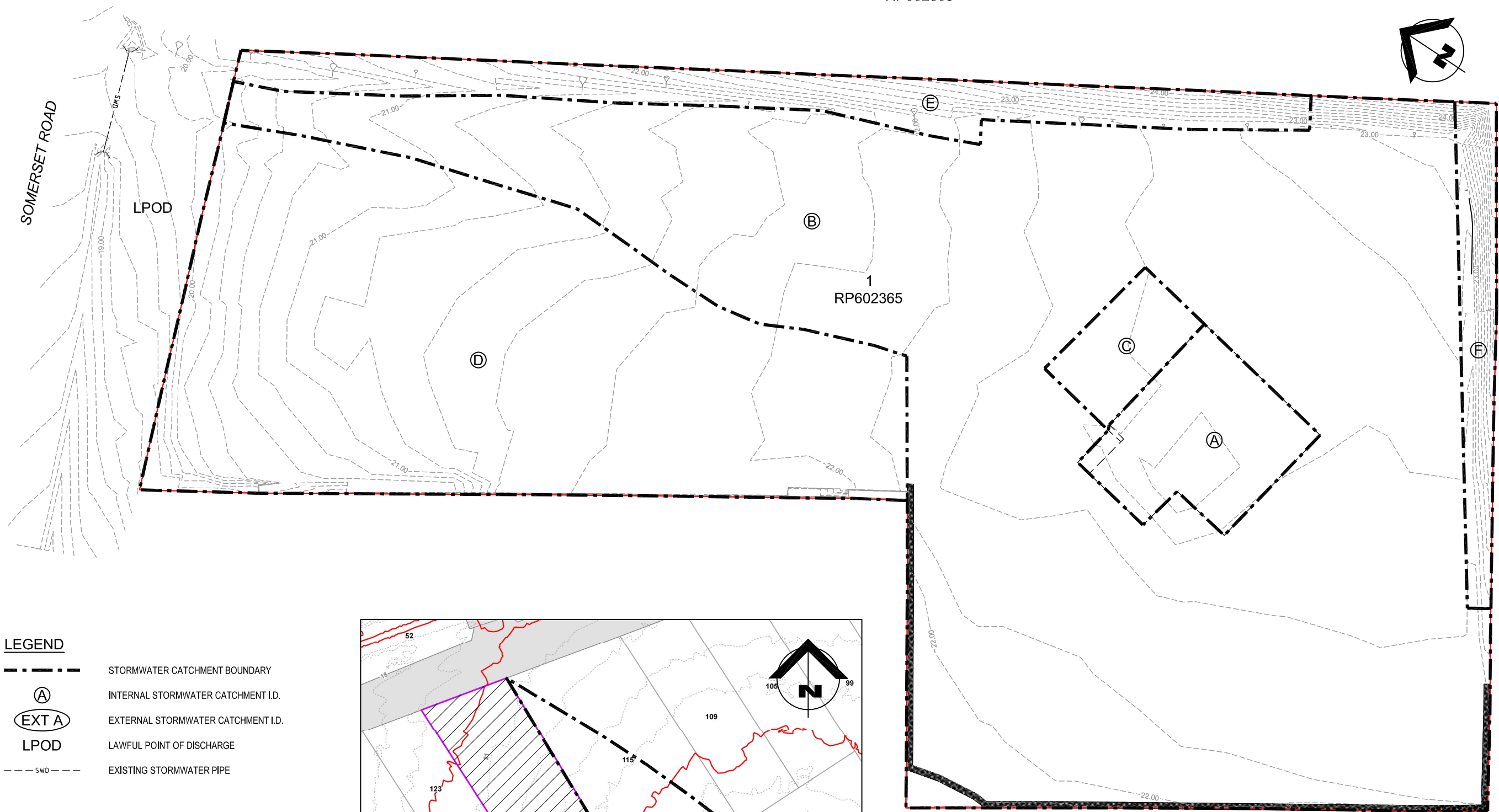


## APPENDIX

# C

Knobel Consulting Pty Ltd  
*Pre Development Stormwater Catchment Plan*  
(Ref: K2696/C001/A)





