APPLICATION ON NOTIFICATION – CROWN DEVELOPMENT

Type of development:	SECTION 49 - Public Infrastructure
Development Number:	313/V013/15 V1
Applicant:	Bunyip Water Pty Ltd
Nature of Development:	Change to the operational use of the Wingate Dam to store treated waste water (to enable the existing storage capacity of 430ML to be used for this purpose when no inflows from the Gawler River are available).
Subject Land:	Two Wells Road, Gawler River (Allotment 47, DP94551: CT 6203/982)
Development Plan:	Light Regional Council Development Plan
Zone / Policy Area:	Primary Production Zone
Contact Officer:	Simon Neldner
Phone Number:	08 7109 7058
Consultation Start Date:	19 September 2018
Consultation Close Date:	12 October 2018
During the notification period, hard copies of the application documentation can be viewed at the Department of Planning, Transport and Infrastructure, Level 5, 50 Flinders St, Adelaide, during normal business hours. Application documentation may also be viewed during normal business hours at the local Council office (if identified on the public notice).	

Written representations must be received by the close date (indicated above) and can either be posted, hand-delivered, faxed or emailed to the State Commission Assessment Panel (SCAP). A representation form is provided as part of this document.

Any representations received after the close date will not be considered.

Postal Address:
The Secretary
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Street Address:
Development Division
Department of Planning, Transport and Infrastructure
Level 5, 50 Flinders Street
ADELAIDE

Email Address: scapreps@sa.gov.au

Government of South Australia

Department of Planning, Transport and Infrastructure

DEVELOPMENT ACT 1993

NOTICE OF APPLICATION FOR CONSENT TO DEVELOPMENT

SECTION 49 – PUBLIC INFRASTRUCTURE

Notice is hereby given that an application has been made by **Bunyip Water Pty Ltd** (previously sponsored as 'public infrastructure' by the Department of State Development under Section 49 of the *Development Act 1993*) for a variation to the Gawler Water Reuse Project. **Development Application No: 313/V013/15 V1.**

The amended proposal seeks a change to the operational use of the previously approved Wingate Dam to store treated waste water (to enable the existing storage capacity of 430ML to be used for this purpose when no inflows from the Gawler River are available). The current approval limits stormwater storage only within the main basin, with treated waste water accommodated within the 5ML [internal] pumping pond.

The development site comprises the Wingate Dam at Two Wells Road, Gawler River (Allotment 47, DP94551: CT 6203/982). All other elements of the Gawler Water Reuse Project remain as previously approved.

The subject land is located within the Primary Production Zone (Policy Area 3 - General Farming: Precinct 17 – Market Garden) of the Light Regional Council Development Plan (Consolidated 8 December 2016).

The application may be examined during normal office hours at the office of the State Commission Assessment Panel (SCAP), Level 5, 50 Flinders Street, Adelaide. Application documentation may also be viewed on the SCAP website: https://www.saplanningcommission.sa.gov.au/scap/public_notices

Any person or body who desires to do so may make representations concerning the application by notice in writing delivered to the Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide 5001 **NOT LATER THAN FRIDAY 12 OCTOBER 2018.** Submissions may also be made via email to scapreps@sa.gov.au

Each person or body making a representation should state the reason for the representation and whether that person or body wishes to be given the opportunity to appear before the SCAP to further explain the representation.

Submissions may be made available for public inspection.

Should you wish to discuss the application and the public notification procedure please contact **Simon Neldner** on **(08) 7109 7058** or simon.neldner@sa.gov.au.

Alison Gill
SECRETARY
STATE COMMISSION ASSESSMENT PANEL

PN3212

www.sa.gov.au

PN3212
23x2 (63mm)
Gawler Bunyip, Adelaide Advertiser
19 September 2018
APPROVAL REQUIRED BY COB THURS 13.09

DEVELOPMENT ACT, 1993
S49/S49A – CROWN DEVELOPMENT
REPRESENTATION ON APPLICATION

Applicant:	Bunyip Water Pty Ltd
Development Number:	313/V013/15 V1
Nature of Development:	Change to the operational use of the Wingate Dam to store treated waste water (to enable the existing storage capacity of 430ML to be used for this purpose when no inflows from the Gawler River are available).
Zone / Policy Area:	Primary Production Zone
Subject Land:	Two Wells Road, Gawler River (Allotment 47, DP94551: CT 6203/982)
Contact Officer:	Simon Neldner
Phone Number:	08 7109 7058
Close Date:	12 October 2018

My Name: _____ My phone number: _____

Primary method(s) of contact: Email: _____

Postal Address: _____

_____ Postcode: _____

You may be contacted via your nominated PRIMARY METHOD(s) OF CONTACT if you indicate below that you wish to be heard by the State Commission Assessment Panel in support of your submission.

My interests are: *(please tick one)*

- ☐ owner of local property
- ☐ occupier of local property
- ☐ a representative of a company/other organisation affected by the proposal
- ☐ a private citizen

The address of the property affected is: _____

_____ Postcode _____

My interests are: *(please tick one)*

- ☐ I support the development
- ☐ I support the development with some concerns
- ☐ I oppose the development

The specific aspects of the application to which I make comment on are: _____

_____

_____

_____

_____

I: *(please tick one)*

- ☐ wish to be heard in support of my submission
- ☐ do not wish to be heard in support of my submission *(Please tick one)*

By: *(please tick one)*

- ☐ appearing personally
- ☐ being represented by the following person *(Please tick one)*

Signature: _____

Date: _____

Return Address: The Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide, SA 5001 /or
Email: scapadmin@sa.gov.au

Our Ref: 313/265/2018

LIGHT REGIONAL COUNCIL

8 August 2018

Mr Simon Neldner
State Commission Assessment Panel
G P O Box 1815
ADELAIDE SA 5001

Dear Simon,

DEVELOPMENT NUMBER	**313/265/2018**
APPLICANT	**Bunyip Water Pty Ltd**
NATURE OF DEVELOPMENT	**Variation to DA 313/V013/2015 comprising the permanent storage of treated wastewater at the Wingate Basin**
SUBJECT LAND	**1646 Two Wells Road BUCHFELDE, LOT: 47 DP: 94551 CT: 6203/982**

I refer to the abovementioned development application recently lodged with the Light Regional Council.

In 2015 a Section 49 Development Application (313/V013/2015) was submitted which sought approval for the construction of the Wingate Basin on 1646 Two Wells Road, Buchfelde and Hill Basin located at 961 Rosedale Road, Sheaoak Log. This application was granted approval by the Commission and a variation application was later submitted, to allow the temporary storage of treated waste water at the Wingate Basin. This was also granted approval which allowed the temporary storage of treated waste water (recycled water) from Bolivar which is then further treated before entering the Virginia Pipeline Scheme.

The applicant is now seeking to permanently store treated waste water at the Wingate detention basin. The Applicant in their application has advised that a site specific assessment has been undertaken to meet EPA guidelines having regard to potential odour and noise. Treated waste water has been stored within 100 metres of sensitive receptors (dwellings) at the Wingate Basin for 2 years without any reported complaints received by Council. The Wingate Basin is located on Council owned land and as the original application was assessed by the Commission as a Section 49, this application has been forwarded requiring a decision from the Commission.

The Council will not provide any comments on this development given its involvement in the land.
The Commission is also advised that no application fees have been paid to the Council.

It would be appreciated if Council could be informed of the outcome of this application in terms of the Development Plan assessment. Copies of the Development Application Form and information submitted are included.

Please contact the Council Office if further information regarding this question is required by the Commission.

Yours sincerely

Lisa Sapio
Manager – Development Services
Attach: DA Form
Plans
Report from Applicant

Postal Address:
PO Box 72, Kapunda, South Australia 5373

Telephone: (08) 8525 3200
Email: light@light.sa.gov.au
Website: www.light.sa.gov.au

Principal Office
93 Main Street, Kapunda, SA 5373
Fax: (08) 8566 3262

Branch Office
12 Hanson Street, Freeling, SA 5372
Fax: (08) 8525 2441

Light Regional Council ABN: 35 455 841 625

RECEIVED
30 JUL 2018
BY: .....

DEVELOPMENT APPLICATION FORM

PLEASE USE BLOCK LETTERS

COUNCIL: Light Regional Council

APPLICANT: Bunyip Water Pty Ltd

Postal Address: c/- HydroPlan

62 Glen Osmond Rd, Parkside SA 5063

Owner: Light Regional Council

Postal Address: PO Box 72 KAPUNDA SA 5373

BUILDER: _____

Postal Address: _____

_____ Licence No: _____

CONTACT PERSON FOR FURTHER INFORMATION

Name: John Gransbury

Telephone: 0412 600 674 [work] _____ [Ah]

Fax: _____ [work] _____ [Ah]

EXISTING USE: _____

FOR OFFICE USE

Development No: 313/265/2018

~~Previous Development No:~~ 3169999204

~~Assessment No:~~ 18865 A 2837 CT6203/982

☐ Complying	Application forwarded to DA
☐ Non Complying	Commission/Council on
☐ Notification Cat 2	/ /
☐ Notification Cat 3	Decision: _____
☐ Referrals/Concurrences	Type: _____
☐ DA Commission	Date: / /

	Decision required	Fees	Receipt No	Date
Planning:	Y			
Building:				
Land Division:				
Additional:				
Development Approval				

DESCRIPTION OF PROPOSED DEVELOPMENT: Operational flexibility to store VPS water in Wingate Basin

LOCATION OF PROPOSED DEVELOPMENT: Two Wells Road Gawler River

House No: _____ Lot No: ____ Street: _____ Town/Suburb: _____

Section No [full/part] _____ Hundred: _____ Volume: CT 6203 Folio: 982

Section No [full/part] _____ Hundred: _____ Volume: _____ Folio: _____

LAND DIVISION:

Site Area [m^2] _____ Reserve Area [m^2] _____ No of existing allotments _____

Number of additional allotments [excluding road and reserve]: _____ Lease: **YES** ☐ **NO** ☐

BUILDING RULES CLASSIFICATION SOUGHT: _____ Present classification: _____

If Class 5,6,78 or 9 classification is sought, state the proposed number of employees: Male: ____ Female: _____

If Class 9a classification is sought, state the number o persons for whom accommodation is provided: _____

If Class 9b classification is sought, state the proposed number of occupants of the various spaces at the premises: _____

DOES EITHER SCHEDULE 21 OR 22 OF THE DEVELOPMENT REGULATIONS 2008 APPLY? **YES** ☐ **NO** ☐

HAS THE CONSTRUCTION INDUSTRY TRAINING FUND ACT 2008 LEVY BEEN PAID? **YES** ☐ **NO** ☐

DEVELOPMENT COST [do not include any fit-out costs]: $ 10,000

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the Development Regulations 2008.

SIGNATURE: _____ Dated: 30 / 07 / 2018

John Gransbury

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 6203 Folio 982

Parent Title(s) CT 6159/778, CT 6203/980

Creating Dealing(s) TG 12871041

Title Issued 26/02/2018 **Edition** 1 **Edition Issued** 26/02/2018

Estate Type

FEE SIMPLE (RESERVE)

Registered Proprietor

LIGHT REGIONAL COUNCIL
OF PO BOX 72 KAPUNDA SA 5373

Description of Land

ALLOTMENT (RESERVE) 47 DEPOSITED PLAN 94551
IN THE AREA NAMED GAWLER RIVER
HUNDRED OF MUDLA WIRRA

Easements

TOGETHER WITH FREE AND UNRESTRICTED RIGHT(S) OF WAY OVER THE LAND MARKED A ON F253228 (TG 12871041)

Schedule of Dealings

NIL

Notations

Dealings Affecting Title NIL

Priority Notices NIL

Registrar-General's Notes NIL

Administrative Interests

SIGNIFICANT ENVIRONMENTAL BENEFIT 2015_3112

PURPOSE:	DIVISION AND REDESIGNATION OF PARCELS	AREA NAME:	BUCHFELDE, GAWLER RIVER, WARD BELT
MAP REF:	6628/12/D, 6628/12/E	COUNCIL:	LIGHT REGIONAL COUNCIL
LAST PLAN:		DEVELOPMENT NO:	

RE-APPROVED:
JOHN VERDUYN
03/07/2015

DEPOSITED:
SANDY BEAGLEHOLE
03/07/2015

D94551

SHEET 1 OF 5

43498_text_01_v08_Version_8

AGENT DETAILS: MICHAEL GREAR SURVEYS
1397 SOUTH ROAD
BEDFORD PARK SA 5042
PH: 8357 6833
FAX: 8357 6855

AGENT CODE: MGS7P

REFERENCE: 2013087-6D

SURVEYORS CERTIFICATION: I Paul Eiternick , a licensed surveyor do hereby certify - 1) That this plan has been made from surveys carried out by me or under my personal supervision and in accordance with the Survey Act 1992. 2) That the field work was completed on the 12th day of August 2014
3rd day of July 2015 Paul Eiternick Licensed Surveyor

SUBJECT TITLE DETAILS:

