DATED **DAY OF** **2020**

DEED OF VARIATION

Between

MINISTER FOR INFRASTRUCTURE AND TRANSPORT~~TRANSPORT, INFRASTRUCTURE AND LOCAL GOVERNMENT~~

(**Minister**)

-And-

COMMISSIONER OF HIGHWAYS

(**Commissioner**)

-And-

ADELAIDE PLAINS COUNCIL
ABN 58 384 968 672

(**Council**)

-And-

HICKINBOTHAM DEVELOPMENTS (TWO WELLS NO.1) PTY LTD
ACN 132 319 352

HICKINBOTHAM AGRICULTURAL PROJECTS PTY LTD
ACN 064 928 945

HICKINBOTHAM DEVELOPMENTS (TWO WELLS NO.4) PTY LTD
ACN 144 951 306

(**Developer**)

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THIS DEED is made on day of 2020

Between:

MINISTER FOR INFRASTRUCTURE AND TRANSPORT~~TRANSPORT, INFRASTRUCTURE AND LOCAL GOVERNMENT~~ a body corporate pursuant to the *Administrative Arrangements Act 1994* of Level 5, 50 Flinders Street, Adelaide, SA 5000 (**Minister**)

And

COMMISSIONER OF HIGHWAYS a body corporate pursuant to the *Highways Act 1926* of Level 5, 50 Flinders Street, Adelaide SA 5000 (Commissioner)

And

ADELAIDE PLAINS COUNCIL (ABN 58 384 968 672) a body corporate pursuant to the *Local Government Act 1999* of 2a Wasleys Road, Mallala SA 5502 (**Council**)

And

HICKINBOTHAM DEVELOPMENTS (TWO WELLS NO.1) PTY LTD (ACN 132 319 352); **HICKINBOTHAM AGRICULTURAL PROJECTS PTY LTD** (ACN 064 928 945) and **HICKINBOTHAM DEVELOPMENTS (TWO WELLS NO.4) PTY LTD (**ACN 144 951 306) all of 25 North Terrace, Hackney SA 5069 (**Developer**)

BACKGROUND:

A. The Minister, the Commissioner, the Council and the Developer are parties to the Road Infrastructure Design and Delivery Deed dated 18 July 2013 and attached as Annexure 1 **(Existing Deed)**.

B. The Existing Deed requires installation of a single lane roundabout at the intersection of Mallala Road and Old Port Wakefield Road to be funded equally by the Developer and the Council.

C. The location of the Roundabout will be the primary means of access to the residential development currently being undertaken by the Developer. Under the Existing Deed, the Roundabout is required at or before occupation of the first dwelling taking access from the intersection (unless obviated by alternative temporary access arrangements).

D. The Minister and the Commissioner require amendments to the design of the Roundabout as set out in the Existing Deed in order to allow for it to ~~be designed to~~ [CL1]accommodate existing heavy vehicle routes, including B-Doubles and Over Size Over Mass vehicles. The Minister and the Commissioner also wish to facilitate access through the Roundabout by PBS Level 3B vehicles[DL2] for through movements on Mallala Road, being for the right turn from Mallala Road to Old Port Wakefield Road (eastbound) and left turn from Old Port Wakefield to Mallala Road (southbound)~~[CL3][DL4],~~ to provide future heavy vehicle route connections.

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E. To facilitate delivery of the Roundabout in accordance with the Minister and the Commissioner's requirements, the parties have agreed to vary the terms of the Existing Deed in accordance with this Deed of Variation as and from the Variation Commencement Date.

It is agreed:

1. **DEFINITIONS**

The parties agree that the following definitions will apply in the Existing Deed and this Deed of Variation:

1.1 **Detailed Designs** means the detailed design drawings for the Roundabout, based on the concept plan in Annexure 4 of the Existing Deed with variations [CL5][DL6]to the extent necessary to accommodate the requirements set out in paragraph D of the Background, ~~PBS Level 3 vehicles and~~ as ~~otherwise~~ approved by or on behalf of the Commissioner;[DL7]

1.2 **Land Acquisition** means any land acquisition required to be undertaken by the Commissioner (whether under the *Land Acquisition Act 1969* or otherwise) or the Minister to enable the Roundabout as shown in the Detailed Designs to be constructed;

1.3 **Land Acquisition Costs** means all of the costs associated with the Land Acquisition.

1.4 **Minister's Roundabout Contribution** means the fixed and maximum contribution payable by the Minister towards the Roundabout as ascribed to the Minister in the Contributions Schedule;

1.5 **Roundabout** means the roundabout specified in Item 1, column 3 (Treatment) in Annexure 1 (Traffic Intervention Schedule) required to be constructed under the Existing Deed at the intersection of Mallala Road and Old Port Wakefield Road, Two Wells and which is varied by, and in accordance with 4.4 to 4.6 inclusive, of~~,~~ this Deed of Variation.

1.6 **Variation Commencement Date** means the date on which the variations contemplated in clause 4 of this Deed of Variation take~~s~~ effect as described in clause 3 of this Deed of Variation.

2. **INTERPRETATION**

2.1 All words and expressions defined in this Deed of Variation will have the same meaning as in the Existing Deed.

2.2 The parties acknowledge and agree that the matters referred to in the Background of this Deed of Variation are true and correct in every material particular and that the Background will form part of this Deed of Variation.

2.3 To the extent of any inconsistency between this Deed of Variation and the Existing Deed, this Deed of Variation will prevail.

3. **CONDITION PRECEDENT TO VARIATION ~~DEED~~ COMMENCEMENT DATE**

3.1 The parties agree that the ~~provisions of this Deed of~~ Variation Commencement Date will only take effect upon the Commissioner notifying the other parties to

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this agreement in writing that the Commissioner has acquired the land necessary to construct the Roundabout.[DL8][DL9]

~~3.1 The Commissioner must use reasonable endeavours to acquire the land necessary to construct the Roundabout.~~[CL10][VD(11]

3.2 If the Commissioner has not notified the other parties to this agreement that the Commissioner has~~is unable to~~ acquired the land necessary to construct the Roundabout on or before ~~[*insert sunset date*]~~30 June 2021 [CL12](**Sunset Date**), then any party may elect to terminate this this Deed of Variation by at least 7 days written notice from the Sunset Date to the other parties.

~~3.2~~3.3 If the Deed of Variation is terminated, the Existing Deed continues in full[DL13][DL14] force and effect.

4. VARIATION OF THE EXISTING DEED

4.1 A new clause 2.1.10A is inserted into the Existing Deed as follows:

2.1.10A **Detailed Designs** has the meaning given to that term in the Deed of Variation between the parties to this Deed executed in or around July~~ne~~ 2020.

4.2 A new clause 2.1.27A is inserted into the Existing Deed as follows:

2.1.27A **Roundabout** means the roundabout specified in Item 1, column 3 (Treatment) in Annexure 1 (Traffic Intervention Schedule).[CL15]

~~4.1~~4.3 A new clause 4.4 is inserted into the Existing Deed as follows:

4.4 *Notwithstanding any other provision of this clause 4, with respect to the Roundabout only:*

4.4.2 notwithstanding clause 12 of this Deed, the Minister will pay the Minister's Roundabout Contribution to the Developer following Practical Completion of the Roundabout by the Developer;

4.4.3 the ~~Council will~~:

4.4.3.1 Council will, notwithstanding clause 12 of this Deed, pay the Council's Contribution to the Developer upon Practical Completion of the Roundabout; and

4.4.3.2 ~~contribute~~ Council's Contribution to the cost of construction of [DL16][DL17]the Roundabout will comprise [CL18]50% of the balance of the cost of the Roundabout (that is 50% of the total cost less the Minister's Roundabout Contribution and the Land Acquisition Costs);

4.4.4 the ~~Developer will~~:

4.4.4.1 Developer will undertake construction of the Roundabout in accordance with the Detailed Designs and any agreement required by the Minister or the Commissioner for the construction of public road infrastructure works ~~and any further standard~~ [CL19]~~requirements of the Commissioner or the Minister (including any necessary authorisation, arrangement or agreement with the Minister or the~~

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~~Commissioner (or any other relevant authority) relating to the undertaking of public road infrastructure works)~~[DL20]; and

4.4.4.2 Developer's Contribution to the cost of construction of[DL21][DL22] the Roundabout will comprise~~contribute~~ [CL23]50% of the balance of the cost of the Roundabout (that is 50% of the total cost less the Minister's Roundabout Contribution and the Land Acquisition Costs)~~.~~;

4.4.5 clauses 4.2.2 and 4.2.3 do not apply in respect of the Roundabout.[CL24]

4.24.4 A new clause 5.9 is inserted into the Existing Deed as follows:

5.9 *Notwithstanding any other provision of this clause 5 of this Deed:*

5.9.1 *The Minister will, as soon as reasonably practicable following the Variation Commencement Date, finalise the Detailed Designs for the Roundabout (having consulted the Developer and the Council prior to such finalisation) and provide the Detailed Designs to the Developer and the Council ~~for approval~~*[DL25].

5.9.2 *The Detailed Designs, once provided to the Developer will satisfy clauses 5.1.1 to 5.1.3 (inclusive) of this Deed, as they relate to the Roundabout.*

~~5.9.3 The provisions of clauses 5.1.7, 5.3 and 5.4 will not apply with respect to the Roundabout or to the Minister's Roundabout Contribution.~~ [DL26]

4.34.5 A new clause 12.3 is inserted into the Existing Deed as follows:

12.3 *With respect to the Roundabout, clauses 12.1 and 12.2 do not apply, and the Developer will instead be entitled to render an invoice to the Council and the Minster for their respective Contributions towards the Roundabout upon Practical Completion of the Roundabout by the Developer. Any such invoice must be accompanied by a certificate of Practical Completion for the Roundabout.*

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4.44.6 The words in Item 1, column 3 (Treatment) in Annexure 1 (Traffic Intervention Schedule) of the Existing Deed are deleted in their entirety and replaced with:

Treatment
Installation of a single lane roundabout as shown on the Detailed Designs as provided by the Commissioner to the Developer in accordance with this Deed.

4.54.7 The words in Item 1, column 7 (Timing) in Annexure 1 (Traffic Intervention Schedule) of the Existing Deed are deleted in their entirety and replaced with:

Timing
1. *The Roundabout must be operational prior to the earlier to occur of:* a. *commencement of operation of a school on the Site; or* b. *occupation of more than 150 dwellings on the Site.* 2. *Temporary alternative access to the Site will be permitted on the following terms and conditions:* a. *the Developer will complete sealing of Meaney Road (as approved by the responsible road authority) at or before occupation of the first dwelling on the Site;* b. *temporary access to the Site for passenger vehicles only being provided to Mallala Road via the upgraded Meaney Road; and* c. *temporary access to the Site for all heavy vehicles will occur via Sharpe Road; and* d. *both temporary access points noted above will be closed and/or reinstated by the Developer as required by the responsible road authority as soon as practicable following Practical Completion of the Roundabout.* 3. *For the purpose of this Item 1, the term "Site" is as defined in this Deed, but excludes that part of the Site situated to the east of Mallala Road.*

4.64.8 The words in Item 1, column 8, 9 and 10 (Contributions Schedule) in Annexure 1 (Traffic Intervention Schedule) of the Existing Deed are deleted in their entirety and replaced with:

Contributions Schedule		
Developer	***Minister***	***Council***
50% of the balance of the cost of construction of the Roundabout (that is 50% of the total cost of the	*$0.731m Minister's*	*50% of the balance of the cost of construction of the Roundabout (that is 50% of the total cost of the*

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Roundabout less the Minister's Roundabout Contribution and the Land Acquisition Costs)	*Roundabout Contribution*	*Roundabout less the Minister's Roundabout Contribution and the Land Acquisition Costs)*[DL27]

5. **RISK AND SECURITY**

5.1 The actual cost of the Roundabout (with the exception of the Minister's Roundabout Contribution and the [CL28]Land Acquisition Costs~~, the Minister's Roundabout Contribution~~ and the costs of completing the Detailed Design[DL29]) will be borne equally by the Council and the Developer, and otherwise in accordance with the Existing Deed.

5.2 The Minister's Roundabout Contribution will be borne by the Minister[CL30]. The Land Acquisition Costs will be borne by the Minister and/or the Commissioner (as the case may be).

6. **DISCRETION**

6.1 The Commissioner's discretion and/or statutory powers regarding funding, procurement, design and delivery of the Roundabout (including land acquisition required for the Roundabout) is not limited by this Deed of Variation or the Existing Deed. The Commissioner cannot and will not act on behalf of or as agent of the Developer or the Council in progressing land acquisition or any other matter contemplated under this Deed of Variation or the Existing Deed.

6.2 The Minister's discretion and/or statutory powers regarding funding, procurement, design and delivery of the Roundabout (including ~~l~~Land ~~a~~Acquisition ~~required for the Roundabout~~) is not limited by this Deed of Variation or the Existing Deed. The Minister cannot and will not act on behalf of or as agent of the Developer or the Council in progressing the Land Acquisition ~~land acquisition~~ or any other matter contemplated under this Deed of Variation ~~or the Existing Deed~~.[CL31]

7. **DISPUTE RESOLUTION**

Unless otherwise provided in this Deed of Variation, all disputes or differences between the parties in connection with:

7.1 this Deed of Variation; or

7.2 any other matter in any way relating to this Deed of Variation,

that are reasonably suitable for expert determination, will be dealt with in accordance with clause 15 of the Existing Deed.

8. **RELEASE**

Subject to payment of the Minister's Roundabout Contribution, the Developer and the Council releases the Minister and the Commissioner from all claims arising from or in relation to the funding, procurement, design and delivery of the Roundabout~~, other than claims under this Deed, the Existing Deed~~ [CL32][DL33]~~or any other agreement entered into between some or all of the parties to this Deed~~.

9. **PUBLIC DISCLOSURE**

~~The disclosure of any media or press release or public announcement about the subject matter of this Deed of Variation is at the sole discretion of the Minister.~~

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~~Any media or press release or public announcement about the subject matter of this Deed of Variation which another party to this Deed proposes to make must first be approved in writing by the Minister.~~

~~Nothing in this clause derogates from the obligations of a party under the *Freedom of Information Act 1991 (SA)*.~~Clause 21 of the Existing Deed applies to this Deed of Variation. [CL34][DL35]

~~ACKNOWLEDGEMENT OF NOTICE~~~~[CL36]~~[DL37]

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EXECUTED as a **DEED**

By the Minister

SIGNED for and on behalf of	)	
THE MINISTER FOR ~~TRANSPORT,~~	)	
~~INFRASTRUCTURE AND~~	)	
~~LOCAL GOVERNMENT~~		
INFRASTRUCTURE AND TRANSPORT	)	
	)	
	)	
	)	
on:……	)	
by its duly constituted	)	
Attorney under Power of Attorney	)	……
No.	)	
	)	
in the presence of:	)	

……
Witness (Witness to sign above)

[Witness to Print Name]

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By the Commissioner

THE COMMON SEAL of the **COMMISSIONER OF HIGHWAYS** was hereto affixed on:…… in the presence of:	))))))))	……

……
Witness (Witness to sign above)

[Witness to Print Name]

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By the Council

THE COMMON SEAL of the)
ADELAIDE PLAINS COUNCIL)
(ABN 58 384 968 672))
was hereto affixed)
)
)
)
on …….)
(Insert date above))
as attested by the Principal Member and)
Chief Executive Officer) (affix seal above)

Signature: ……..... Signature: ……

Name: …… Name: ……..

Principal Member Chief Executive Officer

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By the Developer

SIGNED by

HICKINBOTHAM DEVELOPMENTS (TWO WELLS NO.1) PTY LTD
(ACN 132 319 352) pursuant to section 127 of the
Corporations Act 2001 (Cth) by its sole ~~two of its~~ Director~~s~~
~~or by one of its Directors~~ and ~~the~~ Company Secretary.

Signed:	.....	~~Signed: .....~~
Name:	.....	~~Name: .....~~
Position:	.....	~~Position: .....~~

HICKINBOTHAM AGRICULTURAL PROJECTS PTY LTD
(ACN 064 928 945) pursuant to section 127 of the
Corporations Act 2001 (Cth) by ~~two of~~ its sole Director~~s~~
~~or by one of its Directors~~ and ~~the~~ Company Secretary.

Signed:	.....	~~Signed: .....~~
Name:	.....	~~Name: .....~~
Position:	.....	~~Position: .....~~

HICKINBOTHAM DEVELOPMENTS (TWO WELLS NO.4) PTY LTD
(ACN 144 951 306) pursuant to section 127 of the
Corporations Act 2001 (Cth) by ~~two of~~ its sole Director~~s~~
~~or by one of its Directors~~ and ~~the~~ Company Secretary.

Signed:	.....	~~Signed: .....~~
Name:	.....	~~Name: .....~~
Position:	.....	~~Position: .....~~

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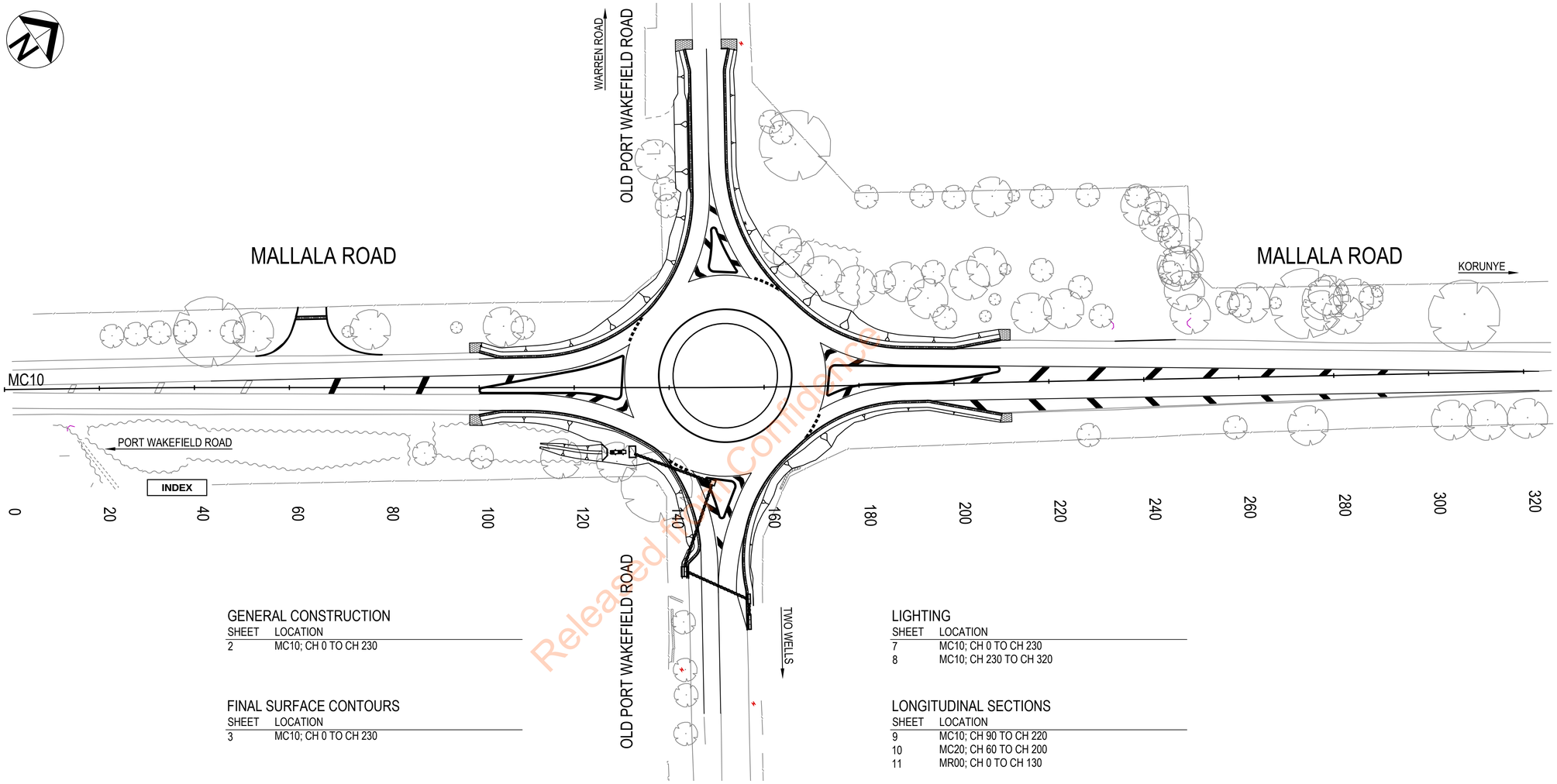
Annexure 1

Existing Deed

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MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD



Released for Public Consultation

GENERAL CONSTRUCTION

SHEET	LOCATION
2	MC10; CH 0 TO CH 230

FINAL SURFACE CONTOURS

SHEET	LOCATION
3	MC10; CH 0 TO CH 230

PAVEMENT TREATMENT

SHEET	LOCATION
4	MC10; CH 0 TO CH 230

TRAFFIC CONTROL

SHEET	LOCATION
5	MC10; CH 0 TO CH 230
6	MC10; CH 230 TO CH 320

LIGHTING

SHEET	LOCATION
7	MC10; CH 0 TO CH 230
8	MC10; CH 230 TO CH 320

LONGITUDINAL SECTIONS

SHEET	LOCATION
9	MC10; CH 90 TO CH 220
10	MC20; CH 60 TO CH 200
11	MR00; CH 0 TO CH 130

CROSS SECTIONS

SHEET	LOCATION
12	MC10; CH 100 TO CH 150
13	MC10; CH 160 TO CH 210
14	MC20; CH 80 TO CH 130
15	MC20; CH 140 TO CH 190
16	MR00; CH 0 TO CH 80
17	MR00; CH 90 TO CH 130

DRAINAGE LONGITUDINAL SECTION

SHEET	LOCATION
18	PIPE RUN DI01

REFERENCE DOCUMENTS

- AS1742 MANUAL OF TRAFFIC CONTROL DEVICES
- DPTI CODE OF TECHNICAL REQUIREMENTS FOR THE LEGAL USE OF TRAFFIC CONTROL DEVICES.
- DPTI PAVEMENT MARKING MANUAL
- DPTI MASTER SPECIFICATION
- S-4070 SHEETS 6 & 7 (KERB AND GUTTER)
- S-4080 SHEETS 1,2,&3 (JUNCTION BOX AND SIDE ENTRY PITS)
- S-4002 SHEETS 17-24 (HEADWALLS AND WINGWALLS)
- S-4055 SHEETS 19-24, 30, 37-42, 46, 48 & 49 (LIGHT POLES & FOOTINGS)
- S-4055 SHEETS 33-35 (LIGHTING PIT DETAILS)
- S-4055 SHEETS 43 & 54-58 (ELECTRICAL SWITCH BOARD)
- AUSTROADS GUIDE TO ROAD DESIGN: PART 4B 'ROUNDABOUTS'

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0001
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	

SCALES: 10 0 5 10 15 20

ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD

MC10; CH 0 TO CH 320

TITLE AND INDEX

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	1	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

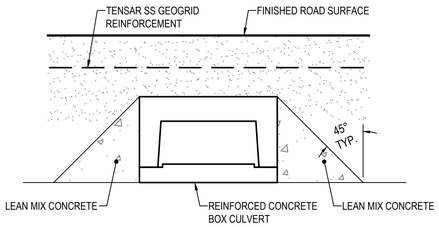
CAD FILE NAME: 7365 SHEET 0001DWG

LEGEND

SYMBOL	DESCRIPTION
	EXISTING FEATURES
	PROPERTY BOUNDARY
	FENCE
	COMMUNICATIONS
	INSPECTION COVER
	JUNCTION BOX
	UNDERGROUND CABLE
	ELECTRICAL
	OVERHEAD CABLE (SAPN)
	STOBIE POLE - EXISTING
	SEWER
	INSPECTION COVER
	WATER
	FIRE PLUG MARKER POST
	METER
	INSPECTION COVER
	UNDERGROUND PIPE
	STORMWATER
	PIPE / CULVERT

LEGEND

SYMBOL	DESCRIPTION
	DESIGN FEATURES
	KERB AND GUTTER
	MEDIAN KERB
	PROPERTY CROSSOVER / DISH DRAIN
	STORMWATER CULVERT
	DOUBLE SIDE ENTRY GULLY
	TRIPLE SIDE ENTRY GULLY
	JUNCTION BOX
	HEADWALL / ENDWALL
	RIP RAP
	LIGHT POLE BASE - INSTALL
D3	DRAINAGE STRUCTURE IDENTIFIER
	TREES TO BE REMOVED
SKG	STANDARD KERB & GUTTER
MK2	MEDIAN KERB TYPE 2
MTE	MATCH TO EXISTING



TYPICAL SECTION A - A
NTS

NOTES:

1. THE SERVICES INFORMATION INDICATED ON THIS DRAWING IS BASED ON FIELD OBSERVATIONS AND DETAILS PROVIDED BY SERVICE AUTHORITIES. DPTI, ITS SERVANTS OR AGENTS SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE CAUSED BY THE USE OF THIS SERVICES INFORMATION . THIS DESIGN MAY INCLUDE THE POSSIBILITY OF SERVICE CONFLICT AND / OR ENCROACHMENT WITHIN SAFETY CLEARANCES REQUIRING ASSESSMENT AND APPROVAL BY THE OFFICE OF TECHNICAL REGULATOR AND SERVICES AUTHORITIES. IF DURING CONSTRUCTION IT IS DETERMINED THAT THE CLEARANCES AS DETERMINED BY THE OFFICE OF THE TECHNICAL REGULATORS CANNOT BE MET, WORK MUST IMMEDIATELY CEASE AND THE DESIGN & PROJECT MANAGER NOTIFIED.
2. FOR KERB & GUTTER, MEDIAN KERB, DISH DRAIN & PROPERTY CROSSOVER DETAILS REFER TO STANDARD DRAWING S-4070 SHEETS. 6 & 7.
3. FOR JUNCTION BOX AND SIDE ENTRY PIT DETAILS, REFER TO STANDARD DRAWING S-4080 SHEETS 1, 2 & 3.
4. FOR DETAILS OF HEADWALLS & WINGWALLS REFER STANDARD DRAWING S-4002 SHEETS 17-24.
5. THE REFERENCE POINT FOR THE SETTING OUT OF A DRAINAGE STRUCTURE IS SHOWN ON THE STANDARD DRAWING FOR EACH STRUCTURE.
6. DRAIN DETAILS IN THE DRAIN CONNECTION SCHEDULE ARE LISTED IN CLOCKWISE ORDER COMMENCING AT THE OUTLET.
7. ALL CUT AND FILL BATTERS 1: in 4 UNLESS SHOWN OTHERWISE.
8. AT ALL POINTS LABELED 'MATCH TO EXISTING' A HORIZONAL AND VERTICAL TRANSITION SHALL BE MADE ON SITE DURING CONSTRUCTION.

DRAIN DETAILS

ID	STRUCTURE	DESCRIPTION			DETAILS		
	INLET - OUTLET	RUNS	SIZE(mm)	TYPE	CLASS	LENGTH	GRADE%
DI01	D1-D2	1	375	RCP	6	2.44	0.3
DI01	D2-D3	1	450x300	RCBC	-	14.0	0.3
DI01	D3-D4	1	600x300	RCBC	-	18.4	0.3
DI01	D4-D5	1	600x300	RCBC	-	17.0	0.3
DI01	D5-D6	1	900x300	RCBC	-	4.8	0.3

DRAIN CONNECTION DETAILS

ID	DESCRIPTION	SET OUT LOCATION			DRAIN		COMMENTS
		PPIT PT	ORIENTATION	LEVEL	SIZE (mm)	LEVEL	
D1	TRIPLE GULLY	1	XD01	9.43	375	8.78	
D2	DOUBLE GULLY	2	XD02	9.40	450x300	8.76	
					375	8.76	
D3	COMBINED DOUBLE GULLY & JUNCTION BOX	3	XD03	9.39	600x300	8.72	
					450x300	8.72	
D4	JUNCTION BOX 900x900	4	-	9.94	600x300	8.66	
					600x300	8.66	
D5	SPECIAL JUNCTION BOX 2200x1200	5	-	9.65	600x450	8.61	CONTRACTOR TO CAST IN-SITU
					600x300 (E)	8.61	
					600x300	8.61	
D6	HEADWALL	6	-	9.22	900x300	8.59	

(E) DENOTES 'EXISTING'

Released from Confidence

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
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F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY: JL	DESIGN CHECK: PT	CAD REF: 7365 Sheet 0002
DRAFTED BY: JL	DRAFTING CHECK: PT	PLOT DATE: 29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	
SCALES: 6 0 3 6 9 12	

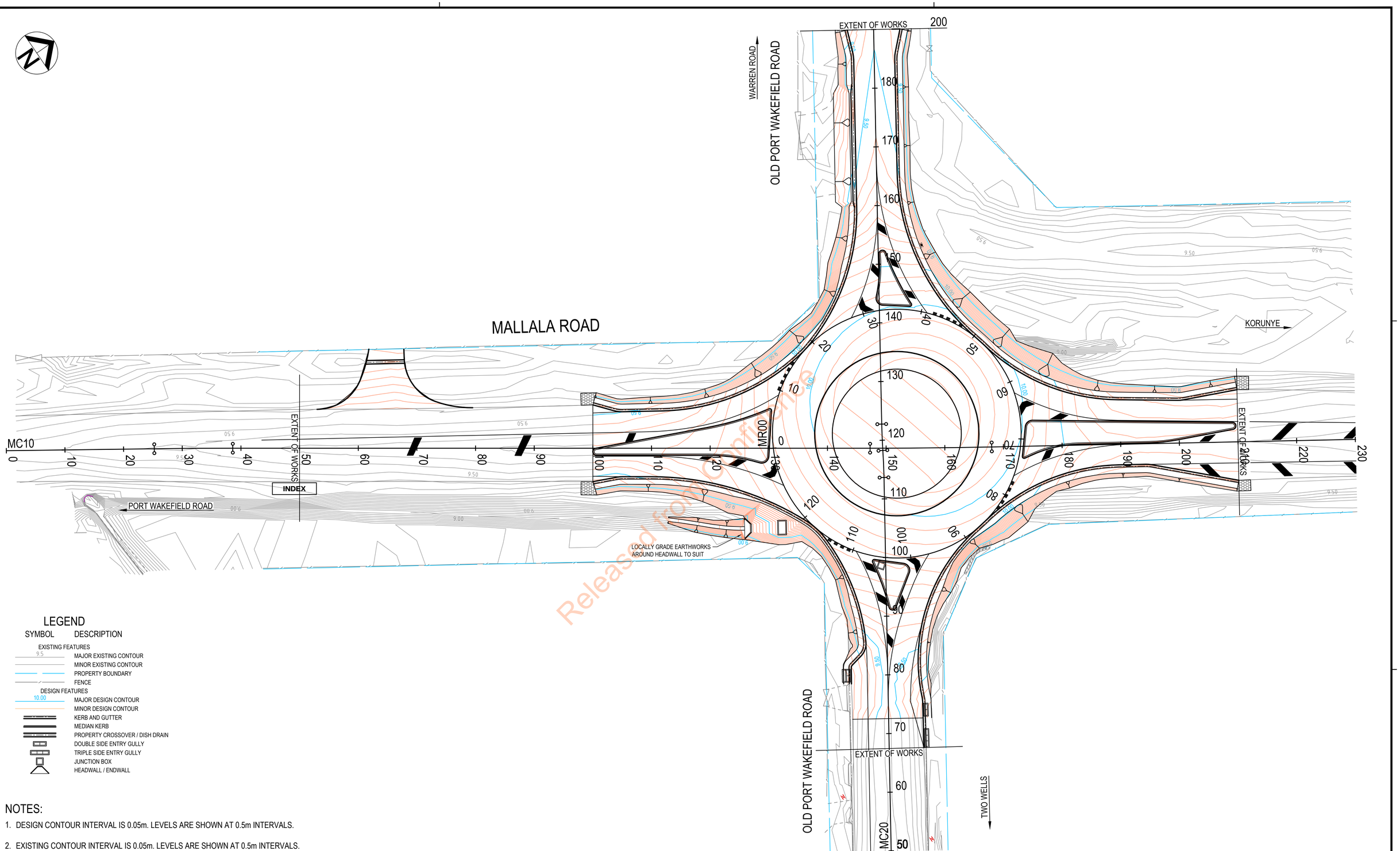
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 0 TO CH 230
GENERAL CONSTRUCTION

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	2	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0002.DWG



Released for Construction

LEGEND

SYMBOL	DESCRIPTION
EXISTING FEATURES	
9.5	MAJOR EXISTING CONTOUR
	MINOR EXISTING CONTOUR
	PROPERTY BOUNDARY
	FENCE
DESIGN FEATURES	
10.00	MAJOR DESIGN CONTOUR
	MINOR DESIGN CONTOUR
	KERB AND GUTTER
	MEDIAN KERB
	PROPERTY CROSSOVER / DISH DRAIN
	DOUBLE SIDE ENTRY GULLY
	TRIPLE SIDE ENTRY GULLY
	JUNCTION BOX
	HEADWALL / ENDWALL

NOTES:

1. DESIGN CONTOUR INTERVAL IS 0.05m. LEVELS ARE SHOWN AT 0.5m INTERVALS.
2. EXISTING CONTOUR INTERVAL IS 0.05m. LEVELS ARE SHOWN AT 0.5m INTERVALS.

