FORM 2

NOTICE OF AN APPLICATION FOR A PLANNING PERMIT
SECTION 52 (1) *PLANNING AND ENVIRONMENT ACT 1987*

Hindmarsh Shire Council

The application reference number is:	**PA1816-2023-A1**
The land affected by the application is located at:	**160 Rupps Road, Nhill VIC 3418**
The application is for a permit to allow:	**Amended Planning Permit Application PA1816-2023: Buildings and Works for the Construction of Four Wastewater Basins at Existing Poultry Processing Plant**
The applicant for the permit is:	[redacted]
Submissions to be received by:	**Thursday 10 April 2025**

Viewing the application
You may view the application and any supporting documentation at www.hindmarsh.vic.gov.au/Planning-Permits-on-Public-Notice or by scanning the QR code below. Alternatively, you can call 03 5391 4444 to arrange a time to view the application at the Nhill office during business hours and free of charge.

Lodging an objection or submission
Any person who may be affected by the granting of the permit may object or make other submissions to Council (the responsible authority). An objection must be made in writing with an explanation of how the objector would be affected by the proposal.

Deciding on the Planning Permit Application
The application will be assessed by Council on its merits against the Hindmarsh Planning Scheme and any submissions received. A decision will not be made on this application until after . Please lodge any submissions prior to this date.

If Council decides to grant the permit despite your objection, you can appeal against the decision. Instructions for appeals are outlined within the Notice of Decision that Council will provide to every objector upon decision of the application.

Privacy and other considerations for lodging an objection or submission
Please note that all personal information contained within a submission will be publicly available until the date of decision, except for any telephone numbers provided.

Ram Upadhyaya
Director of Infrastructure Services

Scan to view documents

Hindmarsh Shire Council	**Office Use Only**	
	VicSmart:	**No**
Planning Enquiries Phone: (03) 5391 4444 Web: http://www.hindmarsh.vic.gov.au/	Specify class of VicSmart application:	-
	Application No: **PA1816-2023-A1**	Date Lodged: **19/02/2025**

Application for
Planning Permit

If you need help to complete this form, read How to complete the Application for Planning Permit form.

⚠ Any material submitted with this application, including plans and personal information, will be made available for public viewing, including electronically, and copies may be made for interested parties for the purpose of enabling consideration and review as part of a planning process under the *Planning and Environment Act 1987*. If you have any concerns, please contact Council's planning department.

⚠ **Questions marked with an asterisk (*) are mandatory and must be completed.**

⚠ **If the space provided on the form is insufficient, attach a separate sheet.**

Application type

Is this a VicSmart Application?*

No

If yes, please specify which VicSmart class or classes:

⚠ If the application falls into one of the classes listed under Clause 92 or the schedule to Clause 94, it is a VicSmart application

Pre-application meeting

Has there been a pre-application meeting with a Council planning officer?

If 'yes', with whom?:

Date: day / month / year

The Land ⓘ

Address of the land. Complete the Street Address and one of the Formal Land Descriptions.

Street Address*

Unit No:	St. No:	St. Name: **Rupps Road**

Suburb/Locality: **Nhill** Postcode: **3418**

Formal Land Description*
Complete either A or B

⚠ This information can be found on the certificate of title.

A Lot No: ○ Lodged Plan ○ Title Plan ○ Plan of Subdivision No:

OR

B Crown Allotment No: Section No:

Parish/Township Name:

If this application relates to more than one address, please attach details.

The Proposal

⚠ You must give full details of your proposal and attach the information required to assess the application. Insufficient or unclear information will delay your application.

ⓘ For what use, development or other matter do you require a permit?*

Amended Planning Permit Application PA1816-2023: Buildings and Works for the Construction of Four Wastewater Basins at Existing Poultry Processing Plant

Provide additional information on the proposal, including: plans and elevations; any information required by the planning scheme, requested by Council or outlined in a Council planning permit checklist; and if required, a description of the likely effect of the proposal.

ⓘ Estimated cost of development for which the permit is required*

Cost **$1,200,000.00**

⚠ You may be required to verify this estimate
Insert '0' if no development is proposed

Insert '0' if no development is proposed (eg. change of use, subdivision, removal of covenant, liquor licence)

Existing Conditions ⓘ

Describe how the land is used and developed now*

Eg. vacant, three dwellings, medical centre with two practitioners, licensed restaurant with 80 seats, grazing.

Provide a plan of the existing conditions. Photos are also helpful.

Title Information ⓘ

Encumbrances on title*

If you need help about the title, read: How to complete the Application for Planning Permit form

Does the proposal breach, in any way, an encumbrance on title such as a restrictive covenant, section 173 agreement or other obligation such as an easement or building envelope?

- ○ Yes. (if 'yes' contact Council for advice on how to proceed before continuing with this application.)
- ○ No
- ○ Not applicable (no such encumbrance applies).

Provide a full, current copy of the title for each individual parcel of land forming the subject site.
(The title includes: the covering 'register search statement', the title diagram and the associated title documents, known as 'instruments' eg restrictive covenants.)

Applicant and Owner Details ⓘ

Provide details of the applicant and the owner of the land.

Applicant *

The person who wants the permit

Name:
Title: **Mr** | First Name [redacted] | Surname: [redacted]

Email [redacted] | Phone no:

Organisation (if applicable) [redacted]

Postal Address | If it is a PO Box, enter the details here:
Unit No: | St. No: [redacted] | St. Name: [redacted]

Suburb/Locality: [redacted] | State: [redacted] | Postcode: [redacted]

*Please provide at least one contact phone number **

Contact Information
Business Phone: | Email [redacted]

Mobile Phone: [redacted]	Fax:

Information Requirements

Is the required information provided?

Contact Council's planning department to discuss the specific requirements for this application and obtain a planning permit checklist.

- ○ Yes
- ○ No

Declaration ⓘ

This form must be signed by the applicant*

⚠ Remember it is against the law to provide false or misleading information, which could result in a heavy fine and cancellation of the permit

I declare that I am the applicant; and that all the information in this application is true and correct and the owner (if not myself) has been notified of the permit application.

Signature:
Electronically Signed.

Date:19 February 2025
day / month / year

This application has been lodged online. The declaration has been electronically signed.

Checklist ⓘ

Have you:

- ☐ Filled in the form completely?
- ☐ Paid or included the application fee?

⚠ Most applications require a fee to be paid. Contact Council to determine the appropriate fee.

- 📎 Provided all necessary supporting information and document?
  - ☐ A full and current copy of the information for each individual parcel of land forming the subject site.
  - ☐ A plan of existing conditions.
  - ☐ Plans showing the layout and details of the proposal.
  - ☐ Any information required by the planning scheme, requested by council or outlined in a council planning permit checklist.
  - ☐ If required, a description of the likely effect of the proposal (eg traffic, noise, environmental impacts).

Lodgement ⓘ

Lodge the completed and signed form and all documents with:

Hindmarsh Shire Council
92 Nelson St, Nhill VIC 3418 92 Nelson Street, Nhill
Telephone: (03) 5391 4444

Contact information:
Telephone: (03) 5391 4444
Email: Building@hindmarsh.vic.gov.au

Hindmarsh Shire Council

PLANNING PERMIT ON PUBLIC NOTICE

What is a Planning Permit?

Land-use Planning considers the way land is used and developed, and how this impacts the character and amenity (liveability) of the municipality. Assessed against the Hindmarsh Planning Scheme, a Planning Permit is a legal document that gives you permission to use or develop land in a certain way. It usually includes conditions and approved plans, which must be complied with.

What is Public Notice?

S52 of the *Planning and Environment Act 1987* set out Council's responsibilities for public notice. The purpose is to ensure that any persons who may be affected by a land use or development proposal are aware of the proposal, have the opportunity to learn more about the proposal, and have the opportunity to make a submission about or object to the proposal.

How do I lodge a submission

If you believe you will be affected by this proposal, Form 2 (attached) describes the process of lodging a submission. Council decides to grant the permit despite your objection, you can appeal against the decision. Instructions for appeals are outlined within the Notice of Decision that Council will provide to every objector upon decision of the application.

Viewing the supporting documentation

You can view the supporting documentation by scanning the QR code on Form 2. Some of the information may be redacted or excluded for privacy reasons.

Questions?

Please contact the Nhill Customer Service centre on (03) 5391 4444. Alternatively, you can email development@hindmarsh.vic.gov.au with any questions. Please quote the application number if applicable.

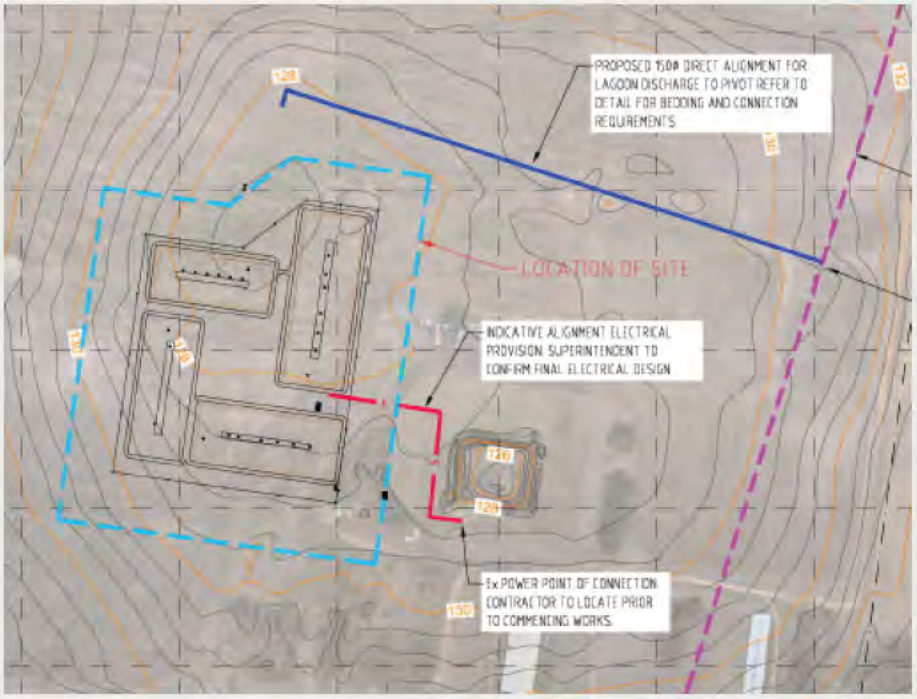
Amendment Planning Permit Application PA1816-2023-A1

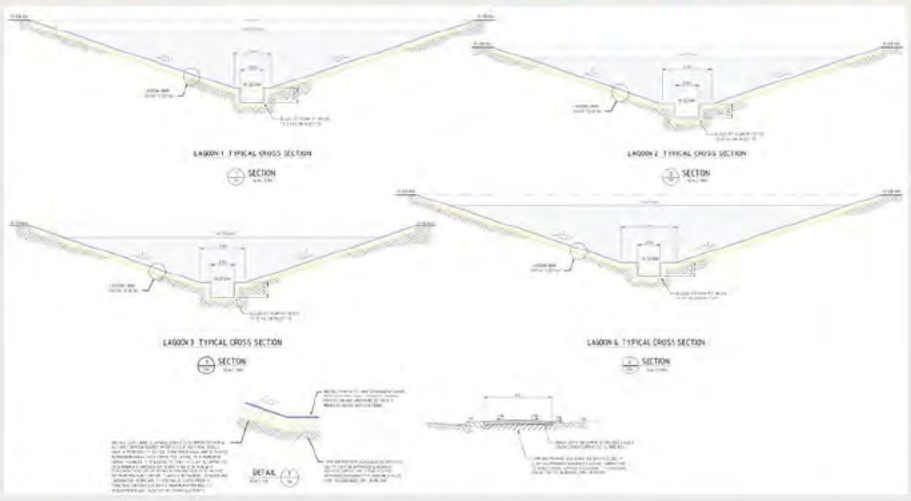
160 Rupps Road, Nhill VIC 3418
(Lot 1 of PS737805)

Buildings and Works for the Construction of Four Wastewater Basins at Existing Poultry Processing Plant

Four wastewater lagoons (on-site wastewater management system) to be constructed on Lot 1 PS737805 as required by Environmental Protection Authority (EPA).

Snippets of Proposal:





Dear Planning Officer,

Luv-a-Duck intends to construct four wastewater lagoons (on-site wastewater management system) on their property known as 160 Rupps Road, Nhill more specifically known as Lot 1 in PS737805.
The construction of the lagoons is a requirement of the EPA in response to an Improvement Notice.
The key change requiring the amendment is based around feedback from the EPA on nutrient reduction more than just waste water storage, hence increasing from 1 lagoon to 4 smaller staged lagoons. (EPA have approved this in principle, hence the request)

All assessment documentation and reporting has been lodged with the EPA in relation to an EPA development license to construct the Lagoons. It is noted that a permit from Council is required to construct, install or alter an on-site wastewater management system with a design or actual flow rate of sewage not more than 5000L on any day. Systems that can treat more than 5000L per day need an EPA development licence and operating licence. The Proposed lagoons have a minimum pump limit of 1.2ML/day (1,200,000L), this demonstrates that no Permit from Council is required for a wastewater management system and that only an EPA development license and operating licence is required.

The land is currently used as an abattoir, the proposed use for an on-site wastewater management system is in conjunction with the use as abattoir, there is an essential association between the uses and the use is genuine, close and will be a continuing functional relationship in its operation with the abattoir use.

The property is located within the Farming Zone, wastewater management system is not specifically listed in the Table of uses, however Section 2 states a Permit is required for any other use not listed in Section 1 or 3 (table of uses). The construction of the waster management system includes activities that may be considered works. Therefore, in accordance with Permit trigger 35.07-4 Buildings and works.

35.07-4 - A permit is required to construct or carry out any of the following:

- A Building or works associated with a use in Section 2 of Clause 35.07-1.

It is also noted that Earthworks is specified in a schedule to this zone, if on land specified in a schedule, the schedule states:

  - Earthworks which change the rate of flow or the discharge point of water across a property boundary - All land
  - Earthworks which increase the discharge of saline groundwater - All land

Luv-a-Duck advises that none of the schedule provisions applicable to earthworks apply in this instance.

Luv-a-Duck would like to confirm that in this instance Council will require an amendment to the application development Permit for works associated with the construction of a wastewater management system.

Thank you in anticipation of your assistance in this matter.

Kind Regards

[redacted]

Project Manager

[redacted]

REGISTER SEARCH STATEMENT (Title Search) Transfer of Land Act 1958

VOLUME 11622 FOLIO 199 Security no : 124121807661W
Produced 06/02/2025 01:25 PM

LAND DESCRIPTION

Lot 1 on Plan of Subdivision 737805V.
PARENT TITLES :
Volume 07381 Folio 167
Volume 09088 Folio 521 to Volume 09088 Folio 522
Volume 09840 Folio 792 Volume 10364 Folio 194
Created by instrument PS737805V 10/12/2015

REGISTERED PROPRIETOR

Estate Fee Simple
Sole Proprietor
THE LUV-A-DUCK RANGE PTY LTD of 2 SOUTHBANK BOULEVARD SOUTHBANK VIC 3006
AM494308K 21/01/2016

ENCUMBRANCES, CAVEATS AND NOTICES

CAVEAT as to part AM998657X 08/08/2016
Caveator
POWERCOR AUSTRALIA LTD
Grounds of Claim
LEASE WITH THE FOLLOWING PARTIES AND DATE.
Parties
THE REGISTERED PROPRIETOR(S)
Date
02/08/2016
Estate or Interest
LEASEHOLD ESTATE
Prohibition
ANY INSTRUMENT THAT AFFECTS MY/OUR INTEREST
Lodged by
POWERCOR AUSTRALIA LTD
Notices to
POWERCOR AUSTRALIA LTD of 40 MARKET STREET MELBOURNE VIC 3000

Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION

SEE PS737805V FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS

NIL

DOCUMENT END

Imaged Document Cover Sheet

The document following this cover sheet is an imaged document supplied by LANDATA®, Secure Electronic Registries Victoria.

Document Type	**Plan**
Document Identification	**PS737805V**
Number of Pages (excluding this cover sheet)	**4**
Document Assembled	**06/02/2025 13:25**

Signed by Council: Hindmarsh Shire Council, PP Ref: 1491-2015, Cert Ref: PS737805V, Original Certification: 06/08/2015, S.O.C.: 06/08/2015

PLAN OF SUBDIVISION

LV USE ONLY
EDITION 1

PS 737805V

LOCATION OF LAND

PARISH : TARRANGINNIE
TOWNSHIP : ———
SECTION : ———
CROWN ALLOTMENT : 247 & 269
CROWN PORTION : ———
TITLE REFERENCE : VOL. 7381 FOL. 167
VOL. 9088 FOL. 522
VOL. 10364 FOL. 194
VOL. 9840 FOL. 792
VOL. 9088 FOL. 521
LAST PLAN REFERENCE : TP 759809A (CA 269)
TP 199905Y (LOT 1)
TP 217714M (LOT 1)
TP 140383K (LOT 1)
TP 627670T (LOT 1)
POSTAL ADDRESS : 160 RUPPS ROAD &
(At time of subdivision) 171 PROPODOLLAH ROAD
NHILL 3418
MGA94 Co-ordinates
(of approx centre of land in plan) E 555750 ZONE: 54
N 5980650 GDA 94

HINDMARSH SHIRE COUNCIL

NOTATIONS

THIS IS A SPEAR PLAN.

THE DIMENSIONS SHOWN UNDERLINED HAVE BEEN ADOPTED FROM TITLE AND ARE NOT THE RESULT OF THIS SURVEY.

THE AREAS OF LOTS 1 & 2 HAVE BEEN DEDUCED FROM TITLE.

THE CARRIAGEWAY EASEMENT SHOWN AS E-1 ON TP627670T AND CREATED BY C/E N896133G WILL DISAPPEAR BY MERGER UPON REGISTRATION OF THIS PLAN.

VESTING OF ROADS AND/OR RESERVES

IDENTIFIER	COUNCIL/BODY/PERSON
Nil.	Nil.

NOTATIONS

DEPTH LIMITATION: DOES NOT APPLY TO LOT 1 ON TP217714M.
15·24 METRES BELOW THE SURFACE APPLIES TO ALL OTHER THE LAND IN THE PLAN.

Survey: This plan is based on survey.

This survey has been connected to permanent marks no(s)
BALROOTAN PM'S 11 & 40
In proclaimed Survey Area no. ———

STAGING This is not a staged subdivision.
Planning Permit No. ———

EASEMENT INFORMATION

LEGEND: A - Appurtenant Easement E - Encumbering Easement R - Encumbering Easement (Road)

Easement Reference	Purpose	Width (Metres)	Origin	Land Benefited/In Favour Of
E-1 & E-3	POWERLINE	14	THIS PLAN (SECTION 88 OF THE ELECTRICITY INDUSTRY ACT 2000)	POWERCOR AUSTRALIA LTD
E-2, E-3 & E-4	SUPPLY OF ELECTRICITY THROUGH UNDERGROUND CABLE	AS SHOWN	THIS PLAN	POWERCOR AUSTRALIA LTD

Ferguson Perry Surveying Pty Ltd
62 McLachlan Street Horsham,
Victoria 3400
ABN 76126 194 483

T (03) 5382 2023
F (03) 5381 1544
E admin@fergusonperry.com.au

A member of Alexander Symonds Group

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

DIGITALLY SIGNED BY LICENSED SURVEYOR:

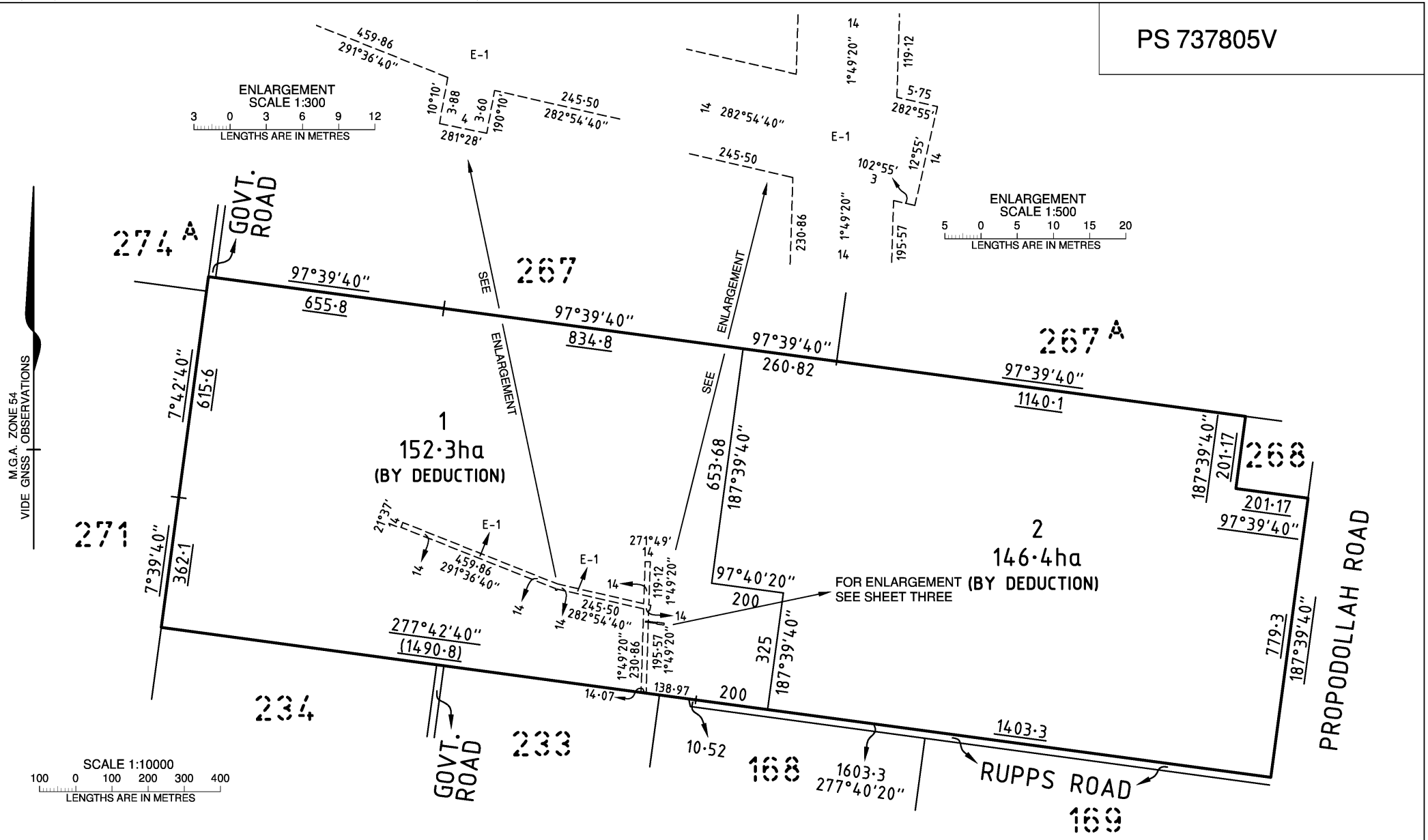
IAN YOUNG

REF H015214 VERSION 2 DRAWN BY C.B. 07-15

Sheet 1 of 3 Sheets
ORIGINAL SHEET SIZE A3
PLAN REGISTERED
TIME: 4.30PM
DATE: 10/12/2015
GARY M ROBERTSON
Assistant Registrar of Titles

Signed by: Ian Young (Ferguson Perry Surveying Pty Ltd) Surveyor's Plan Version (2) SPEAR Ref: S066002P 05/08/2015, Amended: 28/10/2015.

PS 737805V

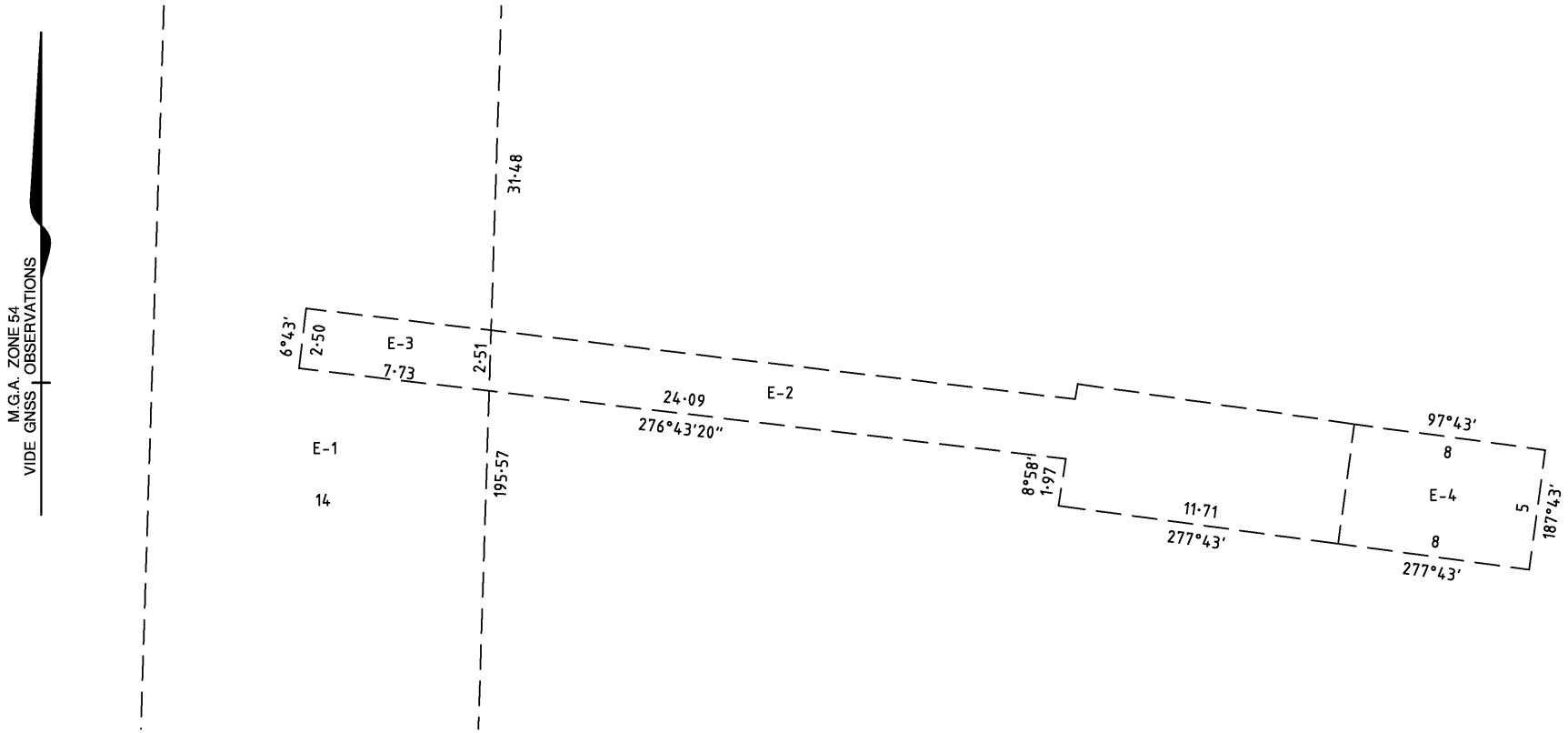


Ferguson Perry Surveying Pty Ltd 62 McLachlan Street Horsham, Victoria 3400 ABN 76126 194 483 T (03) 5382 2023 F (03) 5381 1544 E admin@fergusonperry.com.au A member of Alexander Symonds Group + Property + Land Development + + Construction + Mining + + Spatial Information Management +	ORIGINAL SCALE AS SHOWN	DIGITALLY SIGNED BY LICENSED SURVEYOR: IAN YOUNG REF H015214 VERSION 2 DRAWN BY C.B. 07-15

Sheet 2

ORIGINAL SHEET SIZE A3

PS 737805V



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F (03) 5381 1544
E admin@fergusonperry.com.au

A member of Alexander Symonds Group

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

SCALE 1:10000
2 0 2 4 6 8
LENGTHS ARE IN METRES

ORIGINAL SCALE AS SHOWN

DIGITALLY SIGNED BY LICENSED SURVEYOR:

IAN YOUNG

REF H015214 VERSION 2 DRAWN BY C.B. 07-15

Sheet 3

ORIGINAL SHEET SIZE A3

Plan of Subdivision PS737805V

Concurrent Certification and Statement of Compliance (Form 3)

SUBDIVISION (PROCEDURES) REGULATIONS 2011

SPEAR Reference Number: S066002P
Plan Number: PS737805V
Responsible Authority Name: Hindmarsh Shire Council
Responsible Authority Permit Ref. No.: 1491-2015
Responsible Authority Certification Ref. No.: PS737805V
Surveyor's Plan Version: 2

Certification

☑ This plan is certified under section 6 of the Subdivision Act 1988

Statement of Compliance

☑ This is a statement of compliance issued under section 21 of the Subdivision Act 1988

Public Open Space

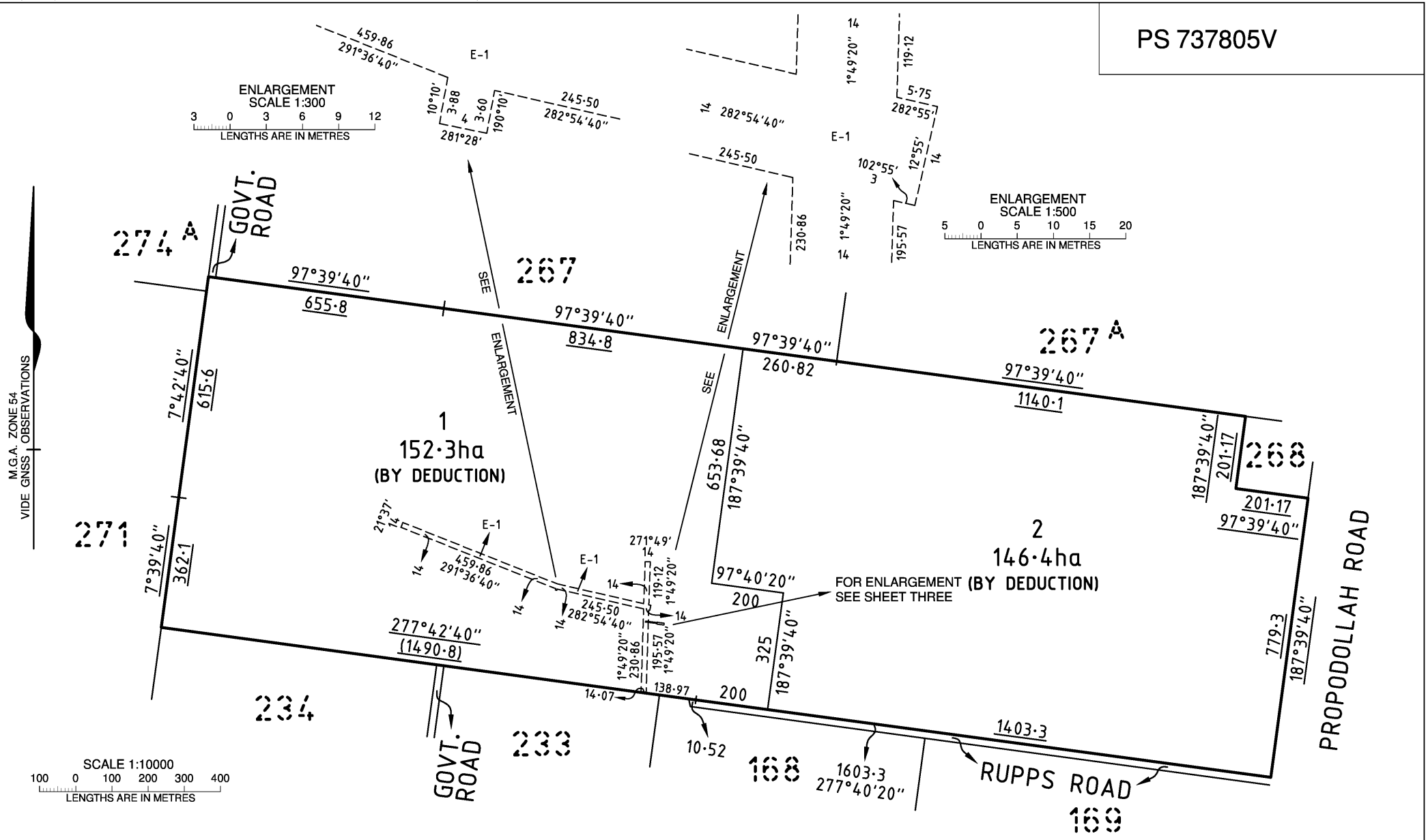
A requirement for public open space under section 18 of the Subdivision Act 1988

○ Has not been made at Certification

Digitally signed by Council Delegate: [redacted]
Organisation: Hindmarsh Shire Council
Date: 06/08/2015

Signed by: Douglas Grant Gowans (Hindmarsh Shire Council) 06/08/2015

PS 737805V

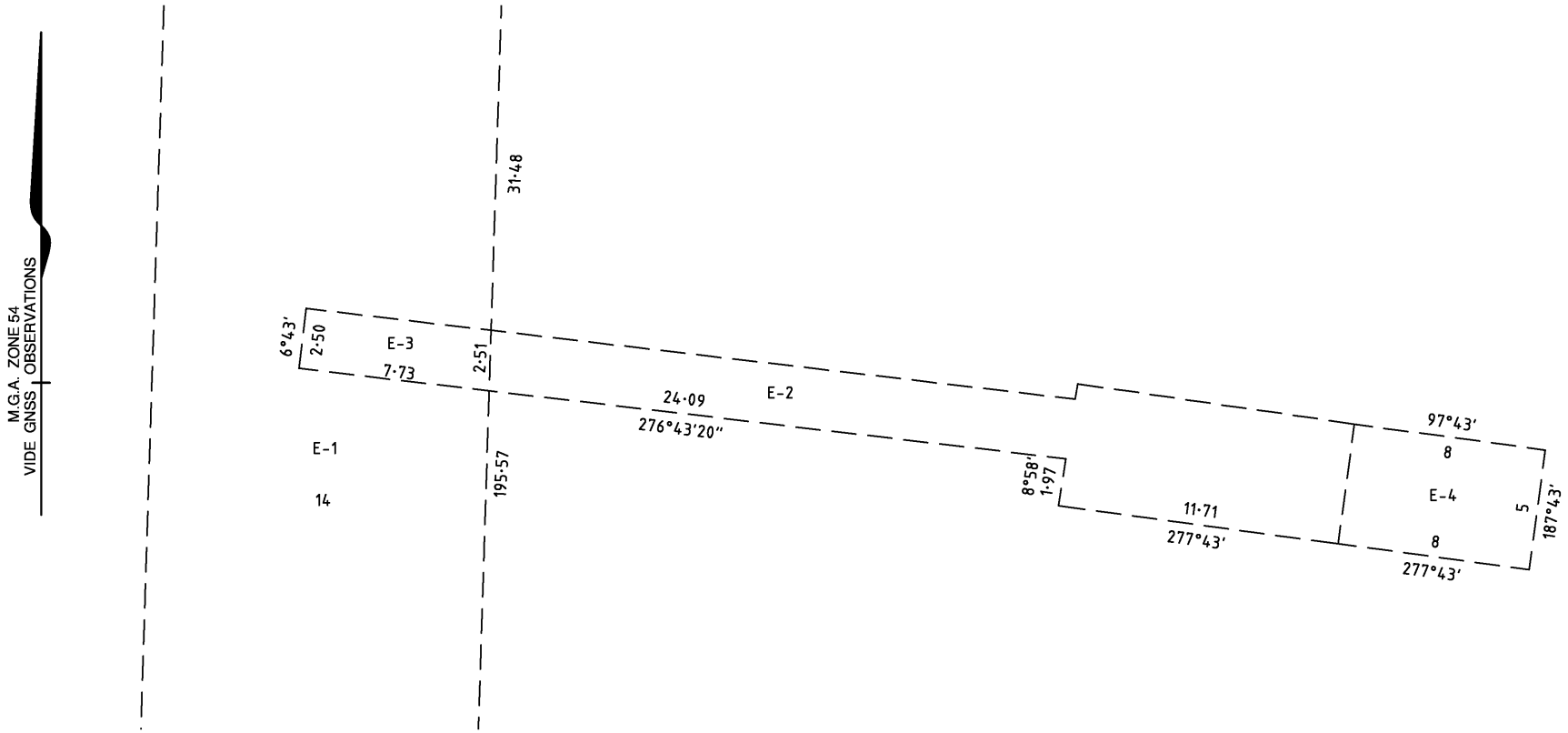


Ferguson Perry Surveying Pty Ltd 62 McLachlan Street Horsham, Victoria 3400 ABN 76126 194 483 T (03) 5382 2023 F (03) 5381 1544 E admin@fergusonperry.com.au A member of Alexander Symonds Group + Property + Land Development + + Construction + Mining + + Spatial Information Management +	ORIGINAL SCALE AS SHOWN	DIGITALLY SIGNED BY LICENSED SURVEYOR: IAN YOUNG REF H015214 VERSION 2 DRAWN BY C.B. 07-15

Sheet 2

ORIGINAL SHEET SIZE A3

PS 737805V



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Victoria 3400
ABN 76126 194 483

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F (03) 5381 1544
E admin@fergusonperry.com.au

A member of Alexander Symonds Group

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

SCALE 1:10000
2 0 2 4 6 8
LENGTHS ARE IN METRES

ORIGINAL SCALE AS SHOWN

DIGITALLY SIGNED BY LICENSED SURVEYOR:

IAN YOUNG

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Plan of Subdivision PS737805V

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SUBDIVISION (PROCEDURES) REGULATIONS 2011

SPEAR Reference Number: S066002P
Plan Number: PS737805V
Responsible Authority Name: Hindmarsh Shire Council
Responsible Authority Permit Ref. No.: 1491-2015
Responsible Authority Certification Ref. No.: PS737805V
Surveyor's Plan Version: 2

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○ Has not been made at Certification

Digitally signed by Council Delegate: [redacted]
Organisation: Hindmarsh Shire Council
Date: 06/08/2015

Signed by: Douglas Grant Gowans (Hindmarsh Shire Council) 06/08/2015

Imaged Document Cover Sheet

The document following this cover sheet is an imaged document supplied by LANDATA®, Secure Electronic Registries Victoria.

Document Type	**Instrument**
Document Identification	**AM998657X**
Number of Pages (excluding this cover sheet)	**4**
Document Assembled	**04/10/2023 16:33**

Caveat

Section 89 Transfer of Land Act 1958

The information from this form under statutory authority and is u publicly

AM998657X
08/08/2016 $46.30 89

1. Land/s

Land Title

Volume 11622 Folio 199
Description PART OF THE LAND MARKED L-1, E-1, E-2, E-3, E-4 AND E-5 ON THE PLAN ATTACHED

2. Caveator/s

Caveator

Name POWERCOR AUSTRALIA LTD
ABN 06 465 110 9

3. Grounds of Claim

LEASE WITH THE FOLLOWING PARTIES AND DATE.

Parties

THE REGISTERED PROPRIETOR(S)

Date of Claim

Date: (DD/MM/YYYY) 02/08/2016

4. Estate or Interest claimed

LEASEHOLD ESTATE

5. Prohibition

ANY INSTRUMENT THAT AFFECTS MY/OUR INTEREST

6. Address for Service o[illegible]

Lawyer/Conveyancer/Firm Name

POWERCOR AUSTRALIA LTD

Address

Unit		Street No	40
Street Name	MARKET		
Street Type	STREET		
Locality	MELBOURNE		
State	VIC	Postcode	3000

7. Signing

The caveator claims the estate or interest specified in the land described on the grounds set out. This caveat forbids the registration of any instrument affecting the estate or interest to the extent specified.

Caveator

EXECUTED by POWERCOR AUSTRALIA LTD ACN 064 651 109 by its duly appointed attorney SIMON LUCAS, Company Secretary pursuant to Power of Attorney dated 4 October 2013 a certified copy of which is filed in Permanent Order Book No. 277 at Page 032 Item 31 in the presence of:

.....
Simon Lucas

.....
Witness Sign

JEANINE LAUGHTON

Caveat

Section 89 Transfer of Land Act 1958

Privacy Collection Statement

The information from this form is collected by the Registrar under statutory authority and is used publicly

AM998657X

08/08/2016 $46.30 89

1. Date

Date: (DD/MM/YYYY) 02/08/2016

2. Lodging Party

Customer Code 9928M

Reference X7826 77/AJ/1701

Annexure Page

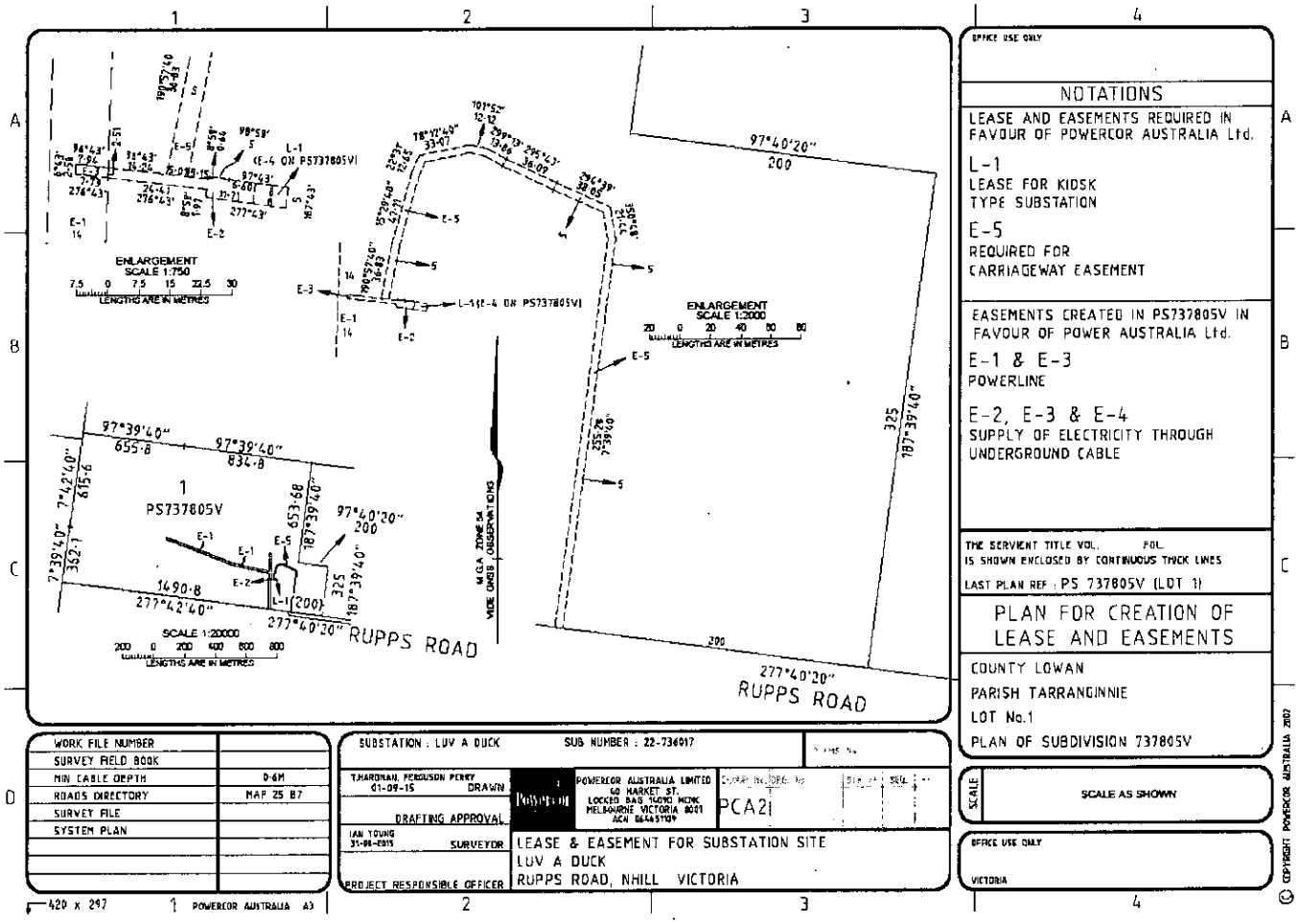
Transfer of Land Act 1958

AM998657X

08/08/2016 $46.30 89

This is page 2 of 2 dated 2 August 2016 between POWERCOR AUSTRALIA LTD and THE LUV-A-DUCK RANGE PTY. LTD.

Signatures of the Parties



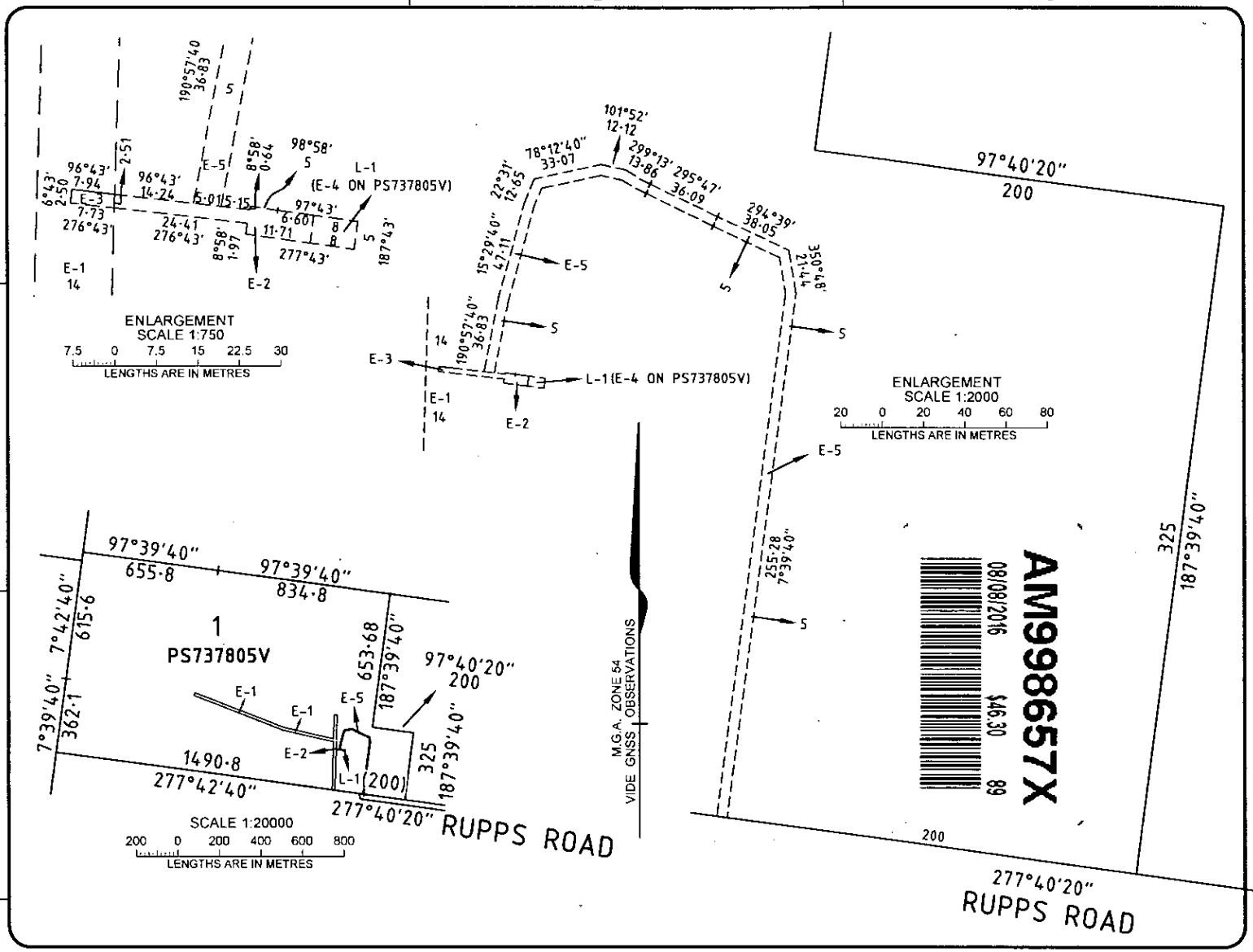
30800812A

A1

1. If there is insufficient space to accommodate the required information in a panel of the attached form insert the words "See Annexure Page 2" (or as the case may be) and enter all the information on the Annexure Page under the appropriate panel heading.
2. The approved Annexure Pages must be properly identified and signed by the parties to the attached form to which it is annexed.
3. All pages must be attached together by being stapled in the top left corner.

THE BACK OF THIS FORM MUST NOT BE USED

Land Victoria, 570 Bourke Street, Melbourne, 3000, Phone 8636-2010



OFFICE USE ONLY

NOTATIONS

LEASE AND EASEMENTS REQUIRED IN FAVOUR OF POWERCOR AUSTRALIA Ltd.

L-1
LEASE FOR KIOSK TYPE SUBSTATION

E-5
REQUIREO FOR CARRIAGEWAY EASEMENT

EASEMENTS CREATED IN PS737805V IN FAVOUR OF POWER AUSTRALIA Ltd.

E-1 & E-3
POWERLINE

E-2, E-3 & E-4
SUPPLY OF ELECTRICITY THROUGH UNDERGROUND CABLE

THE SERVIENT TITLE VOL. FOL.
IS SHOWN ENCLOSED BY CONTINUOUS THICK LINES

LAST PLAN REF : PS 737805V (LOT 1)

PLAN FOR CREATION OF LEASE AND EASEMENTS

COUNTY LOWAN
PARISH TARRANGINNIE
LOT No.1
PLAN OF SUBDIVISION 737805V

WORK FILE NUMBER	
SURVEY FIELD BOOK	
MIN CABLE DEPTH	0-6M
ROADS DIRECTORY	MAP 25 B7
SURVEY FILE	
SYSTEM PLAN	

SUBSTATION : LUV A DUCK SUB NUMBER : 22-736017 PLEMS No.

T.HAROMAN, FERGUSON PERRY 01-09-15 DRAWN

DRAFTING APPROVAL

IAN YOUNG 31-08-2015 SURVEYOR

PROJECT RESPONSIBLE OFFICER

POWERCOR AUSTRALIA LIMITED
40 MARKET ST.
LOCKED BAG 14090 MCMC
MELBOURNE VICTORIA 8001
ACN 064651109

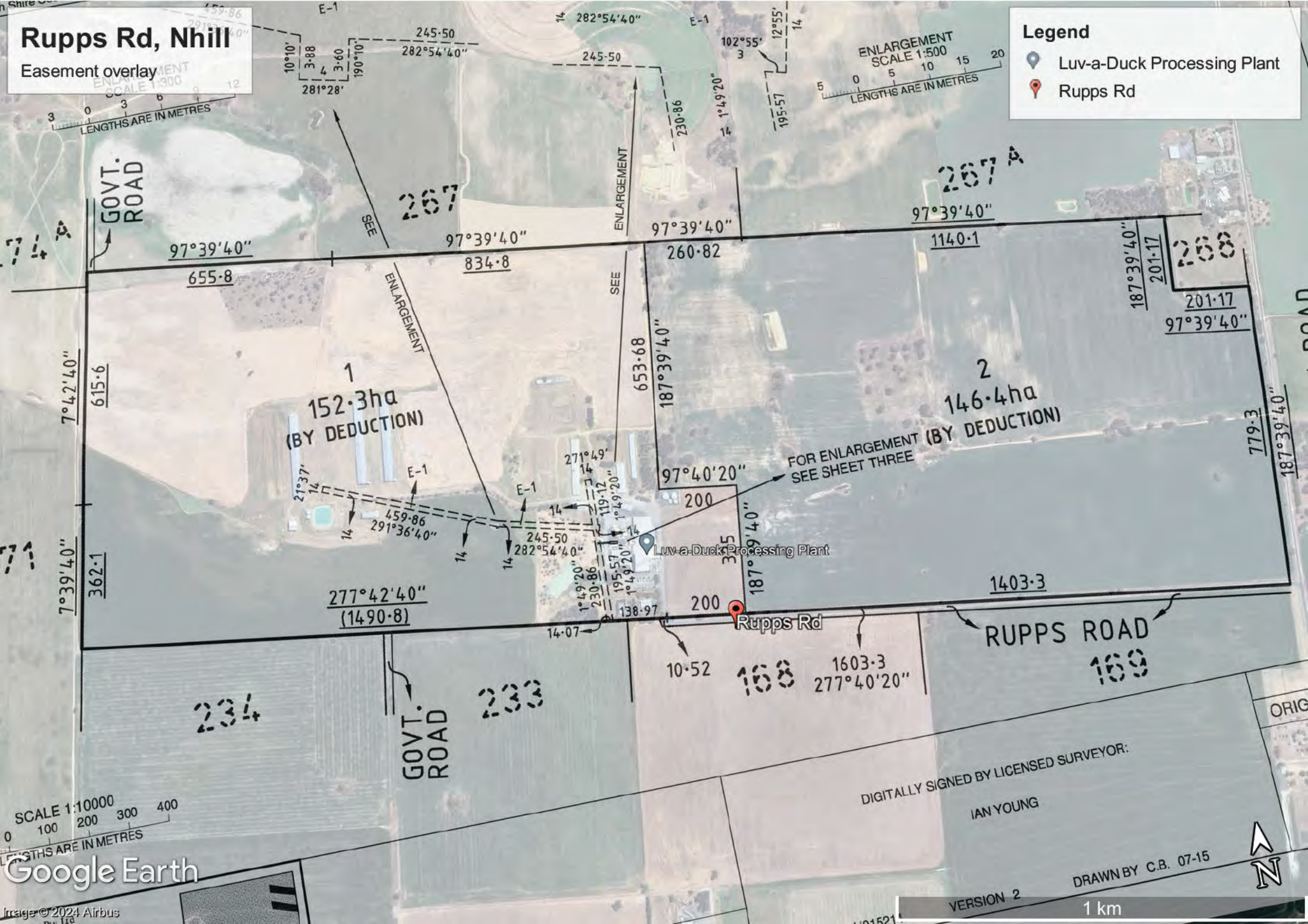
ROW No.	DRG. No.	STROKE	SEQ.	REV.
PCA2				

LEASE & EASEMENT FOR SUBSTATION SITE
LUV A DUCK
RUPPS ROAD, NHILL VICTORIA

SCALE: SCALE AS SHOWN

OFFICE USE ONLY
VICTORIA

420 x 297 1 POWERCOR AUSTRALIA A3


Rupps Rd, Nhill
Easement overlay
Legend
Luv-a-Duck Processing Plant
Rupps Rd
GOVT. ROAD
267
267 A
268
97°39'40"
655·8
834·8
260·82
1140·1
201·17
615·6
7°42'40"
7°39'40"
362·1
653·68
187°39'40"
779·3
1
152·3ha
(BY DEDUCTION)
2
146·4ha
(BY DEDUCTION)
FOR ENLARGEMENT SEE SHEET THREE
97°40'20"
200
335
1403·3
277°42'40"
(1490·8)
Luv-a-Duck Processing Plant
Rupps Rd
RUPPS ROAD
168
169
1603·3
277°40'20"
10·52
14·07
138·97
459·86
291°36'40"
245·50
282°54'40"
119·12
1°49'20"
195·57
230·86
271°49'
21°37'
E-1
ENLARGEMENT
SEE
ENLARGEMENT SCALE 1:500
LENGTHS ARE IN METRES
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0 100 200 300 400
LENGTHS ARE IN METRES
DIGITALLY SIGNED BY LICENSED SURVEYOR:
IAN YOUNG
DRAWN BY C.B. 07-15
VERSION 2
N
1 km
Google Earth
Image © 2024 Airbus

Luv-a-Duck

Wastewater Irrigation Assessment Report

V3.0

Property and Address:	THE LUV A DUCK RANGE PTY. LTD 160 Rupps Rd, Nhill, Victoria, 3418
Crown Allotment/Parcels:	Lot 1 PS737805, Lot 2 PS442515
LGA:	Hindmarsh Council
Client:	[redacted]

Disclaimer

This document has been prepared by Scolexia Pty Ltd with all reasonable skill, care and diligence. Information reported herein is based on the interpretation of data collected, included that provided by ***THE LUV A DUCK RANGE PTY. LTD***, which has been accepted in good faith as being accurate and valid. This report also relies on the interpretation of visual and pictorial observations described as at the time of Scolexia's site visit to site of ***THE LUV A DUCK RANGE PTY. LTD*** at 160 Rupps Rd, Nhill, Victoria, 3418, and third-party reports prepared during the course of this investigation. These observations may not reflect the circumstances or situations at the site at different times. If the information on which this report is based changes, the report will need to be revised to reflect these changes.

This report is for the exclusive use of ***THE LUV A DUCK RANGE PTY. LTD*** No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Scolexia Pty Ltd.

DOCUMENT CONTROL

Reference	Status	Date	[redacted]	[redacted]	[redacted]
LAD Wastewater Irrigation Assessment Report	DRAFT V1.0	24/02/2024	[redacted]	[redacted]	[redacted]
LAD Wastewater Irrigation Assessment Report	V2.0 – With client feedback incorporated	14/03/2024	[redacted]	[redacted]	[redacted]
LAD Wastewater Irrigation Assessment Report	V3.0 – Issued Final	19/03/2024	[redacted]	[redacted]	[redacted]

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Executive Summary

In response to EPA Improvement Notice (IMPN-00002719) (16 June 2022), a Wastewater & Environmental Management Plan (EMP) was previously prepared that recommended irrigation of the wastewater generated at 160 Rupps Rd, Nhill, Victoria, 3418 (the Site) across a larger area.

This current report describes further investigations which were performed to assess water availability and nutrient uptake for sustainable crop growth over the proposed larger irrigation area. Moreover, given that the proposed irrigation followed a fixed daily frequency, year-round, as has been historically done over several years at the Site in accordance with its environmental license, the current investigations sought to establish whether these practices would have to rely on soil storage and if so, whether this would be achievable without posing significant risk of environmental harm.

The analyses included a daily timestep model in the reputable Model for Effluent Disposal Using Land Irrigation (MEDLI) V 2.5 model, to model soil, water, crops, nutrients, and salinity and their interactions for the irrigation area over an extended 50-year model period. The model calculations incorporated long term climate data for the Site sourced from the reputable database SILO hosted by the Queensland Department of Environment and Science, as well as the advice from an agronomist, and an agricultural engineering specialist to select model input parameters appropriate for the Site. Model scenarios were set up to assess the suitability of irrigation at the Site, first assessing nutrient and water balances for the largest possible irrigation area available at the Site (110 ha). However, practicality, cost, and availability of water and nutrients for cropping may limit a suitable irrigation area. Hence, further model analyses assessed options to reduce the suitable irrigation area based on water availability, cropping and nutrient management, and applying additional treatment of the wastewater in an aerated lagoon to remove nitrogen (N) and phosphorus (P) prior to irrigation. This could then provide greater flexibility to proactively manage nutrients and water and maximising crop production potentially across a smaller irrigation area.

The water balance results showed some water deficiency stress for a 110-ha irrigation area, but water stress was reduced if the irrigation area was reduced to 50-ha. Regardless, crop yield under irrigation was reasonable, even at 110-ha, indicating that enough water was available for the proposed areas and crop type. The nutrient balance results showed that some excess of P was available if the wastewater was not first pre-treated in an aerated lagoon to remove N and P. However, whilst with untreated wastewater, accumulation of P in the soil column was observed across 110-ha, soil storage was complete, and no significant P losses occurred via leaching over a 50-year irrigation period. With wastewater first treated in an aerated lagoon, the N and P supply in irrigated wastewater matched crop demands well for a 50-ha area, with minimal soil P loss, and minimal soil N loss. These results suggested that continuous P loading of the soil would not be required with treated wastewater.

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As the Site is located in an area of low rainfall, pooling and significant run-off was **not** observed in any of the modelled scenarios. Modelled soil nitrate concentrations were however elevated, which appeared to be caused by crop biomass accumulation over time, undergoing subsequent nitrogen mineralisation and release into the soil column.

Modelling tested wet weather storage implemented for a 50 ha irrigation area with a maximum spill frequency constraint of 1:10 years (Noting that this required an impractically large storage pond of over 100 megalitres, because of the high wastewater flows). However, with wet weather storage, both the summer crop and winter crop suffered significant yield loss due to water stress and nitrogen deficiency for some months of the year. This meant that N losses to leaching could only be marginally decreased with wet weather storage as compared to a fixed daily irrigation schedule. Moreover, the reduced leaching fraction with wet weather storage (noting the low rainfall at the Site) meant that annual nitrate-N leaching concentrations were notably higher with wet weather storage than without, and soil salinity more than three times higher with wet weather storage.

Overall, the results indicated that:

1. crop demand for water and nutrients can be generally sustained year-round at the Site;

2. that wastewater treated in an aerated lagoon prior to irrigation would not require significant soil storage of nutrients; and

3. that wet weather storage would not be required to minimise the risk of environmental harm associated with irrigation at the Site, but actually increased the risks associated with elevated soil salinity and nitrate concentrations in the soil leaching fraction.

Accordingly, it is recommended that the design of the aerated lagoon and associated sludge pond systems described herein be fully developed for the Site and implemented, and that the irrigation area at the Site be expanded to at least 50 ha (i.e. MEDLI modelling scenario 2a). It is further recommended that the irrigation scheduling, the amount of wastewater treatment to remove nutrients, and the area under irrigated cropping be guided by a dedicated Monitoring and Agronomic Program with input from agricultural/soil specialists, as previously proposed in the EMP.

Note that the proposed aerated lagoon would satisfy the requirements for flow and compositional buffering of wastewater at the Site, as previously highlighted in the EMP; thus, with implementation of this lagoon, a 500kL tank previously proposed in the EMP would no longer be required.

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1 Background

A Wastewater & Environmental Management Plan V2.0 (EMP), 24/10/2023, was previously prepared for the operational duck processing facility of THE LUV A DUCK RANGE PTY LTD (LAD) at 160 Rupps Rd, Nhill, Victoria, 3418 (the Site). The EMP sought to assist LAD in meeting its obligations under an EPA Improvement Notice (IMPN-00002719), 16 June 2022.

EPA VIC provided the following queries in response to the EMP, 14/11/2023:

1. The proposal appears to put forward spreading wastewater for reuse over a larger area, and then crop this area to remove nutrients. This is good in principle; however, no details are provided to confirm there is enough water to adequately irrigate the proposed area and crop type. To address these concerns a water balance needs to be provided that demonstrates how crop demands for the proposed area would be met.

2. In addition to point 1 and balance on the water balance, there would then need to be a nutrient balance provided that demonstrates for the type of crop and area proposed that nutrient removal can be achieved without continuous nutrient loading of the soil.

3. Lastly, the proposed system only contains 6 hours of treated wastewater storage. The proposal does not specifically detail how waste water will be managed in wet conditions when crop demand is not present. If the proposal is to simply keep irrigating and allow wastewater to percolate through the soil profile this may be considered a disposal of waste and unlikely be acceptable to EPA considering the General Environmental Duty provisions of the EP Act. If the proposal is to use soil profile as storage, please detail how this can be achieved without it becoming a disposal.

At the request of LAD, Scolexia Pty Ltd prepared this current irrigation assessment report to respond to these queries. The purpose of the investigations in this current report was to determine the suitability of the Site and the proposed irrigation practices for on-going sustainable management of wastewater generated at the Site.

This current irrigation assessment report should be read in conjunction with a separate Desktop Hydrogeological Assessment report prepared by EHS Support Pty Ltd (EHS Support), January 2024, which separately evaluated potential risk to groundwater receptors, as a result of proposed wastewater irrigation activities at the Site.

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2 Scope

The analyses described in this report included a daily timestep model in the reputable Model for Effluent Disposal Using Land Irrigation (MEDLI) V 2.5 to assess soil, water, crops, nutrients, and salinity over an extended 50-year model period. The model calculations incorporated long term climate data for the Site sourced from the reputable database SILO hosted by the Queensland Department of Environment and Science, as well as the advice from an agronomist, and an agricultural engineering specialist regarding model input parameters appropriate for the Site.

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3 Site Description

3.1 Site Operations Overview

The Site at 160 Rupps Rd, Nhill, Victoria, 3418, is owned and operated by LAD, processes Pekin meat ducks, and value-adds to offal/by-products via offsite rendering and by onsite processing and refinement of duck feathers. Processing typically occurs weekly, Monday and Friday, from 5am to 7pm, except on Mondays when processing is commonly 1-hr shorter. Wastewater is generated from cleaning and processing. Refer to the EMP for detailed site operations, environmental considerations and constraints.

3.2 Wastewater Irrigation/Reuse Areas

An underground pipeline conveys the wastewater to pivot paddocks at the Northern end of the Site (**Figure 1**) to be land applied (**Figure 2**) under EPA Licence OL000003138. This irrigation occurs whenever processing occurs at the Site, year-round, in all climate conditions (previously wastewater was irrigated long-term across Pivot 1 in accordance with the site environmental license, however, currently, wastewater is only irrigated across Pivot paddock 2 (**Figure 1**)).

Figure 1: Aerial photo showing the location of the processing facility and old and new pivot irrigation paddocks in the Northern end of the Site (Adapted from EnProve, 2023)

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Figure 2: Photo of operational centre pivot at the Site in the Pivot 2 paddock in Figure 1.

The plan outlined in the EMP was to increase the area over which wastewater is to be distributed across the Site, to maximise the crop productivity benefits from the wastewater and to minimise the risk of environmental impacts. The EMP also proposed a minimum of two irrigation areas be provided to allow rotation of paddocks to rest, crop, and meet required withholding periods. The historic Pivot 1 paddock, combined with the current Pivot 2 paddock (taking into account buffers) is about 30 ha. Other areas proposed in the EMP included areas to the north of the processing facility (**Figure 3**, blue, approximately 50 ha) and to the South of the processing facility (yellow, **Figure 3**, approx. 31 ha), so that the total area over which irrigation could be spread could be up to 110 ha.