PREFIX	VOLUME	FOLIO	OTHER	PARCEL	NUMBER	PLAN	NUMBER	HUNDRED / IA / DIVISION	TOWN	REFERENCE	NUMBER
CT	6063	754		ALLOTMENT(S)	804	D	81965	MUDLA WIRRA		SECTION	42
CT	6094	882		ALLOTMENT(S)	902	D	85887	MUDLA WIRRA		SECTION	41
CT	6058	535		ALLOTMENT(S)	815	D	76384	MUDLA WIRRA		SECTION	34
CT	6059	961		ALLOTMENT(S)	889	D	81793	MUDLA WIRRA		SECTION	34
CT	6152	595		ALLOTMENT(S)	40	D	92745	MUDLA WIRRA		SECTION	42
CT	6152	596		ALLOTMENT(S)	41	D	92745	MUDLA WIRRA MUDLA WIRRA		SECTION SECTION	41 42
CT	6152	597		ALLOTMENT(S)	42	D	92745	MUDLA WIRRA		SECTION	42

OTHER TITLES AFFECTED:

EASEMENT DETAILS:

STATUS	LAND BURDENED	FORM	CATEGORY	IDENTIFIER	PURPOSE	IN FAVOUR OF	CREATION
EXISTING	53	LONG	EASEMENT(S)	A		COMMISSIONER OF HIGHWAYS	RTC12261512
NEW	49	LONG	RIGHT(S) OF WAY WITH LIMITATIONS	B		53	

ANNOTATIONS: CENTRE OF GAWLER RIVER PLOTTED FROM F50552. D30190. LTO A382 AND LTO C576
NO OCCUPATION ON SUBJECT LAND BOUNDARIES UNLESS SHOWN OTHERWISE
PATCHS 20100745

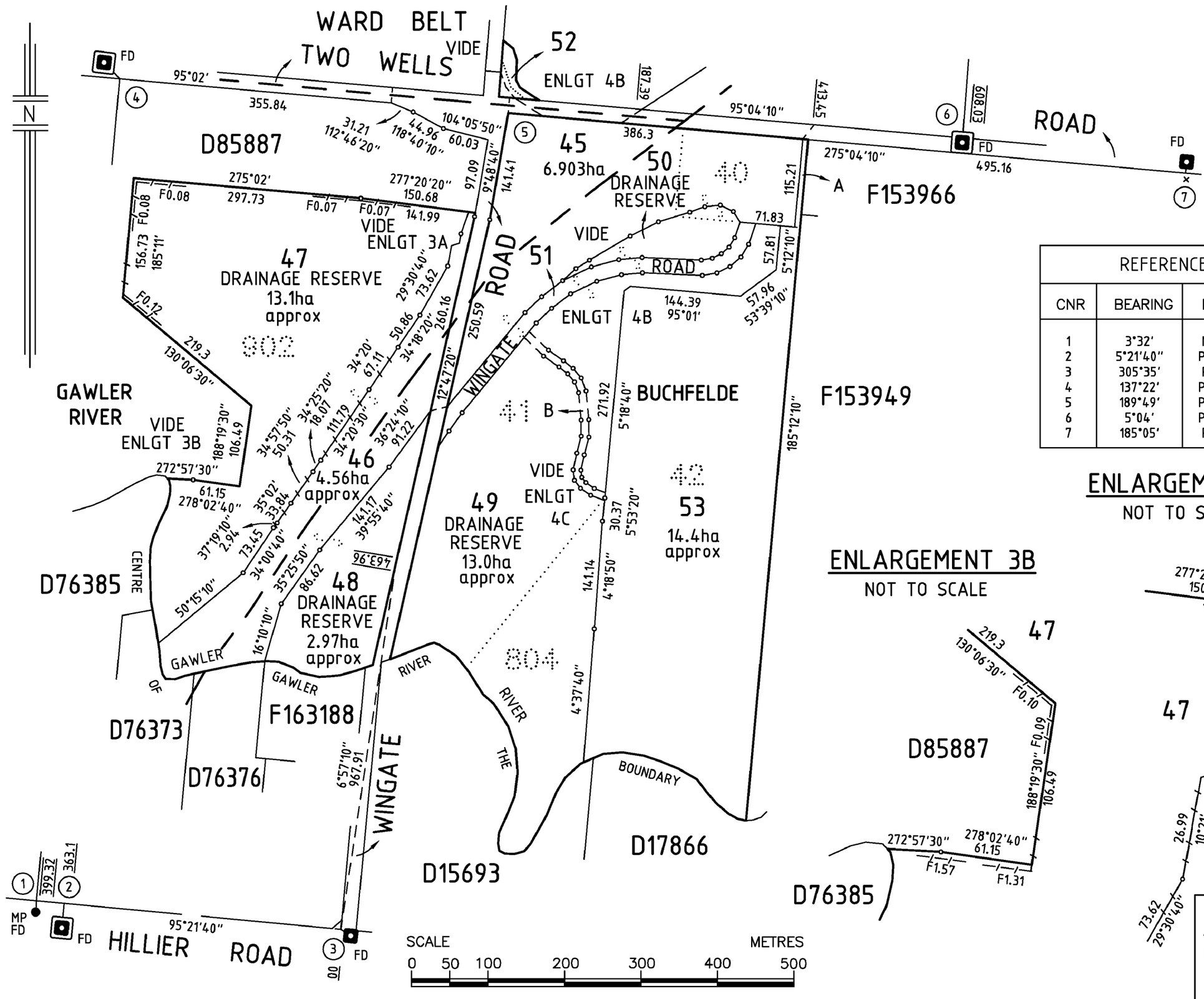
D94551

SHEET 3 OF 5

43498_pland_1_V03_Version_8

BEARING DATUM: MGA 94 ZONE 54
DERIVATION: 6628/37216 – 6628/37554

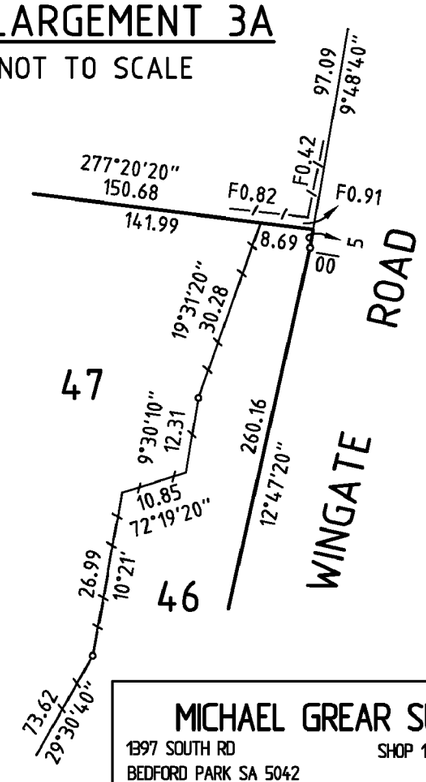
TOTAL AREA:



REFERENCE MARKS				
CNR	BEARING	FROM	DIST.	P.M.No.
1	3°32'	MP FD	0.80	
2	5°21'40"	PSM FD	18.38	6628/37216
3	305°35'	PM FD	1.12	6628/39083
4	137°22'	PSM FD	0.89	6628/39100
5	189°49'	PSM FD	0.60	6628/37553
6	5°04'	PSM FD	0.98	6628/37554
7	185°05'	PM FD	0.60	6628/39141

ENLARGEMENT 3A

NOT TO SCALE



ENLARGEMENT 3B

NOT TO SCALE

MICHAEL GREAR SURVEYS
1397 SOUTH RD
BEDFORD PARK SA 5042
PHONE: 8357 6833
FAX: 8357 6855
REF: 2013087-6D-3

SHOP 1, 61 PATTERSON ST
WHYALLA SA 5600
PHONE: 8644 2040
FAX: 8357 6855
ABN:93205344714

D94551

SHEET 4 OF 5

43498_pland_2_V04_Version_8

52 D81793 WARD BELT

TWO WELLS ROAD

VIDE ENLGT 5D

D85887

45 GAWLER RIVER BUCHFELDE

50 DRAINAGE RESERVE 8563m²

47 DRAINAGE RESERVE

46

48

49 DRAINAGE RESERVE

51

53

WINGATE ROAD 20.12 WIDE

VIDE ENLGT 3A

VIDE ENLGT 4C

CONN ONLY

FD

ENLARGEMENT 4B

SCALE 0 20 40 80 120 160 200 METRES

REFERENCE MARKS				
CNR	BEARING	FROM	DIST.	P.M.No.
5	189°49'	PSM FD	0.60	6628/37553
6	5°04'	PSM FD	0.98	6628/37554

ENLARGEMENT 4C

NOT TO SCALE

MICHAEL GREAR SURVEYS

1397 SOUTH RD
BEDFORD PARK SA 5042
PHONE: 8357 6833
FAX: 8357 6855
REF: 2013087-6D-4

SHOP 1, 61 PATTERSON ST
WHYALLA SA 5600
PHONE: 8644 2040
FAX: 8357 6855
ABN:93205344714

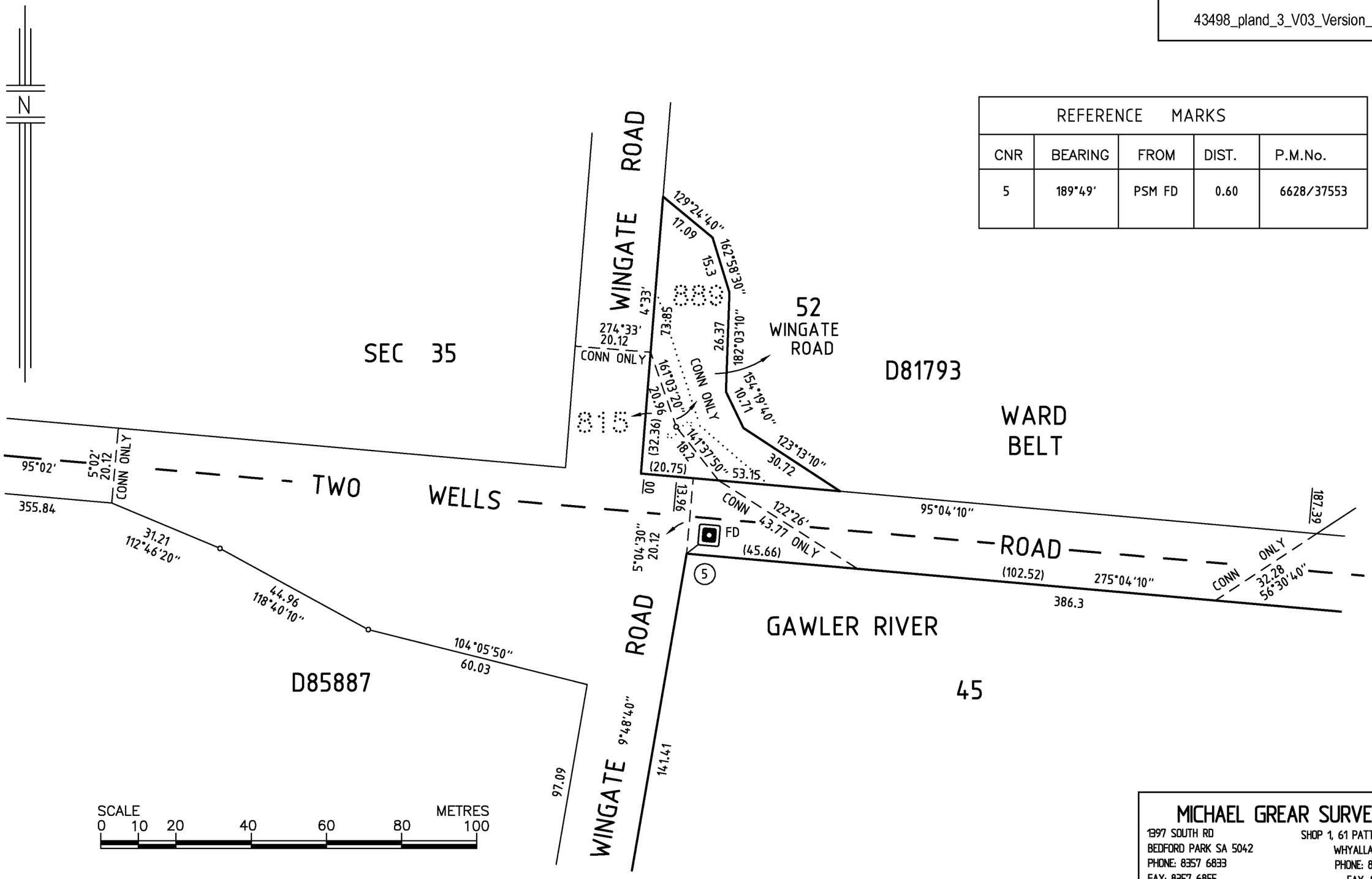
D94551

SHEET 5 OF 5

43498_pland_3_V03_Version_8

ENLARGEMENT 5D

REFERENCE MARKS				
CNR	BEARING	FROM	DIST.	P.M.No.
5	189°49'	PSM FD	0.60	6628/37553



MICHAEL GREAR SURVEYS

1397 SOUTH RD
BEDFORD PARK SA 5042
PHONE: 8357 6833
FAX: 8357 6855
REF: 2013087-6D-5

SHOP 1, 61 PATTERSON ST
WHYALLA SA 5600
PHONE: 8644 2040
FAX: 8357 6855
ABN:93205344714

29 July 2018

Light Regional Council
PO Box 72, Kapunda SA 5373

Attention: Lisa Sapio, Manager - Development Services

Dear Lisa,

Re: Development Application for operational flexibility to store treated wastewater at Wingate Basin

I refer to our recent discussions regarding Bunyip Water's need for operational flexibility to store treated wastewater in the entire facility at Wingate Basin, and attach a development application.