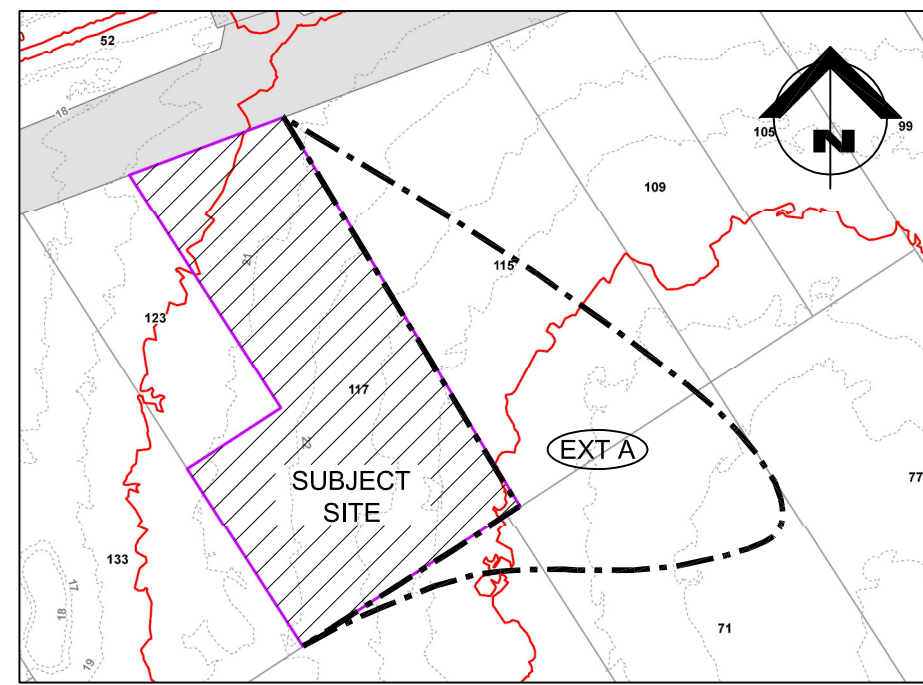
28  
RP604012

26  
RP604012

LEGEND

- STORMWATER CATCHMENT BOUNDARY
- (A) INTERNAL STORMWATER CATCHMENT I.D.
- (EXT A) EXTERNAL STORMWATER CATCHMENT I.D.
- LPOD LAWFUL POINT OF DISCHARGE
- SWD --- EXISTING STORMWATER PIPE

STORMWATER CATCHMENT TABLE		
STORMWATER CATCHMENT I.D.	CATCHMENT TYPE	AREA (m²)
A	EXISTING BUILDING	383
B	GRAVEL	6301
C	TURF	172
D	DIRT	2905
E	DIRT	605
F	DIRT	244
TOTAL		10610
EXT A		9501