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0003
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	

SCALES: 6 0 3 6 9 12

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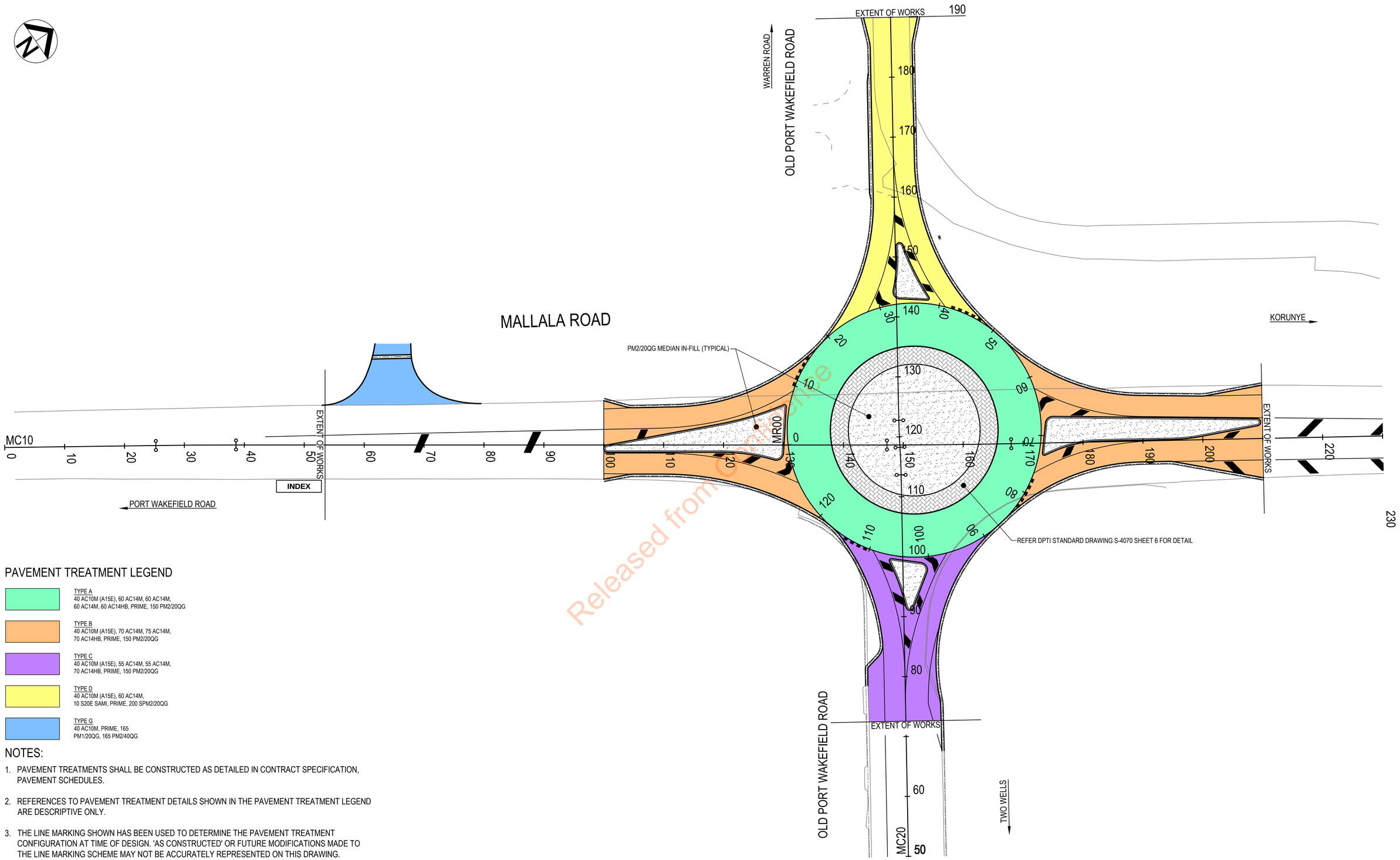
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 0 TO CH 230
FINAL SURFACE CONTOURS

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	3	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0003.DWG



Released from Compliance

PAVEMENT TREATMENT LEGEND

- TYPE A — 40 AC10M (A15E), 60 AC14M, 60 AC14M, 60 AC14M, 60 AC14HB, PRIME, 150 PM2/20QG
- TYPE B — 40 AC10M (A15E), 70 AC14M, 75 AC14M, 70 AC14HB, PRIME, 150 PM2/20QG
- TYPE C — 40 AC10M (A15E), 55 AC14M, 55 AC14M, 70 AC14HB, PRIME, 150 PM2/20QG
- TYPE D — 40 AC10M (A15E), 60 AC14M, 10 S20E SAMI, PRIME, 200 SPM2/20QG
- TYPE G — 40 AC10M, PRIME, 165 PM1/20QG, 165 PM2/40QG

NOTES:

1. PAVEMENT TREATMENTS SHALL BE CONSTRUCTED AS DETAILED IN CONTRACT SPECIFICATION, PAVEMENT SCHEDULES.
2. REFERENCES TO PAVEMENT TREATMENT DETAILS SHOWN IN THE PAVEMENT TREATMENT LEGEND ARE DESCRIPTIVE ONLY.
3. THE LINE MARKING SHOWN HAS BEEN USED TO DETERMINE THE PAVEMENT TREATMENT CONFIGURATION AT TIME OF DESIGN. 'AS CONSTRUCTED' OR FUTURE MODIFICATIONS MADE TO THE LINE MARKING SCHEME MAY NOT BE ACCURATELY REPRESENTED ON THIS DRAWING.

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	DESIGN CHECK:	CAD REF:
BBC	BBC	7365 Sheet 0004
DRAFTED BY:	DRAFTING CHECK:	PLOT DATE:
JL	PT	29-Nov-16

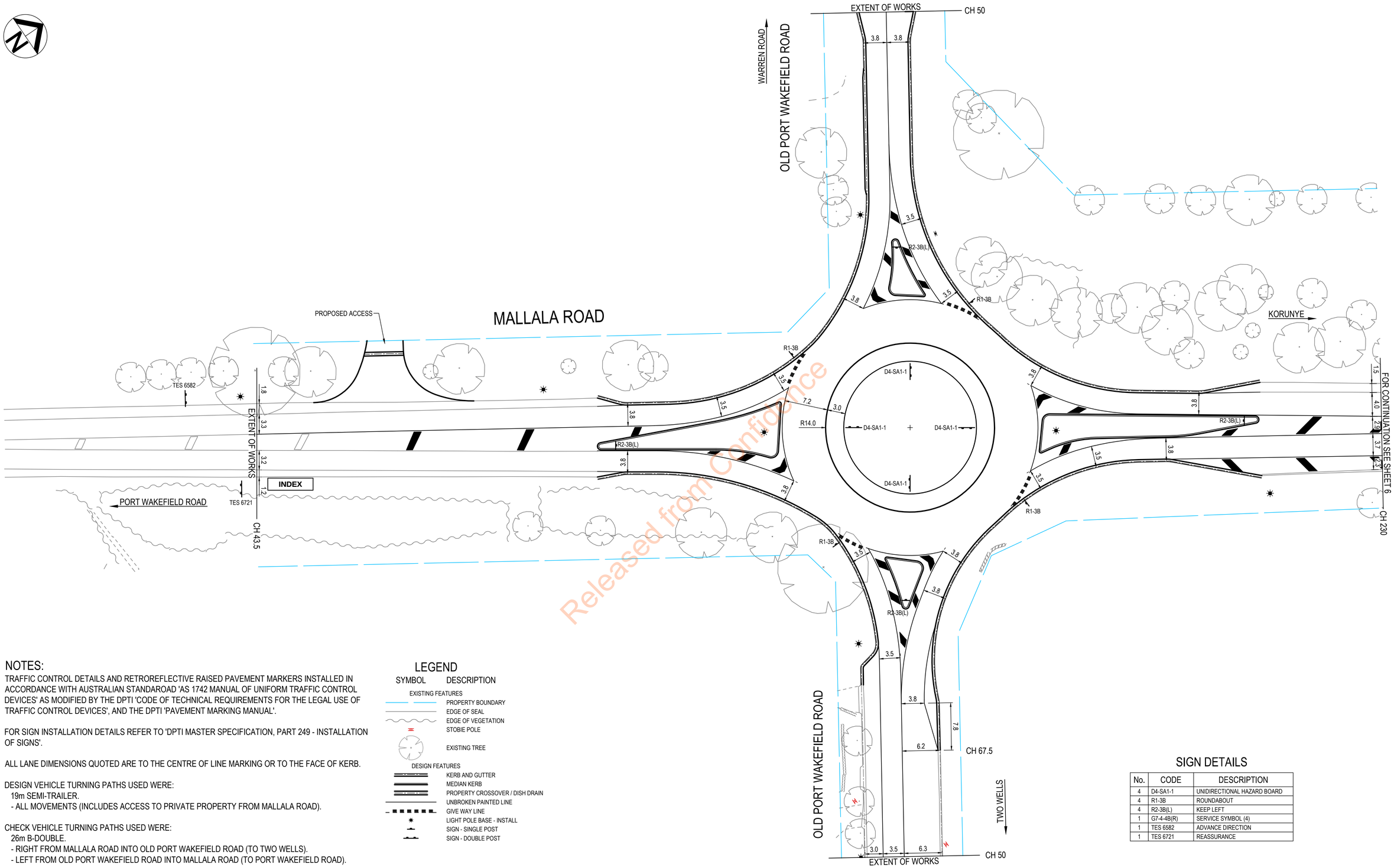
Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: | FILE No.:
DESIGN No.: | SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 6 0 3 6 9 12

ROAD No. 43703 / 04378
MALLALA ROAD
ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 0 TO CH 230
PAVEMENT TREATMENT

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
BBC	GE	J. JOVANOVIC	981 9611	7365	4	0
CHECKED: BBC	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0004.DWG



Released from Confidence

NOTES:

1. TRAFFIC CONTROL DETAILS AND RETROREFLECTIVE RAISED PAVEMENT MARKERS INSTALLED IN ACCORDANCE WITH AUSTRALIAN STANDAROAD 'AS 1742 MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES' AS MODIFIED BY THE DPTI 'CODE OF TECHNICAL REQUIREMENTS FOR THE LEGAL USE OF TRAFFIC CONTROL DEVICES', AND THE DPTI 'PAVEMENT MARKING MANUAL'.
2. FOR SIGN INSTALLATION DETAILS REFER TO 'DPTI MASTER SPECIFICATION, PART 249 - INSTALLATION OF SIGNS'.
3. ALL LANE DIMENSIONS QUOTED ARE TO THE CENTRE OF LINE MARKING OR TO THE FACE OF KERB.
4. DESIGN VEHICLE TURNING PATHS USED WERE:
   19m SEMI-TRAILER.
   - ALL MOVEMENTS (INCLUDES ACCESS TO PRIVATE PROPERTY FROM MALLALA ROAD).
5. CHECK VEHICLE TURNING PATHS USED WERE:
   26m B-DOUBLE.
   - RIGHT FROM MALLALA ROAD INTO OLD PORT WAKEFIELD ROAD (TO TWO WELLS).
   - LEFT FROM OLD PORT WAKEFIELD ROAD INTO MALLALA ROAD (TO PORT WAKEFIELD ROAD).

LEGEND

SYMBOL	DESCRIPTION
	EXISTING FEATURES
	PROPERTY BOUNDARY
	EDGE OF SEAL
	EDGE OF VEGETATION
	STOBIE POLE
	EXISTING TREE
	DESIGN FEATURES
	KERB AND GUTTER
	MEDIAN KERB
	PROPERTY CROSSOVER / DISH DRAIN
	UNBROKEN PAINTED LINE
	GIVE WAY LINE
	LIGHT POLE BASE - INSTALL
	SIGN - SINGLE POST
	SIGN - DOUBLE POST

SIGN DETAILS

No.	CODE	DESCRIPTION
4	D4-SA1-1	UNIDIRECTIONAL HAZARD BOARD
4	R1-3B	ROUNDABOUT
4	R2-3B(L)	KEEP LEFT
1	G7-4-4B(R)	SERVICE SYMBOL (4)
1	TES 6582	ADVANCE DIRECTION
1	TES 6721	REASSURANCE

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
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Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0005
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	

SCALES: 6 0 3 6 9 12

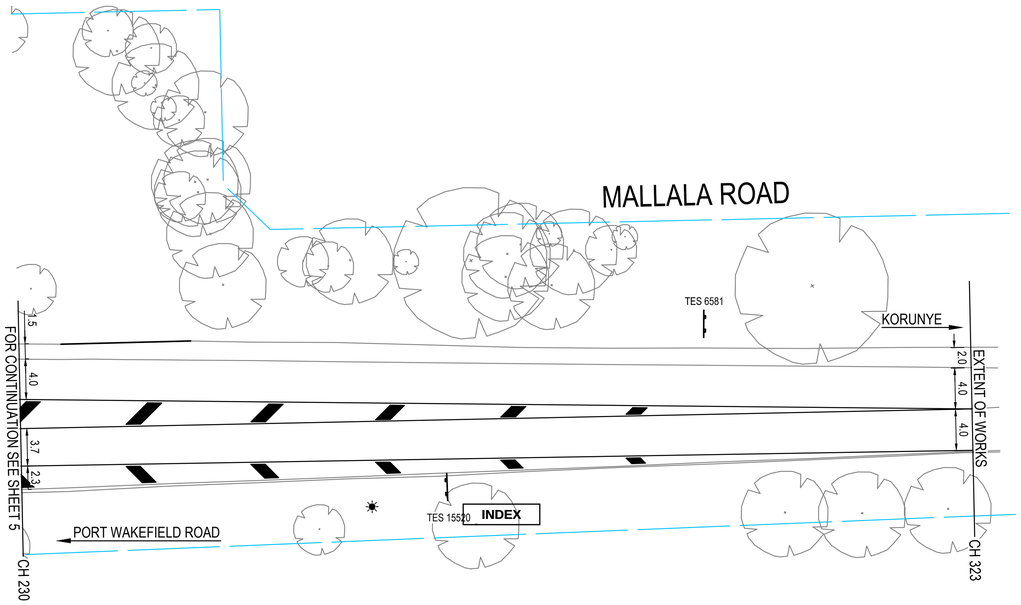
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 0 TO CH 230
TRAFFIC CONTROL

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	5	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0005.DWG



Released from Confidence

NOTES:

1. TRAFFIC CONTROL DETAILS AND RETROREFLECTIVE RAISED PAVEMENT MARKERS INSTALLED IN ACCORDANCE WITH AUSTRALIAN STANDARD 'AS 1742 MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES' AS MODIFIED BY THE DPTI 'CODE OF TECHNICAL REQUIREMENTS FOR THE LEGAL USE OF TRAFFIC CONTROL DEVICES', AND THE DPTI 'PAVEMENT MARKING MANUAL'.
2. FOR SIGN INSTALLATION DETAILS REFER TO 'DPTI MASTER SPECIFICATION, PART 249 - INSTALLATION OF SIGNS'.
3. ALL LANE DIMENSIONS QUOTED ARE TO THE CENTRE OF LINE MARKING OR TO THE FACE OF KERB.

LEGEND

SYMBOL	DESCRIPTION
	EXISTING FEATURES
	PROPERTY BOUNDARY
	EDGE OF SEAL
	EDGE OF VEGETATION
	STOBIE POLE
	EXISTING TREE
	DESIGN FEATURES
	UNBROKEN PAINTED LINE
	LIGHT POLE BASE - INSTALL
	SIGN - DOUBLE POST

SIGN DETAILS

No.	CODE	DESCRIPTION
1	TES 15520	ADVANCED DIRECTION
1	TES 6581	REASSURANCE

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
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ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0006
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	

SCALES: 6 0 3 6 9 12

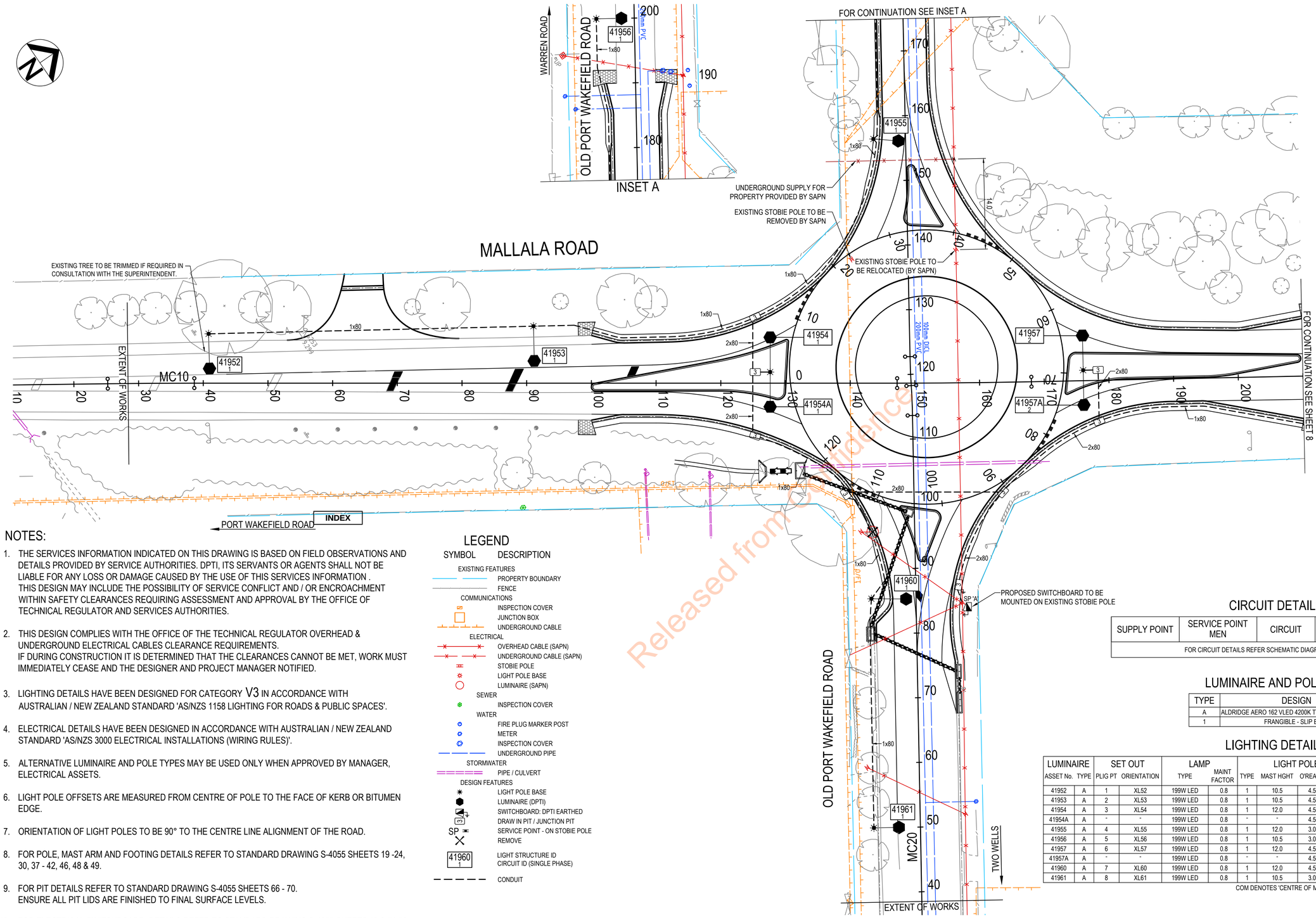
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 230 TO CH 320
TRAFFIC CONTROL

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	6	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS				
		DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0006.DWG



NOTES:

1. THE SERVICES INFORMATION INDICATED ON THIS DRAWING IS BASED ON FIELD OBSERVATIONS AND DETAILS PROVIDED BY SERVICE AUTHORITIES. DPTI, ITS SERVANTS OR AGENTS SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE CAUSED BY THE USE OF THIS SERVICES INFORMATION . THIS DESIGN MAY INCLUDE THE POSSIBILITY OF SERVICE CONFLICT AND / OR ENCROACHMENT WITHIN SAFETY CLEARANCES REQUIRING ASSESSMENT AND APPROVAL BY THE OFFICE OF TECHNICAL REGULATOR AND SERVICES AUTHORITIES.
2. THIS DESIGN COMPLIES WITH THE OFFICE OF THE TECHNICAL REGULATOR OVERHEAD & UNDERGROUND ELECTRICAL CABLES CLEARANCE REQUIREMENTS. IF DURING CONSTRUCTION IT IS DETERMINED THAT THE CLEARANCES CANNOT BE MET, WORK MUST IMMEDIATELY CEASE AND THE DESIGNER AND PROJECT MANAGER NOTIFIED.
3. LIGHTING DETAILS HAVE BEEN DESIGNED FOR CATEGORY V3 IN ACCORDANCE WITH AUSTRALIAN / NEW ZEALAND STANDARD 'AS/NZS 1158 LIGHTING FOR ROADS & PUBLIC SPACES'.
4. ELECTRICAL DETAILS HAVE BEEN DESIGNED IN ACCORDANCE WITH AUSTRALIAN / NEW ZEALAND STANDARD 'AS/NZS 3000 ELECTRICAL INSTALLATIONS (WIRING RULES)'.
5. ALTERNATIVE LUMINAIRE AND POLE TYPES MAY BE USED ONLY WHEN APPROVED BY MANAGER, ELECTRICAL ASSETS.
6. LIGHT POLE OFFSETS ARE MEASURED FROM CENTRE OF POLE TO THE FACE OF KERB OR BITUMEN EDGE.
7. ORIENTATION OF LIGHT POLES TO BE 90° TO THE CENTRE LINE ALIGNMENT OF THE ROAD.
8. FOR POLE, MAST ARM AND FOOTING DETAILS REFER TO STANDARD DRAWING S-4055 SHEETS 19 -24, 30, 37 - 42, 46, 48 & 49.
9. FOR PIT DETAILS REFER TO STANDARD DRAWING S-4055 SHEETS 66 - 70. ENSURE ALL PIT LIDS ARE FINISHED TO FINAL SURFACE LEVELS.
10. FOR ELECTRICAL SWITCHBOARD DETAILS REFER TO STANDARD DRAWING S-4055 SHEETS 43 & 54-58

LEGEND

SYMBOL	DESCRIPTION
	EXISTING FEATURES
	PROPERTY BOUNDARY
	FENCE
	COMMUNICATIONS
	INSPECTION COVER
	JUNCTION BOX
	UNDERGROUND CABLE
	ELECTRICAL
	OVERHEAD CABLE (SAPN)
	UNDERGROUND CABLE (SAPN)
	STOBIE POLE
	LIGHT POLE BASE
	LUMINAIRE (SAPN)
	SEWER
	INSPECTION COVER
	WATER
	FIRE PLUG MARKER POST
	METER
	INSPECTION COVER
	UNDERGROUND PIPE
	STORMWATER
	PIPE / CULVERT
	DESIGN FEATURES
	LIGHT POLE BASE
	LUMINAIRE (DPTI)
	SWITCHBOARD: DPTI EARTHED
	DRAW IN PIT / JUNCTION PIT
SP	SERVICE POINT - ON STOBIE POLE
	REMOVE
41960 1	LIGHT STRUCTURE ID CIRCUIT ID (SINGLE PHASE)
	CONDUIT

CIRCUIT DETAILS

SUPPLY POINT	SERVICE POINT MEN	CIRCUIT	LAMPS	LAMPS VDROP/ZLOOP
FOR CIRCUIT DETAILS REFER SCHEMATIC DIAGRAM ON SHEET 008				

LUMINAIRE AND POLE TYPE

TYPE	DESIGN
A	ALDRIDGE AERO 162 VLED 4200K TYPE 3 SHORT 504mA
1	FRANGIBLE - SLIP BASE

LIGHTING DETAILS

LUMINAIRE ASSET No.	TYPE	SET OUT PLIG PT	ORIENTATION	LAMP TYPE	MAINT FACTOR	LIGHT POLE TYPE	MAST HGHT	O'REACH	OFFSET	SAPN DWG. No.	TARIFF	COMMENTS
41952	A	1	XL52	199W LED	0.8	1	10.5	4.5	1.3	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41953	A	2	XL53	199W LED	0.8	1	10.5	4.5	1.7	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41954	A	3	XL54	199W LED	0.8	1	12.0	4.5	COM	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41954A	A	-	-	199W LED	0.8	-	-	4.5	-	N/A	EO	NEW DPTI LUMINAIRE
41955	A	4	XL55	199W LED	0.8	1	12.0	3.0	1.0	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41956	A	5	XL56	199W LED	0.8	1	10.5	3.0	3.0	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41957	A	6	XL57	199W LED	0.8	1	12.0	4.5	COM	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41957A	A	-	-	199W LED	0.8	-	-	4.5	-	N/A	EO	NEW DPTI LUMINAIRE
41960	A	7	XL60	199W LED	0.8	1	12.0	4.5	3.0	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41961	A	8	XL61	199W LED	0.8	1	10.5	3.0	0.7	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE

COM DENOTES 'CENTRE OF MEDIAN'

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	DESIGN CHECK:	CAD REF:
ATS	ATS	7365 Sheet 0007
DRAFTED BY:	DRAFTING CHECK:	PLOT DATE:
JL	PT	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

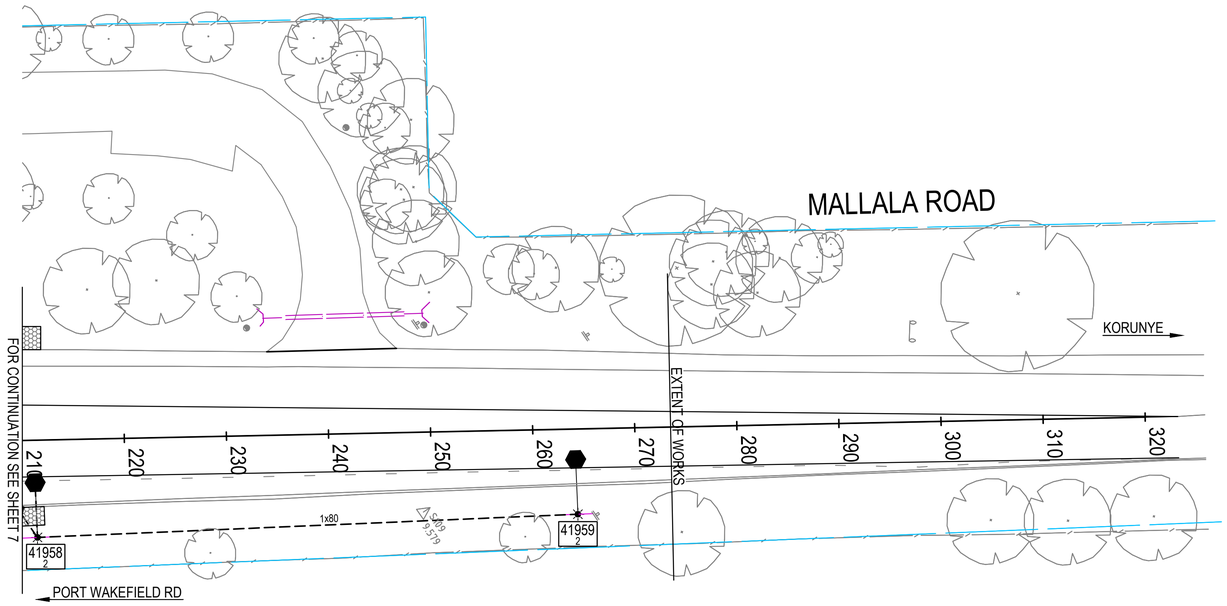
PROJECT No.: FILE No.:
DESIGN No.: SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 6 0 3 6 9 12

ROAD No. 43703 / 04378
MALLALA ROAD
ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 0 TO CH 230
LIGHTING

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
ATS	GE	J. JOVANOVIC	981 9611	7365	7	0
CHECKED: ATS	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0007.DWG

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INDEX

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2. THIS DESIGN COMPLIES WITH THE OFFICE OF THE TECHNICAL REGULATOR OVERHEAD & UNDERGROUND ELECTRICAL CABLES CLEARANCE REQUIREMENTS. IF DURING CONSTRUCTION IT IS DETERMINED THAT THE CLEARANCES CANNOT BE MET, WORK MUST IMMEDIATELY CEASE AND THE DESIGNER AND PROJECT MANAGER NOTIFIED.
3. LIGHTING DETAILS HAVE BEEN DESIGNED FOR CATEGORY V3 IN ACCORDANCE WITH AUSTRALIAN / NEW ZEALAND STANDARD 'AS/NZS 1158 LIGHTING FOR ROADS & PUBLIC SPACES'.
4. ELECTRICAL DETAILS HAVE BEEN DESIGNED IN ACCORDANCE WITH AUSTRALIAN / NEW ZEALAND STANDARD 'AS/NZS 3000 ELECTRICAL INSTALLATIONS (WIRING RULES)'.
5. ALTERNATIVE LUMINAIRE AND POLE TYPES MAY BE USED ONLY WHEN APPROVED BY MANAGER, ELECTRICAL ASSETS.
6. LIGHT POLE OFFSETS ARE MEASURED FROM CENTRE OF POLE TO THE FACE OF KERB OR BITUMEN EDGE.
7. ORIENTATION OF LIGHT POLES TO BE 90° TO THE CENTRE LINE ALIGNMENT OF THE ROAD.
8. FOR POLE, MAST ARM AND FOOTING DETAILS REFER TO STANDARD DRAWING S-4055 SHEETS 19 -24, 30, 37 - 42, 46, 48 & 49.
9. FOR PIT DETAILS REFER TO STANDARD DRAWING S-4055 SHEETS 66 - 70. ENSURE ALL PIT LIDS ARE FINISHED TO FINAL SURFACE LEVELS.
10. FOR ELECTRICAL SWITCHBOARD DETAILS REFER TO STANDARD DRAWING S-4055 SHEETS 43 & 54-58

LEGEND

SYMBOL	DESCRIPTION
	EXISTING FEATURES
	PROPERTY BOUNDARY
	FENCE
	COMMUNICATIONS
	INSPECTION COVER
	JUNCTION BOX
	UNDERGROUND CABLE
	ELECTRICAL
	OVERHEAD CABLE (SAPN)
	UNDERGROUND CABLE (SAPN)
	STOBIE POLE
	LIGHT POLE BASE
	LUMINAIRE (SAPN)
	SEWER
	INSPECTION COVER
	WATER
	FIRE PLUG MARKER POST
	METER
	INSPECTION COVER
	UNDERGROUND PIPE
	STORMWATER
	PIPE / CULVERT
	DESIGN FEATURES
	LIGHT POLE BASE
	LUMINAIRE (DPTI)
	SWITCHBOARD: DPTI EARTHED
DI	DRAW IN PIT / JUNCTION PIT
SP	SERVICE POINT - ON STOBIE POLE
	REMOVE
L15 1	LIGHT STRUCTURE ID CIRCUIT ID (SINGLE PHASE)
	CONDUIT

CIRCUIT DETAILS

SUPPLY POINT	SERVICE POINT MEN	CIRCUIT	LAMPS	LAMPS VDROP/ZLOOP
STOBIE POLE	SP:A DPTI TYPE A SW/BD-1Ø (REFER S-4055 SH55) 2x16mm² (I_{TOTAL} = 10.5A) ID: 2046	CCT. No. 1 A : 1x6mm² N : 1x6mm² ETH : 6mm² ($I_{CCT\ 1}$ = 7.0A)	8x199W LED LAMPS 41952, 41953, 41954A, 41954B, 41955, 41956, 41960, 41961	Vdrop = 2.6% (5.98V) Zloop = 1.28Ω
		CCT. No. 2 A : 1x6mm² N : 1x6mm² ETH : 6mm² ($I_{CCT\ 1}$ = 3.5A)	4x199W LED LAMPS 41957A, 41957B, 41958, 41959	Vdrop = 1.07% (2.46V) Zloop = 1.05Ω

LUMINAIRE AND POLE TYPE

TYPE	DESIGN
A	ALDRIDGE AERO V 162 LED 4200K TYPE 3 SHORT 504mA
1	FRANGIBLE - SLIP BASE

LIGHTING DETAILS

LUMINAIRE		SET OUT		LAMP		LIGHT POLE				SAPN		COMMENTS
ASSET No.	TYPE	PLIG PT	ORIENTATION	TYPE	MAINT FACTOR	TYPE	MAST HGHT	O'REACH	OFFSET	DWG. No.	TARIFF	
41958	A	1	XL58	199W LED	0.8	1	10.5	4.5	3.0 *	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE
41959	A	1	XL59	199W LED	0.8	1	10.5	4.5	3.0 *	N/A	EO	NEW DPTI LUMINAIRE, POLE & BASE

* DENOTES FROM 'EDGE OF TRAFFIC LANE'

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No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	DESIGN CHECK:	CAD REF:
ATS	ATS	7365 Sheet 0008
DRAFTED BY:	DRAFTING CHECK:	PLOT DATE:
JL	PT	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	

SCALES: 6 0 3 6 9 12

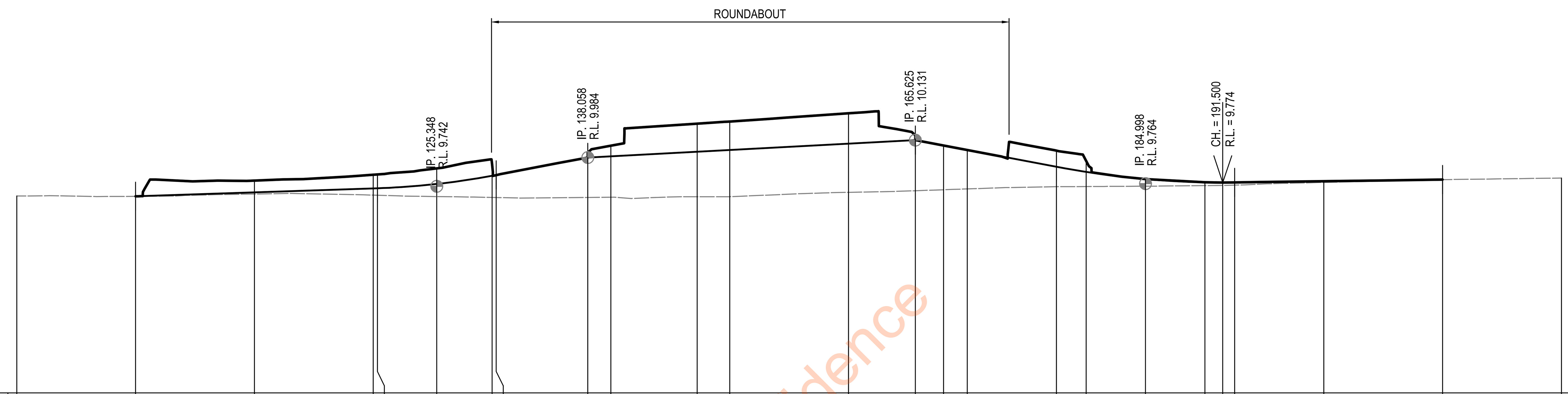
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 230 TO CH 320
LIGHTING

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
ATS	GE	J. JOVANOVIC	981 9611	7365	8	0
CHECKED: ATS	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0008.DWG



DATUM R.L. = 8.000

CHAINAGE	DESIGN LEVELS MC10	DESIGN SURFACE	EXISTING SURFACE
90.000			9.659
100.000	9.657	9.657	9.657
110.000	9.691	9.789	9.677
120.000	9.724	9.839	9.667
120.348	9.725	9.841	9.666
125.348	9.761	9.893	9.655
130.000	9.831	9.929	9.647
130.348	9.837	9.835	9.647
138.058	9.984	9.984	9.647
140.000	9.995	10.084	9.649
147.261	10.033	10.270	9.653
150.000	10.048	10.288	9.654
160.000	10.101	10.357	9.691
165.625	10.131	10.141	9.704
168.005	10.086	10.086	9.713
170.000	10.048	10.048	9.719
177.498	9.906	10.042	9.738
180.000	9.863	9.956	9.740
184.998	9.802	9.802	9.743
190.000	9.775	9.775	9.747
191.500	9.774	9.774	9.749
192.498	9.774	9.774	9.751
200.000	9.784	9.784	9.775
210.000	9.798		9.798
220.000			9.811

INDEX

HORIZONTAL: L=108.648; R=-1000.000 L=20.744; L=155.193

VERTICAL: L=20.348 G=0.333%; K=6.343 L=10.000; L=7.710 G=1.910%; L=27.567 G=0.530%; L=11.874 G=-1.891%; K=7.404 L=15.000; L=17.502 G=0.135%

MC10 LONGITUDINAL SECTION

Released from Confidence

LEGEND

DESIGN SURFACE
REFERENCE STRING
EXISTING SURFACE

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

UNCONTROLLED COPY WHEN PRINTED — 100 MILLIMETRES ON ORIGINAL DRAWING — ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO. 14-1040 | REV. 0 | STATUS FINAL
DESIGNED BY: JL | DESIGN CHECK: PT | CAD REF: 7365 Sheet 0009
DRAFTED BY: JL | DRAFTING CHECK: PT | PLOT DATE: 29-Nov-16

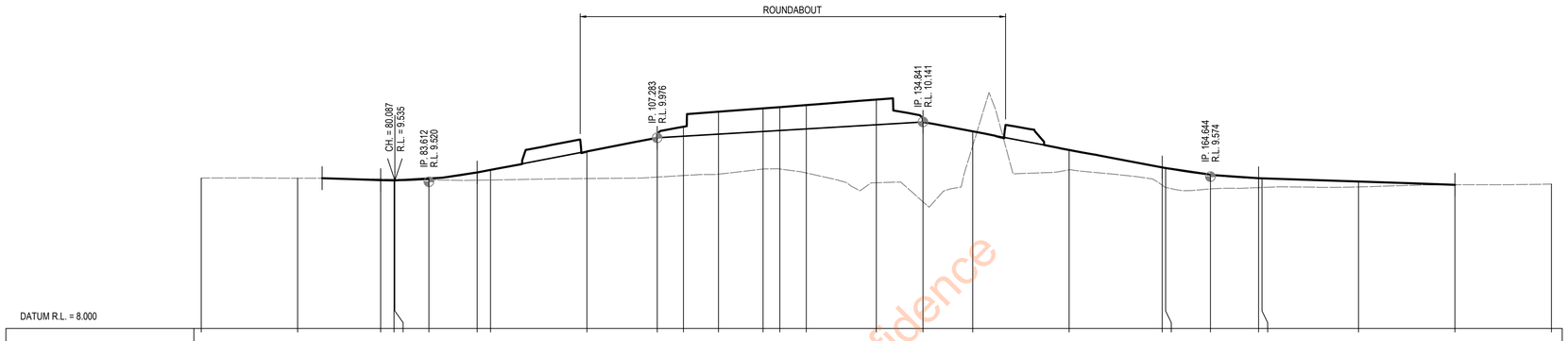
Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: | FILE No.:
DESIGN No.: | SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 6 0 3 6 9 12 H; 0.6 0 0.3 0.6 0.9 1.2 V