Wingate Basin is a 430 ML water storage facility that was developed as part of the Gawler Water Reuse Scheme (GWRS) under Development Number 313/V013/15 in accordance with s49 (1) of the Act, following endorsement as public infrastructure by the Minister for Investment and Trade.

The Town Planning Statement for 313/V013/15 included extensive data which remains relevant to this current application, save the development has been constructed and commissioned. The description of the proposal for Wingate Basin (Dam) in Section 6.1, and the development assessment in Section 7.1 have not changed materially and neither have the appended reports:

- Lagoon Construction Assessment for both Wingate and Hill Dams – FMG Engineering
- Flood Impact Assessment for Wingate Dam – Australian Water Environments
- NEXY/Wingate Dam Stormwater Management Report - Southfront

Bunyip Water requested clarity from DAC on the matter of VPS storage on 6/06/2016. Following referral to EPA, DEWNR and AMLRNRM, approval was granted by the Minister of Planning's delegate on 12/07/2016 for temporary storage of VPS water in Wingate Basin until the end of 2016. However, it was noted that a separate DA would be required for storage beyond 2016. The associated correspondence is relevant and attached. It includes controlled fill certification of the compacted clay liner by FMG and as-constructed drawings for a typical thickness of 600mm.

The original DA was submitted 8/09/2015 when there was less than 12 months available to deliver the GWRS. Although the stormwater harvesting project had been discussed with the public and Agencies for several years, inclusion of VPS in the project was a very recent addition. This introduced uncertainty and risk to the approval process which was perceived to threaten the core project so a "5 ML pumping pond within a 430 ML dam" was included in the works, enabling the storage of VPS water at Wingate to be minimised and physically separated from stormwater. Whilst this strategy was successful in that a Decision Notice was received 24/12/2015 and the scheme reached the commissioning milestone 31/08/2016, the inability to utilise 425 ML of the Wingate Basin asset for storage of VPS water is no longer desirable.

A marked-up copy of Section 6.1 from the original DA is attached with comments regarding variances. It includes a risk assessment for impact on the environment at Section 6.1.3 for the scenario where 430 ML of VPS was stored at Wingate Basin. This is the same scenario sought for operational flexibility by this current application. Wingate Basin is below the flood plain and will only be flooded during an event with an average recurrence interval of approximately 50 years. So, on the rare occasions when 430 ML of VPS water 'escapes' into the environment, it will be applied directly to the flooded land at the same time as the stormwater that carries it. Gawler River stormwater and VPS water are both suitable for application to land (irrigation).

The ocean outfall from Bolivar is physically close to the Gawler River mouth. Each year around 35,000 ML of treated wastewater is discharged from Bolivar to the ocean, and 15,000 ML is applied to land via the VPS. The average Gawler River flow is 24,000 ML. During a 1 in 50-year flood, the Gawler River flow would be 38,000 ML in one day, and this is the day when 430 ML would 'escape into the environment'. The environmental impact of this 430 ML which is diluted 880 times, needs to be compared to the 1,750,000 ML of treated wastewater that is released directly into the ocean in between 50-year flood events.

The proposal to store 430 ML of VPS at Wingate Basin is part of a plan to increase the usage of VPS water for irrigation, and each ML used will reduce the amount directly discharged from Bolivar to the ocean. The frequency of dry winters like 2015 and 2018 is predicted to increase, but even if only 430 ML more VPS water is consumed once in 5 years, this would still be 10 times more beneficial to the environment compared to discharging the same volume 10 times directly to the ocean between the 50-year floods.

Level 1 Supervision (AS 3798:2007) by a Geotechnical Inspection and Testing Authority (GITA) ensured the constructed clay lining of Wingate Basin met the Construction Quality Assurance (CQA) requirements of EPA guideline 509/14 for Wastewater lagoon construction. A revised Risk Assessment is attached to reflect the larger storage volume and slightly higher risk associated with increased depth. The EPA guideline notes in-situ clay lining can be appropriate for very large lagoons holding cycled water (page 8) and that treated wastewater poses a low risk to the receiving environment (page 20). Bunyip Water's objective of engineering a robust low-permeability water-retaining structure has been achieved, and the EPA's guidelines were consequently met.

The EPA guideline 509/14 for wastewater lagoon construction (page 6) also notes:

> *Separation distances for recycled water storage lagoons are not specified. This is because air (odour) and noise issues are not generally associated with these lagoons, providing wastewater has been treated to minimise odour and they contain no mechanical treatment processes which generate noise. For recycled water storage lagoons, a site-specific assessment should be undertaken to determine appropriate separation from sensitive receptors.*

A site-specific assessment has been conducted and attached. This is based on the August 2016 EPA publication "Evaluation distances for effective air quality and noise management" for compliance with the EPA's Environment Protection Policies for air and noise. It is noted that:

- VPS water was temporarily stored in Wingate Basin until December 2016, without complaint from neighbours
- Since 2016, VPS water has been stored in the 5 ML pumping pond within 170m of a sensitive receptor, without complaint
- Most users of VPS water have earthen storages to receive the water, so storage of VPS water is very common in the region. The distance to the nearest resident at Wingate Basin will be more than double the distance found at many storages in the region
- The quality of VPS water is "Class A" and very similar to stormwater. When the storage is full and nearest to the residents, the water will be deep and dark in both instances

As the current dry season makes it approval more desirable, I respectfully request your advice regarding the process, and look forward to further discussion.

Yours sincerely,

John Gransbury
Irrigation Engineer for Bunyip Water Pty Ltd

ATTACHMENTS

1. Development Application Form
2. As-constructed drawing extracts
3. Approval to store VPS until end of 2016
4. Certification of the compacted clay liner
5. Marked-up Section 6.1 extract from 313/V013/15
6. Revised risk assessment to wastewater lagoon guidelines
7. Assessment of evaluation (separation) distances

Assessment Report

HYDROPLAN

Wingate Basin – Evaluation Distances

ProjectID: 14541-09

Topic: Site specific assessment to meet EPA guidelines

Date: 29/07/2018

Author: John Gransbury

Checked: MA

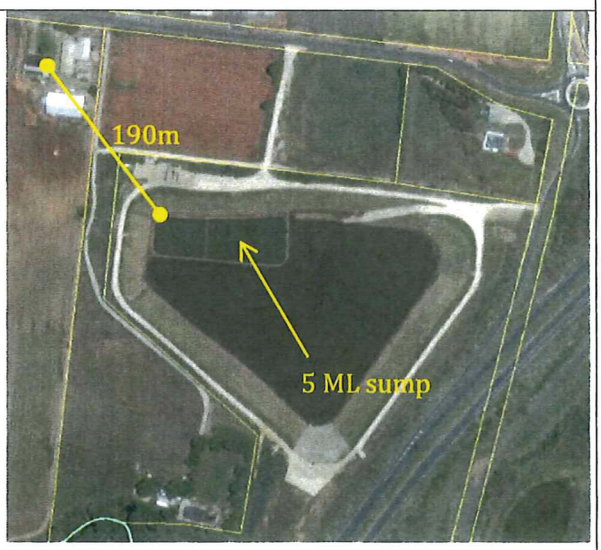
#	Note
1	Design, construction and operation of Wingate Basin must comply with the Environment Protection Act 1993. The distance between a polluting activity and a sensitive receptor is a key strategy for management of environmental risk. As the potential impacts are air quality and noise, EPA sets out its requirements in Environment Protection Policies (Air EPP, Noise EPP).
2	In August 2016 the EPA released a publication called "Evaluation distances for effective air quality and noise management" which superseded their publication called "Guidelines for separation distances (2007)". Evaluation distances were defined on page 5 of the 2016 publication and related to previous terms "separation distances" and "buffer areas" as below: Evaluation distances[1] provide an envelope around an activity (or multiple activities) within which environmental risks need to be assessed against current knowledge, technologies and practices. [1] For the purposes of this document, the term 'evaluation distance' embodies other terminology such as buffer distances, buffer areas or separation distances, which may still appear in reference documents.
3	Recommended evaluation distances are given in Appendix 1 of the 2016 EPA publication which can be found on their website with other "wastewater" documents at: http://www.epa.sa.gov.au/environmental_info/waste_management/liquid_waste/wastewater Note EPA states on page 3 that: ***there is no recommended evaluation distance for recycled water storage lagoons, so a site-specific assessment is recommended.***
4	Wingate Basin is NOT a wastewater treatment lagoon like seen at wineries and small country towns. Nor is a wastewater treatment plant located here, like at Roseworthy and Freeling. The water stored at Wingate Basin is defined by EPA as "recycled water". It is treated at Bolivar and further treated to a high quality before entering the VPS (Virginia Pipeline Scheme).

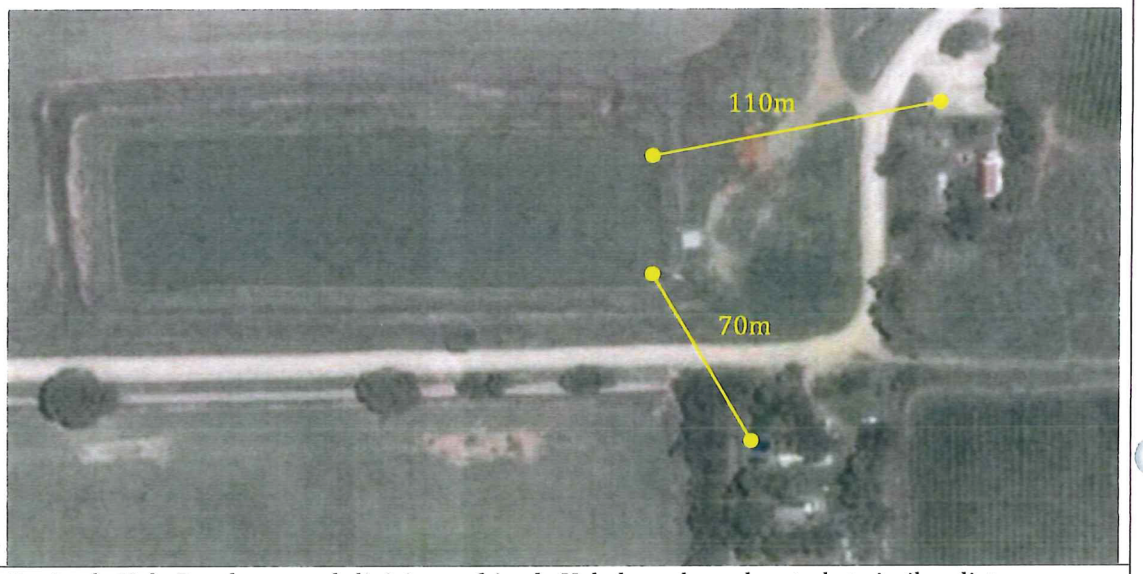
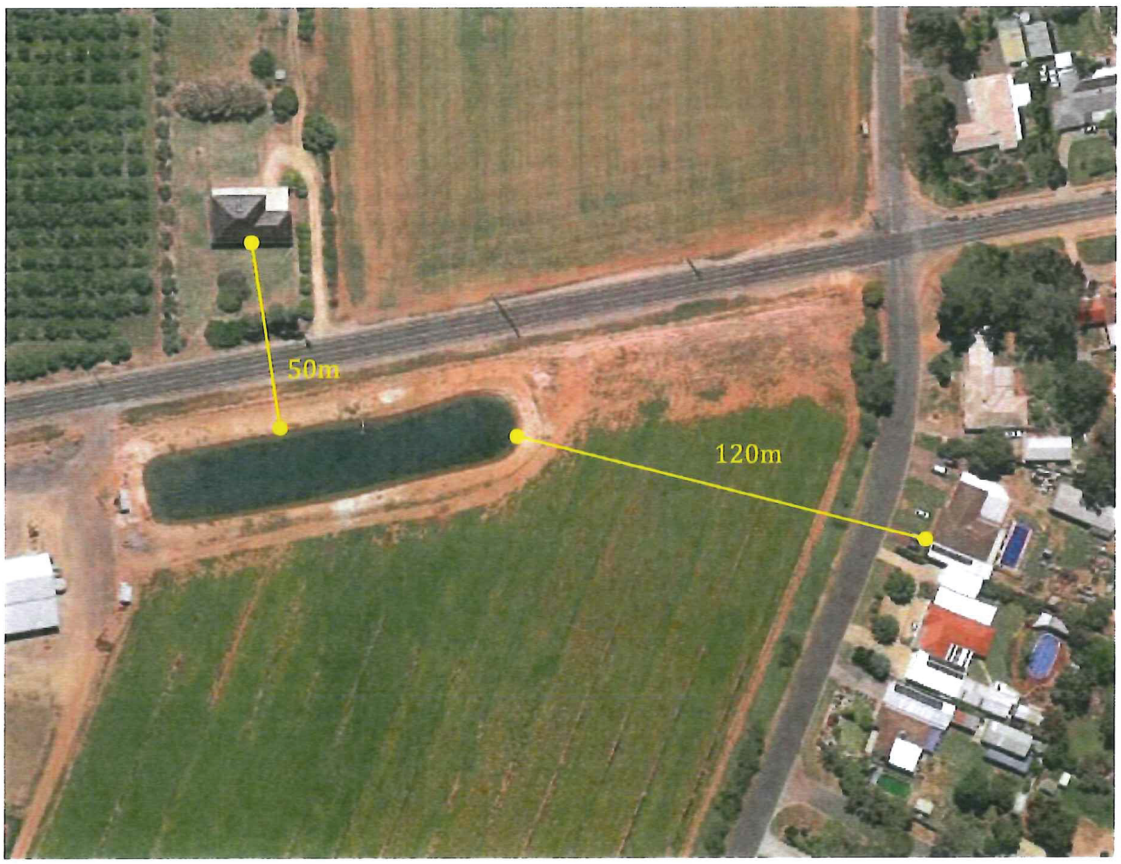
Evaluation distances for effective air quality and noise management