EXTERNAL CATCHMENT PLAN  
1:1250 AT A1

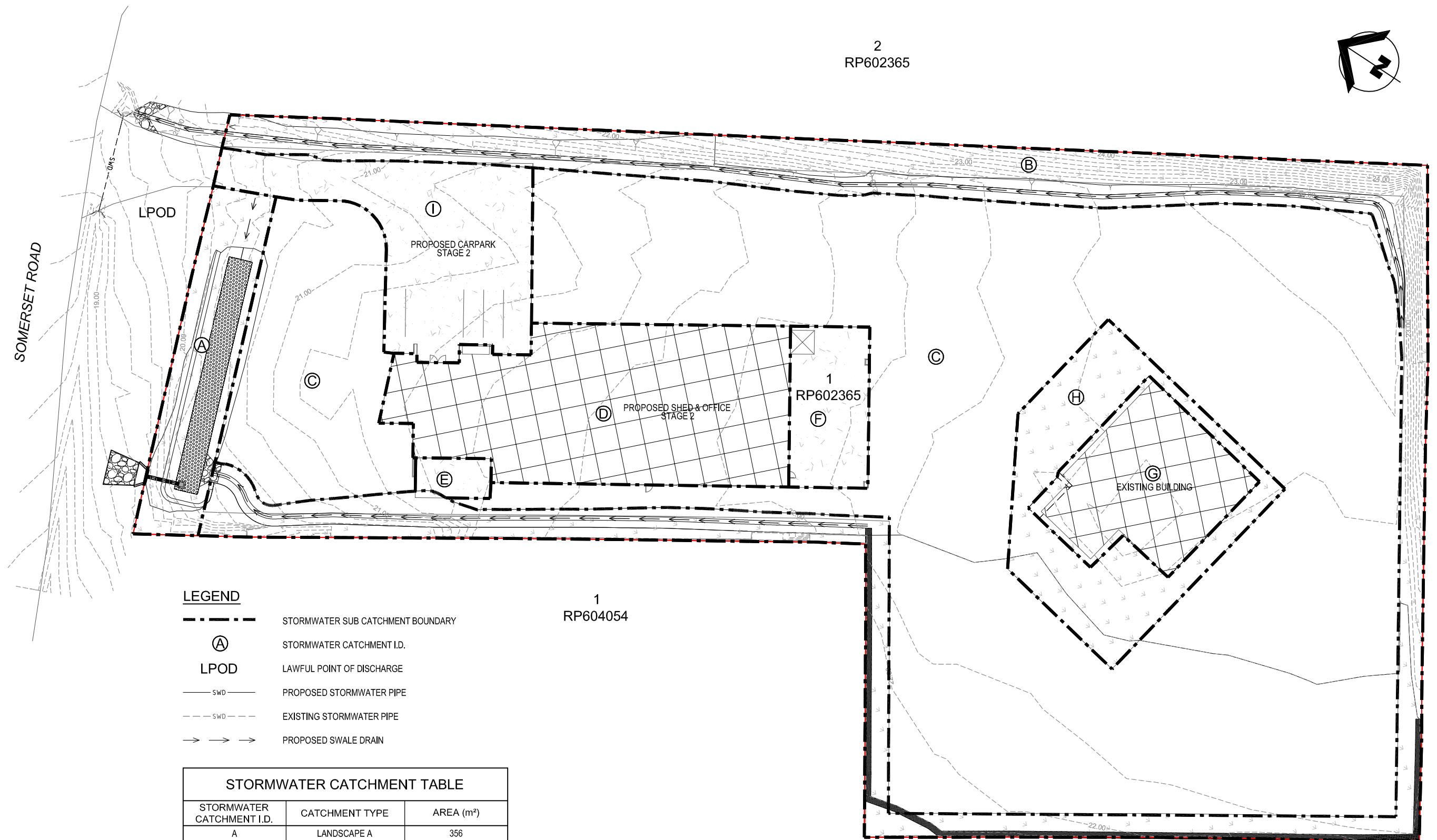


APPENDIX

**D**

Knobel Consulting Pty Ltd  
*Post Development Stormwater Catchment Plan*  
(Ref: K2696/C002/A)





LEGEND

- STORMWATER SUB CATCHMENT BOUNDARY
- Ⓐ STORMWATER CATCHMENT I.D.
- LPOD LAWFUL POINT OF DISCHARGE
- SWD — PROPOSED STORMWATER PIPE
- - - SWD - - - EXISTING STORMWATER PIPE
- → → PROPOSED SWALE DRAIN

STORMWATER CATCHMENT TABLE		
STORMWATER CATCHMENT I.D.	CATCHMENT TYPE	AREA (m²)
A	LANDSCAPE A	356
B	LANDSCAPE B	1958
C	COMPACTED GRAVEL	5731
D	PROPOSED BUILDING	887
E	PROPOSED CONCRETE	47
F	PROPOSED CONCRETE	202
G	EXISTING BUILDING	383
H	EXISTING GRASS	487
I	PROPOSED CONCRETE	559
TOTAL		10610


**KNOBEL CONSULTING**  
CIVIL ENGINEERS + HYDRAULIC ENGINEERS + PROJECT MANAGERS

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Rockhampton City Q, 4700  
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Email: admin@knobelconsulting.com.au

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Rockhampton Q, 4701  
ABN: 33 071 435 202  
W: www.knobelconsulting.com.au