ROAD No. 43703 / 04378
MALLALA ROAD
ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 90 TO CH 220
LONGITUDINAL SECTION

DESIGNED: GE | DRAFTED: GE | CHECKED: GE | CHECKED: GE
ACCEPTED FOR USE: J. JOVANOVIC | TITLE: MAN. TRAFF. SOLUTIONS | DATE: 14/11/2016
ACCEPTANCE FORM KNET No.: 981 9611 | IN ACCORDANCE WITH DP013
DRAWING No.: 7365 | SHEET No.: 9 | AMEND No.: 0
SHEET LATITUDE -34.591836 SHEET LONGITUDE 138.510989

CAD FILE NAME: 7365 SHEET 0009.DWG



MC20 LONGITUDINAL SECTION

Released in Confidence

LEGEND

- DESIGN SURFACE
- REFERENCE STRING
- EXISTING SURFACE

INDEX

INDEX SHEET REFERENCE: 7365 SHEET 1

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

UNCONTROLLED COPY WHEN PRINTED ◄ 100 MILLIMETRES ON ORIGINAL DRAWING ► ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT
DRAFTED BY:	JL	DRAFTING CHECK:	PT

CAD REF: 7365 Sheet 0010
PLOT DATE: 29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:

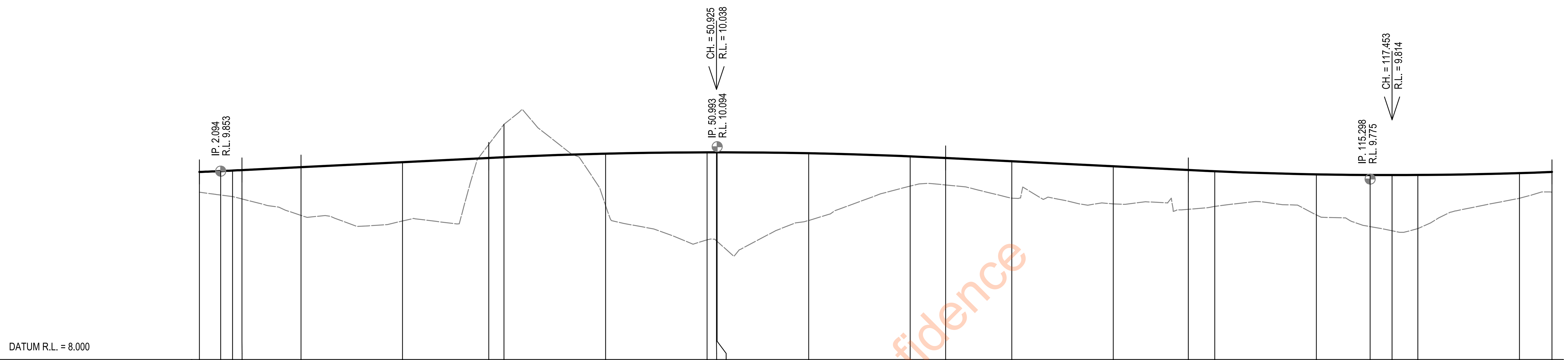
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:

SCALES:
6 0 3 6 9 12 H
0.6 0 0.3 0.6 0.9 1.2 V

ROAD No. 43703 / 04378
MALLALA ROAD
ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC20; CH 60 TO CH 200
LONGITUDINAL SECTION

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.
GE	GE	J. JOVANOVIC	981 9611	7365	10	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0010.DWG



CHAINAGE	DESIGN LEVELS MR00	DESIGN SURFACE	EXISTING SURFACE
0.000	9.845	9.845	9.646
2.094	9.854	9.854	9.618
3.262	9.859	9.859	9.603
4.189	9.864	9.864	9.580
10.000	9.892	9.892	9.418
20.000	9.941	9.941	9.363
28.493	9.983	9.983	10.137
30.000	9.990	9.990	10.314
40.000	10.025	10.025	9.514
50.000	10.038	10.038	9.178
50.925	10.038	10.038	9.174
50.993	10.038	10.038	9.168
60.000	10.029	10.029	9.368
70.000	9.998	9.998	9.706
73.493	9.982	9.982	9.717
80.000	9.950	9.950	9.587
90.000	9.901	9.901	9.530
97.392	9.864	9.864	9.477
100.000	9.852	9.852	9.506
110.000	9.821	9.821	9.422
115.298	9.815	9.815	9.302
117.453	9.814	9.814	9.262
120.000	9.815	9.815	9.288
130.000	9.834	9.834	9.586
133.204	9.845	9.845	9.646

INDEX

HORIZONTAL: R=21.200 L=3.262; R=21.200 L=129.941

VERTICAL: L=24.304 G=0.492%; K=45.593 L=45.000; L=23.899 G=-0.495%; K=40.527 L=35.811

MR00 LONGITUDINAL SECTION

Released from Confidence

LEGEND

- DESIGN SURFACE
- REFERENCE STRING
- EXISTING SURFACE

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL
DESIGNED BY: JL	DESIGN CHECK: PT	CAD REF: 7365 Sheet 0011
DRAFTED BY: JL	DRAFTING CHECK: PT	PLOT DATE: 29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

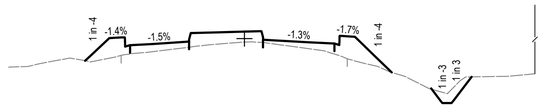
PROJECT No.: FILE No.:
DESIGN No.: SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 6 0 3 6 9 12 H; 0.6 0 0.3 0.6 0.9 1.2 V

ROAD No. 43703 / 04378
MALLALA ROAD
ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MR00; CH 0 TO CH 130
LONGITUDINAL SECTION

DESIGNED: GE	DRAFTED: GE	ACCEPTED FOR USE: J. JOVANOVIC	ACCEPTANCE FORM KNET No.: 981 9611	DRAWING No.: 7365	SHEET No.: 11	AMEND No.: 0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

UNCONTROLLED COPY WHEN PRINTED — 100 MILLIMETRES ON ORIGINAL DRAWING — ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

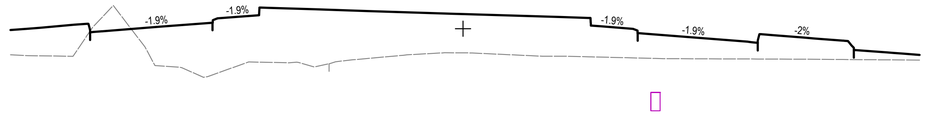
CAD FILE NAME: 7365 SHEET 0011.DWG



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL			IA30	EV30	CE30		CEA0		MC10	CEA0		CE60	EV60		IA60		IAF0	IDF0	IDFJ	IAFJ		
DESIGN LEVELS			9.362	9.732	9.617		9.675		9.724	9.706		9.644	9.754		9.171		8.913	8.673	8.672	9.100		
LEVEL DIFF.			0.003	-0.327	-0.143		-0.091		-0.057	-0.043		-0.171	-0.393		0.000		-0.012	0.176	0.223	0.000		
HORIZ. OFFSET			-10.404	-8.809	-7.465		-3.618		-0.001	1.213		5.872	7.199		9.621		12.193	12.915	13.523	14.833		

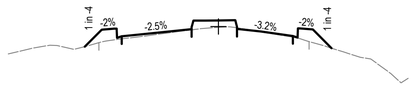
CHAINAGE 120



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	CEB0	CEJ0		MC10	CEJ0	CED0	
DESIGN LEVELS	9.988	10.147		10.048	9.977	9.818	
LEVEL DIFF.	0.023	-0.852		-0.393	-0.407	-0.265	
HORIZ. OFFSET	-24.345	-16.356		0.000	11.406	19.246	

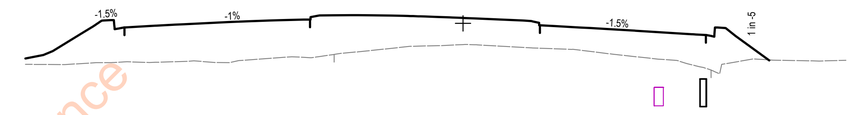
CHAINAGE 150



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL		IA30	EV30	CE30		CEA0	MC10	CEA0		CE60	EV60	IA60	
DESIGN LEVELS		9.362	9.639	9.531		9.648	9.691	9.652		9.535	9.643	9.337	
LEVEL DIFF.	INDEX	0.000	-0.200	-0.042		-0.011	-0.014	0.017		-0.018	-0.215	0.000	
HORIZ. OFFSET		-8.727	-7.620	-6.320		-1.751	0.000	1.212		4.862	6.162	7.385	

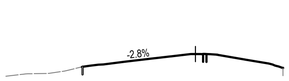
CHAINAGE 110



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	EV30	CE30		CEJ0	MC10	CEJ0		CE60	EV60	IA60	
DESIGN LEVELS	10.039	9.928		10.058	9.995	9.963		9.806	9.919	9.390	
LEVEL DIFF.	-0.685	-0.562		-0.623	-0.346	-0.373		-0.544	-0.383	0.010	
HORIZ. OFFSET	-23.575	-22.101		-9.989	0.000	5.022		15.862	17.122	20.004	

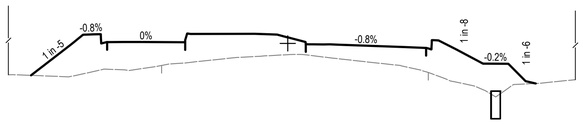
CHAINAGE 140



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	CE30	MC10	CEA0	CEA0	
DESIGN LEVELS	9.449	9.657	9.654	9.653	
LEVEL DIFF.	-0.000	-0.000	0.005	0.005	
HORIZ. OFFSET	-7.379	0.000	0.502	0.721	

CHAINAGE 100



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	IA30	EV30	CE30	CEA0	MC10	CEA0		CE60	EV60	IA60	
DESIGN LEVELS	9.309	9.973	9.852	9.851	9.831	9.818		9.757	9.879	9.177	
LEVEL DIFF.	0.000	-0.638	-0.442	-0.339	-0.183	-0.174		-0.390	-0.562	0.000	
HORIZ. OFFSET	-16.768	-13.351	-11.799	-6.696	-0.001	1.175		9.036	9.828	16.183	

CHAINAGE 130

LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- EXISTING CULVERT
- PROPOSED CULVERT

Released for Confidence

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0012
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	

SCALES: 4 0 2 4 6 8 H; 1 0 0.5 1 1.5 2 V

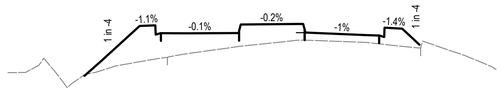
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD MC10; CH 100 TO CH 150 CROSS SECTIONS

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.
GE	GE	J. JOVANOVIC	981 9611	7365	12	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

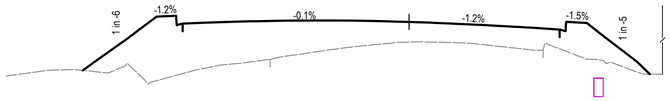
CAD FILE NAME: 7365 SHEET 0012.DWG



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	IA40	EV40	CE40	CEO0	MC10	CEO0	CE50	EV50	IA50
DESIGN LEVELS	9.158	9.972	9.854	9.858	9.863	9.866	9.816	9.928	9.866
LEVEL DIFF.	0.019	-0.583	-0.408	-0.218	-0.123	-0.126	-0.136	-0.287	-0.053
HORIZ. OFFSET	-14.334	-10.717	-9.341	-4.238	0.000	0.047	4.905	6.396	7.541

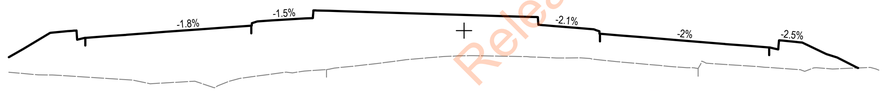
CHAINAGE 180



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	IA40	EV40	CE40	MC10	CE50	EV50	IA50
DESIGN LEVELS	9.257	10.134	10.021	10.048	9.923	10.030	9.196
LEVEL DIFF. INDEX	0.000	-1.043	-0.815	-0.328	-0.313	-0.590	0.000
HORIZ. OFFSET	-21.308	-16.453	-14.774	0.000	9.833	11.611	15.724

CHAINAGE 170



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	CE40	CEOJ	MC10	CEOJ	CE50	EV50
DESIGN LEVELS	9.983	10.182	10.101	10.050	9.826	9.906
LEVEL DIFF.	-0.640	-0.835	-0.410	-0.427	-0.327	-0.454
HORIZ. OFFSET	-24.725	-13.890	0.000	8.876	19.924	22.087

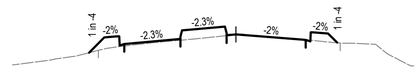
CHAINAGE 160



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	CE40	MC10	CE50
DESIGN LEVELS	9.552	9.798	9.661
LEVEL DIFF.	-0.000	-0.000	0.000
HORIZ. OFFSET	-8.889	0.000	6.554

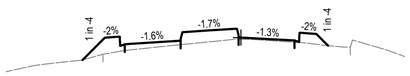
CHAINAGE 210



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	IA40	EV40	CE40	CEO0	CEO0 MC10	CE50	EV50 IA50
DESIGN LEVELS	9.486	9.736	9.629	9.712	9.771 9.784	9.695	9.799 9.651
LEVEL DIFF.	0.000	-0.190	-0.032	-0.022	-0.006 -0.010	0.004	-0.138 0.000
HORIZ. OFFSET	-9.584	-8.588	-7.291	-3.625	-0.606 0.000	4.556	6.010 6.611

CHAINAGE 200



REF. STRING MC10
DATUM R.L. 8

DESIGN LABEL	IA40	EV40	CE40	CEO0	CEO0 MC10	CE50	EV50	IA50
DESIGN LEVELS	9.409	9.773	9.665	9.723	9.779 9.775	9.728	9.833	9.643
LEVEL DIFF.	0.000	-0.264	-0.100	-0.064	-0.032 -0.028	-0.028	-0.169	0.000
HORIZ. OFFSET	-10.343	-8.884	-7.583	-3.932	-0.150 0.000	3.500	4.925	5.688

CHAINAGE 190

LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- EXISTING CULVERT
- PROPOSED CULVERT

Released from Confidence

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

UNCONTROLLED COPY WHEN PRINTED ◄ 100 MILLIMETRES ON ORIGINAL DRAWING ► ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0013
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: | FILE No.:
DESIGN No.: | SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 4 0 2 4 6 8 H; 1 0 0.5 1 1.5 2 V

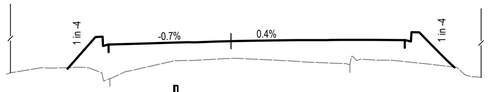
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC10; CH 160 TO CH 210
CROSS SECTIONS

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	13	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS				
		DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

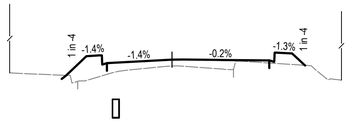
CAD FILE NAME: 7365 SHEET 0013.DWG



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA60	EV60	CE60	MC20	CE50	EV50	IA50
DESIGN LEVELS	9.386	9.902	9.760	9.836	9.852	9.978	9.405
LEVEL DIFF.	0.017	-0.547	-0.563	-0.283	-0.350	-0.501	0.007
HORIZ. OFFSET	-10.672	-8.822	-7.969	0.000	11.345	12.263	14.594

CHAINAGE 100



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA60	EV60	CE60	MC20	CE50	EV50	IA50
DESIGN LEVELS	9.379	9.701	9.486	9.643	9.630	9.745	9.549
LEVEL DIFF.	0.008	-0.396	-0.183	-0.105	-0.042	-0.161	0.000
HORIZ. OFFSET	-6.938	-5.577	-4.248	0.000	6.351	7.834	8.686

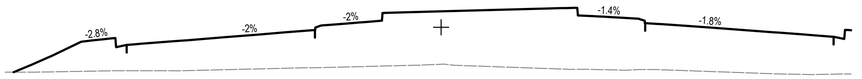
CHAINAGE 90



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA60	EV60	CE60	MC20	CE50	EV50	IA50
DESIGN LEVELS	9.391	9.383	9.276	9.535	9.403	9.506	9.425
LEVEL DIFF.	0.000	0.007	-0.000	0.012	0.094	-0.046	-0.008
HORIZ. OFFSET	-7.543	-7.512	-6.212	0.000	5.272	6.700	7.040

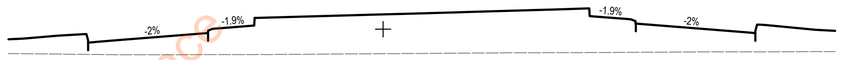
CHAINAGE 80



REF. STRING MC20
DATUM R.L. 9

DESIGN LABEL	EV30	CE30	CE0J	MC20	CE0J	
DESIGN LEVELS	9.877	9.824	10.069	10.112	10.181	
LEVEL DIFF.	-0.484	-0.421	-0.617	-0.602	-0.759	
HORIZ. OFFSET	-23.468	-20.534	-8.242	0.000	13.325	

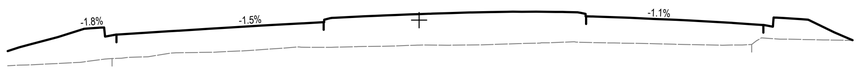
CHAINAGE 130



REF. STRING MC20
DATUM R.L. 9

DESIGN LABEL	CEA0	CE0J	MC20	CE0J	CEC0	
DESIGN LEVELS	9.832	9.989	10.052	10.144	9.988	
LEVEL DIFF.	-0.191	-0.351	-0.399	-0.469	-0.305	
HORIZ. OFFSET	-19.264	-11.432	0.000	16.496	24.305	

CHAINAGE 120



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	EV60	CE60	CE0J	MC20	CE0J	CE50	
DESIGN LEVELS	9.852	9.756	9.959	9.992	10.055	9.913	
LEVEL DIFF.	-0.539	-0.388	-0.411	-0.407	-0.425	-0.212	
HORIZ. OFFSET	-21.868	-19.761	-6.238	0.000	10.899	22.475	

CHAINAGE 110

LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- EXISTING CULVERT
- PROPOSED CULVERT

Released from Confidence

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0014
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

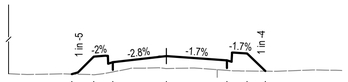
Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: | FILE No.:
DESIGN No.: | SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 4 0 2 4 6 8 H ; 1 0 0.5 1 1.5 2 V

ROAD No. 43703 / 04378
MALLALA ROAD
ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC20; CH 80 TO CH 130
CROSS SECTIONS

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	14	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

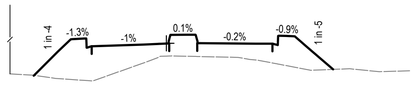
CAD FILE NAME: 7365 SHEET 0014.DWG



REF. STRING MC20
DATUM R.L. 9

DESIGN LABEL	IA30	EV30	CE30	MC20	CE40	EV40	IA40
DESIGN LEVELS	9.369	9.654	9.564	9.662	9.594	9.705	9.419
LEVEL DIFF.	0.000	-0.296	-0.159	-0.202	-0.165	-0.286	-0.002
HORIZ. OFFSET	-5.175	-4.741	-3.500	0.000	3.950	5.266	6.456

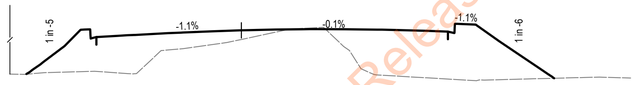
CHAINAGE 160



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA30	EV30	CE30	MC20	CEB0	CEB0	CE40	EV40	IA40
DESIGN LEVELS	9.325	9.919	9.804	9.852	9.851	9.854	9.846	9.967	9.427
LEVEL DIFF.	0.007	-0.657	-0.564	-0.208	-0.206	-0.216	-0.314	-0.504	0.000
HORIZ. OFFSET	-8.666	-6.230	-4.877	0.000	0.182	2.016	6.924	8.356	10.882

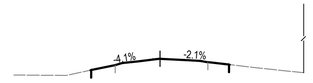
CHAINAGE 150



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA30	EV30	CE30	MC20	CE40	EV40	IA40
DESIGN LEVELS	9.330	10.051	9.933	10.043	10.022	10.136	9.361
LEVEL DIFF.	-0.003	-0.683	-0.561	-0.148	-0.774	-0.914	0.000
HORIZ. OFFSET	-14.040	-10.497	-9.463	0.000	13.489	15.270	20.419

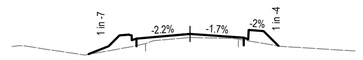
CHAINAGE 140



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA30	CE30	MC20	CE40
DESIGN LEVELS	9.303	9.306	9.489	9.395
LEVEL DIFF.	-0.000	-0.000	-0.000	-0.000
HORIZ. OFFSET	-4.545	-4.498	0.000	4.498

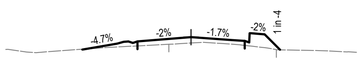
CHAINAGE 190



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA30	EV30	CE30	MC20	CE40	EV40	IA40
DESIGN LEVELS	9.196	9.500	9.447	9.522	9.462	9.569	9.327
LEVEL DIFF.	-0.007	-0.220	-0.114	-0.056	-0.039	-0.202	0.000
HORIZ. OFFSET	-6.625	-4.606	-3.500	0.000	3.500	4.800	5.769

CHAINAGE 180



REF. STRING MC20
DATUM R.L. 8

DESIGN LABEL	IA30	EV30	CE30	MC20	CE40	EV40	IA40
DESIGN LEVELS	9.353	9.480	9.486	9.556	9.495	9.603	9.352
LEVEL DIFF.	0.007	-0.078	-0.073	-0.095	-0.073	-0.218	-0.002
HORIZ. OFFSET	-7.100	-4.400	-3.500	0.000	3.500	4.800	5.803

CHAINAGE 170

INDEX

LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- EXISTING CULVERT
- PROPOSED CULVERT

Released from Confidence

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0015
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

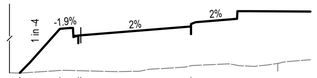
Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: FILE No.:
DESIGN No.: SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 4 0 2 4 6 8 H; 1 0 0.5 1 1.5 2 V

ROAD No. 43703 / 04378
MALLALA ROAD
ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MC20; CH 140 TO CH 190
CROSS SECTIONS

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	15	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

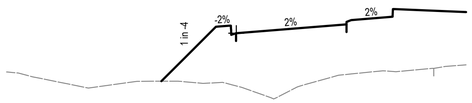
CAD FILE NAME: 7365 SHEET 0015.DWG



REF. STRING MR00
DATUM R.L. 9

DESIGN LABEL		IA30	EV30	CE30	MC20	CE0J	
DESIGN LEVELS		9.329	10.047	9.937	9.941	10.085	
LEVEL DIFF.		-0.005	-0.681	-0.573	-0.578	-0.642	
HORIZ. OFFSET		-3.978	-1.358	-0.162	0.000	7.200	

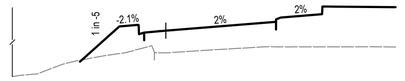
CHAINAGE 20



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL		IA40	EV40	CE40	MC20	CE0J	
DESIGN LEVELS		9.255	10.144	10.037	10.038	10.182	
LEVEL DIFF.		0.000	-0.914	-0.858	-0.860	-0.817	
HORIZ. OFFSET		-4.888	-1.318	-0.016	0.000	7.200	

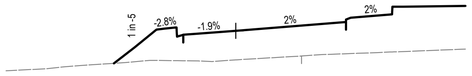
CHAINAGE 50



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL		IA50	EV50	CE50	MC20	CE0J	
DESIGN LEVELS		9.444	10.019	9.918	9.950	10.094	
LEVEL DIFF.		0.024	-0.442	-0.247	-0.363	-0.409	
HORIZ. OFFSET		-5.606	-3.007	-1.410	0.000	7.200	

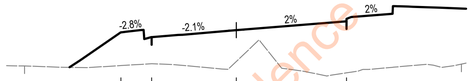
CHAINAGE 80



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL		IA30	EV30	CE30	MC20	CE0J	
DESIGN LEVELS		9.361	9.913	9.827	9.892	10.036	
LEVEL DIFF.		-0.000	-0.504	-0.424	-0.474	-0.518	
HORIZ. OFFSET		-7.957	-5.139	-3.425	0.000	7.200	

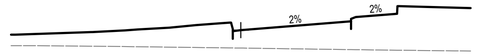
CHAINAGE 10



REF. STRING MR00
DATUM R.L. 9

DESIGN LABEL		EV40	CE40	MC20	CE0J	
DESIGN LEVELS		9.989	9.911	10.025	10.169	
LEVEL DIFF.		-0.542	-0.434	-0.511	-0.841	
HORIZ. OFFSET		-7.533	-5.530	0.000	7.200	

CHAINAGE 40



REF. STRING MR00
DATUM R.L. 9

DESIGN LABEL		CE0D	MC20	CE0J	
DESIGN LEVELS		9.982	9.998	10.142	
LEVEL DIFF.		-0.274	-0.292	-0.462	
HORIZ. OFFSET		-0.522	0.000	7.200	

CHAINAGE 70



REF. STRING MR00
DATUM R.L. 9

DESIGN LABEL		CE40	MC20	CE0J	
DESIGN LEVELS		9.828	9.845	9.989	
LEVEL DIFF.		-0.180	-0.199	-0.352	
HORIZ. OFFSET		-0.702	0.000	7.200	

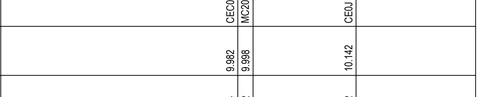
CHAINAGE 0



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL		CE30	MC20	CE0J	
DESIGN LEVELS		9.806	9.990	10.134	
LEVEL DIFF.		-0.567	0.323	-0.800	
HORIZ. OFFSET		-8.584	0.000	7.200	

CHAINAGE 30



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL		IA40	EV40	CE40	MC20	CE0J	
DESIGN LEVELS		9.123	10.067	9.974	10.029	10.173	
LEVEL DIFF.		0.005	-0.786	-0.652	-0.662	-0.681	
HORIZ. OFFSET		-9.141	-4.421	-2.788	0.000	7.200	

CHAINAGE 60

LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- EXISTING CULVERT
- PROPOSED CULVERT

Released from Confidence

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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GREENHILL
Level 1, 64 Hindmarsh Square
Adelaide SA 5000
T: 08 8406 1300
F: 08 8215 0018
ABN 39 061 222 964

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0016
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:	
PROJECT END ROAD RUNNING DISTANCE:	

SCALES: 4 0 2 4 6 8 H; 1 0 0.5 1 1.5 2 V

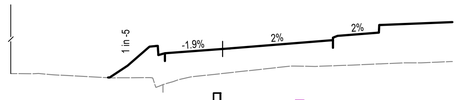
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
MR00; CH 0 TO CH 80
CROSS SECTIONS

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	16	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836 SHEET LONGITUDE 138.510989		

CAD FILE NAME: 7365 SHEET 0016.DWG



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL	IA60	EV60	CE60	MC20	CEOJ
DESIGN LEVELS	9.356	9.861	9.751	9.821	9.965
LEVEL DIFF.	-0.004	-0.506	-0.501	-0.399	-0.418
HORIZ. OFFSET	-7.380	-4.771	-3.770	0.000	7.200

CHAINAGE 110



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL	MC20	CEOJ
DESIGN LEVELS	9.652	9.996
LEVEL DIFF.	-0.346	-0.434
HORIZ. OFFSET	0.000	7.200

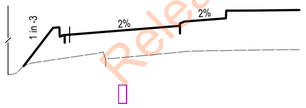
CHAINAGE 100



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL	MC20	CEOJ
DESIGN LEVELS	9.834	9.978
LEVEL DIFF.	-0.248	-0.336
HORIZ. OFFSET	0.000	7.200

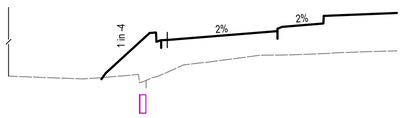
CHAINAGE 130



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL	IA50	EV50	CE50	MC20	CEOJ
DESIGN LEVELS	9.386	10.013	9.865	9.901	10.045
LEVEL DIFF.	0.009	-0.522	-0.377	-0.370	-0.428
HORIZ. OFFSET	-3.010	-1.067	-0.323	0.000	7.200

CHAINAGE 90



REF. STRING MR00
DATUM R.L. 8

DESIGN LABEL	IA60	EV60	CE60	MC20	CEOJ
DESIGN LEVELS	9.174	9.929	9.810	9.815	9.959
LEVEL DIFF.	0.024	-0.748	-0.364	-0.527	-0.391
HORIZ. OFFSET	-4.296	-1.148	-0.393	0.000	7.200

CHAINAGE 120

LEGEND

- DESIGN SURFACE
- EXISTING SURFACE
- EXISTING CULVERT
- PROPOSED CULVERT

Released from Confidence

INDEX

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

UNCONTROLLED COPY WHEN PRINTED ◄ 100 MILLIMETRES ON ORIGINAL DRAWING ► ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

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F: 08 8215 0018
ABN 39 061 222 964
GREENHILL

PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0017
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: FILE No.:
DESIGN No.: SURVEY No:
PROJECT START ROAD RUNNING DISTANCE:
PROJECT END ROAD RUNNING DISTANCE:
SCALES: 4 0 2 4 6 8 H; 1 0 0.5 1 1.5 2 V

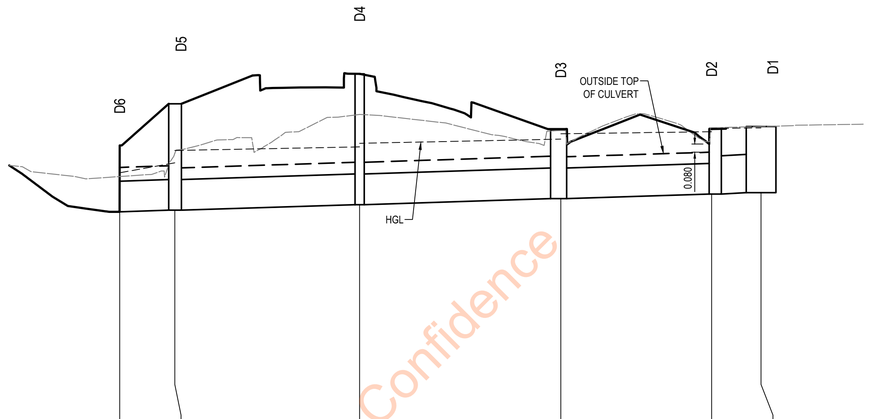
ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD MR00; CH 90 TO CH 130 CROSS SECTIONS

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	17	0
CHECKED: GE	CHECKED: GE	TITLE: MAN. TRAFF. SOLUTIONS DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0017.DWG



INDEX

DATUM = 6.0

	D6	D5	D4	D3	D2	D1
	900x300mm	600x300mm	600x300mm	450x300mm	375mm	
ACTUAL FLOW	Q20 = 0.44m³/s	Q20 = 0.174m³/s	Q20 = 0.174m³/s	Q20 = 0.122m³/s	Q20 = 0.064m³/s	
GRADES	0.30%	0.30%	0.30%	0.30%	0.30%	
INVERT LEVEL	8.59	8.61	8.66	8.72	8.76	8.78
DESIGN SURFACE	9.22	9.65	9.94	9.39	9.40	9.43
CHAINAGE	0.00	5.40	23.49	43.20	57.98	62.82

DI01 - LONGITUDINAL SECTION

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LEGEND

DESIGN SURFACE
EXISTING SURFACE
PROPOSED CULVERT

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

INDEX SHEET REFERENCE: 7365 SHEET 1

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PROJECT NO.	REV.	STATUS
14-1040	0	FINAL

DESIGNED BY:	JL	DESIGN CHECK:	PT	CAD REF:	7365 Sheet 0018
DRAFTED BY:	JL	DRAFTING CHECK:	PT	PLOT DATE:	29-Nov-16

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.:	FILE No.:
DESIGN No.:	SURVEY No:

PROJECT START ROAD RUNNING DISTANCE:

PROJECT END ROAD RUNNING DISTANCE:

SCALES:
6 0 3 6 9 12 H
0.6 0 0.3 0.6 0.9 1.2 V

ROAD No. 43703 / 04378

MALLALA ROAD

ROUNDABOUT; OLD PORT WAKEFIELD ROAD
PIPE RUN DI01
DRAINAGE LONGITUDINAL SECTION

DESIGNED:	DRAFTED:	ACCEPTED FOR USE:	ACCEPTANCE FORM KNET No.:	DRAWING No.:	SHEET No.:	AMEND No.:
GE	GE	J. JOVANOVIC	981 9611	7365	18	0
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GE	GE	DATE: 14/11/2016	IN ACCORDANCE WITH DP013	SHEET LATITUDE -34.591836	SHEET LONGITUDE 138.510989	

CAD FILE NAME: 7365 SHEET 0018.DWG

Adelaide Plains Council	**13.2 Confidential Item**
3 September 2020	

13.2 Mallala CWMS Augmentation

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RECOMMENDATION

"that:

1. **Pursuant to section 90(2) of the *Local Government Act 1999*, the Infrastructure and Environment Committee orders that all members of the public, except Chief Executive Officer, General Manager – Infrastructure and Environment, General Manager – Development Community, Manager Governance and Administration/Minute Taker and Information Technology Officer be excluded from attendance at the meeting of the Committee for Agenda Item 13.2 – *Mallala CWMS Augmentation;***

2. **The Committee is satisfied that pursuant to section 90(3)(b) of the *Local Government Act 1999*, Item 13.2 – *Mallala CWMS Augmentation* concerns information the disclosure of which could reasonably be expected to prejudice the commercial position of Council and would, on balance, be contrary to the public interest, being information relating to ongoing negotiations;**

3. **The Committee is satisfied that the principle that Committee meetings should be conducted in a place open to the public has been outweighed by the need to keep the information, matter and discussion confidential."**

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Adelaide Plains Council	**13.2**	**Mallala CWMS Augmentation**
	Department:	**Infrastructure and Environment**
	Report Author:	**General Manager Infrastructure and Environment**
Date: 3 September 2020	**Document Ref:**	**D20/39667**

Released from Confidence

EXECUTIVE SUMMARY

- The purpose of this report is for the Infrastructure and Environment Committee (the Committee) to consider, and make recommendation to Council in relation to the Gracewood development connecting into the Mallala CWMS and associated augmentation charges.
- In July 2020, Rider Levett Bucknall (RLB) was engaged to undertake investigations and prepare a report that would determine the augmentation costs associated with connection of Gracewood into the existing Mallala CWMS.
- RLB engaged Wallbridge Gilbert Aztec (WGA) to perform a capacity assessment to determine CWMS system upgrades and trigger points for the proposed development.
- WGA has prepared a comprehensive assessment report analysing the existing CWMS capacity and the impact of the proposed development on the existing CWMS. WGA has also calculated the upgrade requirements for the CWMS in two stages of development i.e. Stage 1 and Ultimate.
- There are some potential risks to Council that have not been addressed within the report, these being;
    - Future small developments within the Mallala Township i.e. 1 into 2 subdivions will not be able to be accommodated if Option 2 is accepted, in the short term.
    - The ultimate infrastructure for Stage 2 onward timing is unknown. If Gracewood does not go beyond Stage 1, the spare capacity identified will not be available for small developments. Additionally, allowing Gracewood Stage 1 to connection into the existing CWMS is essentially providing infrastructure at no cost to the developer.
    - However, when the ultimate infrastructure is constructed the remaining capacity utilised by Stage 1 will be return to the system and could be then taken up by small developments.
    - Specific costs not included within the Mallala CWMS cost augmentation report **Attachment 3** i.e. cost associated with Council shortfall.
- Gracewood will bring significant residential growth within the Mallala Township, Management are seeking endorsement from the Committee to Council that in principle approval is granted for the Gracewood development connecting into the Mallala CWMS, with further work required in establishing an appropriate augmentation fee and minimising risks related to stage timing and associated infrastructure requirements.