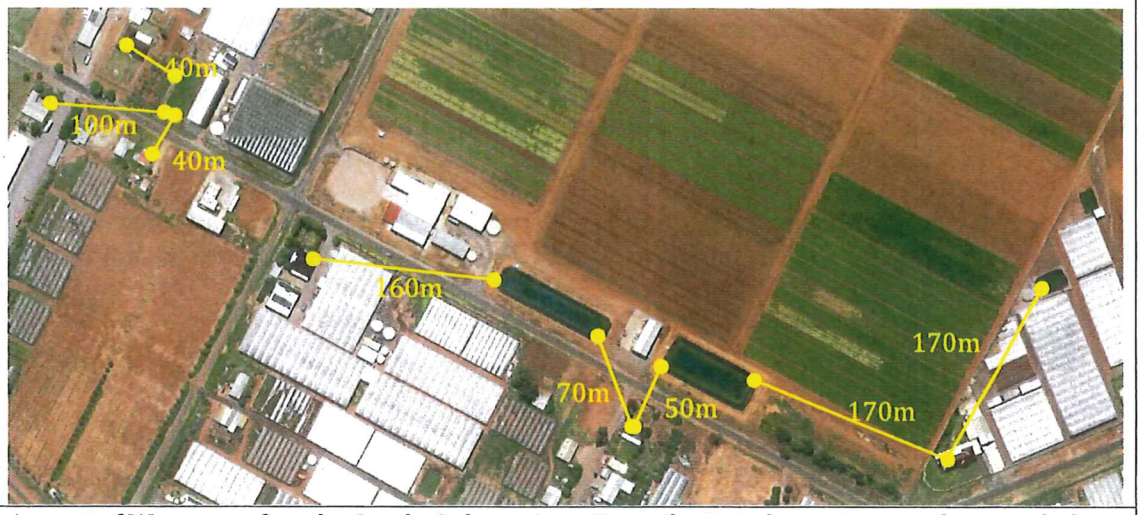
Waste treatment and disposal

Activity	Additional activity notes	Evaluation distance (metres)	Description of typical activities and potential air or noise impacts
Wastewater treatment plants (WWTPs) • Development Regulations, Schedules 21 3(2) & 22 3(2) • Environment Protection Act, Schedule 1 3(2)	Mechanical wastewater plants (including aerated lagoons): • <1,000 equivalent persons (EP) • >1,000 and <5,000 EP • >5,000 and <15,000 EP • >15,000 EP. Treatment lagoons (non-mechanical): • <1,000 equivalent persons (EP) • >1,000 and <5,000 EP • >5,000 and <15,000 EP • >15,000 EP.	100 200 300 Individual assessment 150 350 700 Individual assessment	Mechanical treatment and aeration reduces the potential for off-site odour impacts compared to non-mechanical treatment lagoons. However, regular pumping and maintenance activities may produce short-term odour events. Within a mechanical treatment plant, noise may originate from aeration equipment (eg blowers and pumps), and truck operations relating to tank pumping and maintenance. There is no recommended evaluation distance for recycled water storage lagoons, so a site-specific assessment is recommended.

5	EPA's guidelines for construction of lagoons (2014) refers to the old 2007 publication, and explains why air (odour) and noise issues are not generally associated with recycled water storage lagoons - as quoted from page 6 below: **Separation distance considerations** The *Guidelines for separation distances* (2007) provide recommended separation distances to prevent odour and noise impacts on sensitive receptors (for example dwellings) from aerated and facultative lagoons in sewage treatment works and community wastewater management systems (CWMS), wineries and distilleries. Separation distances for recycled water storage lagoons are not specified. This is because air (odour) and noise issues are not generally associated with these lagoons, providing wastewater has been treated to minimise odour and they contain no mechanical treatment processes which generate noise. For recycled water storage lagoons a site-specific assessment should be undertaken to determine appropriate separation from sensitive receptors.
6	This site-specific assessment is conducted as recommended by the EPA. This assessment considers the risk that air (odour) and noise issues may impact sensitive receptors nearby. When Wingate Basin is full as shown below, the distances to the nearest residences is 100m, 130m and 170m. The water shown in the 15/10/2017 image below is 100% stormwater. 

7	In 2016, Wingate Basin was created from a 'borrow pit' which had an open connection with the Gawler River via a 900mm culvert and a deep vee-channel above it. The vee-channel was filled in back to its original level (the flood plain), and the culvert became the inlet to a pump station which lifts water into storage. The impoundment holds 430 ML when filled to leave 1 m of freeboard below the flood plain level. The images below are 'before' (10/08/2013) and 'after' (25/08/2016) conversion to a water retaining storage.  
8	Water on the image above right contained about 20% recycled water because permission was sought and received from DAC for temporary storage of VPS recycled water up until end of 2016. No complaints were received from the neighbours. The proportion of VPS water would have been higher if it was not for floods that enabled stormwater to be pumped instead.
9	Although the prospect of VPS storage was contemplated at the time of the orginal submission, it was subsequently determined that development application 313/V013/15 provided to store VPS water in the 5 ML sump at the bottom of the dam but not in the 430 ML basin beyond. VPS water has been stored in the sump almost continuously for 2 years. The nearest sensitive receptor to storage of VPS water is currently 190m away, and this will change to 170m as shown in item 6 above. No complaint regarding storage of VPS water within 190m of a sensitive receptor has been received during 2 years of operation. 

9	SA Water requires that VPS water is taken into a storage. Some customers use tanks, but the most common receptacle is an above-ground 'turkey-nest' storage. The nearby storage shown below is on Gawler River Road, and nearest sensitive receptors are 70m and 110m away. 
10	On Angle Vale Road, new subdivisions of Angle Vale have been located at similar distances from existing VPS storages. 

11	On Penfield Road in Virginia, VPS storages have co-existed for two decades with market gardens and housing. 
15	As part of Waterproofing the South, Onkaparinga Council created two storages for recycled water which is treated to Class B (VPS is Class A). The existing storage at Willunga is 75m from a residence, and one of the new dams (below) was located even closer. 

16	A site-specific assessment to meet EPA guidelines has been conducted. The EPA specifies evaluation distances for many activities, but there is no recommended evaluation distance for recycled water storage because air (odour) and noise issues are not generally associated with storage of treated wastewater. This assessment concludes that compliance with EPA Environment Protection Policies for air and noise is being achieved by current practice of storing VPS water within 50m of sensitive receptors in the region. VPS water has been stored within 100m of sensitive receptors at Wingate Basin for 4 months previously without complaint, and within 190m for 2 years without complaint. It is concluded that storage of VPS water in Wingate Basin will be compliant with the EPA's Environment Protection (Air Quality) Policy.

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Certificate of Controlled Fill

Site: Wingate Dam, Buchfelde, SA

Job No: S24376 / 241602

The work carried out in the preparation of this report has been performed in accordance with the requirements of FMG Engineering's Quality Management System which is certified by NCS International Pty Ltd to comply with the requirements of ISO9001

Site Preparation

Site preparation prior to construction of Wingate Dam included stripping of all topsoil, vegetation, and existing fill to expose the natural subgrade for the subsequent clay liner. The surface was confirmed to be 'natural ground' and proof rolled to achieve a suitable foundation prior to filling. Levels and areas of filling have been recorded prior to and after filling and marked on the attached plans titled, "Asbuilt: Subgrade" and "Asbuilt Clay Capping".

The extent of the area defined by this controlled fill certificate can be seen hatched on the attached Hydroplan drawing titled "Contract 04 - Wingate Dam Earthwork's overall site layout at 1:1000" and stamped with, "Controlled Fill Extents".

Certification

Controlled filling was carried out in general accordance with the specification titled, "Technical Specification Wingate Dam, Civil and Structural Gawler Water Reuse Scheme". Some variations to this specification were made during the project to ensure that there would be ample suitable clay for the clay liner construction and to also improve the rate of works. Variations included:

- Enabling compaction of clays insitu (if found to be suitable) in lieu of remove, moisture condition and replacement
- Decreasing the thickness of the clay liner within the embankments from 0.6m to 0.3m
- Reducing the northern batter clay liner to 0.2m due to significant general filling for the dam embankment in this area having utilised ample non permeable clay
- The embankment natural subgrade was to be left as dimpled to increase adhesion of the clay liner in lieu of keying/benching
- A single benched clay key (1m wide min.) constructed 2.5m vertically from the base of the wall.

All variations were agreed to via email correspondence between Hydroplan, FMG Engineering and McMahons over the period between February 2016 and March 2016.

All fill was won from site or the adjacent site and generally comprised sandy silty CLAY and silty SAND. Sands were used as general controlled fill, while clays were used as controlled fill within the liner. Both were placed, compacted and tested under the supervision of FMG Research House in accordance with the requirements for Level 1 Supervision set out in AS3798 (2007) 'Guidelines on Earthworks for Commercial and Residential Developments'.

Field density tests have been carried out and have reached a minimum compacted density of 95% in accordance with AS1289 5.1.1 (Standard Compaction).

RISK ASSESSMENT MATRIX (From EPA Guideline 509/14 for Wastewater lagoon construction)

Instructions: Select one category under each criteria by clicking 'Y' in the blue column opposite the category. Additional explanations are provided in Appendix 3A.

SITE: Wingate Basin, Gawler River

		Points	Yes/No	Score	Notes/Comments	Instructions
1	**Groundwater occurrence**					
1a	none	0				
1b	confined	0.2	Y	0.2	Qpah(Q3)	
1c	semi-confined	2			MPA047	
1d	unconfined (covered)	6			SWL 17 mAHD typ	
1e	unconfined	10				
2	**Aquifer type**					
2a	Clay or crystalline rock	0.25				
2b	Silt, fractured rock or limestone	3.75			Lithological log of MPA047	
2c	Sand,gravel or Fill	10	Y	10		
3	**Minimum distance of groundwater from base of lagoon liner**					
3a	greater than 50m	0				
3b	>20m to 50 m	0.1				
3c	>10m to 20 m	1			Lower dam floor	
3d	>5m to10 m	2	Y	2	25.2 mAHD	
3e	>2m to 5 m	6				
3f	2 m or less	10				
4	**Groundwater usage**					
4a	Not Likely	0.5			Qpah is more saline and	
4b	Possible	2.5	Y	2.5	less preferred than	
4c	Current	10			(deeper) T1 and T2	
5	**Groundwater salinity**					
5a	>10 000 mg/L	0				
5b	>5000 to10000 mg/L	0.2			Qpah(Q3) approx	
5c	>1500 to 5000 mg/L	3	Y	3	1600 mg/L	
5d	1500 mg/L or less	10				
6	**Nominal capacity of lagoon (excluding freeboard)**					
6a	Small (5ML or less)	0.2				
6b	Medium (>5ML to 10ML)	1.2			430 ML	
6c	Large (>10ML to 30 ML)	4.8				
6d	Very Large (>30ML)	10	Y	10		
7	**Max lagoon water depth**					
7a	1m or less (evaporative)	0.2				
7b	>1m to 3m (aerobic/facultative)	1.2			8.7 m deep	
7c	>3m to 6m (anaerobic)	4.8				
7d	deeper than 6m	10	Y	10		
8	**Nature of wastewater (see Appendix 3A for definitions)**					
8a	contaminated stormwater	0.2				
8b	treated wastewater	0.8	Y	0.8	VPS water is suitable for	
8c	composting/landfill	4.2			application to land	
8d	organic/nutrient	4.2			(irrigation)	
8e	reactive	6.4				
8f	hazardous	10				

Rating		48.1
Preliminary category		3
A. Is the lagoon located within 100m of a watercourse?	Y	4
B. Is there potential groundwater that may intersect the base of lagoon liner?		FALSE

Select YES (Y) in the appropriate blue box if either of the scenarios in blue text apply

RECOMMENDED CATEGORY 4

RECEIVED 30 JUL 2018 BY: .....

EPA USE ONLY

FOR ASSESSOR:

Suggested Category and reasons:

ASSESSOR *(name and signature)* **:**

PEER REVIEWER *(name and signature)* **:**

Category supported : _____ Date: _____

Comments in RED added July 2018

6 DESCRIPTION OF PROPOSAL

A copy of the overall concept plan of Gawler Water Reuse Scheme has been attached as Appendix D.

6.1 Wingate Dam

6.1.1 Description

Wingate Dam is a water storage dam, created by opportunistically converting the 'borrow pit' which was formed recently by DPTI when earth was required to build up the Northern Expressway. By replacing earth which was excavated on the southern edge of the borrow pit, a water storage dam will be created below the natural flood plain level. Aerial sectional and locality plans in photographs have been attached as Appendix E.

The dam will hold 430 ML when filled to within 1 m of the rim. The road around the rim will be at 34.80m which is the average natural ground level.

On the northern edge where natural ground level rises to 37.50m, a raised area at 37.00m will be formed for pumping station PS#2. This is above the 1 in 100 flood level of 36.55m, and similar height as natural ground in that location.