CLIENT  
EARTHWORX AUSTRALIA WIDE PTY LTD

PROJECT  
PROPOSED INDUSTRIAL DEVELOPMENT  
117 SOMERSET ROAD  
GRACEMERE, QLD, 4702

DESIGN JH	DRAWN JP	APPROVED AP
A.R.PIANTA - R.P.E.Q. NUMBER 10423		
		13.12.16
SIGNED		DATE

TITLE  
POST DEVELOPMENT STORMWATER CATCHMENT PLAN

SCALE  
1:250 AT A1  
1:500 AT A3

0 5 10 15 20m

PROJECT NO.  
K2696

DWG NO.  
C002

ISSUE  
A

ISSUE No.	DATE	AMENDMENT
A	13.12.16	ISSUED FOR OPERATIONAL WORKS APPROVAL

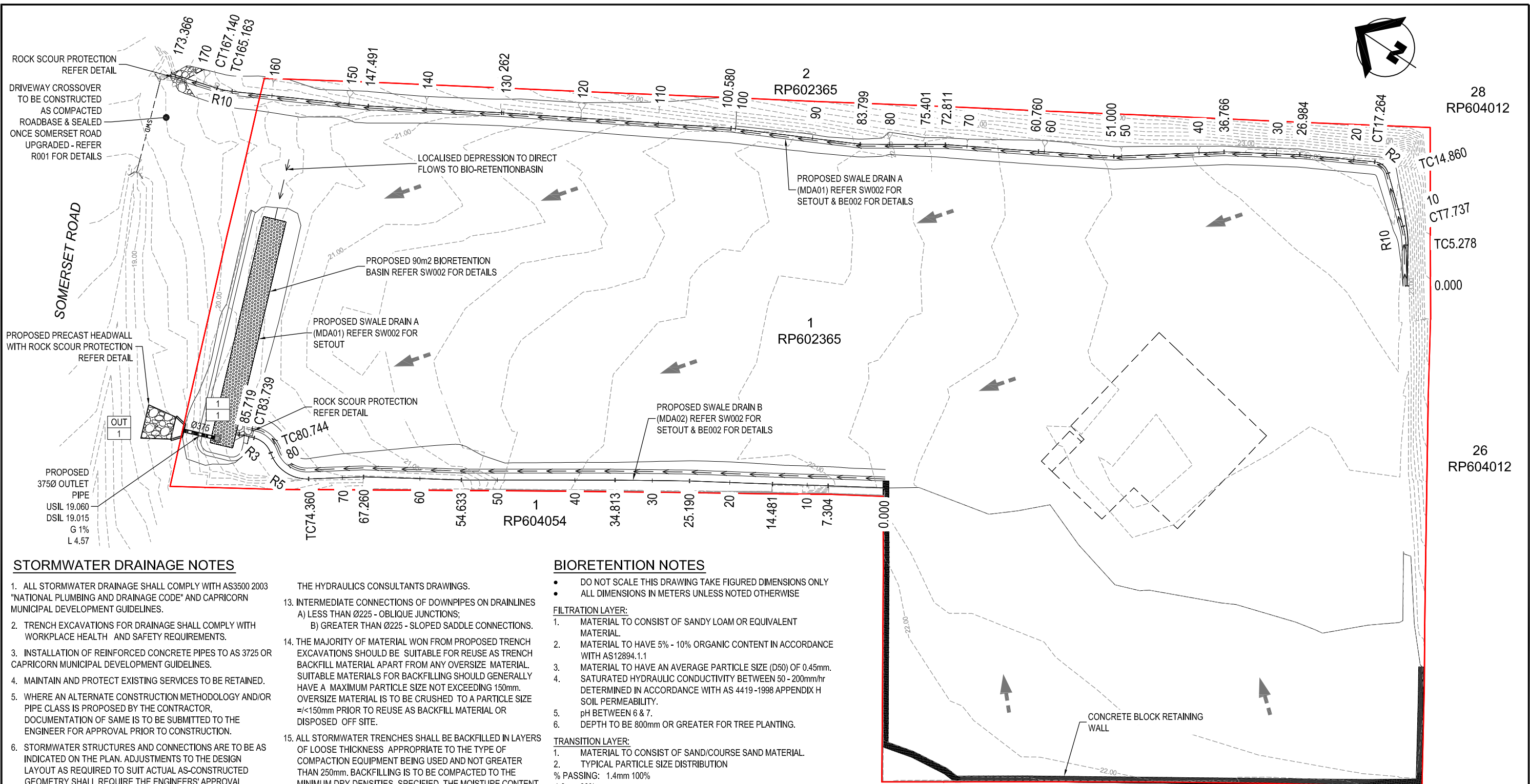


## APPENDIX

# E

Knobel Consulting Pty Ltd  
*Stormwater Drainage Plan*  
(Ref: K2696/SW001/A)