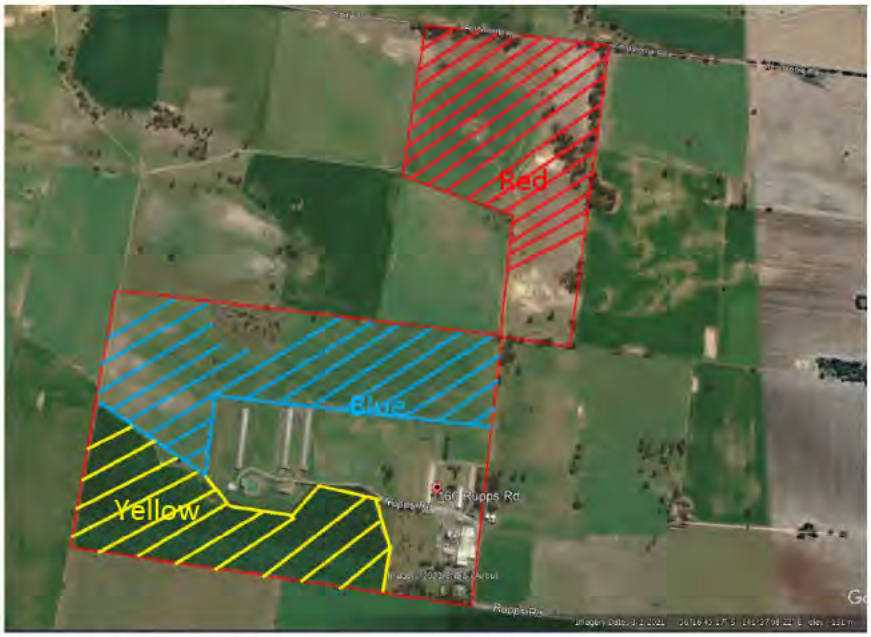

Figure 3: Irrigation areas, Red =Current area utilised, Blue and Yellow =potential areas (Source: Google Earth, 2023), as presented in the EMP

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3.3 Wastewater Flow and Composition

Wastewater produced at the Site currently first undergoes onsite primary treatment to screen out coarse solids and feathers. The screened wastewater is then irrigated via a centre pivot as above.

The volume of wastewater being irrigated was assessed in the EMP using historic flow data and over the period 2021-2023(June) was highest in 2021, specifically observed to be on average 1,198 m^3/d on an operational day (~1.2 ML/d, or 312 ML/annum for a nominal 260 processing days), largely insensitive to rainfall at the Site.

The wastewater was also representatively sampled as described in the EMP, and compositions found to be as shown in **Table 1**. The two wastewater samples varied somewhat in composition, possibly because the pivot outlet samples could not be collected during low-light hours of operation due to safety reasons. For this reason, the present model calculations used an average of the two samples to provide a reasonably conservative estimate of nutrient loading.

Table 1: Table of measured characteristics for irrigated wastewater at the Site, as presented in the EMP (samples collected August 2023, ALS Batch # 23-52004; 23-48900)

Analyte	Wastewater - Prior to final screen	Wastewater – Pivot outlet	Wastewater – Average of two samples
Chemical Oxygen Demand (COD) (mg/L)	5,000	3,000	4,000
Biochemical Oxygen Demand, 5 Day (BOD_5) (mg/L)	2,300	2,300	2,300
Total Kjeldahl Nitrogen (TKN, HL) (mg N / L)	240	260	250
Nitrate (NO_3-N) (mg N / L)	<0.01	<0.1	-
Ammonia nitrogen (mg N / L)	28	12	20
Total Phosphorus (TP, HL) (mg P / L)	26	48	37
Reactive Phosphorus (Reactive P, HL) (mg P / L)	18	48	33
Potassium (K) (mg/L)	58	150	104
Sulphur (mg/L)	31	24	28
Electrical Conductivity (EC) @ 25C µS/cm	1,800	1,500	1,650
Chloride (mg/L)	260	210	235
Sodium Adsorption Ratio (SAR) (-)	4.4	6.8	6
Total Iron (mg/L)	5.3	1.5	3

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4 Environmental characteristics

Specific environmental constraints for the Site had been previously outlined in the EMP. Characteristics important for the present analysis are summarised below.

4.1 Climate

Climate data were sourced from the Silo database for a grid point location near the Site (coordinates -36.30 141.60) for the period 1970-2023 and was used in the model calculations described below. These data showed that the Site had a mean annual rainfall of 400 mm/year, characterised by wetter winters and dryer summers. The average annual PAN evaporation was reported at 1,588 mm/year, significantly exceeding annual rainfall.

4.2 Soils

The Site is located in an area known as the North-west dunefields and plains. Pale sandy sand (Rudosols and podosols) occurs on the Lowan sand in the south with some reworked areas of exposed and heavily ferruginised Parilla sand (VRO, 2023). In areas with deep unconsolidated siliceous sand (Lowan sans), soils can be described as deep sandy sodosols. “Hardsetting Red Sodosols usually occur on the gently undulating plains and rises north of the Little Desert in the Nhill and Kaniva region” (VRO, 2023). “The surface soil is usually a grey-brown to reddish brown sandy loam to clay loam and slightly acidic” (VRO, 2023). Accordingly, the standard Red sodosol 1 was elected as the soil in the Medli model calculations for the Site.

4.3 Groundwater

Refer to the Desktop Hydrogeological Assessment prepared by EHS Support Pty Ltd, dated January 2024, for relevant detail. Whilst MEDLI had an in-built groundwater contaminant migration model for nitrate transport towards the property boundary, this module in the model was unable to execute (reasons unknown, appeared to be a “bug” in the model). Hence, the groundwater module was deactivated in MEDLI to not interfere with the valid soil, water and crop calculations.

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5 Model Assessment Method for Proposed Wastewater Irrigation

5.1 Model Set-Up and Details

The most current version of MEDLI (V2.5.0.2, released in April 2023) was used. Briefly, MEDLI is a Windows®-based program tool used for designing and assessing effluent irrigation systems. MEDLI models the complex dynamics of the soil-water-crop interactions for an area under irrigation with wastewater. It specifically tracks nutrients, water, and salts over a user defined period which in this case was several decades. This is done using daily time-step mass balancing, with inputs which include historical climate data for the specific location under study sourced from the reputable SILO database as per section 4.1. MEDLI models storage, mobilisation and uptake of nutrients, water and salts in soil and crops, providing information on the fate of these components in irrigated wastewater. MEDLI also estimates and implements potential stressors of crop growth including water scarcity, nutrient deficiency, temperature, and salinity impacts, to provide realistic crop yields/nutrient uptakes.

5.2 Wastewater quality scenarios

Model scenarios were set up to assess the suitability of irrigation at the Site, first assessing nutrient and water balances for the largest possible irrigation area available at the Site (110 ha). However, practicality, cost, and availability of water and nutrients for cropping may limit a suitable irrigation area. Hence, further model analyses in this work assessed options to reduce the suitable irrigation area based on water availability, cropping and nutrient management to ensure minimal losses and to maximise crop production. The model analysis suggested that additional treatment of the wastewater to remove N and P prior to irrigation, could provide greater flexibility to proactively manage nutrients and water and maximise crop production across a smaller irrigation area at the Site. The proposed treatment is described in this section below. A model scenario was then also assessed for the treated wastewater to assess the benefits of treatment in terms of nutrient supply to crops.

5.2.1 Without treatment

Based on an assumed wastewater flow of **312 ML/annum** and the composition in **Table 1**, the total mass of nitrogen (TKN), phosphorus (P) and potassium (K) that is currently in wastewater irrigated at the Site is approximately 81 tonnes N/annum (TKN), 15 tonnes P/annum, and 47 tonnes K/annum. Note this excludes any nitrogen likely to be lost via volatilisation. This wastewater volume and nutrient loading was used for model analysis of the largest available irrigation area at the Site (i.e. 110 ha).

5.2.2 With further treatment

To assess the benefits of wastewater treatment prior to irrigation, it was noted that the wastewater currently being irrigated at the Site contained a BOD:N:P ratio of 100:11:2, showing a higher nutrient content than required for secondary wastewater treatment using a conventional activated sludge process at a sludge age of over 7 days (i.e. 100:5:1; Metcalf and Eddy, 2004). This means that treatment of the BOD load in the wastewater could be used to remove a large proportion of the N and P in the wastewater prior to irrigation.

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A proposed treatment option suitable for the Site was devised for the model scenario assessment, involving aerated biological treatment in a proposed newly constructed 2ML (minimum working volume) lagoon. The aerated lagoon is to be supplied with sufficient oxygen to maintain a minimum dissolved oxygen level and thereby operate as an activated sludge process.

The sludge age in the lagoon is to be extended up to 7 days or more by settling separation of biological sludge that forms, such as by operating the lagoon in tandem with a sludge settling pond, or by constructing a dedicated post-secondary settling tank. This then allows separated sludge to be recycled back to the aerated lagoon to maintain the operational sludge age. The operation of the aerated lagoon relies on heterotrophic microbial growth, utilising BOD in the wastewater and sequestering N and P, forming a sludge that is separated to remove these nutrients contained in the sludge.

The sludge that forms could be pumped into a newly constructed sludge pond, wherein the sludge could settle, be pumped back to the aerated lagoon as above, and consolidate to be made available for use offsite as a compost additive, or a potentially valuable nutrient source and soil amendment. Two sludge ponds could be constructed to operate in tandem, with one pond operational whilst the other is left to settle sludge and decant clarified wastewater to irrigation. These ponds could have a sludge storage capacity of approximately 2ML each, to provide storage of densely settled and consolidated sludge for up to an estimated 3 months each.

By operating the aerated lagoon, it is estimated that N will be reduced to 140 mg N/L and P to 14 mg P/L before the treatment will become limited by available BOD. To reduce P even further, an iron salt solution (e.g. ferric chloride) can be dosed directly to an aerated lagoon to further reduce P in the treated wastewater (Butler, 2018). The amount of iron salt required to reduce final P concentration to a nominal 10 mg P/L in the current scenario was estimated to be a low dose because of the prior P removal by the biology in the aerated lagoon, and therefore would only marginally increase the salinity in the treated wastewater.

Accordingly, the treated wastewater used in the model analysis of smaller irrigation areas was assumed to contain 140 mg N/L and 10 mg P/L.

Note that, depending on nutrient requirements for seasonal crop growth at the Site, there is an option to reduce the amount of iron salt dosed, or the amount of air supplied to the aerated lagoon, to make additional N and P available for maximising crop growth. The design and operation of the proposed aerated lagoon and sludge ponds needs to be separately considered and confirmed prior to implementation, including a consideration of the potential risk of odour associated with storage and handling of sludge formed by the treatment.

Note that the proposed aerated lagoon and subsequent sedimentation basins would provide adequate flow and composition buffering of wastewater to be irrigated at the Site; hence, if the aerated lagoon is implemented at the Site, a 500 kL buffer tank previously proposed in the EMP would no longer be required.

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The Medli scenario with wastewater treatment described below, made allowance for rainfall catchment and evaporation footprint of the proposed aerated lagoon and sludge ponds for an accurate water balance.

5.3 MEDLI Model Scenarios

Whilst MEDLI users can define model inputs for various crop and soil characteristics, the current analysis opted to use standard defaults where reasonable and possible to prevent mechanistic conflicts within the model, and thus provide valid model estimates. Characteristics of the MEDLI models used in the current work are summarised in **Table 2**.

Table 2: MEDLI model characteristics used in the current work

MEDLI Input	Description
Climate	Daily climate data for the period 1970 to 2023, for a grid point location near Nhill, Victoria -36.3°, 141.6°, sourced from Silo
Wastewater characteristics	As per Table 1 for untreated (scenario 1), or for treated (scenario 2) as described in Section 5.2 with reduced N (140 mg/L) and total P (10 mg/L)
Nitrogen fractions in irrigated wastewater (assumed)	20% ammonia; 80% organic-N, which allows for some biological decay in wastewater pond prior to irrigation
Irrigation pump capacity	Minimum 1.2 ML/d; Maximum 3.12 ML/d (See pump capacity in EMP) No shandying, due to general lack of water availability
Irrigation paddock area	110 ha (Scenario 1) 50 ha (Scenario 2)
Irrigation scheduling	Year-round, at a specified fixed daily frequency (Scenario 1 and Scenario 2a, See **Table 3**) At a specified application depth of 1.09 mm for 110 ha area (Scenario 1) At a specified application depth of 2.4 mm for 50 ha area (Scenario 2a) At a specified soil water deficit of 2.4 mm for 50 ha area (Scenario 2b) No irrigation if rainfall in any day exceeds 10 mm, and irrigation permitted on the following day
Irrigation system type	Centre Pivot (with default ammonia loss factor of 26%)
Crop type	Rotation crop in all scenarios Summer crop – 1 October start – Mown pasture – Default type – Kikuyu 1 pasture Winter crop – 1 April start – Mown pasture – Default type – Ryegrass 2 pasture
Soil type	Australian Soil Classification – Default – Red Sodosol 1 – "Low Permeability Red Brown Earth" Comparative simulations with default soil type Red Sodosol 2 – "Medium Permeability Red Brown Earth" delivered similar results

In addition, several model scenarios were run and compared to understand the impact of different irrigation reuse areas, wet weather storage, and additional wastewater treatment (Section 5.2). These scenarios are summarised in **Table 3**.

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Table 3: MEDLI model scenarios used in the current work

MEDLI scenario	Description
Scenario 1a	• 110 ha irrigated paddock area, fixed irrigation frequency and depth, daily irrigation whenever wastewater is available • With effluent pond (for flow buffering required by the model); 5.6ML (49.8m x 49.8m, depth 2.5m, drawdown depth 2.2m, 100% rainfall and evaporation catchment, pond evaporation coefficient of 1.05, internal batter slope of 45°) • No subsequent storage pond • untreated wastewater with average composition in **Table 1**
Scenario 1b	• as in scenario 1a, but with treated wastewater composition as described Section 5.2
Scenario 2a	• 50 ha irrigated paddock area, fixed irrigation frequency and depth, daily irrigation whenever wastewater is available • Pond 1 – combined catchment of proposed aerated wastewater treatment plus two parallel sludge ponds; entered into the model for catchment and evaporation area calculations as a combined 6.8ML pond with nominal model dimensions 90.5m x 32m, depth 3m (including 0.5m freeboard, 100% rainfall/evaporation catchment, pond evaporation coefficient of 1.05, internal batter slope of 45°; drawdown depth 2.1m). **Note that this a modelled equivalent, NOT actual proposed dimensions, to provide reliable rainfall and evaporation calculations.** • with treated wastewater composition as described Section 5.2
Scenario 2b	• Like scenario 2a, but with irrigation triggered based on soil moisture deficit equivalent to expected/achievable application rate • Pond 2 is instead a (hypothetical only, NOT proposed) wet weather storage; The model required 162ML pond to not to not overtop more frequently than 1 in 10 years (289m x 289m, depth 2m, drawdown depth 1.7m, freeboard of 0.5m, 100% rainfall and evaporation catchment, pond evaporation coefficient of 1.05, internal batter slope of 45°)

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6 Model Results

The full model result reports are provided in Appendix A for all the scenarios. Model observations were summarised in **Table 4**.

Table 4: MEDLI model results

MEDLI scenario	Observations
Scenario 1a untreated wastewater across very large area of 110 ha, fixed daily frequency irrigation, no wet weather storage	• signs of significant water stress for the summer crop, but adequate water to support a consistent and reasonable rotational crop yield year-round; • crop growth took up the vast majority of P and N supplies/sources to the model system; • substantial accumulation of P in the soil over time, but no significant leaching losses via the soil column; • substantial depletion of N in the soil over time (5% of total N sources); mostly translating into about 8% of the total N sinks being via leaching through the soil column • estimated annual nitrate leaching concentrations mostly ranged from 55 to 90 mg/L; • no notable soil salinity accumulation or salinity limitations on crop yield
Scenario 1b treated wastewater across 110 ha, fixed daily frequency irrigation, no wet weather storage	• signs of significant water stress for the summer crop, but also nitrogen deficiency stress, substantially reducing its yield by about 40%; the winter crop's yield was also reduced by about 30%, plausibly due to the reduced supply of N and P under this scenario; • strong depletion of N deposits in soil • proportion of N lost to the soil via leaching was negligible (<1% of total N sinks); • estimated annual nitrate leaching concentrations mostly ranged from 1 to 15 mg/L; • strong depletion of P deposits in soil • no notable soil salinity accumulation or salinity limitations on crop yield
Scenario 2a treated wastewater across 50 ha, fixed daily frequency irrigation, no wet weather storage	• reduced water stress for the summer crop compared to Scenarios 1 due to smaller irrigation area; • a consistent and reasonable rotational crop yield was observed year-round; • negligible nitrogen deficiency stress despite reduced N in treated wastewater (compared to scenario 1b), indicating better balanced N supply for crop growth; • no significant soil P losses or accumulation, indicating P supply matches crop demand; • soil N loss suggested to occur over time, but with a lower leaching loss rate (kg/annum) than in scenario 1a, indicating that the nitrogen supply of the treated wastewater largely balances crop demand with a 50 ha irrigation area; the nitrogen loss to leaching (115 mgN/ha/year) was a minority portion of the total N sinks of the system (i.e. 834 mgN/ha/year), with the remainder being harvested as crops; • annual nitrate-N leaching concentrations were predicted to be in the range 40-70 mg N/L • no notable soil salinity accumulation or salinity limitations on crop yield
Scenario 2b treated wastewater across 50 ha, irrigation based on soil water deficit, with wet weather storage	• with wet weather storage, significant yield reductions were observed for the summer crop in January to March, and the winter crop in April to June, caused by a combination of water deficiency stress as well as nitrogen deficiency; • soil P accumulation was observed under this scenario, representing about 10% of all P sinks in the system, indicating an imbalance in supply and crop demand; • soil N loss over time was comparable between this scenario and scenario 2a (without wet weather storage); • the nitrogen loss to leaching was reduced in this scenario (81 mgN/ha/year) as compared to scenario 2a (without wet weather storage). However, because of the low rainfall at the Site, the nitrogen loss via leaching under this scenario resulted in a much higher annual nitrate-N leaching concentration (100-140 mg N/L) than scenario 2a without storage; • although soil salinity under this scenario did not limit crop growth, average soil salinity was more than three times that under scenario 2a. This observation together with the higher estimated annual nitrate-N leaching concentration under this scenario, indicates a relative benefit of maintaining fixed daily frequency irrigation, likely because the Site is located in a low rainfall region

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7 Response to Queries

The following responses are based on the modelling results presented in **Table 4** and the full model reports provided in Appendix A.

1. The proposal appears to put forward spreading wastewater for reuse over a larger area, and then crop this area to remove nutrients. This is good in principle; however, no details are provided to confirm there is enough water to adequately irrigate the proposed area and crop type. To address these concerns a water balance needs to be provided that demonstrates how crop demands for the proposed area would be met.

The water balance model results showed some water deficiency stress for a very large (and probably impractical and cost-prohibitive to manage) 110-ha irrigation area, but water stress was reduced for a (more realistic) 50-ha irrigation area. Regardless, crop yield under irrigation was reasonable and sustained with both these irrigation area scenarios, indicating that enough water was available for the proposed area and crop type.

2. In addition to point 1 and balance on the water balance, there would then need to be a nutrient balance provided that demonstrates for the type of crop and area proposed that nutrient removal can be achieved without continuous nutrient loading of the soil.

The nutrient balance model results showed that some excess of P would be available if the wastewater was not first pre-treated as described in Section 5.2. However, whilst accumulation of P was observed when untreated wastewater was irrigated across 110-ha in scenario 1a, no significant P losses via leaching occurred over the 50-year model period.

The results also showed that with treated wastewater and a 50-ha area, N and P supply matched crop demands well, with minimal soil P loss, and minimal soil N loss.

These results indicated that with aerated lagoon treatment, the proposed type of crop and a nominal 50-ha area can achieve nutrient removal without requiring continuous nutrient loading of the soil.

3. Lastly, the proposed system only contains 6 hours of treated wastewater storage. The proposal does not specifically detail how waste water will be managed in wet conditions when crop demand is not present. If the proposal is to simply keep irrigating and allow wastewater to percolate through the soil profile this may be considered a disposal of waste and unlikely be acceptable to EPA considering the General Environmental Duty provisions of the EP Act. If the proposal is to use soil profile as storage, please detail how this can be achieved without it becoming a disposal.

As the Site is located in an area of low rainfall (Section 4.1), pooling and significant run-off was **not** observed in any of the modelled scenarios.

When wet weather storage was implemented for a 50 ha irrigation area (scenario 2b), summer crop yield and winter crop yield suffered from water deficiency and nitrogen deficiency for some months of the year.

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Moreover, with the implementation of a wet weather storage pond (scenario 2b) only a marginal reduction in N losses via leaching could be achieved as compared to a fixed daily irrigation scenario (scenario 2a), and annual nitrate-N leaching concentrations were actually higher with a wet weather storage pond scenario than without.

Also, soil salinity with a wet weather storage pond was more than three times that for a fixed daily irrigation scenario, which together with the N concentration effects above indicate that maintaining a leaching fraction is important for conditions at the Site.

Overall, the results indicated that because “wet conditions” are uncommon for the Site, crop demand can be generally sustained, and wet weather storage is not only impractical for the Site (due to large wastewater volumes requiring a storage pond of several 10s of megalitres), but also provides minimal benefit compared to fixed daily irrigation as previously proposed.

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8 General Design Considerations for Proposed Wastewater Treatment System

The proposed aerated biological treatment of wastewater prior to irrigation, is to occur in a lined, in-ground lagoon. The lagoon is to have a minimum liquid treatment volume of 2 ML (@ nominal organic loading rate of 1.5 kg BOD/m^3/d), which can be achieved by constructing an in-ground lagoon with a total volume of 2.93 ML (including a nominal 0.6 m freeboard), crest dimensions of 50m (L) x 30m (W), and a total depth of 3m (including freeboard). Surface aerators are proposed, because the alternative of diffuse aeration systems typically require relatively high maintenance with wastewaters such as that generated the Site. The required surface aeration capacity was estimated at 60kWe (@nominal transfer efficiency of 1kg O_2/kWh), which for example could be configured with 2 x 15kWe and 1 x 30kWe aerators to provide an even distribution of aeration across the lagoon surface (See **Figure 4**). Different sized aerators could be used as long as their total combined aeration power input is 60kWe. The recommended siting of the aerators should be based on the following principles:-

- Maximise depth under the aerators. All aerators are placed away from the lagoon banks.
- Minimise un-aerated distances.
- Aerated regions can overlap, and the lagoon could fit a number of additional aerators as required by the design.

The aerated lagoon is a biological treatment system with the inventory of sludge to be maintained with a mixed liquor suspended solids concentration of >2,500 mg L^{-1}. Initially during lagoon start-up, a seed sludge would be required from a viable activated sludge system, to be brought onsite subject to appropriate safety and biosecurity considerations. A nominal seed sludge volume might be 10% of the operational volume of the aerated lagoon, but this would depend on the solids content and the viability of the seed sludge. Once the aerated lagoon is fully commissioning and operational, additional seed sludge would not be required.

Operation of the lagoon should:-

- Optimise aerator capacity;
- Achieve the required wastewater quality measures in terms of N and P to be irrigated, whilst minimising odour potential of stored wastewater by minimising the operational BOD concentration in the aerated lagoon; and
- lower on-going (though more intense) operator inputs.

To achieve this, a semi-batch operation of the aerated lagoon and sludge pond system is recommended whereby sludge that forms in the aerated lagoon can be managed without a separate clarifier. The batch exchange volume can be set at the daily wastewater generation rate of 1.2 ML. The system operation can occur as follows:-

1. Start feeding the aerated lagoon with wastewater at the beginning of the operational shift, with the aerated lagoon flowing out by gravity into one of the sludge ponds (the operational sludge pond). At the same time pump back settled sludge from the sludge pond to the aerated lagoon to maintain a mixed liquor suspended solids concentration of >2,500 mg L^{-1}. The amount of sludge to be pumped back will vary depending on the solids concentration in the settled sludge and the requirement to maintain a recommended lagoon mixed liquor suspended solids of >2,500 mg L^{-1}, but may be approximately 100 m^3 total per day;

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2. Pump treated wastewater from the stand-by sludge pond using a floating pontoon to prevent settled sludge being irrigated out with the treated wastewater.
3. At the end of the operational shift, switch operation from the operational sludge pond to the stand-by sludge pond, thereby allowing sludge in the operational sludge pond to settle (thus becoming the stand-by pond for the next operational shift).
4. Liquid samples should be taken from the aerated lagoon periodically during the first few months of operation, to confirm sludge pump times to maintain a lagoon mixed liquor suspended solids of >2,500 mg L^{-1}.

The proposed sludge ponds would be two lined in-ground ponds with a volumetric holding capacity of approximately 2ML each, to provide storage of settled and consolidated sludge for up to an estimated 3 months each. This can be achieved by each sludge pond having the same crest dimensions and depth as the aerated lagoon above. An indicative layout for the aerated lagoon and two sludge ponds is shown in **Figure 4**. The sludge ponds would need to be lined to limit permeability to below required limits. Reinforcement of the liner may be required to protect the liner in the case that an excavator is used to remove dried sludge.

Figure 4: Preliminary layout of the aerated wastewater treatment lagoon, and sludge ponds (left), and layout of the surface aerators on the aerated lagoon (right). **Note that the location and layout indicated are nominal and should be the subject of detailed site investigations to confirm a preferred location and design.**

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Iron salt dosing system: In addition, an iron chemical dosing system should be installed to enable dosing into the aerated lagoon to remove additional P as mineral precipitate. The system needs to be capable of dosing a minimum of 60 kg/d of ferric chloride solution at a nominal concentration of 42% by weight. A comprehensive chemical safety and risk assessment would need to be undertaken, as well as a considerations of safe design aspects (e.g. bunding, containment, and spill emergency management). Industrial grade ferric chloride solution at 40-42% is highly corrosive and hazardous.

Lagoon/pond size: The dimensions and depth (including its internal batter slope) of the proposed wastewater lagoon and sludge ponds can be altered to better suite site conditions, but the minimum freeboard, and minimum liquid treatment volume are to be maintained as described above.

Lagoon/pond location: The nominal location of the lagoon and sludge ponds indicated above is preliminary, and should be the subject of detailed site investigations (e.g. soil testing, proximity assessment), to confirm a preferred location. **NOTE:** The preferred location identified by such investigations may be different from that indicated above.

Freeboard: A minimum freeboard of 0.6 m is to be incorporated into the wastewater lagoon/ponds design to protect the pond bank stability.

Pond embankment design: With respect to lagoon/pond embankment construction details, the design of embankments to be constructed should be fully defined with reference to historic flood datum levels and must be undertaken by a specialist geotechnical consultant with experience in effluent pond design. This embankment design would need to consider such factors as:

1. the size and layout of the pond;
2. how it is to be lined (including if using a compacted clay liner);
3. engineered overflow provisions;
4. bank mechanical reinforcement in the case of the aerated lagoon to protect against wave action generated by the surface aerators;
5. how pond sludge is to be periodically removed in the case of the sludge ponds;
6. access considerations for construction plant; and
7. upstream and downstream diversion requirements.

Crest: The crest of the effluent pond embankment should be a minimum width of 6.0 m to allow for vehicle and machinery access during pond construction and maintenance (Birchall et al. 2008). The crest width must take into account desludging activities which can require heavy machinery. It can also be beneficial to provide a gravel-topped crest to maintain good traction while machinery is working beside the pond (Birchall et al. 2008). A much more gradual external batter slope may be required for safe machinery access. Machinery may require an approach and departure ramp (and potential internal access ramp) with a slope of no greater than 1:10 to safely access the sludge pond for desludging (adapted from Birchall et al. 2008).

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Final selected pond bank internal and external batter slopes may vary based on the findings of the recommended geotechnical assessments to be conducted at the Site.

Soil: Strip and remove topsoil. Topsoil should not be integrated into the construction or banks of effluent ponds, as it may lead to poor compaction which may facilitate leakage. Topsoil can be put back over the tops of the bank after construction. Depending on the depth of the pond excavation, portions of the cut, battered sides and the floor may be in different soil types. This should be confirmed at the Site by a detailed geotechnical investigation, and the implication is that without appropriate lining using a compacted clay liner or synthetic membrane liner, the sides and base of a newly excavated effluent pond may not meet impermeability requirements.

Permeability and pond lining: The excavated base level of effluent ponds must be at least 1 m above the highest seasonal groundwater level. Ponds must meet the design criteria of 1 x 10^{-9} m/s. This generally requires lining of the base and banks of a pond, using a compacted clay layer, a geosynthetic clay liner (e.g. soil additives such as bentonite), a synthetic membrane liner such as high-density polyethylene (HDPE) sheeting, or similar. A liner may also require a protective overlayer to allow for desludging without affecting the integrity of the liner, and/or underlying infrastructure to remove groundwater and thereby protect the liner integrity. Additional reinforcement of the liner in the aerated lagoon would be required to protect against the wave action and downforce generated by the surface aerators.

A detailed geotechnical assessment should confirm appropriate requirements for lining of the proposed lagoon/ponds.

Stormwater diversion: Divert any stormwater run-off from above wastewater lagoons/ponds and overland flow around the lagoons/ponds to reduce clean stormwater entering the wastewater or sludge.

Risk and hazard operability study requirements: The design, construction, operation and maintenance of the proposed aerated lagoon system, the sludge ponds, and the iron chemical dosing system, are to be subject to a dedicated and detailed hazard and operability assessment process, and dedicated safety planning, to identify and mitigate associated significant OH&S and environmental risks to as low a level as reasonably practicable. For example, the aeration of a water body can substantially decrease buoyancy and thereby increase drowning risk. Moreover, safe access is required to the aerators, pumps, and to the sludge ponds for desludging using a pump rig, vacuum tanker, or excavator. All of these aspects and others are to be considered in detail in a dedicated risk and safe design planning process, before a system design can be finalised and progressed to implementation.

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9 Conclusion and Recommendations

The nutrient and water balance modelling results presented in this report indicated a significant benefit from first treating the wastewater in an aerated lagoon before it is irrigated across a dedicated expanded irrigation area in the range of 50-110 ha. The model results indicated that water and nutrient supply (in the treated wastewater) would be adequate and generally not excessive for crop demand at the Site. Lastly, the model results demonstrated that with a dedicated agronomic and soil monitoring program as previously proposed in the EMP, a fixed daily irrigation of wastewater can present a low risk of environmental impacts to soil and water at the Site. Moreover, the model results indicated that, because of the low annual rainfall at the Site, a wet weather storage pond would not only be impractical for the Site (due to large wastewater volumes requiring a storage pond of several 10s of megalitres) but would also provide minimal environmental benefit as compared to the proposed fixed daily irrigation schedule.

Accordingly, it is proposed that the design of the aerated lagoon and sludge pond system be fully developed for the site, and be implemented, and that irrigation be expanded to an area of at least 50 ha at the Site, guided by a dedicated Monitoring and Agronomic Program and agricultural/soil specialists, as previously proposed in the EMP. This aligns with MEDLI modelling scenario 2a.

Note that surface aerators proposed for an aerated treatment lagoon can discourage wild fowl away from frequenting the lagoon as a body of water, thereby maintaining the biosecurity considerations previously highlighted in the EMP.

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Figures List

Tables List

10 References

Birchall, S., Dillon, C., Wrigley, R. (2008). Effluent and manure management database for the Australian dairy industry. Dairy Australia.

EHS Support (2004). Desktop Hydrogeological Assessment. Prepared for THE LUV A DUCK RANGE PTY LTD. 160 Rupps Road, Nhill, Victoria. January 2024

EnProve Pty Ltd. (2023). Soil Testing Results for Wastewater Irrigation. Report Prepared by Dean Suckling for Luv A Duck. Report Date: 12th July 2023

Scolexia Pty Ltd. (2023). Wastewater Environmental Management Plan. V2.0. Prepared for THE LUV A DUCK RANGE PTY LTD. 160 Rupps Road, Nhill, Victoria. October 2023.

Tchobanoglous G., Burton, F.L., Stensel, H.D. (2004). Metcalf & Eddy, Inc. Wastewater Engineering: Treatment and Reuse. Edited text. Boston: McGraw-Hill.

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Appendix A – Full Medli model results reports

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General Information

SCENARIO REPORT: Full run

General information

Enterprise: Luv a Duck
Client: Luv a Duck
MEDLI user: Dr Stephan Tait

Description:

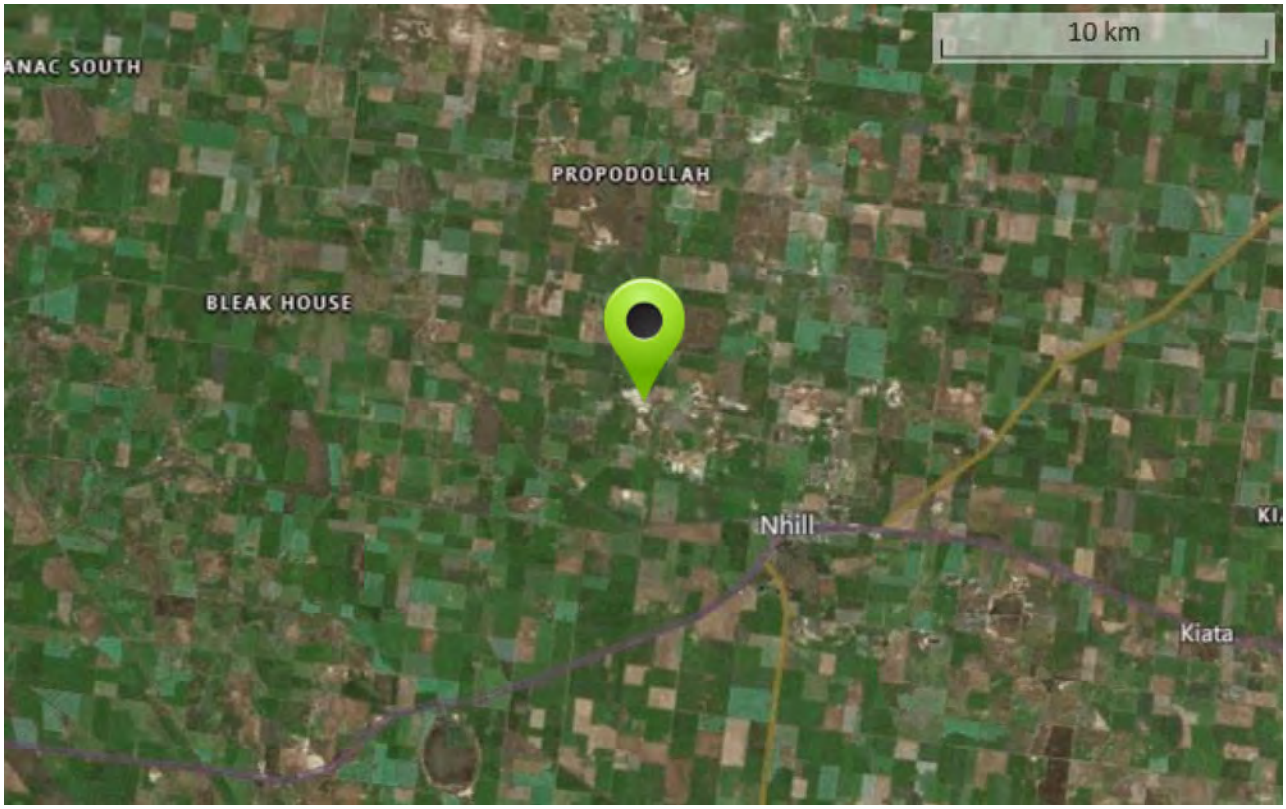
Scenario 1a - 110 ha irrigation, no treatment

Scenario details:

The high strength effluent is irrigated over a large land area to minimise nutrient leaching.

Map of location:

Note: If the map above appears as a dark box, check that the network is accessible and that the coordinates are not for a location in the ocean.



Description

Climate information

Climate Data Location: Nhill, -36.3°, 141.6°

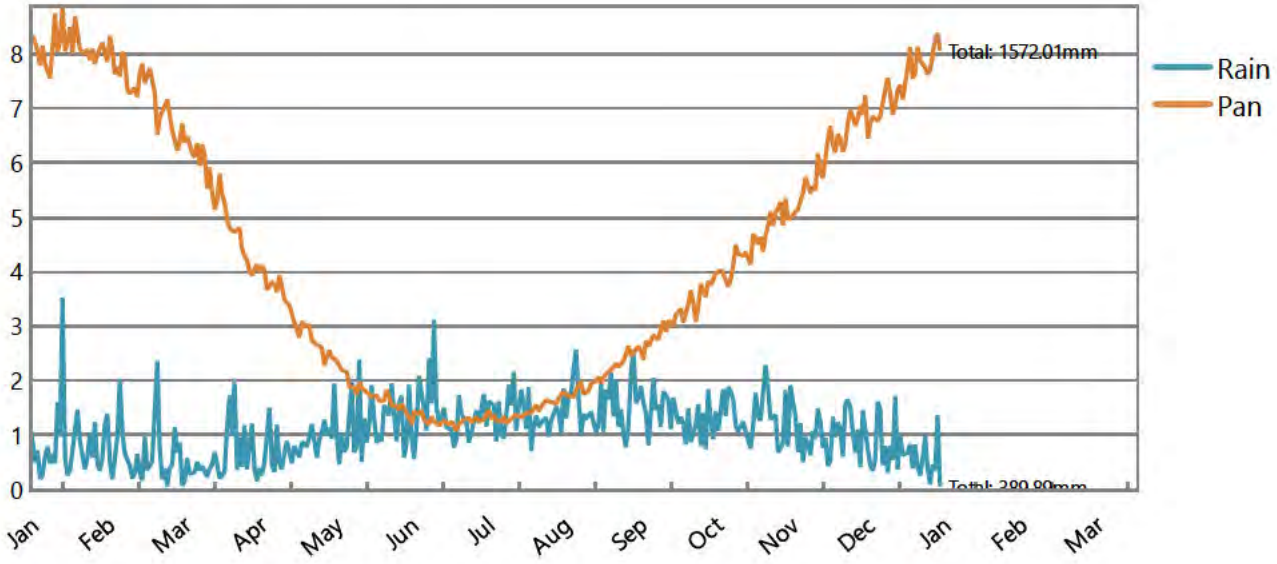
Run Period: 01/01/1972 to 31/12/2023 (52 years)

Climate statistics

	5th Percentile		50th Percentile		95th Percentile	
Rainfall (mm/year)	(Year 1994)	230.6	(Year 1999)	400.0	(Year 2022)	527.9
Pan evaporation (mm/year)	(Year 2010)	1379.3	(Year 2012)	1587.7	(Year 1990)	1711.4

Climate data

Daily average across run period:



Description

Wastestream information

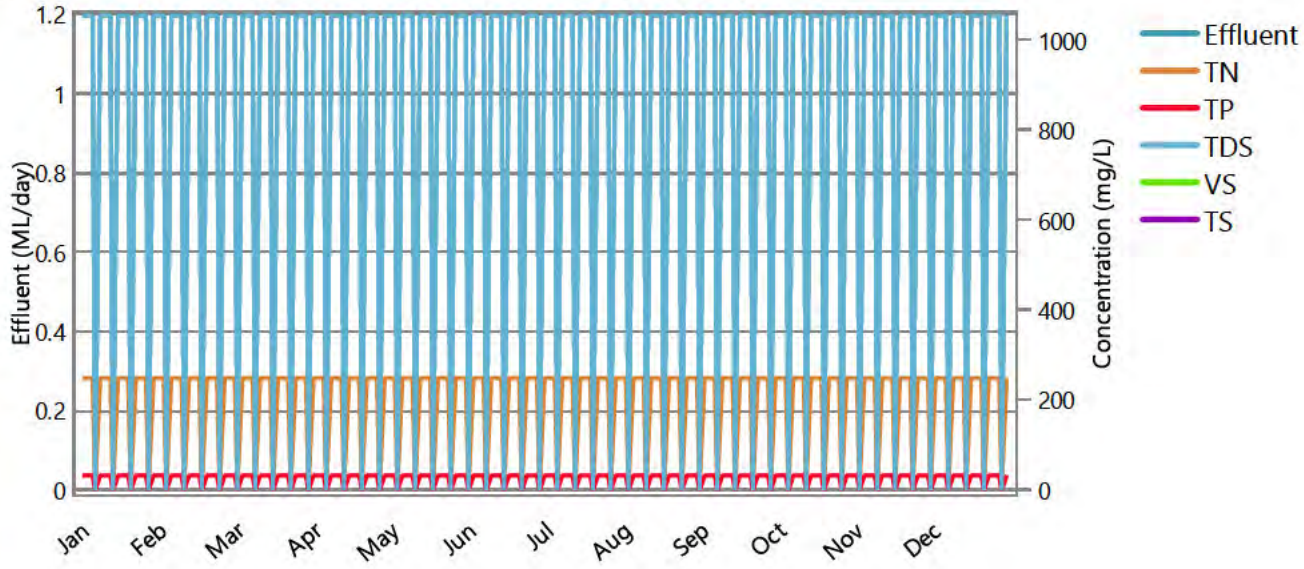
Wastestream Name: Waste estimation system - Irrigated wastewater

Wastestream production description

Daily Irrigated wastewater data supplied for a representative year. This wastestream is not separately pretreated.

Wastestream

Average Daily Quantity and Flow-Weighted Average Quality:



Wastestream

Effluent Quantity: 312.98 ML/year or 0.86 ML/day (Min-Max 0.00 - 1.20)

Flow-Weighted Average (Min - Max) Daily Effluent Quality Entering the Pond System:

	Concentration (mg/L)	Load (kg/year)
Total nitrogen	250.00 (250.00 - 250.00)	78244.38 (78169.50 - 78469.00)
Total phosphorus	33.00 (33.00 - 33.00)	10328.26 (10318.37 - 10357.91)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	330504.24 (330187.97 - 331453.06)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

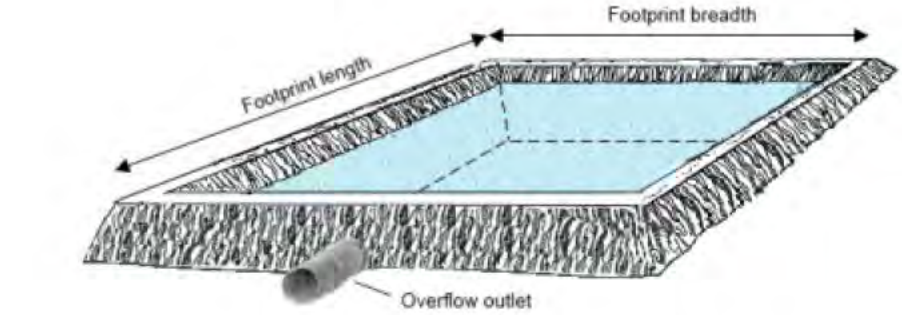
Description

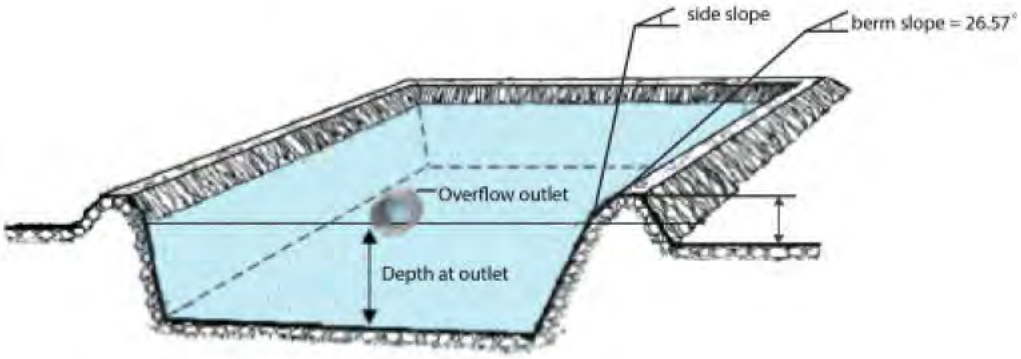
Pond system information

Pond System Configuration: 1 sludge-free pond

Pond system details

	Pond 1
Maximum pond volume (ML)	5.60
Minimum allowable pond volume (ML)	0.61
Pond depth at overflow outlet (m)	2.50
Maximum water surface area (m2)	2480.70
Pond footprint length (m)	49.81
Pond footprint width (m)	49.81
Pond catchment area (m2)	2480.70
Average active volume (ML)	1.28





Irrigation pump limits

Minimum pump rate limit (ML/day)	1.20
Maximum pump rate limit (ML/day)	3.12

Shandying water

Annual allocation of fresh water available for shandying (ML/year)	0.00
Maximum rate of application of fresh water (ML/day)	0.00
Nitrogen concentration (mg/L)	0.00
Salinity (dS/m)	0.00
Minimum shandy water is used	No

Description

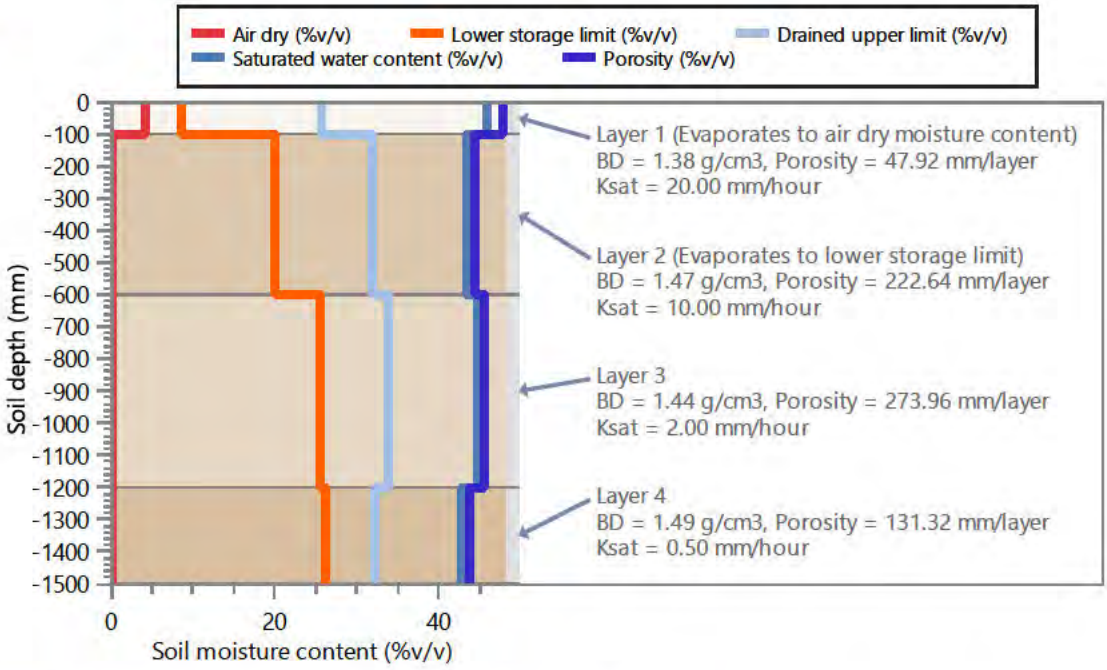
Paddock information

Paddock: All paddocks, 110 ha

Soil type: Red sodosol 1, 1500.00 mm defined profile depth

Profile porosity (mm)	675.85
Profile saturation water content (mm)	660.70
Profile drained upper limit (or field capacity) (mm)	486.00
Profile lower storage limit (or permanent wilting point) (mm)	341.30
Profile available water capacity (mm)	144.70
Profile limiting saturated hydraulic conductivity (mm/hour)	0.50
Surface saturated hydraulic conductivity (mm/hour)	20.00
Runoff curve number II (coefficient)	75.00
Soil evaporation U (mm)	10.00
Soil evaporation Cona (mm/sqrt day)	4.00

Profile



Planting regime: Rotated Kikuyu 1 pasture | Ryegrass 1 pasture

Maximum crop factor at 100% cover (mm/mm) (Maximum crop coefficient 0.8 | 0.8 x Pan coefficient 1 | 1)	0.80 | 0.80
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 97.00
Potential rooting depth in defined soil profile (mm)	1200.00 | 600.00
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60

Irrigation rules: Centre pivot

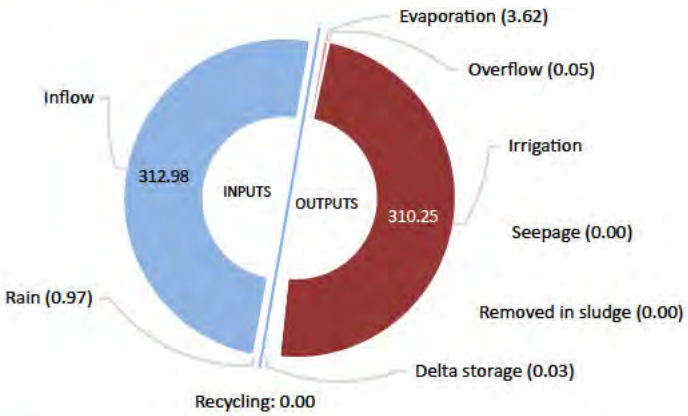
Rule 1. Irrigation triggered every 1 days and rainfall is less than or equal to 10.00 mm
Rule 2. Irrigate a fixed amount of 1.09 mm each day
Rule 3. Irrigation window from 1/1 to 31/12 including the days specified
Rule 4. A minimum of 0 days must be skipped between irrigation events

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond (wet weather storage pond: 5.6 ML)

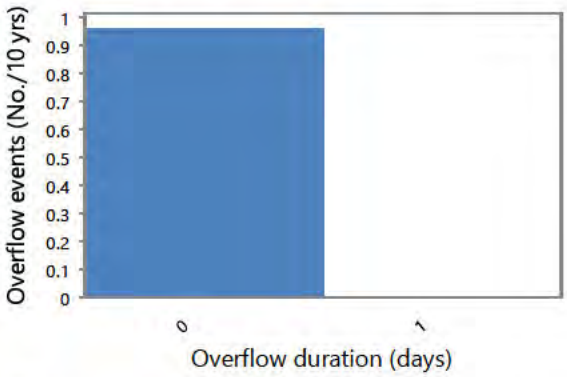
Pond system water balance (ML/year)

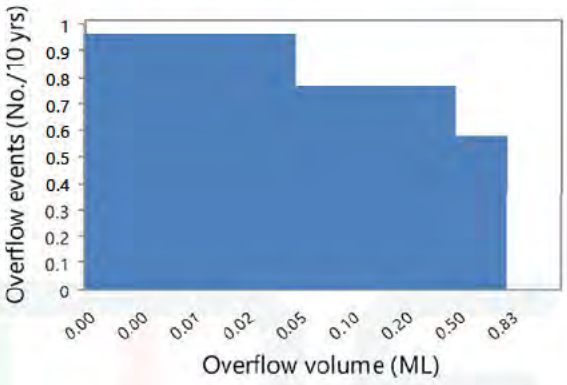


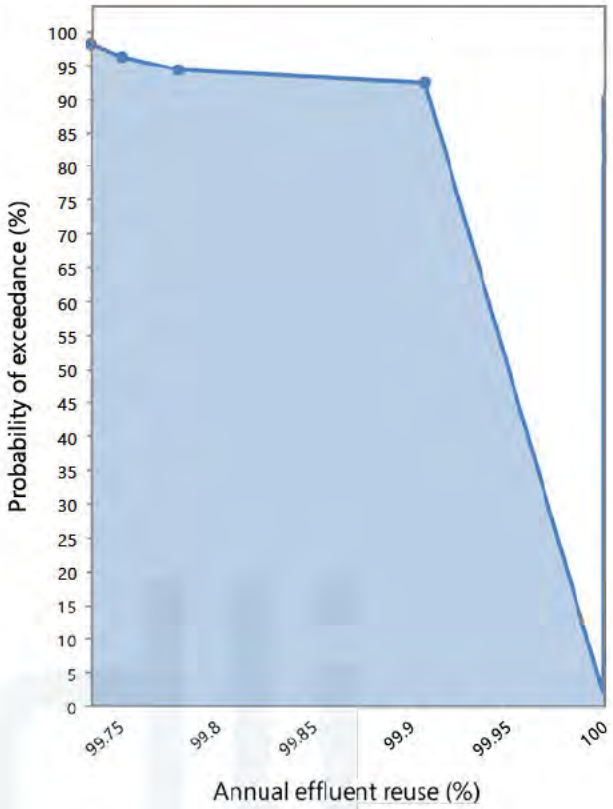
Name	Value
Rain	0.97
Inflow	312.98
Recycling	0.00
Evaporation	3.62
Overflow	0.05
Irrigation	310.25
Seepage	0.00
Removed in sludge	0.00
Delta storage	0.03

Overflow and reuse diagnostics

Metric	Value
Total volume of overflow (ML/10 years)	0.49
Total number of overflow events (events/10 years)	0.96
Total number of pond overflow days (days/10 years)	0.96
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (Proportion of inflow + net gain in rain that is irrigated) (%)	99.98





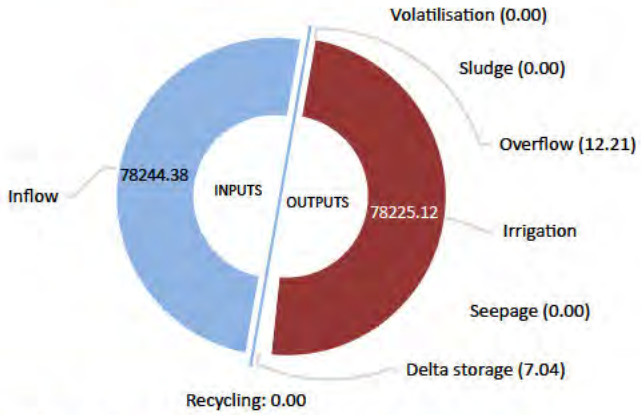


Performance

Pond system information

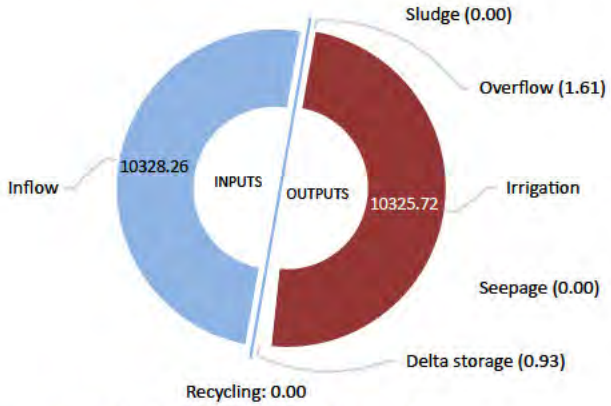
Pond System Configuration: 1 sludge-free pond

Pond system nitrogen balance (kg/year)



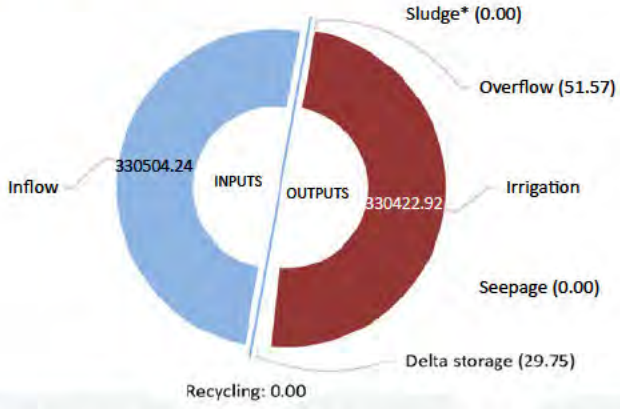
Name	Value
Inflow	78244.38
Recycling	0.00
Volatilisation	0.00
Sludge	0.00
Overflow	12.21
Irrigation	78225.12
Seepage	0.00
Delta storage	7.04

Pond system phosphorus balance (kg/year)



Name	Value
Inflow	10328.26
Recycling	0.00
Sludge	0.00
Overflow	1.61
Irrigation	10325.72
Seepage	0.00
Delta storage	0.93

Pond system salt balance (kg/year)



Name	Value
Inflow	330504.24
Recycling	0.00
Sludge*	0.00
Overflow	51.57
Irrigation	330422.92
Seepage	0.00
Delta storage	29.75

* Salt removal in sludge is not calculated from the pond salt balance. However if salt could be assumed to be present in the sludge at the same concentration as in the pond supernatant (up to a maximum of salt added in inflow) - then salt accumulation in the sludge could be 0.00 kg/year

Pond system sludge accumulation: 0.00 kg dwt/year

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond

Pond nutrient concentrations and salinity

Average across simulation period	Pond 1
Average nitrogen concentration of pond liquid (mg/L)	252.32
Average phosphorus concentration of pond liquid (mg/L)	33.31
Average salinity of pond liquid (dS/m)	1.67

Value on final day of simulation period	Pond 1
Final nitrogen concentration of pond liquid (mg/L)	252.85
Final phosphorus concentration of pond liquid (mg/L)	33.38
Final salinity of pond liquid (dS/m)	1.67

Performance

Water use (assumes 100% irrigation efficiency)

Metric	Value
Pond water irrigated (ML/year)	310.25
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Total water irrigated (ML/year)	310.25
Proportion of irrigation events requiring shandying (% of events)	0.00
Proportion of years shandying water allocation of 0 ML/year is exceeded (% of years)	0.00
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)

Irrigation quality

Metric	Value
Average nitrogen concentration of irrigation water - before ammonia loss during irrigation (mg/L)	252.14
Average nitrogen concentration of irrigation water - after ammonia loss during irrigation (mg/L)	239.03
Average phosphorus concentration of irrigation water (mg/L)	33.28
Average salinity of irrigation water (dS/m)	1.66

Irrigation diagnostics

Metric	Value
No. periods/year without any irrigable effluent in the wet weather storage pond (periods/year)	0.81
Average length of such periods (days)	1.45

Irrigation triggering and application

No. Days without Irrigation Applied per Year: 106.73 (with water supply insufficient for pump [96.19], rain exceeding specified rainfall threshold [9.37] and pond water volume below minimum volume for irrigation [1.17])

No. Days without Irrigation Applied per Year: 106.73 (with no supply - no application [97.37] and not triggered [9.37])

No. Days with Irrigation Applied per Year: 258.52 (with full application)

No. Days with Irrigation Triggered per Year: 355.88

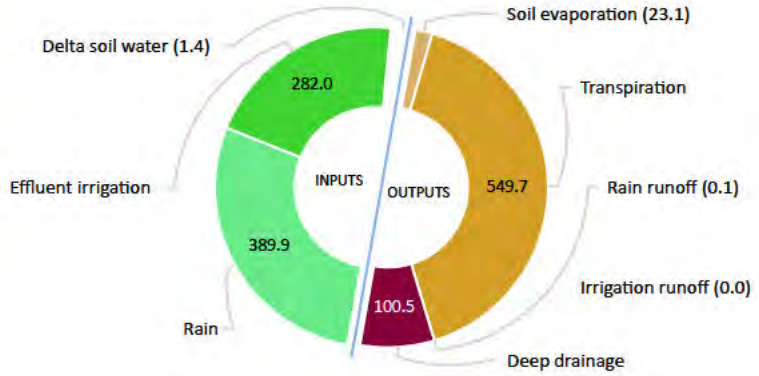
Performance

Paddock information

Paddock: All paddocks, 110 ha

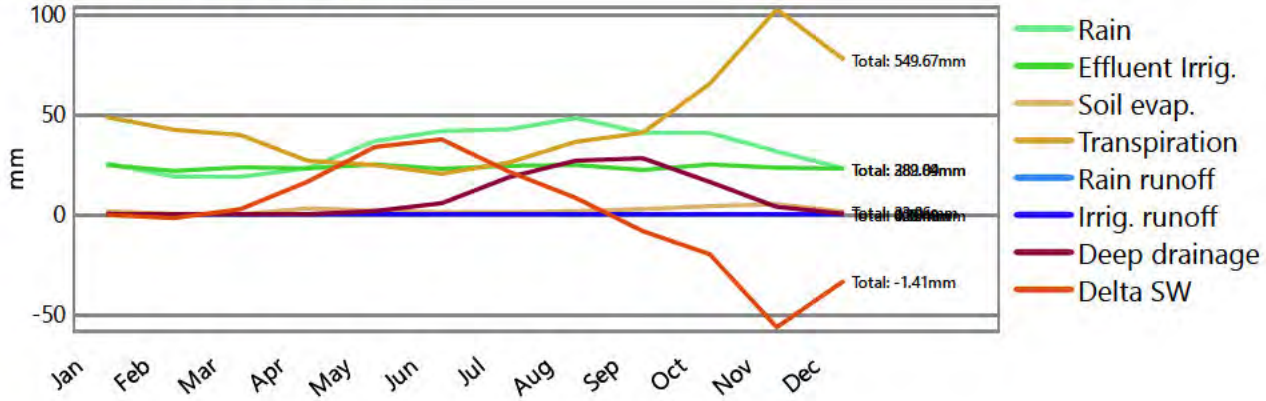
Soil Type: Red sodosol 1, 126.40 mm PAWC at maximum root depth

Soil water balance (mm/year)

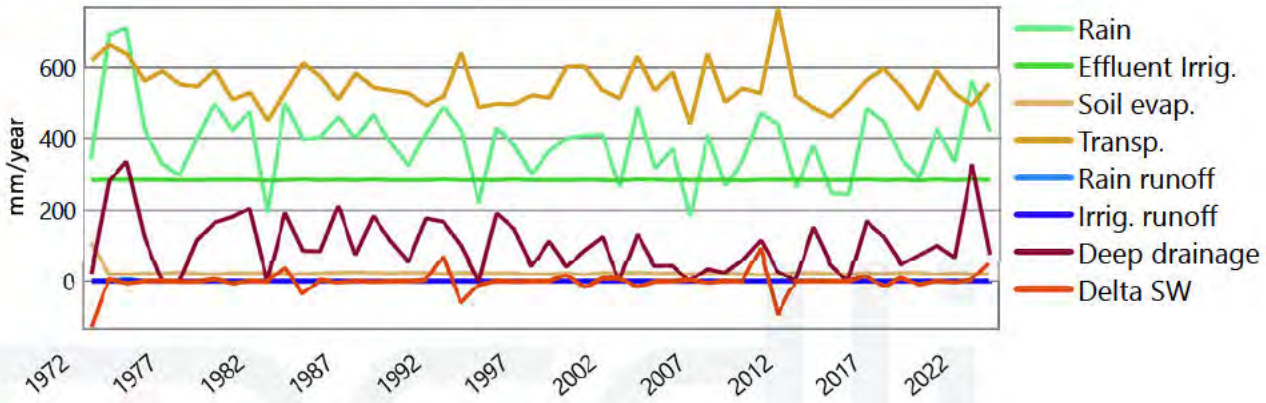


Name	Value
Rain	389.9
Effluent irrigation	282.0
Soil evaporation	23.1
Transpiration	549.7
Rain runoff	0.1
Irrigation runoff	0.0
Deep drainage	100.5
Delta soil water	-1.4

Average monthly totals (mm)



Average annual totals (mm/year)

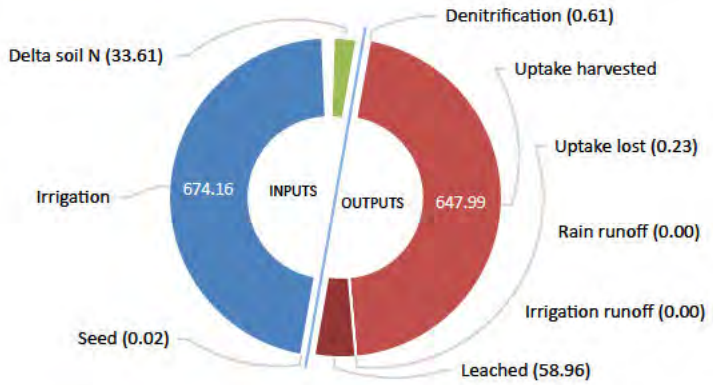


Performance

Paddock information

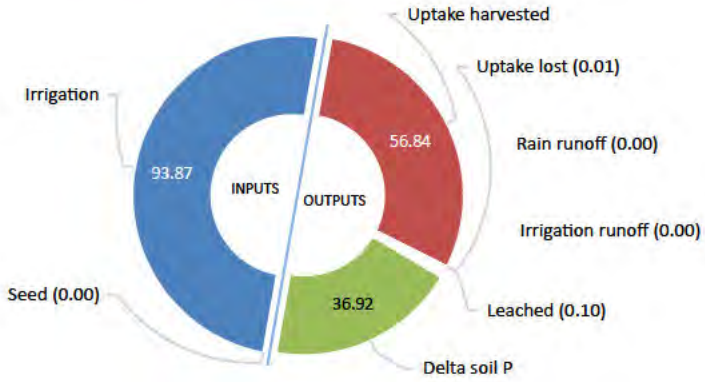
Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Irrigation Ammonia-N Volatilisation Losses (kg/ha/year): 36.98
Proportion of Total Nitrogen in Irrigated Effluent as Ammonium (%): 20.00

Soil nitrogen balance (kg/ha/year)



Name	Value
Seed	0.02
Irrigation	674.16
Denitrification	0.61
Uptake harvested	647.99
Uptake lost	0.23
Rain runoff	0.00
Irrigation runoff	0.00
Leached	58.96
Delta soil N	-33.61