When full, the water surface area will be almost 8 hectares, and water depth will be 7.3 m metres. Earth will be cut to depths of 4.5 m below existing surfaces and moved with the site to build up to heights of 5.0 m above existing levels as represented in Figure 5.

Water level in two existing monitoring wells was measured at 6.2 m below the bottom of the dam.

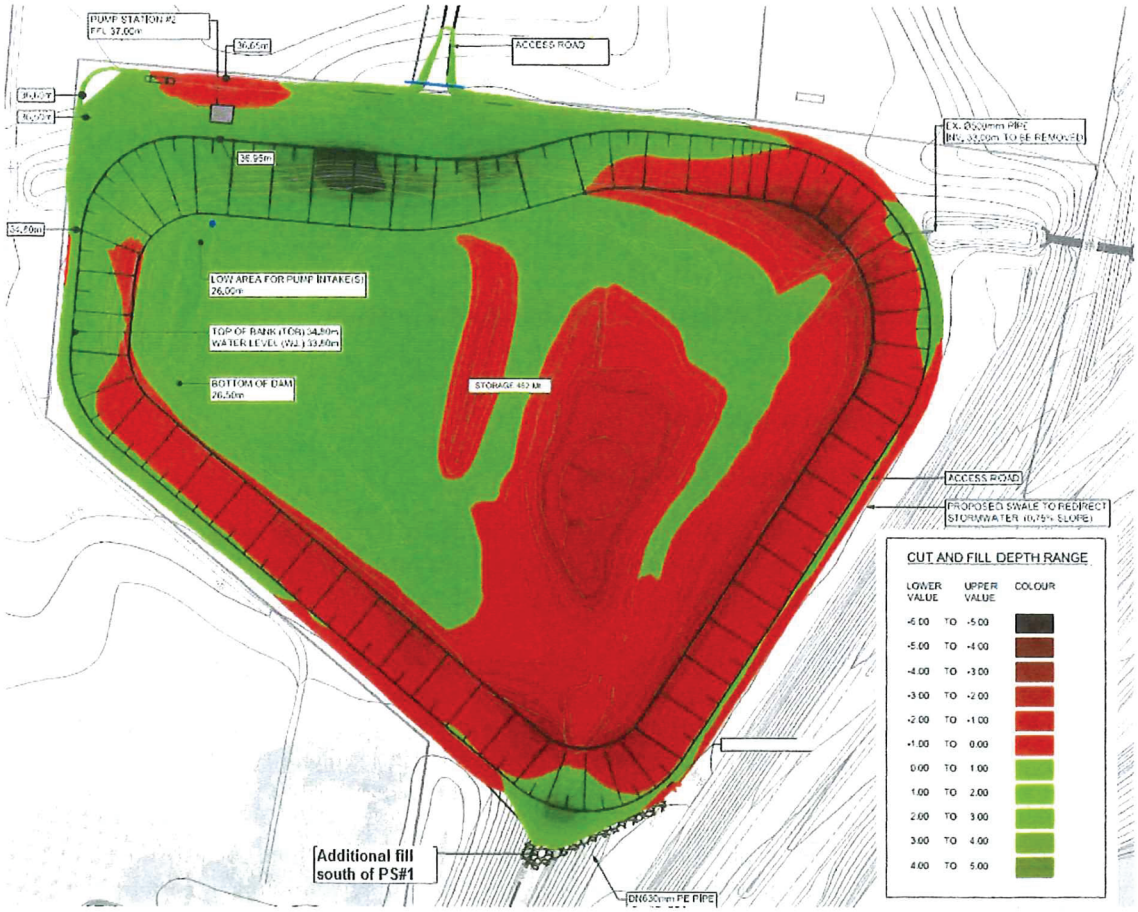

Figure 5: Wingate Dam estimated depth of cut and height of fill

A new, safer entrance to the site has been created from Two Wells Road vide a 15m wide easement on the neighbouring property. This was the original entrance to the farm, part of which was acquired by DPTI. The only direct entrance to the site is from the off-ramp from the NEXY to Two Wells Road. This entrance will remain for Council use during maintenance outside of the Wingate Dam security fence.

Water will be lifted into the dam by pumping station PS#1 which is on the southern edge, and pumped from the northern edge of the dam to other storages from PS#2.

Within PS#2 there are three separate pump stations (each with 2 pumps operating in parallel) as follows:

- 'A' pumps = Transfer from Wingate Dam to Hill Dam, high pressure, flows up to 150 L/s, and with expansion provisioning to 300 L/s
- 'B' pumps = Filter from Wingate Dam to MAR Tank, low pressure, flows up to 150 L/s
- 'C' pumps = Transfer from MAR Tank to inject into MAR wells 5km north of Wingate Dam, medium pressure, flows up to 150 L/s

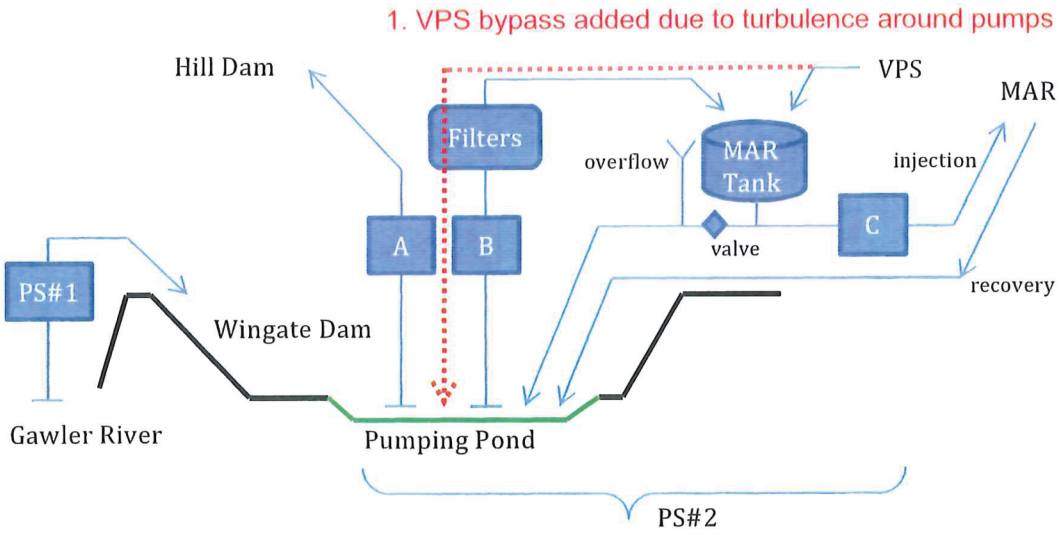

Figure 6: Schematic of Wingate Dam pumping infrastructure

6.1.2 Functional purpose

6.1.2.1 Stormwater harvesting

The primary function of Wingate Dam is to facilitate harvesting of stormwater from the Gawler River. Current conditions of s128 approval are that 616 L/s must flow past the pumps when the pumps are operating, and not more than 1600 ML can be diverted per year.

Gawler River flow is monitored continuously and recorded every 10 minutes in accordance with DEWNR requirements. The monitoring complies with Parts 2 and 6 of the National Industry Guidelines for Hydrometric Monitoring. Water Data Services will assist Bunyip Water document work in accordance with DEWNR Technical Procedures for Documenting Monitoring, including Form A (Purpose Statement) and Form B (Monitoring Specification).

The diversion pumps at PS#1 have variable speed motors which operate automatically on the logic that if volume pumped this year is less than 1600 ML, and if Wingate Dam is not full,

operate both pumps together to lift water into Wingate Dam, provided that 616 L/s continues to flow downstream of the pumps. Flow meters (to NMI 10 standard) will record the volume diverted from the river to the dam. The PS#1 pumps can lift between 60 L/s and 600 L/s into the dam when operating together.

The rate at which water can be pumped out of the dam is limited by the size of the long transfer pipes. The flow from Wingate Dam will be controlled automatically on the logic that if there is room in Hill Dam then transfer the water out of Wingate Dam. Given the limit of 1600 ML and the dam capacity of 430 ML, Wingate Dam will be filled and emptied almost 4 times per year when the river flows are available. The dam is the first to fill and the first to be emptied. By keeping Wingate Dam empty, the potential to harvest more water is increased.

Stormwater will be moved from Wingate as quickly as possible to other storages. Initially the transfer flow rate capacity of PS#2 will be 150 L/s but strategic provisioning has been included for increasing this to 450 L/s. The greater the flow rate out of Wingate, the greater the stormwater harvesting potential, and the greater the scheme cost. The flow rate of PS#2 will be increased above 150 L/s to the extent that funds are available.

6.1.2.2 Stormwater storage

2. Application is with EPA for 35 L/s into MAR. Funds ran out after one well.

When other storages are full, Wingate Dam will store stormwater in readiness for the coming irrigation season. As soon as the irrigation season begins, water will be moved from Wingate Dam to replenish on-farm dams. The volume of water stored in the dam was modelled for historical flows recorded at Gawler Junction in the period from 1/01/1973 to 10/12/1995. Figure 7 shows daily volumes stored at Wingate Dam, indicating the variable nature of harvesting opportunities. Figure 8 shows the average monthly volume in this 23 year period, indicating the timing of harvesting opportunities, and the duration of water retention.

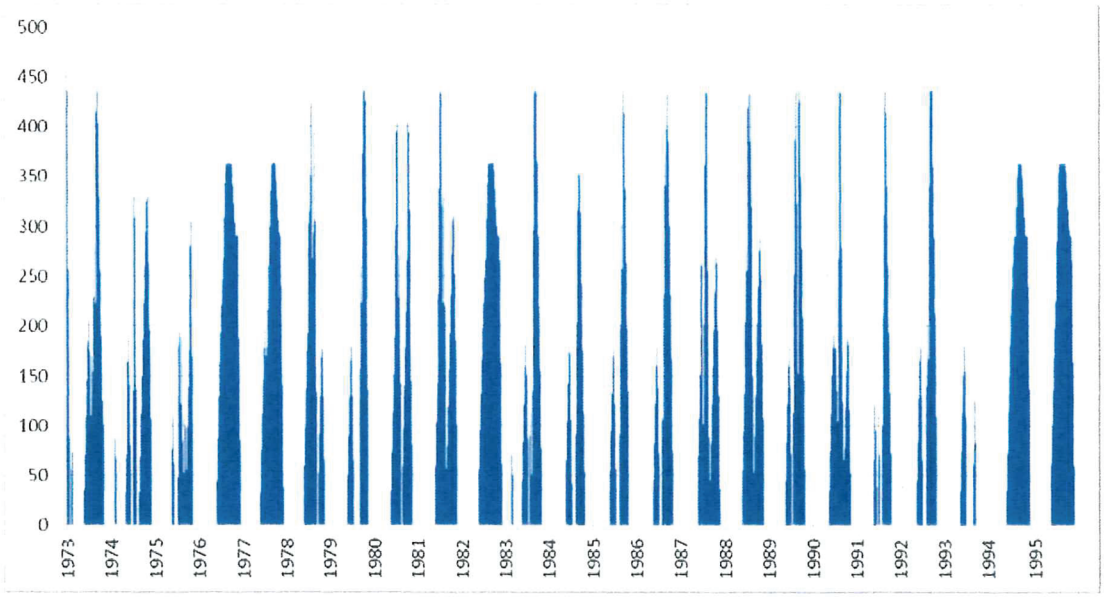

Figure 7: Daily volume (ML) stored at Wingate Dam, based on 1973-1995 flows

3. Modelling assumes 150 L/s to MAR

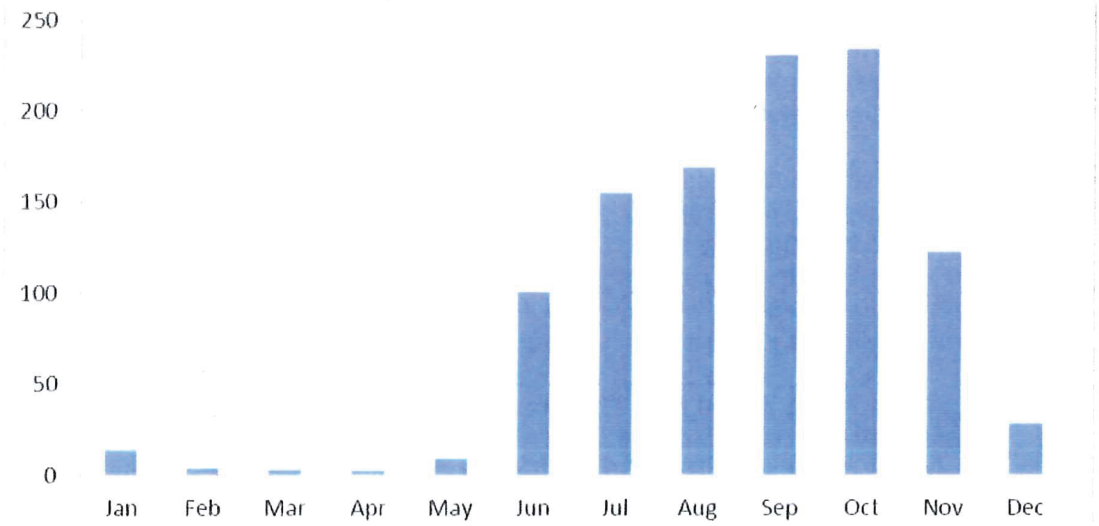

Figure 8: Average monthly volume (ML) stored at Wingate Dam, based on 1973-1995 flows

6.1.2.3 Pumping pond for daily balancing storage

When stormwater has been moved from Wingate Dam to other storages, a small 'pumping pond' at the bottom of the dam around the intake of the PS#2 pumps will be utilised as a small balancing storage. This area is lined with a geomembrane because it will hold treated wastewater. The volume will be less than 5 ML. The function of this tiny 'pond within a dam' is to facilitate balancing of daily inflows and outflows. For example, water accumulated during the day can be pumped at night up to Hill Dam to utilise off-peak power tariffs.