### STORMWATER DRAINAGE NOTES

1. ALL STORMWATER DRAINAGE SHALL COMPLY WITH AS3500 2003 "NATIONAL PLUMBING AND DRAINAGE CODE" AND CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES.
2. TRENCH EXCAVATIONS FOR DRAINAGE SHALL COMPLY WITH WORKPLACE HEALTH AND SAFETY REQUIREMENTS.
3. INSTALLATION OF REINFORCED CONCRETE PIPES TO AS 3725 OR CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES.
4. MAINTAIN AND PROTECT EXISTING SERVICES TO BE RETAINED.
5. WHERE AN ALTERNATE CONSTRUCTION METHODOLOGY AND/OR PIPE CLASS IS PROPOSED BY THE CONTRACTOR, DOCUMENTATION OF SAME IS TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.
6. STORMWATER STRUCTURES AND CONNECTIONS ARE TO BE AS INDICATED ON THE PLAN. ADJUSTMENTS TO THE DESIGN LAYOUT AS REQUIRED TO SUIT ACTUAL AS-CONSTRUCTED GEOMETRY SHALL REQUIRE THE ENGINEERS' APPROVAL.
7. SPOIL MATERIAL GENERATED FROM TRENCH EXCAVATION IS TO BE DISPOSED OF AS DIRECTED BY THE SUPERINTENDENT.
8. PIPES EQUAL TO OR SMALLER THAN Ø225 SHALL BE uPVC, SRCP OR FRC.  
PIPES GREATER THAN Ø225 SHALL BE SRCP OR FRC.
9. uPVC PIPES SHALL BE RUBBER RING JOINTED, CLASS SEH UNLESS NOTED OTHERWISE.
10. SRCP AND FRC PIPES SHALL BE CLASS 2 UNLESS NOTED OTHERWISE. PIPES Ø600 AND UNDER ARE TO BE RUBBER RING JOINTED. PIPES GREATER THAN Ø600 ARE TO BE FLUSH JOINTED WITH EXTERNAL BANDS.
11. ALL PIPE STUBS ARE TO BE SEALED WITH APPROVED SCREW ON / CLIP ON END CAPS PRIOR TO BACKFILLING.
12. CONNECTIONS OF DOWNPIPES TO BOTH DRAINAGE STRUCTURES AND PIPELINES SHALL BE IN ACCORDANCE WITH

THE HYDRAULICS CONSULTANTS DRAWINGS.

13. INTERMEDIATE CONNECTIONS OF DOWNPIPES ON DRAINLINES  
A) LESS THAN Ø225 - OBLIQUE JUNCTIONS;  
B) GREATER THAN Ø225 - SLOPED SADDLE CONNECTIONS.
14. THE MAJORITY OF MATERIAL WON FROM PROPOSED TRENCH EXCAVATIONS SHOULD BE SUITABLE FOR REUSE AS TRENCH BACKFILL MATERIAL APART FROM ANY OVERSIZE MATERIAL. SUITABLE MATERIALS FOR BACKFILLING SHOULD GENERALLY HAVE A MAXIMUM PARTICLE SIZE NOT EXCEEDING 150mm. OVERSIZE MATERIAL IS TO BE CRUSHED TO A PARTICLE SIZE  $\leq$  150mm PRIOR TO REUSE AS BACKFILL MATERIAL OR DISPOSED OFF SITE.
15. ALL STORMWATER TRENCHES SHALL BE BACKFILLED IN LAYERS OF LOOSE THICKNESS APPROPRIATE TO THE TYPE OF COMPACTION EQUIPMENT BEING USED AND NOT GREATER THAN 250mm. BACKFILLING IS TO BE COMPACTED TO THE MINIMUM DRY DENSITIES SPECIFIED. THE MOISTURE CONTENT OF BACKFILL MATERIAL SHOULD BE MAINTAINED WITHIN THE RANGE OF  $\pm$ 2% OF THE OPTIMUM MOISTURE CONTENT.
16. COMPACTION TESTING IS TO BE CARRIED OUT AT THE SPECIFIED FREQUENCY BY A N.A.T.A. REGISTERED GEOTECHNICAL TESTING AUTHORITY AT THE CONTRACTORS COST. THE CONTRACTOR SHALL PROVIDE DETAILS OF ALL TESTING TO THE ENGINEER PROGRESSIVELY THROUGH THE WORKS AND NOTIFY THE ENGINEER OF ANY NON-CONFORMANCES. ALL NON CONFORMING WORK IS TO BE RECTIFIED AS DIRECTED BY THE ENGINEER.
17. OVERLAND FLOW CHANNELS / SWALE DRAINS ARE TO BE GRADED EVENLY BETWEEN INVERT LEVELS PROVIDED.