Soil phosphorus balance (kg/ha/year)



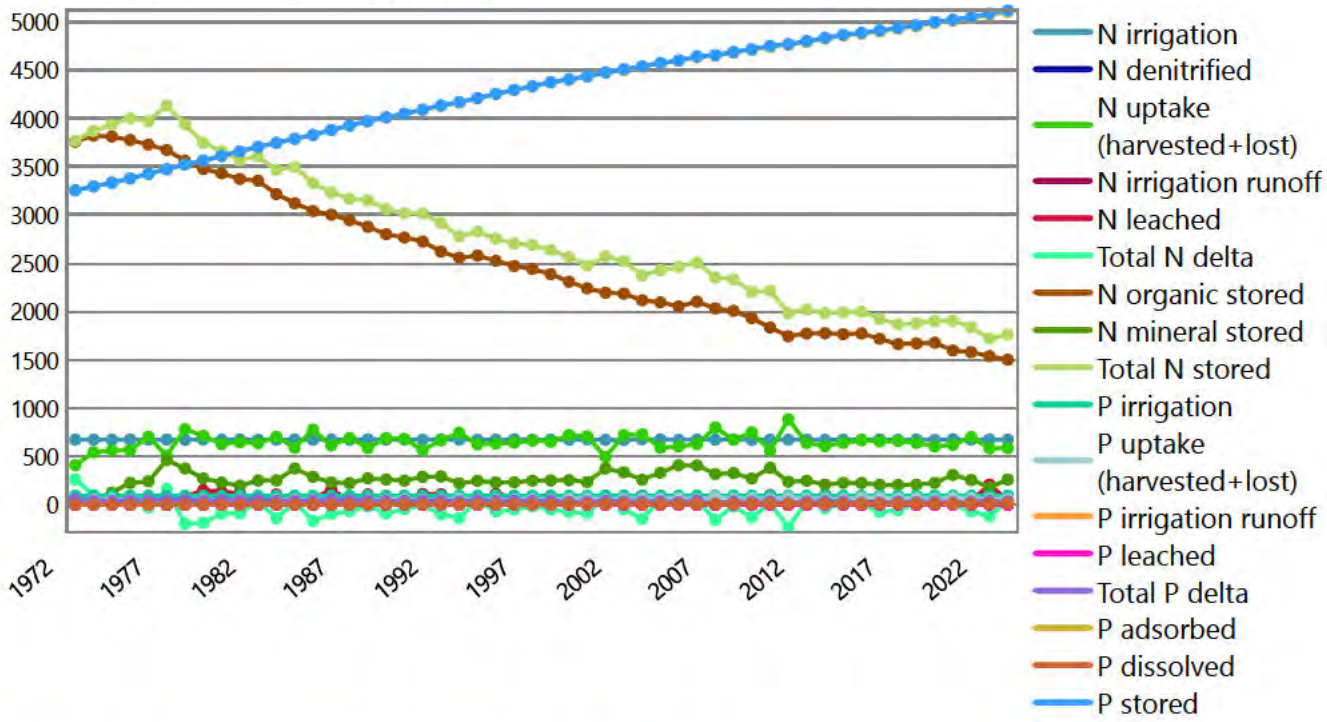
Name	Value
Seed	1.73E-03
Irrigation	93.87
Uptake harvested	56.84
Uptake lost	0.01
Rain runoff	0.00
Irrigation runoff	0.00
Leached	0.10
Delta soil P	36.92

Performance

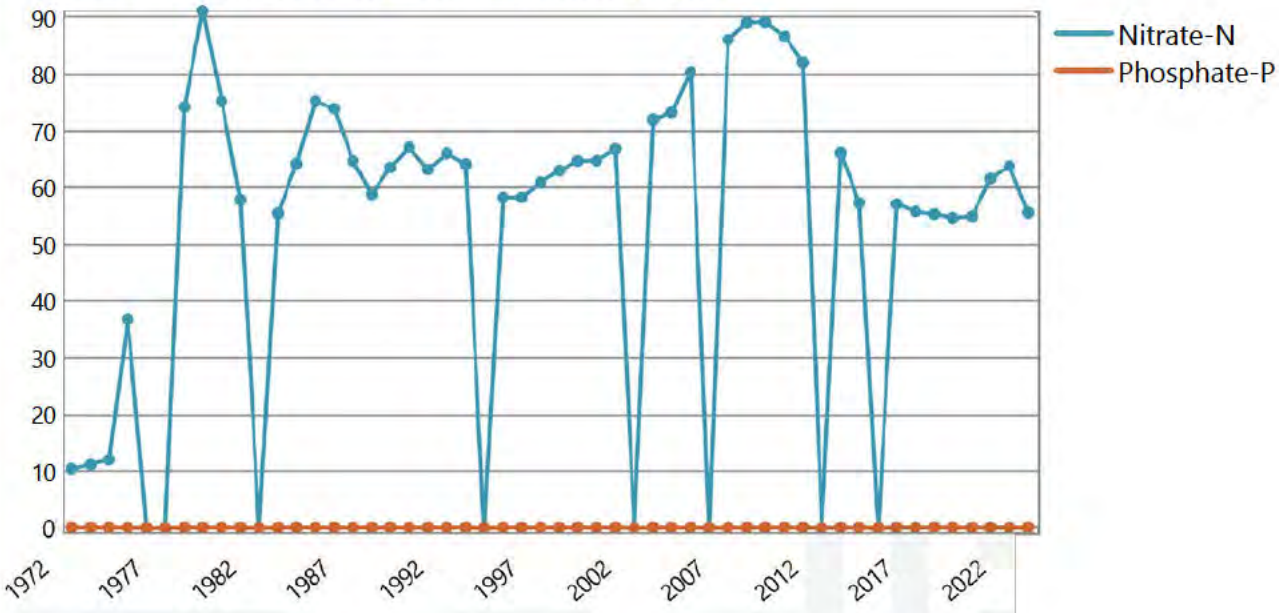
Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1

Annual nutrient totals (kg/ha)



Annual nutrient leaching concentration (mg/L)



Performance

Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Plant growth (minimum - maximum)

Season one plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	10520.56 (7204.54 - 19194.84)
Average annual shoot dry matter lost (kg/ha/year)	0.40 (0.00 - 5.88)
Average monthly plant (green) cover (%)	83.41 (58.77 - 94.03)
Average monthly root depth (mm)	1074.11 (637.97 - 1200.00)

Season two plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	5401.54 (4602.25 - 6609.17)
Average annual shoot dry matter lost (kg/ha/year)	1.84 (0.00 - 17.08)
Average monthly plant (green) cover (%)	62.57 (49.22 - 73.88)
Average monthly root depth (mm)	600.00 (600.00 - 600.00)

Plant nutrient uptake (minimum - maximum)

Season one plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	416.72 (233.64 - 699.28)
Average annual shoot nitrogen lost (kg/ha/year)	0.14 (0.00 - 3.06)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	37.21 (22.02 - 57.47)
Average annual shoot phosphorus lost (kg/ha/year)	0.00 (0.00 - 0.02)
Average annual shoot nitrogen concentration (fraction dwt)	0.04 (0.03 - 0.06)
Average annual shoot phosphorus concentration (fraction dwt)	0.004 (0.002 - 0.005)

Season two plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	231.28 (155.99 - 346.38)
Average annual shoot nitrogen lost (kg/ha/year)	0.09 (0.00 - 0.87)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	19.63 (14.64 - 25.18)
Average annual shoot phosphorus lost (kg/ha/year)	0.01 (0.00 - 0.08)
Average annual shoot nitrogen concentration (fraction dwt)	0.04 (0.03 - 0.07)
Average annual shoot phosphorus concentration (fraction dwt)	0.004 (0.003 - 0.005)

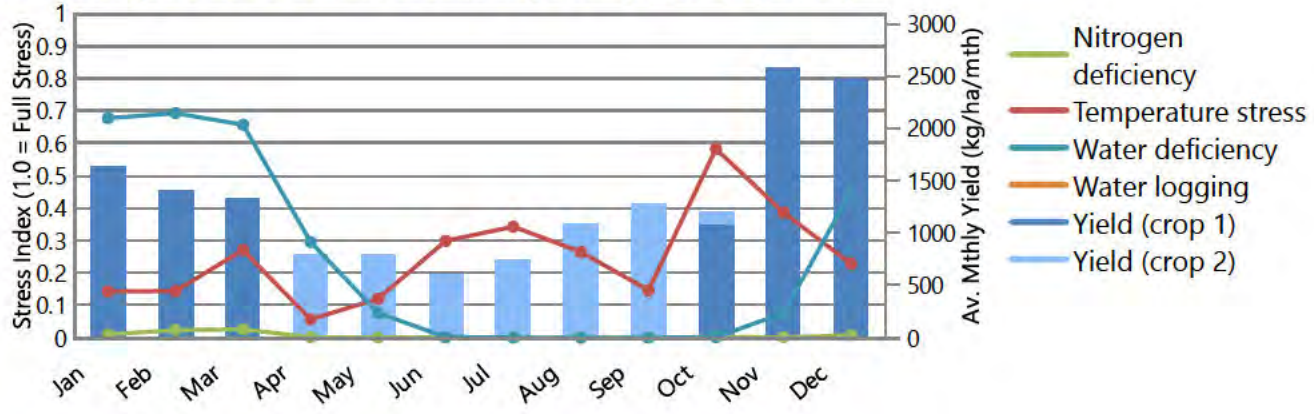
*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Performance

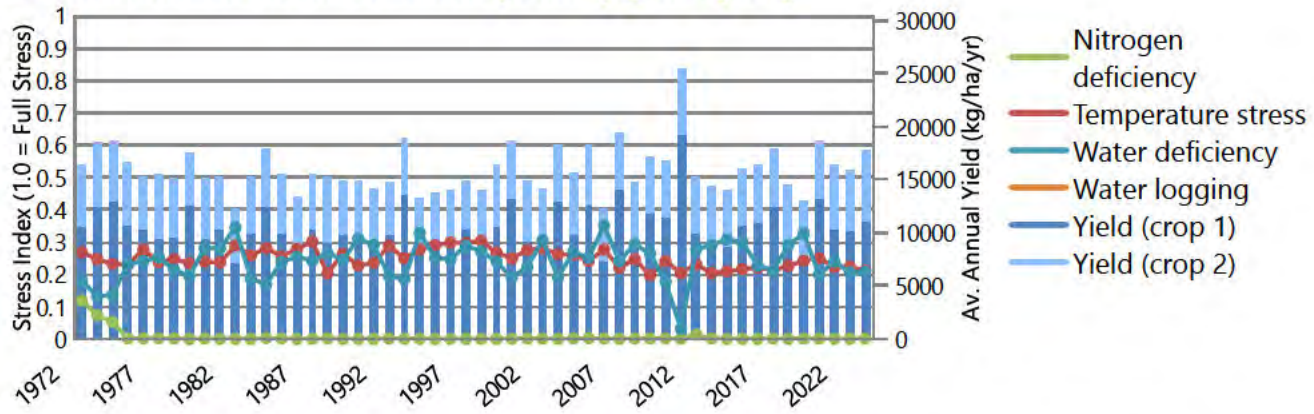
Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Av. monthly stresses & harvestable yield* (kg/ha/month)



Av. annual stresses & harvestable yield* (kg/ha/year)



*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Normal and forced harvest information

No. of Harvests per Year: 4.29 (normal).
No. Days without Crop per Year (no./year): 0.00

Performance

Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Plant salinity tolerance

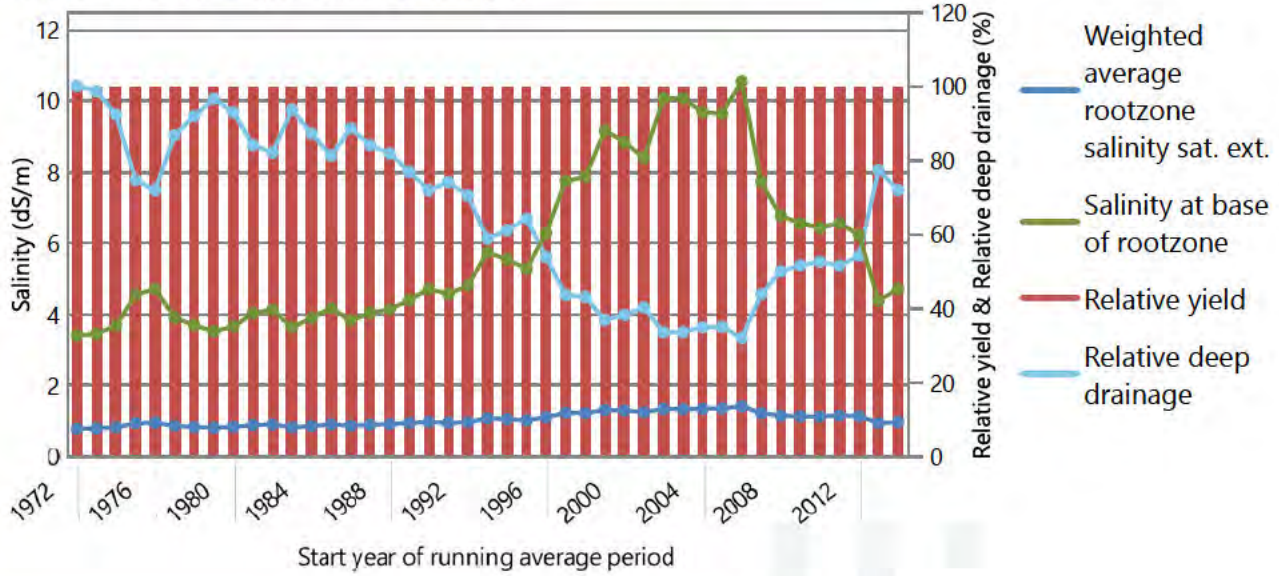
Metric	Value
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60
No. years assumed for leaching to reach steady-state (years)	10.00

Soil salinity

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	0.73
Salt added by rainfall (kg/ha/year)	74.83
Average annual salt added & leached at steady state (kg/ha/year)	3078.68
Average leaching fraction based on 10 -year running averages (fraction)	0.32
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	1.05
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	5.80
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Average annual rootzone salinity and relative yield

All values based on 10 -year running averages.

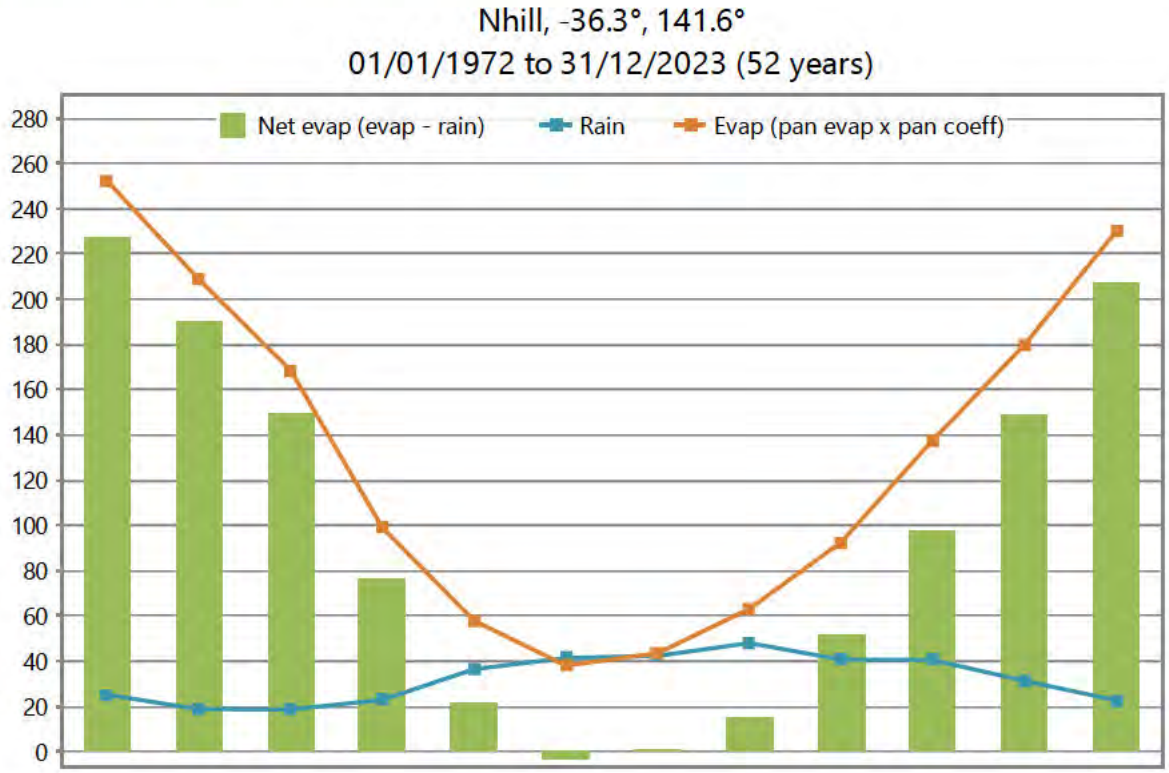


Diagnostics

Scenario information

Enterprise: Luv a Duck

Climate long-term monthly averages (mm)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Evap	252.3	208.9	168.6	99.1	58.0	38.1	43.6	63.1	92.6	137.7	179.8	230.1	1572.0
Net evap	227.1	190.0	149.9	76.2	21.4	-3.4	1.2	15.1	51.8	97.2	148.4	207.3	1182.1
Net evap/day	7.3	6.7	4.8	2.5	0.7	-0.1	0.0	0.5	1.7	3.1	4.9	6.7	3.2

Diagnostics

Pond system information

Pond System Configuration: 1 sludge-free pond

Effluent Type: Waste estimation system - 312.98 ML/year or 0.86 ML/day generated on average

Effluent entering pond system after any pretreatment and recycling

Average (Minimum-Maximum) influent quality calculated for 261.25 *non-zero flow days/year.*

Constituent	Concentration (mg/L)	Load (kg/year)
Total nitrogen	250.00 (250.00 - 250.00)	78244.38 (78169.50 - 78469.00)
Total phosphorus	33.00 (33.00 - 33.00)	10328.26 (10318.37 - 10357.91)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	330504.24 (330187.97 - 331453.06)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

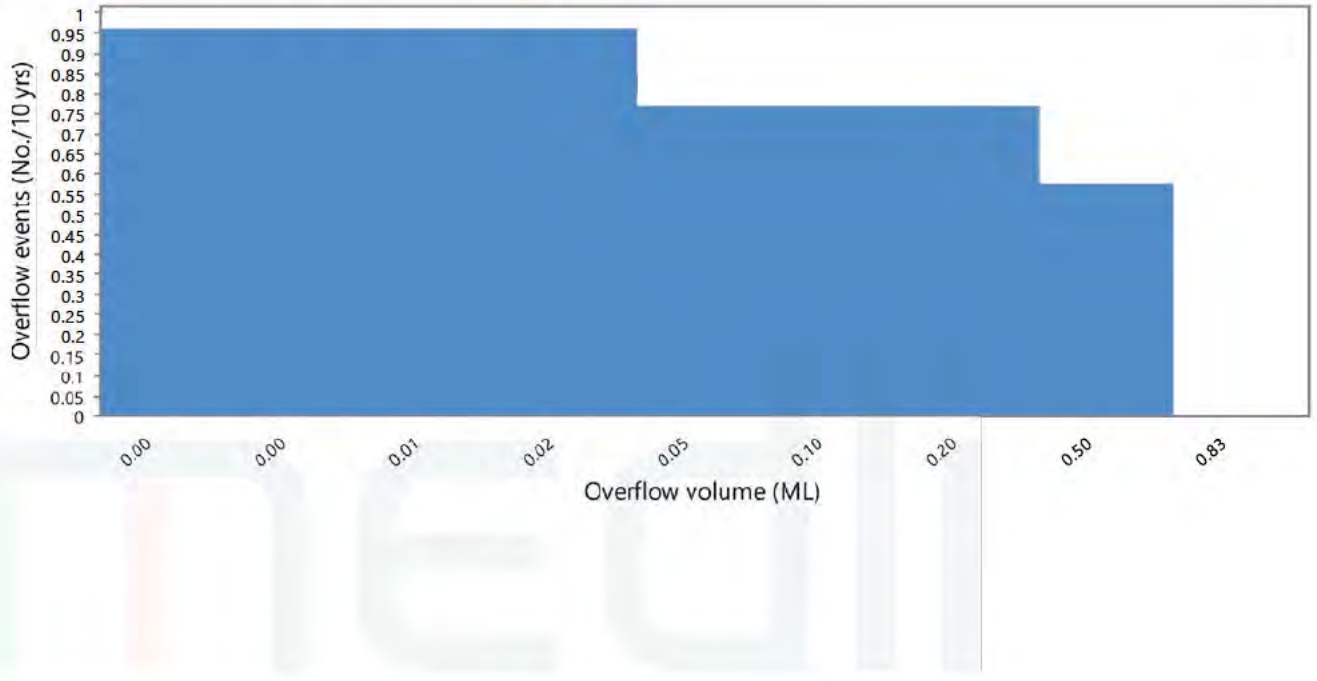
Ammonia-N loss from pond system water surface area: 0.00 kg/m2/year

Last pond (wet weather store): 5.60 ML

Metric	Value
Theoretical hydraulic retention time (days)	6.54
Volume of overflow (ML/year) Average (minimum-maximum)	0.05 (0.00 - 0.83)
Volume of overflow per day (m3/day) Average (minimum-maximum)	0.14 (0.00 - 826.82)
No overflow days - Average per year (Total in run period)	0.10 (5)
No. overflow events per 10 years exceeding threshold of 0.002 ML* (events/10 years)	0.96
Average overflow event recurrence interval (years)	10.40
Average duration of overflow (days)	1.00
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (proportion of inflow + net rain gain that is irrigated) (%)	99.98
Average salinity (dS/m)	1.67
Salinity on final day of simulation (dS/m)	1.67

* The threshold is the volume equivalent of the top 1 mm depth of water of a full pond

Volume distribution of the overflow events



Diagnostics

Scenario information

Area irrigated: 110 ha total area

Loading to whole irrigation area: (assuming 100% irrigation efficiency)

	Quantity/year	Quantity/ha/year
Total irrigation applied (ML)	310.25	2.82
Total nitrogen applied (kg)	74157.42	674.16
Total phosphorus applied (kg)	10325.72	93.87
Total salts applied (kg)	330422.92	3003.84

Shandying

Metric	Value
Annual allocation of fresh water for shandying (ML/year)	0.00
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)
Minimum shandy water is used	No

Irrigation issues

Metric	Value
Number of days without irrigation (days/year)	106.73
Number of periods without irrigatable water (periods/year)	0.81
Average length of such periods (days)	1.45

Diagnostics

Paddock information

Paddock: - All paddocks, 110 ha

Irrigation: Centre pivot with 26% ammonium loss during irrigation

Irrigation Rules
Irrigation triggered every 1 days and rainfall is less than or equal to 10.00 mm
Irrigate a fixed amount of 1.09 mm each day Irrigation window from 1/1 to 31/12 including the days specified
A minimum of 0 days must be skipped between irrigation events

Soil water balance (mm): Red sodosol 1, 126.40 mm PAWC at maximum root depth

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Efflt. irrg.	24.6	21.7	23.4	22.9	25.0	22.7	24.2	24.6	22.1	24.8	23.2	22.8	282.0
Soil evap	1.5	0.2	0.0	2.9	1.7	1.1	1.1	1.5	2.7	4.1	5.0	1.3	23.1
Transpn.	48.5	42.2	39.6	26.7	24.6	20.2	25.8	36.2	40.7	65.2	102.5	77.3	549.7
Rain runoff	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Irr. runoff	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage	0.1	0.0	0.0	0.0	1.6	5.5	18.4	26.8	28.0	16.1	3.6	0.3	100.5
Delta SW	-0.3	-1.9	2.5	16.3	33.6	37.4	21.3	8.1	-8.4	-20.1	-56.5	-33.3	-1.4

Soil nitrogen balance: (Concentrations are flow-weighted)

Metric	Value
Average annual nitrogen added in seed (kg/ha/year)	0.02
Average annual nitrogen added from irrigation (kg/ha/year)	674.16
Av. annual soil N removed by uptake (harvest + lost) (kg/ha/year)	648.22 (647.99, 0.23)
Av. annual soil nitrogen removed by denitrification (kg/ha/year)	0.61
Average annual soil nitrogen leached (kg/ha/year)	58.96
Average annual nitrate-N loading to groundwater (kg/ha/year)	58.96
Soil organic-N kg/ha (Initial - Final)	3456.00 - 1502.37
Soil inorganic-N kg/ha (Initial - Final)	54.60 - 260.40
Average nitrate-N concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	58.68 (91.17)
Excluding first year of data (mg/L)	58.87 (91.17)

Soil phosphorus balance: (Concentrations are flow-weighted)

Metric	Value
Average annual phosphorus added in seed (kg/ha/year)	1.73E-03
Average annual phosphorus added from irrigation (kg/ha/year)	93.87
Av. annual soil P removed by uptake (harvest + lost) (kg/ha/yr)	56.85 (56.84, 0.01)
Average annual soil phosphorus leached (kg/ha/year)	0.10
Dissolved phosphorus (kg/ha) (Initial - Final)	0.49 - 16.75
Adsorbed phosphorus (kg/ha) (Initial - Final)	3201.01 - 5104.56
Average phosphate-P concentration in rootzone (mg/L)	3.52
Average phosphate-P concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	0.10 (0.10)
Last year only (mg/L)	0.10 (N.D.*)
Design soil profile storage life based on average infiltrated water phosphorus concn. of 13.97 mg/L (years)	171.98

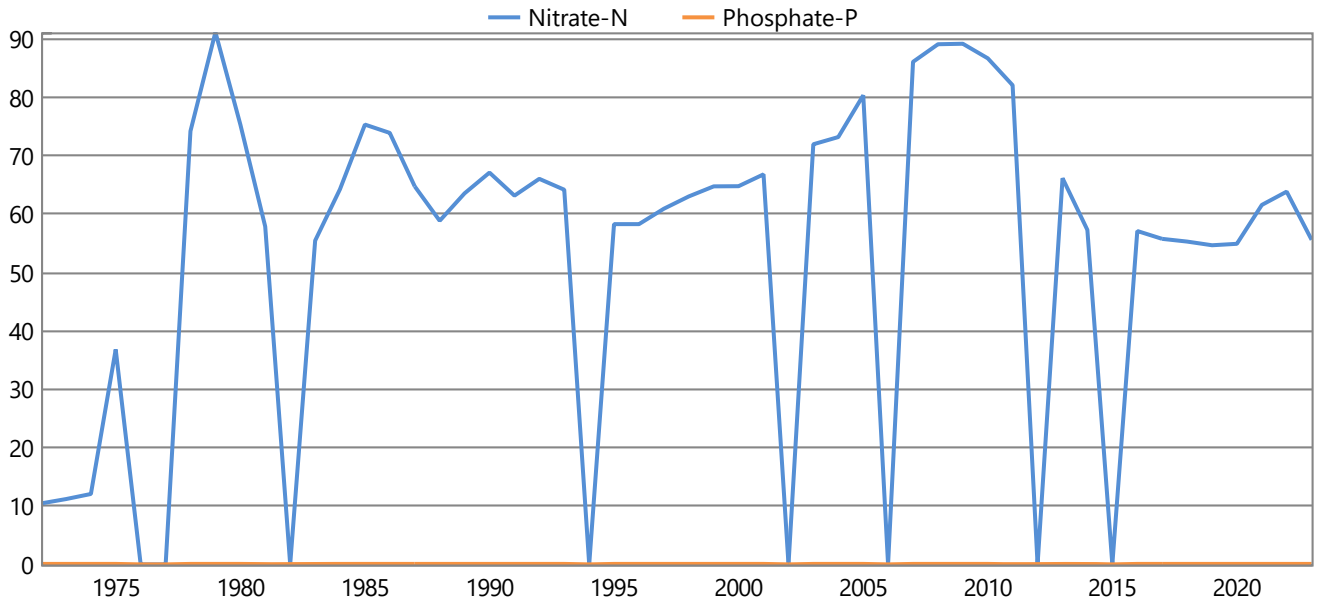
* Not determined

Diagnostics

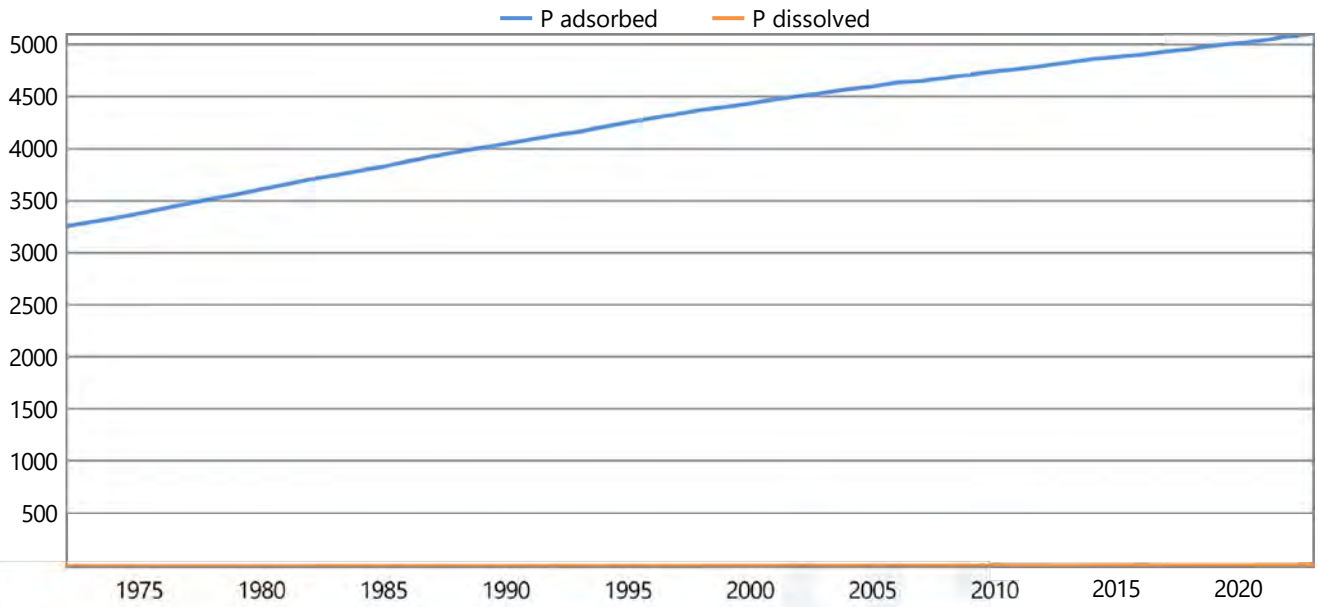
Paddock information

Paddock: All paddocks, 110 ha
Irrigation: Centre pivot with 26% ammonium loss during irrigation

Annual nutrient leachate concentration (mg/L)



Annual phosphate-P in soil (kg/ha)



Diagnostics

Paddock information

Paddock: All paddocks, 110 ha

Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Average plant performance (minimum - maximum)

Metric	Value
Average annual shoot dry matter harvestable yield (kg/ha/year)	15922.10 (12184.30 - 25375.30)
Average annual shoot dry matter lost (kg/ha/year)	2.24 (0.00 - 17.08)
Average monthly plant (green) cover (%)	72.33 (49.57 - 94.03)
Average monthly crop factor (fraction)	0.58 (0.40 - 0.75)
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 97.00
Average monthly root depth (mm)	826.82 (600.00 - 1200.00)
Average number of normal harvests per year (no./year)	4.29 (3.00 - 6.00)
Average number of normal harvests for last five years only (no./year)	4.20
Average number of forced harvests per year (no./year)	0.00 (0.00 - 0.00)
Average number of forced harvests for last five years only (no./year)	0.00
Average annual nitrogen deficiency index (0 = no stress, 1 = full stress) (coefficient)	0.01 (0.00 - 0.12)
Average January temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.14 (0.03 - 0.29)
Average July temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.34 (0.18 - 0.69)
Average monthly water stress index (0 = no stress, 1 = full stress) (coefficient)	0.24 (0.00 - 0.69)
Average monthly waterlogging index (0 = no stress, 1 = full stress) (coefficient)	0.00 (0.00 - 0.00)
No. days without crop per year. Excludes bare fallow days (days)	0.00

Soil salinity - plant salinity tolerance: Moderately tolerant | Moderately tolerant

Assumes 1.0 dS/m Electrical Conductivity = 640 mg/L Total Dissolved Salts

All values based on 10 -year running averages.

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	0.73
Salt added by rainfall (kg/ha/year)	74.83
Average annual salt added & leached at steady state (kg/ha/year)	3078.68
Average leaching fraction based on 10 -year running averages (fraction)	0.32
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	1.05
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	5.80
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Diagnostics

Run information

Messages generated when the scenario was run
********** WASTESTREAM RESULTS **********
TABLE OF QUANTITY AND QUALITY OF EACH RAINFALL-INDEPENDENT WASTESTREAM (AFTER PRETREATMENT AND BEFORE ENTERING ANY SEDIMENTATION BASIN)
Source Volume_ML/yr N conc_mg/L P conc_mg/L TDS conc_mg/L N load_kg/yr P load_kg/yr TDS load_kg/yr
Irrigated wastewater 313.0 250.0 33.0 1056.0 78244.4 10328.3 330504.2
********** END WASTESTREAM RESULTS **********
No. Days without Irrigation Applied per Year: 106.73 (with water supply insufficient for pump [96.19], rain exceeding specified rainfall threshold [9.37] and pond water volume below minimum volume for irrigation [1.17])
UNCONDITIONAL FINISH

General Information

SCENARIO REPORT: Full run

General information

Enterprise: Luv a Duck
Client: Luv a Duck
MEDLI user: Dr Stephan Tait

Description:

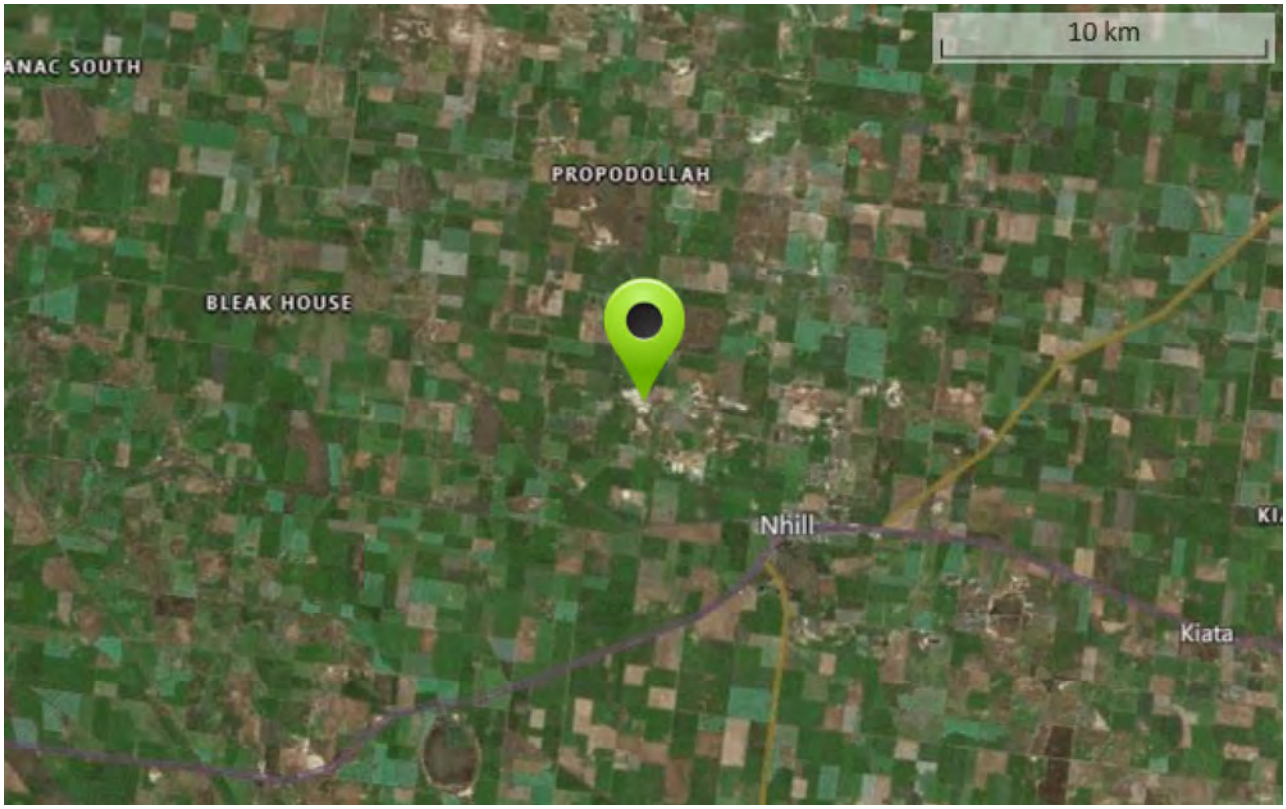
Scenario 1b - 110 ha irrigation, after treatment

Scenario details:

The high strength effluent is irrigated over a large land area to minimise nutrient leaching.

Map of location:

Note: If the map above appears as a dark box, check that the network is accessible and that the coordinates are not for a location in the ocean.



Description

Climate information

Climate Data Location: Nhill, -36.3°, 141.6°

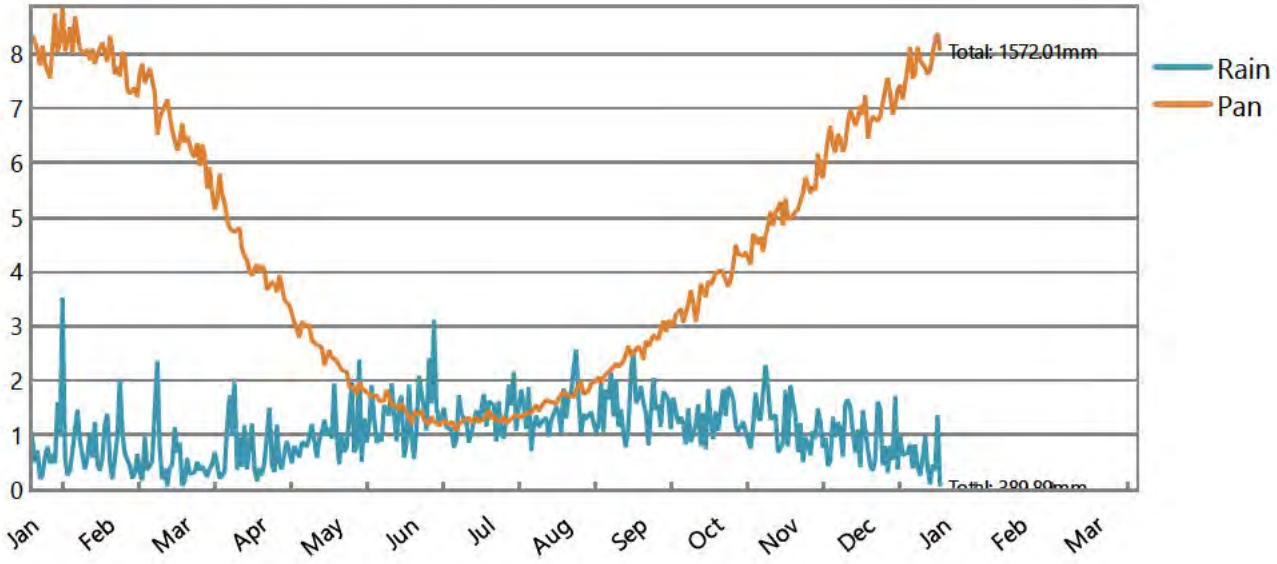
Run Period: 01/01/1972 to 31/12/2023 (52 years)

Climate statistics

	5th Percentile		50th Percentile		95th Percentile	
Rainfall (mm/year)	(Year 1994)	230.6	(Year 1999)	400.0	(Year 2022)	527.9
Pan evaporation (mm/year)	(Year 2010)	1379.3	(Year 2012)	1587.7	(Year 1990)	1711.4

Climate data

Daily average across run period:



Description

Wastestream information

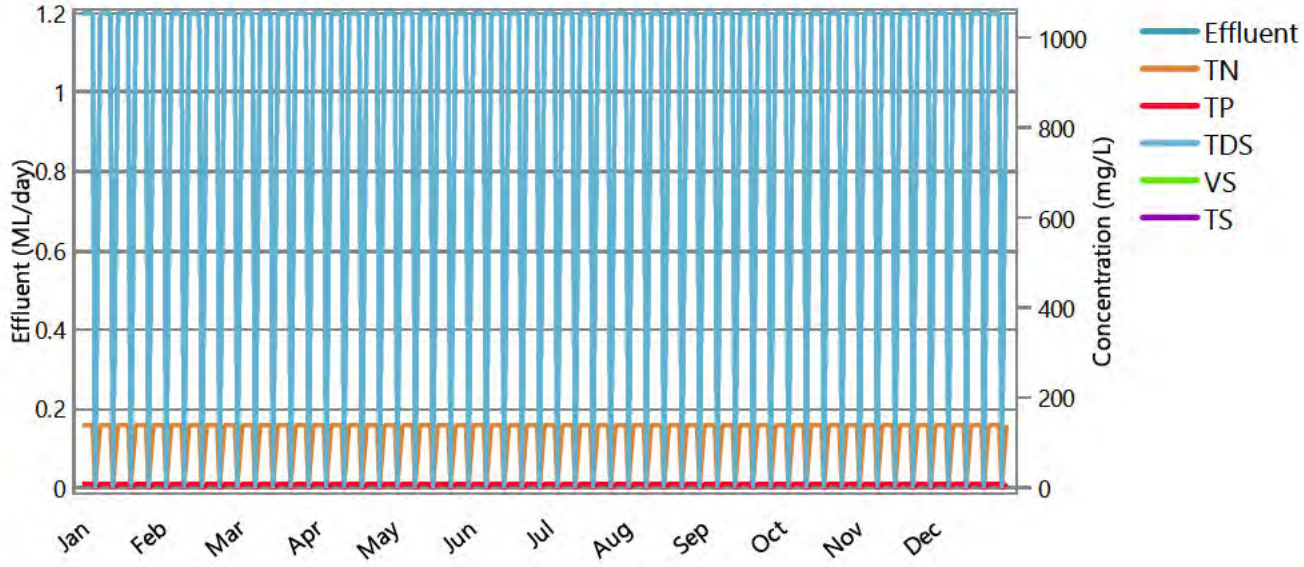
Wastestream Name: Waste estimation system - Irrigated wastewater

Wastestream production description

Daily Irrigated wastewater data supplied for a representative year. This wastestream is not separately pretreated.

Wastestream

Average Daily Quantity and Flow-Weighted Average Quality:



Wastestream

Effluent Quantity: 313.50 ML/year or 0.86 ML/day (Min-Max 0.00 - 1.20)

Flow-Weighted Average (Min - Max) Daily Effluent Quality Entering the Pond System:

	Concentration (mg/L)	Load (kg/year)
Total nitrogen	140.40 (140.40 - 140.40)	44015.40 (43973.28 - 44141.76)
Total phosphorus	9.99 (9.99 - 9.99)	3132.91 (3129.91 - 3141.90)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	331056.00 (330739.20 - 332006.40)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

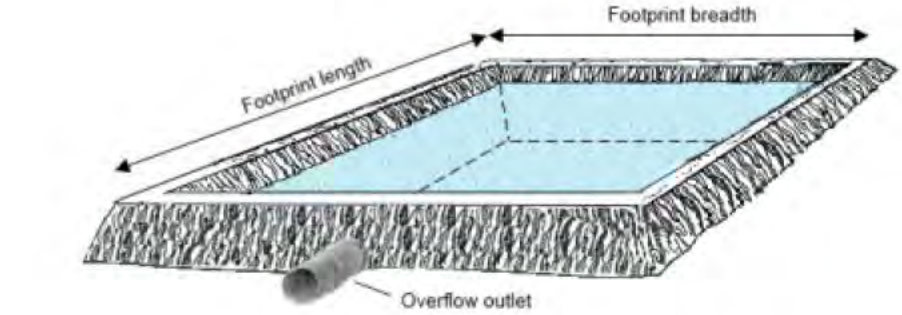
Description

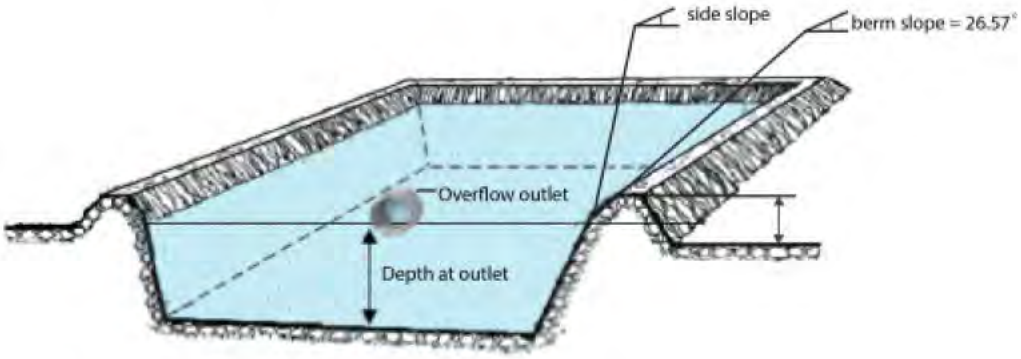
Pond system information

Pond System Configuration: 1 sludge-free pond

Pond system details

	Pond 1
Maximum pond volume (ML)	5.60
Minimum allowable pond volume (ML)	0.61
Pond depth at overflow outlet (m)	2.50
Maximum water surface area (m2)	2480.70
Pond footprint length (m)	49.81
Pond footprint width (m)	49.81
Pond catchment area (m2)	2480.70
Average active volume (ML)	1.29





Irrigation pump limits

Minimum pump rate limit (ML/day)	1.20
Maximum pump rate limit (ML/day)	3.12

Shandying water

Annual allocation of fresh water available for shandying (ML/year)	0.00
Maximum rate of application of fresh water (ML/day)	0.00
Nitrogen concentration (mg/L)	0.00
Salinity (dS/m)	0.00
Minimum shandy water is used	No

Description

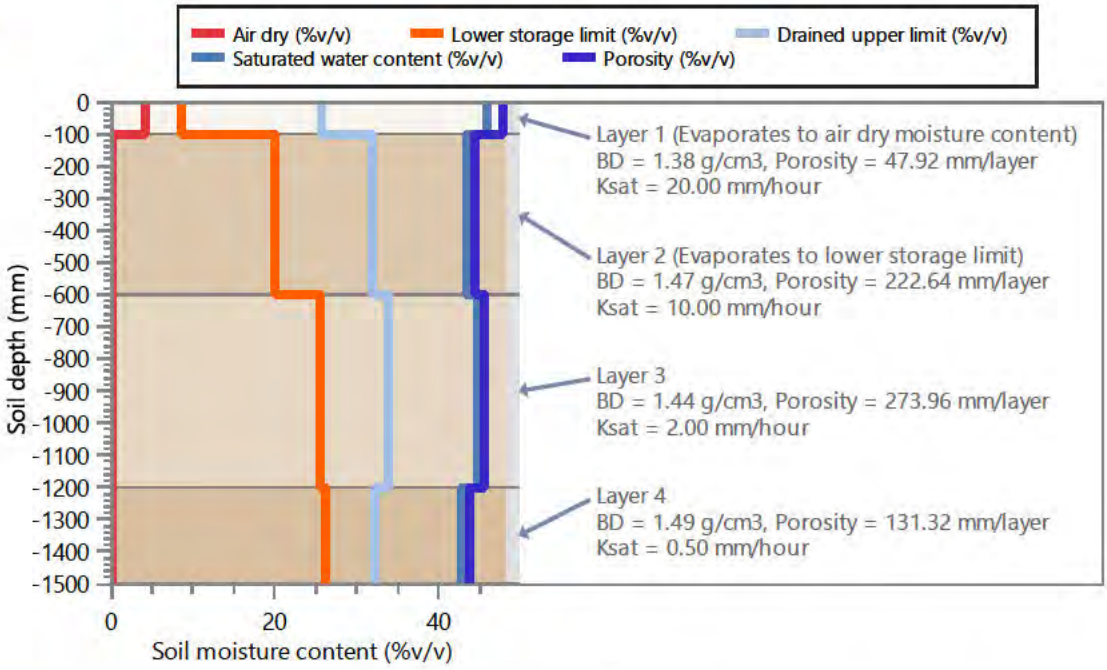
Paddock information

Paddock: All paddocks, 110 ha

Soil type: Red sodosol 1, 1500.00 mm defined profile depth

Profile porosity (mm)	675.85
Profile saturation water content (mm)	660.70
Profile drained upper limit (or field capacity) (mm)	486.00
Profile lower storage limit (or permanent wilting point) (mm)	341.30
Profile available water capacity (mm)	144.70
Profile limiting saturated hydraulic conductivity (mm/hour)	0.50
Surface saturated hydraulic conductivity (mm/hour)	20.00
Runoff curve number II (coefficient)	75.00
Soil evaporation U (mm)	10.00
Soil evaporation Cona (mm/sqrt day)	4.00

Profile



Planting regime: Rotated Kikuyu 1 pasture | Ryegrass 1 pasture

Maximum crop factor at 100% cover (mm/mm) (Maximum crop coefficient 0.8 | 0.8 x Pan coefficient 1 | 1)	0.80 | 0.80
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 97.00
Potential rooting depth in defined soil profile (mm)	1200.00 | 600.00
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60

Irrigation rules: Centre pivot

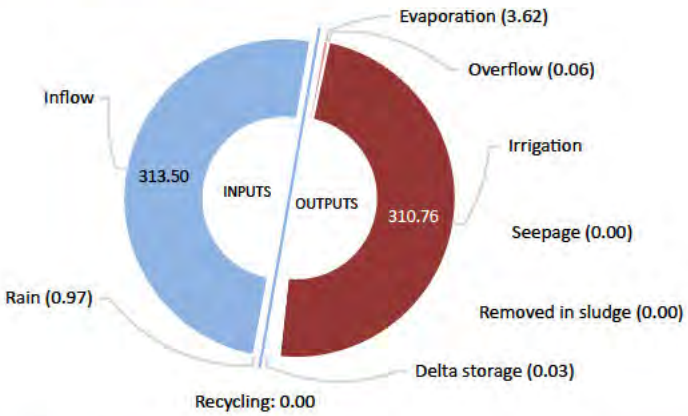
Rule 1. Irrigation triggered every 1 days and rainfall is less than or equal to 10.00 mm
Rule 2. Irrigate a fixed amount of 1.09 mm each day
Rule 3. Irrigation window from 1/1 to 31/12 including the days specified
Rule 4. A minimum of 0 days must be skipped between irrigation events

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond (wet weather storage pond: 5.6 ML)

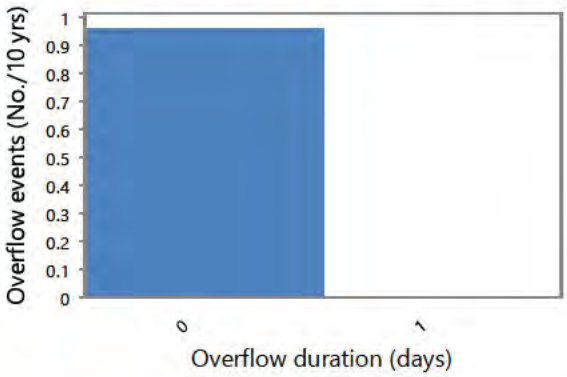
Pond system water balance (ML/year)

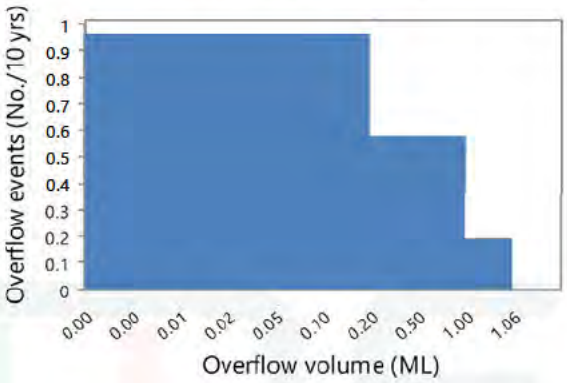


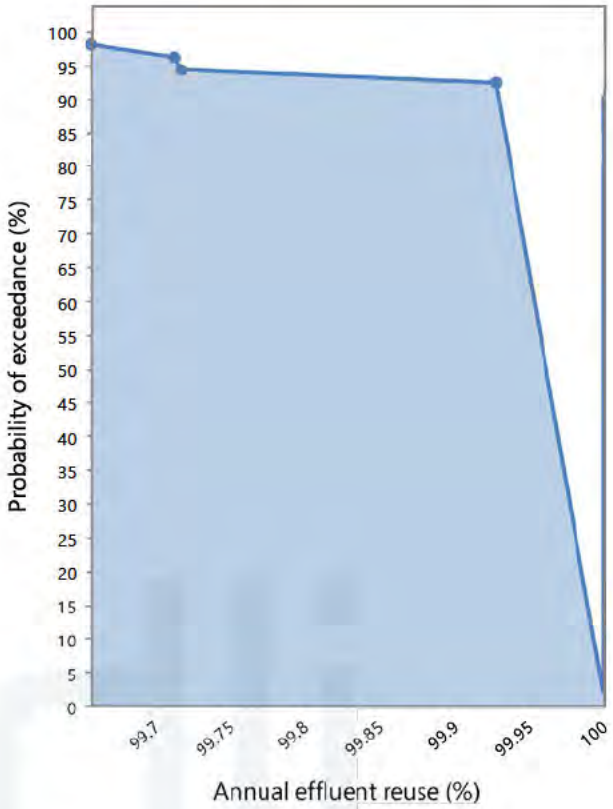
Name	Value
Rain	0.97
Inflow	313.50
Recycling	0.00
Evaporation	3.62
Overflow	0.06
Irrigation	310.76
Seepage	0.00
Removed in sludge	0.00
Delta storage	0.03

Overflow and reuse diagnostics

Metric	Value
Total volume of overflow (ML/10 years)	0.59
Total number of overflow events (events/10 years)	0.96
Total number of pond overflow days (days/10 years)	0.96
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (Proportion of inflow + net gain in rain that is irrigated) (%)	99.98





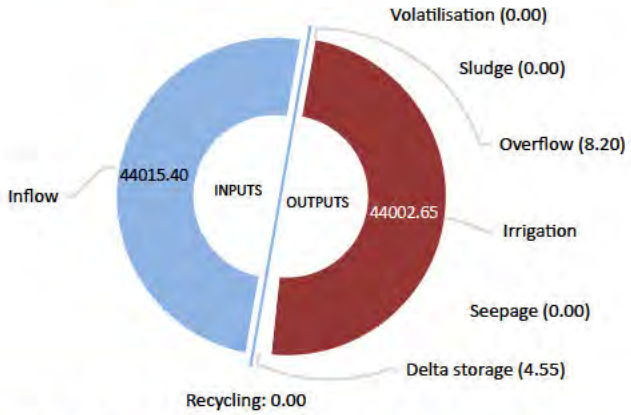


Performance

Pond system information

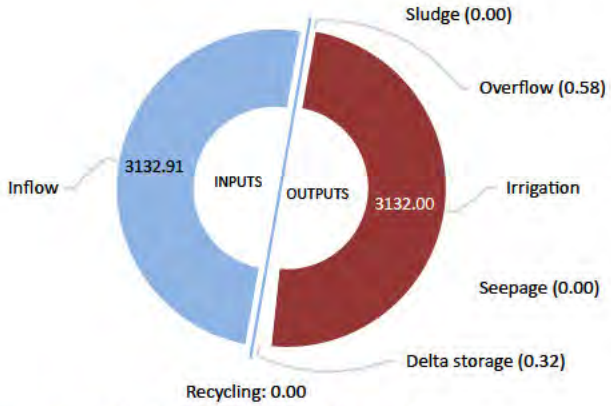
Pond System Configuration: 1 sludge-free pond

Pond system nitrogen balance (kg/year)



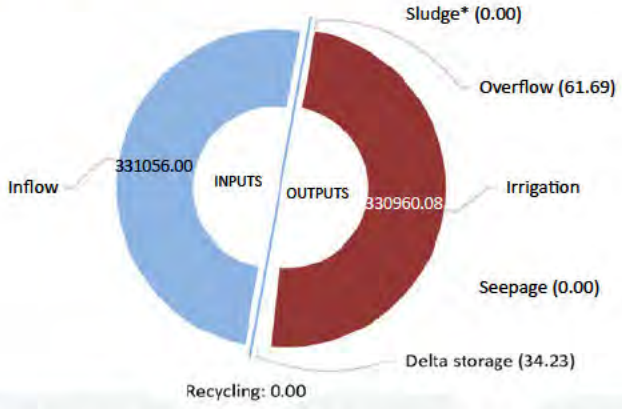
Name	Value
Inflow	44015.40
Recycling	0.00
Volatilisation	0.00
Sludge	0.00
Overflow	8.20
Irrigation	44002.65
Seepage	0.00
Delta storage	4.55

Pond system phosphorus balance (kg/year)



Name	Value
Inflow	3132.91
Recycling	0.00
Sludge	0.00
Overflow	0.58
Irrigation	3132.00
Seepage	0.00
Delta storage	0.32

Pond system salt balance (kg/year)



Name	Value
Inflow	331056.00
Recycling	0.00
Sludge*	0.00
Overflow	61.69
Irrigation	330960.08
Seepage	0.00
Delta storage	34.23

* Salt removal in sludge is not calculated from the pond salt balance. However if salt could be assumed to be present in the sludge at the same concentration as in the pond supernatant (up to a maximum of salt added in inflow) - then salt accumulation in the sludge could be 0.00 kg/year

Pond system sludge accumulation: 0.00 kg dwt/year

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond

Pond nutrient concentrations and salinity

Average across simulation period	Pond 1
Average nitrogen concentration of pond liquid (mg/L)	141.69
Average phosphorus concentration of pond liquid (mg/L)	10.08
Average salinity of pond liquid (dS/m)	1.67

Value on final day of simulation period	Pond 1
Final nitrogen concentration of pond liquid (mg/L)	142.00
Final phosphorus concentration of pond liquid (mg/L)	10.11
Final salinity of pond liquid (dS/m)	1.67

Performance

Water use (assumes 100% irrigation efficiency)

Metric	Value
Pond water irrigated (ML/year)	310.76
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Total water irrigated (ML/year)	310.76
Proportion of irrigation events requiring shandying (% of events)	0.00
Proportion of years shandying water allocation of 0 ML/year is exceeded (% of years)	0.00
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)

Irrigation quality

Metric	Value
Average nitrogen concentration of irrigation water - before ammonia loss during irrigation (mg/L)	141.60
Average nitrogen concentration of irrigation water - after ammonia loss during irrigation (mg/L)	134.24
Average phosphorus concentration of irrigation water (mg/L)	10.08
Average salinity of irrigation water (dS/m)	1.66

Irrigation diagnostics

Metric	Value
No. periods/year without any irrigable effluent in the wet weather storage pond (periods/year)	0.77
Average length of such periods (days)	1.58

Irrigation triggering and application

No. Days without Irrigation Applied per Year: 106.31 (with water supply insufficient for pump [95.73], rain exceeding specified rainfall threshold [9.37] and pond water volume below minimum volume for irrigation [1.21])

No. Days without Irrigation Applied per Year: 106.31 (with no supply - no application [96.94] and not triggered [9.37])

No. Days with Irrigation Applied per Year: 258.94 (with full application [258.92] and supply limited - partial application [0.02])

No. Days with Irrigation Triggered per Year: 355.88

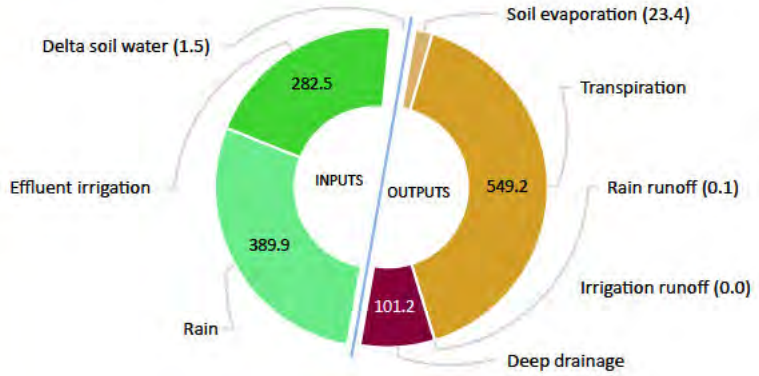
Performance

Paddock information

Paddock: All paddocks, 110 ha

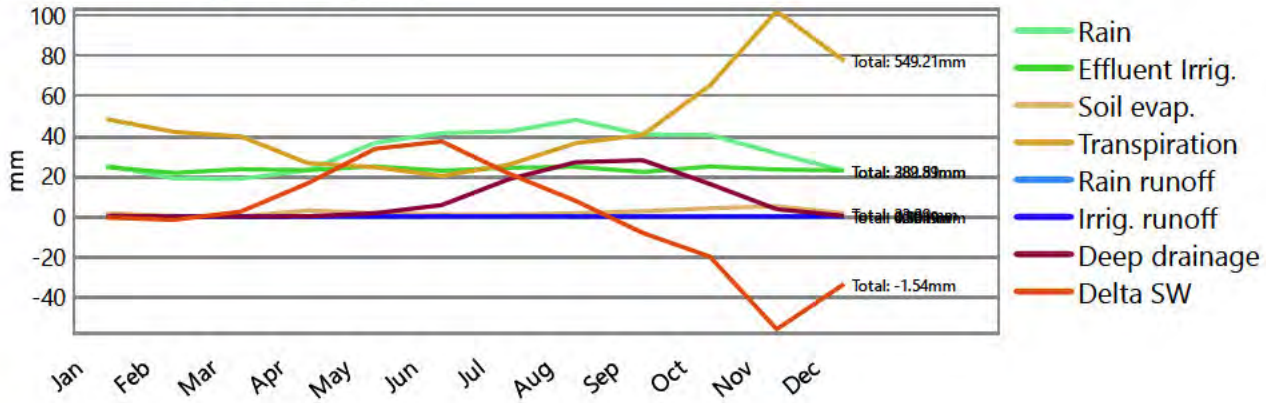
Soil Type: Red sodosol 1, 126.40 mm PAWC at maximum root depth

Soil water balance (mm/year)

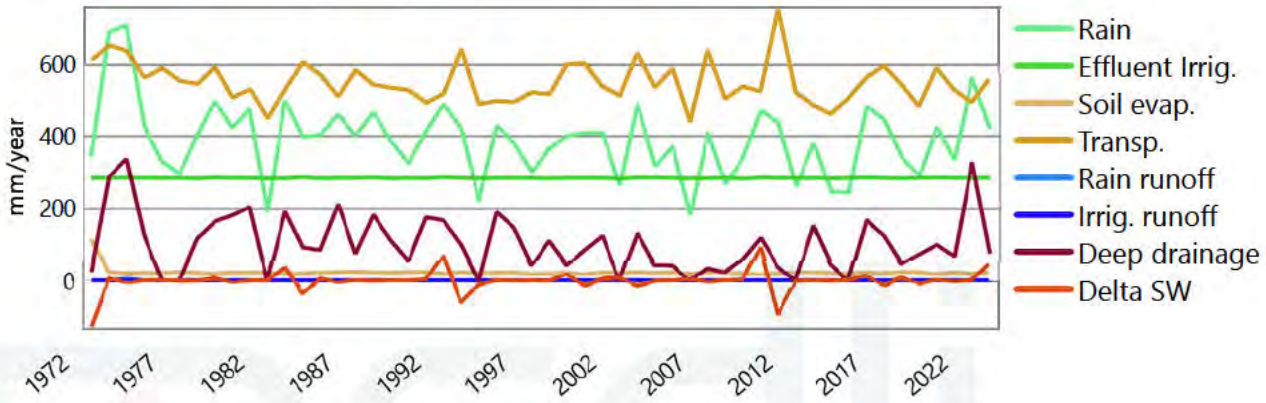


Name	Value
Rain	389.9
Effluent irrigation	282.5
Soil evaporation	23.4
Transpiration	549.2
Rain runoff	0.1
Irrigation runoff	0.0
Deep drainage	101.2
Delta soil water	-1.5

Average monthly totals (mm)



Average annual totals (mm/year)

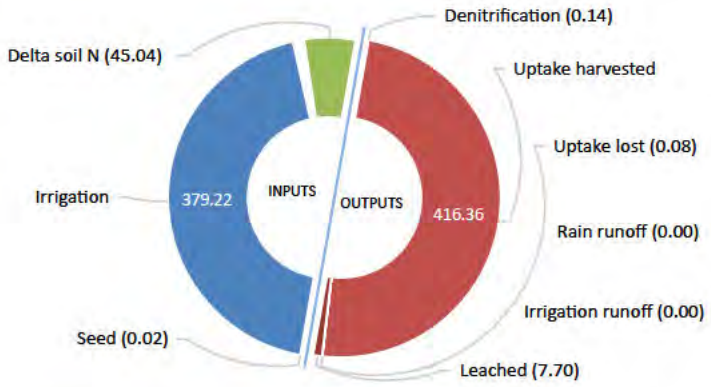


Performance

Paddock information

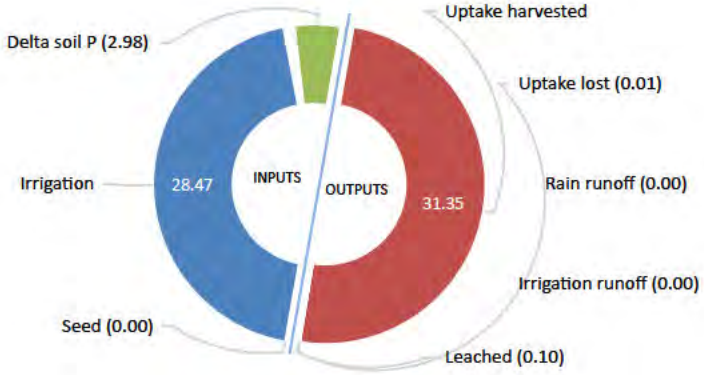
Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Irrigation Ammonia-N Volatilisation Losses (kg/ha/year): 20.80
Proportion of Total Nitrogen in Irrigated Effluent as Ammonium (%): 20.00