Water recovered from MAR (Managed Aquifer Recharge) will be accumulated and allowed to settle (aquifer sand) for a few hours in this pond. The transfer pumps can empty the pond as quickly as the MAR borehole pumps can recover water to fill the pond. There is no benefit from creating a larger pond, or over-filling the pond to store the water in the dam. The pond is merely a staging place for water so the PS#2 pumps can access it and send it to Hill Dam.

Water recovered from MAR will be a combination of treated wastewater, stormwater and groundwater.

6.1.2.4 Treated wastewater reuse

The Gawler River may not flow for several years in succession. Water security is critical to the success of the GWRS, and this will be achieved using both treated wastewater and carry-over storage in MAR.

Treated wastewater from Bolivar will flow from the Virginia Pipeline Scheme ("VPS") into the MAR Tank at PS#2 under agreements with Trility and a user who is willing to share the flow capacity of their outlet from the VPS.

The majority of VPS water available will be available in winter, and therefore needs to be stored ready for summer. The above-ground storages will be left empty for as long as possible in the hope that stormwater can be harvested from the Gawler River. When the river does flow, water will be cleared from Wingate Dam as quickly as possible – and this means stormwater will be directed to dams and MAR as well. It also means VPS water will preferentially be directed to MAR, until such time as it is stopped whilst stormwater is sent to MAR instead, or until such time as it may as well be sent straight to Hill Dam because stormwater has not materialised.

4. Water stored in MAR can not be recovered in the same financial year

Typically 70% of Bolivar's 50 GL of treated wastewater flows to sea and 15 GL (30%) is reused by customers connected to the VPS. Provision has been included to take VPS water at the flow rate of 14 ML/d (170 L/s) into MAR Tank which is the capacity of the existing VPS booster pump feeding the point of connection, but Trility has only been able to offer 5.4 ML/d (63 L/s) at this stage. Negotiations will continue for a higher flow rate in winter when demand on the VPS is light.

5. SA Water have given verbal approval to take up to 14.7 ML/d

The flow of 63 L/s will be easily handled by the MAR pumps (refer to 'C' in Figure 6). If however short-term operational issues cause the tank to overflow, the water will be captured in the pumping pond and subsequently pumped to Hill Dam. The logic of 'A' pumps will be to begin clearing Wingate Dam to Hill Dam at 9pm (off-peak tariff) each night if there is room at Hill Dam.

When the goal of taking 170 L/s into MAR Tank is reached, 20 L/s will overflow into the pumping pond whilst 150 L/s is injected into MAR wells. At this flow of 20 L/s, the 5 ML pond will accumulate 1.7 ML/d, and then be cleared by 'A' pumps in a period of 3.7 hours of pumping to Hill Dam.

6. Once approved, the MAR will take 35 L/s not 150 L/s

There is some prospect of 'summer water' being available from the VPS connection. This water can be pumped direct to Hill Dam, via the pumping pond. An automatic valve will be operated to introduce water into the pumping pond at a controlled rate. There may be situations when a blend of stormwater and VPS water is desirable. For example, there may be 100 ML of stormwater remaining in Wingate Dam and only room for 30 ML at Hill Dam. If it is December and no more river flows are likely, and if 5.4 ML/d (63 L/s) of VPS water is available, then the 63 L/s flow could be dropped direct into the sump of 'A' pumps so the total of 150 L/s pumped is 58% stormwater and 42% VPS water.

7. Operational flexibility is desired

6.1.3 Risk of treated wastewater impacting the environment

The operating scenarios described above and associated operational controls will ensure less than 1% of the volume that could be stored in the Wingate Dam would be treated wastewater at any one time. In other words, whilst VPS water may enter Wingate Dam just prior to being pumped elsewhere, VPS water is not stored in Wingate Dam.

8. This statement has proven to be unnecessarily restrictive on operations

Risk assessment has identified that there is a risk of VPS water being released to the environment during floods greater than 1 in 50 year ARI flood events, if VPS water was stored in Wingate Dam. Flood modelling has identified that flood events of less than this magnitude stay within the river channel and do not over-top the banks of the dam.

If the dam was full of VPS water for whatever reason, the 0.43 GL would likely be diluted by stormwater to an extent that the entire 0.43 GL entered the Gawler River. However, the environment would not be significantly impacted by the VPS water because:

- During a 1 in 50 year event the flow is around 446 m3/s, so the 38 GL flowing during one day would dilute the volume of Wingate Dam by about 90 times
- Every year, 35 GL of treated wastewater is discharged to the ocean at the Bolivar outfall which is right where the Gawler River would discharge 0.43 GL once in 50 years. The additional flow only increases the total discharge by 1 in 4000
- VPS water is used to irrigate crops, and un-fixed nutrients in the drainage water from the irrigated fields will enter the environment either through the aquifers or streams
- The VPS water quality is not significantly different to the river water quality. Comparisons are provided in Figure 11 and Figure 12 below, drawing from Figure 9 and Figure 10

		TDS (mg/L)	N (mg/L)	P (mg/L)	K (mg/L)
2012	Oct-Dec	1340	10.9	0.2	38.8
	Jul-Sept	1311	13.5	0.5	34.7
	Apr-Jun	1104	10.0	0.0	34.6
	Jan-Mar	1190	5.2	1.1	35.9
2011	Oct-Dec	1295	13.9	0.4	37.7
	Jul-Sept	1251	13.8	0.1	34.6
	Apr-Jun	1030	16.7	0.5	38.4
	Jan-Mar	1136	8.6	0.2	39.0
2010	Oct-Dec	1242	12.9	1.1	39.3
	Jul-Sept	1027	15.6	1.2	32.1
	Apr-Jun	913	18.8	1.0	35.1
		1097	12.9	0.5	37.8
	Average	**1161**	**12.7**	**0.6**	**36.5**

Figure 9: Treated wastewater quality from VPS (http://www.nais.com.au/)

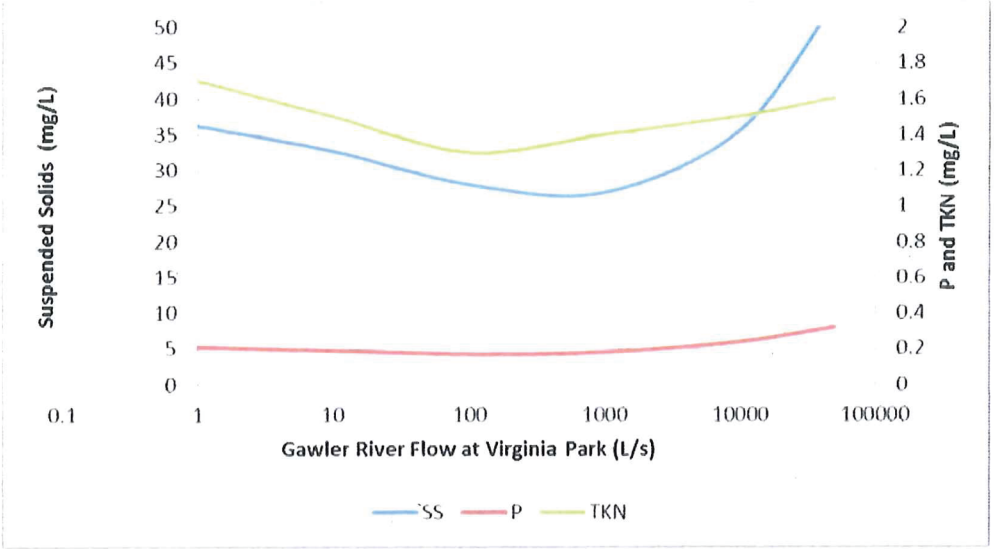

Figure 10: Gawler River water quality at Virginia Park 2009-2014

		Concentration (mg/L)			
	Period	Salt	SS	P	TKN
Gawler River stormwater	2009-2014	902	31.9	0.2	1.5
VPS treated wastewater	2010-2012	1161	36.2	0.6	12.7
Stormwater as % of VPS water		78%	88%	35%	12%

Figure 11: Concentration of nutrients in stormwater and treated wastewater

9. Negative impact on receiving environment is minimal, and offset by the positive impact of using more VPS water

		Weight (tonne)			
	Water (ML)	Salt	SS	P	TKN
Gawler River annual average	24,010	21,669	766	5.1	35.3
Wingate Dam full of VPS	430	499	16	0.3	5.5
% of total if flooded 1 in 10 years	0.2%	0.2%	0.2%	0.5%	1.5%
% of total if flooded 1 in 50 years	0.0%	0.0%	0.0%	0.1%	0.3%

Figure 12: Stormwater and treated wastewater nutrients released by weight

Prior to settling on the proposed design which does not have a rim above the original flood plain, a concept with walls raised several metres above the flood plain was investigated. The perceived benefit was that more water could be stored, and that the top would be above 1 in 200 year flood level. Besides having an all-weather road on the dam rim, an advantage of being above frequent inundation was the reduced risk of treated wastewater being swept downstream – if treated wastewater was stored in the dam at the time of the flood. Modelling of the flood impact revealed development would cause in the order of approximately 0.100m additional flood level in the vicinity of the dam. This was because the walls quarantined an area and volume which was otherwise available for detaining and mitigating the storm surge. This option was not progressed further because of the need for mitigation measures, the potential for community concern, and the marginal benefits to the project.

6.1.4 Flood impact assessment

Any construction activity in the flood plain has potential to impact others so modelling was conducted using the most recent DTM (digital terrain model) and hydrographs (estimates of river flow versus time). Modelling was conducted by Australian Water Environments who have experience in modelling the hydrology of the Gawler River. Their summary report is presented in Appendix H.

Figure 13 is an exaggerated relief model looking west showing a full Wingate Dam. These images are clipped from an animation of the 1 in 100 year ARI event. As the stored water is below the original flood plain, the impact of the proposed development on the levels during a 1 in 100 ARI flood is very small.

Note that the plan of potential impacts shows there is an increase in flood depth of 0.025m to 0.010m about 1km east (represented by a light blue colour), but interrogation by the modellers revealed the actual levels were 0.030m or less. Around the dam during the 1 in 100 ARI event shows there is a reduction in flood depth of less than 0.025m (green).

Figure 13: Wingate Dam: Full level is below the natural flood plain

Due to the Dr Bruce Eastick detention basin upstream on the North Para River, the large majority of flows are contained within the river channel as depicted in Figure 14. Water does not spread over the flood plain (and over-top the dam) until a 1 in 50 ARI event. Figure 15 shows a 1 in 100 year event.

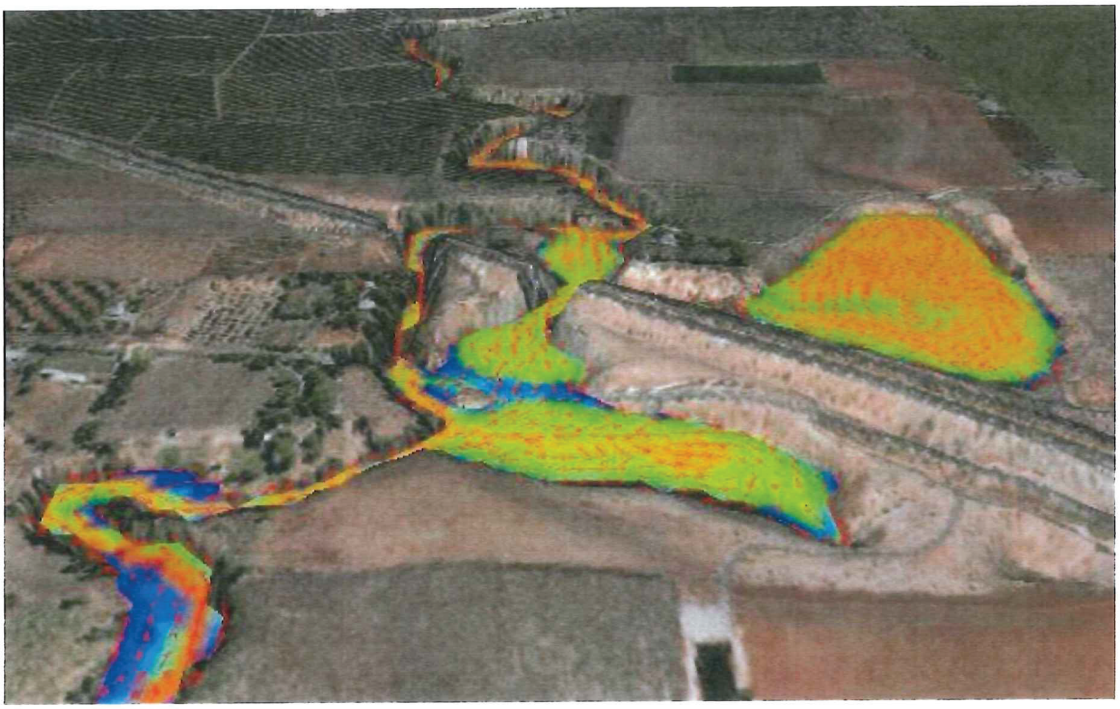

Figure 14: Wingate Dam: Up to 1 in 50 ARI floods are contained in the river channel

The NEXY has two bridges, one for the original river channel, and one to the north of it which is referred to as a 'bypass'. These two flow paths are evident in Figure 14 and Figure 15. The

original river channel is on the left (south) and the recently constructed bypass is on the right.