- It is for the Committee to now consider, and make recommendations to Council accordingly.

RECOMMENDATION

"that the Infrastructure and Environment Committee, having considered Item 13.2 – *Mallala CWMS Augmentation*, dated 3 September 2020, receives and notes the report and in doing so recommends to Council that it endorses the Gracewood development connecting into the existing Mallala CWMS, subject to:

1. **Council establishing an appropriate augmentation fee for the prospective development in Mallala, inclusive of all costs outlined within the RLB report for Gracewood stage 1; and**
2. **Gracewood being provided with the particulars and resultant proposed augmentation fee set out in point 2 above, derived from the RLB report, and secure acceptance of same through the appropriate legal instrument.**

BUDGET IMPACT

Estimated Cost:	$0
Future ongoing operating costs:	$0
Is this Budgeted?	No

RISK ASSESSMENT

There are some risks associated with this report. The Mallala CWMS capacity assessment report was undertaken by RLB and WGA outlining risk, infrastructure and cost associated with the short term and longer term growth of the Gracewood development should it proceed. There are however further risk associated with the options outlined in the capacity assessment, these have been defined within the body of the report.

Considerable risks are associated with affording concessions to developers large or small when upgrades to external infrastructure to support land division applications are required. These upgrade if not funded by the developer will be funded by Council through rate revenue.

Attachments

1. Gracewood Stage 1
2. Gracewood Ultimate Development
3. Mallala CWMS capacity assessment report - RLB and WGA

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DETAILED REPORT

Purpose

The purpose of this report is for the Infrastructure and Environment Committee (the Committee) to consider, and make recommendation to Council in relation to Gracewood development connecting into the Mallala CWMS and associated augmentation charges.

Background/History

Mallala Township has an established Community Wastewater Management Scheme (CWMS) which was constructed in 2014. The collection network consists of predominantly gravity mains, with a small number of pressure sewer connections. The flows from the collection network are captured within 5 pump stations across the township, which typically pump via the common rising main to the Wastewater Treatment Plant (WWTP) located on Wasleys Road.

Currently 161 out of 322 total connections for the Mallala CWMS are currently occupied.

A proposed land division named Gracewood is located at the north-west side of the Mallala Township. The proposed development is bound by Balaklava Road and Lisieux Street to the south, Aerodrome Road and Hall Road to the east and agricultural land to the north and west. The developer Konzags are seeking to connect Gracewood into the Mallala CWMS. Gracewood Stage 1 consists of 78 lots as shown in **Attachment 1**. The ultimate Gracewood development consists of 335 lots as shown in **Attachment 2**.

The Development can be summarised as:

- A total area of approximately 41 Hectares, consisting of internal road networks, swales, a retirement home, and reserves
- 335 Residential Allotments
- 1 Ha Nursing home (has been assumed to contain 30 beds)
- A total reserve area of 6.4 hectares that may be utilised for water re-use
- A staging plan has been provided by the Developer. Once commenced, the project will be rolled out over 10-12 years (assumed to be 10 years at a rate of 34 lots/year for the purposes of this report)
- Stage 1 consists of 78 residential allotments and is located adjacent to Aerodrome Road to the northeast of the Development

In July 2020, Rider Levett Bucknall (RLB) was engaged to undertake investigations and prepare a report that would determine the augmentation costs associated with connection of Gracewood into the existing Mallala CWMS.

RLB engaged Wallbridge Gilbert Aztec (WGA) to perform a capacity assessment to determine system upgrades and trigger points for the proposed development. The capacity assessment report prepared by WGA has been included as **Attachment 3**

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Discussion

WGA has prepared a comprehensive assessment report analysing the existing CWMS capacity and the impact of the proposed development on the existing CWMS. WGA has also calculated the upgrade requirements for the CWMS in two stages of development i.e. Stage 1 and Ultimate.

The report has been prepared for Rider Levett Bucknall to perform a capacity assessment of the existing Mallala CWMS and to determine the impacts of the proposed residential development on the wastewater infrastructure.

The scope of this report includes all upgrades required by Council as a result of the development. It must be noted that the assessment does not include design of infrastructure required for Councils to meet existing shortfalls in winter storage lagoon and irrigation area. These need to be rectified prior to any further augmentations into the system i.e. Gracewood connecting to the Mallala CWMS.

Furthermore it does not include any CWMS infrastructure to be constructed within the development.

Outcome of capacity assessment report

The following table summarises the trigger levels before upgrades are required for each CWMS component. Note Councils existing shortfalls in winter storage lagoon and irrigation area are required even for existing flows, these have not been highlighted as having additional capacity.

COMPONENT (SCOPE OF WORKS)	COUNCIL (Shortfall)	STAGE 1	ULTIMATE
CWMS NETWORK	Nil	Proposed HDPE PN12 DN125 rising main from residential development (31 residential lots) to connect to existing Maintenance Shaft on Aerodrome Road.	Proposed HDPE PN12 DN125 rising main from previously built Stage 1 rising main on Aerodrome Road to WWTP on Wasleys Road.
IRRIGATION NETWORK	1.9ha of irrigation land	Proposed HDPE PN12 DN125 rising main from existing School oval on Chivell Street to residential development.	Proposed HDPE PN12 DN125 rising main from existing WWTP on Wasleys Road to connect to existing previously built Stage 1 rising main on Chivell

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			Street to residential development. Additional dedicated pump at existing WWTP.
WASTEWATER TREATMENT PLANT	Nil	Nil	Augmentation of existing WWTP.
WINTER STORAGE LAGOON	10ML lagoon and associated land	Additional 10ML lagoon behind existing lagoon adjacent Wasleys Road.	Additional 10ML lagoon behind existing lagoon adjacent Wasleys Road.

Option 2 presented within the capacity assessment identifies that development utilises all remaining capacity in pump station 1 on Aerodrome Road and the WWTP for Stage 1. Noting that the report is premised on;

- "all existing connection are assumed to be occupied for the basis of the pump station capacity analysis", and
- "For the ultimate scenario where all existing connections are occupied, an ultimate hydraulic loading of 141kL/day is expected based on existing flows. As the existing WWTP has approval for 179 kL/day, the WWTP has sufficient capacity for the existing system, and a total additional capacity of approximately 39 kL/day."

Further noting that there is currently 161 out of 322 total connections for the Mallala CWMS are currently occupied.

There are some potential risks to Council that have not been addressed within the report, these being;

- Future small developments within the Mallala Township i.e. 1 into 2 subdivions will not be able to be accommodated if Option 2 is accepted, in the short term.
- The ultimate infrastructure for Stage 2 onward timing is unknown. If Gracewood does not go beyond Stage 1, the spare capacity identified above will not be available for small developments. Additionally, allowing Gracewood Stage 1 to connection into the existing CWMS is essentially providing infrastructure at no cost to the developer.
- However, when the ultimate infrastructure is constructed the remaining capacity utilised by Stage 1 will be return to the system and could be then taken up by small developments.
- Specific costs not included within the Mallala CWMS cost augmentation report **Attachment 3** i.e. cost associated with Council shortfall.

The above outlines the major risk associated with Gracewood development connecting into the Mallala CWMS, it is important to note the considerable risks associated with affording concessions to developers large or small when upgrades to external infrastructure to support land division applications are required. These upgrade if not funded by the developer will be funded by Council through rate revenue.

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Conclusion

Gracewood is a significant proposed residential growth within the Mallala Township, Management are seeking endorsement from the Committee to Council that would approve Gracewood development, in principle, connecting into the Mallala CWMS, with further work required in establishing an appropriate augmentation fee and minimising risks related to stage timing and associated infrastructure requirements.

References

Legislation

Local Government Act 1999

Council Policies/Plans

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RECOMMENDATION

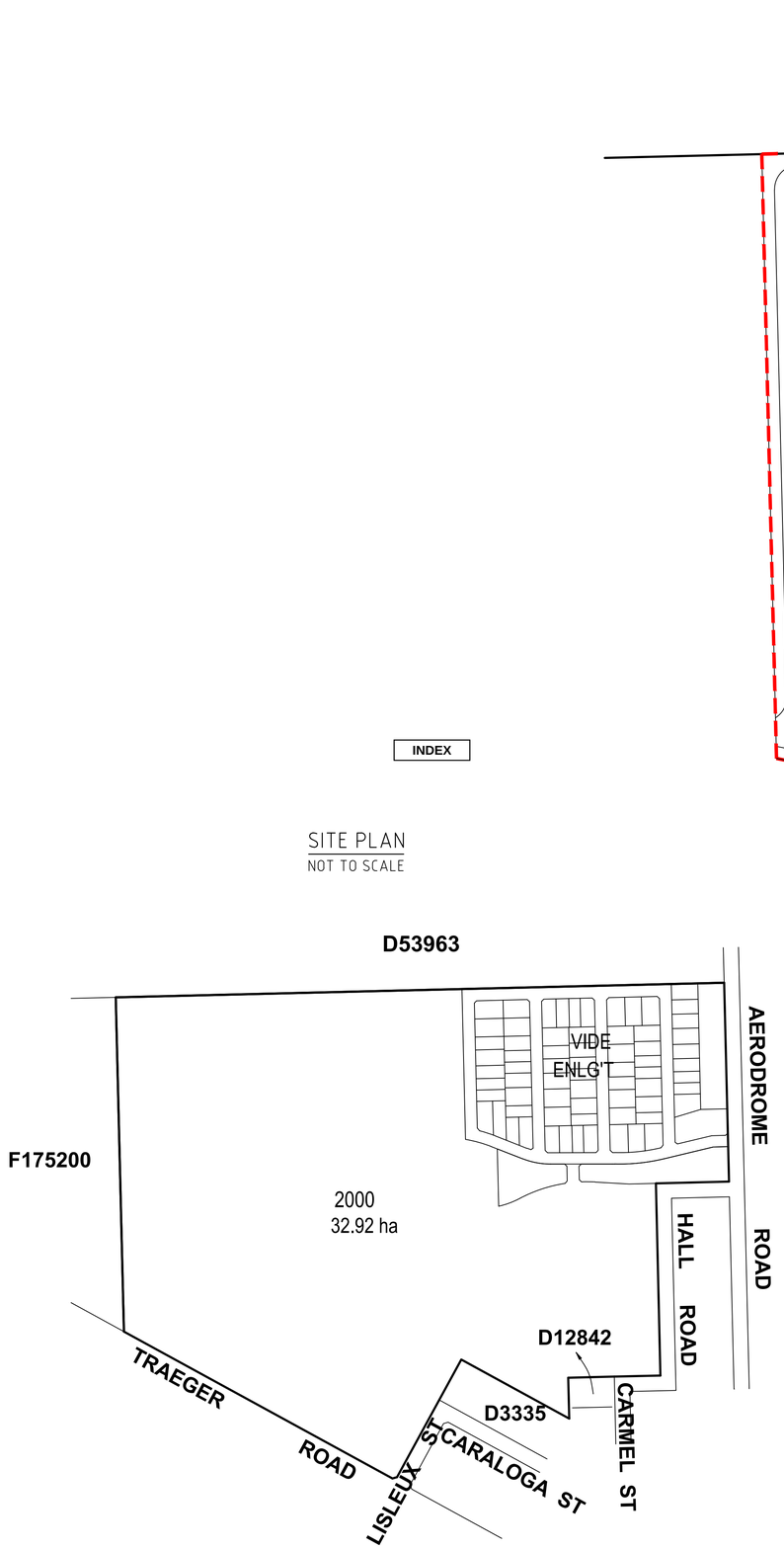
"that the Infrastructure and Environment Committee, having considered the matter of Item 13.2 – *Mallala CWMS Augmentation* in confidence under sections 90(2) and 90(3)(b) of the *Local Government Act 1999,* resolves that:

1. **Attachment 1, Attachment 2, Attachment 3 pertaining to Item 13.2 – *Mallala CWMS Augmentation* remain confidential and not available for public inspection until further order of Council;**
2. **Pursuant to section 91(9)(a) of the *Local Government Act 1999*, the confidentiality of the matter will be reviewed every 12 months; and**
3. **Pursuant to section 91(9)(c) of the *Local Government Act 1999,* the Committee delegates the power to revoke this confidentiality order to the Chief Executive Officer."**

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INDEX

SITE PLAN
NOT TO SCALE





Development No. 312/D048/19
Adelaide Plains Council

Proposed Plan of Division
Allotment 1 in D20237
Hundred of Grace
in the area named
MALLALA

CT 5451/518

0 10 20 40 60 80 100 m

1:1000

AMENDED PLAN
17.02.2020

AMENDED PLAN
12.03.2020

N
W E
S

No. of proposed allotments	71
Total Area	40.77ha
Stage 1 Area	8.868ha
Reserve area	(11.9% of Stage 1) 1.054ha
Length of new roads	1410m

The land is generally flat.

Road pavements shown are indicative only.

Not to be used for detailed engineering design.

Dimensions and areas are subject to survey.

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Original Sheet Size A1

Glenn Ian Hordacre
LICENSED SURVEYOR

REF: A009119.0000	
DWG NO.: A009119PROP1(C)	
REVISION: C	
DEL 12.03.2020	

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Alexander Symonds Surveying Consultants

MASTERPLAN

Allotment 1 in D20237
Hundred of Grace
in the area named
MALLALA

CT 5451/518



LOTS	24.811 ha
Ret Village	1.000 ha
ROADS	8.587 ha
RESERVES	6.374 ha
TOTAL	40.772 ha
Area of Swales	2.387ha

0 20 40 80 120 160 200 m

1:2000 @ B2

N
W E
S

Dimensions and areas are subject to survey.

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Original Sheet Size B2

LICENSED SURVEYOR

REF: **A009119.0000**	
DWG NO.: A009119 OPTION2 REV B ATREAS	
REVISION: A	
DEL 14.02.2020	

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COST AUGMENTATION REPORT

AUGUST 2020

MALLALA CWMS CAPACITY ASSESSMENT & AUGMENTATION COSTS

MALLALA
ADELAIDE PLAIN ACOUNCIL

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Rider Levett Bucknall

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1.0 INTRODUCTION AND BACKGROUND

Rider Levett Bucknall (RLB) has been engaged by Adelaide Plains Council (APC) to determine the augmentation costs associated with connection of a new housing development to be connected to this existing CWMS.

RLB has engaged Wallbridge Gilbert Aztec (WGA) to perform a capacity assessment to determine system upgrades and trigger points for the proposed development. The capacity assessment report prepared by WGA has been included in Annexure A. This report has been further reviewed and discussed by RLB in Section 2 of this report.

The majority of the works require construction through urban settings with traffic, environmental and community considerations and constraints. This report reviews the key construction issues of the project including staging of works, construction and commissioning. The report also outlines the pre-construction items including traffic management requirements, construction techniques, equipment and likely impacts in completing the project. An indicative layout of the development in relationship to the township and WWTP is shown in the locality plan (Figure 1.1) below:

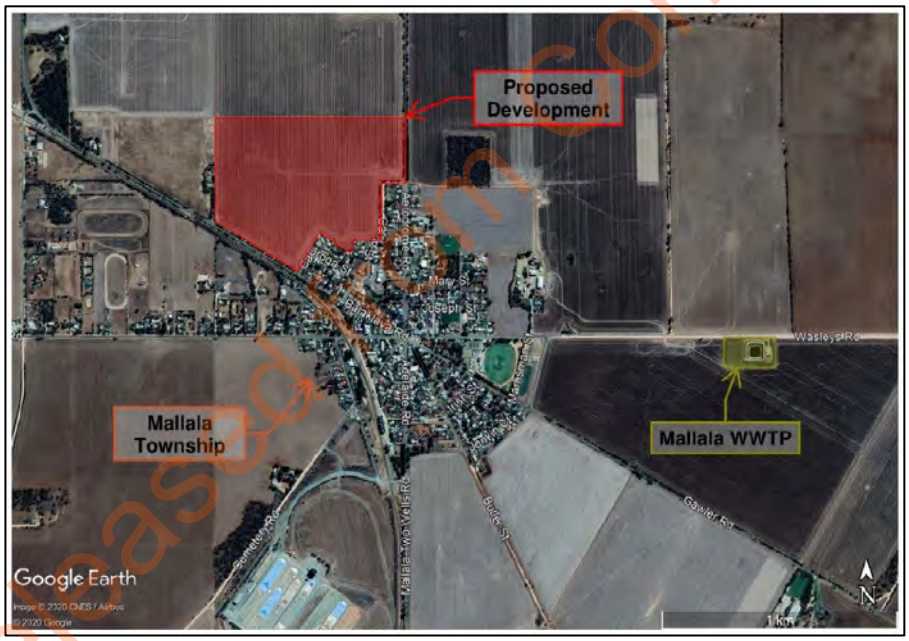


Figure 1.1: Mallala Project Locality Plan

The constructability review contained herein is general in nature, relative to the concept design level.

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2.0 WGA SEWER ASSESSMENT REPORT

WGA has prepared a comprehensive assessment report analysing the existing CWMS capacity and the impact of the proposed development on the existing CWMS. WGA has also calculated the upgrade requirements for the CWMS in two stages of development i.e. Stage 1 and Ultimate.

Component breakdown for each stage is shown in Table 2.1 below:

Table 2.1: Component Breakdown for each Stage

COMPONENT (SCOPE OF WORKS)	STAGE 1	ULTIMATE
CWMS NETWORK	Proposed HDPE PN12 DN125 rising main from residential development (31 residential lots) to connect to existing Maintenance Shaft on Aerodrome Road	Proposed HDPE PN12 DN125 rising main from previously built Stage 1 rising main on Aerodrome Road to WWTP on Wasleys Road
IRRIGATION NETWORK	Proposed HDPE PN12 DN125 rising main from existing School oval on Chivell Street to residential development	Proposed HDPE PN12 DN125 rising main from from existing WWTP on Wasleys Road to connect to existing previously built Stage 1 rising main on Chivell Street to residential development Additional dedicated pump at existing WWTP
WASTEWATER TREATMENT PLANT	Nil	Augmentation of existing WWTP
WINTER STORAGE LAGOON	Additional 30ML lagoon behind existing lagoon adjacent Wasleys Road	Nil

The capacity assessment report prepared by WGA is attached as Annexure A in this report.

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3.0 CONSTRUCTABILITY REVIEW OF PROPOSED UPGRADES

3.1 PRE-CONSTRUCTION ITEMS

3.1.1 SERVICE LOCATIONS

Special consideration must be given to location of existing underground and overhead services, specifically within the road verge, crossing services and overhead powerlines. Beside the desktop study of 'as constructed' drawings of the existing Mallala CWMS Civil Works, service locator or hydro-vacuuming must be applied by the Contractor prior to carrying out any construction activity. This will ensure that the services shown on the as-constructed drawings is clearly marked up for the construction crews, as well it will identify any potential unknow services.

3.1.2 TRAFFIC MANAGEMENT REQUIREMENTS

From a constructability perspective, traffic management is critical for the network construction works along the road verge as well as when crossing the road or connecting into any existing service within the road reserve.

During directional drilling works along the road verge, the Contractor must make an arrangement to reduce the speed to 25 km/h speed restrictions. 25 km/h traffic will allow the machines and the crew to work on the ground at manageable separation distances without the need for road barriers. However, outside of working hours the traffic speed can be reverted to regular speed limits. For any works that are going to occur within the road, they must be backfilled on day basis at the end of the shift.

3.1.3 DURATION AND STAGING

It is important that the Contractor further breakdowns each component to smaller stages with construction perspective and prepares construction works staging plans and durations and submits them to the Council for approval prior to starting the works. This will not only ensure timely completion of the project but will also be the key to avoid any dissatisfaction of the stakeholders, minimize any traffic disruptions and to mitigate any harmful effects on the environment.

3.1.4 REGULATORY, SERVICE AND AUTHORITY APPROVALS

It is recommended to APC and the Contractor to consider consultation with stakeholders and industry to establish a specification for the minimum requirements for traffic management. Additionally, any land acquisition activities should be expedited and completed prior to works to de-risk the project program.

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3.2 CONSTRUCTION METHODOLOGY

This section provides a description of the anticipated construction methodology for the project. It is intended to be indicative and does not represent a definite methodology which will be developed by the contractor.

The construction techniques described in this section are based on realistic and feasible industry practices to avoid any damage to the extensive number of existing underground services in the project works boundary, to minimize traffic disruptions and to mitigate any negative impacts on the social and environmental impacts.

Once a contractor is awarded the project, the construction methodology can be further improved.

3.2.1 SITE ESTABLISHMENT

Site Establishment will consist of timely and organised mobilisation of machinery and equipment as well as the mobilisation of any subcontractors including establishing a site compound. The potential location of site compound is within the vicinity of existing WWTP as shown in Figure below:

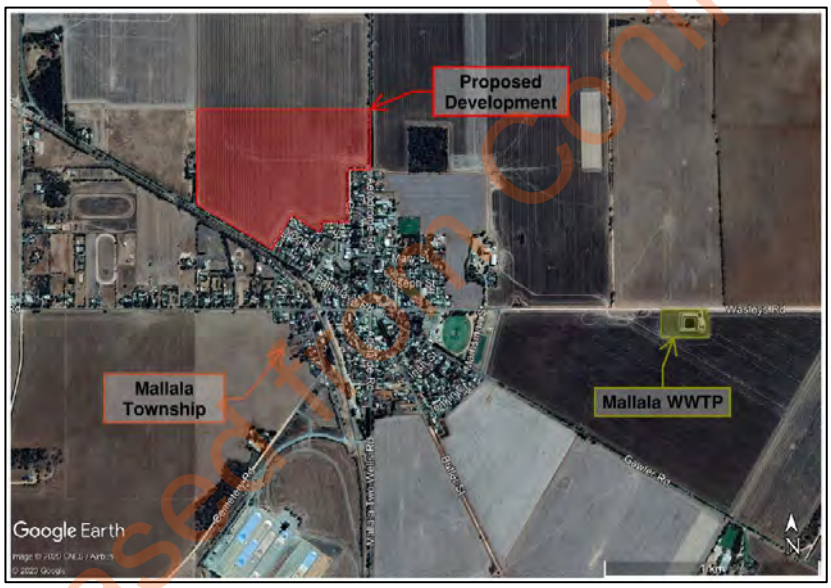


Figure 3.1: Proposed Location of Mallala Project Locality Plan

3.2.2 WORKING HOURS

Construction will occur during day time, however, to minimise disruption to traffic, it is envisaged that night works may be undertaken for any proposed constructions that need to be carried for connection of proposed pipeline with existing underground services on Wasleys Road. General working hours can be between 7AM to 5PM Monday to Friday.

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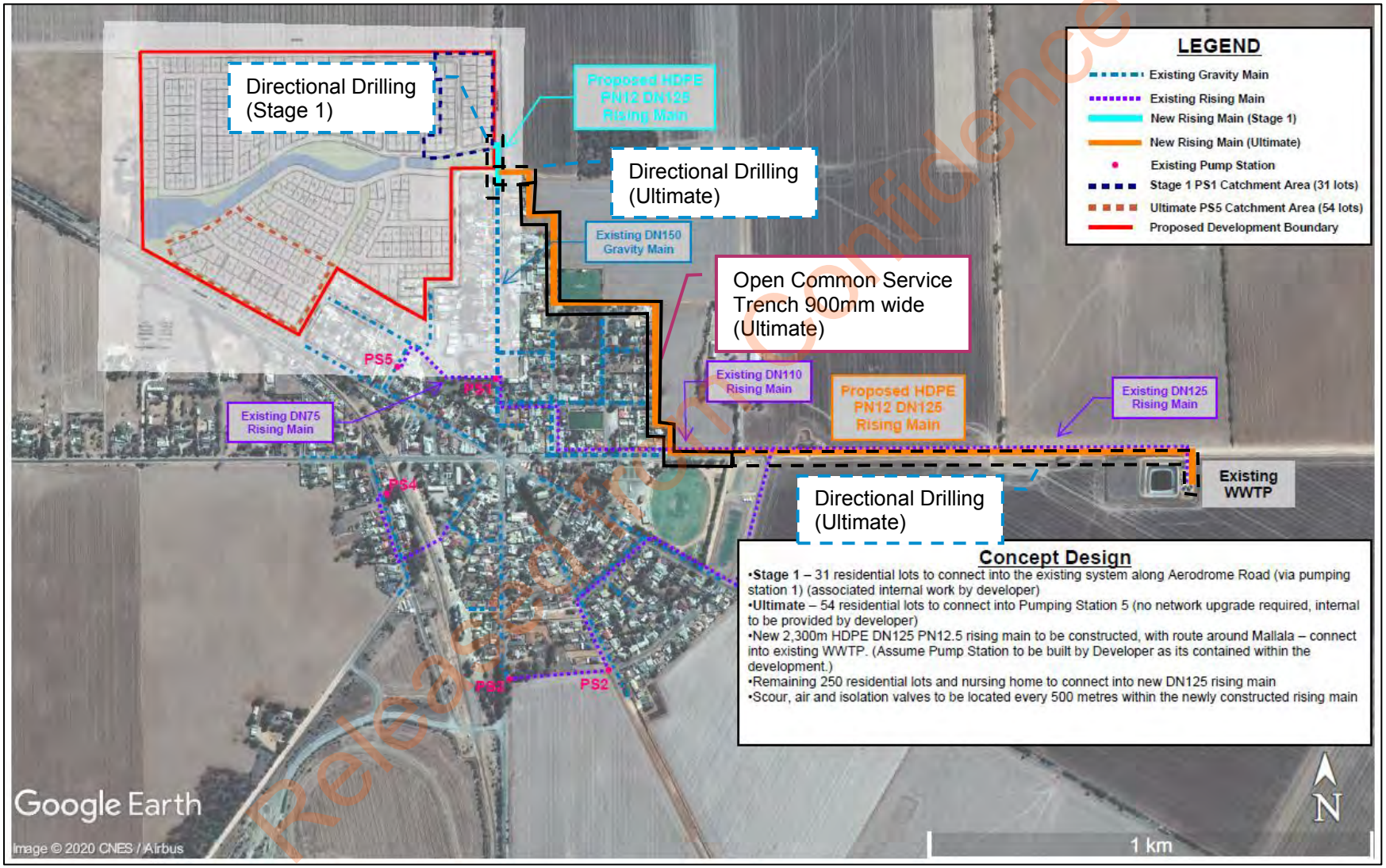
3.2.3 CONSTRUCTION TECHNIQUES

The construction techniques and equipment proposed are to minimise the construction impacts as well as maintain the realistic costs and time for the project. The construction techniques determined for the CWMS and Irrigation networks are critical to the successful execution of the project. Since upgrade to the WWTP and Winter Storage Lagoons will be carried out in isolated areas and based on their simplistic nature, evaluating construction techniques is not that critical.

Based on RLB's past experience and knowledge on similar jobs, RLB propose a combination of open trenching and directional drilling for the two proposed stages of the CWMS and Irrigation networks. Figures 3.2 and 3.3 for CWMS network and Irrigation network respectively show the application of the construction techniques discussed above

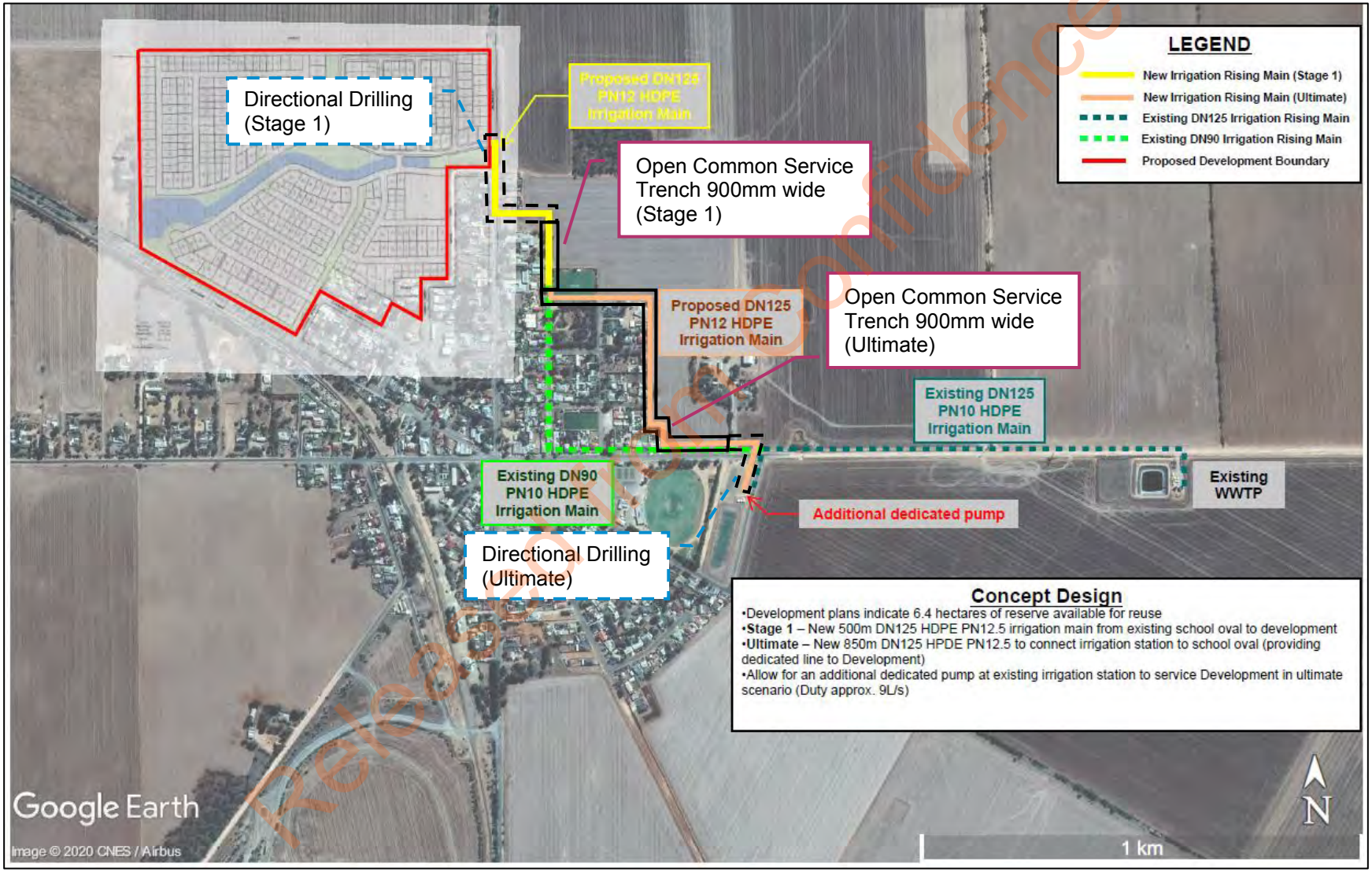
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Figure 3.2: Mallala CWMS Network – Proposed Construction Techniques



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Figure 3.3: Mallala Irrigation Network – Proposed Construction Techni



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3.2.4 CONSIDERATION TO EXISTING INFRASTRUCTURE

It is recommended to the Contractor that additional controls be implemented where working in close proximity to any services such as non-destructive digging, spotting and, if required an allowance for reduced production or other general safe work practices.

Where working in close proximity to the under and overhead power lines, controls must be established in the form of spotters, machine movement limiters or other practices.

Requirement for protection slabs must be determined where proposed and new services are crossing each other.

3.2.5 CONSTRUCTION DURATION

Indicative construction duration for the various components of the project are as under:

Construction Component	Construction duration (in weeks) for Stage 1	Construction duration (in weeks) for Ultimate
CWMS Network	3	10
Irrigation Network	4	7
Wastewater Treatment Plant	20	-
Winter Storage Lagoon	16	-

The Construction duration noted above is based on minimum level of service restrictions.

3.2.6 POTENTIAL IMPACTS, RISKS AND MITIGATION

The potential impacts, risks and mitigation measures for the Mallala CWMS upgrade project are presented in Table 3.1 below:

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Table 3.1: Potential Impacts, Risks and Mitigation

Identified Risk	Details of Identified Risk	Likelihood of Occurrence	Impact to Workplace	Mitigation Strategy
Traffic/Pedestrians	Vehicle (incl. plant)/pedestrian conflicts: ▪ Vehicles and Pedestrians using the streets and roads during the construction period ▪ Residents, businesses and commuters accessing businesses and residences along the streets and roads ▪ Garbage collections ▪ Plant movements ▪ Within worksite ▪ Accessing and existing work site	High	High	Appropriate traffic management measures should be in place, traffic management plans should be presented to council for review and approval prior to commencing works Residents and businesses must well informed, letter drops and door knocking immediately affected residents. Traffic plans and use of steel plates to accommodate access. The site should be fully fenced and signed to ensure no public access both during and after work hours. All trucks and light vehicles entering and leaving site must be directed by a spotter.
Confined Space	CWMS and Irrigation trench	Medium	Low	Must be addressed by the contractor in their Safe Work Method Statement
Restricted Access	Access to site is limited to public road network. Particular hazardous operations during construction and general deliveries, plant/machinery to and from site	Medium	Medium	Approved traffic management plans Plant/machinery access/egress site rules should be in place
Services underground/Overhead hazard	A number of services exist within the project work site. Indicative locations of these are provided on the construction drawings. Services known to be present in or around the work site include: ▪ Telstra ▪ NBN ▪ Sewer ▪ Stormwater ▪ Water ▪ Gas	High	High	Contractor should allow for service locator and/or hydro excavation. The contractor must ensure that all known services are located and potholed prior to works commencing. Contractor must develop a detailed Safe Work Method Statement working close proximity to services

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Identified Risk	Details of Identified Risk	Likelihood of Occurrence	Impact to Workplace	Mitigation Strategy and Allowance in Tender
Services underground	Existing services not where it is located on Dial Before You Dig	Medium	High	As part of the morning prestart all operators must be made aware of any services on the whole site and specifically in their work area. All excavating should be conducted with a spotter.
	Clash with Existing Service	High	High	Timely identification of existing services information by adopting suggested methods. This will also help in design changes which can be made due to unknown site obstacles and service clashes.
Environment	Contamination of existing stormwater system from construction services.	Low	Low	Must be addressed in Contractor's Environmental Management Plan. Where practicable, all trenches should be backfilled at the end of the working day. Areas should be rehabilitated progressively to reduce the potential for sediments to flow into stormwater system Construction Plant and machinery must remain within the construction site for the duration of the contract limiting the transfer of mud from the site. Contractor must ensure stockpiles of materials are located away from areas where it could potentially move, otherwise surround sediment controls.