Soil nitrogen balance (kg/ha/year)



Name	Value
Seed	0.02
Irrigation	379.22
Denitrification	0.14
Uptake harvested	416.36
Uptake lost	0.08
Rain runoff	0.00
Irrigation runoff	0.00
Leached	7.70
Delta soil N	-45.04

Soil phosphorus balance (kg/ha/year)



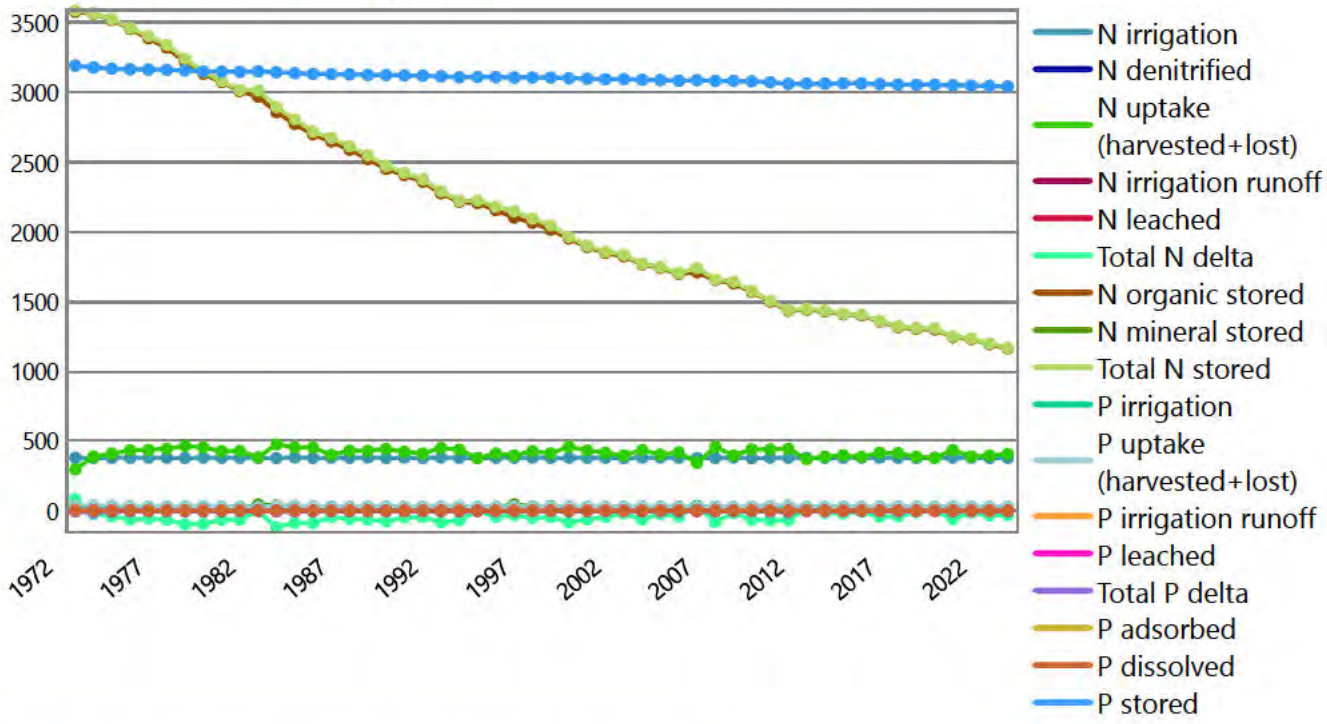
Name	Value
Seed	1.73E-03
Irrigation	28.47
Uptake harvested	31.35
Uptake lost	0.01
Rain runoff	0.00
Irrigation runoff	0.00
Leached	0.10
Delta soil P	-2.98

Performance

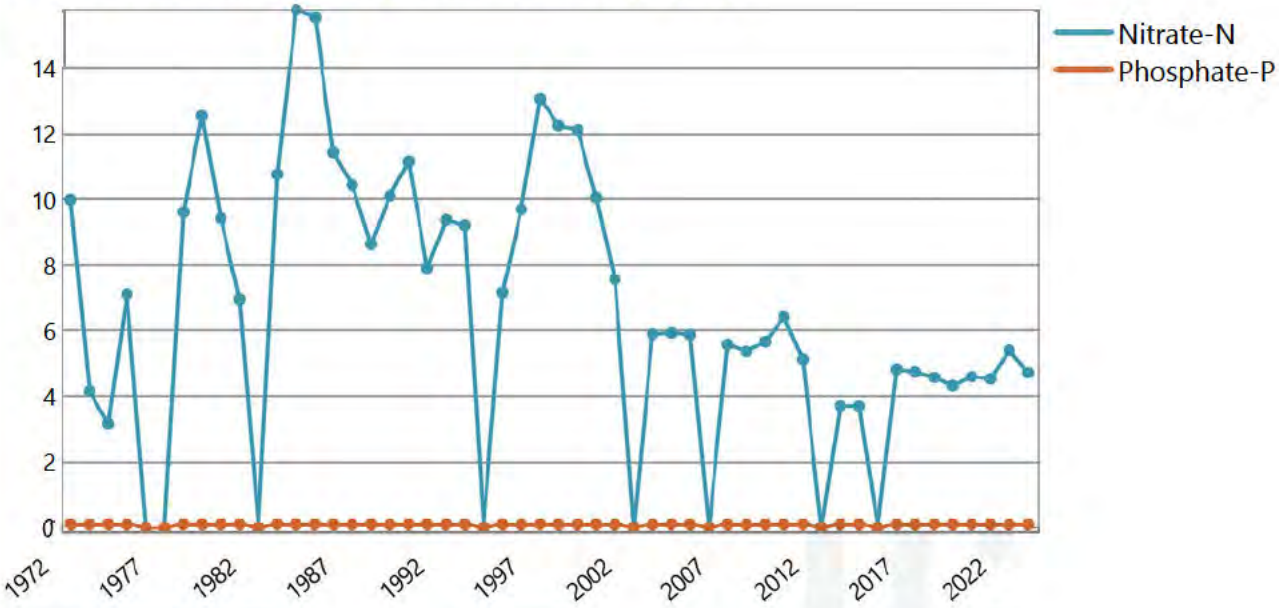
Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1

Annual nutrient totals (kg/ha)



Annual nutrient leaching concentration (mg/L)



Performance

Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Plant growth (minimum - maximum)

Season one plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	9983.32 (7095.48 - 13315.58)
Average annual shoot dry matter lost (kg/ha/year)	0.40 (0.00 - 5.88)
Average monthly plant (green) cover (%)	84.47 (58.71 - 100.00)
Average monthly root depth (mm)	1072.56 (637.09 - 1200.00)

Season two plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	5380.58 (4609.07 - 6611.31)
Average annual shoot dry matter lost (kg/ha/year)	2.11 (0.00 - 18.38)
Average monthly plant (green) cover (%)	62.49 (49.12 - 73.68)
Average monthly root depth (mm)	600.00 (600.00 - 600.00)

Plant nutrient uptake (minimum - maximum)

Season one plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	254.37 (160.68 - 314.63)
Average annual shoot nitrogen lost (kg/ha/year)	0.01 (0.00 - 0.21)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	15.69 (10.42 - 24.34)
Average annual shoot phosphorus lost (kg/ha/year)	0.00 (0.00 - 0.02)
Average annual shoot nitrogen concentration (fraction dwt)	0.03 (0.02 - 0.04)
Average annual shoot phosphorus concentration (fraction dwt)	0.002 (0.001 - 0.003)

Season two plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	161.99 (135.49 - 199.78)
Average annual shoot nitrogen lost (kg/ha/year)	0.06 (0.00 - 0.55)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	15.67 (13.58 - 17.96)
Average annual shoot phosphorus lost (kg/ha/year)	0.01 (0.00 - 0.06)
Average annual shoot nitrogen concentration (fraction dwt)	0.03 (0.03 - 0.03)
Average annual shoot phosphorus concentration (fraction dwt)	0.003 (0.003 - 0.003)

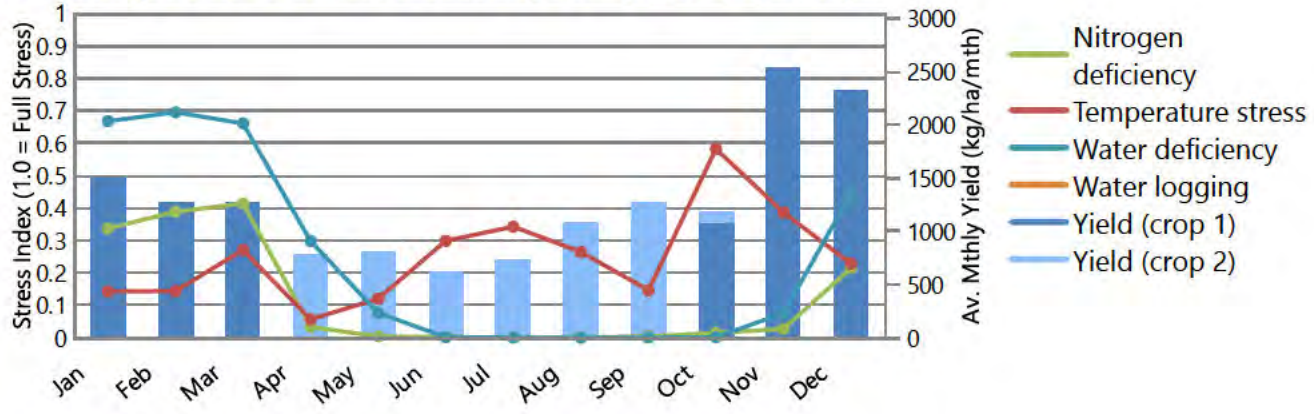
*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Performance

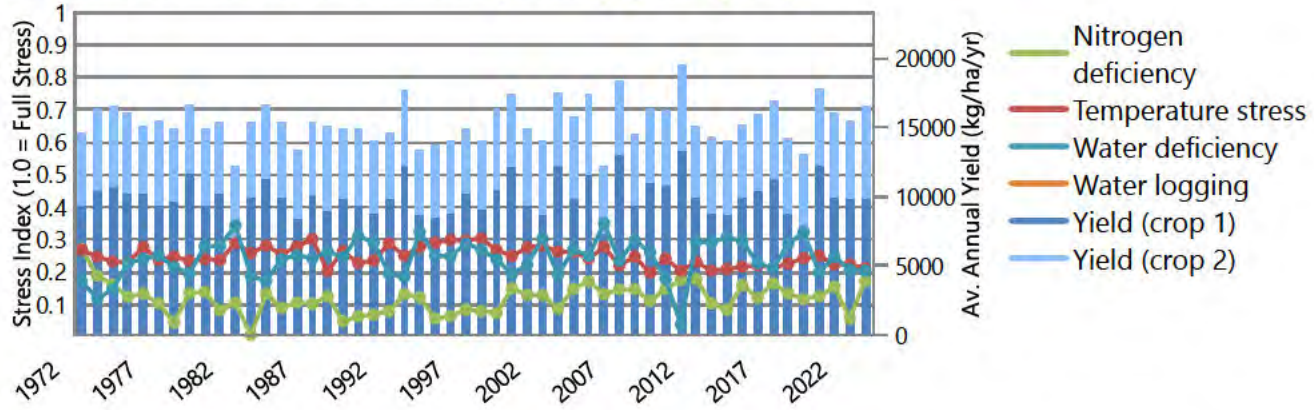
Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Av. monthly stresses & harvestable yield* (kg/ha/month)



Av. annual stresses & harvestable yield* (kg/ha/year)



*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Normal and forced harvest information

No. of Harvests per Year: 4.17 (normal).
No. Days without Crop per Year (no./year): 0.00

Performance

Paddock information

Paddock: All paddocks, 110 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Plant salinity tolerance

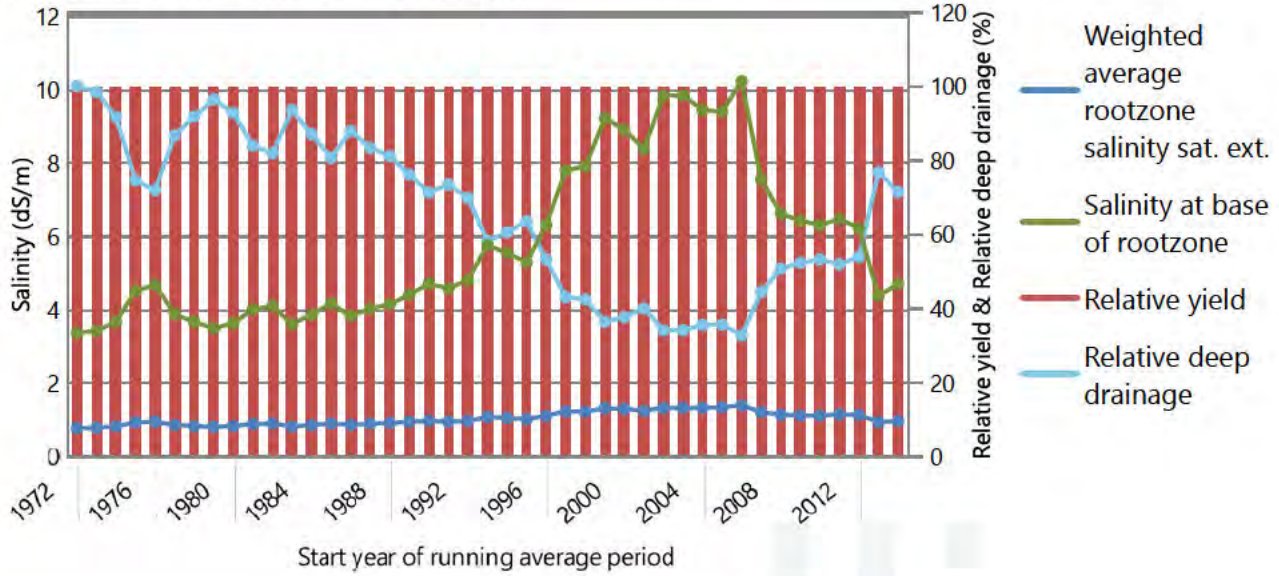
Metric	Value
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60
No. years assumed for leaching to reach steady-state (years)	10.00

Soil salinity

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	0.73
Salt added by rainfall (kg/ha/year)	74.83
Average annual salt added & leached at steady state (kg/ha/year)	3083.56
Average leaching fraction based on 10 -year running averages (fraction)	0.33
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	1.04
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	5.76
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Average annual rootzone salinity and relative yield

All values based on 10 -year running averages.

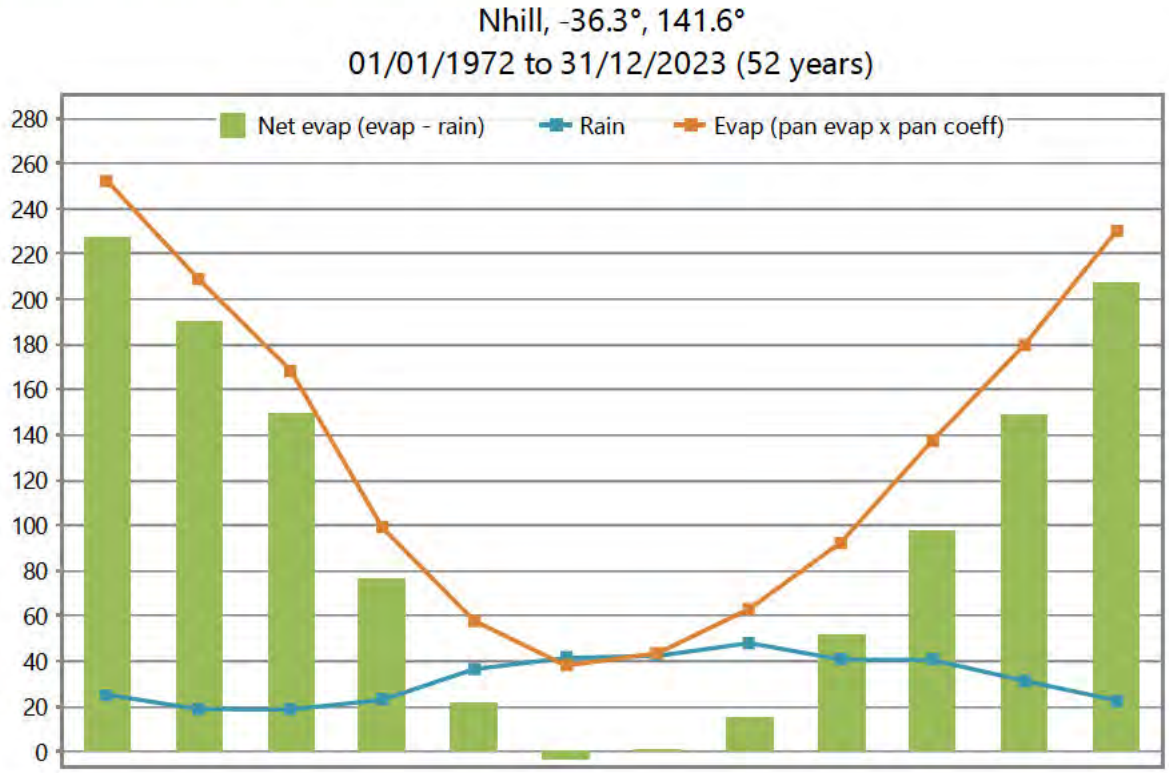


Diagnostics

Scenario information

Enterprise: Luv a Duck

Climate long-term monthly averages (mm)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Evap	252.3	208.9	168.6	99.1	58.0	38.1	43.6	63.1	92.6	137.7	179.8	230.1	1572.0
Net evap	227.1	190.0	149.9	76.2	21.4	-3.4	1.2	15.1	51.8	97.2	148.4	207.3	1182.1
Net evap/day	7.3	6.7	4.8	2.5	0.7	-0.1	0.0	0.5	1.7	3.1	4.9	6.7	3.2

Diagnostics

Pond system information

Pond System Configuration: 1 sludge-free pond

Effluent Type: Waste estimation system - 313.50 ML/year or 0.86 ML/day generated on average

Effluent entering pond system after any pretreatment and recycling

Average (Minimum-Maximum) influent quality calculated for 261.25 *non-zero flow days/year.*

Constituent	Concentration (mg/L)	Load (kg/year)
Total nitrogen	140.40 (140.40 - 140.40)	44015.40 (43973.28 - 44141.76)
Total phosphorus	9.99 (9.99 - 9.99)	3132.91 (3129.91 - 3141.90)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	331056.00 (330739.20 - 332006.40)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

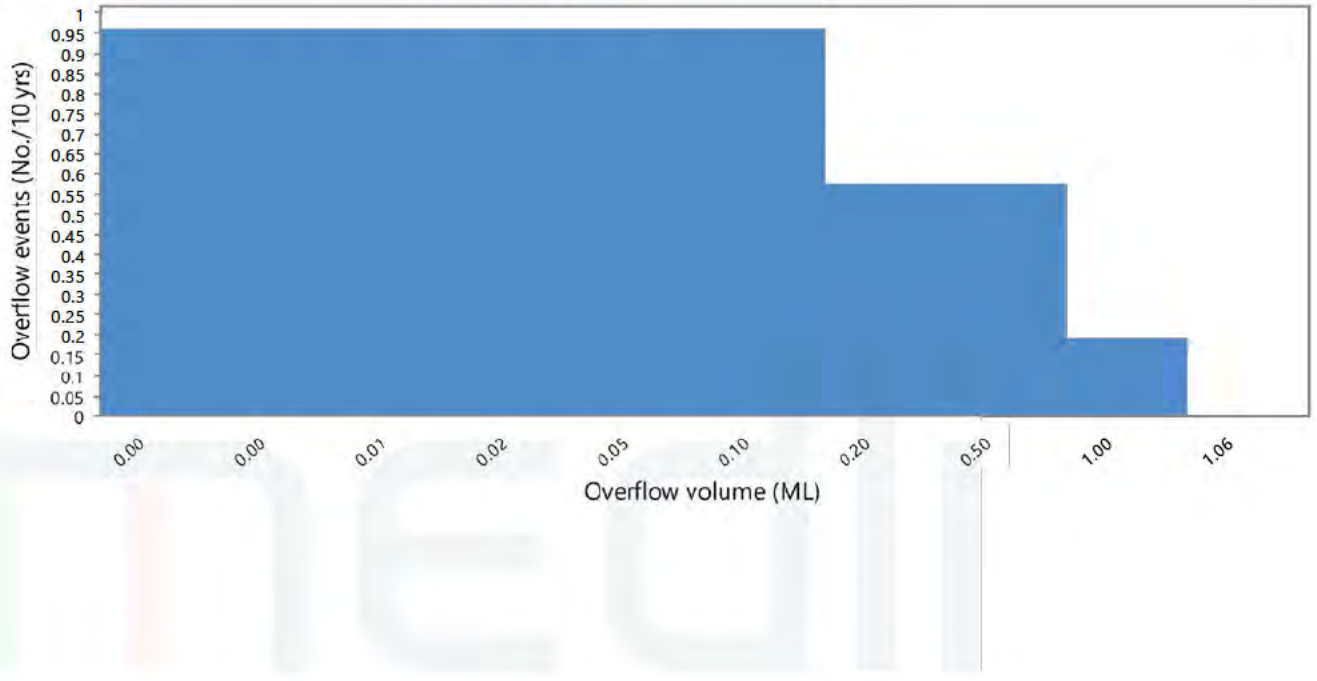
Ammonia-N loss from pond system water surface area: 0.00 kg/m2/year

Last pond (wet weather store): 5.60 ML

Metric	Value
Theoretical hydraulic retention time (days)	6.52
Volume of overflow (ML/year) Average (minimum-maximum)	0.06 (0.00 - 1.06)
Volume of overflow per day (m3/day) Average (minimum-maximum)	0.16 (0.00 - 1064.10)
No overflow days - Average per year (Total in run period)	0.10 (5)
No. overflow events per 10 years exceeding threshold of 0.002 ML* (events/10 years)	0.96
Average overflow event recurrence interval (years)	10.40
Average duration of overflow (days)	1.00
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (proportion of inflow + net rain gain that is irrigated) (%)	99.98
Average salinity (dS/m)	1.67
Salinity on final day of simulation (dS/m)	1.67

* The threshold is the volume equivalent of the top 1 mm depth of water of a full pond

Volume distribution of the overflow events



Diagnostics

Scenario information

Area irrigated: 110 ha total area

Loading to whole irrigation area: (assuming 100% irrigation efficiency)

	Quantity/year	Quantity/ha/year
Total irrigation applied (ML)	310.76	2.83
Total nitrogen applied (kg)	41714.51	379.22
Total phosphorus applied (kg)	3132.00	28.47
Total salts applied (kg)	330960.08	3008.73

Shandying

Metric	Value
Annual allocation of fresh water for shandying (ML/year)	0.00
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)
Minimum shandy water is used	No

Irrigation issues

Metric	Value
Number of days without irrigation (days/year)	106.31
Number of periods without irrigatable water (periods/year)	0.77
Average length of such periods (days)	1.58

Diagnostics

Paddock information

Paddock: - All paddocks, 110 ha

Irrigation: Centre pivot with 26% ammonium loss during irrigation

Irrigation Rules
Irrigation triggered every 1 days and rainfall is less than or equal to 10.00 mm
Irrigate a fixed amount of 1.09 mm each day Irrigation window from 1/1 to 31/12 including the days specified
A minimum of 0 days must be skipped between irrigation events

Soil water balance (mm): Red sodosol 1, 126.40 mm PAWC at maximum root depth

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Efflt. irrg.	24.5	21.7	23.5	23.0	25.0	22.8	24.2	24.7	22.1	24.8	23.3	22.9	282.5
Soil evap	1.5	0.2	0.0	2.9	1.7	1.1	1.1	1.5	2.7	4.1	5.1	1.6	23.4
Transpn.	48.5	42.1	39.8	26.5	24.5	20.2	25.7	36.5	40.5	65.2	102.2	77.5	549.2
Rain runoff	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Irr. runoff	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage	0.3	0.0	0.0	0.0	1.6	5.7	18.5	27.0	27.9	16.2	3.6	0.3	101.2
Delta SW	-0.6	-1.8	2.4	16.5	33.7	37.4	21.3	7.7	-8.2	-20.0	-56.2	-33.7	-1.5

Soil nitrogen balance: (Concentrations are flow-weighted)

Metric	Value
Average annual nitrogen added in seed (kg/ha/year)	0.02
Average annual nitrogen added from irrigation (kg/ha/year)	379.22
Av. annual soil N removed by uptake (harvest + lost) (kg/ha/year)	416.44 (416.36, 0.08)
Av. annual soil nitrogen removed by denitrification (kg/ha/year)	0.14
Average annual soil nitrogen leached (kg/ha/year)	7.70
Average annual nitrate-N loading to groundwater (kg/ha/year)	7.70
Soil organic-N kg/ha (Initial - Final)	3456.00 - 1164.51
Soil inorganic-N kg/ha (Initial - Final)	54.60 - 4.04
Average nitrate-N concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	7.61 (15.76)
Excluding first year of data (mg/L)	7.60 (15.76)

Soil phosphorus balance: (Concentrations are flow-weighted)

Metric	Value
Average annual phosphorus added in seed (kg/ha/year)	1.73E-03
Average annual phosphorus added from irrigation (kg/ha/year)	28.47
Av. annual soil P removed by uptake (harvest + lost) (kg/ha/yr)	31.36 (31.35, 0.01)
Average annual soil phosphorus leached (kg/ha/year)	0.10
Dissolved phosphorus (kg/ha) (Initial - Final)	0.49 - 0.15
Adsorbed phosphorus (kg/ha) (Initial - Final)	3201.01 - 3046.19
Average phosphate-P concentration in rootzone (mg/L)	0.05
Average phosphate-P concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	0.10 (0.10)
Last year only (mg/L)	0.09 (N.D.*)
Design soil profile storage life based on average infiltrated water phosphorus concn. of 4.24 mg/L (years)	999.00

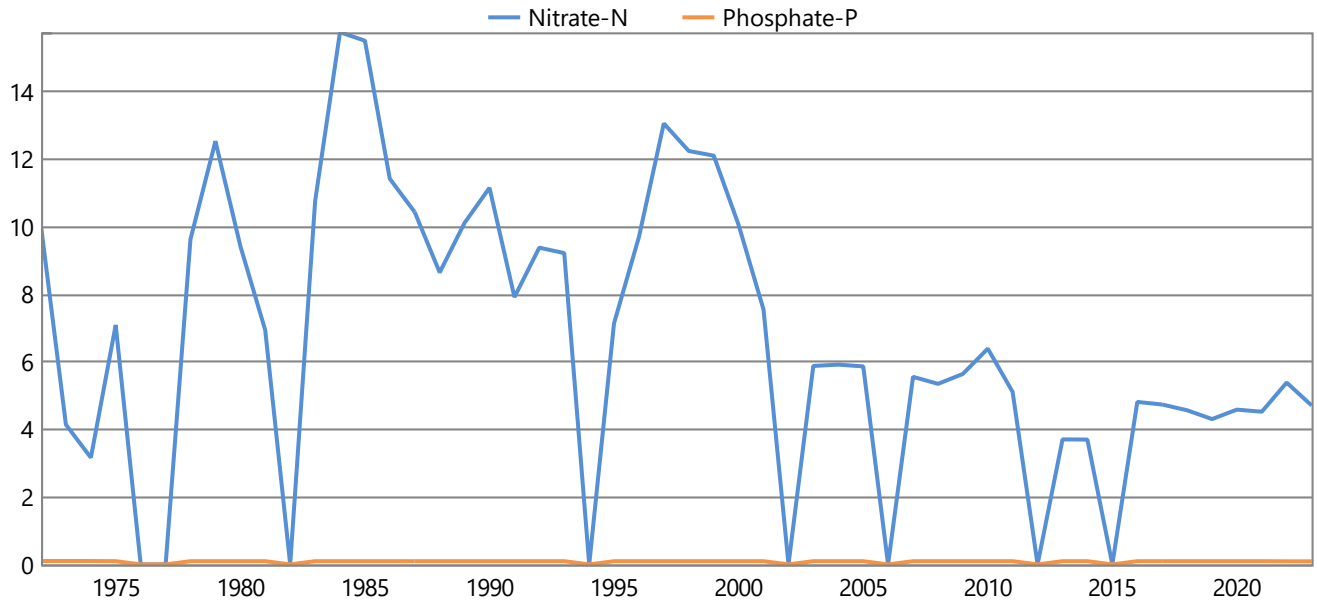
* Not determined

Diagnostics

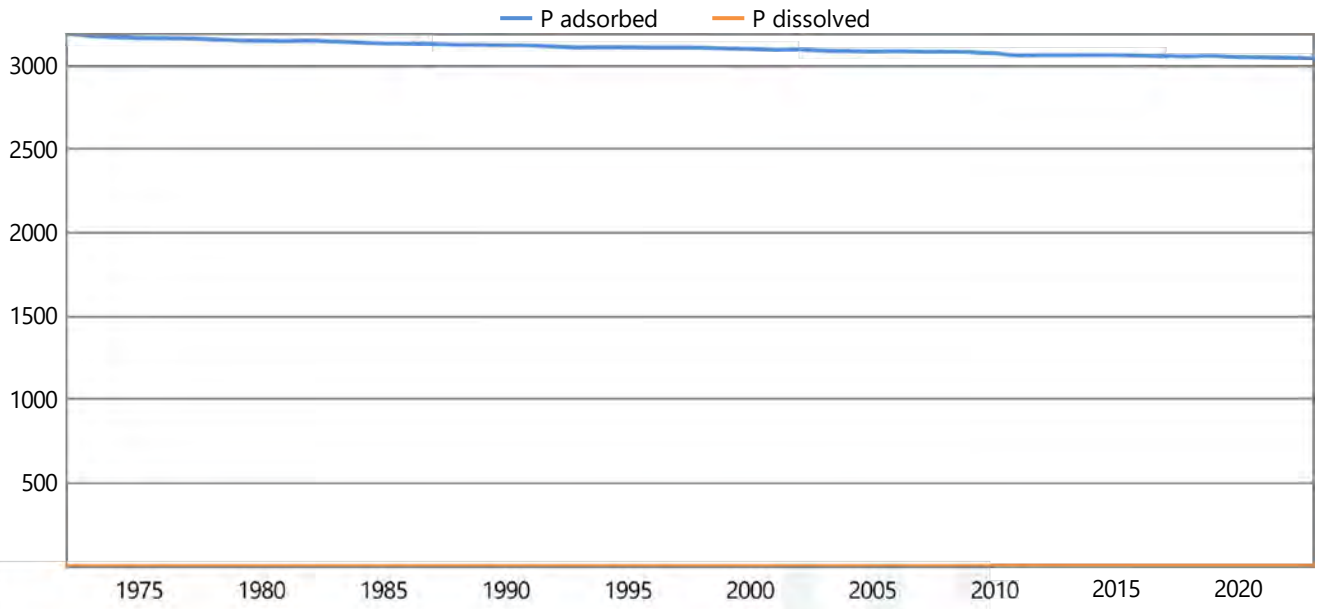
Paddock information

Paddock: All paddocks, 110 ha
Irrigation: Centre pivot with 26% ammonium loss during irrigation

Annual nutrient leachate concentration (mg/L)



Annual phosphate-P in soil (kg/ha)



Diagnostics

Paddock information

Paddock: All paddocks, 110 ha

Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 1 pasture

Average plant performance (minimum - maximum)

Metric	Value
Average annual shoot dry matter harvestable yield (kg/ha/year)	15363.90 (12109.73 - 19454.72)
Average annual shoot dry matter lost (kg/ha/year)	2.51 (0.00 - 18.38)
Average monthly plant (green) cover (%)	72.23 (49.55 - 96.14)
Average monthly crop factor (fraction)	0.58 (0.40 - 0.77)
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 97.00
Average monthly root depth (mm)	825.92 (600.00 - 1200.00)
Average number of normal harvests per year (no./year)	4.17 (3.00 - 5.00)
Average number of normal harvests for last five years only (no./year)	4.20
Average number of forced harvests per year (no./year)	0.00 (0.00 - 0.00)
Average number of forced harvests for last five years only (no./year)	0.00
Average annual nitrogen deficiency index (0 = no stress, 1 = full stress) (coefficient)	0.12 (0.01 - 0.27)
Average January temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.14 (0.03 - 0.29)
Average July temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.34 (0.18 - 0.69)
Average monthly water stress index (0 = no stress, 1 = full stress) (coefficient)	0.24 (0.00 - 0.69)
Average monthly waterlogging index (0 = no stress, 1 = full stress) (coefficient)	0.00 (0.00 - 0.00)
No. days without crop per year. Excludes bare fallow days (days)	0.00

Soil salinity - plant salinity tolerance: Moderately tolerant | Moderately tolerant

Assumes 1.0 dS/m Electrical Conductivity = 640 mg/L Total Dissolved Salts

All values based on 10 -year running averages.

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	0.73
Salt added by rainfall (kg/ha/year)	74.83
Average annual salt added & leached at steady state (kg/ha/year)	3083.56
Average leaching fraction based on 10 -year running averages (fraction)	0.33
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	1.04
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	5.76
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Diagnostics

Run information

Messages generated when the scenario was run
********** WASTESTREAM RESULTS **********
TABLE OF QUANTITY AND QUALITY OF EACH RAINFALL-INDEPENDENT WASTESTREAM (AFTER PRETREATMENT AND BEFORE ENTERING ANY SEDIMENTATION BASIN)
Source Volume_ML/yr N conc_mg/L P conc_mg/L TDS conc_mg/L N load_kg/yr P load_kg/yr TDS load_kg/yr
Irrigated wastewater 313.5 140.4 10.0 1056.0 44015.4 3132.9 331056.0
********** END WASTESTREAM RESULTS **********
No. Days without Irrigation Applied per Year: 106.31 (with water supply insufficient for pump [95.73], rain exceeding specified rainfall threshold [9.37] and pond water volume below minimum volume for irrigation [1.21])
UNCONDITIONAL FINISH

General Information

SCENARIO REPORT: Full run

General information

Enterprise: Luv a Duck
Client: Luv a Duck
MEDLI user: Dr Stephan Tait

Description:

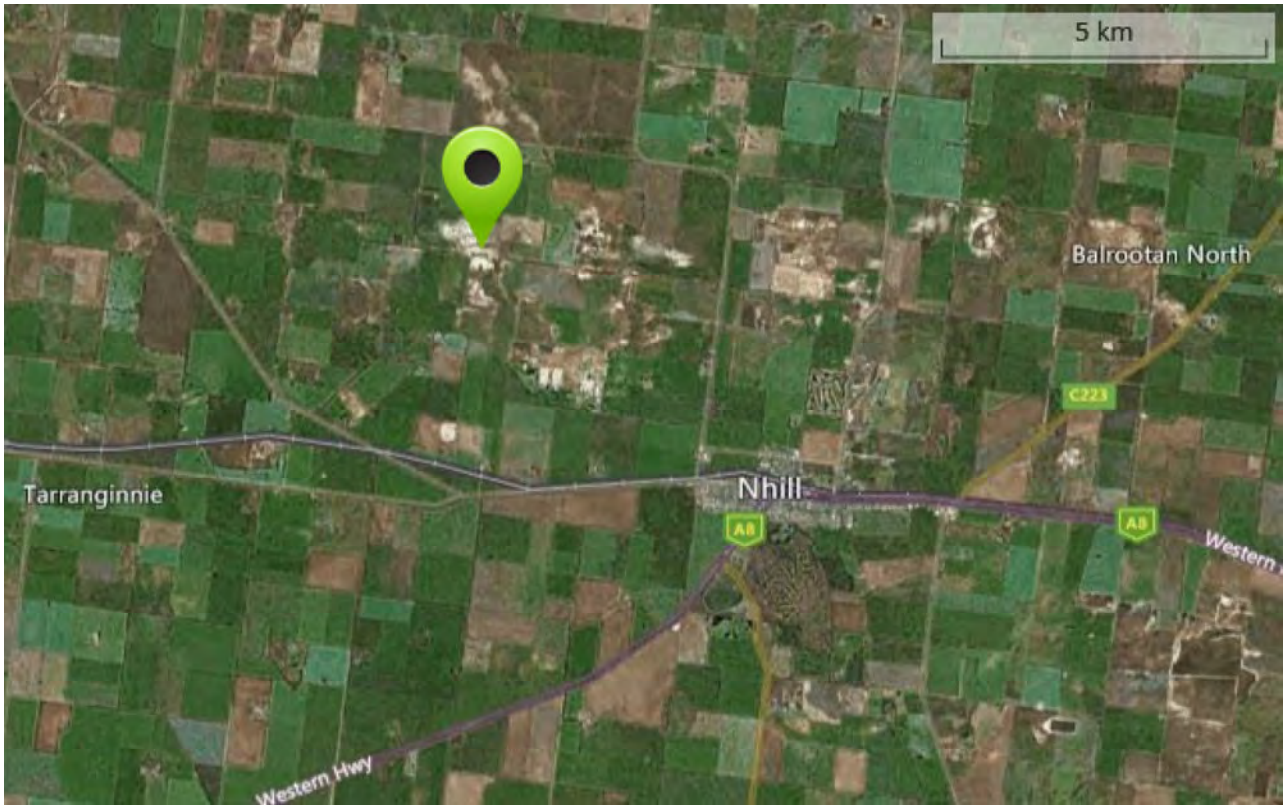
Scenario 2a - 50 ha irrigation, after treatment

Scenario details:

The high strength effluent is irrigated over a large land area to minimise nutrient leaching.

Map of location:

Note: If the map above appears as a dark box, check that the network is accessible and that the coordinates are not for a location in the ocean.



Description

Climate information

Climate Data Location: Nhill, -36.3°, 141.6°

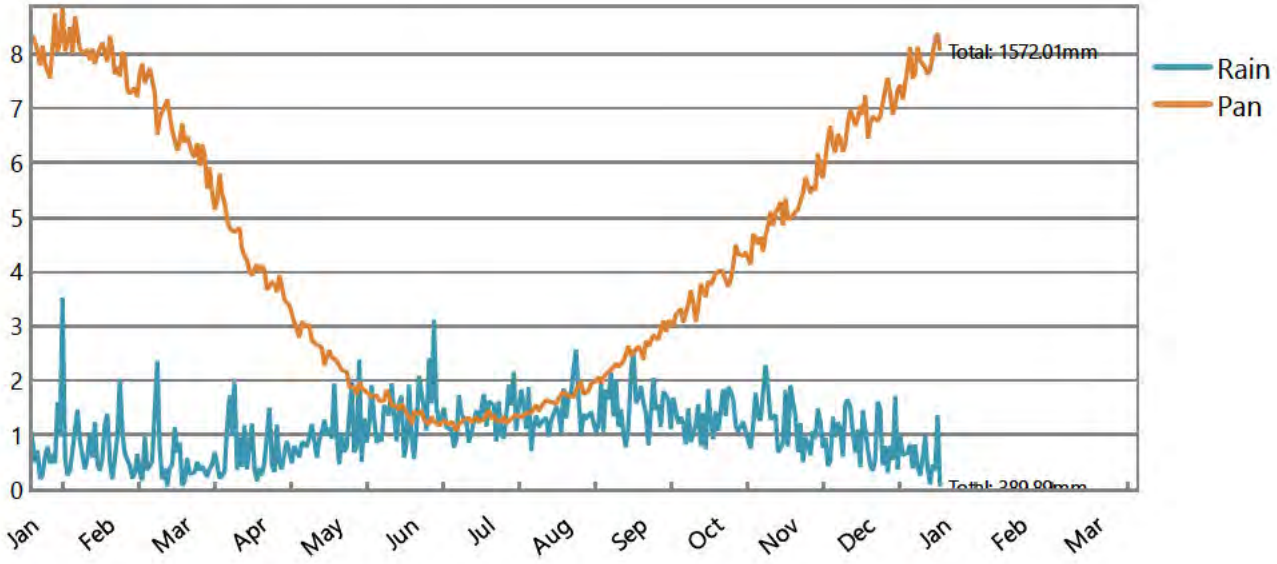
Run Period: 01/01/1972 to 31/12/2023 (52 years)

Climate statistics

	5th Percentile		50th Percentile		95th Percentile	
Rainfall (mm/year)	(Year 1994)	230.6	(Year 1999)	400.0	(Year 2022)	527.9
Pan evaporation (mm/year)	(Year 2010)	1379.3	(Year 2012)	1587.7	(Year 1990)	1711.4

Climate data

Daily average across run period:



Description

Wastestream information

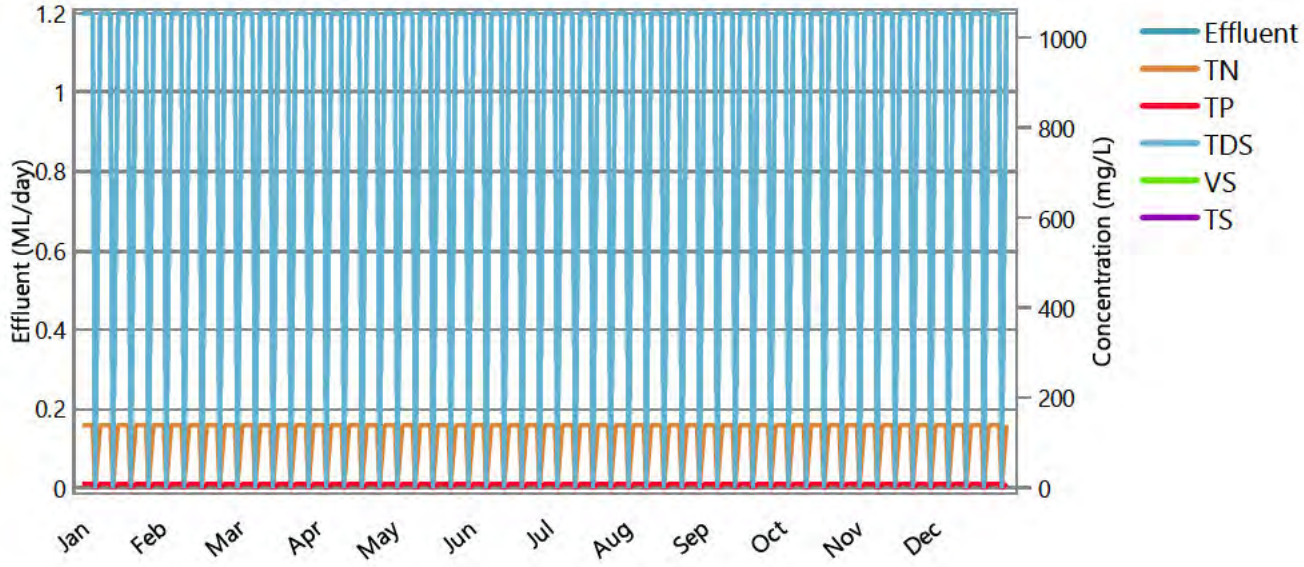
Wastestream Name: Waste estimation system - Irrigated wastewater

Wastestream production description

Daily Irrigated wastewater data supplied for a representative year. This wastestream is not separately pretreated.

Wastestream

Average Daily Quantity and Flow-Weighted Average Quality:



Wastestream

Effluent Quantity: 313.50 ML/year or 0.86 ML/day (Min-Max 0.00 - 1.20)

Flow-Weighted Average (Min - Max) Daily Effluent Quality Entering the Pond System:

	Concentration (mg/L)	Load (kg/year)
Total nitrogen	140.40 (140.40 - 140.40)	44015.40 (43973.28 - 44141.76)
Total phosphorus	9.99 (9.99 - 9.99)	3132.91 (3129.91 - 3141.90)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	331056.00 (330739.20 - 332006.40)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

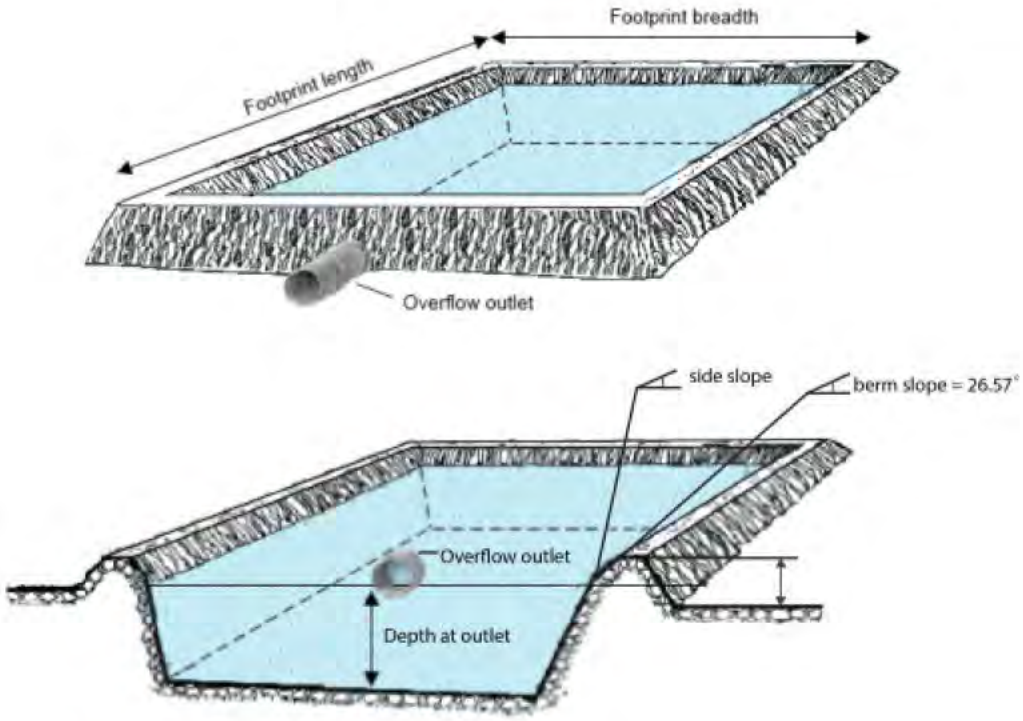
Description

Pond system information

Pond System Configuration: 1 sludge-free pond

Pond system details

	Pond 1
Maximum pond volume (ML)	6.80
Minimum allowable pond volume (ML)	1.83
Pond depth at overflow outlet (m)	3.00
Maximum water surface area (m2)	2608.52
Pond footprint length (m)	90.46
Pond footprint width (m)	31.49
Pond catchment area (m2)	2848.41
Average active volume (ML)	2.48



Irrigation pump limits

Minimum pump rate limit (ML/day)	1.20
Maximum pump rate limit (ML/day)	3.12

Shandying water

Annual allocation of fresh water available for shandying (ML/year)	0.00
Maximum rate of application of fresh water (ML/day)	0.00
Nitrogen concentration (mg/L)	0.00
Salinity (dS/m)	0.00
Minimum shandy water is used	No

Description

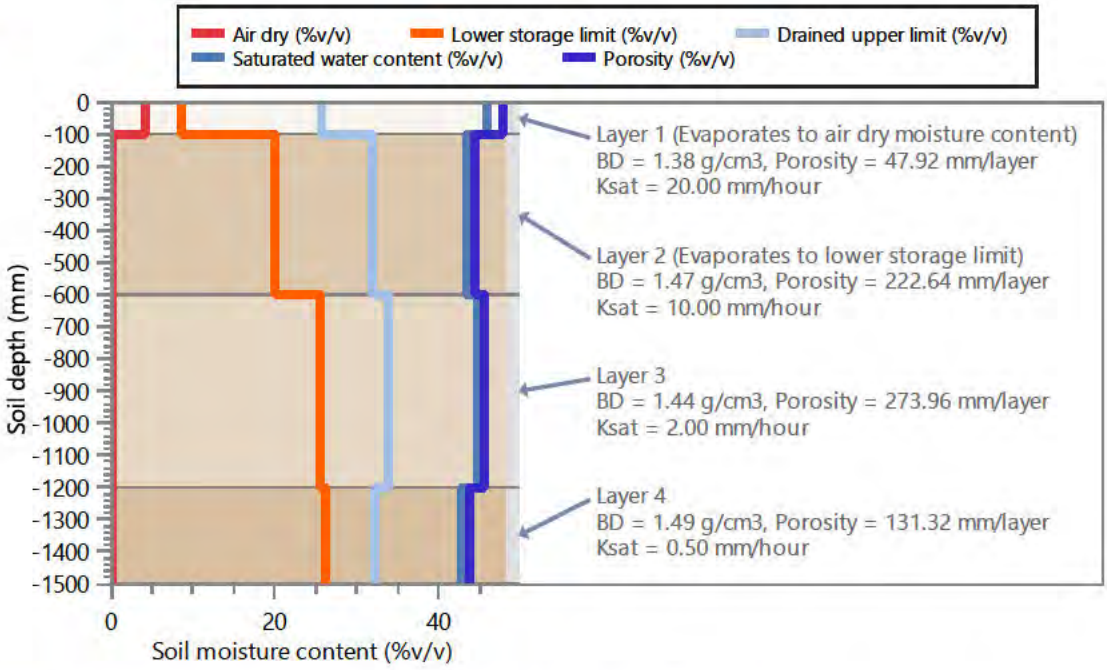
Paddock information

Paddock: All paddocks, 50 ha

Soil type: Red sodosol 1, 1500.00 mm defined profile depth

Profile porosity (mm)	675.85
Profile saturation water content (mm)	660.70
Profile drained upper limit (or field capacity) (mm)	486.00
Profile lower storage limit (or permanent wilting point) (mm)	341.30
Profile available water capacity (mm)	144.70
Profile limiting saturated hydraulic conductivity (mm/hour)	0.50
Surface saturated hydraulic conductivity (mm/hour)	20.00
Runoff curve number II (coefficient)	75.00
Soil evaporation U (mm)	10.00
Soil evaporation Cona (mm/sqrt day)	4.00

Profile



Planting regime: Rotated Kikuyu 1 pasture site | Ryegrass 2 pasture

Maximum crop factor at 100% cover (mm/mm) (Maximum crop coefficient 0.8 | 0.9 x Pan coefficient 1 | 1)	0.80 | 0.90
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 90.00
Potential rooting depth in defined soil profile (mm)	1200.00 | 1200.00
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60

Irrigation rules: Centre pivot

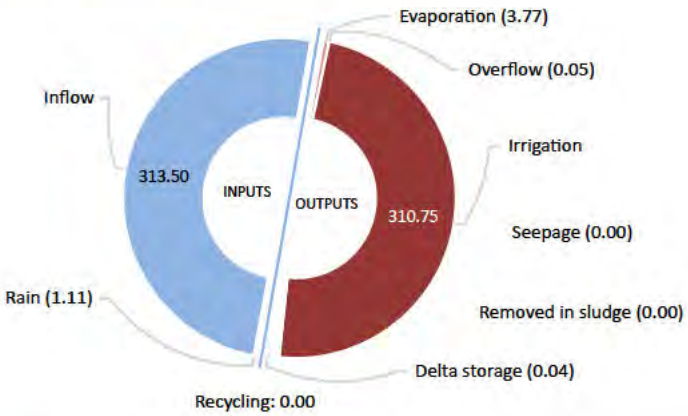
Rule 1. Irrigation triggered every 1 days and rainfall is less than or equal to 10.00 mm
Rule 2. Irrigate a fixed amount of 2.40 mm each day
Rule 3. Irrigation window from 1/1 to 31/12 including the days specified
Rule 4. A minimum of 0 days must be skipped between irrigation events

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond (wet weather storage pond: 6.8 ML)

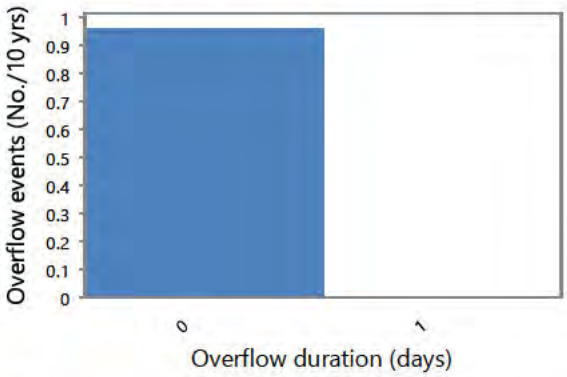
Pond system water balance (ML/year)

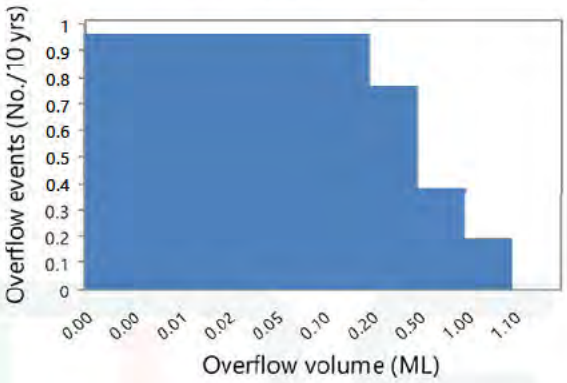


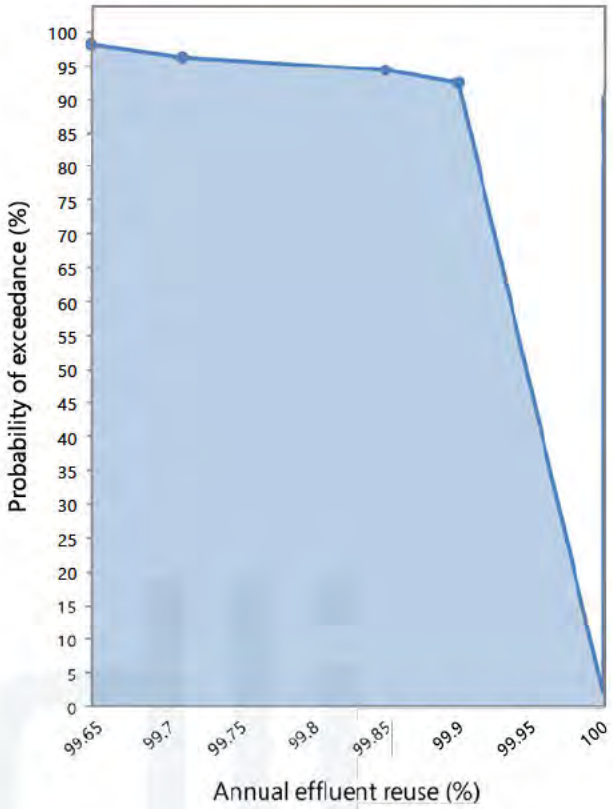
Name	Value
Rain	1.11
Inflow	313.50
Recycling	0.00
Evaporation	3.77
Overflow	0.05
Irrigation	310.75
Seepage	0.00
Removed in sludge	0.00
Delta storage	0.04

Overflow and reuse diagnostics

Metric	Value
Total volume of overflow (ML/10 years)	0.54
Total number of overflow events (events/10 years)	0.96
Total number of pond overflow days (days/10 years)	0.96
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (Proportion of inflow + net gain in rain that is irrigated) (%)	99.98





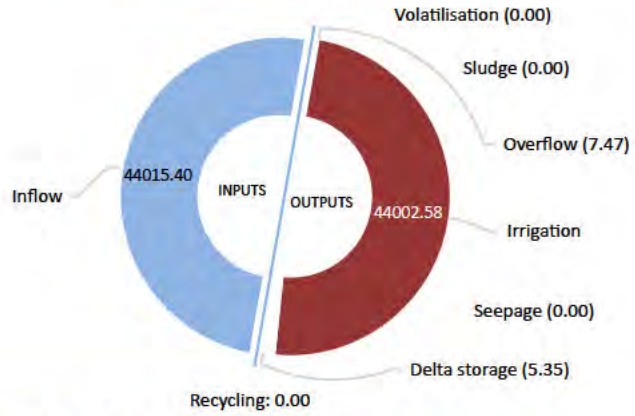


Performance

Pond system information

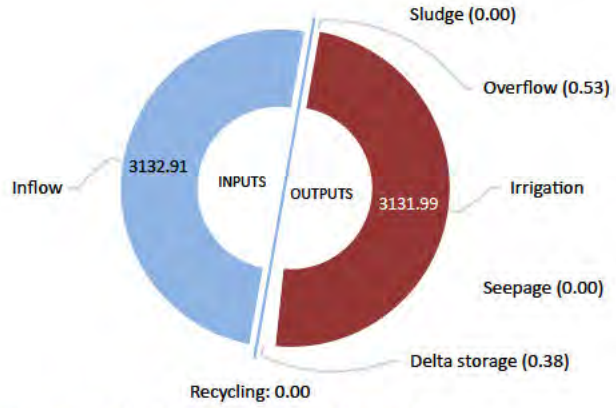
Pond System Configuration: 1 sludge-free pond

Pond system nitrogen balance (kg/year)



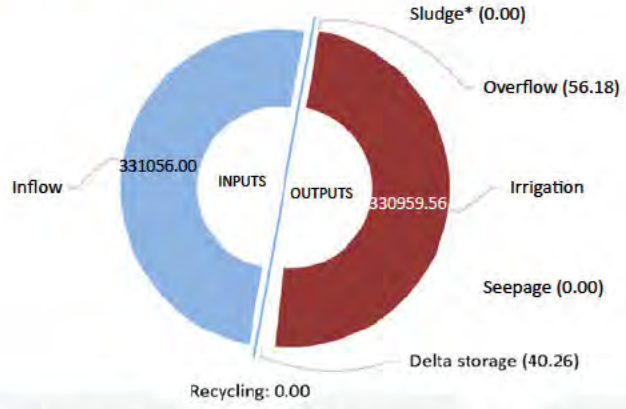
Name	Value
Inflow	44015.40
Recycling	0.00
Volatilisation	0.00
Sludge	0.00
Overflow	7.47
Irrigation	44002.58
Seepage	0.00
Delta storage	5.35

Pond system phosphorus balance (kg/year)



Name	Value
Inflow	3132.91
Recycling	0.00
Sludge	0.00
Overflow	0.53
Irrigation	3131.99
Seepage	0.00
Delta storage	0.38

Pond system salt balance (kg/year)



Name	Value
Inflow	331056.00
Recycling	0.00
Sludge*	0.00
Overflow	56.18
Irrigation	330959.56
Seepage	0.00
Delta storage	40.26

* Salt removal in sludge is not calculated from the pond salt balance. However if salt could be assumed to be present in the sludge at the same concentration as in the pond supernatant (up to a maximum of salt added in inflow) - then salt accumulation in the sludge could be 0.00 kg/year

Pond system sludge accumulation: 0.00 kg dwt/year

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond

Pond nutrient concentrations and salinity

Average across simulation period	Pond 1
Average nitrogen concentration of pond liquid (mg/L)	141.65
Average phosphorus concentration of pond liquid (mg/L)	10.08
Average salinity of pond liquid (dS/m)	1.66

Value on final day of simulation period	Pond 1
Final nitrogen concentration of pond liquid (mg/L)	141.82
Final phosphorus concentration of pond liquid (mg/L)	10.09
Final salinity of pond liquid (dS/m)	1.67

Performance

Water use (assumes 100% irrigation efficiency)

Metric	Value
Pond water irrigated (ML/year)	310.75
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Total water irrigated (ML/year)	310.75
Proportion of irrigation events requiring shandying (% of events)	0.00
Proportion of years shandying water allocation of 0 ML/year is exceeded (% of years)	0.00
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)

Irrigation quality

Metric	Value
Average nitrogen concentration of irrigation water - before ammonia loss during irrigation (mg/L)	141.60
Average nitrogen concentration of irrigation water - after ammonia loss during irrigation (mg/L)	134.24
Average phosphorus concentration of irrigation water (mg/L)	10.08
Average salinity of irrigation water (dS/m)	1.66

Irrigation diagnostics

Metric	Value
No. periods/year without any irrigable effluent in the wet weather storage pond (periods/year)	0.69
Average length of such periods (days)	1.44

Irrigation triggering and application

No. Days without Irrigation Applied per Year: 106.29 (with water supply insufficient for pump [95.92], rain exceeding specified rainfall threshold [9.37] and pond water volume below minimum volume for irrigation [1.00])
No. Days without Irrigation Applied per Year: 106.29 (with no supply - no application [96.92] and not triggered [9.37])
No. Days with Irrigation Applied per Year: 258.96 (with full application)
No. Days with Irrigation Triggered per Year: 355.88

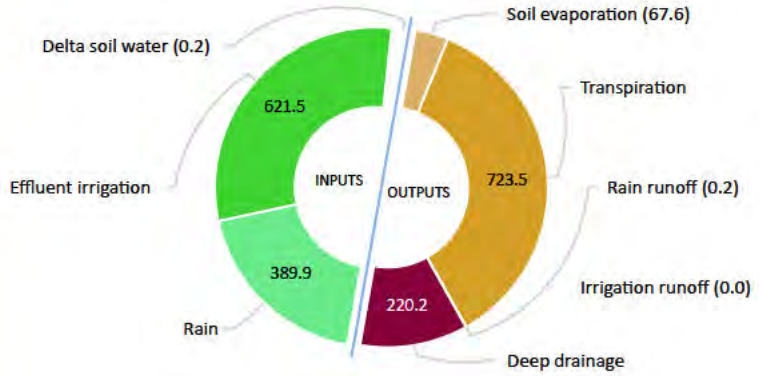
Performance

Paddock information

Paddock: All paddocks, 50 ha

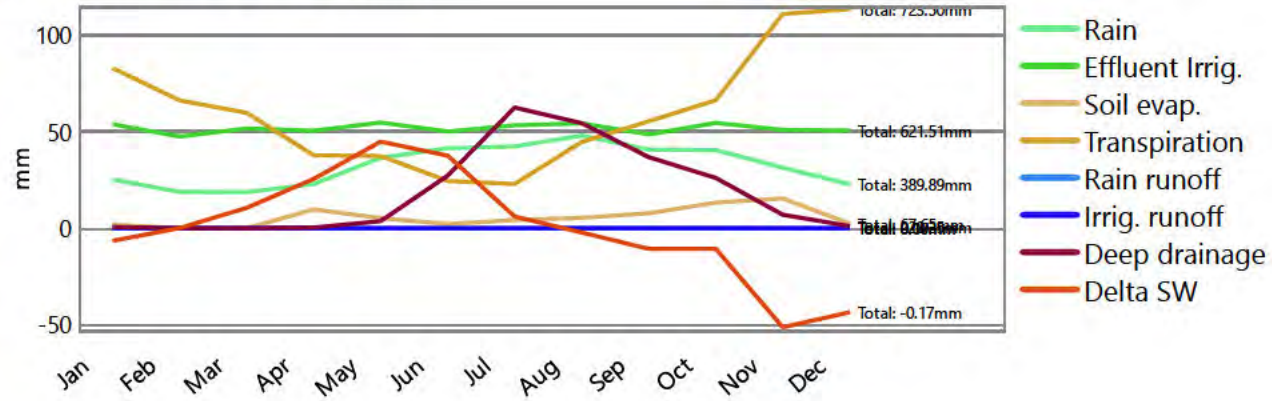
Soil Type: Red sodosol 1, 126.40 mm PAWC at maximum root depth

Soil water balance (mm/year)

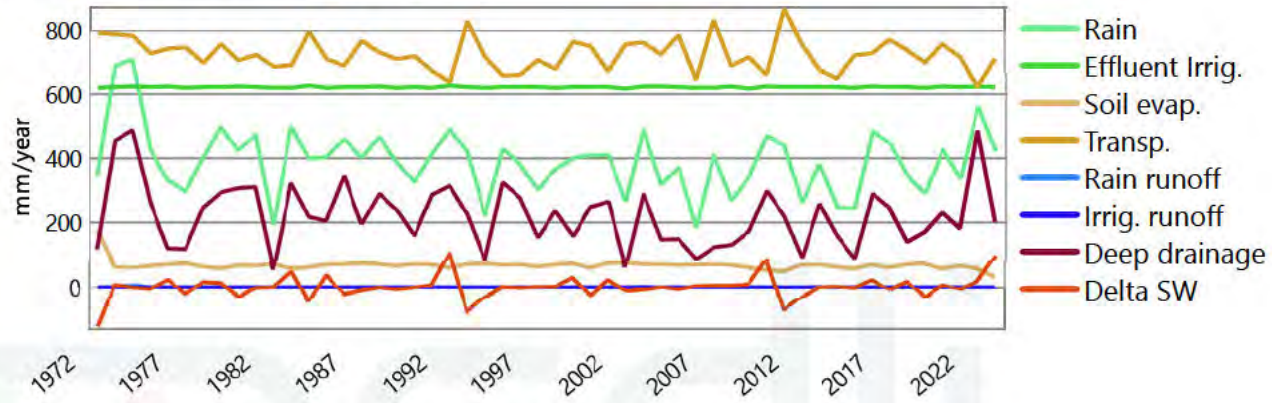


Name	Value
Rain	389.9
Effluent irrigation	621.5
Soil evaporation	67.6
Transpiration	723.5
Rain runoff	0.2
Irrigation runoff	0.0
Deep drainage	220.2
Delta soil water	-0.2