### BIORETENTION NOTES

- DO NOT SCALE THIS DRAWING TAKE FIGURED DIMENSIONS ONLY
- ALL DIMENSIONS IN METERS UNLESS NOTED OTHERWISE

#### FILTRATION LAYER:

1. MATERIAL TO CONSIST OF SANDY LOAM OR EQUIVALENT MATERIAL.
2. MATERIAL TO HAVE 5% - 10% ORGANIC CONTENT IN ACCORDANCE WITH AS12894.1.1
3. MATERIAL TO HAVE AN AVERAGE PARTICLE SIZE (D50) OF 0.45mm.
4. SATURATED HYDRAULIC CONDUCTIVITY BETWEEN 50 - 200mm/hr DETERMINED IN ACCORDANCE WITH AS 4419-1998 APPENDIX H SOIL PERMEABILITY.
5. pH BETWEEN 6 & 7.
6. DEPTH TO BE 800mm OR GREATER FOR TREE PLANTING.

#### TRANSITION LAYER:

1. MATERIAL TO CONSIST OF SAND/COURSE SAND MATERIAL.
2. TYPICAL PARTICLE SIZE DISTRIBUTION  
% PASSING: 1.4mm 100%  
1.0mm 80%  
0.7mm 44%  
0.5mm 08%

#### DRAINAGE LAYER:

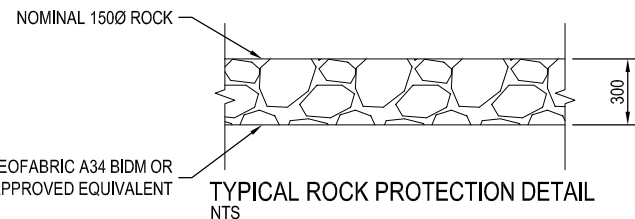
1. MATERIAL TO CONSIST OF 2 - 5mm GRAVEL.

#### PERFORATED PIPE:

1. MINIMUM GRADE OF 0.5%
2. MAXIMUM SPACING \* 1.5m CENTRE FOR BASINS < 100m<sup>2</sup>  
\* 2.5m CENTRE FOR BASINS > 100m<sup>2</sup>

#### CONSTRUCTION PHASE:

1. COVER FILTRATION LAYER WITH GEOTEXTILE, 50mm TOPSOIL & TURF STRIPS PERPENDICULAR TO FLOW.
2. GEOTEXTILE TO BE REMOVED ONLY WHEN UPSTREAM SEDIMENT LOADS ARE CONTROLLED.



### LEGEND

- Ø PROPOSED STORMWATER DRAINAGE
- SWD --- EXISTING STORMWATER PIPE
- 42.0 DESIGN CONTOUR MAJOR
- 42.5 DESIGN CONTOUR MINOR
- 44.0- NATURAL SURFACE CONTOUR
- ← FLOW ARROW



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CLIENT  
EARTHWORX AUSTRALIA WIDE PTY LTD

PROJECT  
PROPOSED INDUSTRIAL DEVELOPMENT  
117 SOMERSET ROAD  
GRACEMERE, QLD, 4702

DESIGN  
JH

DRAWN  
JP

APPROVED  
AP

A.R.PIANTA - R.P.E.Q. NUMBER 10423

SIGNED  
13.12.16

DATE

TITLE  
STORMWATER LAYOUT

SCALE  
1:250 AT A1  
1:500 AT A3

PROJECT NO.

K2696

DWG NO.