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Identified Risk	Details of Identified Risk	Likelihood of Occurrence	Impact to Workplace	Mitigation Strategy and Allowance in Tender
Assembly or removal of elements	Demolition of existing underground services and road pavement Installing new pipes, pits, kerb, pavers and Road pavement	High	Low	Must be addressed by the contractor in Job Safety and Environmental Risk Assessments
Noise, vibration, dust	Excavation and construction of new infrastructure will involve activities with the potential to impact to the properties adjacent to project area.	High	High	Working hours to be in keeping with the local By-laws (7am-5pm) Fit and maintain appropriate mufflers on earthmoving and other vehicles on site. Keep rollers and compaction equipment as far as possible away from existing buildings. Ensure muffler and sound suppression equipment on all machines is maintained in good order. Implement dust suppression measures such as promptly watering exposed areas when visible dust is observed. Use geo-textile fabrics to cover stock piles and de- vegetated areas. Minimise the number of stockpiles, the areas and the time stockpiles are exposed. Smooth surfaces should be deep ripped and left rough and cloddy to reduce wind velocity at the soil surface.
Excavation	Contaminated Soil	Low	Minor	Contractor to give a detailed methodology to handle site contamination
Stakeholders	Disgruntled Business / Residents	Medium	Low	Contractor must develop a communication management plan created for stakeholder management.

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Identified Risk	Details of Identified Risk	Likelihood of Occurrence	Impact to Workplace	Mitigation Strategy and Allowance in Tender
Inclement Weather	Hot / Wet days	High	Low	Contractor must supply and maintain workforce to continue work during hot days to ensure work does not cease. **Inclement Weather:** Contractor must allow for contingency in the program for weather delays. Working smart during wet conditions including dig lay and back fill service trenches as the contractor goes on. Not leaving exposed subgrade for long periods of time. This may mean we require having multiple visits for proof rolling etc. Mitigation of the risks of inclement weather is to have a flexible workforce that can work around inclement weather as well as having a large enough workforce to be able to increase the on-site labour crews to make up for the lost time. **Hot weather:** During the hotter months changing the working times to minimize works during the hottest part of the days. Making sure Contractor has air-conditioned lunchrooms and cold-water stations on site.
Product delay by supplier	Product not available	Low	High	Source product from another supplier.
Subcontractor unavailable to complete works	Overcommitted or understaffed subcontractors	Low	High	Contract another subcontractor to complete outstanding works. Maintain communication between the head contractor and subcontractor to forsee any difficulties that may arise.

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4.0 COST PLANNING

4.1 CONCEPT DESIGN COST ESTIMATE

Following is Mallala CWMS Cost Augmentation Summary:

MALLALA			TOTAL COST
CWMS	**CWMS NETWORK**		
	C1	CWMS Sewer Network - Stage 1	59,563.91
	C2U	CWMS Sewer Network - Ultimate	434,146.05
		CWMS - CWMS NETWORK	***$493,709.96***
IR	**IRRIGATION NETWORK**		
	I1	Irrigation Main - Stage 1	83,080.89
	I1U	Irrigation Main - Ultimate	131,152.11
		IR - IRRIGATION NETWORK	***$214,233.00***
WWTP	**WASTEWATER TREATMENT PLANT**		
	UWW	Wastewater Treatment Plant Augmentation - Ultimate	934,535.39
		WWTP - WASTEWATER TREATMENT PLANT	***$934,535.39***
WS	**WINTER STORAGE LAGOON**		
	1WS	Effluent Winter Storage - Stage 1	1,311,747.65
		WS - WINTER STORAGE LAGOON	***$1,311,747.65***
		ESTIMATED NET COST	**$2,954,226.00**
MARGINS & ADJUSTMENTS			
Professional Fees and Charges			Excl.
Client Direct Costs			Excl.
Escalation Beyond 2020			Excl.
Goods and Services Taxation			Excl.
		ESTIMATED TOTAL COST	**$2,954,226.00**

Full Cost Breakdown is attached as Annexure B.

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RLB has also estimated cost for the alternative option of installing the CWMS and irrigation rising mains along Aerodrome Rd instead of going through the private property.

MALLALA			TOTAL COST
CWMS	**CWMS NETWORK**		
	C1	CWMS Sewer Network - Stage 1	59,554.06
	C2U	CWMS Sewer Network - Ultimate	480,883.48
		CWMS - CWMS NETWORK	***$540,437.54***
IR	**IRRIGATION NETWORK**		
	I1	Irrigation Main - Stage 1	160,989.88
	I1U	Irrigation Main - Ultimate	157,879.14
		IR - IRRIGATION NETWORK	***$318,869.02***
WWTP	**WASTEWATER TREATMENT PLANT**		
	UWW	Wastewater Treatment Plant Augmentation - Ultimate	934,380.79
		WWTP - WASTEWATER TREATMENT PLANT	***$934,380.79***
WS	**WINTER STORAGE LAGOON**		
	1WS	Effluent Winter Storage - Stage 1	1,311,530.65
		WS - WINTER STORAGE LAGOON	***$1,311,530.65***
		ESTIMATED NET COST	**$3,105,218.00**

MARGINS & ADJUSTMENTS	
Professional Fees and Charges	Excl.
Client Direct Costs	Excl.
Escalation Beyond 2020	Excl.
Goods and Services Taxation	Excl.
ESTIMATED TOTAL COST	**$3,105,218.00**

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4.2 AUGMENTATION COST PER ALLOTMENT

As per the capacity assessment report by WGA, each component has a different trigger point. Therefore, there is a different augmentation cost per allotment for each component. Table 4.1, 4.2, 4.3 and 4.4 show the augmentation cost per allotment over the next 10 years, assuming that there will be a development growth rate of 34 allotments per year.

Table 4.1: Augmentation Cost per Allotment for CWMS

LOTS/YEAR	COST AUGMENTATION PER ALLOTMENT (CWMS)		UPGRADE REQUIREMENT (YEAR WISE)
34 lots/2020	$	1,751.88	Connection with PS1 (Internal works by Developer) DN125 pipeline (Stage 1)
68 lots/2021	$	875.94	
102 lots/2022	$	583.96	Connection with PS5 (No associated cost for Council. All works by Developer)
136 lots/2023	$	3,192.25	DN125 pipeline (Ultimate)
170 lots/2024	$	2,553.80	
204 lots/2025	$	2,128.17	
238 lots/2026	$	1,824.14	
272 lots/2027	$	1,596.13	
306 lots/2028	$	1,418.78	
340 lots/2029	$	1,276.90	
374 lots/2030	$	1,160.82	

Table 4.2: Augmentation Cost per Allotment for Irrigation

LOTS/YEAR	COST AUGMENTATION PER ALLOTMENT (IRRIGATION)		UPGRADE REQUIREMENT (YEAR WISE)
34 lots/2020	$	2,443.56	DN125 pipeline (Stage 1) Initially to feed the park, school and partial development (Current system is under capacity)
68 lots/2021	$	1,221.78	
102 lots/2022	$	814.52	
136 lots/2023	$	964.35	DN125 pipeline (Ultimate) (Assume it starts at the same time as CWMS) and additional dedicated pump
170 lots/2024	$	771.48	
204 lots/2025	$	642.90	
238 lots/2026	$	551.06	
272 lots/2027	$	482.18	
306 lots/2028	$	428.60	
340 lots/2029	$	385.74	
374 lots/2030	$	350.67	

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Table 4.3: Augmentation Cost per Allotment for WWTP

LOTS/YEAR	COST AUGMENTATION PER ALLOTMENT (WWTP)		UPGRADE REQUIREMENT (YEAR WISE)
34 lots/2020	$	-	No Upgrade required for first 2 years assuming the Council allows the developers to utilize the existing WWTP capacity
68 lots/2021	$	-	
102 lots/2022	$	9,162.11	WWTP Upgrade
136 lots/2023	$	6,871.58	
170 lots/2024	$	5,497.27	
204 lots/2025	$	4,581.06	
238 lots/2026	$	3,926.62	
272 lots/2027	$	3,435.79	
306 lots/2028	$	3,054.04	
340 lots/2029	$	2,748.63	
374 lots/2030	$	2,498.76	

Table 4.4: Augmentation Cost per Allotment for Winter Storage Lagoon

LOTS/YEAR	COST AUGMENTATION PER ALLOTMENT (WINTER STORAGE LAGOON)		UPGRADE REQUIREMENT (YEAR WISE)
34 lots/2020	$	38,580.81	8ML Lagoon Required for existing connections (the existing lagoons are under capacity) and 22ML required for Development. Therefore, entire 30ML can be built once
68 lots/2021	$	19,290.41	
102 lots/2022	$	12,860.27	
136 lots/2023	$	9,645.20	
170 lots/2024	$	7,716.16	
204 lots/2025	$	6,430.14	
238 lots/2026	$	5,511.54	
272 lots/2027	$	4,822.60	
306 lots/2028	$	4,286.76	
340 lots/2029	$	3,858.08	
374 lots/2030	$	3,507.35	

The following Figure 4.1 best illustrates augmentation cost per allotment in a nutshell:

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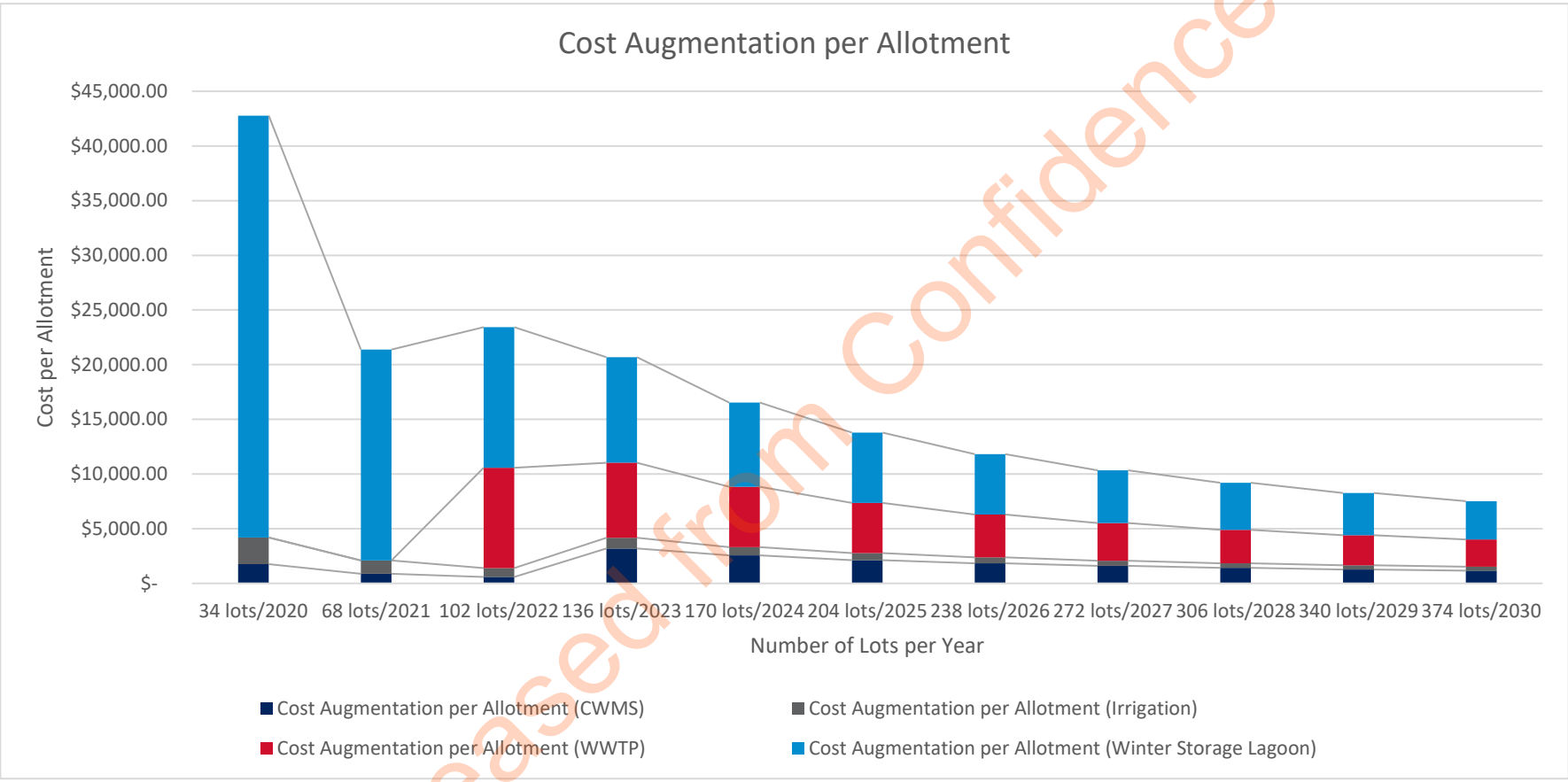


Figure 4.1: Cost Augmentation per Allotment

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5.0 ASSUMPTIONS AND EXCLUSIONS

Assumptions:
The following assumptions have been made:

- We assume all vegetation and topsoil (200mm thick) can be stockpiled within 500m of the site.
- We assume the bulk earthworks for the lagoons will be a cut to fill balance. No allowance to import or dispose any soil.
- We assume the developer will free issue the easements to council

Exclusions:
The following exclusions have been made:

- No allowance for rock excavation
- No allowance for dewatering
- No allowance to handle any contaminated soil
- No allowance for night works

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6.0 REFERENCES

The constructability review and cost planning presented in the report is based on the following documentation:

Doc. No.	Doc. Name	Issue Date
WGA200985	Capacity Assessment for Konzag Residential Subdivision	10 July 2020
A009119PROP1 (C)	Proposed Plan of Division (Development No. 312/D048/19)	12 March 2020
As Constructed Plans Mallala CWMS - HDS Australia 28 September 2017	Mallala Community Wastewater Management System Civil Works	28 September 2017

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ANNEXURE A:

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WALLBRIDGE GILBERT AZTEC

Rider Levett Bucknall

Mallala CWMS

CAPACITY ASSESSMENT FOR KONZAG RESIDENTIAL SUBDIVISION

Project No. WGA200985
Doc No. WGA200985-RP-CV-0001
Rev. B

06 August 2020

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Revision History

Rev	Date	Issue	Originator	Checker	Approver
A	10 July 2020	Issue to Client	JPH	HW	NJS
B	6 August 2020	Client Comments Addressed	MOF		

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Appendices

Appendix A DHA APPROVAL

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Appendix C WATER BALANCE

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1 INTRODUCTION

1.1 BACKGROUND

Wallbridge Gilbert Aztec (WGA) has been engaged by Rider Levett Bucknall to perform a capacity assessment of the Mallala Community Wastewater Management System (CWMS) to determine system upgrades and trigger points for a proposed development.

The township of Mallala is located 55km north of the Adelaide CBD and has a population of 894 (2016 Census) with 322 existing CWMS connections. The Mallala CWMS was constructed in 2014 and conveys wastewater to the Wastewater Treatment Plant (WWTP) located on Wasleys Road, to the east of the township. The land to the northwest of the Mallala township has been zoned as a future residential subdivision located on 41 hectares and consisting of 335 allotments. A locality plan is shown in **Figure 1-1** showing an indicative layout of the development in relationship to the township and WWTP.

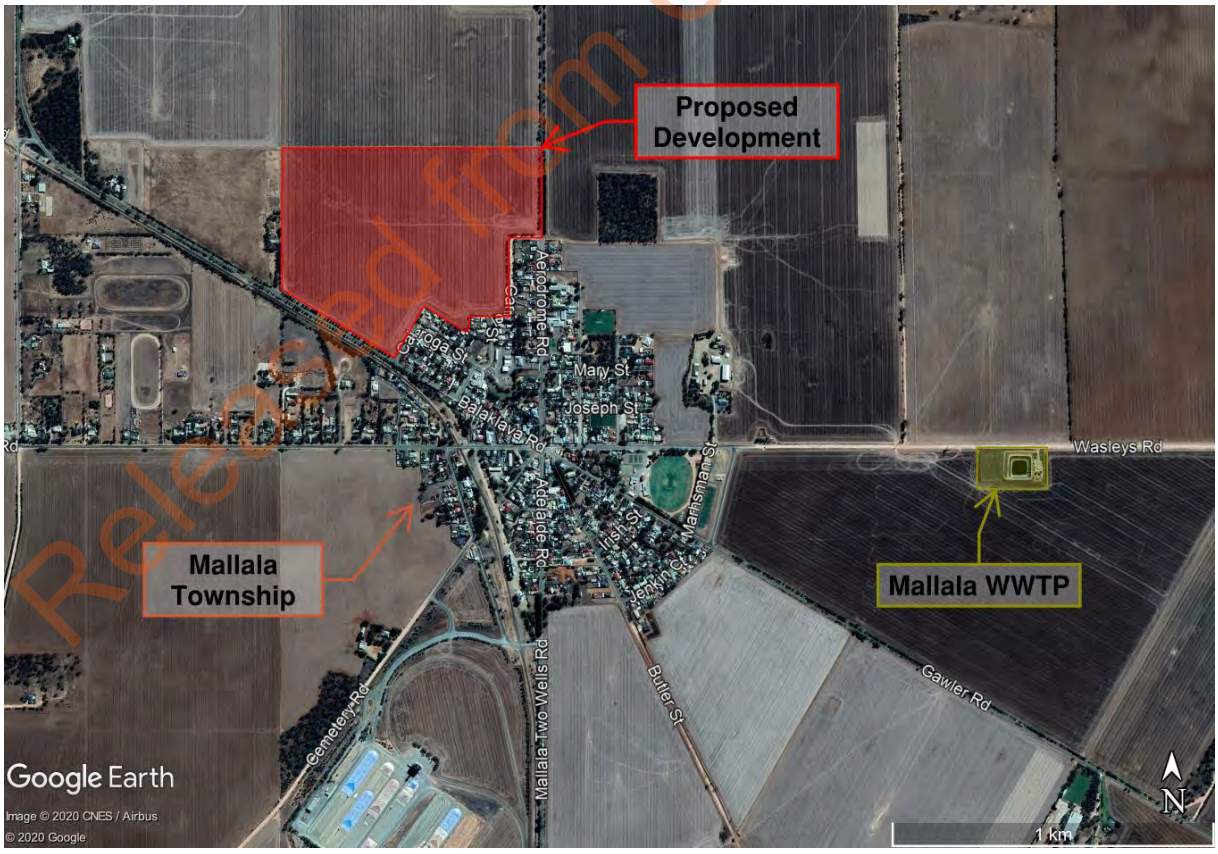


Figure 1-1 - Mallala Locality Plan

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1.2 REPORT PURPOSE

This report has been prepared for Rider Levett Bucknall to perform a capacity assessment of the existing Mallala CWMS and to determine the impacts of the proposed residential development on the wastewater infrastructure.

This report has been prepared for RLB to outline the wastewater system upgrade requirements to cater for a new development consisting of 335 allotments to the northwest of Mallala. The outline of upgrades required will enable RLB to estimate the cost of the required upgrades.

The scope of this report includes all upgrades required by Council as a result of the development. This assessment does not include design of infrastructure required for Council to meet existing shortfalls, and does not include any CWMS infrastructure to be constructed within the development.

1.3 REFERENCES

This report has been prepared based on the following reference documents:

- The South Australian Community Wastewater Management System (CWMS) Design Criteria Rev 1
- Local Government Association of South Australia - South Australian Community Wastewater Management System (CWMS) Design Criteria – July 2019 – Revision 1.0
- COMMUNITY WASTEWATER MANAGEMENT SYSTEM FOR MALLALA – South Australian Public Health Approval – 2013-08522/1 (06.09.2013) (refer Appendix A)
- WASTEWATER TREATMENT PLANT UPGRADE AT MALLALA – South Australian Public Health Approval – WWI-128/15 (12.02.2018) (refer Appendix A)
- Masterplan Allotment 1 in D20237 – Hundred of Grace in the area named Mallala – CT 5451/518 – A009119 OPTION2 REV B ATREAS (14.02.2020) (refer Appendix B)
- WGA report, CWMS Storage and Re-use Option Assessment for the Adelaide Plains Council (Doc no - WAD160711, Rev C, 25 June 2018)
- Mallala CWMS Civil Works As Constructed Drawings – HDS – CWMS257 (09.2017)

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2 EXISTING CAPACITY

2.1 EXISTING SYSTEM OVERVIEW

Mallala has an established Community Wastewater Management Scheme (CWMS) which was constructed in 2014. The collection network consists of predominantly gravity mains, with a small number of pressure sewer connections. The flows from the collection network are captured within 5 pump stations across the township, which typically pump via the common rising main to the Wastewater Treatment Plant (WWTP) located on Wasleys Road.

The WWTP was upgraded in 2019 to a Sequence Batch Reactor (SBR) plant with a number of operational and monitoring improvements including the following:

- New inflow bar screen and underground balance/emergency storage tank
- New reactor and clarifier tank
- New inlet flow meter
- New chlorine dosing equipment (and analysers)
- New irrigation pump and filter

The scheme also has a re-use network, which currently transfers treated wastewater back to the Town Oval, Oval Woodlot and the irrigation tank at the Mallala Primary School on Chivell Street. Refer **Figure 2-1** for schematic.

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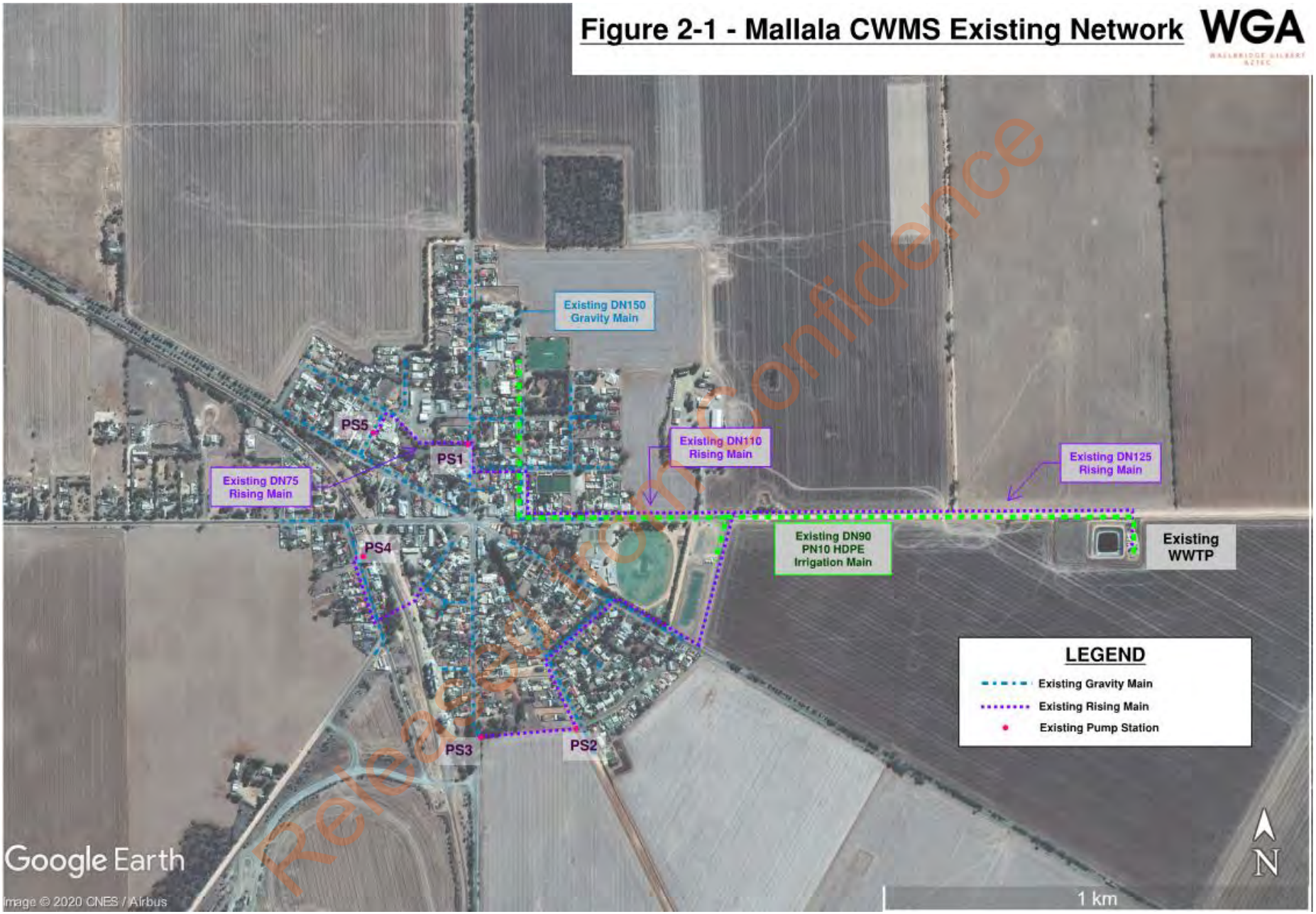


Figure 2-1 - Existing Mallala CWMS Network

2.2 SYSTEM APPROVAL

The Mallala CWMS and WWTP have SA Health Wastewater approval, with the approvals included as Appendix A:

- CWMS Approval – 2013-08522/1 – Dated 06 September 2013
- WWTP Upgrade Approval – WWI-128/15 – Dated 12 February 2018

Key elements are summarised in **Table 2-1**.

Table 2-1 - Summary of DHW Approval

System Element	Approval Description
Gravity Connections	322
Pump Stations	5 Pump stations with suitable duty and standby pumps
Hydraulic Loading	179 kL/day

2.3 COLLECTION NETWORK CAPACITY

The proposed development is located to the northwest of Mallala, therefore any additional flows being directed into the existing system would need to be captured by Pump Station 1 or Pump Station 5 as they are closest in proximity to the proposed development. The collection networks for Pump Station 1 and Pump Station 5 only have been included in the analysis.

The network as-constructed plans provided by Council indicate that flow pumped from Pump Station 5 pumps via a 75mm rising main, which increases to a 110mm common rising main at the location where Pump Station 1 connects into the line.

Council have indicated that 161 out of 322 total connections for the Mallala CWMS are currently occupied. The number of connections into each pump sump has been estimated from the HDS As-constructed drawings. Although Council occupancy information indicates that not all connections are currently being utilized, flow data and occupancy information for each Pump Station individually is unavailable. All existing connections are assumed to be occupied for the basis of the pump station capacity analysis.

The system was approved in 2013, and the pump stations were installed in 2015. The original design would have been based on the previous CWMS Design Guidelines, which allow for 3.5 persons per connection, and 140 L/person/day flow. Although this was the design, in order to determine the capacity of the system for new connections the system has been assessed based on the new criteria. This allows for 2.6 persons per connection, and 170L/person/day. Peaking factors are based on the annual rainfall for the region, 402mm, and are provided in **Table 2-2**.

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Table 2-2 - Mallala CWMS Peaking Factors

System Component	Peaking Factor
Pump Duty	4
Emergency Storage	1.25
WWTP	1.25
Irrigation Area	1
Winter Balancing Storage	1

Table 2-3 summarises the assumptions and outcomes of the capacity assessment for Pump Stations 1 and 5.

Table 2-3 – Pump Station 1 and Pump Station 5 Capacity Assessment

Parameter	Pump Station 1	Pump Station 5	Assumption
Connections (total)	99	46	Direct Connections from HDS As-constructed plans
Average Daily Flow (kL)	43.8	20.5	2.6 persons per connection and 170 L/p/d as per the new CWMS Design Guidelines
Minimum Emergency Storage Required, Full Flow (kL)	10.9	5.13	20% of ADF, assuming remote monitoring/acceptance by DHW. Includes flow from local connections only. Includes PF.
Emergency Storage Available in Pump Sump (kL)	4.1	3.6	Includes all volume above the high-level alarm, up to the flood level indicated on the as constructed plans. Does not include any gravity network storage
Estimated Emergency Storage in Gravity Network (kL)	13.1	11.9	Calculated based on 150mm diameter gravity main and 635m (PS1) and 595m (PS5) length of pipe in the collection network, and adjacent 1.05m diameter collection maintenance holes.
Peak Flow Required (L/s)	2.0	0.9	Estimated Peak Flow from direct connections, based on Peaking Factor of 4 as per the new CWMS Design Guidelines
Pump Duty Flow Provided (L/s)	2.68	2.05	Based on all pumps running simultaneously. Pump curves from a PIRANHA S26/2D 50HZ.
	4.23	3.53	Based on pumps operating in isolation. Pump curves from a PIRANHA S26/2D 50HZ.

The analysis indicates that the existing pumps have sufficient capacity to meet the peak demands anticipated from the system, with all existing connections occupied.

As per **Table 2-3**, the total emergency storage provided is 17.2kL for Pump Station 1 and 15.5kL for Pump Station 5, including the gravity network and the pump sump. This satisfies the existing approvals,

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and follow the criteria set out in the CWMS Guidelines which state that 20% of ADF volume is to be provided as emergency storage, as long as remote monitoring/alarm systems are enabled.

The trigger levels for upgrades have been determined by evaluating the ultimate system capacity based on the existing infrastructure and the criteria specified in the new CWMS Guidelines. The estimated maximum capacity for each pump station is summarised in **Table 2-4**.

Table 2-4 – Maximum Capacity for the existing Pump Stations

	Pump Station 1	**Pump Station 5**
Connections	130	100
Average Daily Flow (ADF)	57.5 kL	44.2 kL
Pump Duty Peak Flow	2.66 L/s	2.05 L/s
Emergency Storage Provided	17.2 kL (24%)	15.5 kL (28%)

The maximum capacity allowed for each pump station is restricted by the pump duty flow and emergency storage supplied. The emergency storage at each pump station has been assessed assuming that 20% of the ADF as emergency storage will be permitted, as per the existing approval.

Based on the evaluation of existing connections as provided in **Table 2-3**, and using the capacity identified in **Table 2-4**, the number of connections available before upgrades are required, based on the existing infrastructure, is therefore as shown in **Table 2-5**.

Table 2-5 – Equivalent Connections Available

	Pump Station 1	**Pump Station 5**
Pump Duty Peak Flow	31 Connections	54 Connections
Emergency Storage Provided	76 Connections	112 Connections

The capacity of the gravity mains which lead directly into these pump stations were assessed, using Appendix A of the current CWMS Design Guidelines. The maximum allowable number of residential connections for each of the gravity mains which supply flow directly to the pump stations of interest is summarised in **Table 2-6**.

Table 2-6 - Collection Network Capacity

Gravity Main into PS	**Gravity Main Size**	**Grade**	**Equivalent HDL Capacity**	**Max no of Typical Allotment Connections**
PS 1	DN150	0.5%	6.5 L/s	318
PS 5	DN150	0.5%	6.5 L/s	318

The maximum number of connections is based on the expected peak flow through the gravity mains, for typical residential allotments at 2.6 persons per connection and 170 L/p/d. If pumped connections to the gravity main are considered, the HDL is the more relevant factor for consideration. The results indicate that the existing gravity mains have capacity for additional connections to be added.

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2.4 WASTEWATER TREATMENT PLANT

Flow data and the existing number of connections into the Mallala WWTP has been provided by Council, refer **Table 2-7** for summary. The data indicates that the current inflows are approximately 39% of the ultimate approved design capacity of 179kL/day. Using flow data presented from Council, the approximate hydraulic loading for the existing system is estimated to be 434 L/connection/day. For the ultimate scenario where all existing connections are occupied, an ultimate hydraulic loading of 141kL/day is expected based on existing flows. As the existing WWTP has approval for 179 kL/day, the WWTP has sufficient capacity for the existing system, and a total additional capacity of approximately 39 kL/day.

Table 2-7 - WWTP Inflow

Scenario	Flow Rate	No. of Connections	Data Source
Existing Occupied Connections	70 kL/day	161	Measured flow and connection data provided by Council
All Existing Connections	140 kL/day	322	Predicted flow based on current flow data

2.5 IRRIGATION DISPOSAL

WGA have previously completed a CWMS Storage and Re-use Option Assessment for the Adelaide Plains Council, which found that 5.3 hectares of irrigation disposal area is required for the existing flows in the network.

Council have indicated which areas are currently in use for irrigation, and which are available to be connected and used for irrigation. This information is summarised in **Table 2-8**. Refer to **Figure 2-2** summarising the locations of the currently used/proposed irrigation.

Table 2-8 - Available Irrigation Areas

Ref	Location	Area Available	In Use?
1	WWTP Woodlot	0.51 ha	Not effective*
2	Town Oval	1.65 ha	✓
3	Oval Woodlot	0.59 ha	✓
4	Pioneer Park	0.42 ha	×
5	School Oval	0.66 ha	✓
6	School Woodlot	0.96 ha	×
7	Northern Scrubland	3.78 ha	×
	TOTAL AVAILABLE	8.57 ha	
	TOTAL CURRENTLY IN USE	2.90 ha	

As summarised in **Table 2-8**, Irrigation is currently taking place on the town oval, oval woodlot, school oval and WWTP woodlot. The woodlot has been found to have poor soil conditions for disposal, therefore the actual total used is 2.9 as presented in the table. This is equal which is a total area of 3.4 ha, a 1.9 ha shortfall from what is required for the existing CWMS.

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Figure 2-2 - Location of Irrigation Areas

There is currently a DN125 PN12.5 HDPE irrigation main from the WWTP back to the Marshman St irrigation compound. The irrigation compound consists of 3 x 50kL storage tanks and a shed that houses the irrigation pump for the town oval. The irrigation main reduces to a DN90 PN10 HDPE after the Marshman St connection, where it follows Wasleys Road and Chivell St.

Treated water is currently pumped using a Grundfos CRI32-2-2 irrigation pump at the WWTP site, which operates on a variable speed drive. According to the Go-Treat design report the duty flow was designed to be 8.9L/s at 30.5m of head.

2.6 WINTER BALANCING STORAGE

The Mallala CWMS has an existing 10ML storage lagoon, which is used to capture winter flows as typically irrigation reuse is insufficient to dispose of the required effluent during this period. This storage lagoon occupies an area of approximately 6,000m^2 and is located adjacent to the WWTP. As summarised in the Re-Use option report (WAD160711 Rev C), the lagoon experienced high levels in 2017. The previous assessment has also identified that an additional 10ML is required based on current inflows, to provide 20ML total winter storage.

2.7 TRIGGER ASSESSMENT SUMMARY

Table 2-9 summarises the trigger levels before upgrades are required for each CWMS component. Note that as an increase in the winter storage lagoon and irrigation area are required even for existing flows, these have not been highlighted as having additional capacity.

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Table 2-9 - Existing Mallala CWMS Upgrade Trigger Assessment Summary

System Component		Has additional capacity?	Trigger (exceeding)	Estimated Additional Capacity
WWTP		✓	179 kL/day Inflow	39 kL/day
Winter Storage Lagoon		✗	-	-
Irrigation Area		✗	-	-
Pump Station	PS 1	✓	2.68 L/s	31 connections
	PS 5	✓	2.05 L/s	54 connections
Gravity Main	PS 1	✓	6.5 L/s	219 connections
	PS 5	✓	6.5 L/s	272 connections

Table 2-9 indicates that the existing pump duty will limit additional number of connections that may connect into each Pump Station. Therefore, 31 connections may be able to connect into Pump Station 1, and 54 connections into Pump Station 5. For this assessment it is assumed that the pumps will remain unchanged, therefore the rising mains will be unaffected.

Any amendments to the existing scheme, including additional connections to the existing Mallala CWMS, will need to be submitted to the Department for Health and Wellbeing (DHW).

The existing scheme capacity can be used to temporarily accept capacity from the new development. In determining upgrade requirements the capacity upgrade should cater for the full flow from the development.