Average monthly totals (mm)



Average annual totals (mm/year)

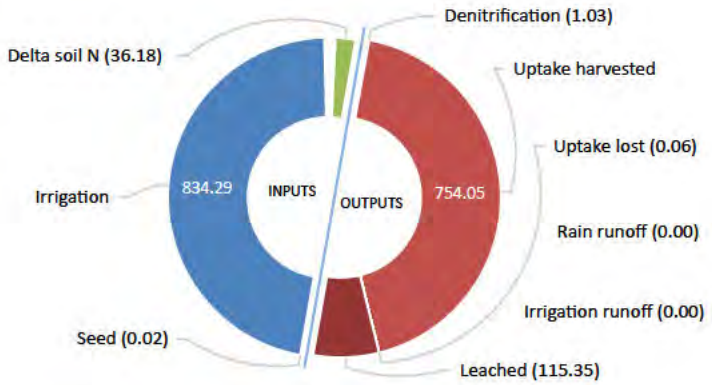


Performance

Paddock information

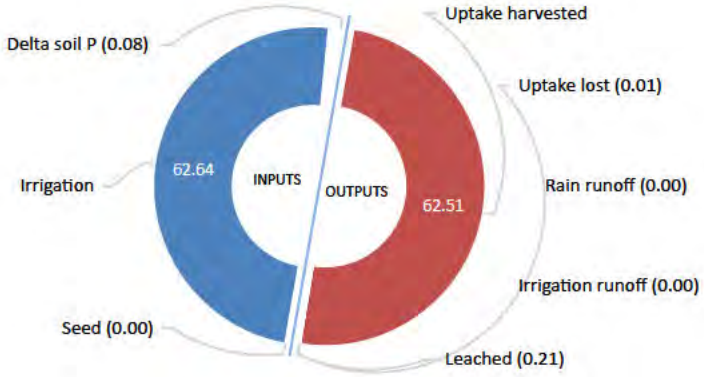
Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Irrigation Ammonia-N Volatilisation Losses (kg/ha/year): 45.76
Proportion of Total Nitrogen in Irrigated Effluent as Ammonium (%): 20.00

Soil nitrogen balance (kg/ha/year)



Name	Value
Seed	0.02
Irrigation	834.29
Denitrification	1.03
Uptake harvested	754.05
Uptake lost	0.06
Rain runoff	0.00
Irrigation runoff	0.00
Leached	115.35
Delta soil N	-36.18

Soil phosphorus balance (kg/ha/year)



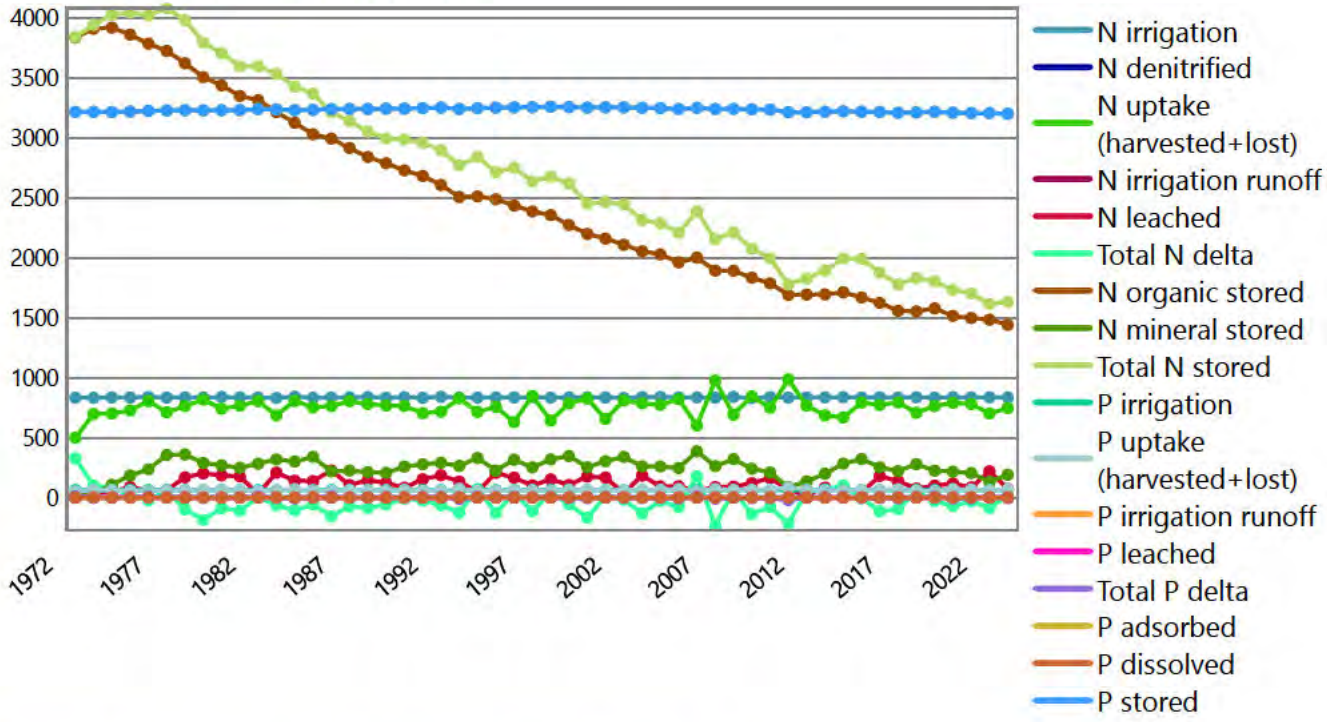
Name	Value
Seed	1.73E-03
Irrigation	62.64
Uptake harvested	62.51
Uptake lost	0.01
Rain runoff	0.00
Irrigation runoff	0.00
Leached	0.21
Delta soil P	-0.08

Performance

Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1

Annual nutrient totals (kg/ha)



Annual nutrient leaching concentration (mg/L)

Performance

Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture site & Ryegrass 2 pasture

Plant growth (minimum - maximum)

Season one plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	13897.58 (11412.77 - 20452.44)
Average annual shoot dry matter lost (kg/ha/year)	0.22 (0.00 - 4.37)
Average monthly plant (green) cover (%)	80.14 (58.69 - 91.31)
Average monthly root depth (mm)	1197.93 (1186.05 - 1200.00)

Season two plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	9514.76 (8326.79 - 11439.39)
Average annual shoot dry matter lost (kg/ha/year)	1.53 (0.00 - 21.25)
Average monthly plant (green) cover (%)	70.30 (56.04 - 82.56)
Average monthly root depth (mm)	1200.00 (1200.00 - 1200.00)

Plant nutrient uptake (minimum - maximum)

Season one plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	492.50 (263.05 - 717.84)
Average annual shoot nitrogen lost (kg/ha/year)	0.01 (0.00 - 0.15)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	34.24 (24.29 - 51.89)
Average annual shoot phosphorus lost (kg/ha/year)	0.00 (0.00 - 0.01)
Average annual shoot nitrogen concentration (fraction dwt)	0.04 (0.02 - 0.05)
Average annual shoot phosphorus concentration (fraction dwt)	0.003 (0.002 - 0.003)

Season two plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	261.55 (208.72 - 333.03)
Average annual shoot nitrogen lost (kg/ha/year)	0.05 (0.00 - 0.76)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	28.27 (24.98 - 32.78)
Average annual shoot phosphorus lost (kg/ha/year)	0.00 (0.00 - 0.06)
Average annual shoot nitrogen concentration (fraction dwt)	0.03 (0.02 - 0.04)
Average annual shoot phosphorus concentration (fraction dwt)	0.003 (0.002 - 0.003)

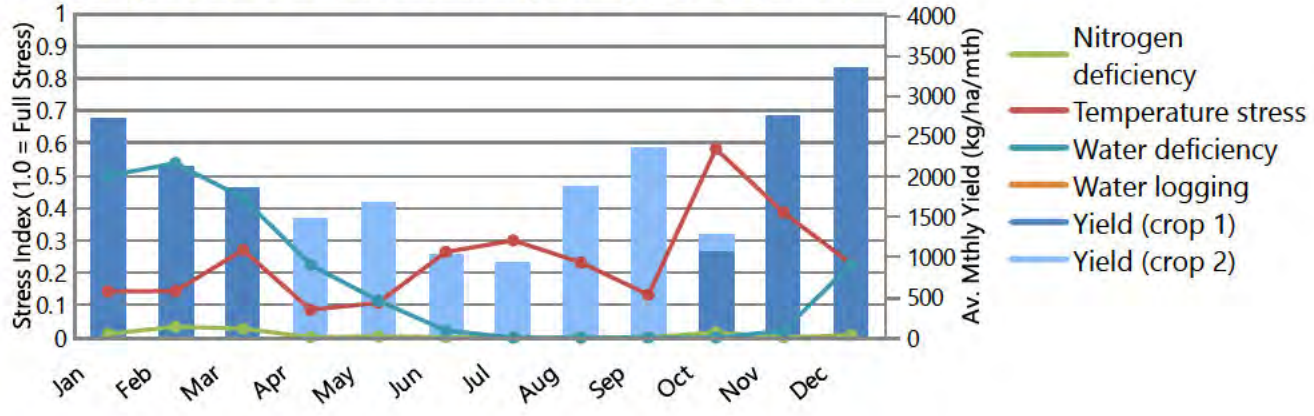
*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Performance

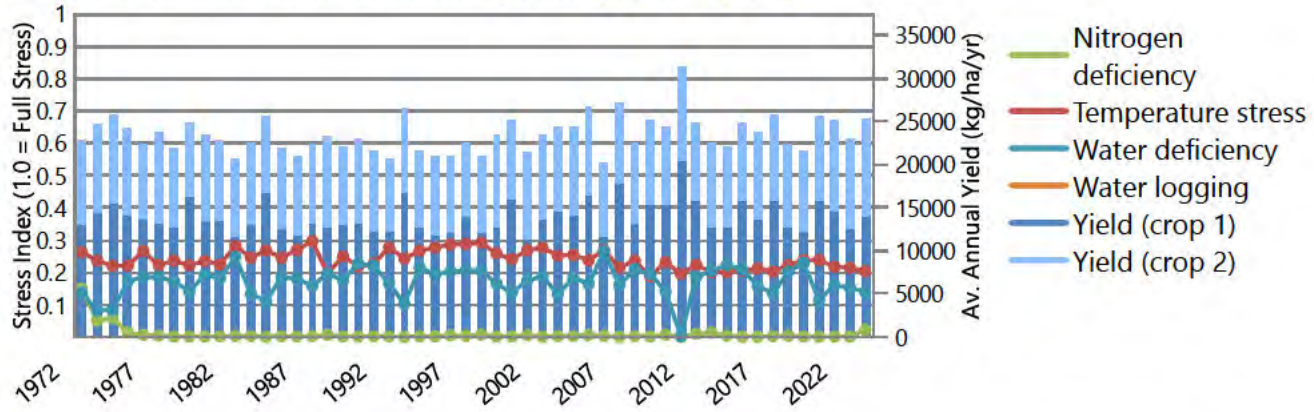
Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture site & Ryegrass 2 pasture

Av. monthly stresses & harvestable yield* (kg/ha/month)



Av. annual stresses & harvestable yield* (kg/ha/year)



*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Normal and forced harvest information

No. of Harvests per Year: 6.00 (normal).
No. Days without Crop per Year (no./year): 0.00

Performance

Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture site & Ryegrass 2 pasture

Plant salinity tolerance

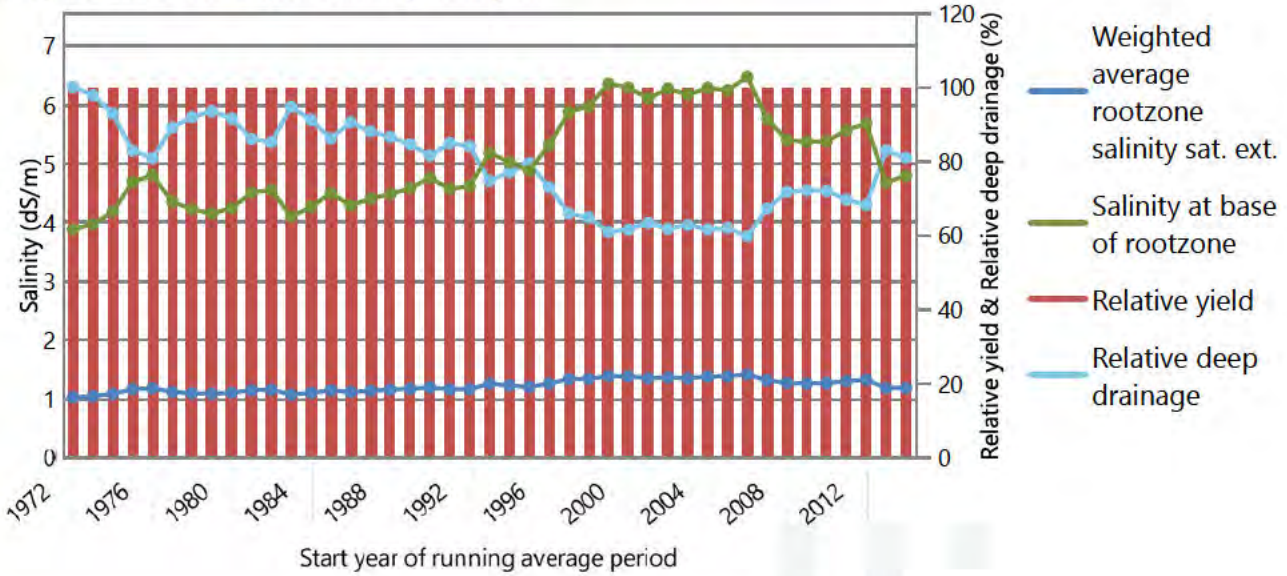
Metric	Value
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60
No. years assumed for leaching to reach steady-state (years)	10.00

Soil salinity

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	1.05
Salt added by rainfall (kg/ha/year)	74.83
Average annual salt added & leached at steady state (kg/ha/year)	6694.02
Average leaching fraction based on 10 -year running averages (fraction)	0.39
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	1.22
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	5.05
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Average annual rootzone salinity and relative yield

All values based on 10 -year running averages.

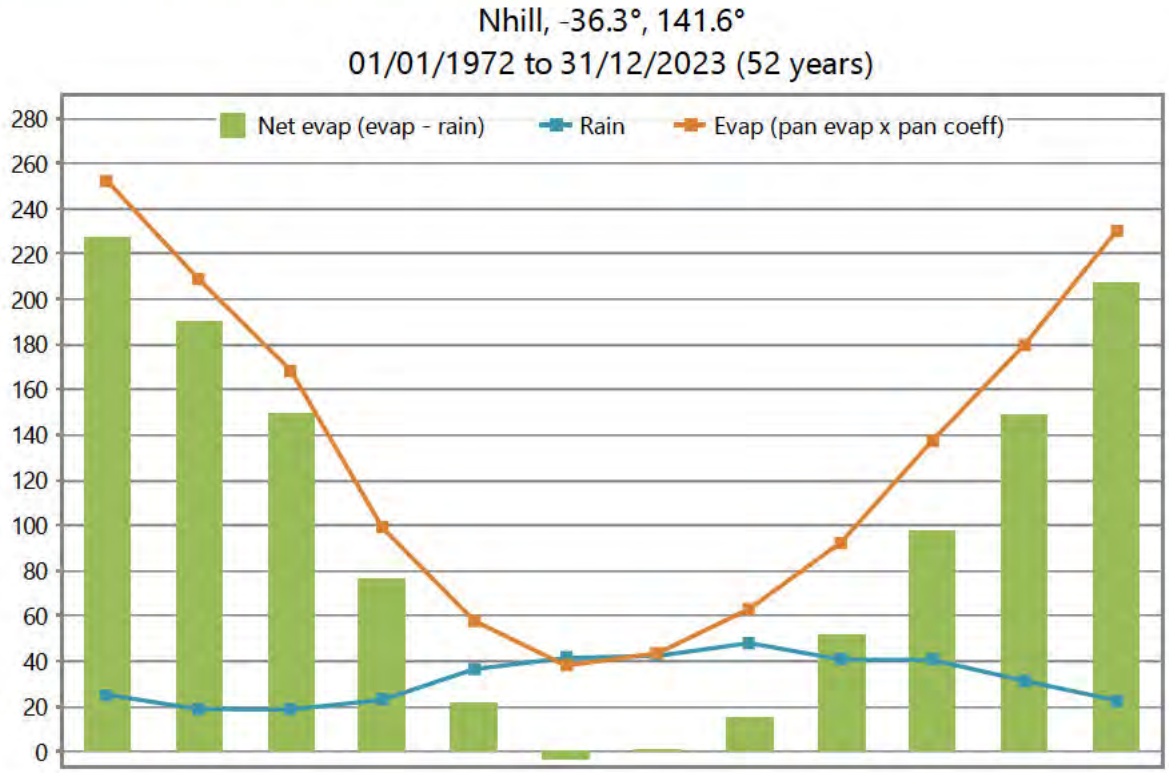


Diagnostics

Scenario information

Enterprise: Luv a Duck

Climate long-term monthly averages (mm)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Evap	252.3	208.9	168.6	99.1	58.0	38.1	43.6	63.1	92.6	137.7	179.8	230.1	1572.0
Net evap	227.1	190.0	149.9	76.2	21.4	-3.4	1.2	15.1	51.8	97.2	148.4	207.3	1182.1
Net evap/day	7.3	6.7	4.8	2.5	0.7	-0.1	0.0	0.5	1.7	3.1	4.9	6.7	3.2

Diagnostics

Pond system information

Pond System Configuration: 1 sludge-free pond

Effluent Type: Waste estimation system - 313.50 ML/year or 0.86 ML/day generated on average

Effluent entering pond system after any pretreatment and recycling

Average (Minimum-Maximum) influent quality calculated for 261.25 *non-zero flow days/year.*

Constituent	Concentration (mg/L)	Load (kg/year)
Total nitrogen	140.40 (140.40 - 140.40)	44015.40 (43973.28 - 44141.76)
Total phosphorus	9.99 (9.99 - 9.99)	3132.91 (3129.91 - 3141.90)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	331056.00 (330739.20 - 332006.40)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

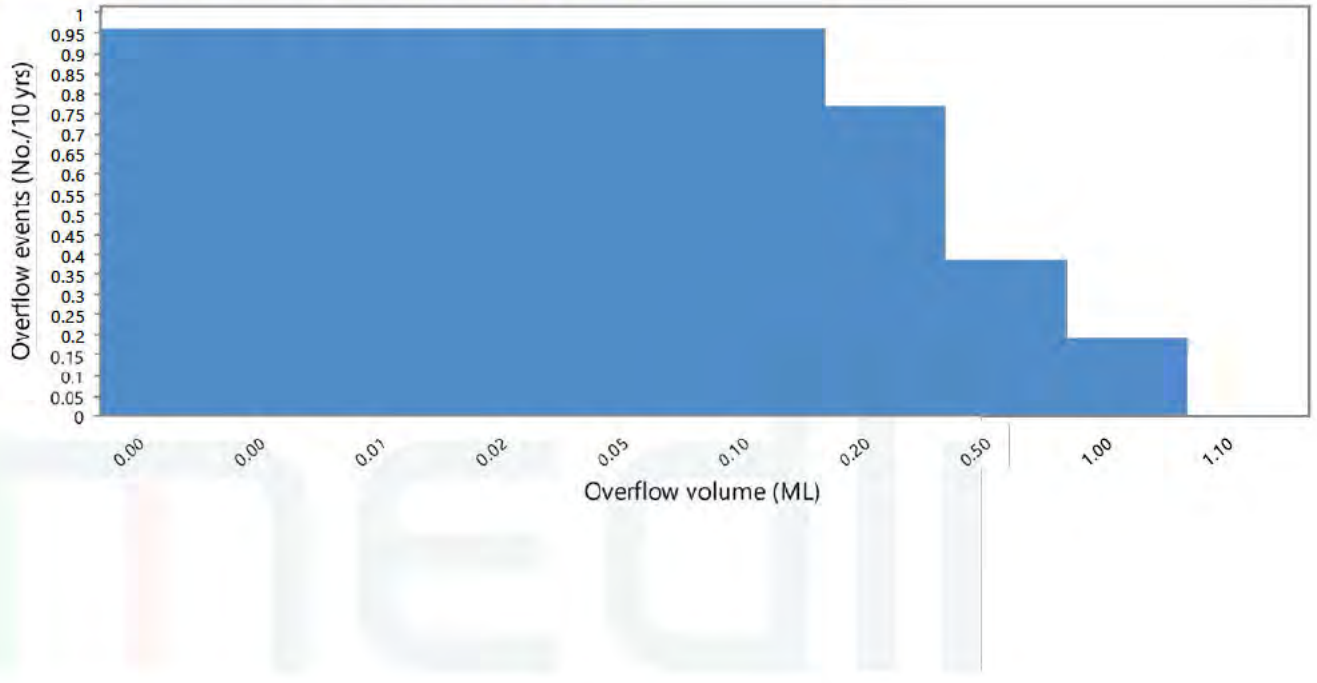
Ammonia-N loss from pond system water surface area: 0.00 kg/m2/year

Last pond (wet weather store): 6.80 ML

Metric	Value
Theoretical hydraulic retention time (days)	7.92
Volume of overflow (ML/year) Average (minimum-maximum)	0.05 (0.00 - 1.10)
Volume of overflow per day (m3/day) Average (minimum-maximum)	0.15 (0.00 - 1099.01)
No overflow days - Average per year (Total in run period)	0.10 (5)
No. overflow events per 10 years exceeding threshold of 0.003 ML* (events/10 years)	0.96
Average overflow event recurrence interval (years)	10.40
Average duration of overflow (days)	1.00
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (proportion of inflow + net rain gain that is irrigated) (%)	99.98
Average salinity (dS/m)	1.66
Salinity on final day of simulation (dS/m)	1.67

* The threshold is the volume equivalent of the top 1 mm depth of water of a full pond

Volume distribution of the overflow events



Diagnostics

Scenario information

Area irrigated: 50 ha total area

Loading to whole irrigation area: (assuming 100% irrigation efficiency)

	Quantity/year	Quantity/ha/year
Total irrigation applied (ML)	310.75	6.22
Total nitrogen applied (kg)	41714.44	834.29
Total phosphorus applied (kg)	3131.99	62.64
Total salts applied (kg)	330959.56	6619.19

Shandying

Metric	Value
Annual allocation of fresh water for shandying (ML/year)	0.00
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)
Minimum shandy water is used	No

Irrigation issues

Metric	Value
Number of days without irrigation (days/year)	106.29
Number of periods without irrigatable water (periods/year)	0.69
Average length of such periods (days)	1.44

Diagnostics

Paddock information

Paddock: - All paddocks, 50 ha

Irrigation: Centre pivot with 26% ammonium loss during irrigation

Irrigation Rules
Irrigation triggered every 1 days and rainfall is less than or equal to 10.00 mm
Irrigate a fixed amount of 2.40 mm each day Irrigation window from 1/1 to 31/12 including the days specified
A minimum of 0 days must be skipped between irrigation events

Soil water balance (mm): Red sodosol 1, 126.40 mm PAWC at maximum root depth

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Efflt. irrg.	53.9	47.6	51.7	50.6	54.8	50.2	53.4	54.4	48.6	54.6	51.0	50.7	621.5
Soil evap	1.8	0.1	0.0	9.8	5.2	2.2	4.3	5.4	7.7	13.3	15.5	2.3	67.6
Transpn.	83.1	66.3	59.9	37.8	37.5	24.5	22.9	44.8	55.5	66.5	111.2	113.6	723.5
Rain runoff	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Irr. runoff	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage	0.7	0.0	0.0	0.4	3.7	27.3	62.6	54.4	36.9	26.1	7.0	1.1	220.2
Delta SW	-6.6	0.1	10.6	25.6	44.9	37.6	6.1	-2.2	-10.7	-10.7	-51.3	-43.6	-0.2

Soil nitrogen balance: (Concentrations are flow-weighted)

Metric	Value
Average annual nitrogen added in seed (kg/ha/year)	0.02
Average annual nitrogen added from irrigation (kg/ha/year)	834.29
Av. annual soil N removed by uptake (harvest + lost) (kg/ha/year)	754.11 (754.05, 0.06)
Av. annual soil nitrogen removed by denitrification (kg/ha/year)	1.03
Average annual soil nitrogen leached (kg/ha/year)	115.35
Average annual nitrate-N loading to groundwater (kg/ha/year)	115.35
Soil organic-N kg/ha (Initial - Final)	3456.00 - 1439.17
Soil inorganic-N kg/ha (Initial - Final)	54.60 - 190.24
Average nitrate-N concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	52.37 (71.53)
Excluding first year of data (mg/L)	52.84 (71.53)

Soil phosphorus balance: (Concentrations are flow-weighted)

Metric	Value
Average annual phosphorus added in seed (kg/ha/year)	1.73E-03
Average annual phosphorus added from irrigation (kg/ha/year)	62.64
Av. annual soil P removed by uptake (harvest + lost) (kg/ha/yr)	62.51 (62.51, 0.01)
Average annual soil phosphorus leached (kg/ha/year)	0.21
Dissolved phosphorus (kg/ha) (Initial - Final)	0.49 - 0.18
Adsorbed phosphorus (kg/ha) (Initial - Final)	3201.01 - 3197.14
Average phosphate-P concentration in rootzone (mg/L)	0.09
Average phosphate-P concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	0.09 (0.10)
Last year only (mg/L)	0.09 (N.D.*)
Design soil profile storage life based on average infiltrated water phosphorus concn. of 6.19 mg/L (years)	999.90

* Not determined

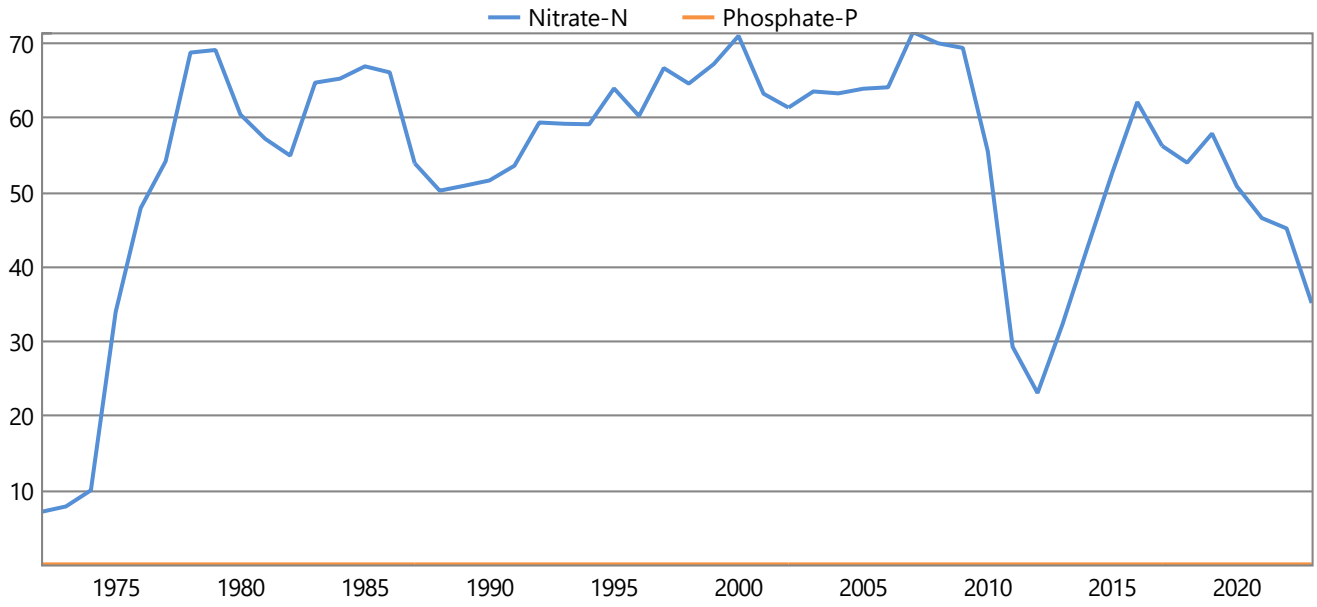
Diagnostics

Paddock information

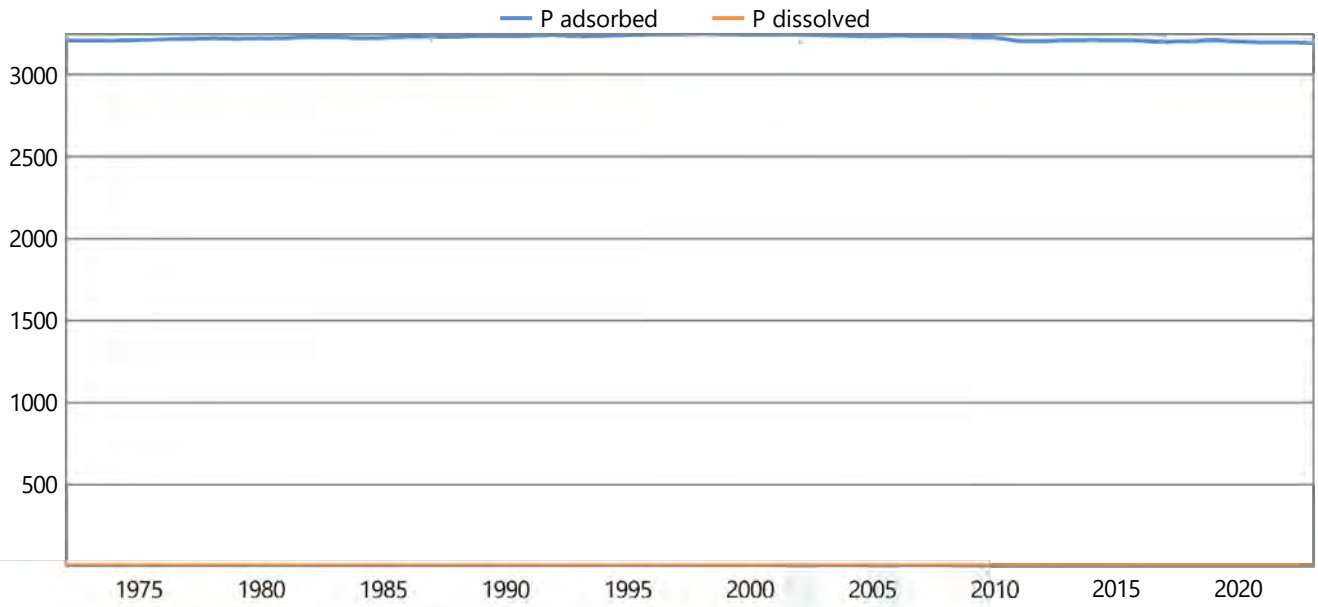
Paddock: All paddocks, 50 ha

Irrigation: Centre pivot with 26% ammonium loss during irrigation

Annual nutrient leachate concentration (mg/L)



Annual phosphate-P in soil (kg/ha)



Diagnostics

Paddock information

Paddock: All paddocks, 50 ha

Planting Regime: Rotated Kikuyu 1 pasture site & Ryegrass 2 pasture

Average plant performance (minimum - maximum)

Metric	Value
Average annual shoot dry matter harvestable yield (kg/ha/year)	23412.34 (20093.93 - 31190.03)
Average annual shoot dry matter lost (kg/ha/year)	1.75 (0.00 - 21.25)
Average monthly plant (green) cover (%)	74.76 (56.24 - 91.31)
Average monthly crop factor (fraction)	0.63 (0.48 - 0.74)
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 90.00
Average monthly root depth (mm)	1198.79 (1186.05 - 1200.00)
Average number of normal harvests per year (no./year)	6.00 (5.00 - 7.00)
Average number of normal harvests for last five years only (no./year)	6.00
Average number of forced harvests per year (no./year)	0.00 (0.00 - 0.00)
Average number of forced harvests for last five years only (no./year)	0.00
Average annual nitrogen deficiency index (0 = no stress, 1 = full stress) (coefficient)	0.01 (0.00 - 0.15)
Average January temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.14 (0.03 - 0.29)
Average July temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.30 (0.15 - 0.66)
Average monthly water stress index (0 = no stress, 1 = full stress) (coefficient)	0.17 (0.00 - 0.54)
Average monthly waterlogging index (0 = no stress, 1 = full stress) (coefficient)	0.00 (0.00 - 0.00)
No. days without crop per year. Excludes bare fallow days (days)	0.00

Soil salinity - plant salinity tolerance: Moderately tolerant | Moderately tolerant

Assumes 1.0 dS/m Electrical Conductivity = 640 mg/L Total Dissolved Salts

All values based on 10 -year running averages.

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	1.05
Salt added by rainfall (kg/ha/year)	74.83
Average annual salt added & leached at steady state (kg/ha/year)	6694.02
Average leaching fraction based on 10 -year running averages (fraction)	0.39
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	1.22
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	5.05
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Diagnostics

Run information

Messages generated when the scenario was run
********** WASTESTREAM RESULTS **********
TABLE OF QUANTITY AND QUALITY OF EACH RAINFALL-INDEPENDENT WASTESTREAM (AFTER PRETREATMENT AND BEFORE ENTERING ANY SEDIMENTATION BASIN)
Source Volume_ML/yr N conc_mg/L P conc_mg/L TDS conc_mg/L N load_kg/yr P load_kg/yr TDS load_kg/yr
Irrigated wastewater 313.5 140.4 10.0 1056.0 44015.4 3132.9 331056.0
********** END WASTESTREAM RESULTS **********
No. Days without Irrigation Applied per Year: 106.29 (with water supply insufficient for pump [95.92], rain exceeding specified rainfall threshold [9.37] and pond water volume below minimum volume for irrigation [1.00])
UNCONDITIONAL FINISH

General Information

SCENARIO REPORT: Full run

General information

Enterprise: Luv a Duck
Client: Luv a Duck
MEDLI user: Dr Stephan Tait

Description:

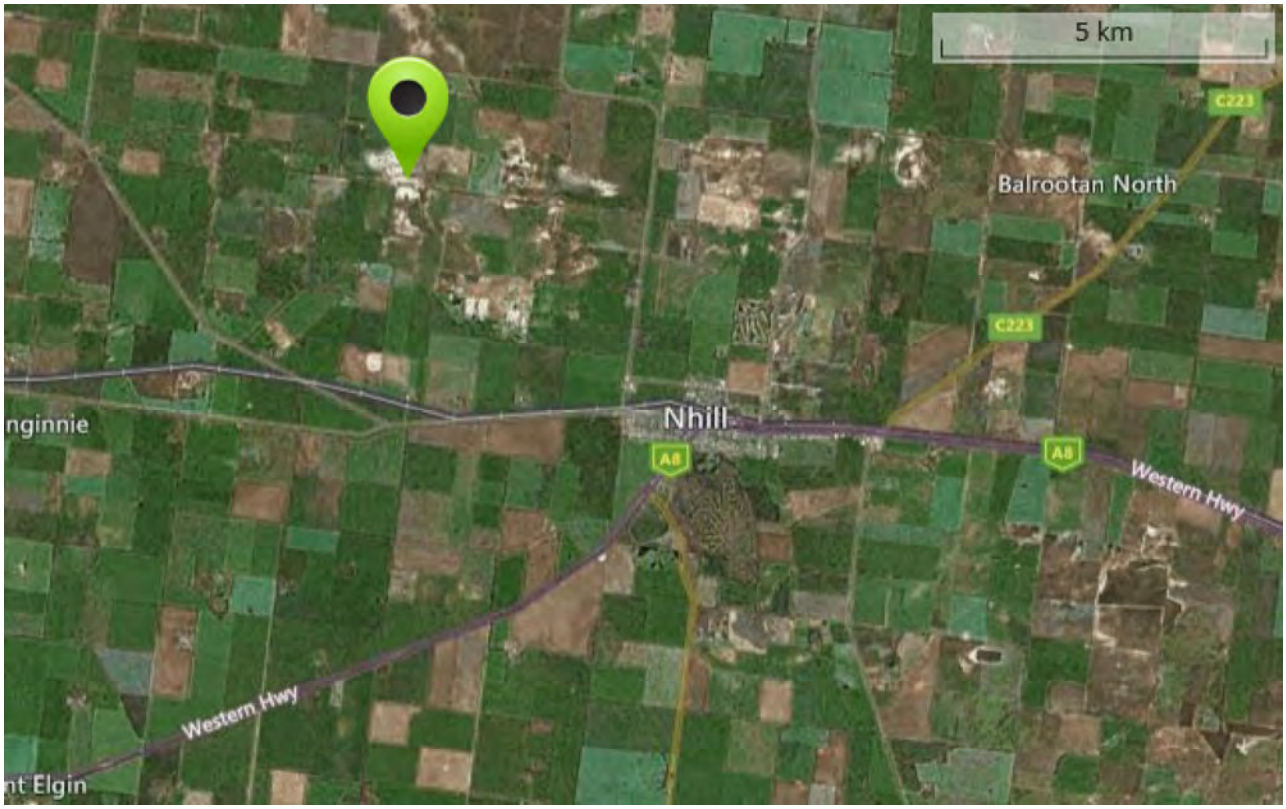
Scenario 2b - 50 ha irrigation, after treatment, with storage

Scenario details:

The high strength effluent is irrigated over a large land area to minimise nutrient leaching.

Map of location:

Note: If the map above appears as a dark box, check that the network is accessible and that the coordinates are not for a location in the ocean.



Description

Climate information

Climate Data Location: Nhill, -36.3°, 141.6°

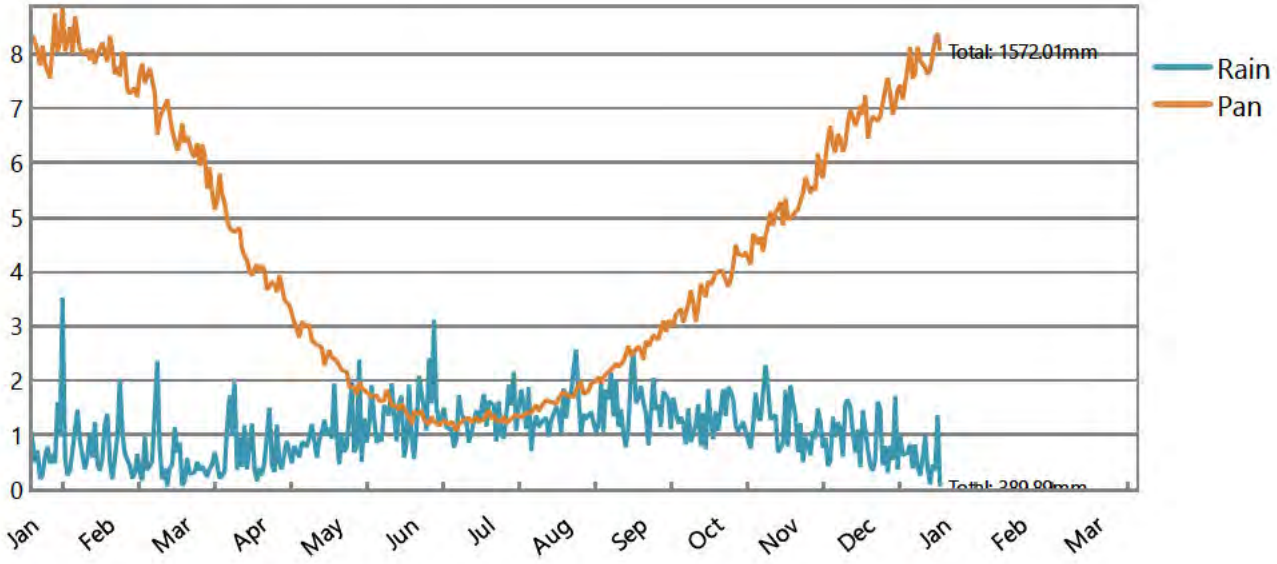
Run Period: 01/01/1972 to 31/12/2023 (52 years)

Climate statistics

	5th Percentile		50th Percentile		95th Percentile	
Rainfall (mm/year)	(Year 1994)	230.6	(Year 1999)	400.0	(Year 2022)	527.9
Pan evaporation (mm/year)	(Year 2010)	1379.3	(Year 2012)	1587.7	(Year 1990)	1711.4

Climate data

Daily average across run period:



Description

Wastestream information

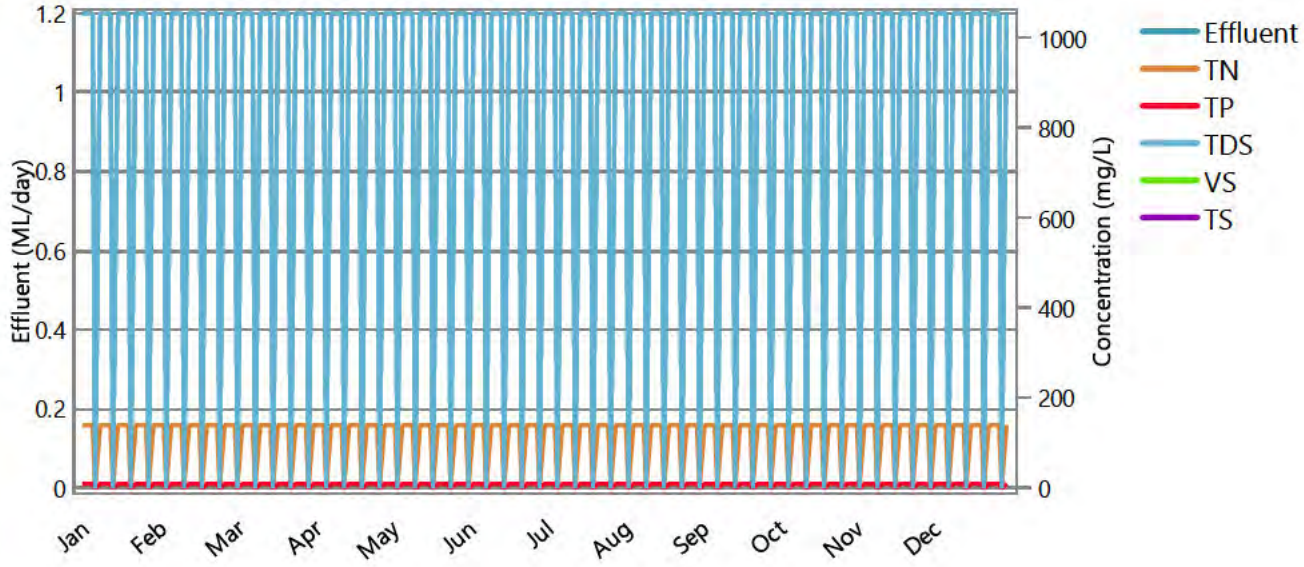
Wastestream Name: Waste estimation system - Irrigated wastewater

Wastestream production description

Daily Irrigated wastewater data supplied for a representative year. This wastestream is not separately pretreated.

Wastestream

Average Daily Quantity and Flow-Weighted Average Quality:



Wastestream

Effluent Quantity: 313.50 ML/year or 0.86 ML/day (Min-Max 0.00 - 1.20)

Flow-Weighted Average (Min - Max) Daily Effluent Quality Entering the Pond System:

	Concentration (mg/L)	Load (kg/year)
Total nitrogen	140.40 (140.40 - 140.40)	44015.40 (43973.28 - 44141.76)
Total phosphorus	9.99 (9.99 - 9.99)	3132.91 (3129.91 - 3141.90)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	331056.00 (330739.20 - 332006.40)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

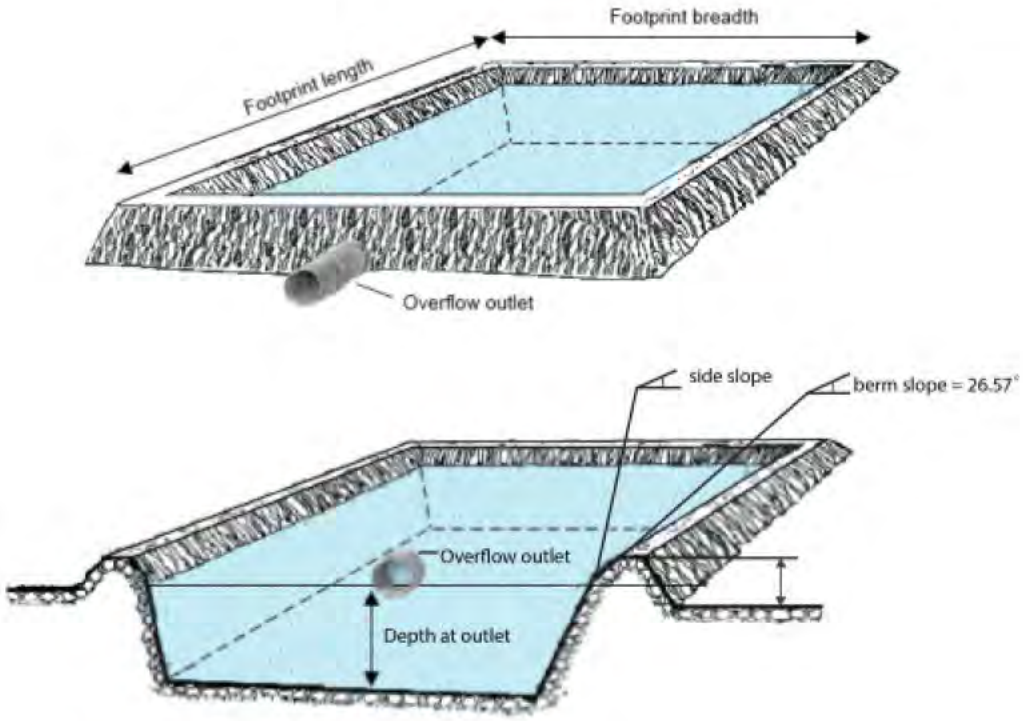
Description

Pond system information

Pond System Configuration: 1 sludge-free pond

Pond system details

	Pond 1
Maximum pond volume (ML)	162.00
Minimum allowable pond volume (ML)	24.01
Pond depth at overflow outlet (m)	2.00
Maximum water surface area (m2)	82141.08
Pond footprint length (m)	288.60
Pond footprint width (m)	288.60
Pond catchment area (m2)	83291.49
Average active volume (ML)	41.39



Irrigation pump limits

Minimum pump rate limit (ML/day)	1.20
Maximum pump rate limit (ML/day)	3.12

Shandying water

Annual allocation of fresh water available for shandying (ML/year)	0.00
Maximum rate of application of fresh water (ML/day)	0.00
Nitrogen concentration (mg/L)	0.00
Salinity (dS/m)	0.00
Minimum shandy water is used	No

Description

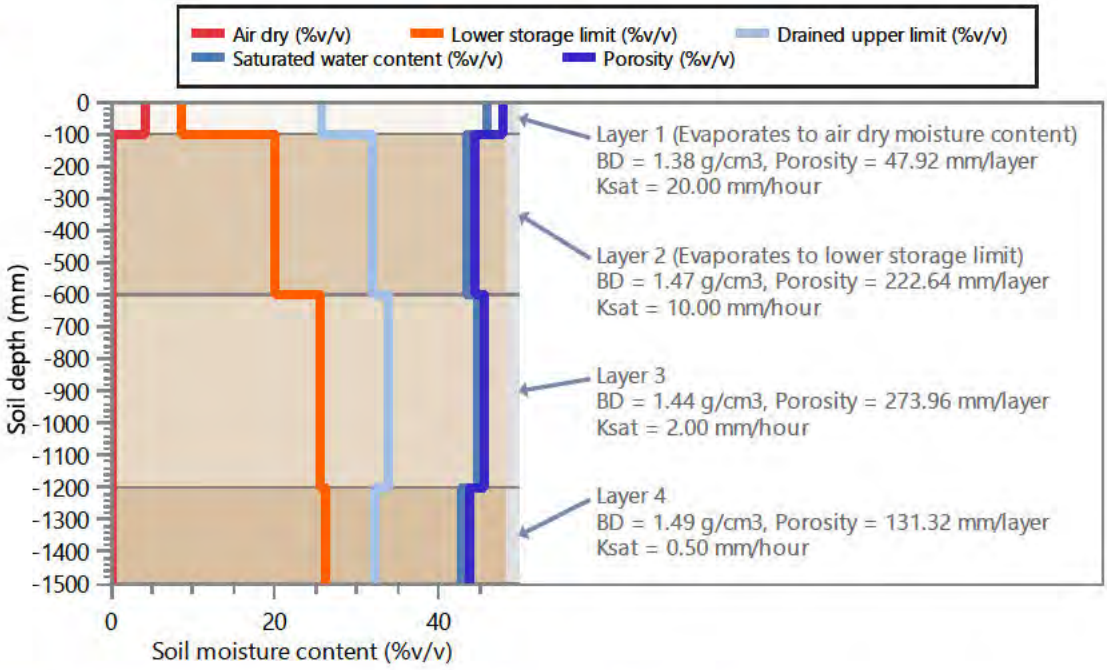
Paddock information

Paddock: All paddocks, 50 ha

Soil type: Red sodosol 1, 1500.00 mm defined profile depth

Profile porosity (mm)	675.85
Profile saturation water content (mm)	660.70
Profile drained upper limit (or field capacity) (mm)	486.00
Profile lower storage limit (or permanent wilting point) (mm)	341.30
Profile available water capacity (mm)	144.70
Profile limiting saturated hydraulic conductivity (mm/hour)	0.50
Surface saturated hydraulic conductivity (mm/hour)	20.00
Runoff curve number II (coefficient)	75.00
Soil evaporation U (mm)	10.00
Soil evaporation Cona (mm/sqrt day)	4.00

Profile



Planting regime: Rotated Kikuyu 1 pasture | Ryegrass 2 pasture

Maximum crop factor at 100% cover (mm/mm) (Maximum crop coefficient 0.8 | 0.9 x Pan coefficient 1 | 1)	0.80 | 0.90
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 90.00
Potential rooting depth in defined soil profile (mm)	1200.00 | 1200.00
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60

Irrigation rules: Centre pivot

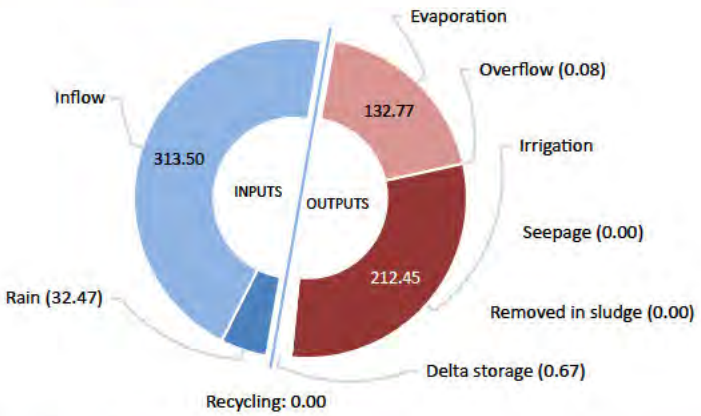
Rule 1. Irrigation triggered when soil water deficit reaches 2.40 mm and rainfall is less than or equal to 10.00 mm
Rule 2. Irrigate a fixed amount of 2.40 mm each day
Rule 3. Irrigation window from 1/1 to 31/12 including the days specified
Rule 4. A minimum of 0 days must be skipped between irrigation events

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond (wet weather storage pond: 162 ML)

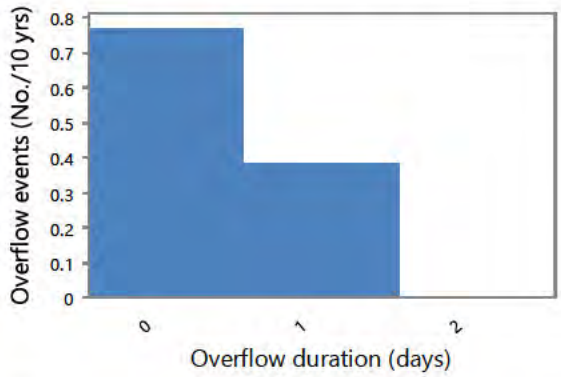
Pond system water balance (ML/year)

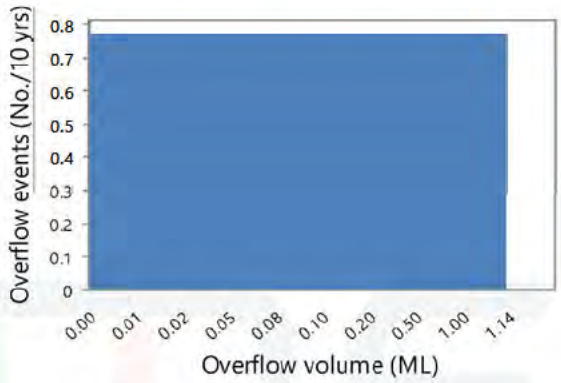


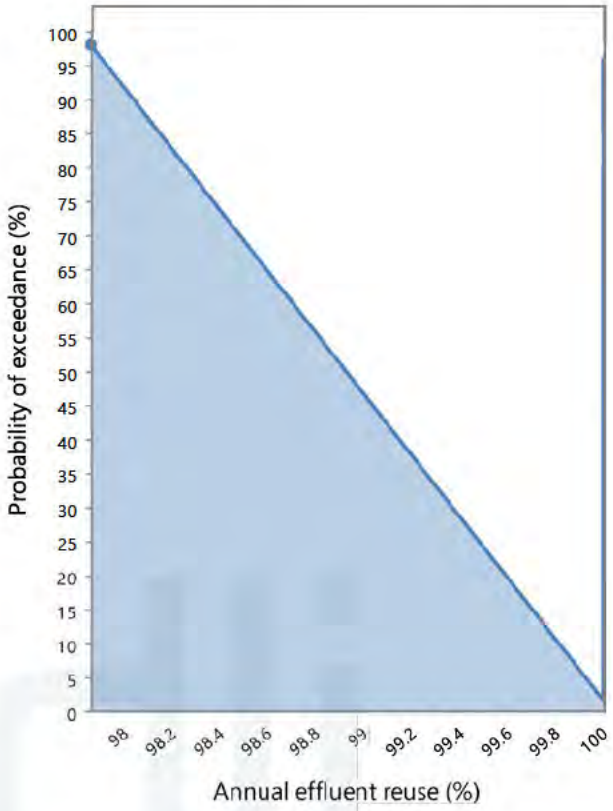
Name	Value
Rain	32.47
Inflow	313.50
Recycling	0.00
Evaporation	132.77
Overflow	0.08
Irrigation	212.45
Seepage	0.00
Removed in sludge	0.00
Delta storage	0.67

Overflow and reuse diagnostics

Metric	Value
Total volume of overflow (ML/10 years)	0.85
Total number of overflow events (events/10 years)	0.77
Total number of pond overflow days (days/10 years)	1.15
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (Proportion of inflow + net gain in rain that is irrigated) (%)	99.96





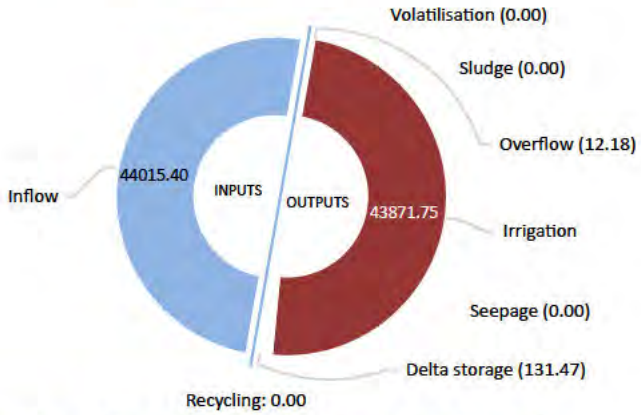


Performance

Pond system information

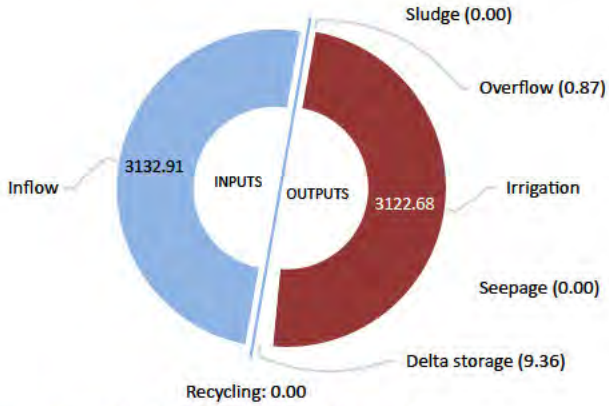
Pond System Configuration: 1 sludge-free pond

Pond system nitrogen balance (kg/year)



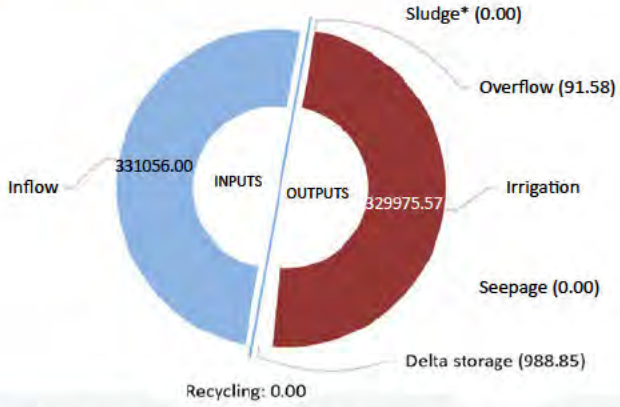
Name	Value
Inflow	44015.40
Recycling	0.00
Volatilisation	0.00
Sludge	0.00
Overflow	12.18
Irrigation	43871.75
Seepage	0.00
Delta storage	131.47

Pond system phosphorus balance (kg/year)



Name	Value
Inflow	3132.91
Recycling	0.00
Sludge	0.00
Overflow	0.87
Irrigation	3122.68
Seepage	0.00
Delta storage	9.36

Pond system salt balance (kg/year)



Name	Value
Inflow	331056.00
Recycling	0.00
Sludge*	0.00
Overflow	91.58
Irrigation	329975.57
Seepage	0.00
Delta storage	988.85

* Salt removal in sludge is not calculated from the pond salt balance. However if salt could be assumed to be present in the sludge at the same concentration as in the pond supernatant (up to a maximum of salt added in inflow) - then salt accumulation in the sludge could be 0.00 kg/year

Pond system sludge accumulation: 0.00 kg dwt/year

Performance

Pond system information

Pond System Configuration: 1 sludge-free pond

Pond nutrient concentrations and salinity

Average across simulation period	Pond 1
Average nitrogen concentration of pond liquid (mg/L)	194.15
Average phosphorus concentration of pond liquid (mg/L)	13.82
Average salinity of pond liquid (dS/m)	2.28

Value on final day of simulation period	Pond 1
Final nitrogen concentration of pond liquid (mg/L)	195.18
Final phosphorus concentration of pond liquid (mg/L)	13.89
Final salinity of pond liquid (dS/m)	2.29

Performance

Water use (assumes 100% irrigation efficiency)

Metric	Value
Pond water irrigated (ML/year)	212.45
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Total water irrigated (ML/year)	212.45
Proportion of irrigation events requiring shandying (% of events)	0.00
Proportion of years shandying water allocation of 0 ML/year is exceeded (% of years)	0.00
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)

Irrigation quality

Metric	Value
Average nitrogen concentration of irrigation water - before ammonia loss during irrigation (mg/L)	206.51
Average nitrogen concentration of irrigation water - after ammonia loss during irrigation (mg/L)	195.77
Average phosphorus concentration of irrigation water (mg/L)	14.70
Average salinity of irrigation water (dS/m)	2.43

Irrigation diagnostics

Metric	Value
No. periods/year without any irrigable effluent in the wet weather storage pond (periods/year)	13.67
Average length of such periods (days)	2.34

Irrigation triggering and application

No. Days without Irrigation Applied per Year: 188.21 (with water demand too small to trigger irrigation [76.27], water supply insufficient for pump [70.69], pond water volume below minimum volume for irrigation [31.88] and rain exceeding specified rainfall threshold [9.37])
No. Days without Irrigation Applied per Year: 188.21 (with no supply - no application [102.58] and not triggered [85.63])
No. Days with Irrigation Applied per Year: 177.04 (with full application)
No. Days with Irrigation Triggered per Year: 279.62

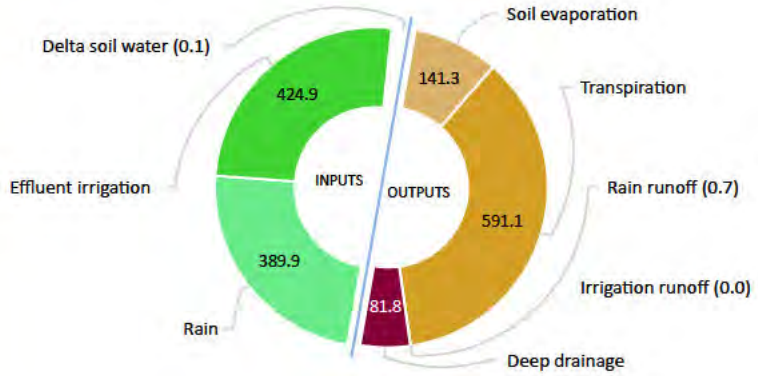
Performance

Paddock information

Paddock: All paddocks, 50 ha

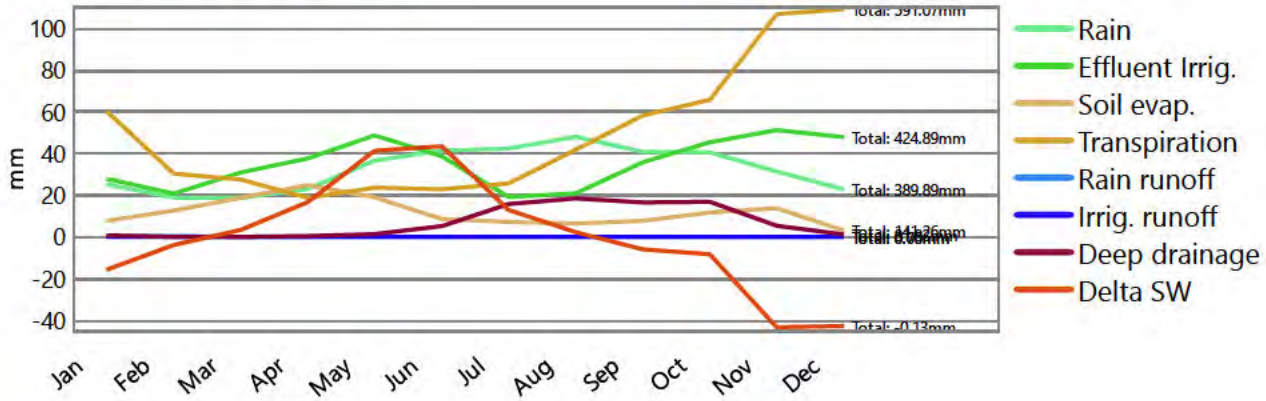
Soil Type: Red sodosol 1, 126.40 mm PAWC at maximum root depth

Soil water balance (mm/year)

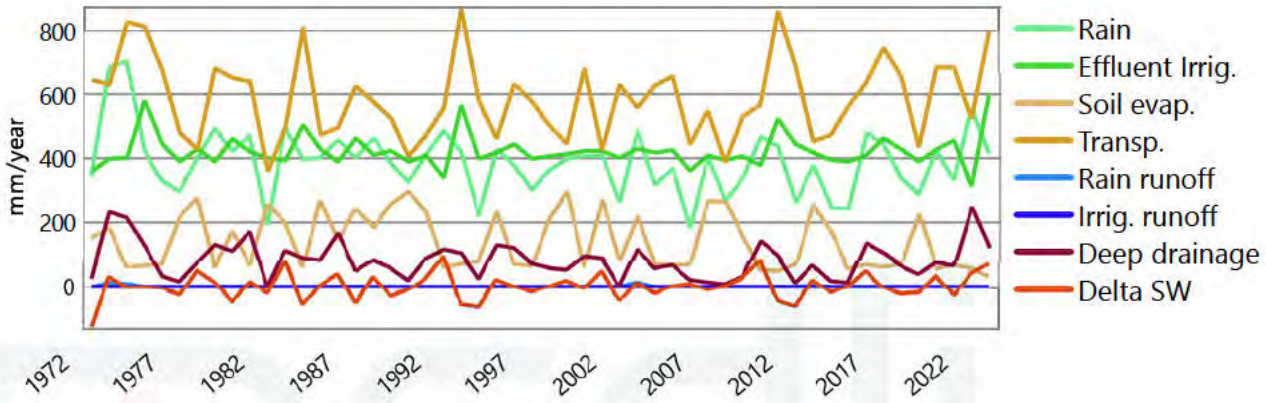


Name	Value
Rain	389.9
Effluent irrigation	424.9
Soil evaporation	141.3
Transpiration	591.1
Rain runoff	0.7
Irrigation runoff	0.0
Deep drainage	81.8
Delta soil water	-0.1

Average monthly totals (mm)



Average annual totals (mm/year)