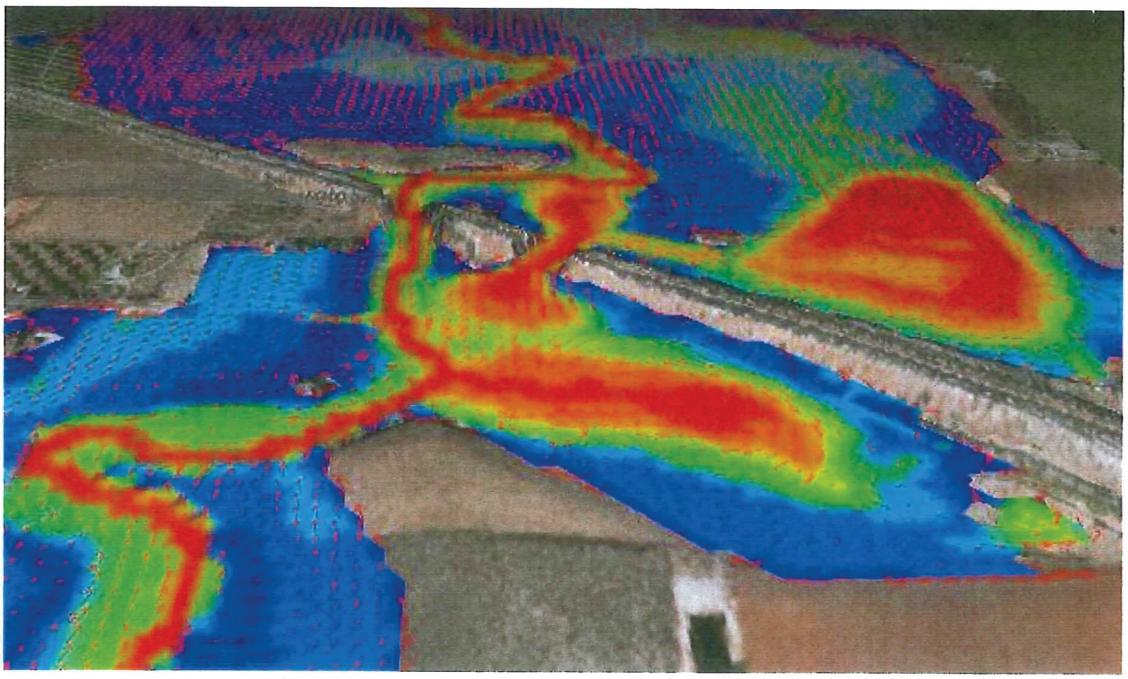

Figure 15: Wingate Dam: Events above 1 in 50 over-top the dam (1 in 100 year ARI shown)

After a flood event, some of the water in the trapped catchment to the west of Wingate Dam will flow back into the dam through a small culvert on the western side which is otherwise intended for local drainage. The flood water will primarily recede though seepage and evaporation.

A small spillway at PS#1 will return water to the river so dam water level will recede below the banks after the flood. A small amount of pumping to other storages would lower it further from spillway level to top water level (full). The spillway will also safeguard against large rainfall events.

The velocity of water was also examined to ascertain the need for bank stabilisation and disaster recovery plans. Appendix H shows the highest velocity during a flood event will be in the order of 0.6 to 0.8 m/s. This will occur at the southern edge where PS#1 is located. The inside lip of the dam wall will be lined with rock pitching but no other provision is considered necessary.

A draft of Bunyip Water's Emergency Management & Recovery Plan has been prepared and provided in Appendix I. Apart from the cost of repairs, no adverse consequences of erosion are anticipated. The fence will be submerged during a flood and may need to be replaced after the event. The transformers for PS#1 and PS#2 will be above flood level, but if a fault occurs during a flood event, access will be limited and repairs will be delayed. Even if many weeks of pumping opportunities are lost, the effect on the business will be no worse than a year when the river hasn't flowed at all.

TWO WELLS ROAD

MAIN ENTRANCE

BUNYIP SIGN

LOCKABLE ACCESS GATE

PUMP STATION #2

OUTLET STRUCTURE

LOCKABLE ACCESS GATE

PIT FOR PUMP INTAKE

LOWER BASIN

WINGATE BASIN
TOTAL AREA = 7.8Ha
EXTENTS = 290m(L) x 380m(W)
AVE. DEPTH = 8.7m
WATER STORAGE = 475ML
MATERIAL: CLAY LINED WITH WETLAND PLANTING, EPDM LINER ONLY IN LOWER BASIN AREA

NORTHERN EXPRESSWAY (M2D)

PUMP STATION #1

GAWLER RIVER

NORTH

LEGEND
PROPERTY BOUNDARY
34 FINISHED CONTOUR AT 0.25m INTERVAL

REV	ISSUED	D DWN	APRVD	REVISION DESCRIPTION
04	10/07/2017	JT	BH	AS CONSTRUCTED (OCT 2016)
03	15/02/2016	JT	BH	FOR CONSTRUCTION
02	20/01/2016	JT	BH	FOR TENDER
01	20/11/2015	JT	BH	FOR TENDER

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PERTH ADELAIDE SYDNEY BRISBANE BEIJING

DES/DRAWN	JT
CHECKED	BH/MA
APPROVED	JG
DATE	-
PLOT DATE	7/10/2017

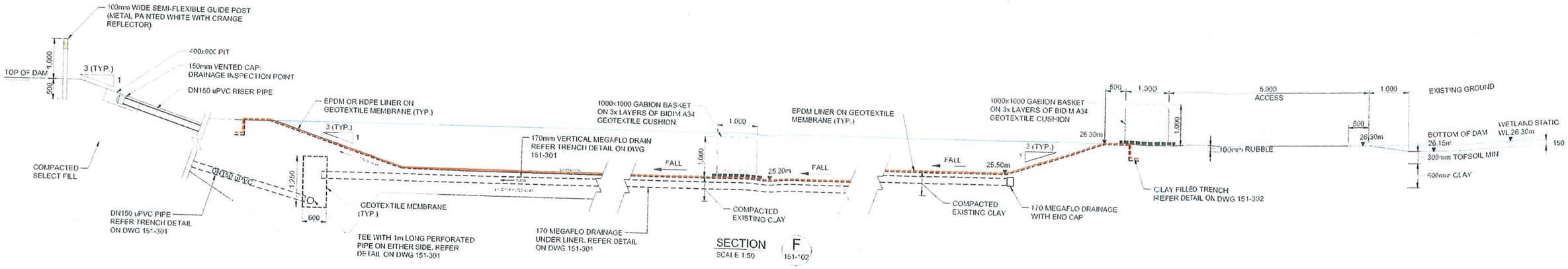
CLIENT: BUNYIP WATER GAWLER WATER RE-USE SCHEME

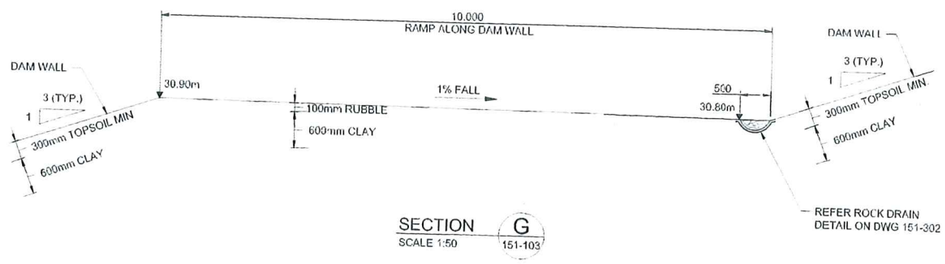
PROJECT: WINGATE BASIN OVERALL POST-CONSTRUCTION PLAN

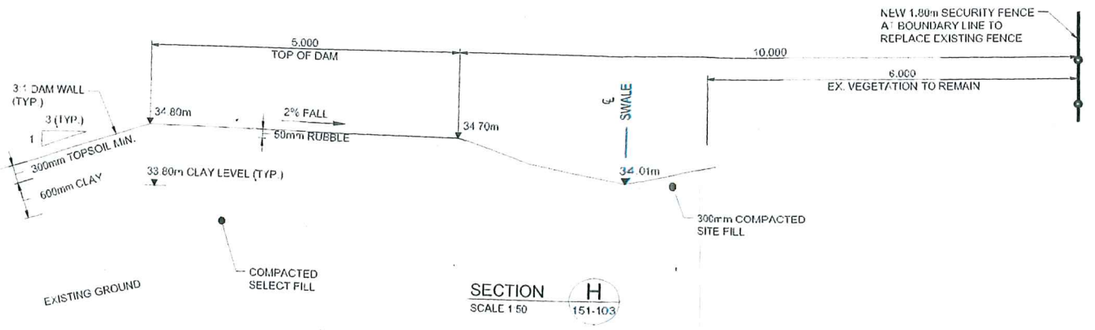
DRAWING No. 151-003 | SHEET 3 OF 4 | REVISION 0

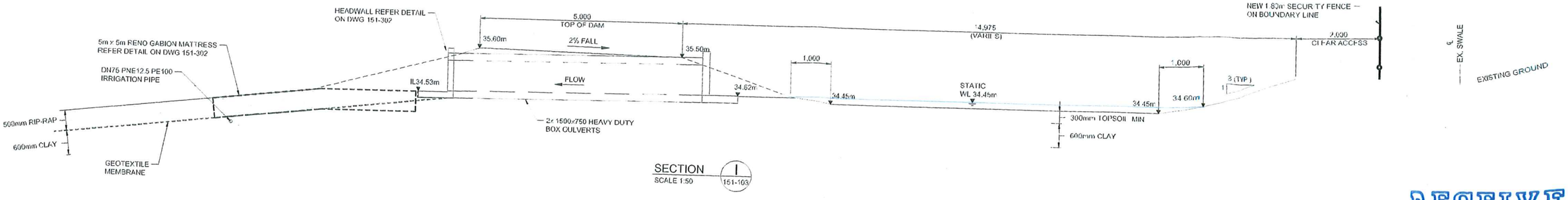
AS CONSTRUCTED

-10 0 10 20 30 40 50 100m
SCALE 1:1000 ORIGINAL SIZE A1









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30 JUL 2018
BY:.....

AS CONSTRUCTED

REV	ISSUED	DWN	APPVD	REVISION DESCRIPTION
04	10/07/2017	JT	BH	AS CONSTRUCTED (OCT 2016)
03	03/03/2016	JT	BH	FOR CONSTRUCTION (PS1 LOCATION REVISED, TELECOM REMOVED)
02	15/02/2016	JT	BH	FOR CONSTRUCTION
01	20/11/2015	JT	BH	FOR TENDER
00	10/11/2015	JT	BH	FOR TENDER REVIEW

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PERTH ADELAIDE SYDNEY BRISBANE BEIJING

DES/DRAWN	JT
CHECKED	BH/MA
APPROVED	JG
DATE	-
PLOT DATE	7/10/2017

CLIENT: BUNYIP WATER
GAWLER WATER RE-USE SCHEME

PROJECT: WINGATE BASIN
DETAILED CROSS SECTIONS SHEET

DRAWING No. 151-202 | SHEET 2 OF 4 | REVISION 04

John Gransbury

From: John Gransbury
Sent: Monday, 6 June 2016 4:12 PM
To: 'Neldner, Simon (DPTI) (Simon.Neldner@sa.gov.au)'
Subject: Wingate Dam - storage of VPS water
Attachments: Wingate20160603.jpg; HillDam20160603.jpg

Hi Simon

On behalf of the Gawler Water Reuse Scheme I seek clarification regarding approval status to store treated wastewater in Wingate Dam.

A key element of development is "Modification to an existing detention basin to enable permanent storage of water at Wingate Dam". Practical Completion inspections start tomorrow – refer to the attached image. As per the drawings and specifications, the basin has been lined with 600m of clay at the base, tapering to 300mm at the top, under level 1 geotechnical supervision. On top 300mm of topsoil has been spread and seeded with grasses to stabilise it.

The role of treated wastewater was described in section 6.1.2.4 of the development application. It was noted that the majority of VPS water would be available in winter and that water security would be achieved using both treated wastewater and carry-over storage in MAR. Construction of the MAR started today but will not be complete during winter when VPS is available for storage. And even if MAR was available, there would be no carry-over storage available from last year. This creates a need to store winter water.

The functional purpose of Wingate Dam was described in section 6.1.2 of the development application. It was noted that ordinarily only a small volume of treated wastewater would be stored in Wingate Dam, maximising the space available for capturing stormwater. However, in this normal operating scenario, treated wastewater bypasses Wingate Dam on its way to MAR and Hill Dam. Unfortunately the liner at Hill Dam is not complete and further rain delays threaten completion for several months. Refer attached photo. Also, the pump stations will not be completed until mid-August, so even if Hill Dam was available, we can not pump the winter water available from VPS. Hence we want to store VPS water at Wingate until the pumps and Hill Dam are available.