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3 PROPOSED DEVELOPMENT

3.1 BACKGROUND

The proposed development is located to the northwest of the Mallala township and is adjacent to Traeger Road to the south, and Aerodrome Road to the east. Plans for the Development have been provided by Council and are included within Appendix B. The Development can be summarised as:

- A total area of approximately 41 Hectares, consisting of internal road networks, swales, a retirement home, and reserves
- 335 Residential Allotments
- 1 Ha Nursing home (has been assumed to contain 30 beds)
- A total reserve area of 6.4 hectares that may be utilised for water re-use
- A staging plan has been provided by the Developer. Once commenced, the project will be rolled out over 10-12 years (assumed to be 10 years at a rate of 34 lots/year for the purposes of this report)
- Stage 1 consists of 78 residential allotments and is located adjacent to Aerodrome Road to the northeast of the Development

3.2 FLOWS

Development plans have indicated that the ultimate number of connections for the development is 335 residential lots. This is expected to roll out at a rate of approximately 34 lots/year over the next 10 years. The ultimate Average Daily Flow (ADF) for the development has been calculated in accordance with the SA CWMS Design Criteria where a flow rate of 170 L/person/day and a rate of occupancy of 2.6 persons per connection have been used. A summary is included in Table 3-1.

Hydraulic Design Loads (HDLs) for the Development have been calculated in accordance with the new CWMS Design Criteria, where HDL = (ADF × PF) + sum of upstream pumped flows. A summary of the peaking factors used for the HDL calculations of the Development is as per Table 2-2, with resultant HDL's provided in Table 3-2.

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Table 3-1 - Summary of Average Daily Flows

System Element	Connections	Design ADF	Source
Residential Development	335 total lots	148 kL/day	*SA CWMS Design Criteria*
Nursing Home	Assumed 30 beds	17kL/day	*SA On-site Code*
Total for Development		**165 kL/day**	
Existing Mallala Township	322 connections	**140 kL/day**	*Extrapolated measured flow data*

Table 3-2 - HDL's for proposed development components

System Component	HDL – Development Only
WWTP	206 kL/day
Irrigation Area	165 kL/day
Winter Balancing Storage	165 kL/day

The HDL for the pump station components and the reticulation network are described in Section 3.3.1.

3.3 DEVELOPMENT IMPACT AND UPGRADE REQUIREMENTS

3.3.1 Collection Network and Pump Stations

Council have indicated that Stage 1 of the works may connect into the northern end of Aerodrome road, with subsequent stages to connect into Carmel Street /Calaroga Street. Therefore, it is anticipated that if possible, the initial stages will connect into Pump Station 1, and future stages into Pump Station 5.

There are some key points for consideration when connecting into the CWMS:

- Both the DN150 gravity mains connecting into the proposed Pump Stations have sufficient capacity
- The as constructed plans indicate that there is only approximately 1.4m depth to the invert at each of the proposed connection locations. Therefore, if connection is required into these pump station catchment areas, a pumped rising main will likely be required.
- Pump Station 1 has additional capacity for only 31 residential connections before an upgrade is required
- Pump Station 5 has additional capacity for only 54 residential connections before an upgrade is required

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Option 1

An initial scenario was to evaluate the feasibility of connecting into the existing Pump Stations, by providing upgrades of the existing network where required. The network operation was evaluated based on the peak flows that would be required from the ultimate development (335 residential lots) divided equally between Pump Station 1 (PS1) and Pump Station 5 (PS5).

Flow PS1 = 5.47 L/s*

Flow PS5 = 4.38 L/s*

**Includes an additional flow of 3.43 L/s from the Development*

If PS1 and PS5 are sized to cater for the flow/head requirements, it is observed that both PS2 and PS3 would experience reduced flows during periods when all pumps are operating. These flows would not meet the existing flow requirements for these Pump Stations, and therefore upgrades to PS1 and PS5 would result in further upgrades being required throughout the network. Due to the significant upgrades required and the costs that would be associated with this option, it is deemed that upgrades of the internal network to cater to the new development are not feasible. Specifically, this option would involve at least 2 pump station upgrades, and upgrades to rising mains for over 2.1km.

Option 2

Due to the constraints that have been presented by the existing system, an additional option was evaluated to determine infrastructure requirements in order to bypass the existing system and connect into the WWTP via a separate rising main. A system diagram can be found in Figure 3-1 on the following page indicating the proposed CWMS extension.

This option allows for the network capacity available without upgrades to be utilized, and involves the following aspects:

- Initial stage – 31 residential lots to connect into the existing gravity network system along Aerodrome road (via Pump Station 1)
  - The connections into Pump Station 1 will be pumped into the existing DN150 gravity line via a new pump station and rising main (by developer), located within the Development. This pump station will need to include its own emergency storage for local connections, and will require telemetry/SCADA to enable remote monitoring.
- Future stage – 54 residential lots to connect into Pump Station 5 via the existing gravity pipeline.
  - The connections into Pump Station 5 will be pumped into the existing DN150 gravity line via a new pump station and rising main (by developer), located within the Development. This pump station will need to include its own emergency storage for local connections, and will require telemetry/SCADA to enable remote monitoring.
- New 2,300m HDPE DN125 PN12 rising main to be constructed, with route around Mallala to connect into existing WWTP.
  - This pump station to be built by Developer as it is contained within the development. The pump station will need to have appropriate emergency storage and pump duty. This will need to be assessed and proposed by the developer.
- 250 residential lots and nursing home to connect into the new Pump Station (located within the Development) which will pump via the new DN125 rising main

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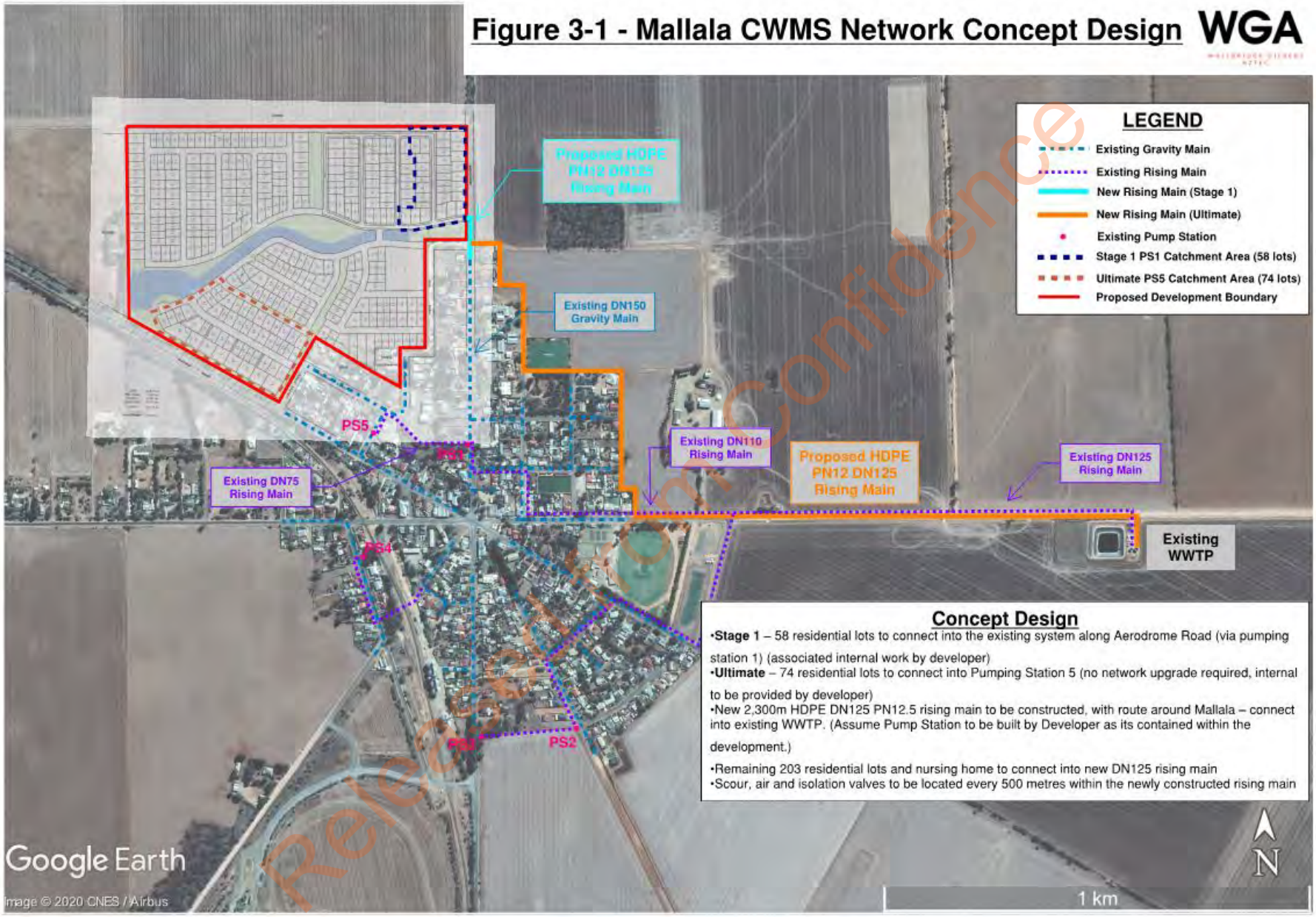


Figure 3-1 - CWMS Network Concept Design

3.3.2 WWTP

In order to determine the upgrade requirements for the WWTP, the following components were assessed:

- Balance storage capacity
- Emergency storage capacity
- Treatment capacity
- Hydraulic infrastructure capacity
- Review of electrical and communications infrastructure

The following upgrades have been identified to upgrade the plant:

- Re-configuration of existing pipework and control system to accommodate new effluent storage lagoon
- Additional 260KL Balance Tank is required including associated infrastructure
- Additional 185KL Sequence Batch Reactor (SBR) Tank is required including associated infrastructure
- Additional waste activated sludge (WAS) tank
- Re-configuration of existing pipework, electrical and communication services
- Increase size of existing control shed to accommodate new irrigation infrastructure
- New electrical and control cabinet to accommodate new infrastructure
- Larger irrigation transfer pump
- Augmentation of the existing power supply into site to accommodate the additional electrical infrastructure

The WWTP has an additional capacity for approximately 39kL/day of inflow. If Council accepts the Developer using the excess plant capacity, it is expected that the WWTP should be upgraded to meet the capacity requirements before the inflow to the WWTP has exceeded the approved 179 kL/day.

It is recommended that the plant is upgraded after Stage 1 of the development is connected or once flows exceed 179kL/day (whichever is sooner). It is noted that an increase in the hydraulic loading of the WWTP will result in an increase in the biological loading of the treatment plant. Refer to **Figure 3-2** detailing projected growth for inflow to the Mallala WWTP.

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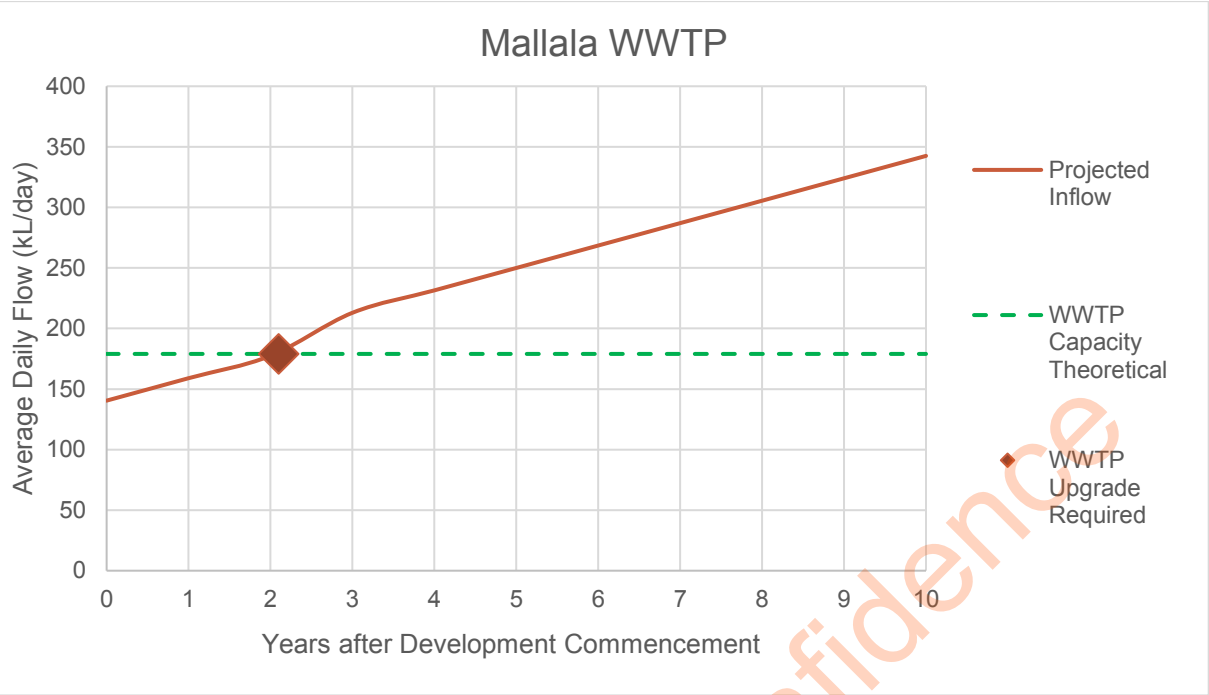


Figure 3-2 - Mallala WWTP Upgrade Trigger Point

3.3.3 Irrigation/Disposal Requirements

The Development plans indicate that the total area of the proposed development is 40.77 ha. Approximately 15.5% of this area (6.37 Ha) is to set aside as reserves and can be utilised as potential irrigation/disposal area. Therefore, if the proposed 6.37 Ha from the Development, as well as Pioneer Park and the School Woodlot (refer **Table 2-8** and **Figure 2-2**) are utilised for disposal/irrigation, there is sufficient area available to accommodate the ultimate Development and Mallala CWMS scenario. This is equivalent to a total of 11.16 hectares for disposal/irrigation (refer **Table 2-8** for available areas). Requirements for the irrigation area for the ultimate scenario are summarised in **Table 3-3** below.

Table 3-3 - Ultimate CWMS Summary

Scenario	HDL (kL/day)	Total Disposal Area Required (ha)
Existing Irrigation Flow Disposal Required	140	5.30
Total Irrigation Flow Disposal Required (Including Development)	305	11.2

The irrigation disposal area required has been calculated as per SA Water Irrigation of Public Open Spaces (IPOS) Irrigation Management calculation, which estimates the irrigation required for various climatic conditions, soil and crop types. Irrigation is assumed to not occur in the winter months and is a 21% decrease from the TQVS 1 estimation from IPOS. A total of 106ML disposal is required, to be disposed of via the proposed 11.2 hectares. The water balance does not include disposal for additional connections from council up to their existing WWTP capacity (an additional 39 kL/day). Refer to **Table 3-4** for a summary of the irrigation schedule, and for full calculations see **Appendix C**.

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Table 3-4 – Approximate Annual Irrigation Schedule

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Irrigation req. (ML)	19.0	14.9	12.4	7.3	3.8	0	0	0	6.4	10.8	14.9	17.0

The upgrade requirements for the irrigation area and network are summarised below:

- Additional Irrigation Areas:
  - Utilize the 6.4 hectares of reserve within the development (as per development plans)
  - Pioneer park and the School Woodlot will be required to connected to the irrigation system.
- Irrigation Pipeline Requirements:
  - Initially construct a new 500m DN125 HDPE PN12 irrigation main from the existing school oval connection, to the development
  - Ultimately, construct a new 850m DN125 HPDE PN12 to connect the irrigation pump station directly to the newly constructed line to the Development. The existing irrigation pipeline from the irrigation pump station to the school oval will then remain as a separate supply line.
- Pump Station Requirements:
  - Allow for an additional dedicated pump at the existing irrigation pump station to service the Development in the ultimate scenario (Duty approx. 9L/s)
  - The Development will need to provide their own balancing storage tanks and irrigation pump to suit the required disposal rate.

A system diagram can be found in **Figure 3-3** indicating the proposed irrigation extension. As the proposed additional irrigation areas within the township at Pioneer Park and the School Woodlot are required regardless to meet the irrigation shortfall, the requirements for the extension for these areas is not included in this analysis. Note that as these two areas are located adjacent to the existing irrigation line, it is likely that only minor adjustments will be required in order to get these sites online.

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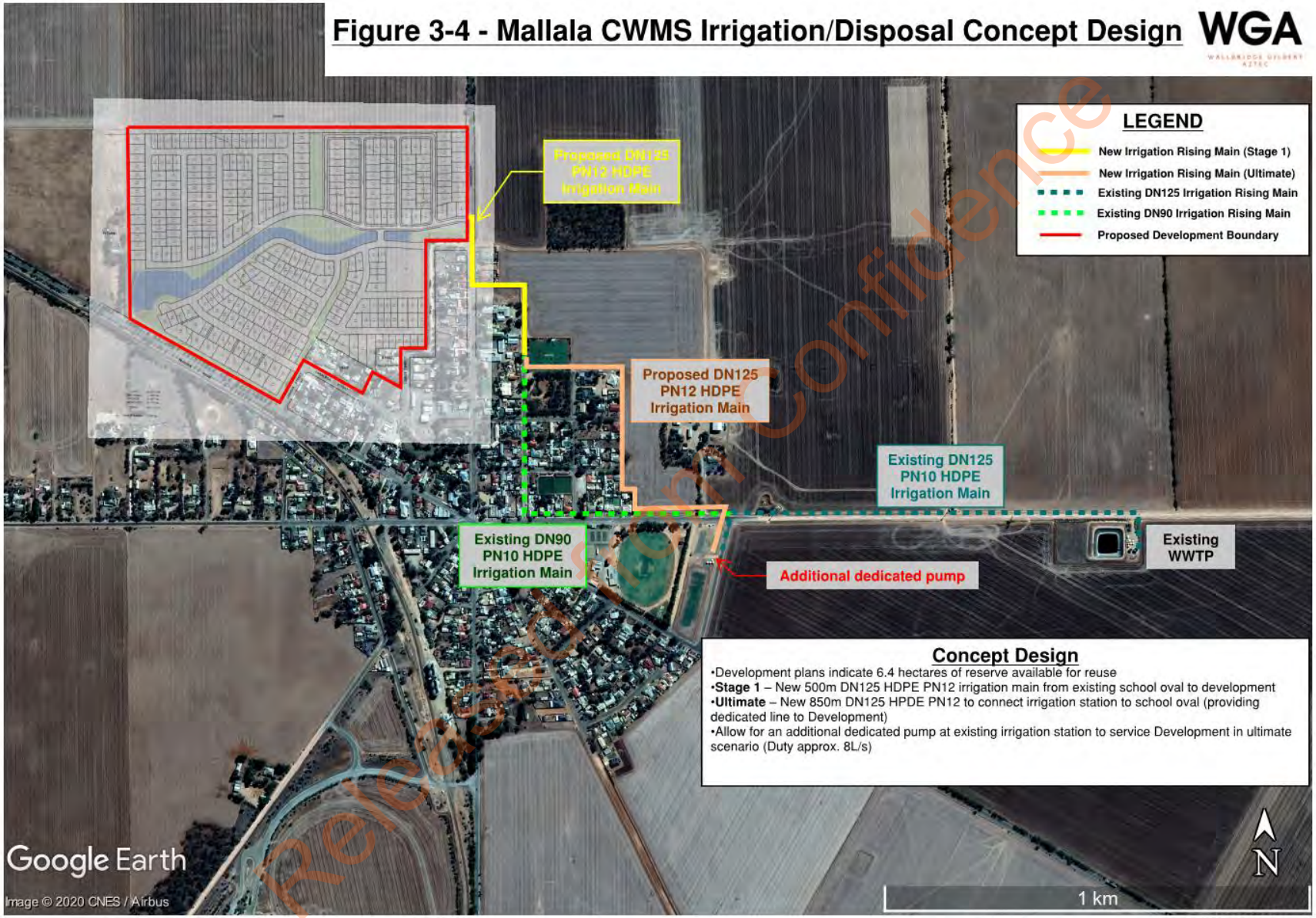


Figure 3-3 - Irrigation/Disposal Concept Design

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3.3.4 Winter Storage Requirements

Mallala has an existing winter storage capacity of 10ML located adjacent to the existing WWTP. Under the CWMS Design Criteria, a water balance calculated over 4 years including a 1:10 wet year has been conducted to determine the upgrade requirements (refer **Appendix C**). The HDL for the winter storage lagoon is provided in **Table 3-2**. The resulting ultimate storage capacity is summarised as 40 ML. **Table 3-5** below summarises the requirements for the winter storage.

Table 3-5 – Winter Storage Summary

Scenario	Daily Design Inflow (kL/day)	Winter Balancing Storage Required (ML)
Existing CWMS	140	18
Existing CWMS plus Development	305	40

The ultimate scenario requires a total storage volume of 40ML, which would be an additional 30ML of storage. This does not include additional irrigation disposal for Council's additional 39kL/day from the treatment plant. It is recommended that the new storage should be built next to the existing lagoon, with estimated footprint as shown in **Figure 3-4**. It is noted that the EPA guidelines for wastewater lagoon construction (April 2019) states that the construction of wastewater lagoons should be avoided within 50m of public roads. It is noted that this is not met with the existing lagoon. If the new lagoon was placed beside the existing lagoon, this buffer distance would not be met.

There is flexibility in how the storage lagoon can be oriented to achieve the appropriate buffer distances, allowing for the landowner's preference.

An indicative diagram defining the upgrade requirements of the winter storage is included on the following page.

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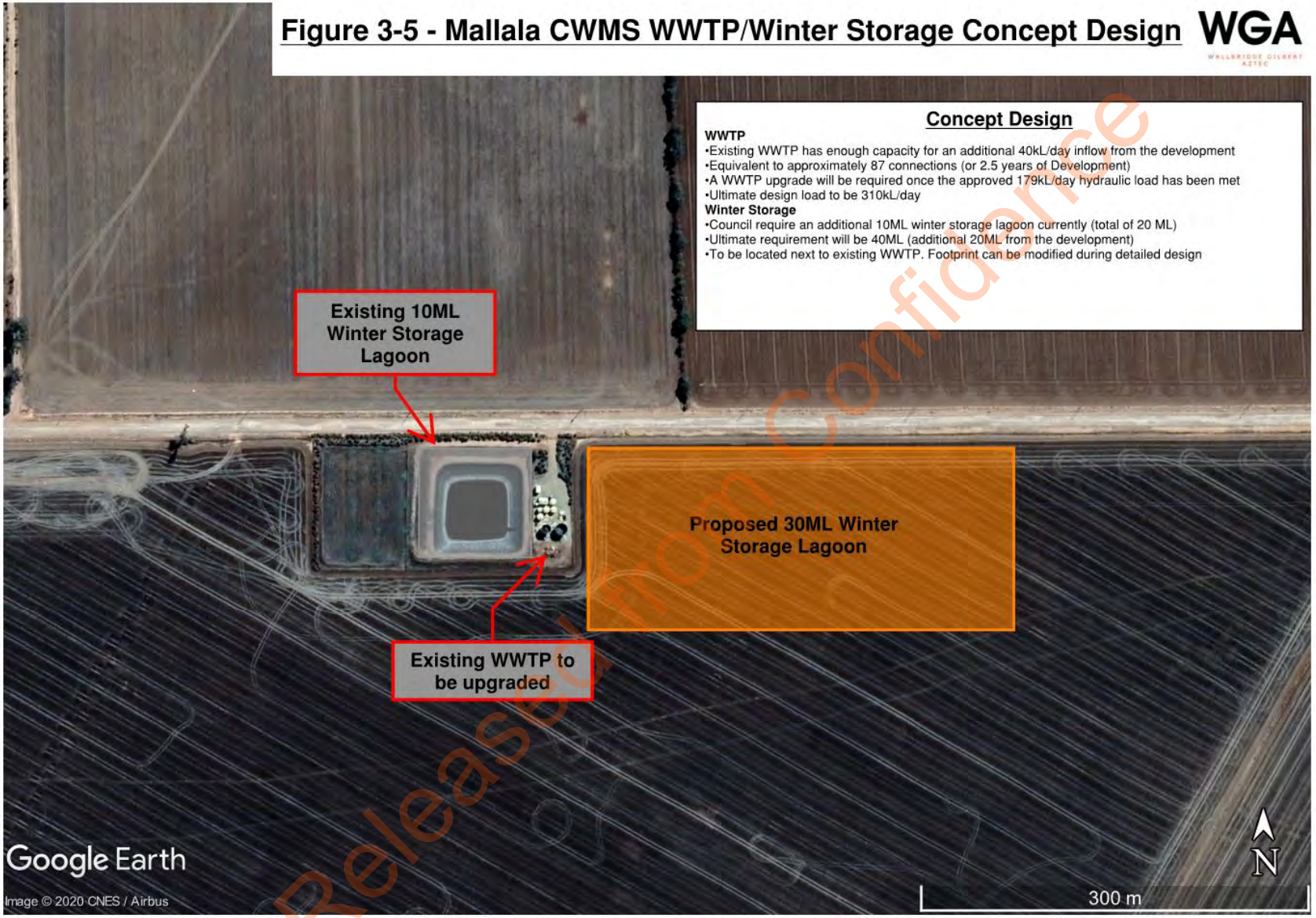


Figure 3-4 - Winter Storage Concept Design

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4 CONCLUSION

Based on the analysis included within this report, the following summarises the key findings:

- Initial staging could be undertaken such that 31 residential connections from Stage 1 connect into Pump Station 1 in the interim whilst the required upgrades are constructed
- The ultimate upgrades for the development is summarised as:
  - a 2,300m DN125 rising main around the east of Mallala to service the 31 residential lots from the initial stage, the nursing home, and a further 250 residential lots. A suitable pump station will be required.
  - 54 residential lots connected into Pump Station 5
  - The existing Mallala WWTP is required to be upgraded to service an additional 206 kL/day
  - An additional 22ML of winter storage is required
- The WWTP is required to be upgraded before the flow reaches the approved 179 kL/day. It is recommended that the plant be upgraded once Stage 1 of the development is connected or the plant inflow exceeds 179 kL/day (whichever is sooner).
- A new 850m DN125 irrigation main will be connected to service the development
  - The irrigation water supply will be serviced by a new dedicated pump

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APPENDIX A

DHA APPROVAL

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Government of South Australia
SA Health

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Rundle Mall SA 5000
DX 243
Tel 08 8226 7100
Fax 08 8226 7102
ABN 97 643 356 590
www.health.sa.gov.au

Our reference: 2013-08522/1

06 September 2013

Mr Phil Castles
HDS Australia Pty Ltd
Level 1, 176 Fullarton Road
Dulwich
SA 5065

Dear Sir,

RE: COMMUNITY WASTEWATER MANAGEMENT SYSTEM FOR MALLALA INCLUDING WASTEWATER COLLECTION, TREATMENT AND IRRIGATION

I refer to your application on behalf of the District Council of Mallala seeking approval to install a wastewater collection, treatment and irrigation system at Mallala.

I advise that, pursuant to the South Australian Public Health (Wastewater) Regulations 2013, your application for wastewater system has been approved subject to the following conditions:

1. The approved system consists of the following:

1.1 Wastewater Collection System:

1.1.1 322 gravity property connections
1.1.2 7 pressure property connections with each property having a Mono PSS-EMS 160 sump fitted with a suitable pump
1.1.3 5773 m of DN150 PVC gravity pipe
1.1.4 242 m of DN75 HDPE PN10 common main
1.1.5 5 Flygt pump stations with four having a diameter of 1.8 m and one (PS-3) having a diameter of 2.2 m and all fitted with suitable duty and standby pumps
1.1.6 3275 m of rising mains which are DN125 HDPE PN10, DN110 HDPE PN10, DN90 HDPE PN10 and DN75 HDPE PN10

1.2 Wastewater Treatment Plant:

1.2.1 A maximum hydraulic flow of 179 kL/day
1.2.2 Three 46.4 kL 1st stage primary tanks
1.2.3 Two 46.4 kL 2nd stage primary tanks
1.2.4 One 20 kL Anoxic MBBR tank fitted with 6 m^3 of media
1.2.5 Two 38 kL aerobic MBBR tanks with each fitted with 9 m^3 of media
1.2.6 Three Greenco 4RB 620 air blowers (two duty and one spare) rated at 125 m^3/hr
1.2.7 One 38 kL clarifier tank
1.2.8 One 38 kL chlorine contact tank
1.2.9 One 5000 L pump sump
1.2.10 A suitable liquid chlorine disinfection system as per the information provided

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1.2.11 An AECNET communications network system
1.2.12 A 10 ML recycled water storage lagoon with 1.5 mm thick HDPE liner

1.3 Recycled Water Irrigation:

1.3.1 A 705 m long DN125 PN12.5 HDPE irrigation main from the wastewater treatment plant to the town oval
1.3.2 Three 46.4 kL recycled water storage tanks at the town oval
1.3.3 An irrigation system for the town oval and the two woodlots as per the information provided including the Irrigation Management Plan
1.3.4 A standpipe at the waste water treatment plant site for filling tankers for the cartage of recycled water. ***The cartage of recycled water will require separate application and approval from the Department for Health and Ageing (DHA)***

2. The system is to be installed, commissioned, operated and maintained in accordance with:

2.1. The plans and specifications as submitted and approved by the DHA
2.2. Manufacturers, installers and equipment suppliers' instructions and recommendations.
2.3. WSAA Sewer Code of Australia (WSA 02-2002)
2.4. Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1)
2.5. AS 3500 for backflow prevention requirements
2.6. All other relevant standards and codes.
2.7. Conditions of this approval.

3. In regards to the inspection and commissioning;

3.1. The DHA must be advised of the completion of installation, prior to commissioning the system.
3.2. The DHA is to be notified in writing of the commissioning date of the system.
3.3. The DHA reserves the right to inspect during construction, or upon completion, or not to inspect the installation.

4. A telemetry alarm system to warn of failure of critical components of the system must be installed.

5. The pumps and other components used in the system must be suitable for their intended loads and operating environment.

6. Spare parts are to be kept on site to enable prompt repair of the critical components of the system.

7. Operation and maintenance manuals for the wastewater treatment plant and associated equipment are to be provided and maintained onsite for use by the system operator and maintenance personnel. The personnel are to be adequately trained to ensure the system is operated as required by the manufacturer and installation contractor as well as in compliance with this approval, including the reclaimed water quality monitoring and reporting requirements. Training shall also include Occupation Health and Safety aspects of system operation and maintenance. Appropriate signage advising of the use of chlorine is to be affixed to the building housing the chlorine containers and any ventilation requirements must also be adhered to.

8. The wastewater treatment plant is to produce recycled water complying with the following criteria:

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8.1. A mean value BOD_5 not greater than 20 mg/L
8.2. A mean value of suspended solids not greater than 30 mg/L
8.3. A median thermotolerant coliform (*E coli*) count not greater than 100/100 mL
8.4. A mean total chlorine level of not less than 1 mg/L

Monitoring is to be carried out weekly for 4 weeks, fortnightly for 8 weeks and monthly for 9 months, then pending successful completion of this regime, on a **quarterly** basis thereafter. Sampling and analysis of samples are to be carried out by a NATA registered laboratory and the results are to be submitted to the DHA as soon as they become available).

After satisfactory completion of the initial 12 months, the results are to be submitted to the DHA in the form of an annual report due on the 30th September each year (for the period of 1st July to 30th June of each year).

However, the DHA reserves the right to request for the monitoring results at anytime. The owner and operator of the system are also responsible for **reporting** the results to the DHA immediately when there is a malfunction of the wastewater system or its components and/or the reclaimed water quality criteria above is not achieved, together with the measures taken to operate the system as per the requirements of this approval.

All such malfunctions and/or reclaimed water quality variations and the measures taken to rectify the problem(s) are also to be detailed in the annual report.

9. The recycled water irrigation system is to comply with Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) and the irrigation areas are to be appropriately signposted, indicating that recycled water is in use and not suitable for human consumption. All irrigation water and aerosols must be contained within the approved irrigation area. The sprinklers near the edge of oval must be inwards throwing and part circle ones.

10. **Where required, backflow prevention devices must be fitted to the system as per AS/NZS 3500 by personnel holding appropriate qualifications to ensure that all water supplies are protected from cross contamination. Backflow Prevention Device Inspection and Maintenance Report sheets for backflow prevention work carried out are to be submitted to the DHA and the Office of the Technical Regulator within 14 days. A full backflow prevention audit must be carried out by a certified backflow prevention tester in conjunction with the certifying engineer and comply with all requirements prior to the use of recycled water. All backflow prevention devices must be tested and a report submitted to the Office of the Technical Regulator annually.**

11. Within **eight weeks** of the completion of the installation, engineering certification by an independent chartered professional engineer experienced in wastewater system design, construction and operation, considering all the conditions of this approval, is to be submitted to the DHA including:

11.1. Structural soundness of the installation for all aspects of the scheme including the collection system, treatment plant, and recycled water irrigation system
11.2. Water tightness testing of the wastewater tanks
11.3. Water tightness testing of the pipes as per the tests described in the WSAA Sewer Code of Australia (WSA 02-2002)

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11.4. Compliance of the irrigation system with the Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1)

11.5. Compliance of all components of the installation (considering materials used, construction/installation methodology, trenching, bedding, jointing, required clearances etc.) with the standards referred to and with the conditions of this approval

The applicant is responsible to ensure that auditing of the wastewater system during installation is undertaken as per the standards, guidelines and specifications referred to by this approval, and that compliance is maintained with installation methods, correctness of materials used, and the testing of the system.

The engineering certification is to clearly state the compliance or otherwise with the approval, of both system components and the system as a whole. The certification is to be based on the assessment results including tests carried out during construction of the wastewater system.

12. Within **eight weeks** of the completion of the installation, "as constructed drawings" must be provided to the DHA indicating the "as constructed" information. Drawings must be of an acceptable quality utilising standard notation, legends and legible detail and include cross sectional details, longitudinal details, layout plans and details of the specific treatment plant and irrigation system components.

13. Pursuant to the South Australian Public Health (Wastewater) Regulations 2013, the DHA reserves the right to vary any or all of the approval conditions, and require the repair, replacement, rectification, or alteration of the system or any part thereof should at any time:

13.1. The system or a component thereof not be manufactured, installed and/or operated in accordance with the approval conditions; or

13.2. The system is defective and not able to perform the function for which the approval was issued; or

13.3. The system is operated in a manner that is prejudicial to public and environmental health, or causes environmental nuisance.

13.4. The operator or the person or agency holding the approval for the system fails to undertake necessary monitoring of the system or provide the results as required in the DHA approval conditions.

Approved by: (Mr Tony Farror) Date: 06 September 2013

Manager, Wastewater Management Section
Delegate of the Minister for Health

CC: District Council of Mallala

References:

- Information provided by HDS Australia Pty Ltd
- Information provided by Environmental Water Services
- Information provided by the District Council of Mallala

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Note 1: The approval does not abrogate responsibilities under other Acts or Regulations to obtain the necessary approvals, permits or licences from other agencies, including but not limited to:

- Environmental Protection Agency (EPA)
- Department of Environment, Water and Natural Resources
- Natural Resource Management Boards
- Department of Primary Industries and Regions SA
- Development Assessment Commission (DAC) and/or the local council

Note 2: This approval is issued on the basis of information provided by the applicant, wastewater treatment plant manufacturer and the District Council of Mallala and that operation and maintenance of the scheme once constructed will be carried out by the Council or their agents.

Note 3: Sludge from the system is to be taken away by an EPA licensed operator to an approved site and in accordance with the SA Biosolids Guidelines.

Note 4: No connection to the system is permitted until "engineering certification" and "as constructed drawings" have been provided to the DHA in accordance with this approval.