SW001

ISSUE

A

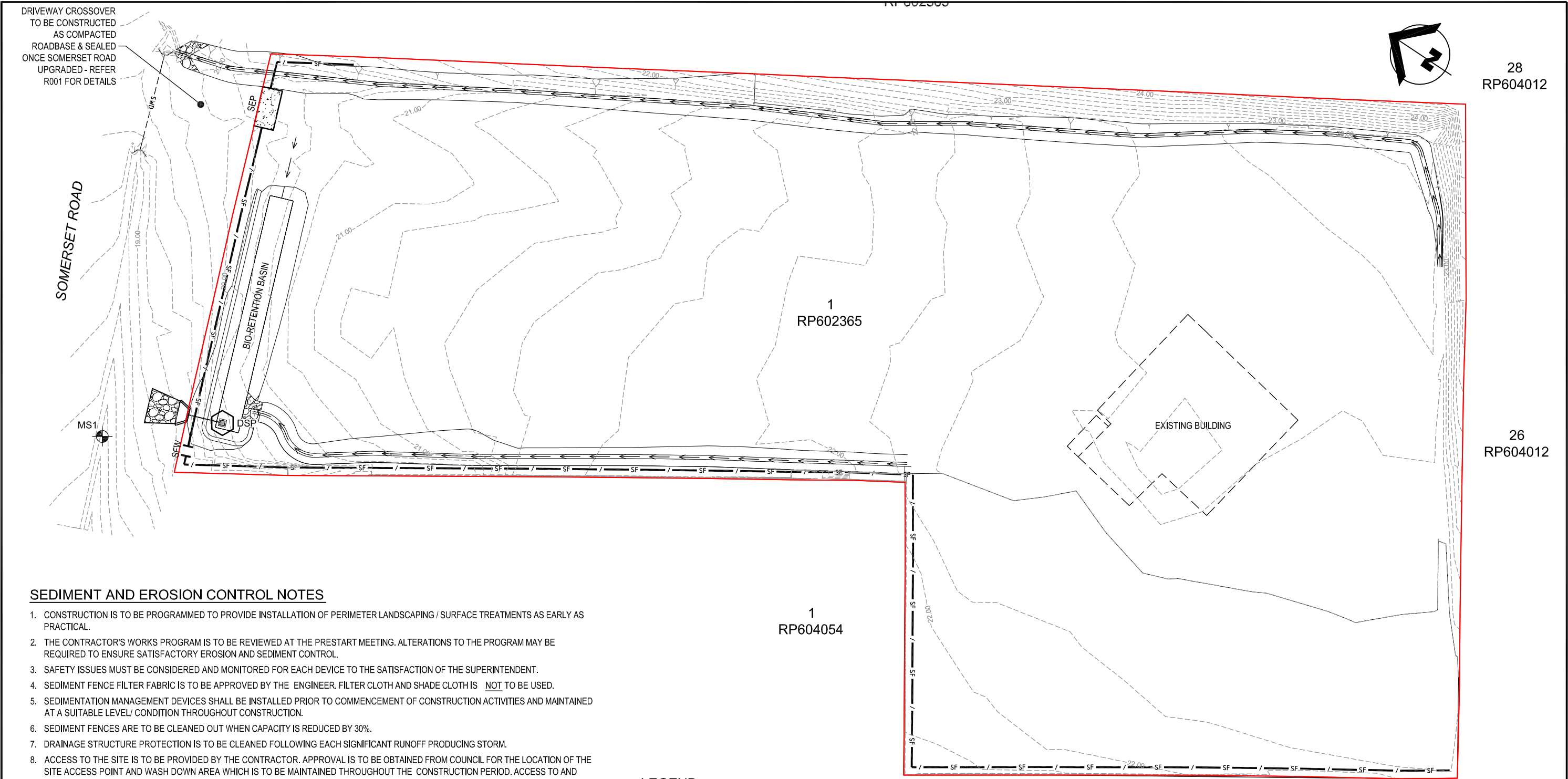


APPENDIX

**F**

Knobel Consulting Pty Ltd  
*Erosion and Sediment Control Plan*  
(Ref: K2696/SE001/A)