The risk of treated wastewater impacting the environment was considered in section 6.1.3 of the development application. The scenario considered the dam was full of VPS treated wastewater at the time a 1 in 50 ARI event occurred. Events less than a 1 in 50 year flood do not top the dam banks. Figure 12 shows the increase weight of P and TKN in the Gawler River would be 0.1% and 0.3% respectively for this occurance. It is noted that Bolivar WWTP releases 70% of its total P and TKN into the environment near the mouth of the Gawler River.

Treated wastewater dams are very common in the region because it is a requirement of VPS water supply agreements. By comparison, construction of Wingate Dam has been to a very high standard. However, other dams are entirely above the 1 in 100 ARI flood level.

A leak detection system has been installed below the rubber lined area which covers about one fifth of the dam floor. Prior to decommissioning monitoring existing wells, groundwater was measured at three points 6.2m below the dam floor. A monitoring well will be installed in the unconfined aquifer.

We note the risk assessment matrix conducted using EPA's process does identify a risk of water reaching the groundwater table, but we note the wastewater is fresher (1000-1200 mg/L) than the native groundwater (2000-3500mg/L), and we note the VPS water is suitable for irrigation whereas the native groundwater is not.

With regards,

John Gransbury | Principal Consultant | HydroPlan
Mobile: +61 412 600 674 **Fax:** +61 8 8373 0779 **Email:** jg@hydroplan.com.au **Website:** http://hydroplan.com.au

John Gransbury

From: Neldner, Simon (DPTI) <Simon.Neldner@sa.gov.au>
Sent: Wednesday, 22 June 2016 8:52 AM
To: John Gransbury
Cc: Kieren Chappell; lsapio@light.sa.gov.au
Subject: Gawler Water Re-Use Scheme - DA 313/V013/15 - Request to vary operating procedure / waste water storage on a temporary basis - feedback

Hi John

The first thing to provide advice on is that the current authorisation vis-à-vis the on-going storage of VPS water at Wingate (outside the existing inner dam).

I note point 3(a) below:

> *Our development application described the normal operating scenario but did not rule out storage of VPS water at Wingate. This is because we preferred to keep this option for VPS storage open. Yes we hope this event is temporary or even once-off, but it would seem unwise to limit the use of such a significant asset.*

Your current authorisation does not permit you to store VPS water in the larger (outer) dam at Wingate on an on-going basis, because whilst the application may not have stated this or 'left' it open, that does not automatically mean this unstated aim was approved – the application considered was fairly explicit on how the GWRS would work under normal operating conditions. This does not preclude a variation being lodged to prove-up the requirement and provide this flexibility, but that is a separate matter for another process and time. What is being considered now is a one-off event of temporary duration, and whether or not the environmental agencies are satisfied with the request, and does your existing authorisation requirement amendment.

I am awaiting advice from DEWNR (advised this should arrive at the end of the week), the EPA's comments are below –

- *EPA Guideline Wastewater lagoon construction (Issued November 2014) should assist in meeting obligations under the Environment Protection Act 1993 and relevant Environment Protection Policies. If the applicant considers that the proposed level of construction would be consistent with this Guideline, the applicant/contractor should be able to meet their obligations under the Environment Protection Act.*
- *We also agree with your comments with regard to the shift in scope from using a lined section of the dam for VPS storage to using the whole of the dam on an ongoing basis.*

I've received no feedback from the NRM Board.

Please let me know if you'd like any further clarification or assistance.

Kind regards

Simon Neldner
Team Leader – Development Assessment
Development Assessment
Investment Management | Development Division
Department of Planning, Transport and Infrastructure
Direct (08) 7109 7058 (97058) • E simon.neldner@sa.gov.au

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GPO Box 1815 Adelaide SA 5001 • DX 171 • www.dpti.sa.gov.au

From: John Gransbury [mailto:jg@hydroplan.com.au]
Sent: Tuesday, 21 June 2016 7:42 PM
To: Neldner, Simon (DPTI) <Simon.Neldner@sa.gov.au>
Subject: RE: Gawler Water Re-Use Scheme - DA 313/V013/15 - Request to vary operating procedure / waste water storage on a temporary basis. [DLM=For-Official-Use-Only]

Hi Simon

Any other feedback from the agencies?

With regards,

John Gransbury | Principal Consultant | HydroPlan
Mobile: +61 412 600 674 **Fax:** +61 8 8373 0779 **Email:** jg@hydroplan.com.au **Website:** http://hydroplan.com.au

From: John Gransbury
Sent: Wednesday, 15 June 2016 10:35 PM
To: 'Neldner, Simon (DPTI)'
Subject: RE: Gawler Water Re-Use Scheme - DA 313/V013/15 - Request to vary operating procedure / waste water storage on a temporary basis. [DLM=For-Official-Use-Only]

Hi Simon

response to the dot points below:

1. The EPA advised us on many occasions that their guidelines are not prescriptive – they are guidelines for us to use to identify and manage risks. We believe we have taken into account the risks identified in the guidelines. VPS water is fit for purpose of irrigating on land, and the concentrated leachate from this practice will usually reach the unconfined aquifer. We have reduced our risk of VPS water reaching the unconfined aquifer by constructing a compacted clay liner under Level 1 supervision. We believe this construction quality surpasses that used by farm dams holding VPS water, and we believe the potential for impact on the unconfined aquifer will be less than that from irrigation. We are not aware of any potential for breaching the EP Act or relevant EPPs.
2. The Certificate of Controlled Fill from FMG is attached.
3. We have identified and described to others the normal operating scenario which is that VPS would bypass Wingate on its way to MAR or on-farm storages. The benefit of Wingate is to capture stormwater, and that benefit is reduced by the presence of any stored water. It is not economic to store 'expensive' VPS water in Wingate and watch 'free' stormwater flow past. From a salinity perspective too – we would be better to capture stormwater if we can. This will also be the case in 2016 - if there is a flood we will close the VPS inflow and pump stormwater into Wingate instead.
    a. Our development application described the normal operating scenario but did not rule out storage of VPS water at Wingate. This is because we preferred to keep this option for VPS storage open. Yes we hope this event is temporary or even once-off, but it would seem unwise to limit the use of such a significant asset. The DA considered the 'worst case' environmental impact of the dam being full of VPS

water when a 1 in 40 ARI inundated the dam. Lesser events do not inundate the dam – as reported by AWE's flood modelling using the 2015 model – so in lesser years, the dam is no different to other VPS storage dams.

b. At the maximum flow rate available from VPS it would take over two months to fill Wingate. We already have remote logging of the flowmeter. We frequent the site and will monitor levels manually until SCADA is operational in mid-August. Level can also be remotely logged if necessary.
c. We will advise the neighbours of the plan. We are typically in contact with them weekly. It is common to store VPS water in dams.

4. Events below 1 in 40 ARI stay within the river channel, and do not cause the top of bank to be inundated. AWE modelled the 1 in 100 event.

I trust this helps explain our rationale

With regards,

John Gransbury | Principal Consultant | HydroPlan
Mobile: +61 412 600 674 **Fax:** +61 8 8373 0779 **Email:** jg@hydroplan.com.au **Website:** http://hydroplan.com.au

From: Neldner, Simon (DPTI) [mailto:Simon.Neldner@sa.gov.au]
Sent: Wednesday, 15 June 2016 4:38 PM
To: John Gransbury
Subject: FW: Gawler Water Re-Use Scheme - DA 313/V013/15 - Request to vary operating procedure / waste water storage on a temporary basis. [DLM=For-Official-Use-Only]

Hi John – the initial feedback from DEWNR is outlined below – can discuss if needed.
Maybe a few dot point responses + the previously highlighted report.
I think they're looking at how the current dam specification will cope vis a vis any potential environmental risk.
Regards - Simon

Simon Neldner
Team Leader - Regional and Out of Councils
Development Assessment
Investment Management | Development Division
Department of Planning, Transport and Infrastructure
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From: Walton, Daniel (DEWNR)
Sent: Wednesday, 15 June 2016 3:42 PM

To: Neldner, Simon (DPTI) <Simon.Neldner@sa.gov.au>
Subject: RE: Gawler Water Re-Use Scheme - DA 313/V013/15 - Request to vary operating procedure / waste water storage on a temporary basis. [DLM=For-Official-Use-Only]

For Official Use Only

Hi Simon

As I mentioned, some of the points that have been raised internally...

1. As the original proposal did not consider wastewater being stored within the Wingate Dam 'proper' (ie. not the inner dam where the wastewater was proposed to be stored on a short term basis), the Wingate Dam 'proper' may not have been constructed as per the requirements in the Wastewater lagoon construction guidelines, November 2004, and hence if the wastewater was stored in the Wingate Dam 'proper' this may lead to a breach of the EP Act or relevant EPPs.
2. As a minimum, as part of a variation to the DA (if required), the submission of an 'As Constructed Report' as per the WW lagoon construction guidelines should be provided for review.
3. Clarification is required from the proponent with respect to:
    a. The temporary nature of the proposal – is it just until the final pipework is set up to transport wastewater directly to the other longer term storage options and will not be considered as a proposal in the future?
    b. How will management of the levels be monitored to avoid potential overflow risks?
    c. What engagement they will have with the local community, given that recent engagement completely ruled out ever putting wastewater in the Wingate Dam 'proper'.
4. Would consideration of a 1 in 20 year flood event be an adequate risk assessment – one for the hydrologists to answer?

Regards

Daniel Walton
River Murray Planner

Coast and River Murray Unit Conservation and Land Management Branch
Department of Environment, Water and Natural Resources
P (08) 8463 6850 E DEWNRplanning@sa.gov.au
Level 9, 81-95 Waymouth Street Adelaide SA 5000 | GPO Box 1047 Adelaide SA 5001 | DX 138
environment.sa.gov.au **naturalresources.sa.gov.au** **waterconnect.sa.gov.au**

From: Neldner, Simon (DPTI)
Sent: Saturday, 4 June, 2016 3:14 PM
To: Walton, Daniel (DEWNR) <Daniel.Walton@sa.gov.au>; Ellyard, Hannah (DEWNR) <Hannah.Ellyard@sa.gov.au>; Riggs, Hayley (EPA) <Hayley.Riggs@sa.gov.au>
Subject: Gawler Water Re-Use Scheme - DA 313/V013/15 - Request to vary operating procedure / waste water storage on a temporary basis.

Hi folks

I've been contacted by John Gransbury (Hydroplan) to modify the operational protocols for the next few months to allow treated waste water to be stored in the Wingate Dam on a temporary basis, prior to the transfer pipeline and Hill Dam becoming operational. The Wingate Dam works have been completed.

The reason is that SA Water can provide larger quantities of the treated waste water during winter at minimal cost, whilst the drier start to winter may not result in expected surface flows to allow water to be taken from the Gawler River as previously planned. Whilst the Wingate Dam was engineered to enable some treated waste water to be temporarily stored, this was in the smaller or inner dam, and then transferred into the main distribution system. As I understand it, one of the issues with Wingate was the potential for flood events to impact upon the storage, where flood waters in a 1:40 ARI event could flow into the dam (as it has no embankments) from the flood plain, and thereby allowing the treated wastewater (if in storage) to enter the Gawler River and floodplain. The query posed is whether for this winter period the dam can be temporarily used to store treated waste water to its designed capacity, which would then be pumped out in later months. I was hoping for something more formal from John, but wanted to pre-empt this by getting some preliminary feedback. Please note I'll be away from the office until 14/6.

Kind regards

Simon Neldner
Team Leader - Regional and Out of Councils
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Investment Management | Development Division
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Government of South Australia
Department of Planning, Transport and Infrastructure

KNET 10633615
Enquiries to Simon Neldner
Telephone (08) 7109 7058

DEVELOPMENT DIVISION

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Telephone: 08 7109 7060

Light Regional Council
93 Main Street
KAPUNDA SA 5373

Attention: John Gransbury (HydroPlan)

Dear Mr Gransbury

Temporary Use of the Wingate Dam for VPS Storage

I refer to your correspondence of 6 June 2016, in relation to the *temporary* storage of Virginia Pipeline Scheme (VPS) water within the approved volumetric capacity of the Wingate Dam prior to the completion of associated water transfer infrastructure.

The Gawler Water Re-Use Scheme was approved by the Minister for Planning on 23 December 2016 subject to a range of construction and operational conditions.

In considering this matter, the Department consulted with the Adelaide and Mount Lofty Ranges Natural Resources Management Board, Environment Protection Authority and the Department of Environment, Water and Natural Resources.

No objection was raised to the temporary use of the Wingate Dam for the storage of VPS water, on the basis that the following requirements are met –

- The allowable period to temporarily store VPS water outside the inner dam must not extend beyond 30 December 2016. The on-going operation of the Wingate Dam must then revert to the approved scheme.

- Beyond 30 December 2016, any proposal to use the Wingate Dam for VPS storage outside the inner dam will require the lodgement of a separate development application to enable an environmental risk assessment to be undertaken.

- The temporary storage of VPS water must be in accordance with relevant requirements of the Environment Protection Act (i.e. environmental duty) and the EPA Wastewater Lagoon Construction Guidelines (November 2014).

- Consideration of possible flood risks in the storage of VPS water.

If you cannot meet these requirements, the development must continue to be operated in accordance with the Minister's approval.

Please contact Simon Neldner (Team Leader – Development Assessment) on 08 7109 7058 if you wish to discuss these matters or require further information.

Yours sincerely

Andrew Grear
MANAGER – DEVELOPMENT POLICY AND ASSESSMENT
as delegate of the
MINISTER FOR PLANNING

12 July 2016