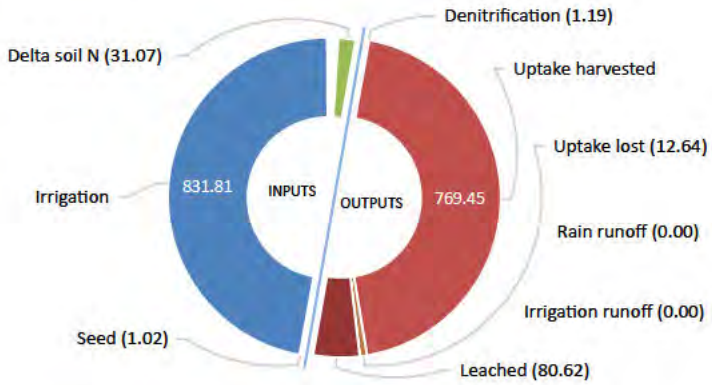


Performance

Paddock information

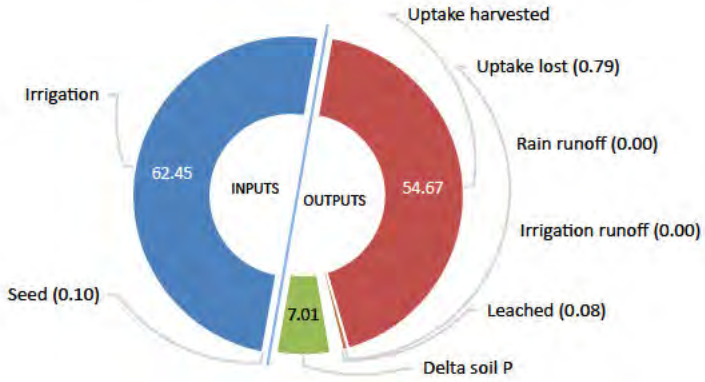
Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Irrigation Ammonia-N Volatilisation Losses (kg/ha/year): 45.63
Proportion of Total Nitrogen in Irrigated Effluent as Ammonium (%): 20.00

Soil nitrogen balance (kg/ha/year)



Name	Value
Seed	1.02
Irrigation	831.81
Denitrification	1.19
Uptake harvested	769.45
Uptake lost	12.64
Rain runoff	0.00
Irrigation runoff	0.00
Leached	80.62
Delta soil N	-31.07

Soil phosphorus balance (kg/ha/year)



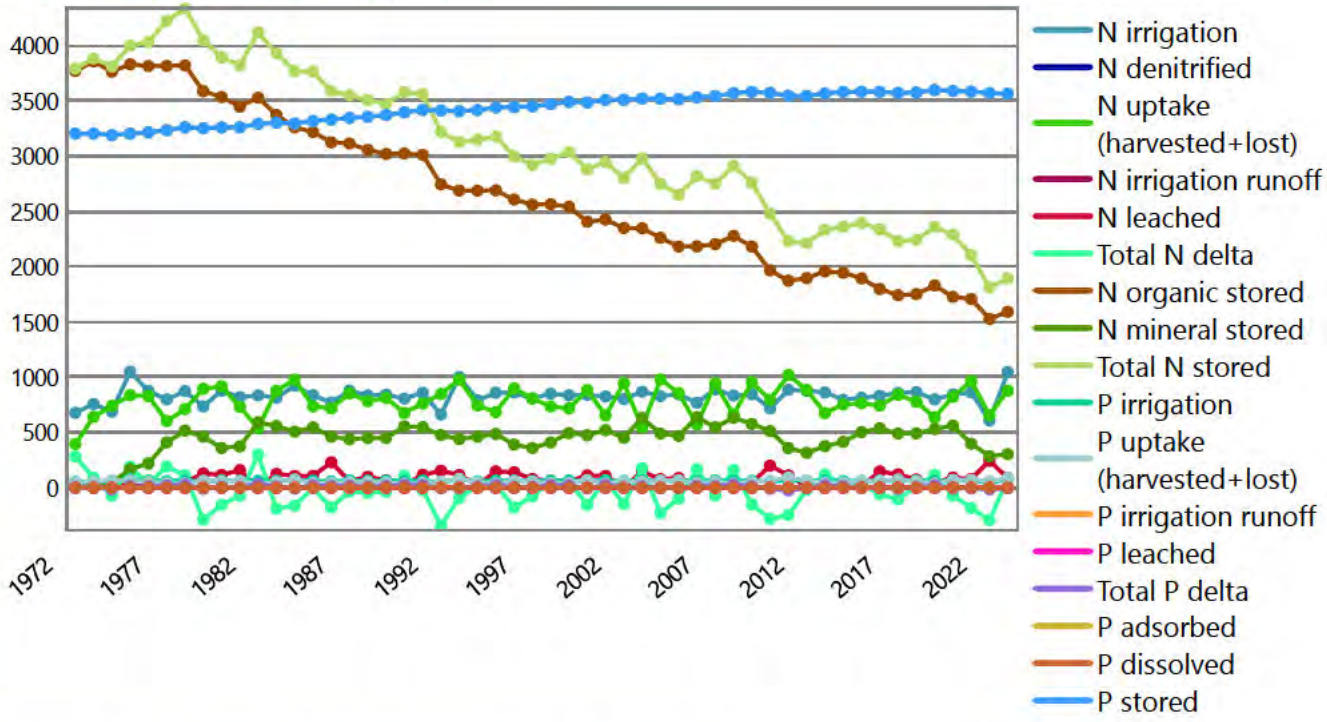
Name	Value
Seed	0.10
Irrigation	62.45
Uptake harvested	54.67
Uptake lost	0.79
Rain runoff	0.00
Irrigation runoff	0.00
Leached	0.08
Delta soil P	7.01

Performance

Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1

Annual nutrient totals (kg/ha)



Annual nutrient leaching concentration (mg/L)

Performance

Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 2 pasture

Plant growth (minimum - maximum)

Season one plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	10533.84 (4085.32 - 20274.11)
Average annual shoot dry matter lost (kg/ha/year)	265.70 (0.00 - 1040.15)
Average monthly plant (green) cover (%)	43.33 (0.00 - 78.02)
Average monthly root depth (mm)	656.89 (0.00 - 1200.00)

Season two plant metrics	Value
Average annual shoot dry matter harvestable yield* (kg/ha/year)	8257.20 (5537.71 - 11617.31)
Average annual shoot dry matter lost (kg/ha/year)	21.27 (0.00 - 293.03)
Average monthly plant (green) cover (%)	64.98 (45.17 - 73.87)
Average monthly root depth (mm)	1061.77 (893.88 - 1200.00)

Plant nutrient uptake (minimum - maximum)

Season one plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	461.56 (165.91 - 754.00)
Average annual shoot nitrogen lost (kg/ha/year)	11.54 (0.00 - 46.76)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	29.98 (10.01 - 59.62)
Average annual shoot phosphorus lost (kg/ha/year)	0.73 (0.00 - 2.85)
Average annual shoot nitrogen concentration (fraction dwt)	0.05 (0.02 - 0.06)
Average annual shoot phosphorus concentration (fraction dwt)	0.003 (0.002 - 0.003)

Season two plant metrics	Value
Average annual shoot nitrogen in harvestable yield* (kg/ha/year)	307.89 (208.51 - 433.18)
Average annual shoot nitrogen lost (kg/ha/year)	1.10 (0.00 - 15.52)
Average annual shoot phosphorus in harvestable yield* (kg/ha/year)	24.69 (16.61 - 34.64)
Average annual shoot phosphorus lost (kg/ha/year)	0.06 (0.00 - 0.79)
Average annual shoot nitrogen concentration (fraction dwt)	0.04 (0.02 - 0.05)
Average annual shoot phosphorus concentration (fraction dwt)	0.003 (0.003 - 0.003)

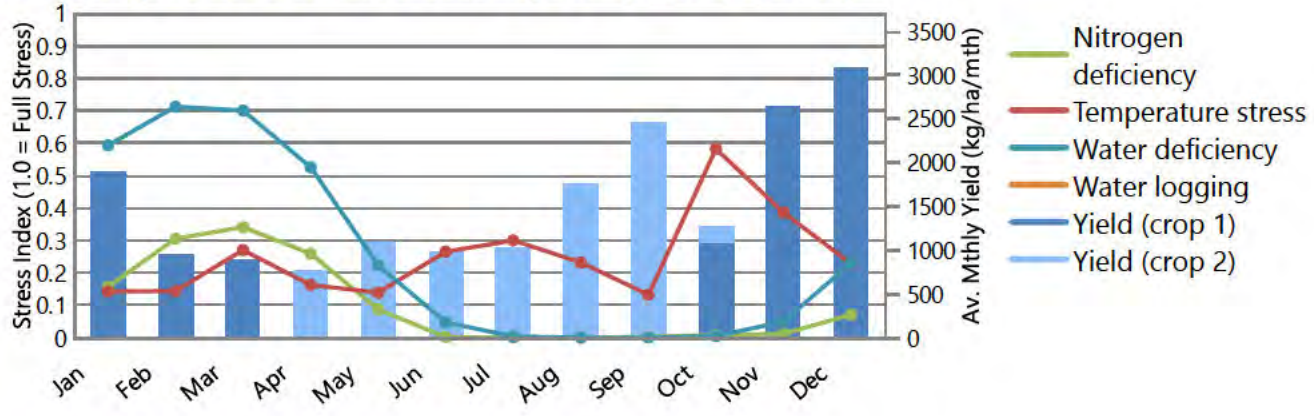
*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Performance

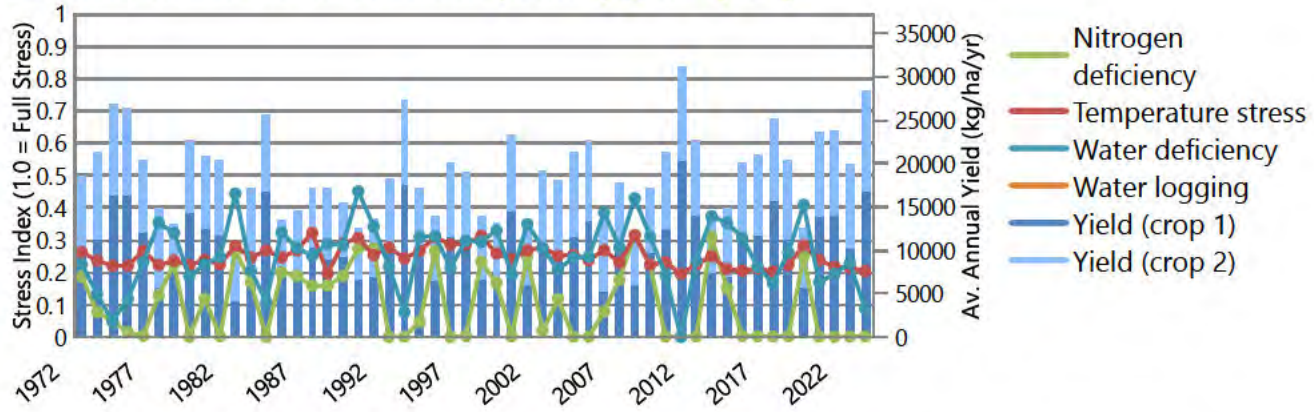
Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 2 pasture

Av. monthly stresses & harvestable yield* (kg/ha/month)



Av. annual stresses & harvestable yield* (kg/ha/year)



*Harvestable yield is a measure of *net* gain over a nominated period - say monthly. It is the total shoot-dry-matter gain minus any shot-dry-matter loss within a given period. Hence, just like financial investments, negative harvestable yields may occur when the (episodic) losses exceed the gains made within a particular accounting period.

Normal and forced harvest information

No. of Harvests per Year: 4.81 (normal), 1.08 (forced by crop death due to water stress).
No. Days without Crop per Year (no./year): 35.56 (due to water stress [35.21], frosting [0.29] and temperature stress - not frost [0.06])

Performance

Paddock information

Paddock: All paddocks, 50 ha
Soil Type: Red sodosol 1
Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 2 pasture

Plant salinity tolerance

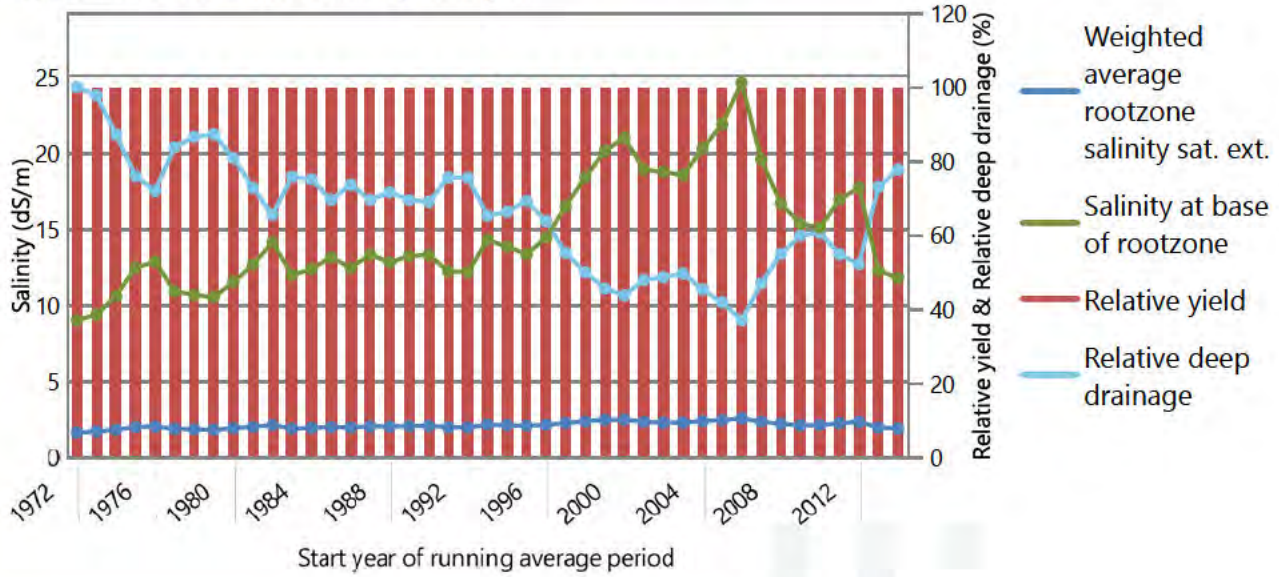
Metric	Value
Salt tolerance	Moderately tolerant | Moderately tolerant
Salinity threshold (dS/m soil saturation extract)	3.00 | 5.60
Proportion of yield decrease per dS/m increase (%/dS/m)	3.00 | 7.60
No. years assumed for leaching to reach steady-state (years)	10.00

Soil salinity

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	1.31
Salt added by rainfall (kg/ha/year)	74.71
Average annual salt added & leached at steady state (kg/ha/year)	6674.23
Average leaching fraction based on 10 -year running averages (fraction)	0.28
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	2.13
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	14.71
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Average annual rootzone salinity and relative yield

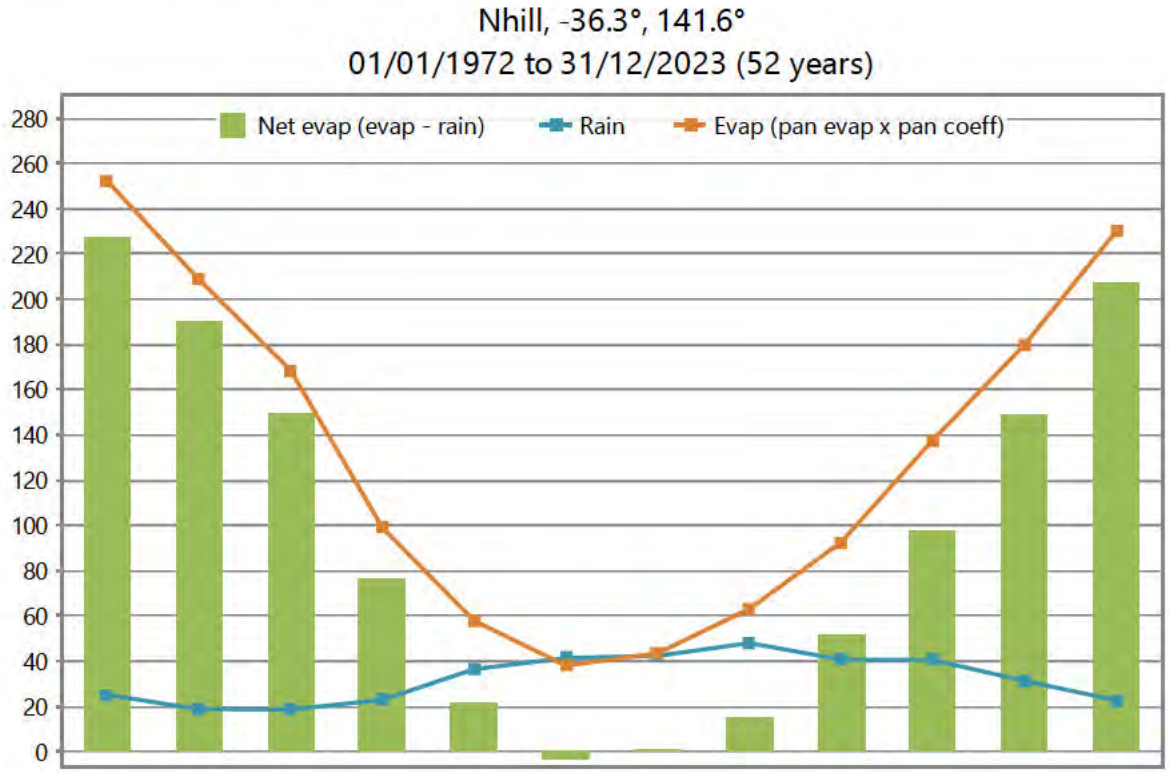
All values based on 10 -year running averages.



Scenario information

Enterprise: Luv a Duck

Climate long-term monthly averages (mm)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Evap	252.3	208.9	168.6	99.1	58.0	38.1	43.6	63.1	92.6	137.7	179.8	230.1	1572.0
Net evap	227.1	190.0	149.9	76.2	21.4	-3.4	1.2	15.1	51.8	97.2	148.4	207.3	1182.1
Net evap/day	7.3	6.7	4.8	2.5	0.7	-0.1	0.0	0.5	1.7	3.1	4.9	6.7	3.2

Diagnostics

Pond system information

Pond System Configuration: 1 sludge-free pond

Effluent Type: Waste estimation system - 313.50 ML/year or 0.86 ML/day generated on average

Effluent entering pond system after any pretreatment and recycling

Average (Minimum-Maximum) influent quality calculated for 261.25 *non-zero flow days/year.*

Constituent	Concentration (mg/L)	Load (kg/year)
Total nitrogen	140.40 (140.40 - 140.40)	44015.40 (43973.28 - 44141.76)
Total phosphorus	9.99 (9.99 - 9.99)	3132.91 (3129.91 - 3141.90)
Total dissolved salts	1056.00 (1056.00 - 1056.00)	331056.00 (330739.20 - 332006.40)
Volatile solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)
Total solids	0.00 (0.00 - 0.00)	0.00 (0.00 - 0.00)

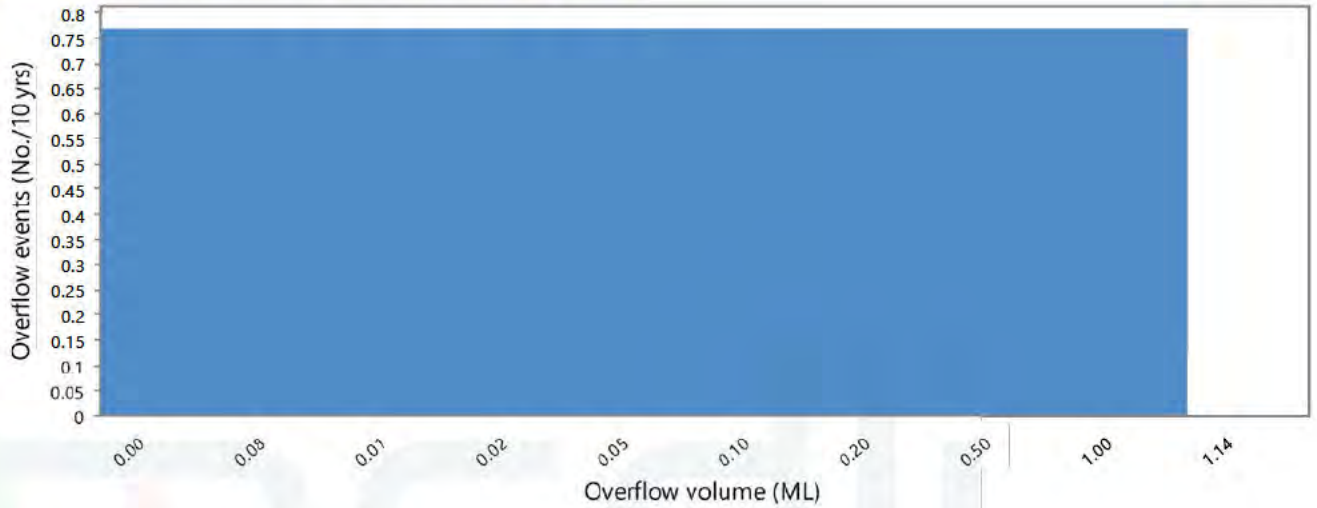
Ammonia-N loss from pond system water surface area: 0.00 kg/m2/year

Last pond (wet weather store): 162.00 ML

Metric	Value
Theoretical hydraulic retention time (days)	188.74
Volume of overflow (ML/year) Average (minimum-maximum)	0.08 (0.00 - 4.41)
Volume of overflow per day (m3/day) Average (minimum-maximum)	0.23 (0.00 - 1102.91)
No overflow days - Average per year (Total in run period)	0.12 (6)
No. overflow events per 10 years exceeding threshold of 0.082 ML* (events/10 years)	0.77
Average overflow event recurrence interval (years)	13.00
Average duration of overflow (days)	1.50
Probability of at least 90% effluent reuse (%)	100.00
Effluent reuse (proportion of inflow + net rain gain that is irrigated) (%)	99.96
Average salinity (dS/m)	2.28
Salinity on final day of simulation (dS/m)	2.29

* The threshold is the volume equivalent of the top 1 mm depth of water of a full pond

Volume distribution of the overflow events



Diagnostics

Scenario information

Area irrigated: 50 ha total area

Loading to whole irrigation area: (assuming 100% irrigation efficiency)

	Quantity/year	Quantity/ha/year
Total irrigation applied (ML)	212.45	4.25
Total nitrogen applied (kg)	41590.42	831.81
Total phosphorus applied (kg)	3122.68	62.45
Total salts applied (kg)	329975.57	6599.51

Shandying

Metric	Value
Annual allocation of fresh water for shandying (ML/year)	0.00
Average shandy water irrigation (ML/year) (minimum - maximum)	0.00 (0.00 - 0.00)
Average exceedance as a proportion of annual shandy water allocation (% of allocation) (minimum - maximum)	0.00 (0.00 - 0.00)
Minimum shandy water is used	No

Irrigation issues

Metric	Value
Number of days without irrigation (days/year)	188.21
Number of periods without irrigatable water (periods/year)	13.67
Average length of such periods (days)	2.34

Diagnostics

Paddock information

Paddock: - All paddocks, 50 ha

Irrigation: Centre pivot with 26% ammonium loss during irrigation

Irrigation Rules
Irrigation triggered when soil water deficit reaches 2.40 mm and rainfall is less than or equal to 10.00 mm
Irrigate a fixed amount of 2.40 mm each day Irrigation window from 1/1 to 31/12 including the days specified
A minimum of 0 days must be skipped between irrigation events

Soil water balance (mm): Red sodosol 1, 126.40 mm PAWC at maximum root depth

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rain	25.3	18.9	18.7	23.0	36.5	41.5	42.4	48.1	40.8	40.6	31.4	22.8	389.9
Efflt. irrg.	27.9	20.7	30.9	37.7	48.7	38.6	19.1	20.9	35.8	45.4	51.3	47.9	424.9
Soil evap	7.7	12.6	18.8	24.9	19.0	8.5	7.2	6.4	7.7	11.7	13.8	3.0	141.3
Transpn.	60.3	30.4	27.5	18.7	23.6	22.9	25.7	41.8	58.3	65.8	106.9	109.3	591.1
Rain runoff	0.2	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Irr. runoff	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage	0.7	0.0	0.0	0.4	1.3	5.2	15.8	18.5	16.6	16.8	5.3	1.2	81.8
Delta SW	-15.8	-3.9	3.3	16.7	41.3	43.5	12.9	2.3	-5.9	-8.4	-43.4	-42.8	-0.1

Soil nitrogen balance: (Concentrations are flow-weighted)

Metric	Value
Average annual nitrogen added in seed (kg/ha/year)	1.02
Average annual nitrogen added from irrigation (kg/ha/year)	831.81
Av. annual soil N removed by uptake (harvest + lost) (kg/ha/year)	782.09 (769.45, 12.64)
Av. annual soil nitrogen removed by denitrification (kg/ha/year)	1.19
Average annual soil nitrogen leached (kg/ha/year)	80.62
Average annual nitrate-N loading to groundwater (kg/ha/year)	80.62
Soil organic-N kg/ha (Initial - Final)	3456.00 - 1591.89
Soil inorganic-N kg/ha (Initial - Final)	54.60 - 303.02
Average nitrate-N concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	98.52 (141.75)
Excluding first year of data (mg/L)	99.06 (141.75)

Soil phosphorus balance: (Concentrations are flow-weighted)

Metric	Value
Average annual phosphorus added in seed (kg/ha/year)	0.10
Average annual phosphorus added from irrigation (kg/ha/year)	62.45
Av. annual soil P removed by uptake (harvest + lost) (kg/ha/yr)	55.47 (54.67, 0.79)
Average annual soil phosphorus leached (kg/ha/year)	0.08
Dissolved phosphorus (kg/ha) (Initial - Final)	0.49 - 0.72
Adsorbed phosphorus (kg/ha) (Initial - Final)	3201.01 - 3565.11
Average phosphate-P concentration in rootzone (mg/L)	0.29
Average phosphate-P concentration of deep drainage (Max annual concentration)	
Across all years (mg/L)	0.10 (0.10)
Last year only (mg/L)	0.10 (N.D.*)
Design soil profile storage life based on average infiltrated water phosphorus concn. of 7.67 mg/L (years)	729.53

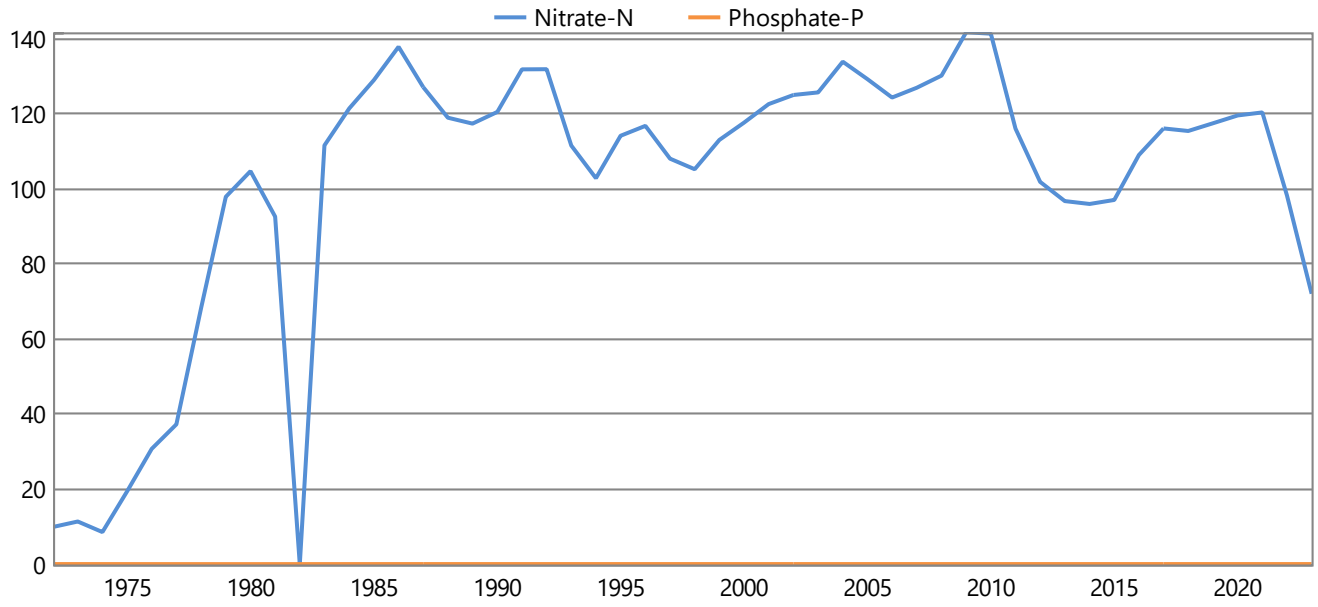
* Not determined

Diagnostics

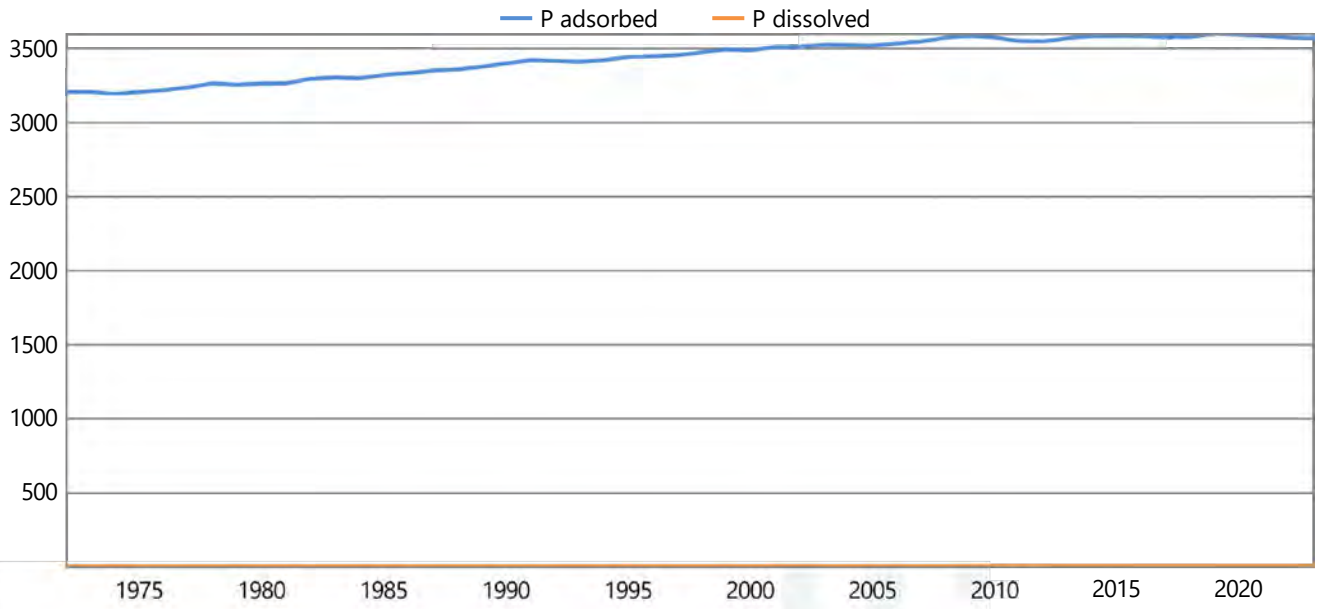
Paddock information

Paddock: All paddocks, 50 ha
Irrigation: Centre pivot with 26% ammonium loss during irrigation

Annual nutrient leachate concentration (mg/L)



Annual phosphate-P in soil (kg/ha)



Diagnostics

Paddock information

Paddock: All paddocks, 50 ha

Planting Regime: Rotated Kikuyu 1 pasture & Ryegrass 2 pasture

Average plant performance (minimum - maximum)

Metric	Value
Average annual shoot dry matter harvestable yield (kg/ha/year)	18791.04 (10565.57 - 31011.70)
Average annual shoot dry matter lost (kg/ha/year)	286.97 (0.00 - 1076.34)
Average monthly plant (green) cover (%)	63.32 (35.97 - 78.02)
Average monthly crop factor (fraction)	0.54 (0.32 - 0.66)
Dead cover (if Mthly Covers) or Tot. cover left after harvest (%)	100.00 | 90.00
Average monthly root depth (mm)	989.94 (697.29 - 1200.00)
Average number of normal harvests per year (no./year)	4.81 (2.00 - 7.00)
Average number of normal harvests for last five years only (no./year)	5.20
Average number of forced harvests per year (no./year)	1.08 (0.00 - 4.00)
Average number of forced harvests for last five years only (no./year)	0.40
Average annual nitrogen deficiency index (0 = no stress, 1 = full stress) (coefficient)	0.10 (0.00 - 0.32)
Average January temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.14 (0.03 - 0.29)
Average July temperature stress index (0 = no stress, 1 = full stress) (coefficient)	0.30 (0.15 - 0.66)
Average monthly water stress index (0 = no stress, 1 = full stress) (coefficient)	0.26 (0.00 - 0.71)
Average monthly waterlogging index (0 = no stress, 1 = full stress) (coefficient)	0.00 (0.00 - 0.00)
No. days without crop per year. Excludes bare fallow days (days)	35.56

Soil salinity - plant salinity tolerance: Moderately tolerant | Moderately tolerant

Assumes 1.0 dS/m Electrical Conductivity = 640 mg/L Total Dissolved Salts

All values based on 10 -year running averages.

Metric	Value
Salinity of infiltrated water (Average salinity of rainwater = 0.03 dS/m) (dS/m)	1.31
Salt added by rainfall (kg/ha/year)	74.71
Average annual salt added & leached at steady state (kg/ha/year)	6674.23
Average leaching fraction based on 10 -year running averages (fraction)	0.28
Average water-uptake-weighted rootzone salinity sat. ext. (dS/m)	2.13
Salinity of the soil solution (at drained upper limit) at base of rootzone (dS/m)	14.71
Relative crop yield expected due to salinity (%)	100.00
Proportion of years that crop yields would be expected to fall below 90% of potential due to salinity (%)	0.00

Diagnostics

Run information

Messages generated when the scenario was run
********** WASTESTREAM RESULTS **********
TABLE OF QUANTITY AND QUALITY OF EACH RAINFALL-INDEPENDENT WASTESTREAM (AFTER PRETREATMENT AND BEFORE ENTERING ANY SEDIMENTATION BASIN)
Source Volume_ML/yr N conc_mg/L P conc_mg/L TDS conc_mg/L N load_kg/yr P load_kg/yr TDS load_kg/yr
Irrigated wastewater 313.5 140.4 10.0 1056.0 44015.4 3132.9 331056.0
********** END WASTESTREAM RESULTS **********
No. Days without Irrigation Applied per Year: 188.21 (with water demand too small to trigger irrigation [76.27], water supply insufficient for pump [70.69], pond water volume below minimum volume for irrigation [31.88] and rain exceeding specified rainfall threshold [9.37])
UNCONDITIONAL FINISH

WASTEWATER TREATMENT FACILITIES
160 RUPPS ROAD, NHILL, VICTORIA 3418

Lot 1 PS737805, Lot 2 PS442515
SHIRE OF HINDMARSH

CIVIL DRAWINGS

LOCALITY PLAN
NOT TO SCALE
GPS: S36°19'13", E141°37'11" ELEV 132m

CIVIL DRAWINGS LIST:

BEFORE YOU DIG www.byda.com.au
Zero Damage - Zero Harm

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES SHOWN ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN. THE CONTRACTOR MUST VERIFY ALL SERVICES ON SITE PRIOR TO ANY EXCAVATION WORKS.

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: NTS
SHEET SIZE: A1
NORTH: PROJECT NORTH

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
COVER PAGE, & LOCALITY PLAN

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C001
REV.: T1

4/06/2024 3:01:43 PM

PRINT IN COLOUR

GENERAL NOTES:

1. MAJOR CONTOUR INTERVAL : 2m
   MINOR CONTOUR INTERVAL : 0.5m
   LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (AHD) VIDE PM40
   CO-ORDINATES ARE ON MAP GRID OF AUSTRALIA (MGA2020) VIDE GPSNET CHECKED TO PM40
2. NATURAL SURFACE LEVELS ARE FROM PLAN PREPARED FOR 4SITE FROM A UAV FLYOVER SURVEY FOR THE PURPOSE OF SHOWING EXISTING SURFACE CONTOURS ON THE LAND. ANY DIGITAL DATA FORWARDED BY LANDAIR SURVEYS MUST NOT BE ALTERED IN ANY WAY WITHOUT PRIOR APPROVAL OF LANDAIR SURVEYS.
3. ALL DIMENSIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.
4. ALL WORKS TO BE COMPLETED IN ACCORDANCE WITH THE COUNCIL AND VICROADS REQUIREMENTS.
5. CONTRACTORS MUST ASCERTAIN THE PRECISE LOCATION OF ALL EXISTING SERVICES WHICH COULD BE AFFECTED BY THE WORKS AND CONTACT ALL RELEVANT AUTHORITIES BEFORE COMMENCING ANY EXCAVATION. EXISTING SERVICES MAY EXIST THAT ARE NOT SHOWN AND MAY EXIST IN LOCATIONS DIFFERING FROM LOCATIONS SHOWN.
6. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER PROJECT DRAWINGS, SCHEDULE OF QUANTITIES, JOB SPECIFICATIONS AND ANY OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE WORK. ALL DISCREPANCIES SHALL BE REFERRED TO THE SUPERINTENDENT FOR DISCUSSION BEFORE PROCEEDING WITH THE WORK.
7. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EXCAVATIONS IN A STABLE CONDITION.
8. ALL CONSTRUCTION UNDERTAKEN BY THE CONTRACTOR IS TO COMPLY WITH THE REQUIREMENTS OF THE CURRENT WORKPLACE HEALTH AND SAFETY ACT.
9. ALL STANDARDS (LOCAL AUTHORITY STANDARDS, AUSTRALIAN STANDARDS ETC.) REFERRED TO IN THESE PLANS SHALL BE THE LATEST EDITION AT THE TIME OF TENDERING.
10. LEVELS SHOWN ARE TO BE CONFIRMED ON SITE PRIOR TO COMMENCING WORK AND CONFLICTS OR DISCREPANCIES SHALL BE ADVISED TO THE SUPERINTENDENT IN WRITING IMMEDIATELY.
11. ALL BENCH MARKS TO BE LEVEL CHECKED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.
12. SURVEY SETOUT INFORMATION WILL BE PROVIDED IN THE FORM OF AUTOCAD DRAWINGS ONLY, UNLESS SPECIFICALLY REQUESTED BY THE CONTRACTOR AT ADDITIONAL COST. SETOUT INFORMATION SHALL NOT BE OBTAINED BY SCALING FROM THESE DRAWINGS.
13. THE CONTRACTOR SHOULD REFER TO LOCAL AUTHORITY AND AUSTRALIAN STANDARDS.
14. ALL DIMENSIONS RELEVANT TO SETTING OUT SHALL BE CONFIRMED AND VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION IS COMMENCED. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE SUPERINTENDENT.
15. AT THE COMPLETION OF ALL WORKS, ALL RUBBISH, DEBRIS AND SURPLUS SPOIL SHALL BE REMOVED OFF SITE AND THE SITE SHALL BE CLEARED TO THE SATISFACTION OF THE SUPERINTENDENT/OR THEIR REPRESENTATIVE.
16. ALL REDUNDANT ASSETS AND THEIR ASSOCIATED INFRASTRUCTURE (I.E PIPE WORK/MANHOLE ETC) ARE TO BE REMOVED AND DISPOSED OF. OFF SITE AT THE CONTRACTOR EXPENSE.
17. CONTRACTOR IS TO ALLOW FOR BACK FILLING ASSOCIATED TRENCHES IN ACCORDANCE WITH THE CIVIL SPECIFICATION / RELEVANT DRAWINGS.

ATTENTION TO CONTRACTOR:

1. THE CONTRACTOR MUST ARRANGE THE REQUISITE INSPECTIONS OF THE WORKS WITH THE SUPERINTENDENT/OR THEIR REPRESENTATIVE AS PER THE SPECIFICATIONS.
2. PRIOR TO COMMENCEMENT OF WORKS ON SITE, THE CONTRACTOR MUST ENSURE THAT ALL MATTERS RELATING TO THE OCCUPATIONAL HEALTH AND SAFETY ACT 2004, HAVE BEEN AND WILL BE COMPLIED WITH.
3. IN ACCORDANCE WITH CLAUSE 15 OF AS4000–1997, THE CONTRACTOR MUST ENSURE THE SAFETY OF THE CONTRACTOR'S EMPLOYEES AND ALL OTHER PEOPLE WHO ARE ON OR ADJACENT TO THE SITE. THE CONTRACTOR MUST COMPLY WITH THE VICTORIAN OCCUPATIONAL HEALTH & SAFETY ACT.
4. THE CONTRACTOR MUST ENSURE THAT ALL PEOPLE EMPLOYED ON THE SITE WEAR APPROVED SAFETY APPAREL. THIS INCLUDES SAFETY HELMETS, VESTS, SAFETY BOOTS, EYE AND EAR PROTECTION WHERE APPROPRIATE.
5. THE CONTRACTOR SHALL REINSTATE ANY EFFECTED FOOTPATH, VEHICLE CROSSINGS AND NATURE STRIP TO THE REQUIREMENTS OF THE RELEVANT AUTHORITY.
6. THE CONTRACTOR IS DIRECTLY RESPONSIBLE FOR THE SETOUT. SHOULD ACTUAL SITE CONDITIONS CONFLICT IN ANY WAY WITH THAT DOCUMENTED, THE CONTRACTOR MUST CONTACT THE OFFICE OF THE CONSULTANT FOR CLARIFICATION BEFORE PROCEEDING.
7. CONTRACTOR TO INTRODUCE MANUAL HANDLING PROCEDURES PRIOR TO CONSTRUCTION AND MAINTENANCE WORKS.
8. CONTRACTOR TO INTRODUCE SAFE MAINTENANCE PROCEDURES PRIOR TO UNDERTAKING MAINTENANCE WORKS ON THESE ASSETS
9. CONTRACTOR TO ENSURE WHILST WORKING ON THE LINER PROPER FLAT SAFETY WORK BOOTS ARE WORN AND NO HOT METALS OR PIPES ARE STORED ON SURFACE.

EXISTING SERVICES NOTES:

1. 4SITE DESIGN GROUP ACCEPT NO RESPONSIBILITIES IN RELATION TO EXTENT AND LOCATION OF EXISTING SERVICES IN THE VICINITY OF THE SITE.
2. LOCATIONS AND ALIGNMENTS OF EXISTING SERVICES ARE INDICATIVE ONLY. CONTRACTOR TO VERIFY EXISTING SERVICES ON SITE PRIOR TO COMMENCEMENT OF WORKS
3. IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT THE SUPERINTENDENT TO ARRANGE AND COORDINATE FOR ANY ADDITIONAL SERVICE RELOCATIONS OR ADJUSTMENTS NOT SHOWN ON THE DRAWINGS.
4. THE CONTRACTOR SHALL LIAISE WITH THE SUPERINTENDENT AND OR ALL RELEVANT SERVICE AUTHORITIES WITH RESPECT TO ANY SERVICE ALTERATIONS OR FOR WORKS IN VICINITY OR CLOSE PROXIMITY TO EXISTING SERVICES. THE CONTRACTOR SHALL BE REQUIRED TO SEEK CLEARANCE, PROGRAM AND COORDINATE THESE WORKS WITH THE RELEVANT SERVICE AUTHORITY AND THEIR CONTRACTORS. THE CONTRACTOR MUST ALSO ARRANGE FOR RELOCATION AND / OR PROTECTION OF EXISTING SERVICES AS REQUIRED TO SUIT SURROUNDING NEW WORK, CONSTRUCTION LOADINGS AND TO SUIT FINAL FINISHED SURFACE LEVELS AND GRADES.
5. ANY INFRASTRUCTURE DAMAGE DURING THE DEFECTS LIABILITY PERIOD IS THE RESPONSIBILITY OF THE CONTRACTOR AND IS TO BE REINSTATED TO THE SATISFACTION OF THE SUPERINTENDENT OR THEIR REPRESENTATIVE.
6. ALL SERVICE CONDUITS TRENCHES UNDER ROAD PAVEMENTS ARE TO BE BACKFILLED AS PER THE REQUIREMENTS OF RELEVANT AUTHORITY STANDARD ROAD OPENING CONDITIONS.
7. ALL TABLE DRAINS AND VERGES ARE TO BE REINSTATED UPON COMPLETION OF WORKS TO THE SATISFACTION OF THE SUPERINTENDENT/OR THEIR REPRESENTATIVE.
8. ALL TRENCHING WORKS TO BE CONSTRUCTION IN ACCORDANCE WITH THE RELEVANT ACT AND REGULATIONS.
9. ALL EXISTING ASSETS AFFECTED BY THE WORKS; EG SIGNS, VEHICLE CROSSINGS, FOOTPATHS, KERB AND LINEMARKING SHALL BE REINSTATED BY THE CONTRACTOR PRIOR TO THE COMPLETION OF THE WORKS TO THE SATISFACTION OF THE SUPERINTENDENT/OR THEIR REPRESENTATIVE.
10. THE PROJECT AREA CONTAINS THE FOLLOWING SERVICES. FOR ASSISTANCE IN LOCATING ASSETS OR IN AN EMERGENCY CONTACT:

AUTHORITY	SERVICE	TELEPHONE
GRAMPIANS WIMMERA MALLEE WATER	WATER & SEWER	1300 659 961
POWERCOR AUST LTD	POWER	132 206
SHIRE OF HINDMARSH	STORMWATER	(03) 5391 4444
AUSNET GAS SERVICES P/L	GAS	1800 088 208
NBN CO VICTAS	COMMS	1800 687 626
TELSTRA VIC/TAS	COMMS	1800 653 935

LOCATIONS AND ALIGNMENTS OF EXISTING SERVICES ARE INDICATIVE ONLY. CONTRACTOR TO VERIFY EXISTING SERVICES ON SITE PRIOR TO COMMENCEMENT OF WORKS BASED ON DIAL BEFORE YOU DIG INFORMATION AND OTHER MEANS AS REQUIRED.

EARTHWORKS NOTES:

1. THE STANDARD FOR THE PROVISION OF EARTHWORKS ARE TO BE IN ACCORDANCE WITH AUSTRALIAN STANDARD AS 3798 "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS", MODIFIED TO SUIT ALL LOCAL CONDITIONS, PRACTICES AND LOCAL AUTHORITY STANDARDS AS REQUIRED AND AS APPROVED IN WRITING BY THE SUPERINTENDENT.
2. SUPERVISION, INSPECTION AND TESTING IS TO BE CARRIED OUT IN ACCORDANCE WITH SECTION 8 AND APPENDIX B OF AS 3798. FOR ALL STRUCTURAL FILL THE SCOPE OF SERVICES TO BE PROVIDED BY THE GEOTECHNICAL TESTING AUTHORITY IS TO BE IN ACCORDANCE WITH LEVEL 1 OR LEVEL 2 AS DETAILED AND IN ACCORDANCE WITH DOUGLAS PARTNERS REPORT. LEVEL 3 SUPERVISION IS NOT PERMITTED FOR STRUCTURAL FILL, BUT IS ACCEPTABLE FOR NONSTRUCTURAL FILL.
3. CLEARED VEGETATION SHALL BE MULCHED AND DISPOSED OF OFFSITE. BURNING OFF IS NOT CONSIDERED AN ACCEPTABLE MEANS OF DISPOSAL AND WILL NOT BE APPROVED.
4. EARTHWORKS LEVELS SHOWN ON DRAWINGS ARE TO FINISHED SURFACE LEVEL AND ARE TO INCLUDE TOPSOIL WHERE APPROPRIATE.
5. TOPSOIL SHALL BE STRIPPED ACROSS THE ENTIRE LIMIT OF THE EARTHWORKS CUT AND FILL AREAS AS DIRECTED BY GEOTECHNICAL CONSULTANT AND SHALL BE STOCKPILED IN A LOCATION APPROVED BY THE SUPERINTENDENT. THE EXISTING STRATA IS TO BE TREATED IN ACCORDANCE WITH THE SPECIFICATION PRIOR TO PLACING ANY FILL.

EARTHWORKS NOTES: . . . . . cont.

6. ALL SITE WON TOPSOIL AND SUBSOIL SHOULD BE STOCKPILED SEPARATELY.
7. THE ROAD PAVEMENT DEPTHS ALLOWED IN EARTHWORKS CALCULATIONS ARE BASED ON THE MINIMUM PAVEMENT THICKNESS FOR THE LOCAL AUTHORITY. THESE DEPTHS ARE PROVISIONAL ONLY AND ARE SUBJECT TO SOIL TESTING OF SUBGRADE MATERIALS AND LOCAL AUTHORITY APPROVAL.
8. ALL FOOTPATHS, BATTERS, ALLOTMENT FILL AREAS AND DISTURBED AREAS SHALL BE TOPSOILED FROM ONSITE STOCKPILES. THE TOPSOIL SHALL BE SCREENED PRIOR TO PLACING.
9. ALL EARTHWORKS TESTING IS TO BE IN ACCORDANCE WITH LOCAL AUTHORITY AND AUSTRALIAN STANDARDS AS1289 AND AS1726 AS APPLICABLE.
10. EARTHWORK SPOIL IN EXCESS OF SITE FILL REQUIREMENTS SHALL BE DISPOSED OFF SITE. CONTRACTOR TO ALLOW FOR ALL ENVIRONMENTAL TESTING ASSOCIATED WITH REMOVAL OF SPOIL FROM SITE.
11. TOPSOIL TO BE STOCKPILED FOR FUTURE LANDSCAPING USE. THE LOCATION OF TOPSOIL STOCKPILE SHALL BE AS APPROVED OR DIRECTED BY THE SUPERINTENDENT. SUBJECT TO THE SUPERINTENDENTS APPROVAL TOPSOIL IN EXCESS TO SITE REQUIREMENTS SHALL BE DISPOSED OFF SITE.
12. PRIOR TO EARTH FILLING WORKS ALL VEGETATION AND TOPSOIL SHALL BE STRIPPED. THE EXPOSED EMBANKMENT FOUNDATION SHALL BE MOISTURE CONDITIONED AND COMPACTED TO A MINIMUM OF 98% STANDARD COMPACTION PRIOR TO FILLING OR PAVEMENT CONSTRUCTION.
13. ANY SOFT OR WEAK AREAS IDENTIFIED DURING THE COMPACTION PROCESS THAT DO NOT RESPOND TO FURTHER COMPACTION, SHOULD BE REMOVED AND REPLACED WITH SELECT FILL IN LAYERS NOT EXCEEDING 200mm LOOSE THICKNESS AND EACH LAYER COMPACTED TO ACHIEVE A DRY DENSITY RATIO OF 98%.
14. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTING AND MAINTAINING A TEMPORARY SITE DRAINAGE SYSTEM AND TO MAINTAIN THE SITE IN A DRY AND STABLE CONDITION. DETAILS OF THE DRAINAGE SYSTEM SHALL BE SUBMITTED FOR THE APPROVAL OF THE SUPERINTENDENT.
15. ALL COMPACTION TO BE CARRIED OUT IN ACCORDANCE WITH COMPACTION PROCEDURES AS DEFINED IN AS–1289 5.2.1 TEST PROCEDURE. CERTIFICATION IS TO BE AN INDEPENDENT GEOTECHNICAL ENGINEER (AT CONTRACTORS EXPENSE). CONTRACTOR TO ADHERE TO ALL COMPACTION HOLD INSPECTIONS.
16. BENEATH PAVEMENTS A NON–EXPANSIVE APPROVED SELECT FILL SHALL BE PLACED WHERE REQUIRED IN UNIFORM LAYERS NOT TO EXCEEDING 200mm LOOSE THICKNESS AND COMPACTED TO ACHIEVE A MINIMUM DRY DENSITY RATIO OF 98%. REFER TO RELEVANT SECTION IN CIVIL SPECIFICATION.

EROSION AND SEDIMENT CONTROL NOTES:

1. PRIOR TO ANY WORKS COMMENCING ON SITE THE CONTRACTOR SHALL ESTABLISH, MANAGE, MAINTAIN AND MONITOR ALL PROPOSED EROSION & SEDIMENT CONTROL MEASURES (INCLUDING BUT NOT LIMITED TO SEDIMENT FENCES, SEDIMENT BASINS, DIVERSION DRAINS, ETC.) AND MODIFY OR INSTALL ADDITIONAL OR ALTERNATIVE MEASURES DURING THE CONSTRUCTION AND MAINTENANCE PERIODS AS REQUIRED TO COMPLY WITH:
   - THE APPROVED DRAWINGS
   - LOCAL AUTHORITY STANDARDS, GUIDELINES AND REQUIREMENTS
   - INTERNATIONAL EROSION CONTROL ASSOCIATION (IECA) STANDARDS AND GUIDELINES
   - ALL STATUTORY REQUIREMENTS
   - ANY ADDITIONAL DIRECTIONS FROM THE SUPERINTENDENT
2. SOIL EXPOSURE SHOULD BE LIMITED, IN ORDER OF PRIORITY, BY:
   a) MAINTAINING EXISTING GRASSED AREAS CLEAR OF EARTHWORKS,
   b) MINIMISING THE EXTENT OF DISTURBANCE WORKS TO EXISTING STABILISED SURFACES,
   c) STAGING WORKS TO MINIMISE THE TOTAL AREA THAT IS EXPOSED AT ANY ON TIME, NOTING THE MAXIMUM ALLOWABLE AREA THAT CAN BE DISTURBED AT ANY ONE TIME IN ACCORDANCE WITH THE LOCAL AUTHORITY REQUIREMENTS,
   d) EFFECTIVELY STABILISING OPEN AREAS PRIOR TO RAINFALL IF WORKS ARE DELAYED OR NOT INTENDED TO OCCUR IMMEDIATELY,
   e) EFFECTIVELY ESTABLISHING GROUND COVER SUFFICIENT TO RESTRAIN EROSION (MINIMUM 80% COVERAGE OF ALL SOIL) MUST BE PROVIDED WITHIN 30 CALENDAR DAYS FROM COMPLETION OF ANY WORKS WHERE THE SOIL IS AT RISK OF ACCELERATED EROSION. DURING THE INTERIM PERIOD BETWEEN COMPLETION OF WORKS AND THE ESTABLISHMENT OF AT LEAST 80% GROUND COVER, E.S.C. MEASURES WILL BE REQUIRED (EG. SEDIMENT FENCES).
3. AT ALL TIMES DURING CONSTRUCTION ADJACENT PROPERTIES, WATER COURSES, AND DRAINAGE SYSTEMS ARE TO BE PROTECTED AGAINST SEDIMENT RUN–OFF BY THE APPLICATION OF SEDIMENT CONTROL MEASURES. ANY DAMAGE INCURRED TO THESE AREAS AS A RESULT OF THE CONTRACTORS WORKS SHALL BE RECTIFIED BY THE CONTRACTOR AT NO COST TO THE PRINCIPAL.
4. SUITABLE ACCESS SHALL BE PROVIDED AND MAINTAINED AT ALL TIMES TO ALLOW MAINTENANCE OF ALL SEDIMENT CONTROL DEVICES. CLEARING SHALL ONLY OCCUR IN AREAS WHERE THERE IS NO OTHER ALTERNATIVE TO GAIN ACCESS TO THE LOCATION OF THE APPROVED SEDIMENT CONTROL DEVICES. (CONTRACTOR SHOULD NOTE THE LOCATION OF EXISTING TREES TO BE RETAINED & VEGETATION PROTECTION AREAS).
5. ALL PERMANENT AND TEMPORARY SEDIMENT CONTROL DEVICES ARE TO BE MAINTAINED FREE OF SEDIMENT. SUCH DEVICES ARE TO BE CHECKED BY THE CONTRACTOR AT LEAST DAILY (WHEN WORK IS OCCURRING ONSITE) OR WEEKLY (WHEN WORK IS NOT OCCURRING ONSITE); WITHIN 24 HOURS OF EXPECTED RAIN AND WITHIN 18 HOURS OF A RAINFALL EVENT (I.E. AN EVENT OF SUFFICIENT INTENSITY AND DURATION TO MOBILISE SEDIMENT ONSITE). MAINTENANCE FOR E.S.C. MEASURES IS TO BE COMPLETED BY THE END OF THE DAY WHEN THEIR CAPACITY FALLS BELOW 75%.
6. THE CONTRACTOR SHALL ENSURE THAT ALL REASONABLE MEASURES ARE TAKEN TO PREVENT DUST POLLUTION IN ACCORDANCE WITH LOCAL AUTHORITY STANDARDS.
7. STOCKPILES OF TOPSOIL, SAND, AGGREGATE, SPOIL OR OTHER MATERIAL CAPABLE OF BEING MOVED BY THE ACTION OF WIND OR RUNNING WATER SHALL BE STORED CLEAR OF DRAINAGE PATHS, WITH APPROPRIATE MEASURES TO PREVENT ENTRY INTO EITHER THE ROAD AND/OR DRAINAGE SYSTEMS, INCLUDING, BUT NOT LIMITED TO CONSTRUCTION OF A SEDIMENT FENCE AROUND THE BOTTOM OF THE STOCKPILE.

STORMWATER NOTES:

1. MANHOLES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE LOCAL AUTHORITY STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE SHOWN OR DIRECTED ON SITE.
2. THE CONTRACTOR IS TO EXERCISE DUE CARE AND ATTENTION DURING PIPE INSTALLATION ENSURING PIPES ARE NOT DAMAGED DURING CONSTRUCTION AND CONSTRUCTION TRAFFIC DOES NOT EXCEED THE LOAD SPECIFIED FOR THE PIPE PROPOSED. IF THE PROPOSED PIPE CLASS WILL NOT WITHSTAND CONSTRUCTION LOAD.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE RELEVANT AUTHORITIES FOR ANY ADDITIONAL INSTALLATIONS NOT SHOWN ON THE DRAWINGS AND TO ENSURE THAT THE EXISTING SERVICES ARE NOT DAMAGED OR DISTURBED IN ANY WAY DURING CONSTRUCTION.
4. ALL CONNECTIONS TO EXISTING DRAINAGE PITS SHALL BE MADE IN A TRADESMAN–LIKE MANNER AND THE INTERNAL WALL OF THE PIT AT THE POINT OF ENTRY SHALL BE CEMENT RENDERED TO ENSURE A SMOOTH FINISH.
5. ALL REINFORCED CONCRETE PIPES ARE TO BE INSTALLED USING TYPE 'HS2' SUPPORT AS DEFINED IN AS 3725 – LOADS ON BURIED CONCRETE PIPES. IF ALTERNATIVE BEDDING METHODS ARE TO BE USED THE PIPE CLASS MUST BE REVIEWED.
6. CONTRACTOR IS TO ENSURE ALL STORMWATER DRAINAGE STRUCTURES ARE ADEQUATELY REINFORCED AND SHALL PROVIDE DESIGN CERTIFICATION FOR ALL REINFORCED CONCRETE LIDS.
7. ALL STORMWATER MATERIAL AND WORKMANSHIP IS TO BE SUPPLIED AND UNDERTAKEN IN ACCORDANCE WITH THE LOCAL AUTHORITY AND AUSTRALIAN STANDARD AS3500.3 AS APPLICABLE.
8. ALL STORMWATER DRAINS ARE TO BE CLASS 2 RC PIPES UNLESS NOTED OTHERWISE. ALL RC PIPES ARE TO BE RUBBER RING JOINTED. ALTERNATIVE PIPE MATERIALS MAY BE USED SUBJECT TO APPROVAL BY THE SUPERINTENDENT.
9. ALL STORMWATER DRAINAGE PIPES 225ø OR LESS TO BE SEWER QUALITY UPVC WITH SOLVENT WELDED JOINTS, UNLESS NOTED OTHERWISE.
10. ALL DRAINS BEHIND KERB AND CHANNELS SHALL BE BACKFILLED TO MATCH PAVEMENT SUBGRADE LEVEL WITH 20mm CLASS 2 FCR. COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY VALUE.
11. ALL GARDEN BEDS ARE TO BE PROVIDED WITH AG PIPES AND CONNECTED TO THE NEAREST STORMWATER DRAINAGE PIT U.N.O.
12. PIT COVER LEVELS TO MATCH SURROUNDING FINISHED LEVELS. PIT SETOUT COORDINATES ARE TO THE CENTRE OF THE PIT.
13. PIT COVERS SHALL BE GALVANISED CAST IRON, PRECAST CONCRETE COVERS OR GRATINGS AND SHALL BE CONSTRUCTED AND FIXED TO PITS IN ACCORDANCE WITH MANUFACTURERS' SPECIFICATIONS. CONCRETE INFILL FOR CAST IRON COVERS SHALL BE N32 WITH MAX AGGREGATE SIZE.
14. GRATED COVERS TO COMPLY WITH AS1428.1–2009. CIRCULAR AND SLOTTED OPENINGS SHALL NOT BE GREATER 13mm DIAMETER AND WIDTH RESPECTIVELY.
15. ALL GRATED COVERS IN PEDESTRIAN WALKWAYS SHALL COMPLY WITH AS4586 AND HAVE GRATES SET PERPENDICULAR TO EXPECTED PATH OF TRAVEL.
16. STORMWATER PIT COVERS TO COMPLY WITH SHIRE OF HINDMARSH REQUIREMENTS.
    REFER TO PIT SCHEDULE FOR ALL PIT LEVELS AND DEPTHS
17. EXISTING STORMWATER PIPE TO BE ABANDONED IS TO BE CUT AND SEALED WITH CONCRETE AT BOTH ENDS.
18. ALL TRENCHING WORKS TO BE IN ACCORDANCE WITH THE RELEVANT ACT AND REGULATIONS. DRAINAGE TRENCHES AND EXCAVATIONS BENEATH PAVEMENTS ARE TO BE BACKFILLED WITH CLASS 2 CRUSHED ROCK (20mm SIZE) AND COMPACTED TO 98 % MODIFIED DRY DENSITY OR AS SPECIFIED.
19. BACKFILL UNDER EXISTING ROADS SHALL BE AS PER REQUIREMENTS OF THE RELEVANT ROAD AUTHORITY'S STANDARD ROAD OPENING CONDITIONS.
20. ROAD RESERVE BACKFILL TO BE CLASS 2 WET-MIX CRUSHED ROCK PLACED AND COMPACTED IN SUCCESSIVE LIFTS OF NOT GREATER THAN 100mm LIFTS.
21. THE CONTRACTOR SHALL OBTAIN A ROAD OPENING PERMIT FOR ANY WORKS WITHIN THE ROAD RESERVE AND COMPLY WITH ALL REQUIREMENTS OF THE ROAD OWNER.

DESIGN FINISHED SURFACE LEVELS OF STRUCTURES ARE FOR THE CONTRACTOR'S GUIDANCE ONLY. ACTUAL FINISHED LEVELS SHALL BE SET OUT AS DIRECTED ON-SITE IN KEEPING WITH THE REQUIREMENTS AND SPECIFICATIONS OF THE LOCAL AUTHORITY AND ACTUAL FINISHED GROUND LEVELS.