SEDIMENT AND EROSION CONTROL NOTES

1. CONSTRUCTION IS TO BE PROGRAMMED TO PROVIDE INSTALLATION OF PERIMETER LANDSCAPING / SURFACE TREATMENTS AS EARLY AS PRACTICAL.
2. THE CONTRACTOR'S WORKS PROGRAM IS TO BE REVIEWED AT THE PRESTART MEETING. ALTERATIONS TO THE PROGRAM MAY BE REQUIRED TO ENSURE SATISFACTORY EROSION AND SEDIMENT CONTROL.
3. SAFETY ISSUES MUST BE CONSIDERED AND MONITORED FOR EACH DEVICE TO THE SATISFACTION OF THE SUPERINTENDENT.
4. SEDIMENT FENCE FILTER FABRIC IS TO BE APPROVED BY THE ENGINEER. FILTER CLOTH AND SHADE CLOTH IS NOT TO BE USED.
5. SEDIMENTATION MANAGEMENT DEVICES SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES AND MAINTAINED AT A SUITABLE LEVEL/ CONDITION THROUGHOUT CONSTRUCTION.
6. SEDIMENT FENCES ARE TO BE CLEANED OUT WHEN CAPACITY IS REDUCED BY 30%.
7. DRAINAGE STRUCTURE PROTECTION IS TO BE CLEANED FOLLOWING EACH SIGNIFICANT RUNOFF PRODUCING STORM.
8. ACCESS TO THE SITE IS TO BE PROVIDED BY THE CONTRACTOR. APPROVAL IS TO BE OBTAINED FROM COUNCIL FOR THE LOCATION OF THE SITE ACCESS POINT AND WASH DOWN AREA WHICH IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. ACCESS TO AND FROM THE SITE IS TO BE VIA THE SHAKEDOWN FACILITY ONLY. ALL VEHICLES ARE TO BE WASHED DOWN PRIOR TO LEAVING THE SITE.
9. THE CONTRACTOR SHALL PROVIDE TEMPORARY DRAINAGE CONTROLS TO DIVERT FLOW FROM UNDISTURBED AREAS AROUND DISTURBED AREAS AND DIRECT FLOW FROM DISTURBED AREAS TOWARD CONTROL DEVICES.
10. PONDED RAINFALL SHALL BE PUMPED THROUGH A SEDIMENT FENCE LOCATED ON THE SITE BEFORE DISCHARGING INTO THE DOWNSTREAM STORMWATER SYSTEM.
11. STRAW BALES USED IN SEDIMENT DEVICES ARE TO BE REPLACED AFTER A MAXIMUM SERVICE PERIOD OF 6 WEEKS.
12. A PHOTOGRAPHIC RECORD OF SEDIMENT AND EROSION CONTROL DEVICES AND THE IMMEDIATE DOWNSTREAM STORMWATER SYSTEM, IS TO BE CARRIED OUT ON A FORTNIGHTLY CYCLE AND AFTER EACH MAJOR STORM EVENT. CARRY OUT CORRECTIVE AND PREVENTATIVE ACTION, AS REQUIRED.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE OF SEDIMENT AND EROSION CONTROL DEVICES. ALL DEVICES ARE TO BE INSPECTED AT LEAST WEEKLY AND AFTER SIGNIFICANT RUNOFF PRODUCING STORMS.
14. IF EROSION AND SEDIMENT CONTROL DEVICES HAVE BEEN FOUND TO BE DEFICIENT OR FAILED IN SERVICE DUE TO UNFORESEEN CIRCUMSTANCES, CORRECTIVE ACTION IS TO BE UNDERTAKEN BY THE CONTRACTOR IMMEDIATELY, WHICH MAY INCLUDE AMENDMENTS/ADDITIONS TO THE ORIGINAL EROSION CONTROL PLANS. SUCH ADDITIONS OR AMENDMENTS ARE TO BE APPROVED BY THE SUPERINTENDENT.
15. SEDIMENTATION MANAGEMENT DEVICES ARE TO BE MAINTAINED BY THE CONTRACTOR, AS NOTED AND DETAILED, UNTIL APPROVAL HAS BEEN GRANTED BY THE ENGINEER FOR THEIR REMOVAL. THE CONTRACTOR IS TO REMOVE AND DISPOSE OF THESE DEVICES OFF SITE.

LEGEND

- / — SF — SEDIMENT FENCE
- SFW  
— | — SEDIMENT FENCE WEIR
- SEP  
[Pattern Box] STABILISED ENTRY/EXIT POINT
- MS1  
[Circle with cross] WATER QUALITY MONITORING STATION
- DSP  
[Hexagon] DRAINAGE STRUCTURE PROTECTION  
REFER DWG SE002 FOR DETAILS

			 CIVIL ENGINEERS + HYDRAULIC ENGINEERS + PROJECT MANAGERS		CLIENT EARTHWORX AUSTRALIA WIDE PTY LTD	DESIGN JH	DRAWN JP	APPROVED AP	TITLE EROSION AND SEDIMENT CONTROL PLAN		PROJECT NO. K2696	
			Level 6, 34 East Street Rockhampton City Q.4701 Phone: 07 4922 5019 Fax: 07 5580 9133 Email: admincq@knobelconsulting.com.au		PROJECT PROPOSED INDUSTRIAL DEVELOPMENT 117 SOMERSET ROAD GRACEMERE, QLD, 4702	A.R.PIANTA - R.P.E.Q. NUMBER 10423			SCALE 1:250 AT A1 1:500 AT A3		DWG NO. SE001	ISSUE A
A			13.12.16	ISSUED FOR OPERATIONAL WORKS APPROVAL			13.12.16		0 5 10 15 20m			
ISSUE No.			DATE	AMENDMENT			SIGNED		DATE			