Note 5: All extensions/upgrades/modifications to the scheme will be subject to separate application (s) and approval from the DHA

Note 6: Before any premises are connected to the wastewater collection system the property owner must submit a waste control application to the District Council of Mallala with the required fee and receive approval. This application and approval by the Council is to cover the sanitary plumbing and drainage work within each property and its connection to the sewer drains in this approval. Connections to the scheme are to be installed in accordance with the SA Health's On-site Wastewater Systems Code and must be provided with inspection openings or flushing points shafted to the surface level and finished with a precast concrete cover and surround

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Government of South Australia
SA Health

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DX 243
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ABN 97 643 356 590
www.health.sa.gov.au

Our reference: WWI-128/15

12 February 2018

Mr Paul Cleghorn
Strategic Infrastructure Officer
Adelaide Plains Council
PO Box 18
Mallala SA 5502

Dear Paul,

RE: WASTEWATER TREATMENT PLANT UPGRADE AT MALLALA

I refer to Council's application for a wastewater treatment plant at Mallala.

I advise that an approval is issued pursuant to the South Australian Public Health (Wastewater) Regulations 2013, for the installation of a wastewater treatment plant for a hydraulic load of 179 kL/day and BOD_5 load of 63 kg/day (sewage) at Mallala, subject to the following conditions:

1. The approved wastewater system incorporates:

    1.1. Online mag flowmeter to measure inflow
    1.2. A mechanical screen rated at 20L/s
    1.3. 2 x 22kL inflow sumps fitted with standby and duty pumps
    1.4. A 260kL inflow reactor tank fitted with a Caprari–OXY152-12 jet aerator with 15kW motor
    1.5. Duty and standby transfer pumps to transfer water from the inflow balance / reactor tank to the SBR tank
    1.6. A 160kL SBR tank fitted with a Caprari-OXY101 – 12 with 3.5kW motor jet aerator and a decant pipe to the existing storage lagoon
    1.7. A 46kL WAS tank
    1.8. Floating discharge line from the existing storage lagoon
    1.9. Chlorination system consisting of a Netafim 80micron disc filter, sodium hypochlorite dosing system and chlorine analyser and 2 x Chlorine contact tanks (22kL and 38kL)
    1.10. A 45kL irrigation balance tank and use of existing irrigation pumps
    1.11. Installation of suitable pumps for the system
    1.12. An operational control and monitoring system with individual operator alarms on all key processes
    1.13. Supply of recycled water for uses including municipal irrigation, dust suppression, landscape irrigation and commercial food crops (all with enhanced restrictions), and irrigation of non-food crops.

2. A Risk Management Plan in accordance with the Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) for the system must be submitted to the DHA with the next annual report.

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3. Operation and maintenance manuals for the wastewater treatment plant and associated equipment are to be provided and maintained onsite for use by the system operator and maintenance personnel. This shall include minimum requirements for maintaining emergency storage provision in the inflow reactor tank in the event of a power outage.

   The personnel are to be adequately trained to ensure the system is operated as required by the manufacturer and installation contractor as well as in compliance with this approval, including the recycled water quality monitoring and reporting requirements. Training shall also include Work Health and Safety aspects of system operation and maintenance.

4. The following operational monitoring must be undertaken for the system:

   4.1. Flowrate at the inlet to the treatment plant, continuously monitored.
   4.2. The aeration systems in the inflow reactor tank and the SBR tank, continuously monitored with coded failure alarm to operator (not general alarm).
   4.3. The unfiltered decanted effluent turbidity, measured on-line during decant, with alarm.
   4.4. Total chlorine residual, continuously monitored with alarm. Chlorine dose set points are to be calibrated during commissioning and general operation with grab samples from Sample point SP04.

   Data is to be recorded and stored, and reviewed by plant operators at a minimum of 3 times a week.

5. The wastewater treatment plant is to produce recycled water complying with the following criteria:

   5.1. BOD_5 < 20 mg/L (SP03)
   5.2. Suspended solids < 30 mg/L (SP03)
   5.3. *E coli* < 100 org/100 mL (SP04)
   5.4. Total chlorine > 1mg/L (SP04)

   Samples are to be collected from the two dedicated sample points SP03 and SP04, as detailed on the drawing titled 'Mallala WWTP Upgrades New Treatment Plant Schematic, For Construction' (2017-108132-01 Rev 1). Both sample points are to be clearly labelled.

   Monitoring is to be carried out monthly for 12 months, then pending successful completion of this regime, on a **quarterly** basis thereafter. Sampling and analysis of samples is to be carried out by a NATA registered laboratory. Any non-compliant results must be investigated and reported to the DHA. A report including test results, copies of all laboratory results and any investigations made following any non-compliant results must be submitted to the DHA 8 weeks after the final monthly result has been collected.

   After satisfactory completion of the initial 12 months, the results are to be submitted to the DHA in the form of an annual report due on the 30th September each year (for the period of 1st July to 30th June of each year).

   However, the DHA reserves the right to request for the monitoring results at any time. The owner and operator of the system are also responsible for reporting the results to the DHA immediately when there is a malfunction of the wastewater system or its

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components and/or the recycled water quality criteria above is not achieved, together with the measures taken to operate the system as per the requirements of this approval.

All such malfunctions and/or reclaimed water quality variations and the measures taken to rectify the problem(s) are also to be detailed in the annual report

6. The wastewater system is to be installed, commissioned, operated and maintained in accordance with:

   6.1. The plans, specifications and other documentation as amended and approved by the Department for Health and Ageing (DHA).
   6.2. The designers', manufacturers', installers' and equipment suppliers' instructions and recommendations.
   6.3. Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) 2006.
   6.4. All other relevant standards and codes.
   6.5. Conditions of this approval.

7. With regards to compliance, inspection and commissioning;

   7.1. The DHA must be advised of completion of the installation and prior to commissioning of the wastewater system.
   7.2. The DHA is to be notified in writing of the commissioning date of the wastewater system.
   7.3. The DHA reserves the right to inspect during installation, or upon completion, or not to inspect the wastewater system.
   7.4. Non-compliance with approval conditions is to be rectified immediately and must be reported to the Department for Health and Ageing as soon as practicable and within 24 hours of the failure being detected.
   7.5. The Department for Health and Ageing reserves the right to inspect the use of recycled water at any time.

8. Where required, backflow prevention devices must be fitted to the system as per AS/NZS 3500 by personnel holding appropriate qualifications to ensure that all water supplies are protected from cross contamination. Backflow Prevention Device Inspection and Maintenance Report sheets for backflow prevention work carried out are to be submitted to the DHA and the Office of the Technical Regulator within 14 days. A full backflow prevention audit must be carried out by a certified backflow prevention tester in conjunction with the certifying engineer and comply with all requirements prior to the use of recycled water. All backflow prevention devices must be tested and a report submitted to the Office of the Technical Regulator annually.

9. Within **eight weeks** of practical completion of the installation, engineering certification by an independent wastewater engineer experienced in wastewater system design, construction and operation, considering all the conditions of this approval, is to be submitted to the DHA including:

   9.1. Structural soundness for all aspects of the installation
   9.2. Compliance of all components of the installation considering:
   9.2.1. Suitability of materials used and suitability of the construction/installation methodology (trenching, bedding, jointing etc).

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9.2.2. All relevant standards and codes, the conditions of this approval, manufacturer's requirements and the design submitted by the engineer.

The applicant is responsible to ensure that auditing of the wastewater system during installation is undertaken as per the standards, guidelines and specifications referred to by this approval, and that compliance is maintained with installation methods, correctness of materials used and the testing of the system.

The engineering certification is to clearly state the compliance or otherwise with the approval, of both system components and the system as a whole. The certification is to be based on the assessment results including tests carried out during construction of the wastewater system.

10. Within eight weeks of practical completion of the installation, "as constructed drawings" must be provided to the DHA indicating the "as constructed" information. Drawings must be of an acceptable quality utilising standard notation, legends and legible detail and include cross sectional details, longitudinal details, layout plans and details of the wastewater system.

11. This approval shall become void if the wastewater system is not completed within 24 months of the date of approval.

12. Pursuant to the South Australian Public Health (Wastewater) Regulations 2013, the DHA reserves the right to vary any or all of the approval conditions, and require the repair, replacement, rectification, or alteration of the system or any part thereof should at any time:

    12.1. The system or a component thereof not be manufactured, installed and/or operated in accordance with the approval conditions; or
    12.2. The system is defective and not able to perform the function for which the approval was issued; or
    12.3. It is operated in a manner that is prejudicial to public and environmental health, or causes environmental nuisance; or
    12.4. The operator or the person or agency holding the approval for the system fails to undertake necessary monitoring of the system or provide the results as required in the DHA approval conditions.

Approved by: (Michelle Wittholz) Date: 12 February 2018

Manager, Wastewater Management

Delegate of the Minister for Health and Ageing

CC: Mr. Tony Catalano, Alano Water

References:

1. Mallala WWTP Information for Approval, 7 February 2018, Alano Water
2. Mallala WWTP Functional Description Rev F, 6 December 2017 Alano Water
3. Mallala WWTP Upgrades New Treatment Plant Schematic, 'For Construction' drawing number 2017-108132-01, Rev 1, dated 20 November 2017
4. Mallala WWTP Site Layout 'For construction', 2017-008132-S01, Rev 2, dated 4 October 2017

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5. Mallala WWTP Conduit Penetrations 'For construction', 2017-008132-S03, Rev 1, dated 4 October 2017
6. Mallala WWTP 'For construction' drawings, 2017-008132-S02, S04, S05 and S06, Rev 2, dated 5 July 2017

Note 1: The approval does not abrogate responsibilities under other Acts or Regulations to obtain the necessary approvals, permits or licences from other agencies, including but not limited to:

- Environmental Protection Agency (EPA)
- Department of Environment, Water and Natural Resources
- Natural Resource Management Boards
- Department of Primary Industries and Regions SA
- Development Assessment Commission (DAC) and/or the local council

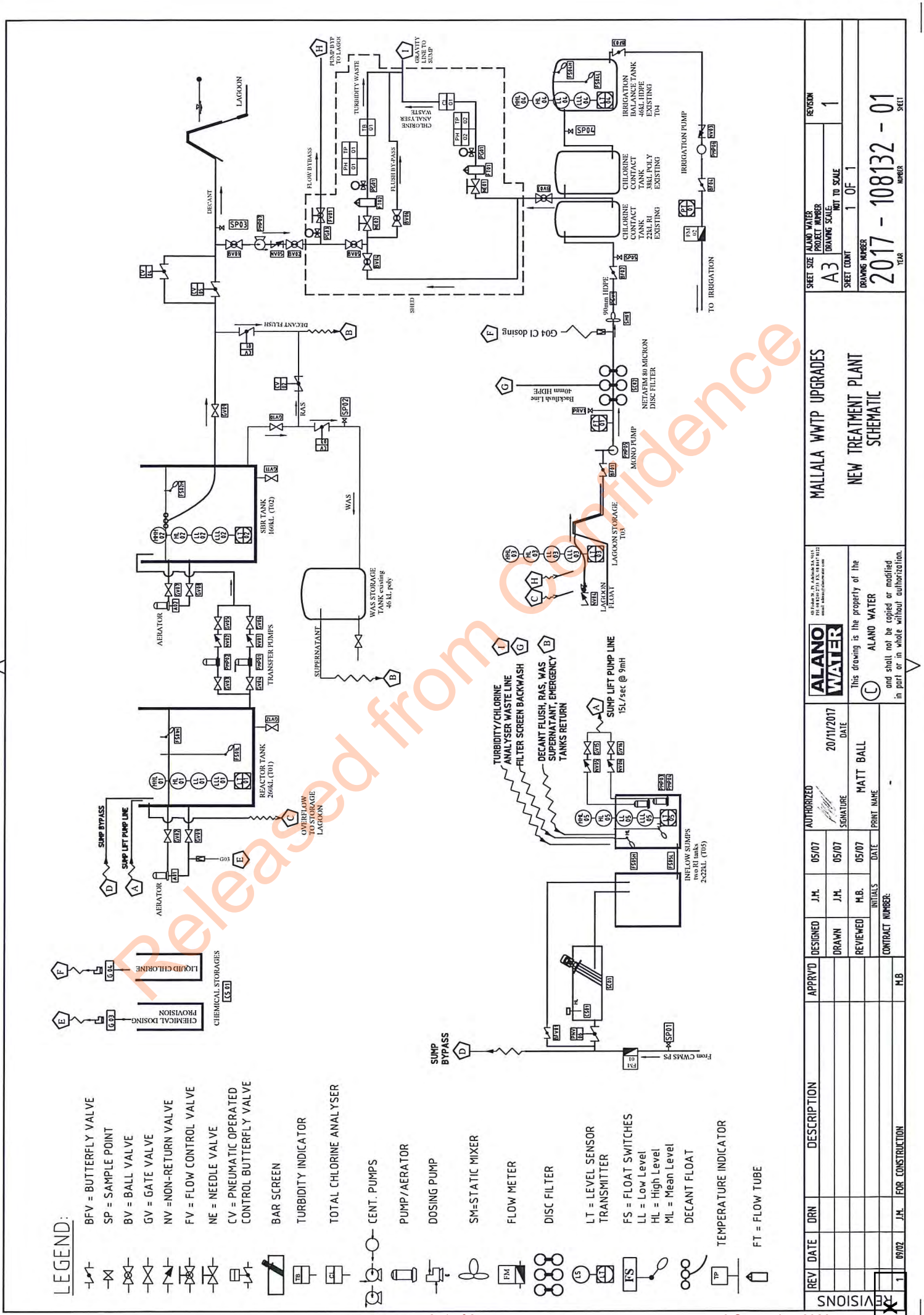
Note 2: This approval is issued on the basis of information provided by Alano Water and Adelaide Plains Council and that operation and maintenance of the scheme once constructed will be carried out by the council or their agents.

Note 3: Sludge from the system is to be taken away by an EPA licensed operator to an approved site and in accordance with the SA Biosolids Guidelines.

Note 4: The wastewater system is to be operated and maintained in accordance with the operation and maintenance manual. Records of maintenance of the wastewater system are to be kept at site and made available to the relevant authority on request.

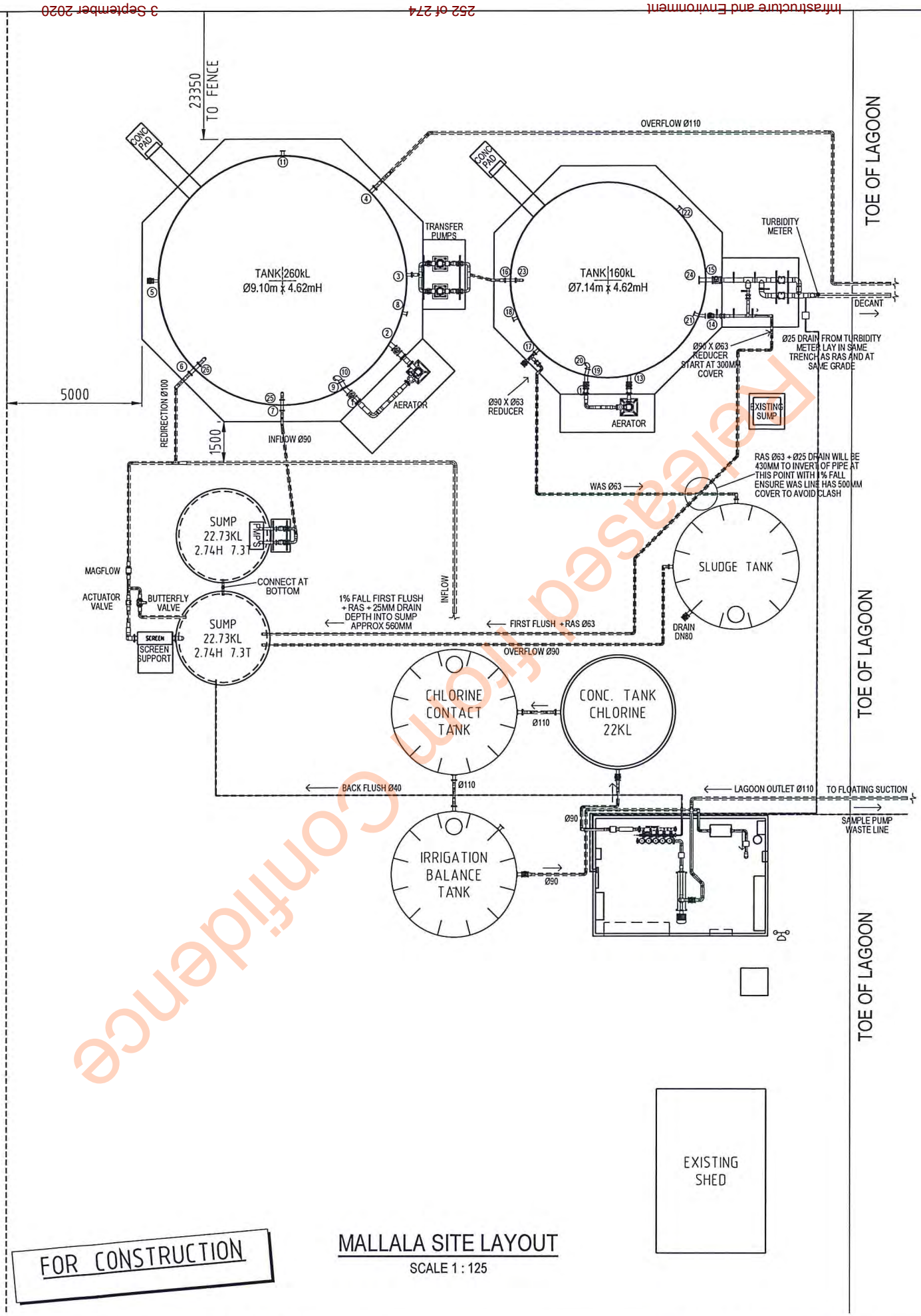
Note 5: All extensions/upgrades/modifications to the system will be subject to separate application (s) and approval from the DHA.

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Infrastructure and Environment Committee Meeting



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FOR CONSTRUCTION

MALLALA SITE LAYOUT

SCALE 1 : 125

DESIGNED	T.C.	-	AUTHORIZED		
DRAWN	R.C.	-	SIGNATURE	04/10/17 DATE	
REVIEWED	M.B.	-	MATT BALL		
	INITIALS	DATE	PRINT NAME		
CONTRACT NUMBER:		-			

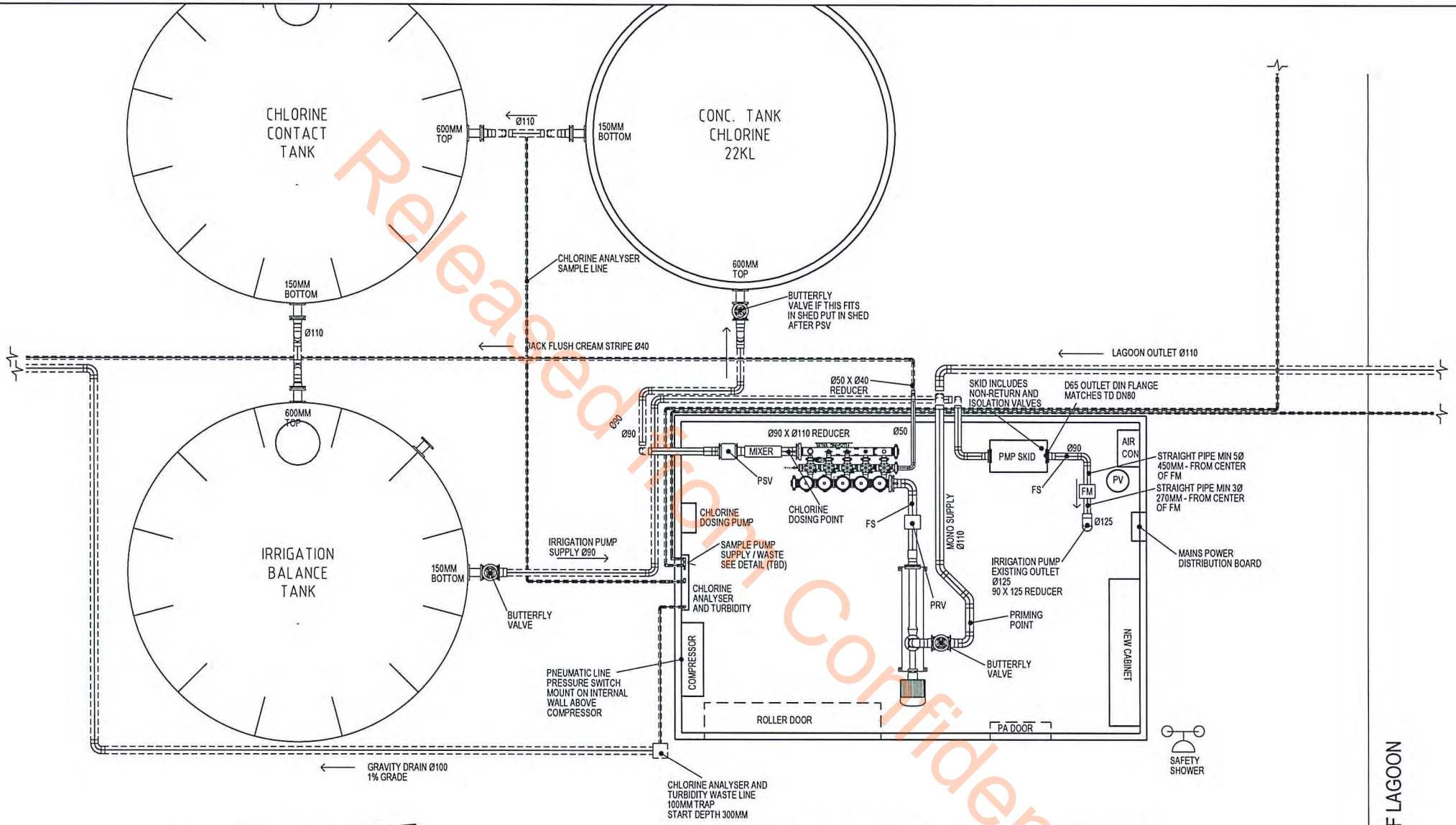
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Pt Adelaide SA 5015
PH: 08 8240 2733
FX: 08 8447 8122
email: admin@alanowater.com

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MALLALA WWTP SITE LAYOUT

SHEET SIZE A3	ALANO WATER PROJECT NUMBER 8132 -	REVISION 2
	DRAWING SCALE: 1 : 125 -	
SHEET COUNT	1 OF 6	
DRAWING NUMBER	2017 - 008132 - - S01	
	YEAR NUMBER SHEET	

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3 September 2020



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FOR CONSTRUCTION

IRRIGATION SHED DETAIL 1

SCALE 1 : 50

REVISIONS	REV	DATE	DRN	DESCRIPTION	APPRV'D
	2	09/02	J.M.	INCLUDE SAMPLE PUMP TURBIDITY	M.B
	1	01/02	J.M.	FOR CONSTRUCTION	M.B
	B	20/11	J.M.	UPDATE AS PER DHA	M.B
	A	18/10	J.M.	FOR APPROVAL	M.B

DESIGNED	T.C.	05/07	AUTHORIZED
DRAWN	J.M.	05/07	SIGNATURE 05/07/2017 DATE
REVIEWED	M.B.	05/07	MATT BALL
	INITIALS	DATE	PRINT NAME

CONTRACT NUMBER: -

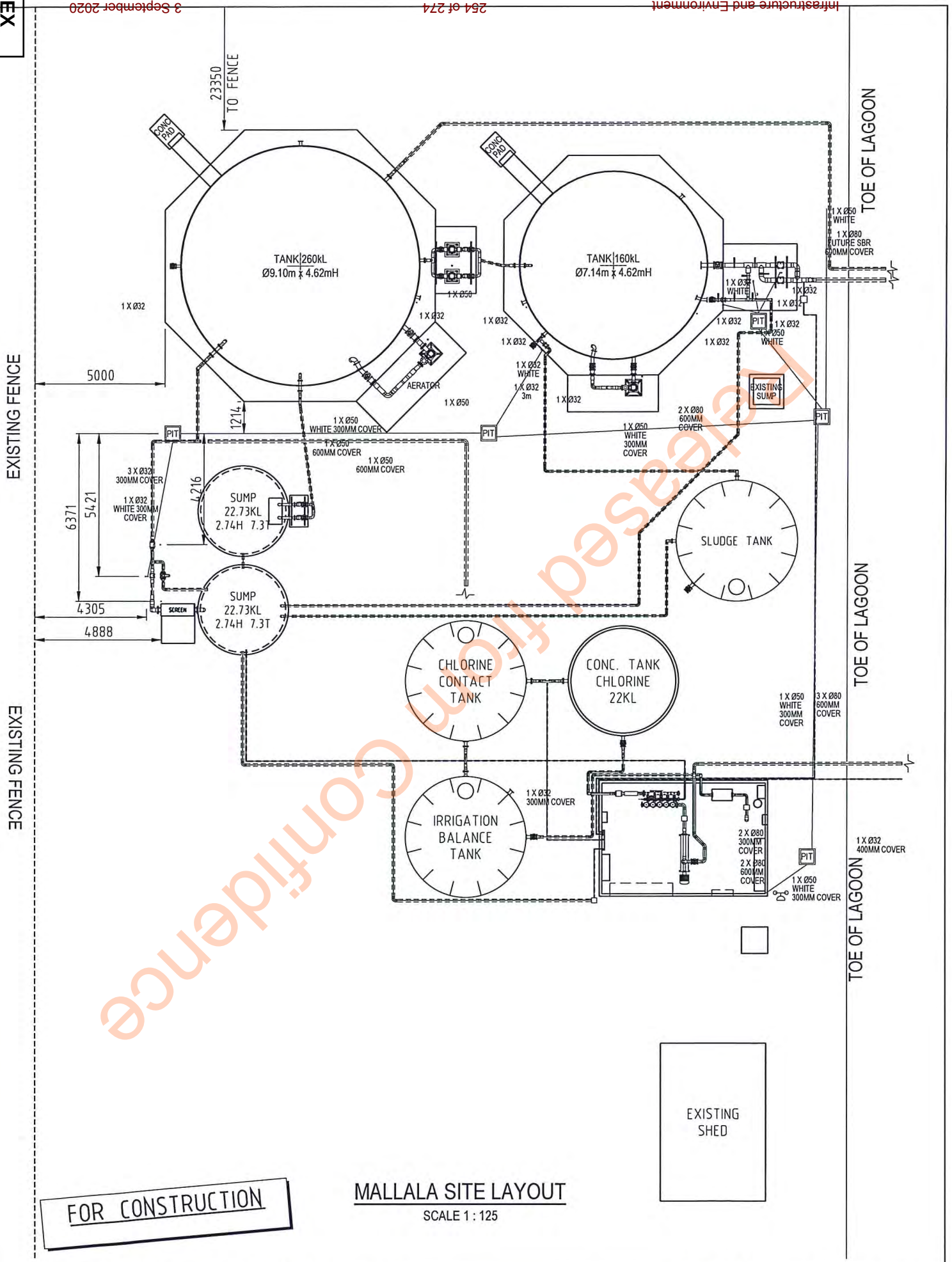
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MALLALA WWTP IRRIGATION SHED LAYOUT

SHEET SIZE A3	ALANO WATER PROJECT NUMBER 8132	REVISION 2
	DRAWING SCALE: AS SHOWN	
SHEET COUNT	2 OF 6	
DRAWING NUMBER	2017 - 008132 - S02	
	YEAR NUMBER SHEET	

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FOR CONSTRUCTION

MALLALA SITE LAYOUT

SCALE 1 : 125

DESIGNED	T.C.	-	AUTHORIZED		
DRAWN	R.C.	-	SIGNATURE	04/10/17 DATE	
REVIEWED	M.B.	-	MATT BALL		
	INITIALS	DATE	PRINT NAME		
CONTRACT NUMBER:		-			

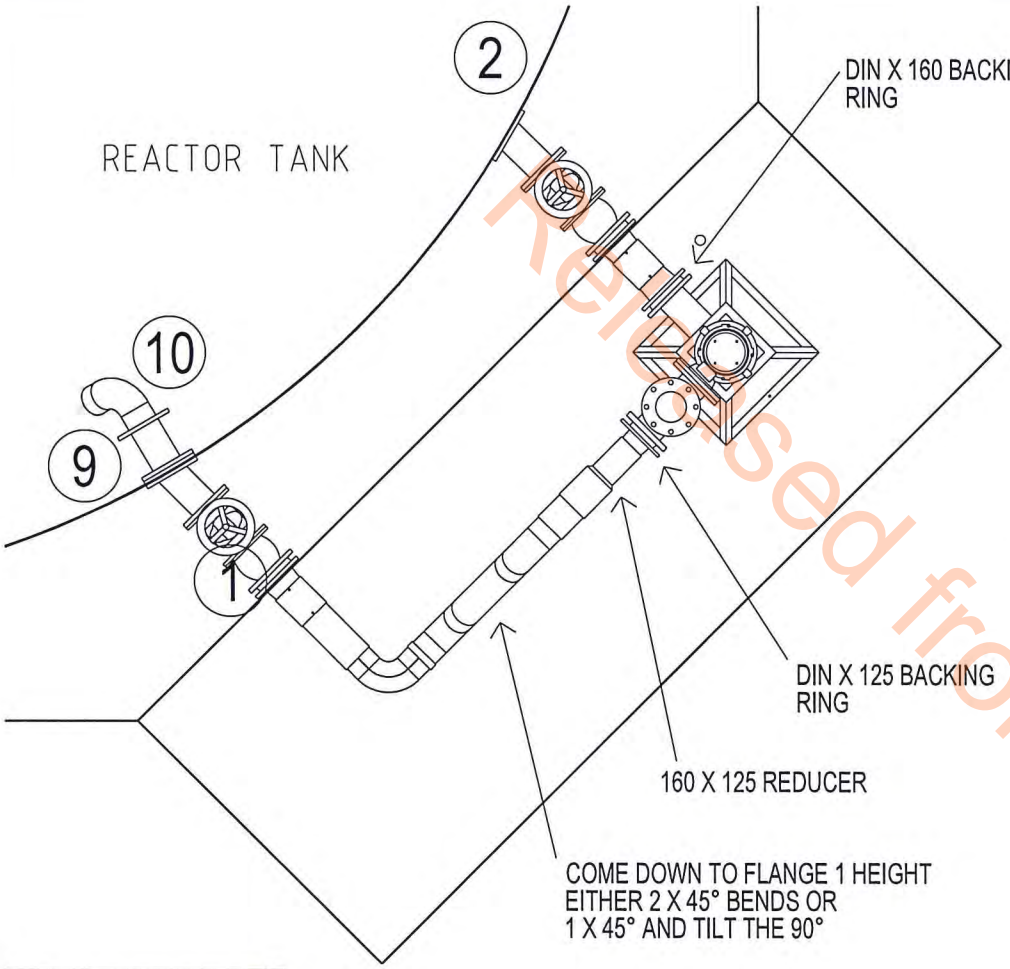
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MALLALA WWTP CONDUIT PENETRATIONS

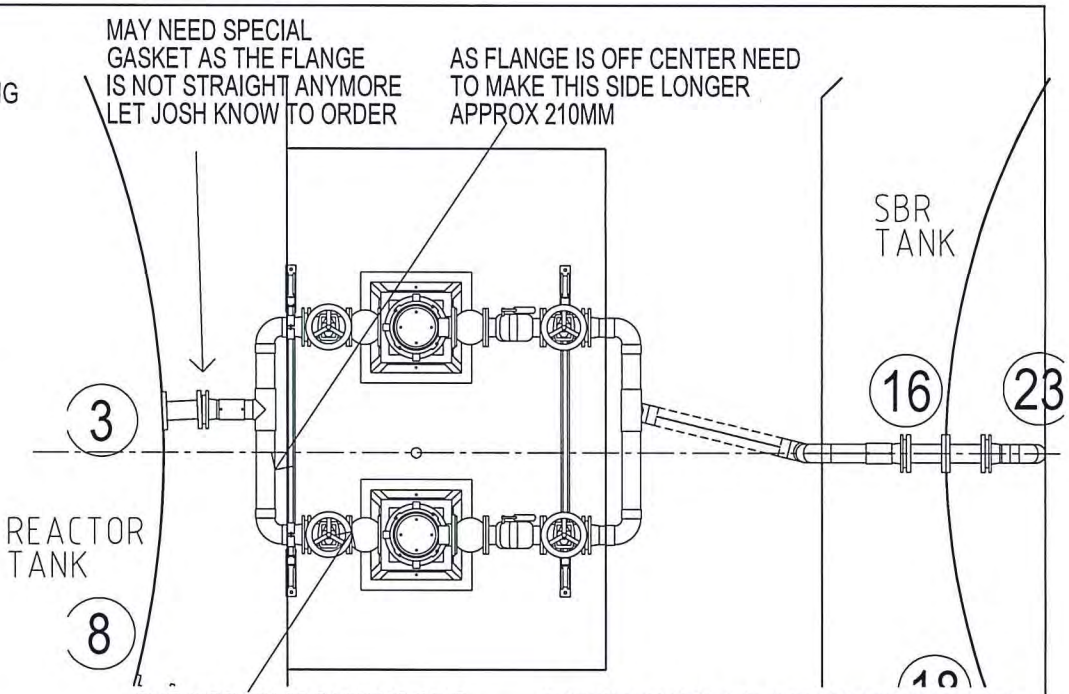
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A3	DRAWING SCALE:	1 : 125 -	1
SHEET COUNT	3 OF 6		
DRAWING NUMBER	2017 - 008132 - - S03		
	YEAR	NUMBER	SHEET

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3 September 2020



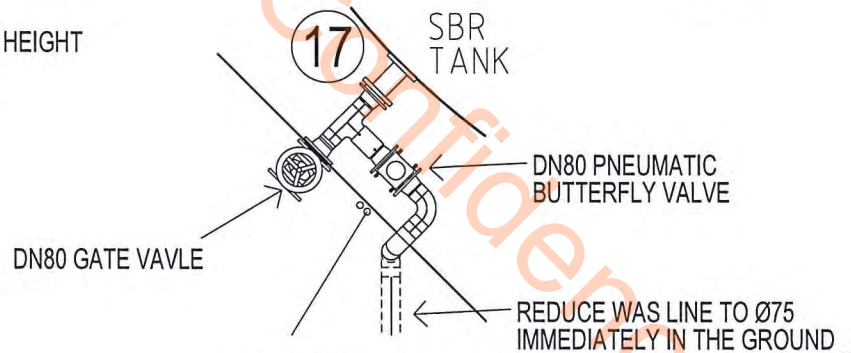
NOTES REACTOR TANK AERATOR:
1. DN160 PIPE WORK
2. AERATOR MODEL KKCM150LA+015042N2

REACTOR TANK AERATOR
SCALE 1 : 25



NOTES REACTOR TO SBR TRANSFER PUMPS:
1. DN90 PIPE WORK
2. PUMP MODEL KKCM080HD+001161N3

REACTOR TANK AERATOR
SCALE 1 : 25



WAS VALVE SET UP
SCALE 1 : 25

FOR CONSTRUCTION

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REVISIONS	REV	DATE	DRN	DESCRIPTION	APPRV'D
	2	09/01	J.M.	FOR CONSTRUCTION	M.B
	1	01/04	J.M.	FOR CONSTRUCTION	M.B
	B	20/11	J.M.	UPDATE AS PER DHA	M.B
	A	18/10	J.M.	FOR APPROVAL	M.B