LINER NOTES

1. THE CONTRACTOR TO REFER TO GEOTECHINCAL REPORT REGARDING THE TYPE A LINER REQUIREMENTS
2. THE CONTRACTOR TO REFER TO GEOTECHINCAL AND SUPPLIER SYNTHETIC LINER SPECIFICATIONS INCLUDING THICKNESS, JOINTING, PROTECTION AND ANCHORING DETAILS
3. THE CONTRACTOR MUST INCORPORATE STRICT WORK PRACTICES WHILST WORK ON TOP LINER TO ENSURE NOT POTENTIAL PENETRATION OR DAMAGE OF LINER PRIOR TO FILL. CONTRACTOR ADVISE SUPERINTENDENT OF ANY DAMAGE CAUSED DURING CONSTRUCTION AND REPAIR TO BE COMPLETED UNDER THE SUPERVISION GEOTECHNICAL ENGINEER AND SUPPLIER
4. CONTRACTOR TO PROVIDE A MANUFACTURER RECORDS AND TESTING RESULTS OF LINER FOR APPROVAL BY SUPERINTENDANT PRIOR TO INSTALLATION
5. CONTRACTOR TO ENSURE SUBGRADE HAS NOT SHARP IN/ORANIC OBJECT WITH POTENTIAL OF PIERCING THE UNDERSIDE OF LINER. HOLD POINT SUBGRADE INSPECTION IS REQUIRED PRIOR TO LAYING OF LINER

ROADWORKS & PAVEMENT NOTES:

1. SETOUT INFORMATION INCLUDING KERB DETAILING AND RADII FOR THE WORKS WILL BE PROVIDED IN DIGITAL (DWG) FORMAT. THE CONTRACTOR IS TO ADVISE IF A SETOUT TABLE INCLUSIVE OF EASTING AND NORTHINGS IS REQUIRED TO COMPLETE SETOUT FOR ADDITIONAL COST.
2. UNLESS STATED OTHERWISE, SET OUT DIMENSIONS ARE TO THE NOMINAL FACE OF KERB. IF THERE IS NO KERB, THEN TO THE EDGE OF SEAL, WHICHEVER IS APPLICABLE.
3. ALL LINEMARKING AND SIGNAGE SHALL CONFORM WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AND LOCAL AUTHORITY REQUIREMENTS.
4. ALL SIGNS TO BE CLASS 1 HIGH INTENSITY TYPE AND TO COMPLY WITH THE REQUIREMENTS OF A.S.1743 -2001.
5. ALL LINE MARKING TO BE SOLVENT BASED PAINT OF LONG LIFE QUALITY IN ACCORDANCE WITH VIC ROADS REQUIREMENTS AND AS1742.
6. ROAD PAVEMENT MARKINGS TO BE MARKED OUT WITH 100mm WHITE LINES UNLESS DENOTED OTHERWISE. CAR PARKING BAYS MARKINGS ARE TO BE 80mm WIDE LINES.
7. AT LIMITS OF CONSTRUCTION/STAGE BOUNDARIES, INTERFACES TO BE MADE FREE DRAINING AND GRADE AT MAX 1:4, MIN 1:100. UNLESS SHOWN OTHERWISE.
8. ANY DAMAGE TO EXISTING KERB AND CHANNEL OR FOOTPATH IS TO BE REPAIRED, INCLUDING REMOVAL OF CONCRETE SLURRY FROM FOOTPATHS, ROADS, KERB AND CHANNEL, STORMWATER PITS AND DRAIN LINES.
9. ROAD DIMENSIONS ARE TO THE NOMINAL EDGE OF CRUSHED ROCK PAVEMENT LINE IF NO KERB, SHOWN. SETOUT COORDINATES FOR PAVEMENT LINES ARE TO THE EGDE OF PAVEMENT.
10. ALL ACTIVITIES WITHIN ROAD RESERVE SHALL BE ARRANGED TO MINIMIZE THE EFFECT ON TRAFFIC AND PEDESTRIAN ADJACENT TO THE WORKS. BARRIERS AND TRAFFIC CONTROL SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH VIC ROADS REQUIREMENTS, WORKPLACE HEALTH AND SAFETY LEGISLATION AND LOCAL AUTHORITY REQUIREMENTS. THE CONTRACTOR IS TO ORGANISE NECESSARY APPROVALS AND PLANS IN CONJUNCTION WITH ANY WORKS WITHIN OR ADJACENT TO ROAD RESERVES.
11. EXISTING SERVICES INCLUDING ANY SERVICE OR PIT COVERS SHALL BE RAISED OR LOWERED TO SUIT THE NEW FINISHED SURFACE LEVEL.
12. WHERE NEW PATHS AND ACCESS POINTS MATCH INTO EXISTING, THE EXISTING SURFACE IS TO BE SAW CUT AND MATCHED NEATLY.
13. PAVEMENT DEPTH SPECIFIED IS A MINIMUM DEPTH AND MAY BE VARIED BY THE SUPERINTENDENT/OR THEIR REPRESENTATIVE. SOFT SPOTS SHALL BE EXCAVATED TO A PROOF ROLLED BASE AND BACKFILLED WITH APPROVED MATERIAL COMPACTED IN 150mm LAYERS TO ACHIEVE TO A DENSITY NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY VALUE DETERMINED BY THE STANDARD COMPACTION TEST IN ACCORDANCE WITH A.S.1289.5.1.1-2003.
14. THE CONTRACTOR SHALL ENSURE THAT THE SITE IS DRAINED SUCH THAT WATER CANNOT POND AGAINST OR NEAR THE BUILDING. THE PAVING IMMEDIATELY ADJACENT OR NEAR THE BUILDING SHALL BE GRADED AT 1:40 AWAY FROM THE BUILDING U.N.O.

THE CONTRACTOR SHALL CHECK AND CONFIRM "AS CONSTRUCTED" LEVELS AND DETAILS OF EXISTING CONNECTING WORKS AND CROSSINGS PRIOR TO COMMENCEMENT OF NEW WORK. IF A VARIATION OCCURS CONTACT CIVIL ENGINEER PRIOR TO CONSTRUCTION.

THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE HYDRAULIC, ELECTRICAL AND IRRIGATION RETICULATION PLANS. THE CONTRACTOR SHALL ENSURE THAT ALL ROAD CROSSING CONDUITS ARE INSTALLED PRIOR TO CONSTRUCTION OF ANY PAVEMENTS. CONTACT THE SUPERINTENDENT IF A VARIATION OR CLASH OCCURS.

SUPERINTENDEN REQUIREMENTS:

1. ALL WORKS TO BE CONDUCTED IN ACCORDANCE WITH THE COUNCIL REQUIREMENTS.
2. THE CONTRACTOR MUST OBTAIN AND SUBMIT TRAFFIC/PEDESTRIAN MANAGEMENT PLANS TO THE COUNCIL PRIOR TO WORKS.
3. ALL AREAS AFFECTED BY WORKS ARE TO BE MINIMIZED AT ALL TIMES AND BE MADE GOOD AT COMPLETION OF WORKS TO THE SATISFACTION OF THE SUPERINTENDENT AND THE COUNCIL.
4. COUNCIL WILL REQUIRE THAT A TRAFFIC MANAGEMENT PLAN BE SUBMITTED FOR APPROVAL WHEN A ROAD IS CLOSED, WHEN WORKS ARE AT AN INTERSECTION, TRAFFIC LANES ARE EFFECTED BY THE WORKS OR WHEN FOOTPATHS ARE CLOSED.
5. 1500mm MIN FOOTPATHS ARE TO BE MAINTAINED AT ALL TIMES AND IF WIDTH NOT AVAILABLE PROVIDE ADVISORY SIGNS REQUESTING PEDESTRIANS TO USE OPPOSITE FOOTPATH.
6. CONTRACTOR TO MEET ALL ABUTTING PROPERTIES REASONABLE ACCESS REQUIREMENTS THAT THEY MAY HAVE.
7. THE WORKS SHALL NOT IMPACT ON THE OPERATIONS OF BUSINESSES, HOTELS, RESTAURANTS, STREET VENDORS, OFF STREET CAR PARKS ETC. ALL PARKING AND NO STOPPING RESTRICTIONS SHALL BE OBSERVED.
8. THE WORKS/INSTALLATION SHALL NOT INTERFERE WITH COUNCILS AND PRIVATE DRAINAGE INFRASTRUCTURE INCLUDING SURFACE DRAINS.
9. THE CONTRACTOR SHALL AGREE TO A DEFECTS LIABILITY PERIOD FOR THE BACKFILLING OF ONE (1) YEAR COMMENCING FROM THE DATE OF WORK. ANY DEFECTS FOUND BY COUNCIL WITHIN THE ONE YEAR PERIOD SHALL BE RECTIFIED BY THE APPLICANT/CONTRACTOR TO COUNCILS SATISFACTION WITHIN TWO WEEKS OF NOTIFICATION IN WRITING.
10. IF COUNCILS INFRASTRUCTURE SUCH AS PARKING SIGNS, ROAD OR LINE MARKINGS, PARKING METERS TICKET MACHINES OR SUPPORTING CABLES/CONDUITS, IRRIGATION PIPES OR STREET FURNITURE ARE REMOVED OR DAMAGED AS A RESULT OF THE WORKS THE CONTRACTOR SHALL, AT COMPLETION OR WORKS, ARRANGE AND PAY FOR THEIR REINSTATEMENT.

CLIENT REQUIREMENTS:

1. THE CONTRACTOR MUST SUBMIT TRAFFIC/PEDESTRIAN MANAGEMENT PLANS TO THE CLIENT PRIOR TO WORKS. THE CONTRACTOR IS TO ENSURE THAT AT LEAST A SINGLE LANE ACCESS AROUND THE WORKS IS MADE AVAILABLE AT ALL TIMES DURING CONSTRUCTION.
2. IF THE CLIENT'S INFRASTRUCTURE SUCH AS PARKING SIGNS, ROAD OR LINE MARKINGS, IRRIGATION PIPES OR STREET FURNITURE, ETC. ARE REMOVED OR DAMAGED AS A RESULT OF THE WORKS THE CONTRACTOR SHALL, AT COMPLETION OR WORKS, ARRANGE AND PAY FOR THEIR REINSTATEMENT

GEOTECHNICAL NOTES:

1. THE CONTRACTOR IS TO REVIEW THE GEOTECHNICAL REPORT AND CIVIL SPECIFICATION FOR SUBGRADE PREPARATION, SOIL PARAMETERS AND CONSTRUCTION METHODOLOGY TO SUIT THE CONDITIONS ONSITE. THE CONTRACTOR'S ATTENTION IS DRAWN TO THE REQUIREMENT TO STRIP THE EXISTING NATURAL TOPSOIL / FILLING AND FOUND WORKS ON NATURAL UNDISTURBED STIFF CLAY OR THE UNDERLYING BASALT ROCK.
2. CONTRACTOR TO REFER TO THE FOLLOWING GEOTECHNICAL INVESTIGATION REPORT:
   PREPARED BY - Douglas Partners Pty Ltd
   REPORT NUMBER - 231031.00
   ISSUE DATE - 02.12.2024

A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER (AT CONTRACTOR EXPENSE) IS TO BE ENGAGED BY THE CONTRACTOR TO WITNESS AND APPROVE THE SUBGRADE PREPARATION WORKS AND FINAL PROOF ROLLING AS ADEQUATE FOR CONSTRUCTION.

PIPEWORK AND FITTINGS:

1. THE CONTRACTOR TO REFER TO AND POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPES ADHERE TO APPLICABLE STANDARDS AND GUIDELINES, SUCH AS: ISO 2531: DUCTILE IRON PIPES, FITTINGS, AND ACCESSORIES. AWWA C105: POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPES. AWWA C151: DUCTILE IRON PIPE, CENTRIFUGALLY CAST. ASTM D3350: STANDARD FOR POLYETHYLENE MATERIALS USED IN PIPE LINING. LOCAL CODES AND REGULATIONS: FOLLOW LOCAL PLUMBING AND CIVIL ENGINEERING STANDARDS.
2. FOLLOW MANUFACTURER GUIDELINES: REVIEW THE MANUFACTURER'S SPECIFICATIONS FOR HANDLING, JOINING, AND INSTALLATION TO AVOID DAMAGING THE PLASTIC LINING. INSPECT MATERIALS: CHECK FOR DAMAGE (E.G., CRACKS, DENTS, OR EXPOSED LINING) IN THE PIPES AND FITTINGS BEFORE INSTALLATION. VERIFY PIPE ALIGNMENT: CONFIRM PIPE GRADE, ALIGNMENT, AND JOINT CONFIGURATION TO MINIMIZE STRESS DURING INSTALLATION. PROPER EQUIPMENT: USE PADDED SLINGS, SPREADER BARS, OR OTHER NON–ABRASIVE LIFTING DEVICES TO PREVENT DAMAGE TO THE PIPE EXTERIOR OR LINING.
3. AVOID IMPACT: DO NOT DROP OR DRAG PIPES TO PREVENT DAMAGE TO THE LINING.PROTECT THE LINING: USE PROTECTIVE CAPS ON PIPE ENDS DURING STORAGE AND TRANSPORT TO PROTECT THE PLASTIC LINING FROM CONTAMINATION OR PHYSICAL DAMAGE.STORE SAFELY: KEEP PIPES STORED ON FLAT SURFACES OR WOODEN SUPPORTS TO PREVENT WARPING OR CRACKING OF THE LINING.
4. BEDDING AND BACKFILL: USE A WELL–COMPACTED GRANULAR MATERIAL FOR THE PIPE BEDDING AND INITIAL BACKFILL. AVOID SHARP STONES OR MATERIALS THAT CAN DAMAGE THE PIPE.TRENCH DEPTH AND WIDTH: FOLLOW THE DESIGN SPECIFICATIONS TO ENSURE ADEQUATE COVER AND SPACE FOR ASSEMBLY WHILE MINIMISING MOVEMENT AFTER INSTALLATION. RECIRCULATION PIPEWORKS TO BE HAVE THE THE CORRECT
5. INSPECT AND CLEAN JOINT AREAS:REMOVE ANY DEBRIS, DIRT, OR BURRS FROM THE PIPE ENDS.ENSURE THE GASKET AND INTERNAL LINING ARE CLEAN AND FREE OF CONTAMINANTS.LUBRICATE GASKETS: USE APPROVED, NON–PETROLEUM–BASED LUBRICANTS TO PREVENT DAMAGE TO THE GASKET OR PLASTIC LINING. ENSURE ALIGNMENT: ALIGN PIPES PROPERLY BEFORE INSERTING THE SPIGOT END INTO THE BELL OR COUPLING. AVOID EXCESSIVE FORCE, AS MISALIGNMENT CAN DAMAGE THE LINING.FOLLOW MANUFACTURER'S TORQUE SPECS: IF MECHANICAL JOINTS OR FLANGES ARE USED, TIGHTEN BOLTS EVENLY IN A CRISS CROSS PATTERN TO AVOID WARPING OR DAMAGING THE FLANGE.
6. CHECK FOR DAMAGE POST–ASSEMBLY: INSPECT JOINTS FOR TEARS, BUCKLING, OR GAPS IN THE LINING. REPAIR MINOR DEFECTS WITH LINING REPAIR KITS AS PER THE MANUFACTURER'S INSTRUCTIONS. PROTECT DURING BACKFILLING: AVOID CONTACT WITH HEAVY MACHINERY OR SHARP OBJECTS DURING THE BACKFILLING PROCESS TO PREVENT DAMAGE TO THE LINING.'S DESIGN LIMITS, AS EXCESS PRESSURE CAN COMPROMISE THE LINING.
7. HYDROSTATIC TESTING: TEST THE PIPELINE AT THE PRESSURE SPECIFIED BY THE MANUFACTURER OR PROJECT REQUIREMENTS. LIMIT TEST DURATIONS TO AVOID DAMAGING THE LINING.AVOID OVER–PRESSURIZATION: ENSURE PRESSURE TESTING DOES NOT EXCEED THE PIPE.
8. MAINTENANCE AND INSPECTION POST–INSTALLATION CHECKS: PERFORM PERIODIC INSPECTIONS TO ENSURE THE PIPELINE IS FREE OF LEAKS OR BLOCKAGES. CORROSION PROTECTION: ENSURE EXTERNAL PROTECTIVE COATINGS OR ENCASEMENTS (LIKE POLYETHYLENE WRAPS) ARE PROPERLY INSTALLED TO PROTECT THE PIPE EXTERIOR FROM CORROSION.
9. CONTRACTOR TO AWWA C105: GUIDELINES FOR POLYETHYLENE ENCASEMENT AND DUCTILE IRON PIPE INSTALLATIONS, WHICH INCLUDE RECOMMENDATIONS FOR VIBRATION ISOLATION AND STRAPPING. CONTRACTOR TO NOMINATED ISO 9001 CERTIFIED PRODUCT FOR SUPERINTENDANT APPROVAL ADS PIPEWORK AND FITTING.
10. CONTRACTOR TO ENSURE THE ALL ADS PIPE INSTALLATIONED HAS A WATER TIGHT SEAL AND MAY REQUIRE ADDITIONAL SEALING AROUND THE JOINT FOR EXTRA PROTECTION AGAINST INFILTRATION OR EXFILTRATION. USE A PIPE JOINT SEALANT SPECIFICALLY RECOMMENDED BY THE MANUFACTURER, AND ENSURE IT IS APPLIED EVENLY AROUND THE CONNECTION.
11. ASTM D3034: STANDARD FOR PVC PIPES AND FITTINGS FOR STORM SEWER AND OTHER GRAVITY–FLOW APPLICATIONS. ASTM F477: STANDARD SPECIFICATION FOR ELASTOMERIC SEALS (GASKETS) FOR JOINING PLASTIC PIPE. AWWA C900: POLYVINYL CHLORIDE (PVC) PIPE FOR WATER DISTRIBUTION SYSTEMS.
12. CONTRACTOR FLUSH PIPE WORKS FOLLOWING INSTALL REMOVE ANY BUILDUP OR DEBRIS THAT MAY OBSTRUCT WATER FLOW AND COMPROMISE THE SEALING.
13. CONTRACTOR TO INSTALL DOUBLE ARE RELEASE VALVES AT ALL PRESSURE PIPE HIGH POINTS. VALVE TO BE LOCATED NOM. 500MM ABOVE GROUND. NOT TO BE INSTALLED ON VACUUM /RECIRCULATIONS PUMPS
14. HYDRAULIC ENGINEER TO NOMINATE HEAD PRESSURE AT DESIGN CAPACITY. PUMP SUPPLIER TO PROVIDE PERFORMANCE CURVE FOR HYDRAULIC ENGINEER APPROVAL ALL PUMPS TO HAVE HOUR RUN METERS DISTRIBUTION BOARDS LOCATED IN PUMP HOUSE

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REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE:
SHEET SIZE: A1
NORTH: PROJECT NORTH

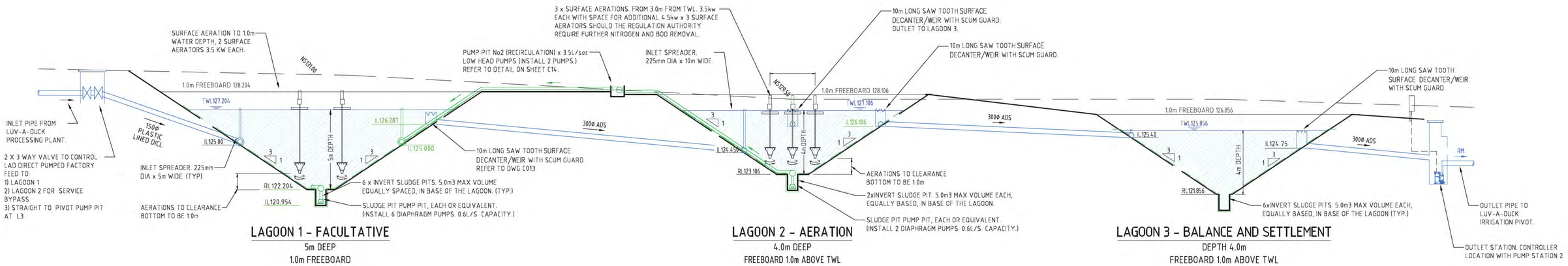
[redacted]

PROJECT: WASTEWATER TREATMENT FACILITIES
160 RUPPS ROAD
NHILL VICTORIA 3418

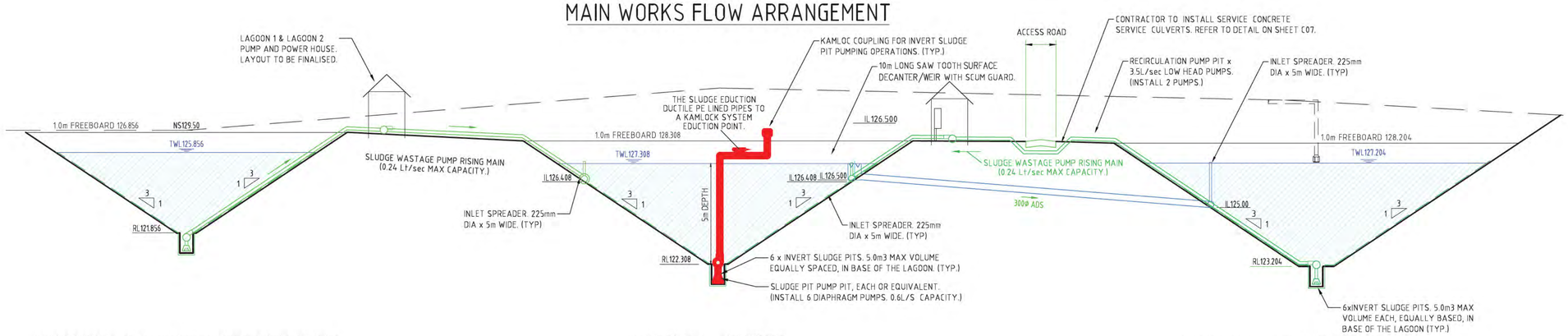
4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001:2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

DRAWING TITLE: GENERAL NOTES
JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C002
REV: T1

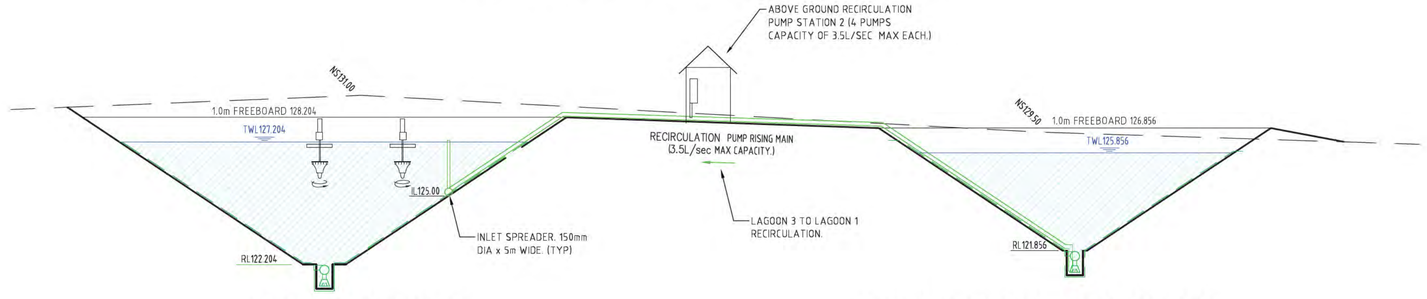
4/06/2024 3:01:43 PM



MAIN WORKS FLOW ARRANGEMENT



LAGOON 4 BYPASS FLOW ARRANGEMENT



LAGOON 3 BYPASS FLOW ARRANGEMENT

HORIZ 0 2.5 5 7.5 10 12.5 15 17.5 20 — SCALE 1:250 (A1) — SCALE 1:500 (A3)

VERTICAL 0 1.25 2.5 3.75 5 6.25 7.5 8.75 1 — SCALE 1:125 (A1) — SCALE 1:25 (A3)

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P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

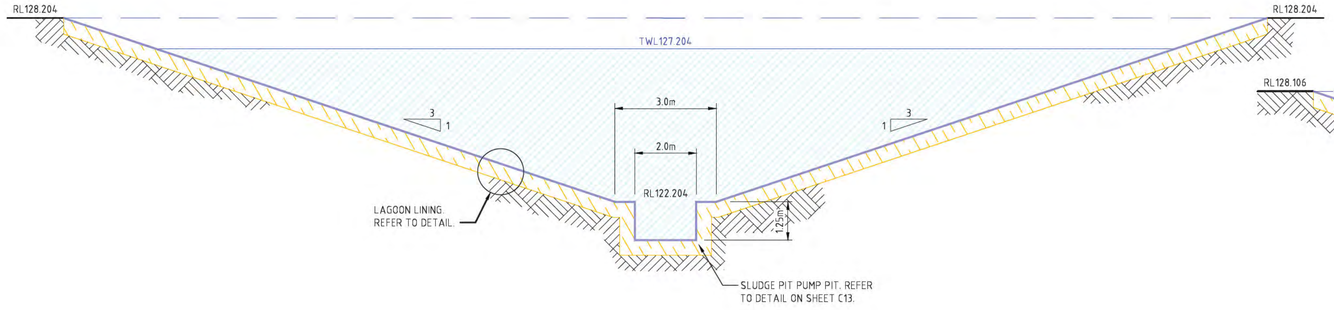
DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: H: 1:250 V: 1:125
SHEET SIZE: A1
NORTH: PROJECT NORTH

PROJECT:
WASTEWATER TREATMENT FACILITIES
160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
HYDRAULIC PROFILE

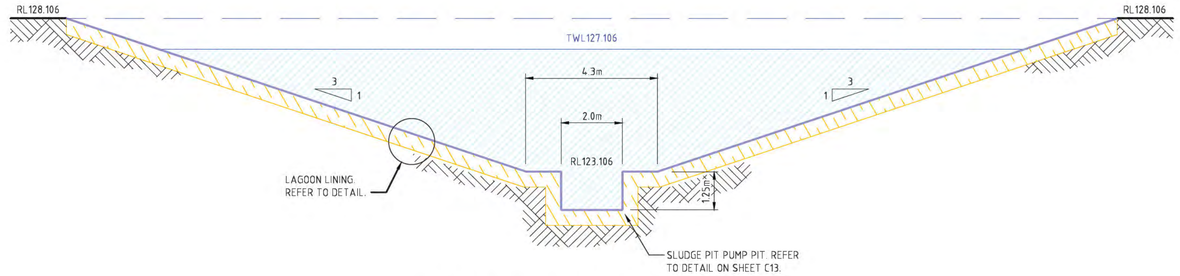
JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C003
REV: T1

4/06/2024 3:01:43 PM



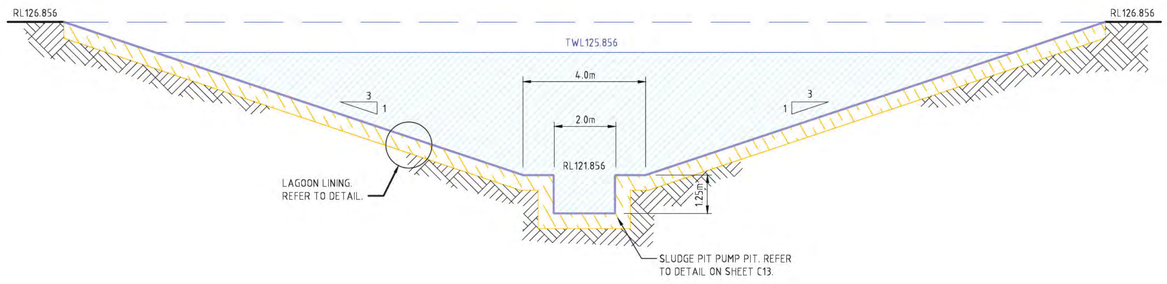
LAGOON 1 TYPICAL CROSS SECTION

1 / C04 SECTION
SCALE 1:100



LAGOON 2 TYPICAL CROSS SECTION

2 / C04 SECTION
SCALE 1:100



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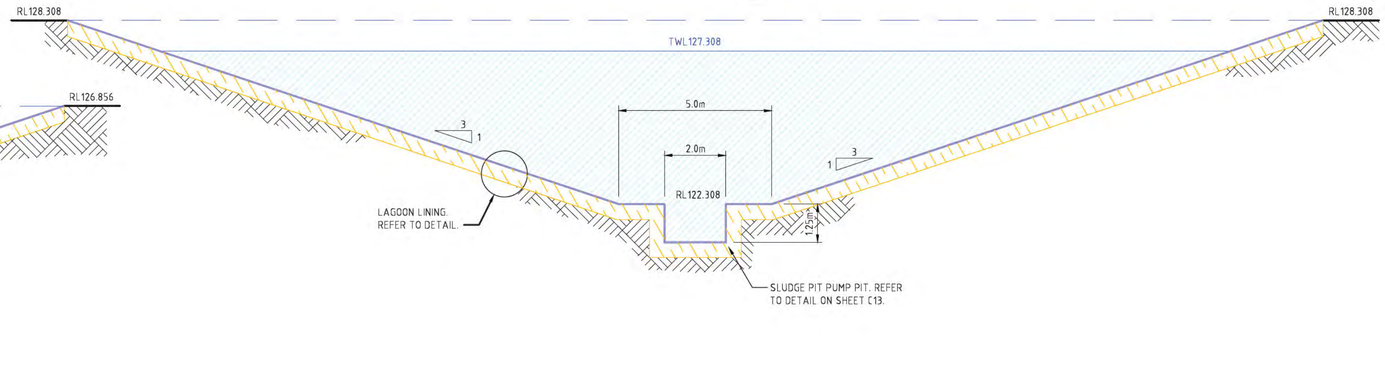
3 / C04 SECTION
SCALE 1:100



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4 / C04 SECTION
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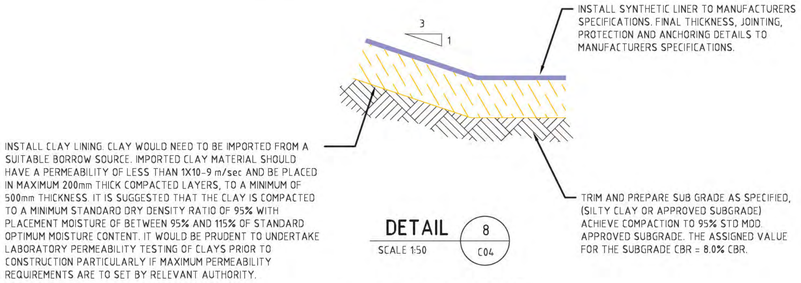
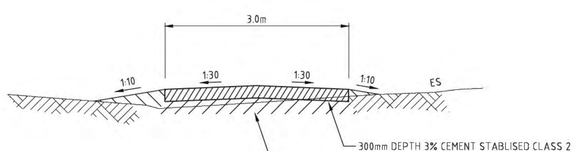


DETAIL 8 / C04
SCALE 1:50

LAGOON LINING DETAIL

FOR ALL TECHINICAL DETAILS REFER TO
- DOUGLAS PARTNERS Pty Ltd
- REPORT ON GEOTECHNICAL INVESTIGATION

WASTEWATER TREATMENT LAGOONS
- 160 RUPPS ROAD, NHILL VIC
- PROJECT 231031.00



ACCESS TRACK TYPICAL CROSS SECTION

5 / C04 SECTION
SCALE 1:100

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SCALE 1:100 (A1) 0 1 2 3 4 5 6 7 8 SCALE 1:200 (A3)

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P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED:	M MASINA
DRAWN:	M MASINA
SCALE:	1:100
SHEET SIZE:	A1
NORTH:	PROJECT NORTH

[redacted]

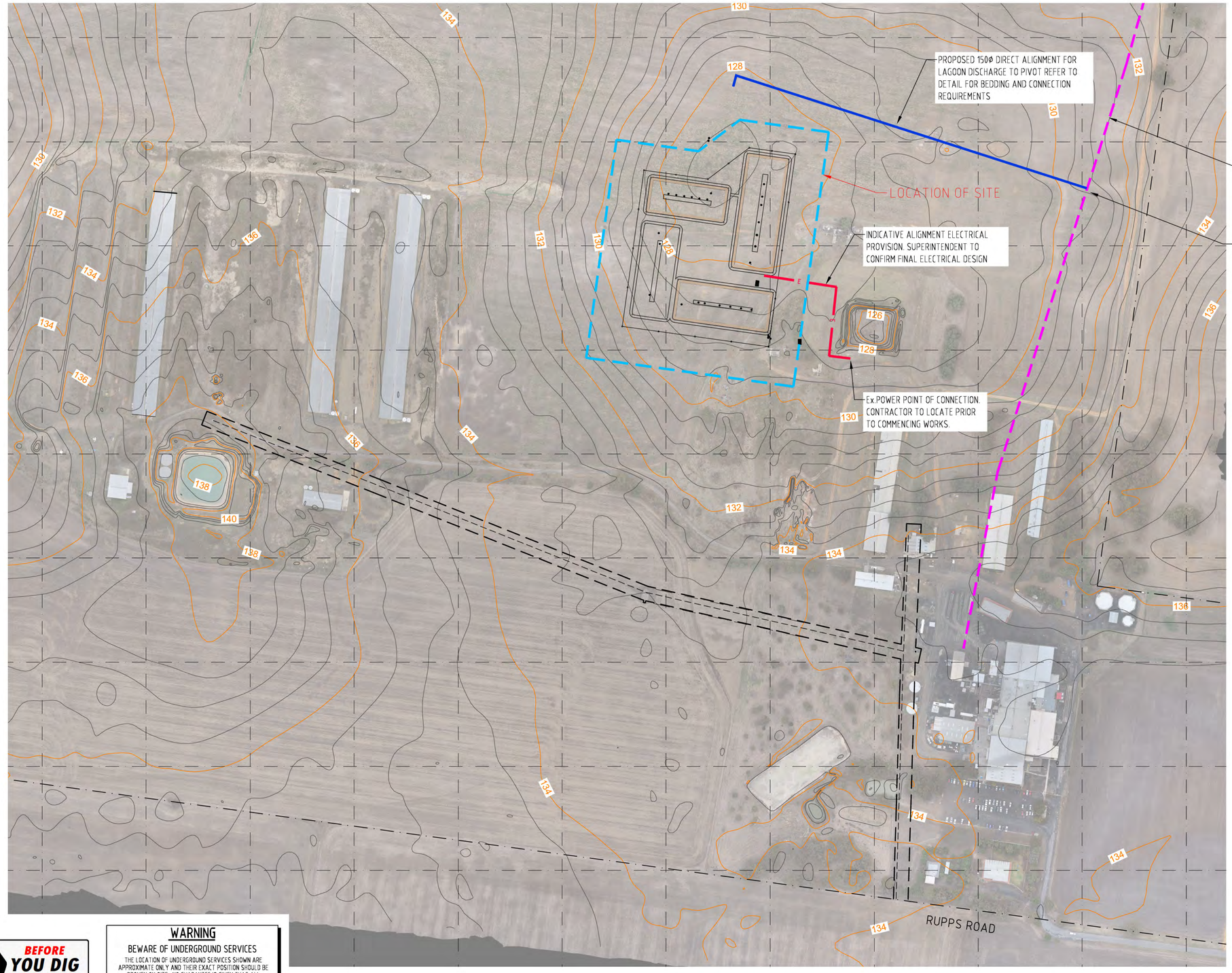
PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
HYDRAULIC PROFILE

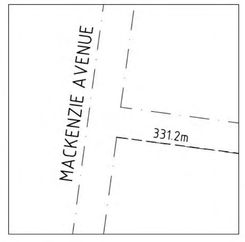
JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C003
REV.: T1

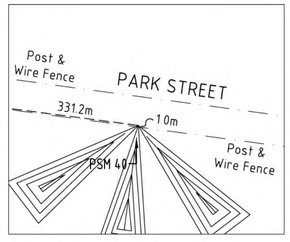
4/06/2024 3:01:43 PM



Ex.250mm PN16 HDPE - CURRENT PIPELINE TO PIVOT

CONNECT PROPOSED 150Ø MAIN TO Ex.250 PE MAIN VIA TAPPING UNDER PRESSURE. REFER TO STD. DWG. MRWA-W-106 - FIG. 106A FOR DETAILS.





PERMANENT SURVEY MARK PSM 40

GENERAL
LGA: HINDMARSH
CODE: 330
LOCALITY: NHILL
PARISH: BALROOTAN
CODE: 2056

COORDINATES
MGA2020 557558.078, 5979567.233 (54)

REDUCED LEVEL
RL126.958

0 20 40 60 80 100 120 140 160
SCALE 1:2000 (A1) SCALE 1:4000 (A3)

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P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED:	M MASINA
DRAWN:	M MASINA
SCALE:	1:2000
SHEET SIZE:	A1
NORTH:	PROJECT NORTH

[redacted]

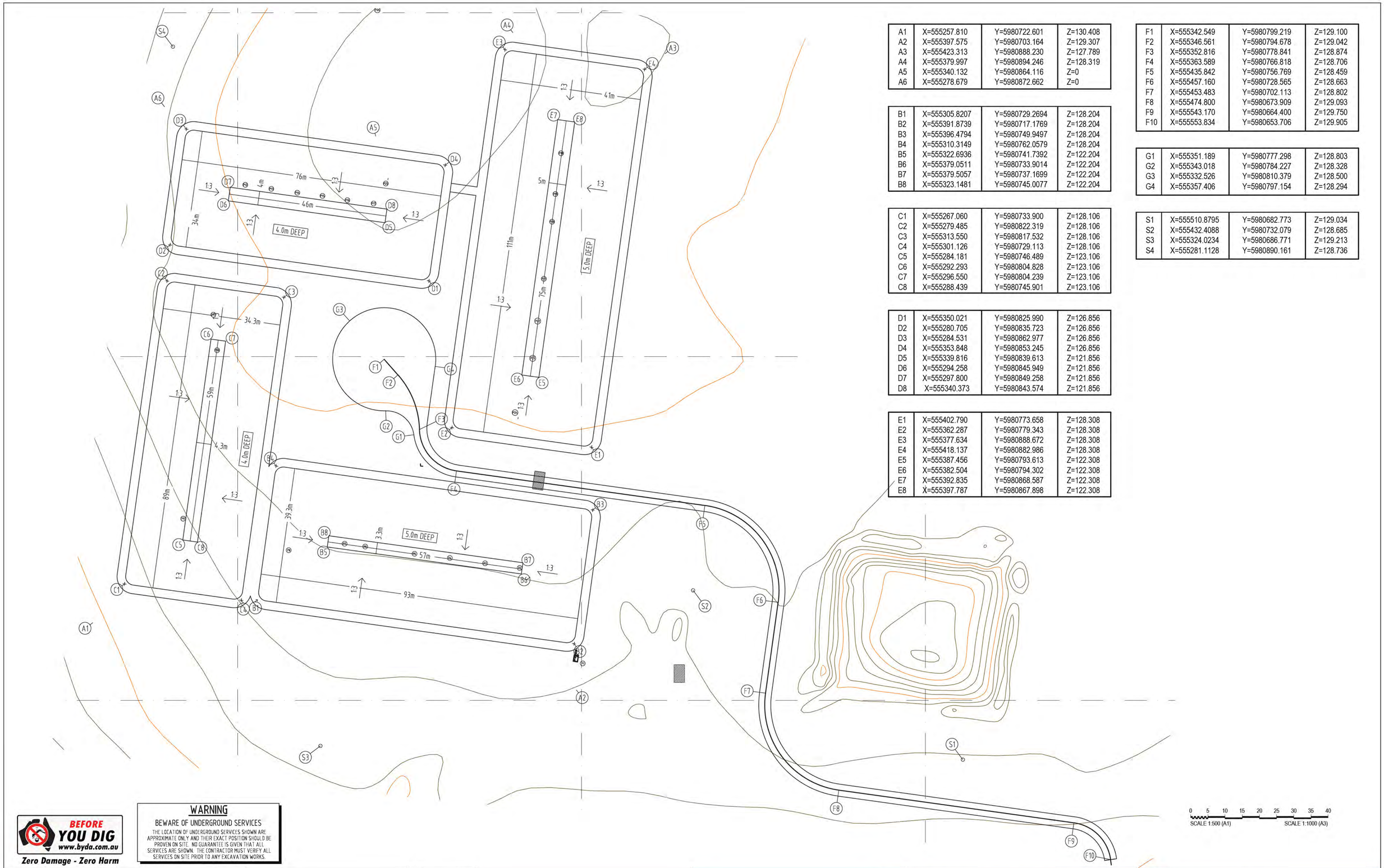
PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
EXISTING CONDITIONS PLAN

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C005
REV: T1

4/06/2024 3:01:43 PM



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A4	X=555379.997	Y=5980894.246	Z=128.319
A5	X=555340.132	Y=5980864.116	Z=0
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B2	X=555391.8739	Y=5980717.1769	Z=128.204
B3	X=555396.4794	Y=5980749.9497	Z=128.204
B4	X=555310.3149	Y=5980762.0579	Z=128.204
B5	X=555322.6936	Y=5980741.7392	Z=122.204
B6	X=555379.0511	Y=5980733.9014	Z=122.204
B7	X=555379.5057	Y=5980737.1699	Z=122.204
B8	X=555323.1481	Y=5980745.0077	Z=122.204

C1	X=555267.060	Y=5980733.900	Z=128.106
C2	X=555279.485	Y=5980822.319	Z=128.106
C3	X=555313.550	Y=5980817.532	Z=128.106
C4	X=555301.126	Y=5980729.113	Z=128.106
C5	X=555284.181	Y=5980746.489	Z=123.106
C6	X=555292.293	Y=5980804.828	Z=123.106
C7	X=555296.550	Y=5980804.239	Z=123.106
C8	X=555288.439	Y=5980745.901	Z=123.106

D1	X=555350.021	Y=5980825.990	Z=126.856
D2	X=555280.705	Y=5980835.723	Z=126.856
D3	X=555284.531	Y=5980862.977	Z=126.856
D4	X=555353.848	Y=5980853.245	Z=126.856
D5	X=555339.816	Y=5980839.613	Z=121.856
D6	X=555294.258	Y=5980845.949	Z=121.856
D7	X=555297.800	Y=5980849.258	Z=121.856
D8	X=555340.373	Y=5980843.574	Z=121.856

E1	X=555402.790	Y=5980773.658	Z=128.308
E2	X=555362.287	Y=5980779.343	Z=128.308
E3	X=555377.634	Y=5980888.672	Z=128.308
E4	X=555418.137	Y=5980882.986	Z=128.308
E5	X=555387.456	Y=5980793.613	Z=122.308
E6	X=555382.504	Y=5980794.302	Z=122.308
E7	X=555392.835	Y=5980868.587	Z=122.308
E8	X=555397.787	Y=5980867.898	Z=122.308

F1	X=555342.549	Y=5980799.219	Z=129.100
F2	X=555346.561	Y=5980794.678	Z=129.042
F3	X=555352.816	Y=5980778.841	Z=128.874
F4	X=555363.589	Y=5980766.818	Z=128.706
F5	X=555435.842	Y=5980756.769	Z=128.459
F6	X=555457.160	Y=5980728.565	Z=128.663
F7	X=555453.483	Y=5980702.113	Z=128.802
F8	X=555474.800	Y=5980673.909	Z=129.093
F9	X=555543.170	Y=5980664.400	Z=129.750
F10	X=555553.834	Y=5980653.706	Z=129.905

G1	X=555351.189	Y=5980777.298	Z=128.803
G2	X=555343.018	Y=5980784.227	Z=128.328
G3	X=555332.526	Y=5980810.379	Z=128.500
G4	X=555357.406	Y=5980797.154	Z=128.294

S1	X=555510.8795	Y=5980682.773	Z=129.034
S2	X=555432.4088	Y=5980732.079	Z=128.685
S3	X=555324.0234	Y=5980686.771	Z=129.213
S4	X=555281.1128	Y=5980890.161	Z=128.736

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WARNING

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REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: 1:500
SHEET SIZE: A1
NORTH: PROJECT NORTH

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
SITE SETOUT PLAN

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C006
REV.: T1

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LAGOON 3 – BALANCE AND SETTLEMENT

DEPTH 4.0m
FREEBOARD 1.0m ABOVE TWL
VOLUME 2,400m3 MIN.
2.4 meg LITRES

LAGOON 4 – SLUDGE

DEPTH 5.0m
FREEBOARD 1.0m ABOVE TWL
VOLUME 7,200m3 MIN.
7.20 meg LITRES

LEGEND:

- E — ELECTRICITY (UNDERGROUND)
- GRAVITY SEWERAGE LINE
- PRESSURE PUMP LINE
- PE SLUDGE EDUCTION PUMP LINE
- RETICULATION PUMP LINE
- INVERT SLUDGE PIT
- 10m LONG SAW TOOTH SURFACE DECANTER / WEIR
- INLET SPREADER
- 123.2 — FINISHED SURFACE CONTOURS
- BL123.204 — BOTTOM OF LAGOON LEVEL
- TWL127.204 — TOP WATER LEVEL OF LAGOON
- TL128.204 — TOP OF LAGOON LEVEL
- TWL121.208 — INVERT LEVEL
- BATTER
- PROPOSED PAVEMENT
- PROPOSED SHOULDER
- PROPOSED PROPOSED TOP OF LAGOON
- PROPOSED SHOULDER

DISCHARGE RM TO IRRIGATION PIVOT.
PUMP STATION AND VALVE CHAMBER No.3 (OUTLET) WITH REFER TO PLAN C016
150Ø PE BYPASS RISING MAIN
3000 ADS @ 1:50
BOUNDARY LINE
100DIA SLOTTED CLASS 9 PRESSURE PIPE TO ALLOW FOR TRAPPED AIR RELEASE UNDER LINER (TYP.)
6 x INVERT SLUDGE PITS. 5.0m³ MAX VOLUME EACH, EQUALLY BASED IN BASE OF THE LAGOON (TYP) REFER TO DETAIL ON SHEET C13
10M LONG SAW TOOTH SURFACE DECANTER / WEIR WITH SCUM GUARD (TYP) REFER TO DETAIL ON SHEET C13
INLET SPREADER ADS 450mm DIA x 5m WIDE. (TYP) REFER TO DETAIL ON SHEET C13
10m LONG SAW TOOTH SURFACE DECANTER / WEIR WITH SCUM GUARD (TYP) REFER TO DETAIL ON SHEET C13
2 x 300Ø ADS PIPE @ 1:100
CONTRACT TO NOMINATE PREFAB PUMP STATION HOUSE. THE VENTILATION MUST HAVE WHIRLYBIRDS AND FANS TO ALLOW FOR 3 AIR CHANGE PER/HR
L2 AND L3 PUMP HOUSE.
2 WAY VALVE TO MANUALLY RECIRCULATION
LAGOON 4 SLUDGE EDUCTION POINT REFER TO DETAIL ON SHEET C13
INLET SPREADER 225mm DIA x 5m WIDE. (TYP) REFER TO DETAIL ON SHEET C13
RODDING PORT/INSPECTION OPENING LOCATED AT TOP OF EMBANKMENT. (TYP.)
CAMLOCK COUPLING FOR INVERT SLUDGE PIT PUMPING OPERATIONS. (TYP) REFER TO DETAIL ON SHEET C13
100DIA SLOTTED CLASS 9 PRESSURE PIPE TO ALLOW FOR TRAPPED AIR RELEASE UNDER LINER (TYP.)
INVERT SLUDGE PITS. 5.0m³ MAX VOLUME EACH, EQUALLY BASED, IN BASE OF THE LAGOON (TYP) REFER TO DETAIL ON SHEET C13
1500 PE @ 1:100
MATCHLINE
FOR CONTINUATION REFER TO SHEET C008
MATCHLINE

SCALE 1:250 (A1) SCALE 1:500 (A3)

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P1	PRELIMINARY ISSUE	29.11.24

PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: 1:250
SHEET SIZE: A1
NORTH: PROJECT NORTH

PROJECT:
WASTEWATER TREATMENT FACILITIES
160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
CIVIL LAYOUT PLAN - SHEET 1 OF 2

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C007
REV.: T1

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001:2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

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MATCHLINE

FOR CONTINUATION REFER TO SHEET C007

MATCHLINE

LAGOON 4 SLUDGE EDUCTION POINT. REFER TO DETAIL ON SHEET C13

MANUALLY RECIRCULATION

INVERT SLUDGE PITS. 5.0m³ MAX VOLUME EACH, EQUALLY BASED, IN BASE OF THE LAGOON (TYP)

100DIA SLOTTED CLASS 9 PRESSURE PIPE TO ALLOW FOR TRAPPED AIR RELEASE UNDER LINER (TYP.)

LAGOON 2 – AERATION

4.0m DEEP
FREEBOARD 1.0m ABOVE TWL
4,800m3 MIN.
4.8 meg LITRES

INVERT SLUDGE PITS. 5.0m³ MAX VOLUME EACH, EQUALLY BASED, IN BASE OF THE LAGOON (TYP) REFER TO DETAIL ON SHEET C13

100DIA SLOTTED CLASS 9 PRESSURE PIPE TO ALLOW FOR TRAPPED AIR RELEASE UNDER LINER (TYP.)

10m LONG SAW TOOTH SURFACE DECANTER / WEIR WITH SCUM GUARD (TYP) REFER TO DETAIL ON SHEET C13

CONTRACTOR TO NOMINATE PREFAB PUMP STATION HOUSE. THE VENTILATION MUST HAVE WHIRL BIRDS AND FANS TO ALLOW FOR 3 AIR CHANGE PER/HR

REFER TO C017 FOR SERRVILE CROSSING DETAIL

CONTRACTOR TO NOMINATE AERATOR FOR SUPERINTENDENT APPROVAL. AERATOR TO BE HAVE 4 POINT ANCHOR WITH WINCH AND PULLEYS TO ENABLE MAINTENANCE

CONTRACTOR TO USED STAINLESS SAVINE RESISTANT WIRE WITH TENSION SUPPORT TO ALLOW AERATOR VERTICAL MOVEMENT

E1 RECIRCULATION x 3SL/sec LOW HEAD PUMPS (INSTALL 1 PUMP)

INLET SPREADER 450mm DIA x 5m WIDE (TYP) REFER TO DETAIL ON SHEET C13

INSTALL THRUST CONNECTOR THROUGH LINER(SOCKET X SOCKET + WEEP FLANGE) REFER TO TYPICAL DETAIL ON SHEET C012

2 X300Ø ADS PIPE

10m LONG SAW TOOTH SURFACE DECANTER / WEIR WITH SCUM GUARD (TYP) REFER TO DETAIL ON SHEET C13

2.0mx2.0m INVERT SLUDGE PITS. 5.0m³ MAX VOLUME EACH, EQUALLY BASED IN BASE OF THE LAGOON (TYP) REFER TO DETAIL ON SHEET C13

SURFACE AERATION TO 1.0m WATER DEPTH. 2 SURFACE AERATORS 3.5KW EACH (TYP)

INLET SPREADER 450mm DIA x 5m WIDE. (TYP) REFER TO DETAIL ON SHEET C13

INLET SPREADER 225mm DIA x 5m WIDE. (TYP) REFER TO DETAIL ON SHEET C13

DIVERSIONARY PUMP FOR LAGOON 1 MAINTENANCE.

1500 ADS @ 1:100

CHAINWIRE CURTAIN TO REMOVAL INORGANIC MATTER. CHAIN CURTAIN TO BE DRAPE 500MM BWL. CONTRACTOR INSTALL PULLEY SYSTEM ON EMBANKMENT 2m X 2m CONCRETE PADS TO ASSIST FOR CLEANING MAINTENANCE

INSTALL THRUST CONNECTOR THROUGH LINER(SOCKET X SOCKET + WEEP FLANGE) REFER TO TYPICAL DETAIL ON SHEET C012

1500 PLASTIC LINED DICL

45Ø BEND

CONTRACTOR TO ENSURE ALL PRESSURE AND VACUUM PIPES BENDS HAVE RESTRAINT AS DETAILED OR FOLLOW THE MRWA-W-200 SERIES

45Ø BENDS

3 WAY VALVE PIT CHAMBER No. 3 (INLET) TO PROVIDE BYPASS ARRANGEMENT

INLET PIPE FROM LUV-A-DUCK.

FINAL ALIGNMENT TO BE CONFIRMED AT A LATER STAGE.

LAGOON 1 – FACULTATIVE

5m DEEP
1.0m FREEBOARD
VOLUME 4,380m3 MIN.
4.38 meg LITRES

BOUNDARY LINE

BOUNDARY LINE

LEGEND:

- ELECTRICITY (UNDERGROUND)
- GRAVITY SEWERAGE LINE
- PRESSURE PUMP LINE
- PE SLUDGE EDUCTION PUMP LINE
- RETICULATION PUMP LINE
- INVERT SLUDGE PIT
- 10m LONG SAW TOOTH SURFACE DECANTER / WEIR
- INLET SPREADER
- 123.2 FINISHED SURFACE CONTOURS
- BL123.204 BOTTOM OF LAGOON LEVEL
- TWL127.204 TOP WATER LEVEL OF LAGOON
- TL128.204 TOP OF LAGOON LEVEL
- TWL121.208 INVERT LEVEL
- BATTER
- PROPOSED PAVEMENT
- PROPOSED SHOULDER
- PROPOSED PROPOSED TOP OF LAGOON
- PROPOSED SHOULDER

0 2.5 5 7.5 10 12.5 15 17.5 20
SCALE 1:250 (A1) SCALE 1:500 (A3)

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P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: 1:250
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001 2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

DRAWING TITLE:
CIVIL LAYOUT PLAN - SHEET 1 OF 2

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C008
REV.: T1

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0 5 10 15 20 25 30 35 40
SCALE 1:500 (A1) SCALE 1:1000 (A3)

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
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P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: 1:500
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

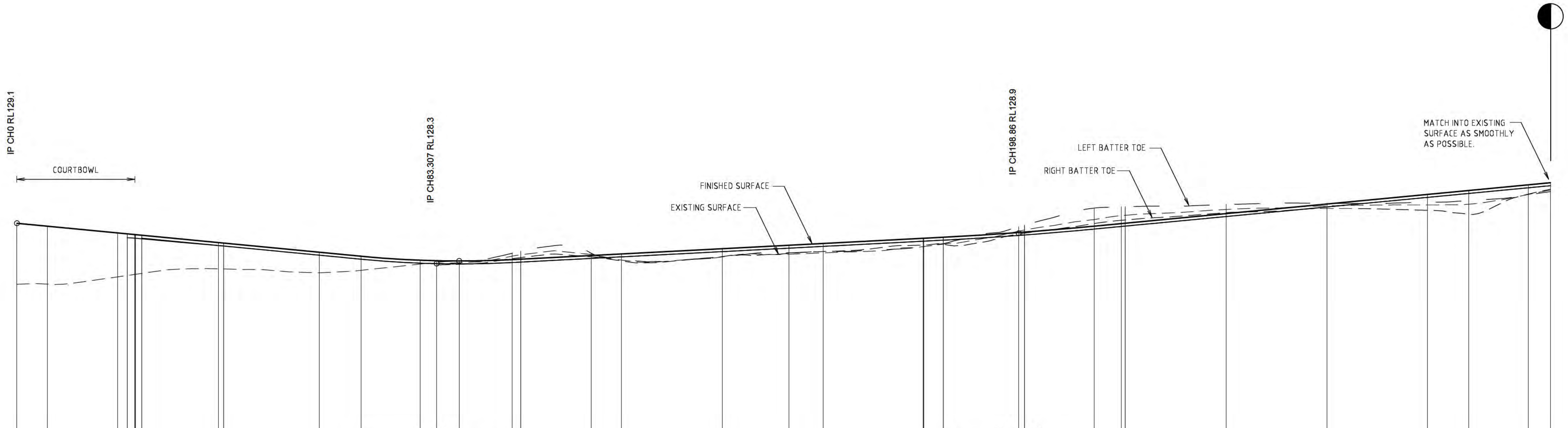
160 RUPPS ROAD
NHILL VICTORIA 3418

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001 2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

DRAWING TITLE:
ACCESS ROAD LAYOUT PLAN

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C009
REV.: T1

4/06/2024 3:01:43 PM



VERTICAL GEOMETRY: -0.96% | 30.00m VC | 0.52% | 30.00m VC | 0.95%

HORIZONTAL GEOMETRY: R=25.0m | R=-12.5m | R=25.0m | R=-25.0m | R=12.5m

DATUM RL123.000

CHAINAGE		RIGHT BOUND'Y LINE LEVEL	LEFT BOUND'Y LINE LEVEL	RIGHT LIP LEVEL	LEFT LIP LEVEL	EXISTING LEVEL	DESIGN LEVEL
0.00						127.889	129.100
6.06	TP					127.891	129.042
20.00						128.035	128.908
21.91	RTP				128.811	128.062	128.890
23.39					128.803	128.083	128.875
23.52	TP				128.802	128.085	128.874
24.78	LTP				128.790	128.104	128.862
40.00				128.658	128.656	128.196	128.716
41.05	TP			128.648	128.647	128.193	128.706
60.00				128.466	128.466	128.115	128.524
68.31				128.386	128.386	128.165	128.444
80.00				128.307	128.307	128.287	128.365
83.31				128.297	128.297	128.301	128.355
87.78		128.354	128.284	128.292	128.292	128.315	128.351
98.31		128.504	128.397	128.320	128.320	128.445	128.378
100.00		128.545	128.418	128.328	128.328	128.472	128.387
113.99	TP	128.505	128.432	128.401	128.401	128.480	128.459
120.00		128.382	128.352	128.432	128.432	128.368	128.491
140.00		128.425	128.437	128.536	128.536	128.431	128.594
153.26	TP	128.513	128.502	128.605	128.605	128.485	128.663
160.00		128.537	128.537	128.640	128.640	128.512	128.698
179.90	TP	128.637	128.663	128.743	128.743	128.636	128.802
180.00		128.639	128.663	128.744	128.744	128.637	128.802
183.86		128.694	128.682	128.764	128.764	128.686	128.822
198.86		129.031	128.884	128.858	128.858	128.943	128.916
200.00		129.064	128.902	128.866	128.866	128.967	128.925
213.86		129.402	129.094	128.985	128.985	129.173	129.043
219.17	TP	129.428	129.157	129.035	129.035	129.250	129.093
220.00		129.430	129.164	129.043	129.043	129.257	129.101
240.00		129.470	129.309	129.233	129.233	129.373	129.292
260.00		129.497	129.392	129.424	129.424	129.444	129.482
280.00		129.515	129.356	129.614	129.614	129.466	129.672
288.20	TP	129.554	129.282	129.692	129.692	129.478	129.750
300.00		129.664	129.678	129.805	129.805	129.673	129.863
304.41	TP	129.730	129.777	129.847	129.847	129.758	129.905

ACCESS DRIVEWAY - TYPICAL CROSS SECTIONS

SCALE H 1:500 V 1:50

0 5 10 15 20 25 30 35 40
SCALE 1:500 (A1) SCALE 1:1000 (A3)

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
SCALE 1:50 (A1) SCALE 1:100 (A3)

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P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED	M MASINA
DRAWN	M MASINA
SCALE:	AS SHOWN
SHEET SIZE:	A1

NORTH: PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001 2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

DRAWING TITLE:
ACCESS ROAD LONGITUDINAL SECTION

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C010
REV: T1

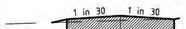
4/06/2024 3:01:43 PM

DATUM RL 128.00						
DESIGN SURFACE LEVEL		128.352	128.432	128.491	128.432	128.382
EXISTING SURFACE LEVEL		128.35	128.36	128.37	128.38	128.38
OFFSET		-2.549	-1.750	0.000	1.750	2.250

CH 120

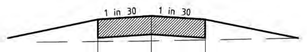
DATUM RL 128.00						
DESIGN SURFACE LEVEL		128.418	128.328	128.387	128.328	128.545
EXISTING SURFACE LEVEL		128.42	128.44	128.47	128.51	128.54
OFFSET		-2.645	-1.750	0.000	1.750	3.912

CH 100



DATUM RL 128.00				
DESIGN SURFACE LEVEL		128.307	128.365	128.307
EXISTING SURFACE LEVEL		128.26	128.29	128.31
OFFSET		-1.750	0.000	1.750

CH 80

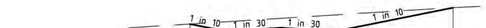


DATUM RL 127.00				
DESIGN SURFACE LEVEL		128.466	128.524	128.466
EXISTING SURFACE LEVEL		128.11	128.12	128.13
OFFSET		-1.750	0.000	1.750

CH 60

DATUM RL 127.00				
DESIGN SURFACE LEVEL		128.656	128.716	128.658
EXISTING SURFACE LEVEL		128.18	128.20	128.21
OFFSET		-1.793	0.000	1.750

CH 40

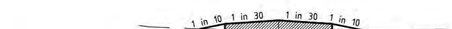


DATUM RL 128.00						
DESIGN SURFACE LEVEL		129.164	129.043	129.101	129.043	129.430
EXISTING SURFACE LEVEL		129.16	129.20	129.26	129.31	129.43
OFFSET		-2.965	-1.750	0.000	1.750	5.619

CH 220

DATUM RL 128.00						
DESIGN SURFACE LEVEL		128.902	128.866	128.925	128.866	129.064
EXISTING SURFACE LEVEL		128.90	128.91	128.97	129.01	129.06
OFFSET		-2.109	-1.750	0.000	1.750	3.731

CH 200

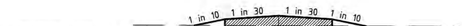


DATUM RL 128.00						
DESIGN SURFACE LEVEL		128.663	128.744	128.802	128.744	128.639
EXISTING SURFACE LEVEL		128.66	128.65	128.64	128.63	128.64
OFFSET		-2.557	-1.750	0.000	1.750	2.801

CH 180

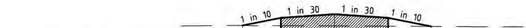
DATUM RL 128.00						
DESIGN SURFACE LEVEL		128.537	128.640	128.698	128.640	128.537
EXISTING SURFACE LEVEL		128.54	128.51	128.51	128.53	128.54
OFFSET		-2.776	-1.750	0.000	1.750	2.777

CH 160



DATUM RL 128.00						
DESIGN SURFACE LEVEL		128.437	128.536	128.594	128.536	128.425
EXISTING SURFACE LEVEL		128.44	128.44	128.43	128.43	128.43
OFFSET		-2.739	-1.750	0.000	1.750	2.859

CH 140



DATUM RL 129.00						
DESIGN SURFACE LEVEL		129.678	129.805	129.863	129.805	129.666
EXISTING SURFACE LEVEL		129.68	129.68	129.67	129.67	129.66
OFFSET		-3.011	-1.750	0.000	1.750	3.156

CH 300

DATUM RL 129.00						
DESIGN SURFACE LEVEL		129.356	129.614	129.672	129.614	129.515
EXISTING SURFACE LEVEL		129.36	129.42	129.47	129.50	129.51
OFFSET		-4.329	-1.750	0.000	1.750	2.743

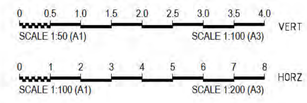
CH 280

DATUM RL 129.00						
DESIGN SURFACE LEVEL		129.392	129.624	129.682	129.624	129.497
EXISTING SURFACE LEVEL		129.39	129.40	129.44	129.48	129.50
OFFSET		-2.063	-1.750	0.000	1.750	2.478

CH 260

DATUM RL 129.00						
DESIGN SURFACE LEVEL		129.309	129.233	129.292	129.233	129.470
EXISTING SURFACE LEVEL		129.31	129.33	129.37	129.42	129.47
OFFSET		-2.511	-1.750	0.000	1.750	4.121

CH 240



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Zero Damage - Zero Harm

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED:	M MASINA
DRAWN:	M MASINA
SCALE:	H 1:100 V 1:50
SHEET SIZE:	A1
NORTH:	

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
ACCESS ROAD PLAN, CROSS SECTIONS

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C011
REV.: T1

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001:2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

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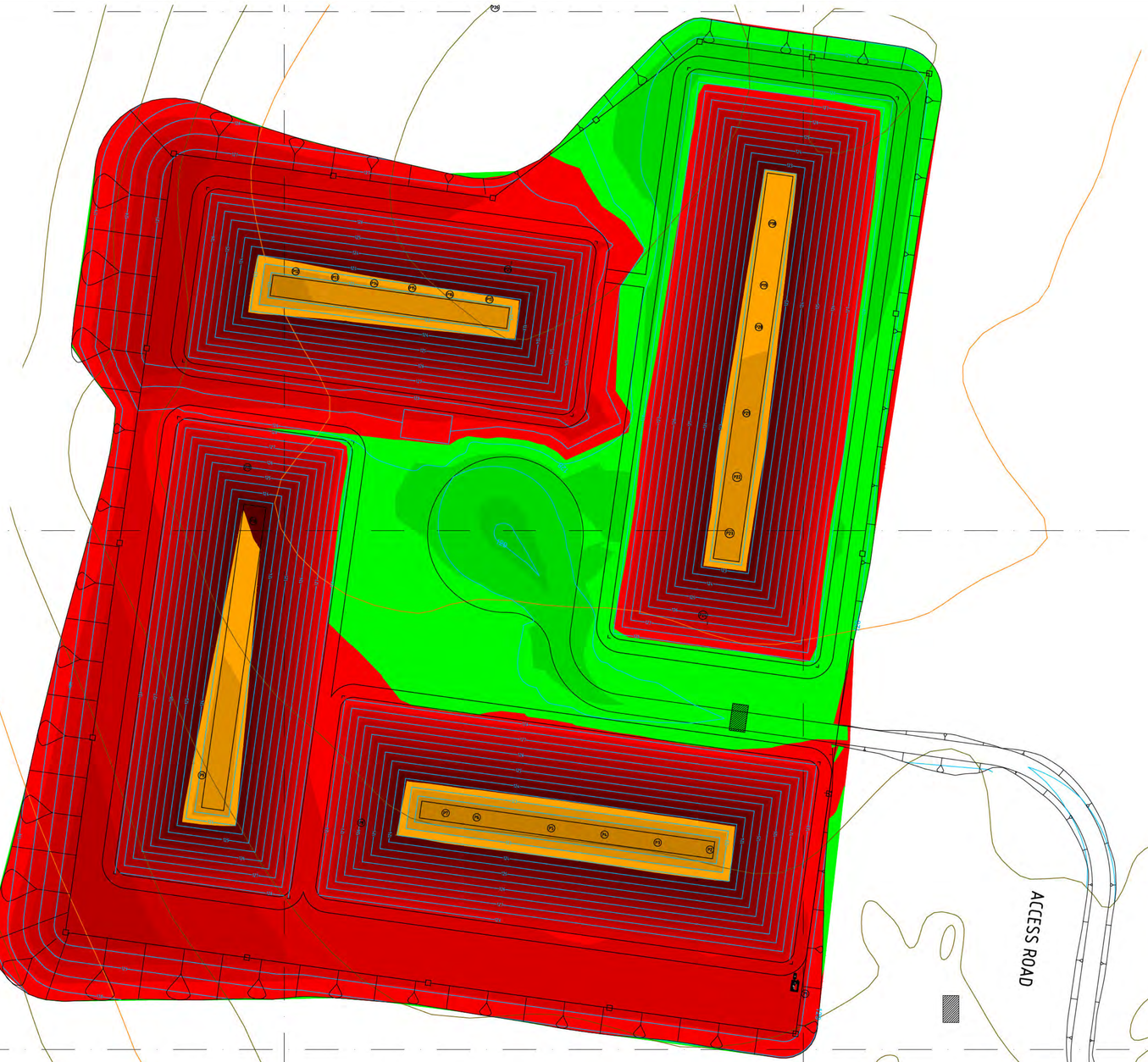

CUT & FILL DEPTH RANGES

LOWER VALUE	UPPER VALUE	COLOUR
1.5m	2.0m	
1.0m	1.5m	
0.5m	1.0m	
0.0m	0.5m	
-0.5m	0.0m	
-1.0m	-0.5m	
-1.5m	-1.0m	
-2.0m	-1.5m	
-2.5m	-2.0m	
-3.0m	-2.5m	
-3.5m	-3.5m	
-4.0m	-3.5m	
-4.5m	-4.0m	
-5.0m	-4.5m	
-5.5m	-5.0m	
-6.0m	-5.5m	
-6.5m	-6.0m	
-7.0m	-6.5m	

NOTES:

APPROXIMATE CUT AND FILL VOLUMES AND DEPTHS ARE FROM EXISTING SURFACE LEVEL TO BOXING SURFACE LEVEL FOR ROAD RESERVE AND EXISTING SURFACE LEVEL TO UNDER SIDE OF SLAB/PAVEMENTS FOR DEVELOPMENT SITE. VOLUMES SHOWN ARE APPROX ONLY AND WILL VARY ON-SITE.