	INITIALS	DATE
DESIGNED	T.C.	05/07
DRAWN	J.M.	05/07
REVIEWED	M.B.	05/07

AUTHORIZED SIGNATURE 05/07/2017 DATE
MATT BALL PRINT NAME
CONTRACT NUMBER: -

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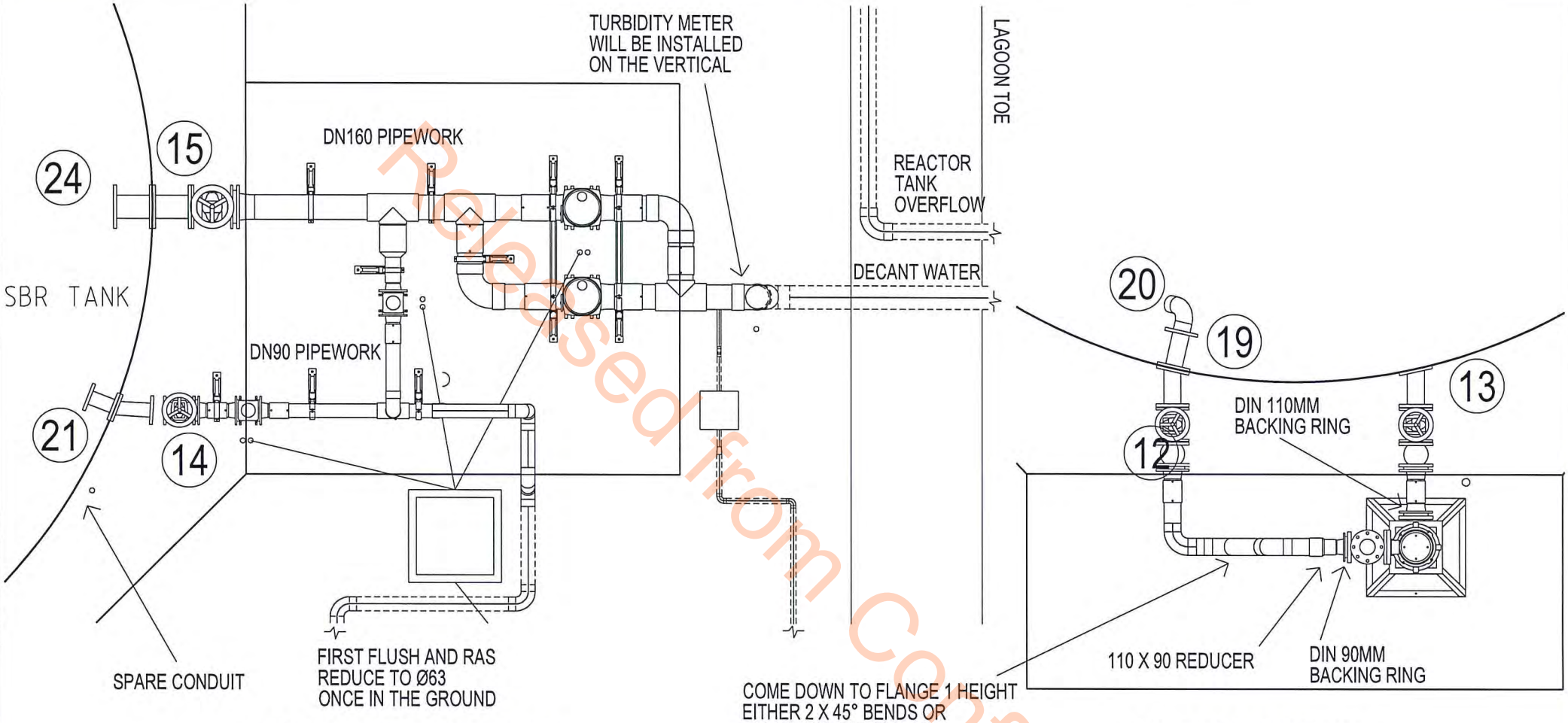
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MALLALA WWTP IRRIGATION SHED LAYOUT

SHEET SIZE A3 | ALANO WATER PROJECT NUMBER 8132 | DRAWING SCALE: AS SHOWN | REVISION 2
SHEET COUNT 4 OF 6
DRAWING NUMBER 2017 - 008132 - S04
YEAR NUMBER SHEET

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DECANT MANIFOLD SBR TANK

SCALE 1 : 25

NOTES SBR TANK AERATOR:
1. DN110 PIPE WORK

SBR TANK AERATOR

SCALE 1 : 25

FOR CONSTRUCTION

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REVISIONS	REV	DATE	DRN	DESCRIPTION	APPRV'D
	2	09/02	J.M.	FOR CONSTRUCTION	M.B
	1	01/02	J.M.	FOR CONSTRUCTION	M.B
	B	20/11	J.M.	UPDATE AS PER DHA	M.B
	A	18/10	J.M.	FOR APPROVAL	M.B

DESIGNED	T.C.	05/07	AUTHORIZED
DRAWN	J.M.	05/07	SIGNATURE 05/07/2017 DATE
REVIEWED	M.B.	05/07	MATT BALL
	INITIALS	DATE	PRINT NAME
CONTRACT NUMBER:		-	

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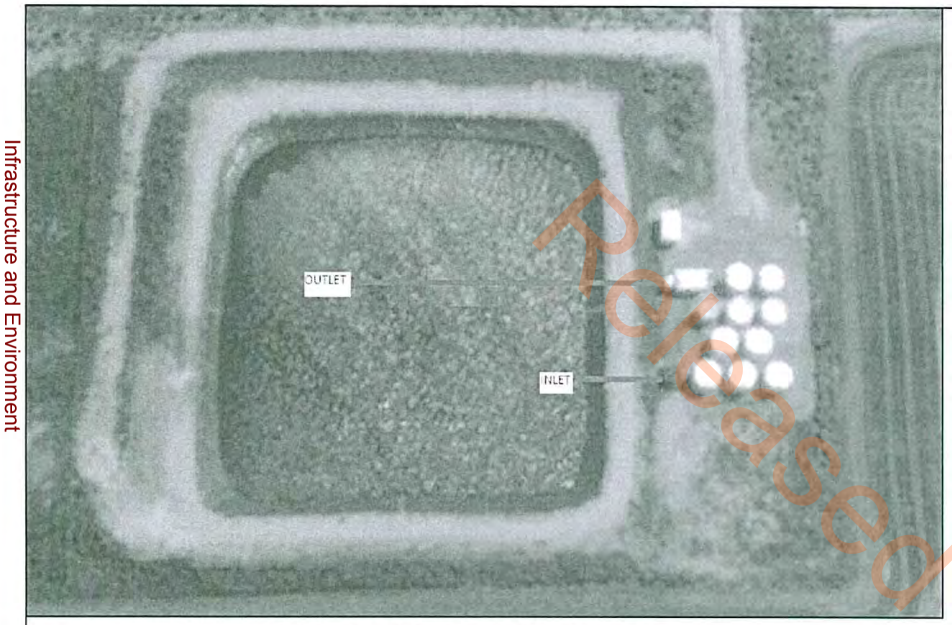
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MALLALA WWTP
IRRIGATION SHED
LAYOUT

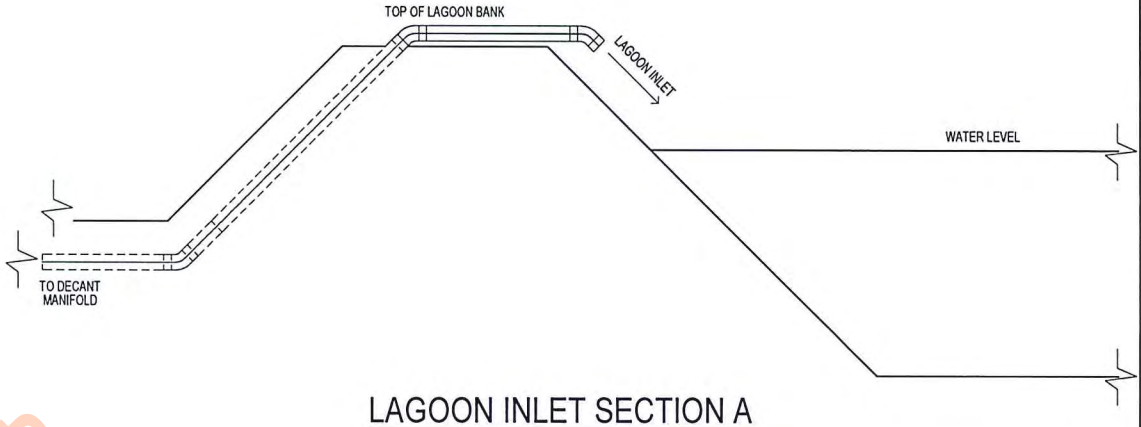
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	DRAWING SCALE: AS SHOWN		
SHEET COUNT 5 OF 6			
DRAWING NUMBER 2017 - 008132 - S05			
YEAR	NUMBER	SHEET	

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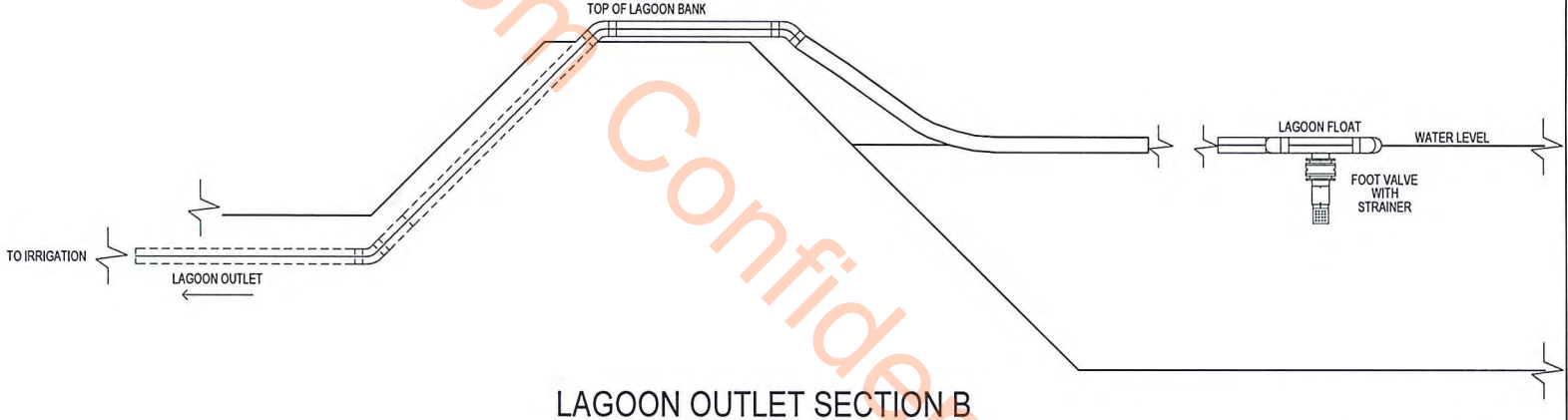
Infrastructure and Environment Committee Meeting
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3 September 2020



HORIZONTAL SEPARATION
SCALE: NTS



LAGOON INLET SECTION A
SCALE: NTS



LAGOON OUTLET SECTION B
SCALE: NTS

NOTE:
SECTION A AND B PROVIDE AN INDICATION OF THE LAGOON INLET AND OUTLET LOCATIONS

FOR CONSTRUCTION

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REVISIONS	REV	DATE	DRN	DESCRIPTION	APPRV'D
	2	09/02	J.M.	FOR CONSTRUCTION	M.B
	1	01/02	J.M.	FOR CONSTRUCTION	M.B
	C	07/12	J.M.	UPDATED AS PER DHA COMMENTS	M.B
	B	14/11	J.M.	UPDATED AS PER DHA COMMENTS	M.B
	A	24/10	J.M.	FOR APPROVAL	M.B

	INITIALS	DATE
DESIGNED	T.C.	05/07
DRAWN	J.M.	05/07
REVIEWED	M.B.	05/07

CONTRACT NUMBER: -

AUTHORIZED
SIGNATURE
05/07/2017
DATE
MATT BALL
PRINT NAME

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MALLALA WWTP
LAGOON DETAILS

SHEET SIZE	A3	ALANO WATER PROJECT NUMBER	8132
		DRAWING SCALE:	AS SHOWN
REVISION	2		
SHEET COUNT	6 OF 6		
DRAWING NUMBER	2017 - 008132 - S06		
	YEAR	NUMBER	SHEET

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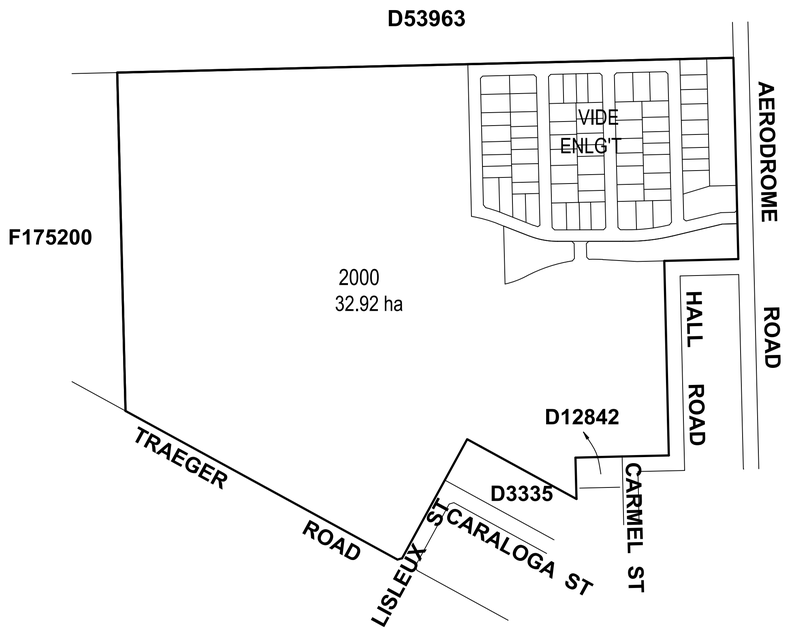
APPENDIX B

DEVELOPMENT PLANS

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SITE PLAN
NOT TO SCALE





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Development No. 312/D048/19
Adelaide Plains Council

Proposed Plan of Division
Allotment 1 in D20237
Hundred of Grace
in the area named
MALALA

CT 5451/518

0 10 20 40 60 80 100 m

1:1000

AMENDED PLAN
17.02.2020

AMENDED PLAN
12.03.2020

N
W E
S

No. of proposed allotments	71
Total Area	40.77ha
Stage 1 Area	8.868ha
Reserve area	(11.9% of Stage 1) 1.054ha
Length of new roads	1410m

The land is generally flat.

Road pavements shown are indicative only.

Not to be used for detailed engineering design.

Dimensions and areas are subject to survey.

© ALEXANDER & SYMONDS PTY. LTD.
Original Sheet Size A1

Glenn Ian Hordacre
LICENSED SURVEYOR

REF: A009119.0000	
DWG NO.: A009119PROP1(C)	
REVISION: C	
DEL 12.03.2020	

Alexander & Symonds Pty Ltd
11 King William Street Kent Town,
South Australia 5067
PO Box 1000 Kent Town, SA 5071
DX 209 ABN 93007 753 988

T (08) 8130 1666
F (08) 8362 0099
W www.alexander.com.au
E adelaide@alexander.com.au

+ Property + Land Development +
+ Construction + Mining +
+ Spatial Information Management +

Alexander Symonds Surveying Consultants

MASTERPLAN

Allotment 1 in D20237
Hundred of Grace
in the area named
MALLALA

CT 5451/518



LOTS	24.811 ha
Ret Village	1.000 ha
ROADS	8.587 ha
RESERVES	6.374 ha
TOTAL	40.772 ha
Area of Swales	2.387ha

0 20 40 80 120 160 200 m

1:2000 @ B2

N
W E
S

Dimensions and areas are subject to survey.

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Original Sheet Size B2

LICENSED SURVEYOR

REF: **A009119.0000**	
DWG NO.: A009119 OPTION2 REV B ATREAS	
REVISION: A	
DEL 14.02.2020	

Alexander & Symonds Pty Ltd
11 King William Street Kent Town,
South Australia 5067
PO Box 1000 Kent Town, SA 5071
DX 209 ABN 93007 753 988

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W www.alexander.com.au
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APPENDIX C

WATER BALANCE

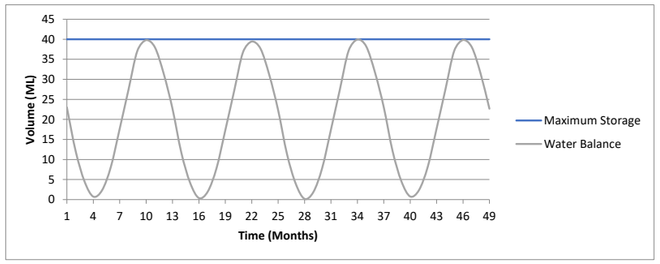
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Water Balance Spreadsheet

CALCULATIONS

General Design Parameters

Maximum Allowable Storage Volume, Vmax (ML)	40
Batter slope (1V:xH)	3
Depth (m)	5.6
Width at Natural Surface (m)	100.66
Width at Water Surface (m)	83.80
Lagoon Surface Area to Top of Batter, A_{lag} (m^2)	10133
Average Water Surface Area, A_{wat} (m^2)	7023
Hydraulic Design Load for Scheme, HDL (L/day)	308176
Assumed Storage at End of December, V_{init} (ML)	23
Evaporation Loss Ratio	0.8



Irrigation Assessment

Irrigation Area (Ha)	11.16

FROM IPOS

Assumptions

Functional Purpose	TQVS 1		
BoM Region	Roseworthy		
Area	1	Ha	*Results are per hectare*
Reduction Factor	79%		
Reduced Irrigation	9.6	ML/Ha/year	
Total	107.1	ML/year	
Does the Lagoon Empty?	**NO**		
Does the Lagoon Spill?	**NO**		

IPOS VALUES	July	August	September	October	November	December	January	February	March	April	May	June
Days in Month	31	31	30	31	30	31	31	28	31	30	31	30
Irrigation requirement (kL)	0	0	732	1238	1697	1941	2169	1703	1415	830	428	0
Reduced Irrigation requirement (kL)	0.0	0.0	578.3	978.0	1340.6	1533.4	1713.5	1345.4	1117.9	655.7	338.1	0.0
Ratio	0%	0%	6%	10%	14%	16%	18%	14%	12%	7%	4%	0%
KL/day	0.00	0.00	19.28	31.55	44.69	49.46	55.27	48.05	36.06	21.86	10.91	0.00
mm/day	0.00	0.00	1.93	3.15	4.47	4.95	5.53	4.80	3.61	2.19	1.09	0.00

	Year 1								
Water Balance	**Inflow**				**Outflow**				**Balance**
Month	**Days in Month**	**Rainfall Depth* (mm/month)**	**Rainfall Inflow (ML)**	**Effluent Inflow (ML)**	**Daily Evap Depth* (mm/day)**	**Monthly Evap (mm)**	**Evap Loss (ML)**	**Main Irrigation (ML)**	**End of Month Storage (ML)**
January	31	18.3	0.2	9.6	8.9	276	1.6	19.1	12.1
February	28	18.9	0.2	8.6	8.4	235	1.3	15.0	4.6
March	31	19	0.2	9.6	6.2	192	1.1	12.5	0.7
April	30	33.5	0.3	9.2	4	120	0.7	7.3	2.3
May	31	45.6	0.5	9.6	2.2	68	0.4	3.8	8.2
June	30	47.9	0.5	9.2	1.5	45	0.3	0.0	17.7
July	31	45.5	0.5	9.6	1.5	47	0.3	0.0	27.4
August	31	45.6	0.5	9.6	2.1	65	0.4	0.0	37.1
September	30	42.4	0.4	9.2	3	90	0.5	6.5	39.8
October	31	36	0.4	9.6	4.6	143	0.8	10.9	38.0
November	30	25.4	0.3	9.2	6.7	201	1.1	15.0	31.4
December	31	22.6	0.2	9.6	8.2	254	1.4	17.1	22.6
			365				Total	107.1	241.9

	Year 2			Year 3 (Wet Year)						Year 4		
Water Balance	**Flows**		**Balance**	**Inflow**			**Outflow**		**Balance**	**Flows**		**Balance**
Month	**Inflow (ML)**	**Outflow (ML)**	**End of Month Storage (ML)**	**Rainfall Depth* (mm)**	**Rainfall Inflow (ML)**	**Effluent Inflow (ML)**	**Evap Loss (ML)**	**Main Irrigation (ML)**	**End of Month Storage (ML)**	**Inflow (ML)**	**Outflow (ML)**	**End of Month Storage (ML)**
January	9.7	20.7	11.7	23.2	0.2	9.6	1.6	19.1	11.4	9.7	20.7	12.1
February	8.8	16.3	4.2	24.0	0.2	8.6	1.3	15.0	3.9	8.8	16.3	4.6
March	9.7	13.6	0.4	24.1	0.2	9.6	1.1	12.5	0.2	9.7	13.6	0.8
April	9.6	8.0	2.0	42.5	0.4	9.2	0.7	7.3	1.9	9.6	8.0	2.4
May	10.0	4.2	7.8	57.8	0.6	9.6	0.4	3.8	7.9	10.0	4.2	8.2
June	9.7	0.3	17.3	60.8	0.6	9.2	0.3	0.0	17.5	9.7	0.3	17.7
July	10.0	0.3	27.1	57.7	0.6	9.6	0.3	0.0	27.3	10.0	0.3	27.5
August	10.0	0.4	36.7	57.8	0.6	9.6	0.4	0.0	37.1	10.0	0.4	37.1
September	9.7	7.0	39.4	53.8	0.5	9.2	0.5	6.5	39.9	9.7	7.0	39.8
October	9.9	11.7	37.6	45.7	0.5	9.6	0.8	10.9	38.2	9.9	11.7	38.0
November	9.5	16.1	31.1	32.2	0.3	9.2	1.1	15.0	31.7	9.5	16.1	31.4
December	9.8	18.5	22.3	28.7	0.3	9.6	1.4	17.1	23.0	9.8	18.5	22.7

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ANNEXURE B:

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MALLALA CWMS CAPACITY ASSESSMENT

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MALLALA CWMS CAPACITY ASSESSMENT

Concept Design Estimate

Mallala CWMS Augmentation Summary — Rates Current At August 2020

Mallala			Total Cost
CWMS	**CWMS NETWORK**		
C1	CWMS Sewer Network - Stage 1		59,563.91
C2U	CWMS Sewer Network - Ultimate		434,146.05
		CWMS - CWMS NETWORK	***$493,709.96***
IR	**IRRIGATION NETWORK**		
I1	Irrigation Main - Stage 1		83,080.89
I1U	Irrigation Main - Ultimate		131,152.11
		IR - IRRIGATION NETWORK	***$214,233.00***
WWTP	**WASTEWATER TREATMENT PLANT**		
UWW	Wastewater Treatment Plant Augmentation - Ultimate		934,535.39
		WWTP - WASTEWATER TREATMENT PLANT	***$934,535.39***
WS	**WINTER STORAGE LAGOON**		
1WS	Effluent Winter Storage - Stage 1		1,311,747.65
		WS - WINTER STORAGE LAGOON	***$1,311,747.65***
		ESTIMATED NET COST	**$2,954,226.00**

MARGINS & ADJUSTMENTS

Professional Fees and Charges	Excl.
Client Direct Costs	Excl.
Escalation Beyond 2020	Excl.
Goods and Services Taxation	Excl.
ESTIMATED TOTAL COST	**$2,954,226.00**

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MALLALA CWMS CAPACITY ASSESSMENT

Concept Design Estimate

Mallala Main Headings/Sub Headings Item

CWMS CWMS NETWORK

C1 CWMS Sewer Network - Stage 1 — Rates Current At August 2020

	Description	Unit	Qty	Rate	Total
	Preliminaries				
68	Contractor's Preliminaries	Item			15,000.00
77	Contractor's Design Fees	Item			3,000.00
55	Contractor's Design and Construct Design Contingency	Item			2,621.10
	Preliminaries				***$20,621.10***
	Demolition				
4	Allowance to remove existing cattle fence	Item			545.00
5	Allowance to remove existing minor vegetation and trees	Item			1,000.00
11	Demolish existing maintenance shaft (TMS 1.2) on Aerodrome Road and dispose debris off site	No	1.0	2,040	2,040.00
	Demolition				***$3,585.00***
	Sewer Rising Main				
6	Allowance to provide 100mm dia. pressure sewer connection to development site including valves and valve box	No	1.0	1,500	1,500.00
7	Supply and lay DN125 PN12 HDPE pipe by directional drilling including mobilisation and demolisation of boring machine and crew, 2 hydro vacuum trucks with operators, dumping of hydro vacuum waste classified as clean fill, excavation and backfilling of entry and exit holes including pavement reinstatements	m	105.3	130	13,689.00
12	Construct new manhole onto existing 150mm dia. sewer drain in place of existing terminal maintenance shaft (TMS 1,2) on Aerodrome Road including, excavation, bedding, backfill and road reinstatement	No	1.0	8,500	8,500.00
14	Supply and install scour valve including fittings and street box	No	1.0	1,400	1,400.00
16	Supply and install air valve including fittings and street box	No	1.0	3,800	3,800.00
17	Supply and install isolation valve including fittings and street box	No	1.0	1,025	1,025.00
	Sewer Rising Main				***$29,914.00***
	Client Contingency				
56	Client's Construction Contingency	Item			5,443.81
	Client Contingency				***$5,443.81***
	Exclusions				
36	No allowance for rock excavation	Item			Excl.
37	No allowance for dewatering	Item			Excl.
38	No allowance to handle any contaminated soil	Item			Excl.
	Exclusions				***Excl.***
	CWMS SEWER NETWORK - STAGE 1				***$59,563.91***

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MALLALA CWMS CAPACITY ASSESSMENT

Concept Design Estimate

Mallala Main Headings/Sub Headings Item

CWMS CWMS NETWORK

C2U CWMS Sewer Network - Ultimate

Rates Current At August 2020

	Description	Unit	Qty	Rate	Total
	Preliminaries				
69	Contractor's Preliminaries	Item			50,000.00
77	Contractor's Design Fees	Item			15,000.00
55	Contractor's Design and Construct Design Contingency	Item			19,104.49
	Preliminaries				***$84,104.49***
	Sewer Rising Main				
3	Supply and lay DN125 PN12 HDPE pipe in 900mm wide common service trench between Aerodrome Road and Wasleys Road including excavation, bedding and backfilling	m	1,116.0	102	113,832.00
7	Supply and lay DN125 PN12 HDPE pipe by directional drilling including mobilisation and demolisation of boring machine and crew, 2 hydro vacuum trucks with operators, dumping of hydro vacuum waste classified as clean fill, excavation and backfilling of entry and exit holes including pavement reinstatements	m	1,183.7	130	153,881.00
13	Allowance to connect new rising main into existing WWTP inlet pipework	No	1.0	2,500	2,500.00
14	Supply and install scour valve including fittings and street box	No	3.0	1,400	4,200.00
16	Supply and install air valve including fittings and street box	No	3.0	3,800	11,400.00
17	Supply and install isolation valve including fittings and street box	No	3.0	1,025	3,075.00
18	Cap existing DN125 PN12 HDPE pipe outside manhole on Aerodrome Road including demolition and reinstatement of existing pavement	No	1.0	3,825	3,825.00
19	Connect into existing DN125 PN12 HDPE pipe to divert flow from existing gravity sewer to proposed CWMS DN125 PN12 HDPE rising main including demolition and reinstatement of existing pavement	No	1.0	2,650	2,650.00
74	Allowance for sewer connection on Calaroga Street for 54 new allotments	Item			15,000.00
	Sewer Rising Main				***$310,363.00***
	Client Contingency				
56	Client's Construction Contingency	Item			39,678.56
	Client Contingency				***$39,678.56***
	Exclusions				
36	No allowance for rock excavation	Item			Excl.
37	No allowance for dewatering	Item			Excl.
38	No allowance to handle any contaminated soil	Item			Excl.
	Exclusions				***Excl.***
	CWMS SEWER NETWORK - ULTIMATE				***$434,146.05***

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MALLALA CWMS CAPACITY ASSESSMENT

Concept Design Estimate

Mallala Main Headings/Sub Headings Item

IR IRRIGATION NETWORK

I1 Irrigation Main - Stage 1

Rates Current At August 2020

Description		Unit	Qty	Rate	Total
Preliminaries					
70	Contractor's Preliminaries	Item			20,000.00
77	Contractor's Design Fees	Item			3,000.00
55	Contractor's Design and Construct Design Contingency	Item			3,655.95
	Preliminaries				***$26,655.95***
Recycled Water Rising Main					
9	Allowance to provide a new 100mm dia. irrigation property connection point to development	No	1.0	1,500	1,500.00
20	Connect proposed DN125 PN12 HDPE irrigation main to existing DN90 PN10 HDPE irrigation main including demolition and reinstatement of existing pavement	No	1.0	2,450	2,450.00
21	Supply and lay DN125 PN12 HDPE pipe in 900mm wide common service trench between Aerodrome Road and Wasleys Road (cost of excavation, bedding and backfilling is covered under CWMS component)	m	167.1	38	6,349.80
22	Supply and lay DN125 PN12 HDPE pipe by directional drilling including mobilisation and demolisation of boring machine and crew, 2 hydro vacuum trucks with operators, dumping of hydro vacuum waste classified as Clean fill, excavation and backfilling of entry and exit holes including any pavement reintatement	m	296.4	130	38,532.00
	Recycled Water Rising Main				***$48,831.80***
Client Contingency					
56	Client's Construction Contingency	Item			7,593.14
	Client Contingency				***$7,593.14***
	IRRIGATION MAIN - STAGE 1				***$83,080.89***

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MALLALA CWMS CAPACITY ASSESSMENT

Concept Design Estimate

Mallala Main Headings/Sub Headings Item

IR IRRIGATION NETWORK

I1U Irrigation Main - Ultimate

Rates Current At August 2020

	Description	Unit	Qty	Rate	Total
	Preliminaries				
75	Contractor's Preliminaries	Item			30,000.00
77	Contractor's Design Fees	Item			4,500.00
55	Contractor's Design and Construct Design Contingency	Item			5,771.32
	Preliminaries				***$40,271.32***
	Recycled Water Rising Main				
21	Supply and lay DN125 PN12 HDPE pipe in 900mm wide common service trench between Aerodrome Road and Wasleys Road (cost of excavation, bedding and backfilling is covered under CWMS component)	m	774.9	38	29,446.20
22	Supply and lay DN125 PN12 HDPE pipe by directional drilling including mobilisation and demolisation of boring machine and crew, 2 hydro vacuum trucks with operators, dumping of hydro vacuum waste classified as Clean fill, excavation and backfilling of entry and exit holes including any pavement reintatement	m	184.6	130	23,998.00
23	Allowance to connect DN125 PN12 HDPE rising main pipe to new irrigation pump at existing irrigation compound	No	1.0	1,850	1,850.00
24	Allowance to supply and install new irrigation pump within existing irrigation shed including suction	No	1.0	23,600	23,600.00
	Recycled Water Rising Main				***$78,894.20***
	Client Contingency				
56	Client's Construction Contingency	Item			11,986.59
	Client Contingency				***$11,986.59***
	IRRIGATION MAIN - ULTIMATE				***$131,152.11***

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MALLALA CWMS CAPACITY ASSESSMENT

Concept Design Estimate

Mallala Main Headings/Sub Headings Item

WWTP WASTEWATER TREATMENT PLANT

UWW Wastewater Treatment Plant Augmentation - Ultimate

Rates Current At August 2020

	Description	Unit	Qty	Rate	Total
	Preliminaries				
67	Contractor's Preliminaries	Item			65,000.00
77	Contractor's Design Fees	Item			30,000.00
55	Contractor's Design and Construct Design Contingency	Item			41,124.00
	Preliminaries				***$136,124.00***
	Wastewater Treatment Plant Upgrade				
42	Allowance to re-configure existing pipe work and control system to accommodate new effluent storage lagoon into WWTP process	Item			80,000.00
43	Allowance to supply and install an additional 260KL Balance/Reactor Tank including aerator, transfer pumps, associated civil works, hydraulic and electrical infrastructure	No	1.0	98,000	98,000.00
44	Allowance to supply and install an additional 185KL Sequence Batch Reactor (SBR) Tank including aerator, associated civil works, hydraulic and electrical infrastructure	No	1.0	88,000	88,000.00
45	Allowance to re-configure existing hydraulic pipework, electrical cabling and communication services to incorporate new tanks into WWTP process	Item			35,000.00
46	Allowance to increase size of existing control shed to accommodate new irrigation infrastructure	Item			60,000.00
51	Allowance to supply and install irrigation transfer pump to meet new demand including associated valving and electrical infrastructure	Item			35,000.00
52	Allowance to supply and install a new electrical and control cabinet to accommodate new infrastructure	Item			45,000.00
53	Allowance for the augmentation of the existing power supply to site to accommodate additional infrastructure	Item			250,000.00
66	Allowance to supply and install additional waste activated sludge tank (WAS) including associated pipework	Item			22,000.00
	Wastewater Treatment Plant Upgrade				***$713,000.00***
	Client Contingency				
56	Client's Construction Contingency	Item			85,411.39
	Client Contingency				***$85,411.39***
	Exclusions				
36	No allowance for rock excavation	Item			Excl.
37	No allowance for dewatering	Item			Excl.
38	No allowance to handle any contaminated soil	Item			Excl.
62	No allowance for the supply and installation on new inlet screen	Note			Excl.
63	No allowance for the augmentation of the existing collection sumps	Note			Excl.

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WWTP WASTEWATER TREATMENT PLANT

UWW Wastewater Treatment Plant Augmentation - Ultimate (continued) Rates Current At August 2020

Description	Unit	Qty	Rate	Total
64 No allowance for the augmentation of the existing disinfection system	Note			Excl.
Exclusions				***Excl.***
WASTEWATER TREATMENT PLANT AUGMENTATION - ULTIMATE				***$934,535.39***

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MALLALA CWMS CAPACITY ASSESSMENT

Concept Design Estimate

Mallala Main Headings/Sub Headings Item

WS WINTER STORAGE LAGOON

1WS Effluent Winter Storage - Stage 1

Rates Current At August 2020

	Description	Unit	Qty	Rate	Total
	Preliminaries				
73	Contractor's Preliminaries	Item			140,000.00
77	Contractor's Design Fees	Item			43,500.00
55	Contractor's Design and Construct Design Contingency	Item			57,723.14
	Preliminaries				***$241,223.14***
	Lagoons				
26	Clear vegetation to stockpile on site within 500m	m²	22,008.0	1	22,008.00
25	Strip 200mm deep topsoil to stockpile on site within 500m	m²	22,008.0	3	66,024.00
27	Cut to fill works for storage lagoon	m³	17,380.0	23	399,740.00
29	Supply and install megaflo MEG300 leak detection drainage	m	220.0	155	34,100.00
31	Surface preparation prior to liner installation	m²	11,648.0	5	58,240.00
32	Supply and install 2mm smooth HDPE liner including tie-in trench and liner contractor mobilization and de-mobilization	m²	11,648.0	15	174,720.00
33	Supply and install PM2/20 to lagoon access track and site access road including trimming and compaction (Assume 4m wide track)	m²	3,024.0	25	75,600.00
30	Supply and install leak detection inspection point including 225mm DWV pipework, fittings and cast iron cover	No	2.0	2,853	5,706.00
28	Allowance to supply and install interconnecting lagoon pipework between existing and new lagoon	Item			20,000.00
76	Supply and install 1800mm high chain mesh fence with gate	Item			69,000.00
	Lagoons				***$925,138.00***
	Land Acquisition				
65	Land Acquisition (assuming market value $8,000 per ha as per JLL Assessment of Compensation Report)	ha	3.0	8,500	25,500.00
	Land Acquisition				***$25,500.00***
	Client Contingency				
56	Client's Construction Contingency	Item			119,886.51
	Client Contingency				***$119,886.51***
	Exclusions				
36	No allowance for rock excavation	Item			Excl.
37	No allowance for dewatering	Item			Excl.
38	No allowance to handle any contaminated soil	Item			Excl.
	Exclusions				***Excl.***
	EFFLUENT WINTER STORAGE - STAGE 1				***$1,311,747.65***

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