BULK EARTHWORKS VOLUMES:

DEVELOPMENT SITE

Total cut	-45633.97 m3
Total fill	2479.25 m3
Total balance	-43154.722 m3

0 5 10 15 20 25 30 35 40

SCALE 1:500 (A1) SCALE 1:1000 (A3)

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Zero Damage - Zero Harm

WARNING

BEWARE OF UNDERGROUND SERVICES

THE LOCATION OF UNDERGROUND SERVICES SHOWN ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN. THE CONTRACTOR MUST VERIFY ALL SERVICES ON SITE PRIOR TO ANY EXCAVATION WORKS.

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: 1:500
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

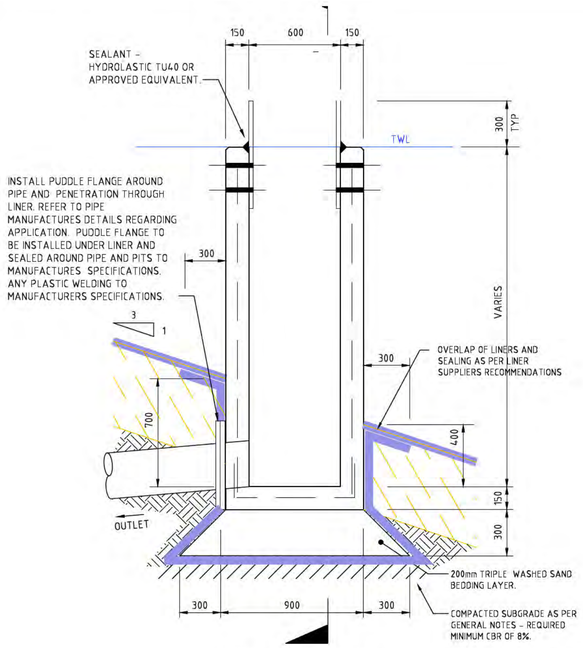
160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
BULK EARTHWORKS PLAN

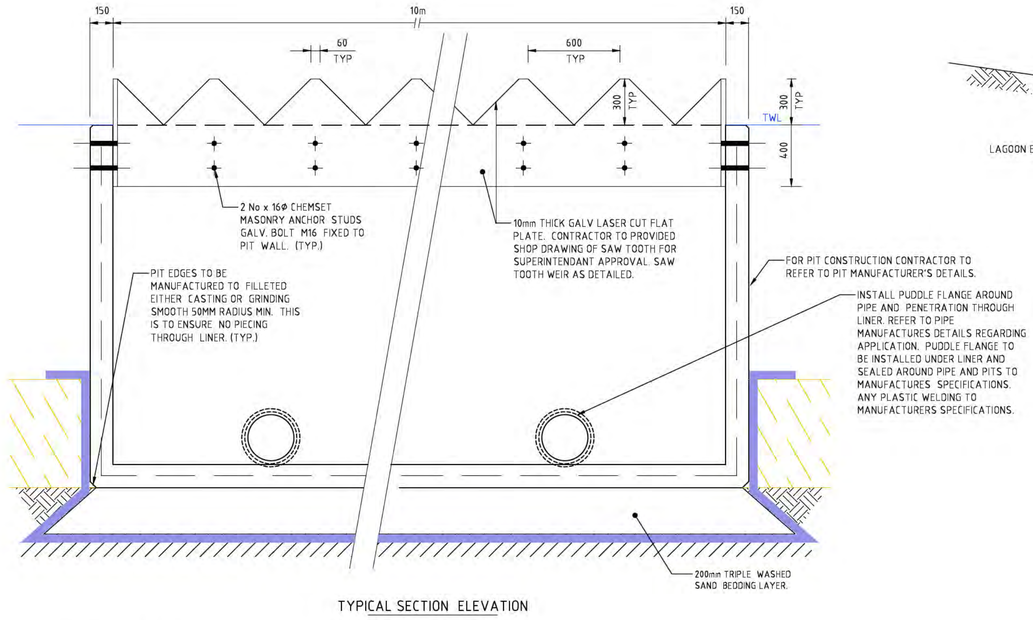
JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C012
REV: T1

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001 2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

4/06/2024 3:01:43 PM



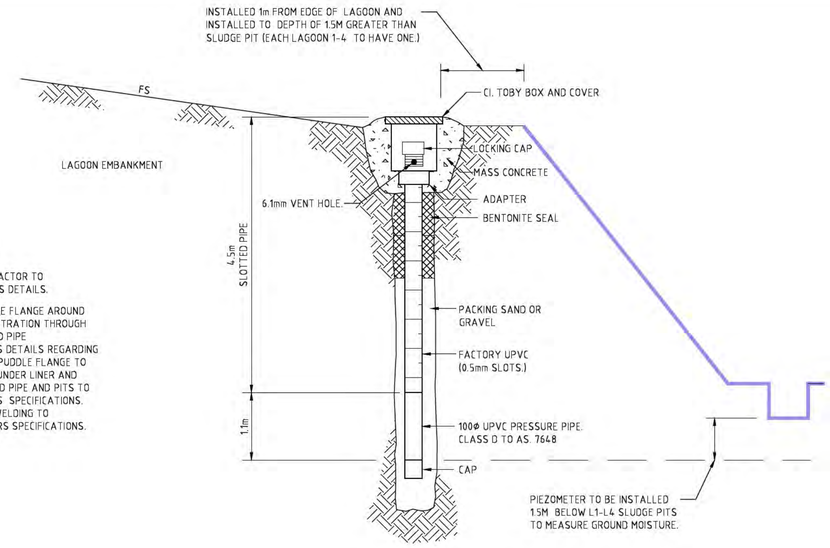
TYPICAL CROSS SECTION



TYPICAL SECTION ELEVATION

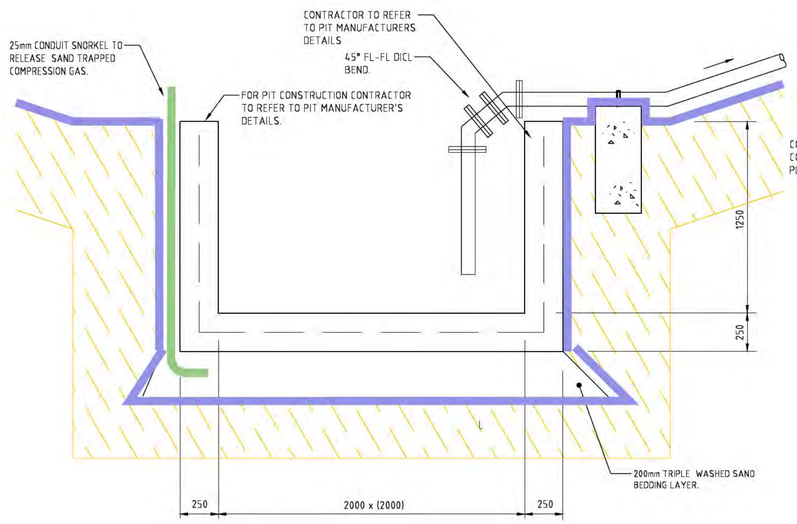
1 C13 SAWTOOTH DECANTER/WEIR

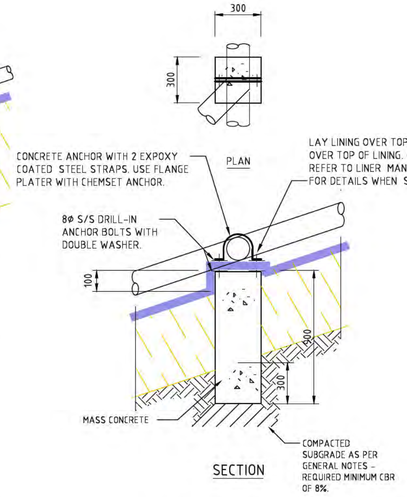
SCALE 1:20



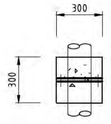
2 C13 LEAK MONITORING BORE DETAIL

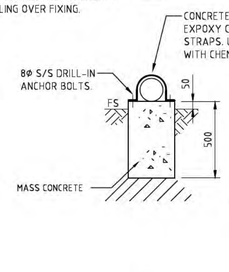
SCALE 1:50



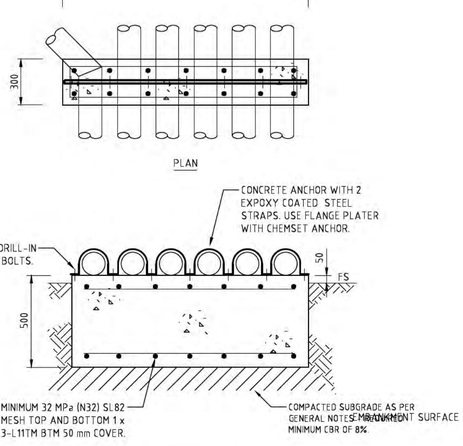


LAGOON PIPE STRAP DOWN TO FOOTING ASSEMBLY





SINGLE PIPE OUT OF POND



MULTIPLE PIPES OUT OF POND

3 C13 INVERT SLUDGE PITS

SCALE 1:20

NOTES:
1. INVERT SLUDGE PIT 5.0m3 MAX VOLUME EACH, EQUALLY SPACED, IN BASE OF THE LAGOON AS NOTED.

4 C13 CONCRETE PIPE SUPPORT

SCALE 1:10

SCALE 1:10 (A1) 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 SCALE 1:20 (A3)

SCALE 1:20 (A1) 0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 SCALE 1:40 (A3)

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Zero Damage - Zero Harm

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: AS SHOWN
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

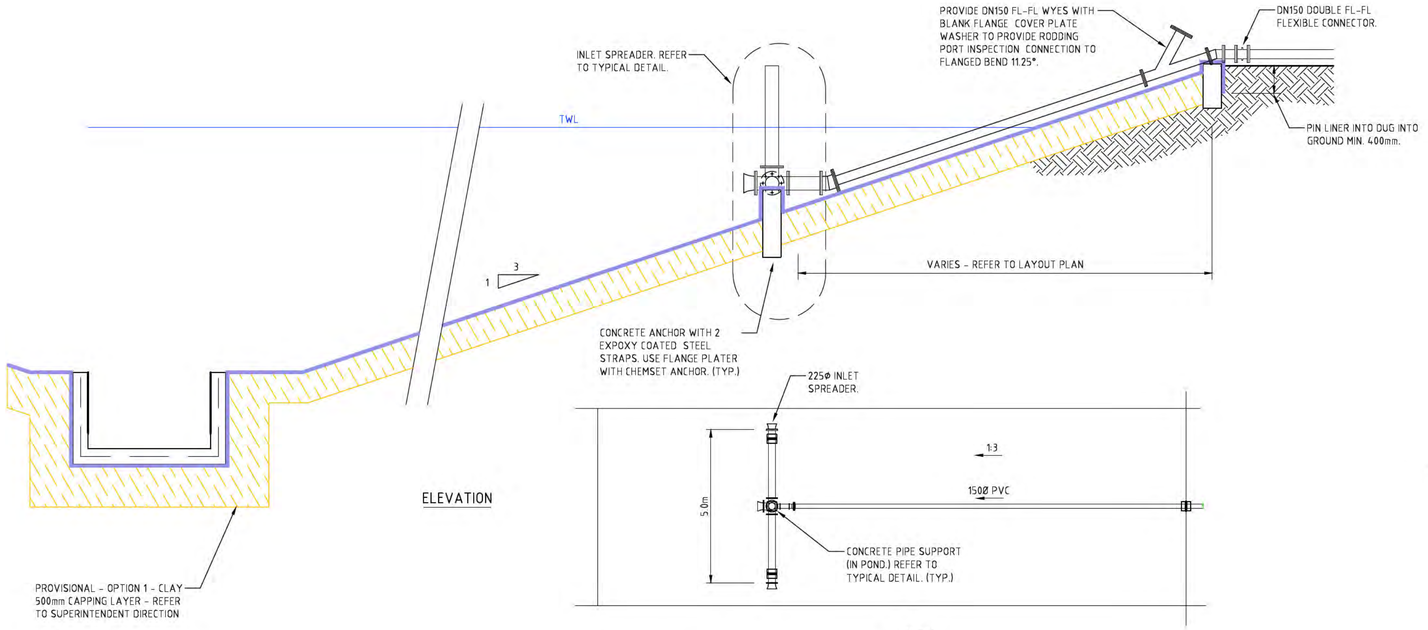
PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

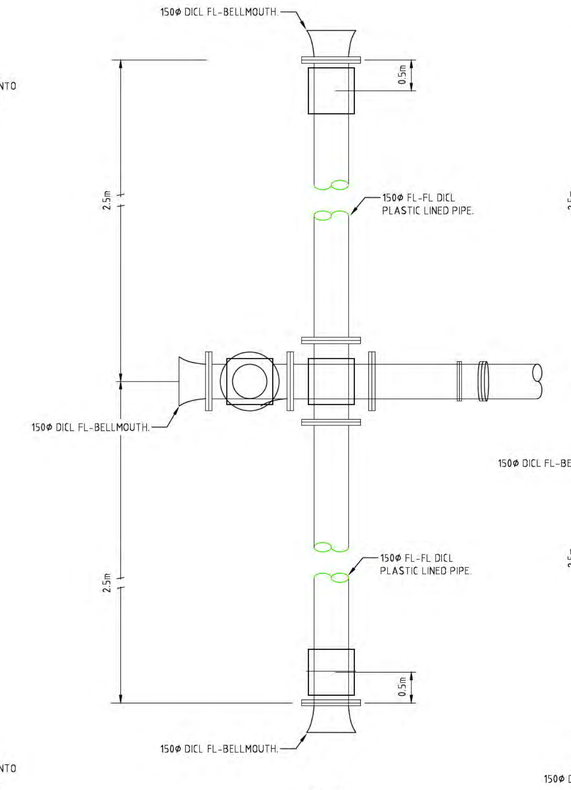
DRAWING TITLE:
CIVIL DETAILS - SHEET 1 OF 7

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C013
REV: T1

4/06/2024 3:01:43 PM

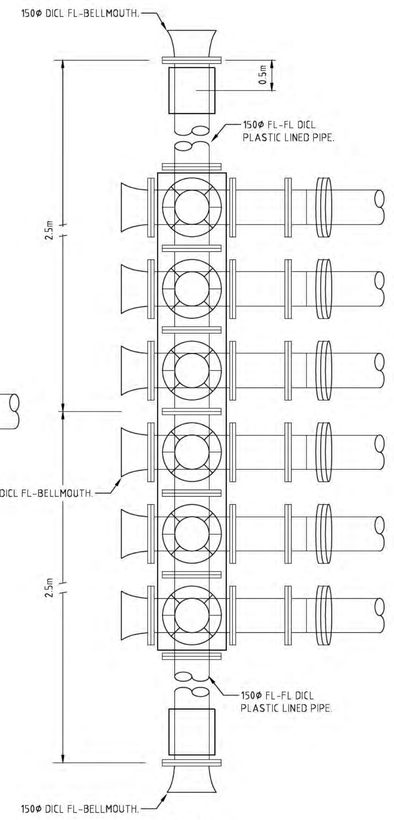


1 / C14 **SINGLE INLET SPREADER**
SCALE 1:50



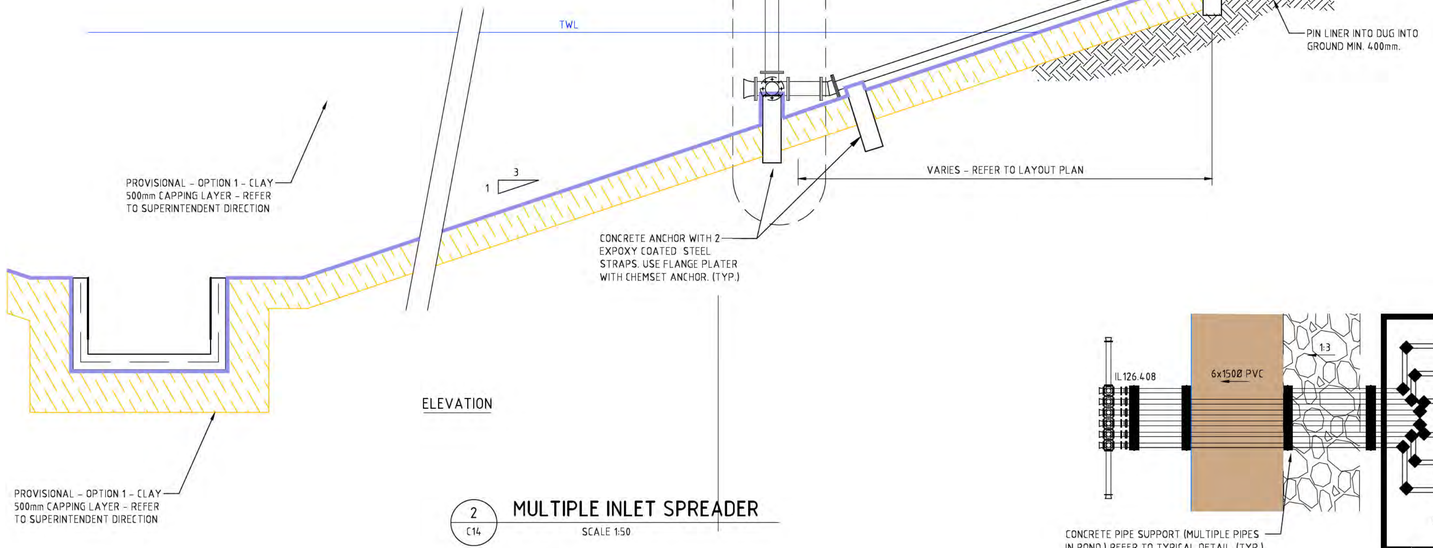
PLAN

3 / C14 **DETAIL "A"**

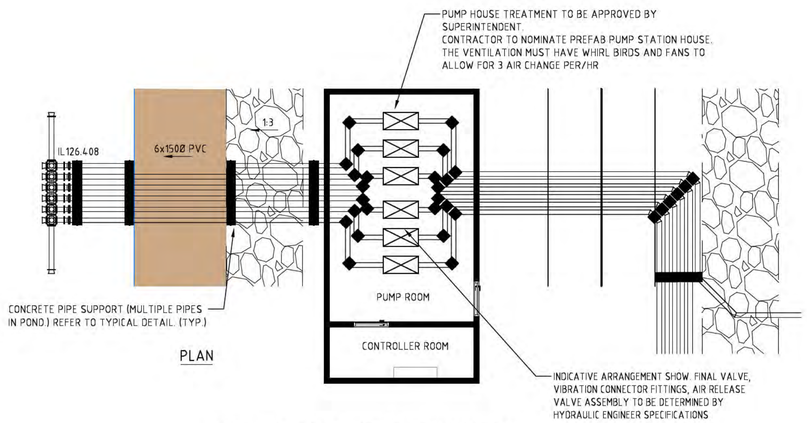


PLAN

4 / C14 **DETAIL "B"**

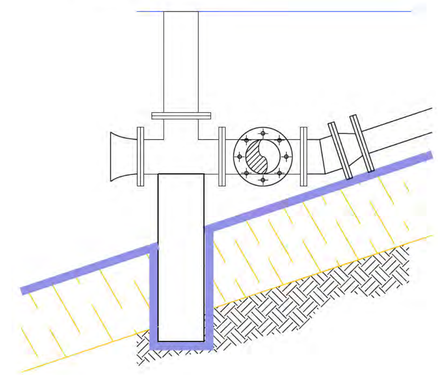


2 / C14 **MULTIPLE INLET SPREADER**
SCALE 1:50



PLAN

5 / C14 **MULTIPLE INLET SPREADER**
SCALE 1:50



TYPICAL ELEVATION

6 / C14 **INLET SPREADERS**
SCALE 1:20

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Zero Damage - Zero Harm

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: AS SHOWN
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
CIVIL DETAILS - SHEET 2 of 7

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C014
REV: T1

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001 2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

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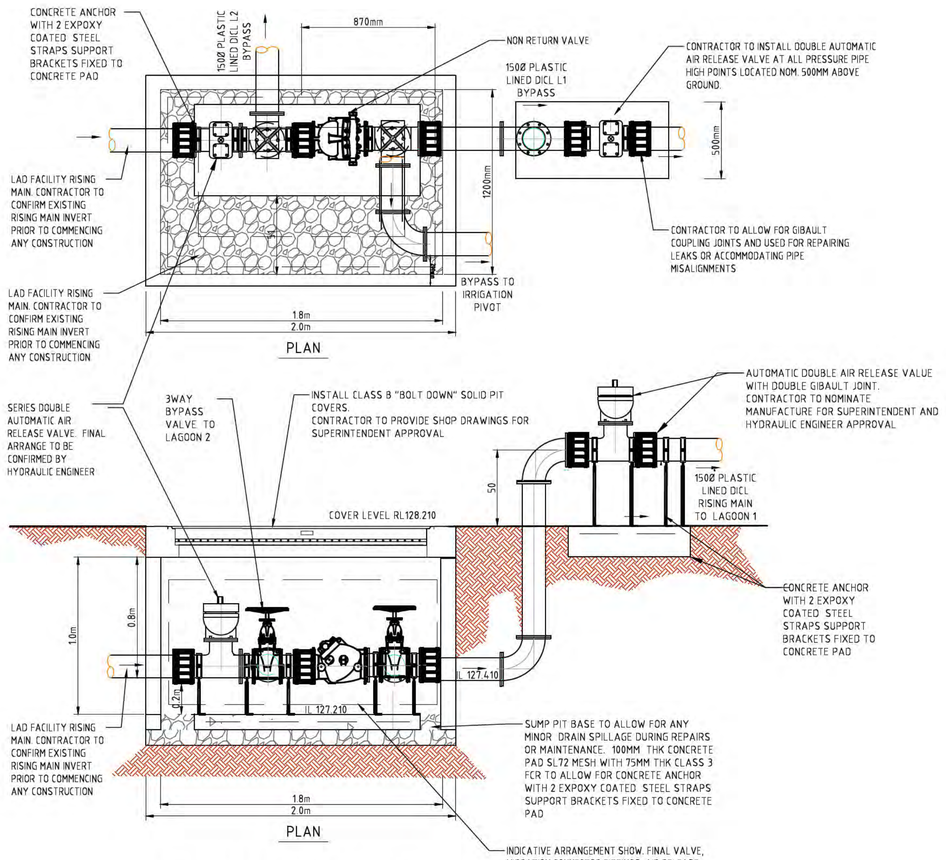
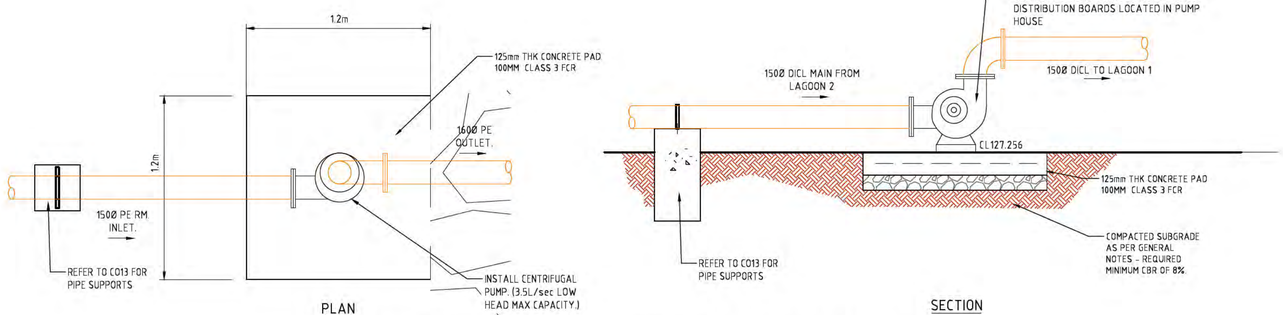


PIT 1 - 3 WAY VALVE(INLET) TYP. ARRANGEMENT

1 / C15

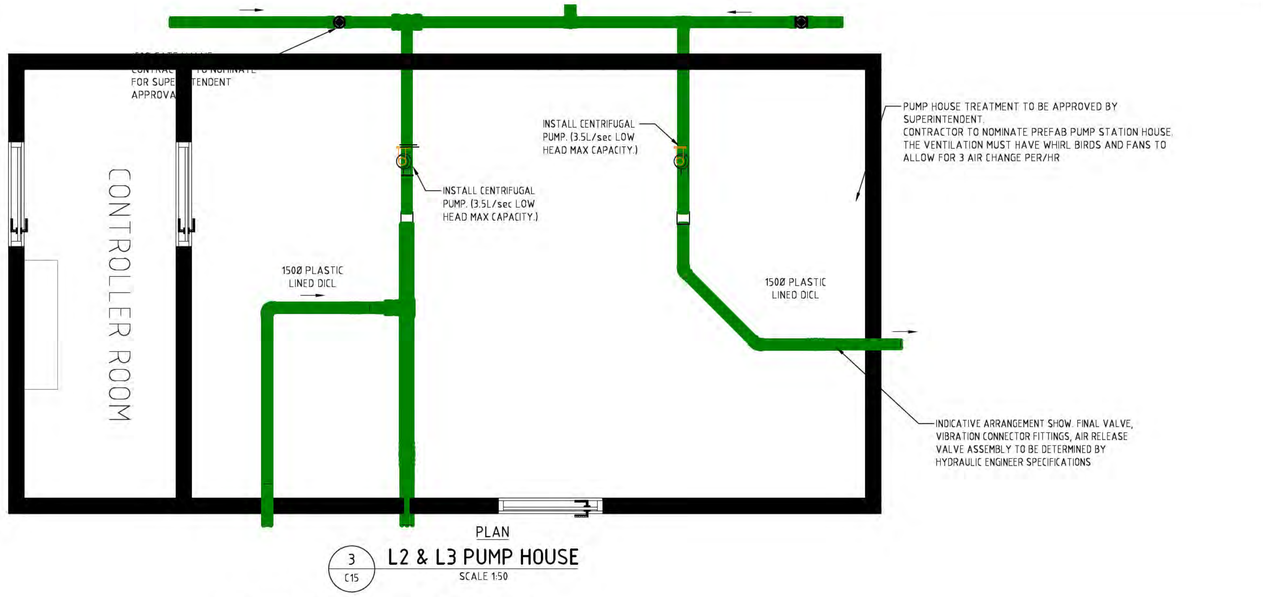
SCALE 1:50



LAGOON T0 LAGOON (ABOVE GROUND RECIRCULATION)

2 / C15

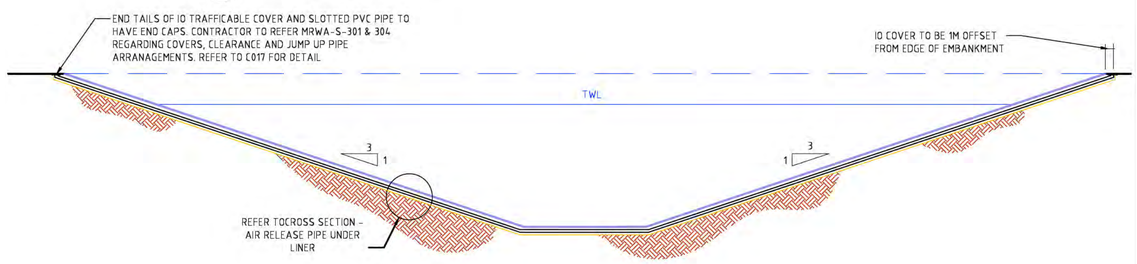
SCALE 1:50



L2 & L3 PUMP HOUSE

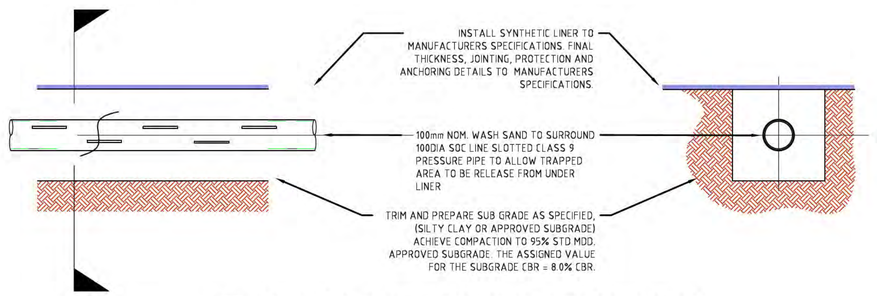
3 / C15

SCALE 1:50



AIR RELEASE UNDER LINER LAGOON SECTION (TYP.)

4 / C14



CROSS SECTION - AIR RELEASE PIPE UNDER LINER

5 / C15

SCALE 1:10 (A1) | SCALE 1:20 (A3) | SCALE 1:20 (A1) | SCALE 1:40 (A3)

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Zero Damage - Zero Harm

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: AS SHOWN
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

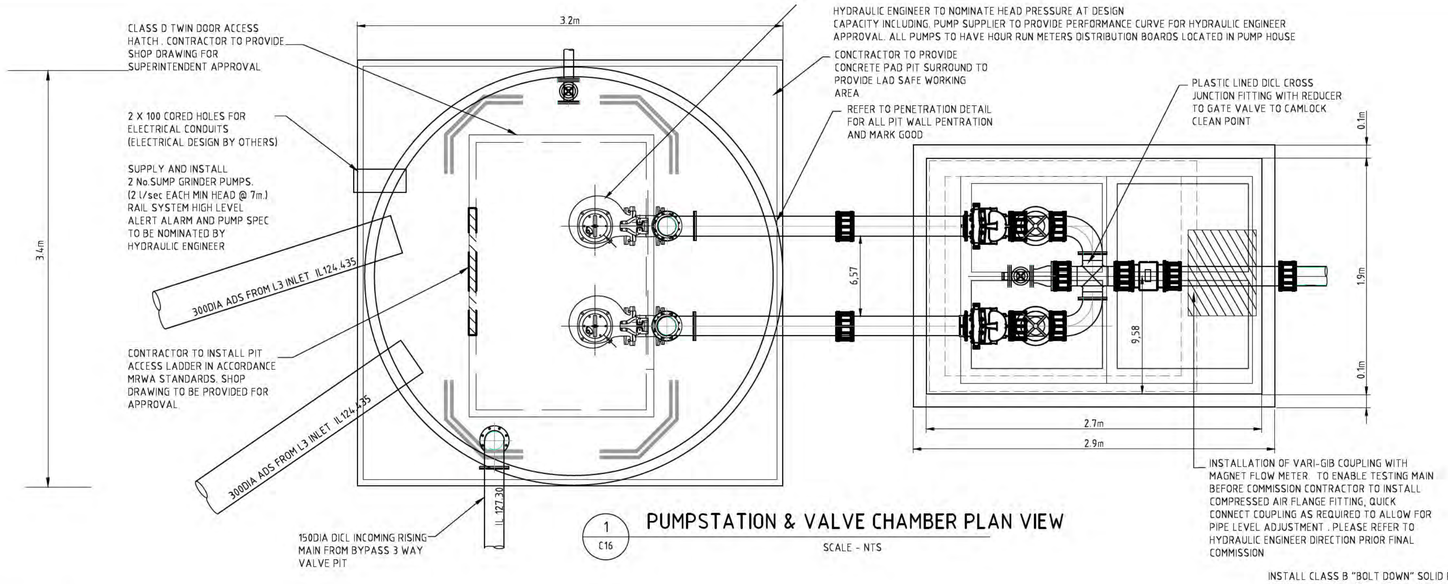
PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
CIVIL DETAILS - SHEET 3 of 7

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C015
REV: T1

4/06/2024 3:01:43 PM

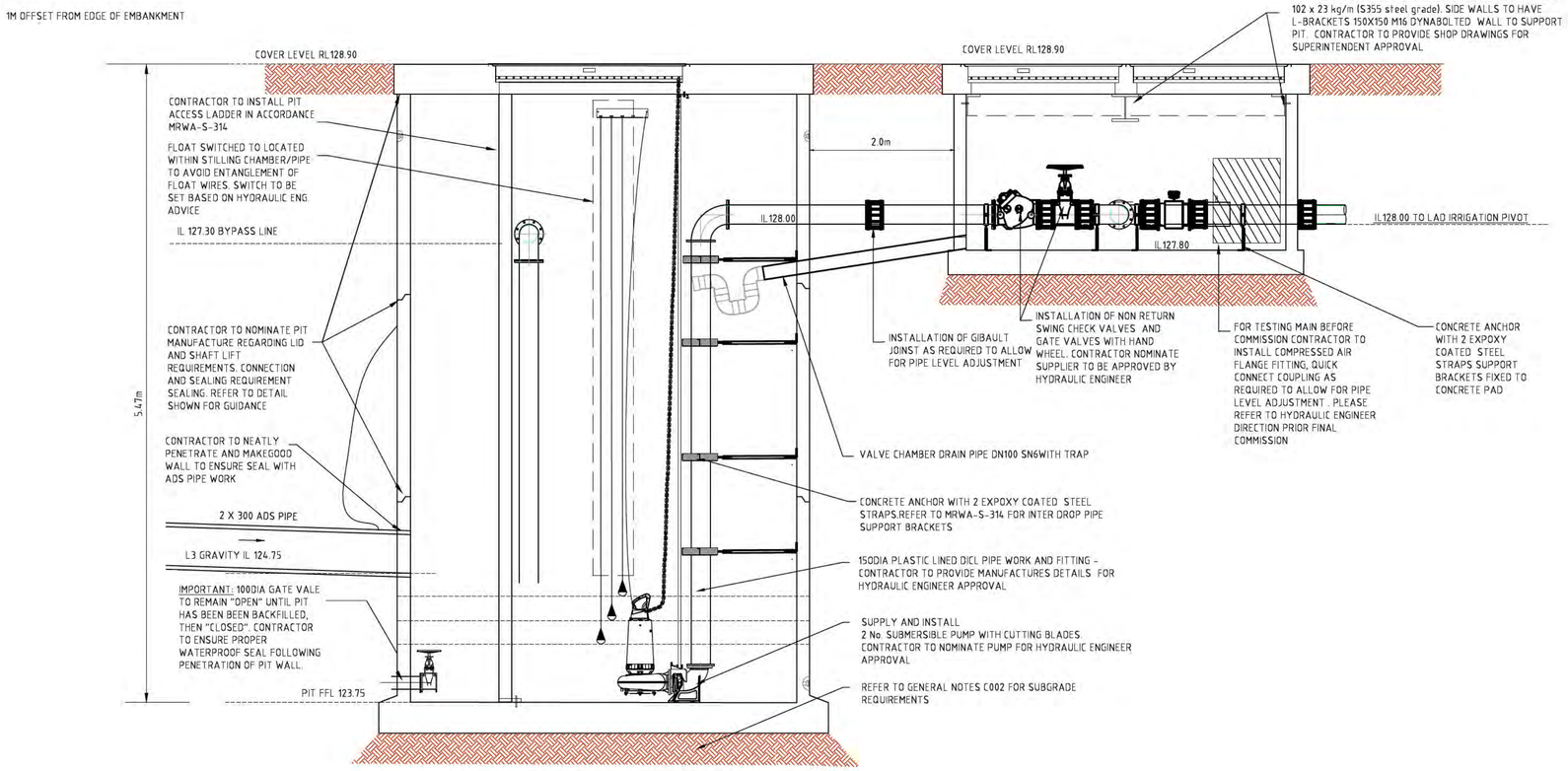


1 C16 **PUMPSTATION & VALVE CHAMBER PLAN VIEW**

SCALE - NTS

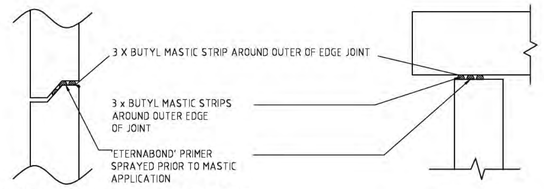
GENERAL NOTES

1. PUMP STATION TO FINAL DESIGN AND CERTIFICATION BY SUPERINTENDENTS HYDRAULIC ENGINEER
2. 2. CONCRETE TYPE - SULPHATE RESISTANT (USE CALCAREOUS AGGREGATE FOR EFFLUENT)
3. CONCRETE STRENGTH -S50 MPA
4. FOR PRECAST WALL THICKNESS REFER TO MANUFACTURERS DETAILS AND PROVIDE SHOP DRAWING FOR HYDRAULIC ENGINEER APPROVAL
5. CAST INSITU WALL THICKNESS -120MM MIN. WITH 45MM INTERNAL COVER REINFORCEMENT FOR WELL AND 100MM THICKNESS FOR EXTERNAL VALVE CHAMBER . FOR PRECAST REFER TO MANUFACTURERS DETAILS AND PROVIDE
6. REINFORCEMENT TO COMPLY WITH AS1302 & as1304
7. INTERNALL WALLS OF THE WET WELL & VALVE CHAMBERT TO BE COATED WITH MC EXPOXY (3 COATS MIN. THICKNESS 0.5MM)
8. ALL HOLES TO BE-CORED AND WATERPROOF SEALED.
9. REFER TO ELECTRICAL DESIGN FOR DETAIL FOR POWER REQUIREMENTS



2 C16 **PUMPSTATION & VALVE CHAMBER PLAN**

SCALE - NTS

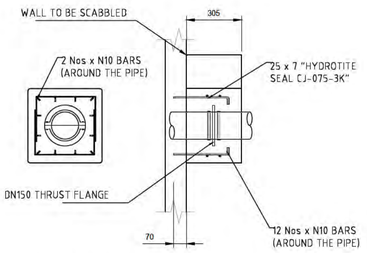


3 C16 **JOINING DETAIL AT CONCRETE PRECAST INCREMENTS IN WET WELL**

SCALE - 1:5 @ A1

4 C16 **JOINING OF CONCRETE PRECAST COVER**

SCALE - 1:5 @ A1



5 C16 **PIPE PENETRATIONS THROUGH PIT WALLS**

DETAIL "B"
THRUST BLOCK
DN300
SCALE - NTS

BEFORE YOU DIG www.byda.com.au

Zero Damage - Zero Harm

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED:	M MASINA
DRAWN:	M MASINA
SCALE:	AS SHOWN
SHEET SIZE:	A1
NORTH:	PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
CIVIL DETAILS - SHEET 4 of 7

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C016
REV.: T1

4SITE ENGINEERS PTY. LTD. ABN 55 166 960 032
ISO 9001 2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1764

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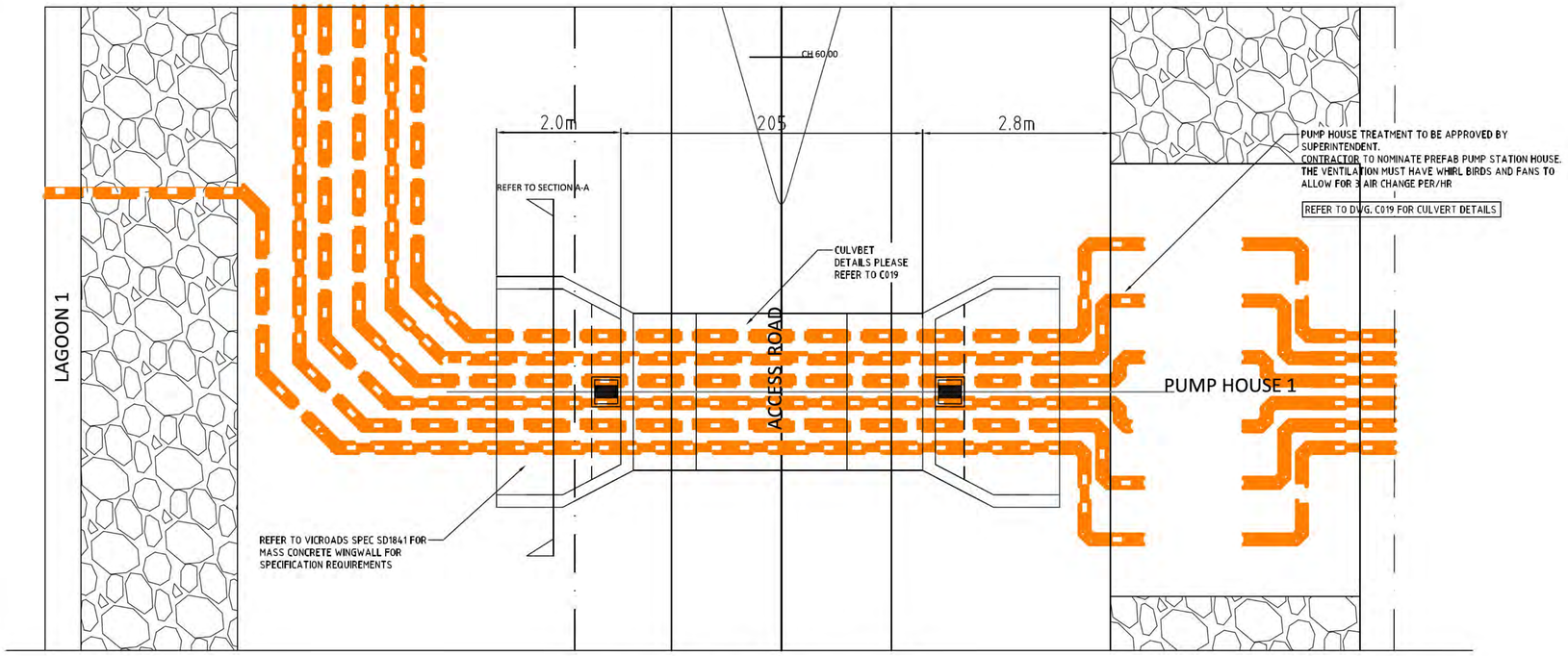
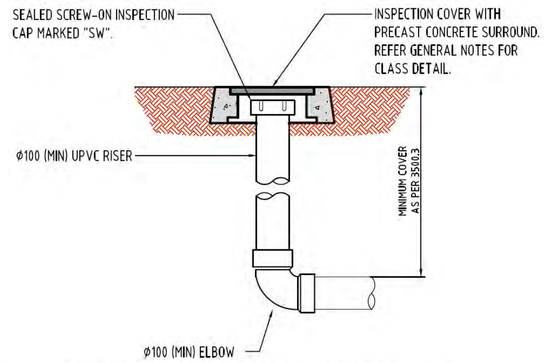


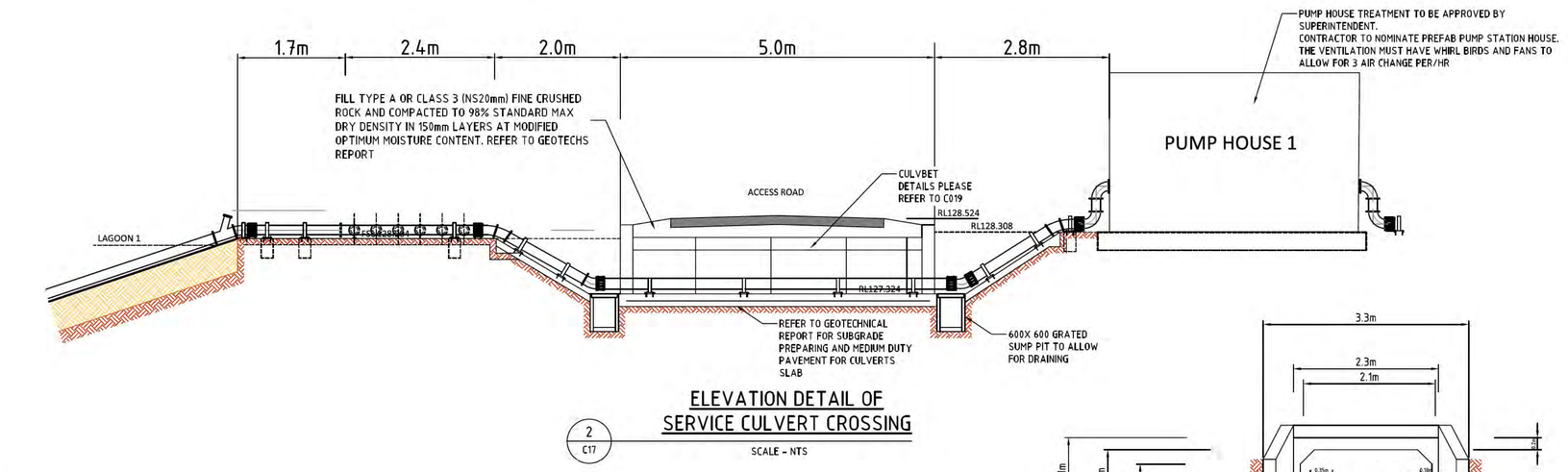
PLAN DETAIL OF SERVICE CULVERT CROSSING

1 / C17 — SCALE - NTS



TYPICAL INSPECTION OPENING DETAILAIR RELEASE PIPE UNDER LINER

4 / C17 — SCALE - NTS

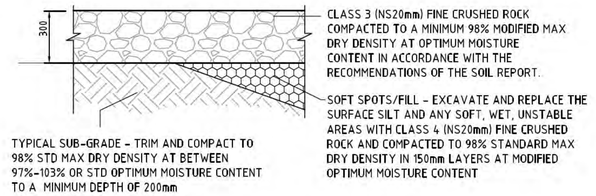


ELEVATION DETAIL OF SERVICE CULVERT CROSSING

2 / C17 — SCALE - NTS

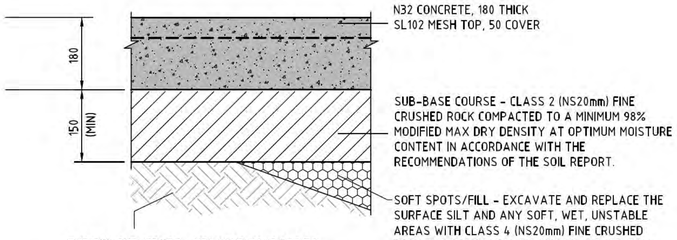
SECTION

3 / C17 — SCALE - NTS



CRUSHED ROCK ACCESS ROAD

5 / C17 — SCALE - N.T.S



CULVERT SUPPORT SLAB - MEDIUM DUTY CONCRETE (TRUCK PATH)

6 / C17 — SCALE - N.T.S

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Zero Damage - Zero Harm

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: AS SHOWN
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
CIVIL DETAILS - SHEET 5 of 7

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C017
REV: T1

4/06/2024 3:01:43 PM

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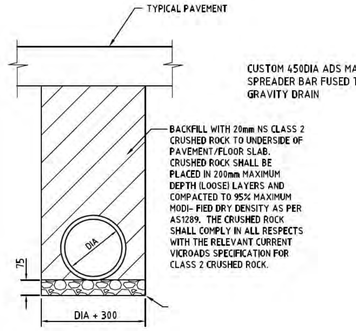
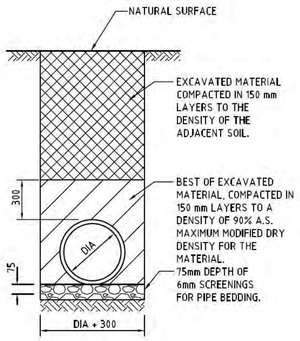
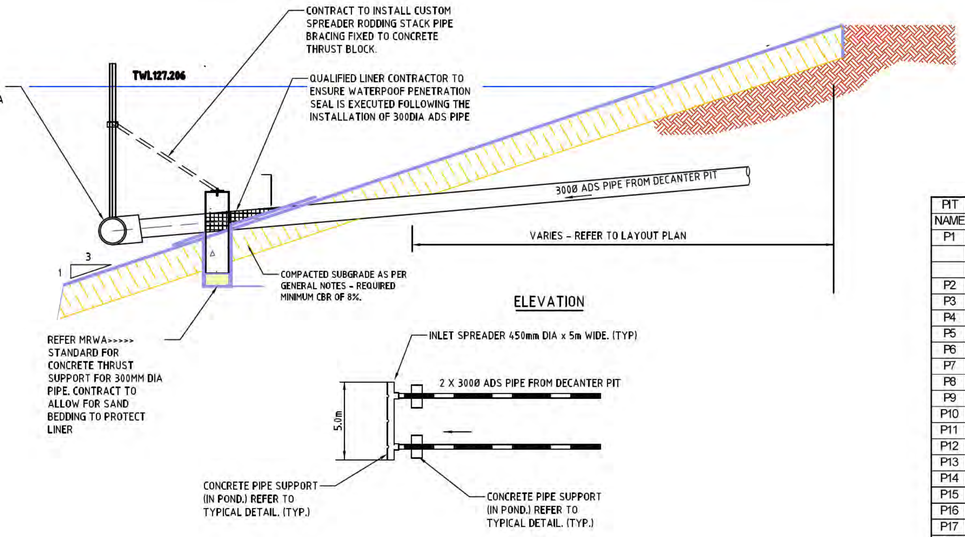


PIPE LAYING DETAILS
(UNDER ALL PAVEMENTS/FLOORS)
1 / C18
SCALE 1:20



PIPE LAYING DETAILS
(UNDER LANDSCAPED AREAS)
2 / C18
SCALE 1:20



GRAVITY PIPE TO SPREADER DETAIL
3 / C18
SCALE 1:20

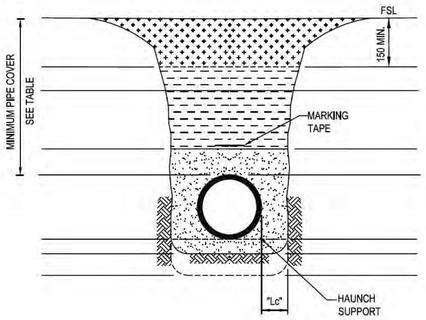
PIT SCHEDULE

PIT		EASTING	NORTHING	INTERNAL		INLET		OUTLET		PIT		REMARKS
NAME	TYPE			WID	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH	
P1	VALVE PIT	555398.697	5980712.044	1800	1200	-	-	150	127.410	128.21	0.80	PUMP TO LAGOON 1
						-	-	150	127.410	128.21	0.80	BYPASS TO LAGOON 2
						-	-	150	127.410	128.21	0.80	BYPASS TO LAGOON 3
P2	SLUDGE PIT	555380.118	5980738.054	2800	2800	-	-	-	119.705	120.95	1.245	LAGOON 1
P3	SLUDGE PIT	555370.230	5980739.263	2800	2800	-	-	-	119.705	120.95	1.245	LAGOON 1
P4	SLUDGE PIT	555361.005	5980741.062	2800	2800	-	-	-	119.705	120.95	1.245	LAGOON 1
P5	SLUDGE PIT	555350.227	5980742.783	2800	2800	-	-	-	119.705	120.95	1.245	LAGOON 1
P6	SLUDGE PIT	555339.991	5980744.242	2800	2800	-	-	-	119.705	120.95	1.245	LAGOON 1
P7	SLUDGE PIT	555329.128	5980745.384	2800	2800	-	-	-	119.705	120.95	1.245	LAGOON 1
P8	DECANTER PIT	555314.908	5980741.845	10000	600	-	-	2 X 300	126.287	127.206	0.919	L1 DECANTER SAW TOOTH PIT
P9	SLUDGE PIT	555288.797	5980751.632	2800	2800	-	-	-	120.606	121.856	1.250	LAGOON 2
P10	SLUDGE PIT	555296.094	5980800.676	2800	2800	-	-	-	120.606	121.856	1.250	LAGOON 2
P11	DECANTER PIT	555304.336	5980803.748	10000	600	-	-	2 X 300	126.106	127.106	1.000	L2 DECANTER SAW TOOTH PIT
P12	SLUDGE PIT	555304.146	5980844.658	2800	2800	-	-	-	119.356	120.606	1.250	LAGOON 3
P13	SLUDGE PIT	555309.455	5980845.125	2800	2800	-	-	-	119.356	120.606	1.250	LAGOON 3
P14	SLUDGE PIT	555319.151	5980842.300	2800	2800	-	-	-	119.356	120.606	1.250	LAGOON 3
P15	SLUDGE PIT	555322.251	5980840.372	2800	2800	-	-	-	119.356	120.606	1.250	LAGOON 3
P16	SLUDGE PIT	555328.576	5980841.670	2800	2800	-	-	-	119.356	120.606	1.250	LAGOON 3
P17	SLUDGE PIT	555337.063	5980840.779	2800	2800	-	-	-	119.356	120.606	1.250	LAGOON 3
P18	SLUDGE PIT	555395.584	5980862.814	2800	2800	-	-	-	119.808	121.058	1.250	LAGOON 4
P19	SLUDGE PIT	555390.342	5980850.085	2800	2800	-	-	-	119.808	121.058	1.250	LAGOON 4
P20	SLUDGE PIT	555391.217	5980836.328	2800	2800	-	-	-	119.808	121.058	1.250	LAGOON 4
P21	SLUDGE PIT	555389.588	5980824.562	2800	2800	-	-	-	119.808	121.058	1.250	LAGOON 4
P22	SLUDGE PIT	555387.296	5980811.430	2800	2800	-	-	-	119.808	121.058	1.250	LAGOON 4
P23	SLUDGE PIT	555385.620	5980800.998	2800	2800	-	-	-	119.808	121.058	1.250	LAGOON 4
P24	DECANTER PIT	555381.033	5980782.731	10000	600	-	-	2 X 300	126.500	127.308	0.808	L4 DECANTER SAW TOOTH PIT
P25	DECANTER PIT	555343.421	5980851.399	10000	600	-	-	2 X 300	124.750	125.856	1.106	L4 DECANTER SAW TOOTH PIT
P26	PUMPSTATION PIT	555342.317	5980893.728	3200DIA	3200	300	123.435	-	123.750	128.90	5.47	INLET FROM L3 DECANTER
						300	123.435	-	-	128.90	5.47	INLET FROM L3 DECANTER
						150	127.300	-	-	128.90	1.60	DROP PIPE INTO PIT - LAD BYPASS
						-	-	100	124.050	128.90	4.85	GATE VALVE
P27	VALVE CHAMBER	555344.622	5980904.931	1900	2700	150	128.000	150	128.000	128.90	0.90	REFER TO HYD. PUMP TO PIVOT
						-	-	100	127.800	128.90	1.10	SUMP DISCHARGE PIPE OUTLET

MINIMUM PIPE COVER	
LOCATION	MINIMUM COVER
PRIVATE PROPERTY NON-VEHICULAR LOADING	450 SEE NOTE 4

NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED
2. BEDDING
   DESIGNER TO SPECIFY SPECIAL BEDDING TO SUIT CONDITIONS IF TRENCH FLOOR HAS:
   - IRREGULAR OUTCROPS OF ROCK.
   - ALLOWABLE BEARING PRESSURE OF <50kPA, (REFER SEW-1200) OR
   - BEEN DISTURBED BY UNCONTROLLED GROUND WATER.
3. KEEP SIDES OF EXCAVATION VERTICAL TO AT LEAST 150 ABOVE PIPE.
4. FOR PRIVATE PROPERTY MINIMUM COVER MAY BE REDUCED TO 300 WITH MECHANICAL PROTECTION WHEN IN ROCK
5. ALTERNATE TRENCHING TECHNIQUES E.G. NARROW TRENCHING USING 'DITCHWITCH' TYPE EXCAVATORS SHALL BE SUBMITTED TO WATER AGENCY FOR CONSIDERATION AND ACCEPTANCE. PROPOSALS SHOULD ADDRESS THE METHOD OF COMPACTION OF THE EMBEDMENT SUPPORT ZONE

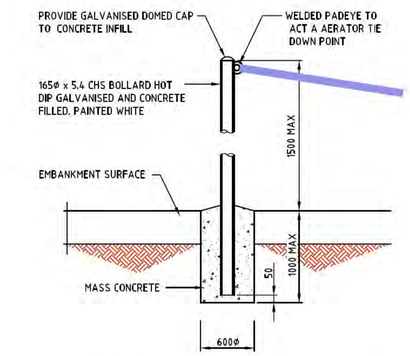
REFER TO PRESSURE SEWER CODE OF AUSTRALIA STD. DWG. PSS-1000 FOR DETAILS



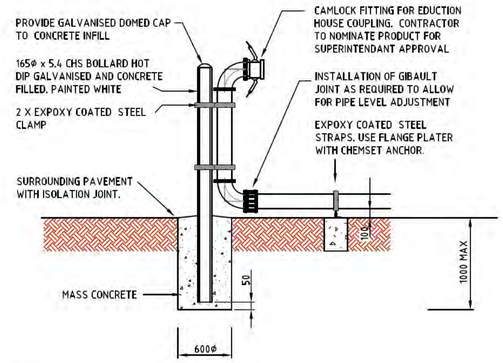
RISING MAIN EMBEDMENT AND TRENCH FILL TYPICAL ARRANGEMENT
4 / C18
NOT TO SCALE

ZONE		MATERIAL
TOP SOIL OR FOOTWAY SURFACE		ORIGINAL MATERIAL OR IMPORTED MATERIAL OF EQUAL QUALITY TO COMPLY WITH WSA 07
TRENCH FILL		
EMBEDMENT	OVERLAY	IN ACCORDANCE WITH WSA PS-350 & PS-351
	SIDE SUPPORT	
	BEDDING	
OVER - EXCAVATION		

NON-VEHICULAR LOADING
(INCLUDES LOCATIONS WHERE OCCASIONAL VEHICLES LOADINGS OCCUR eg. FOOTWAYS)



AERATOR EMANKMENT ANCHOR
CHAIN CURTAIN ANCHOR . . similar
5 / C18
SCALE 1:20



EDUCTION CAMLOCK DETAIL
6 / C18
SCALE - NTS

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Zero Damage - Zero Harm

REV.	DESCRIPTION	DATE
T1	ISSUE FOR TENDER	20.12.24
P4	PRELIMINARY ISSUE	11.12.24
P3	PRELIMINARY ISSUE	06.12.24
P2	PRELIMINARY ISSUE	03.12.24
P1	PRELIMINARY ISSUE	29.11.24

TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED: M MASINA
DRAWN: M MASINA
SCALE: AS SHOWN
SHEET SIZE: A1
NORTH: PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES
160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
CIVIL DETAILS - SHEET 6 of 7

JOB NO: 24-182
DISCIPLINE: CIVIL
SHEET: C018
REV.: T1

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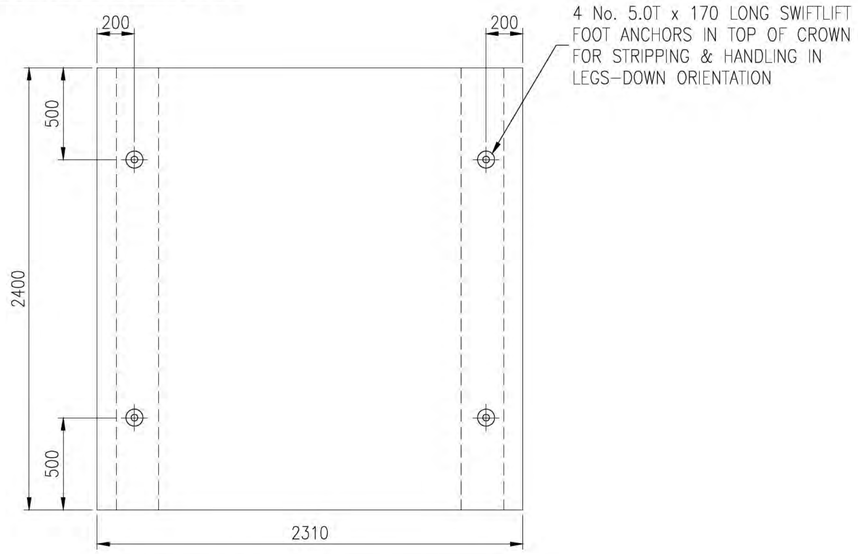
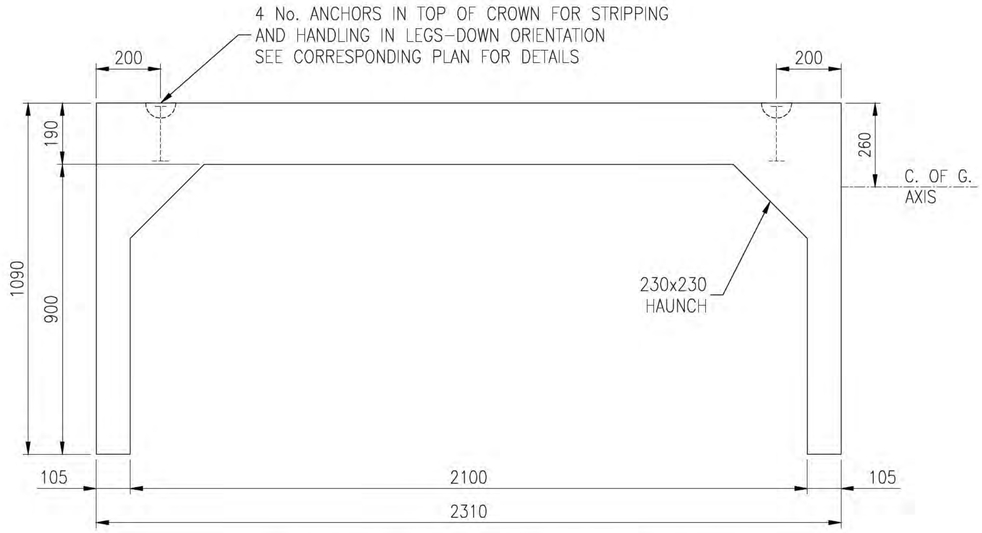
ALL DIMENSIONS IN MILLIMETRES U.N.O.

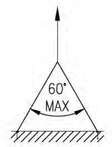


PLAN – 2100x900x2.40m LONG UNIT

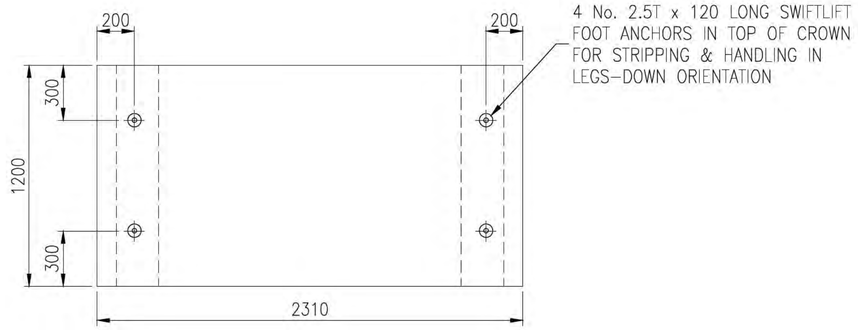
(SEE TABLE FOR PRODUCT QUANTITIES)



SECTION – 2100x900 RCBC CROWN



MAXIMUM 60 DEGREES SLING ANGLE WHEN LIFTING



PLAN – 2100x900x1.20m LONG UNIT

(SEE TABLE FOR PRODUCT QUANTITIES)

	UNIT LENGTHS	
QUANTITIES	1.20m	2.40m
PRODUCT MASS (t)	2.029	4.058
VOLUME (m^3)	0.817	1.634
BRANDING MASS (kg)	2500	4500
PRODUCT CODES	CANA2100902	CANA2100905

NOTES:

1. CHARACTERISTIC CONCRETE STRENGTH TO BE 50MPa.
2. NOMINAL COVER TO REINFORCEMENT IS 25mm FOR EXPOSURE CLASSIFICATION B1. (COVER TOLERANCE –5/+10mm)
3. PRODUCT MASSES ARE BASED ON 2.483T/m^3.
4. DESIGN IS BASED ON AS1597.2–2013 FOR AS5100 ROAD TRAFFIC LOADS CONSISTING OF W80, A160, SM1600 & HLP400 DESIGN LOADS WITH 0–2m FILL.
5. SUITABLE FOR CONSTRUCTION TRAFFIC LOADS EQUIVALENT TO W80, A160 & SM1600 STANDARD ROAD TRAFFIC LOADS WITH 0–2m FILL.
6. TOLERANCES TO COMPLY WITH AS1597.2–2013.
7. LIFTING ANCHORS FOR THIS BOX CULVERT HAVE BEEN DESIGNED WITH A DYNAMIC FACTOR OF 2.0. DO NOT TRAVEL OVER ROUGH TERRAIN.

REV	DRN	CKD	DESCRIPTION	DATE
A	HVS	SMC	ORIGINAL ISSUE	12.05.15

Rocla®

2100x900 BC CROWN
AS1597.2–2013, 0–2m FILL
PRODUCT DETAILS
(25mm COVER / 50MPa / EXPOSURE CLASS B1)

APP	PJC	DATE 12.05.15
CKD	SMC	DATE 06.04.15
DES	HVS	DATE 02.03.15
DRN	HVS	DATE 02.02.15
REF	NATIONAL STANDARD PARALLEL LEG MOULD	
JOB No.	14052701	
SCALE	DO NOT SCALE	
D	225142	
SHEET 1 OF 1		

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TENDER ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DESIGNED:	M MASINA
DRAWN:	M MASINA
SCALE:	AS SHOWN
SHEET SIZE:	A1
NORTH:	PROJECT NORTH

[redacted]

PROJECT:
WASTEWATER TREATMENT FACILITIES

160 RUPPS ROAD
NHILL VICTORIA 3418

DRAWING TITLE:
CIVIL DETAILS - SHEET 7 of 7

JOB NO: 24-182

DISCIPLINE: CIVIL | SHEET: C019 | REV: T1

4SITE ENGINEERS PTY. LTD. ABN 55 168 980 032
ISO 9001:2015 REGISTERED COMPANY. CERTIFICATE NO. AU 1784

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