

LORD HOWE ISLAND BOARD

Development Application

Section 78A, Environmental Planning and Assessment Act 1979

Date Received:

Development Application No.: DA2023.3.1 Date Lodged: 29/05/2023

Use this form to apply for development consent to:

- Erect, alter or demolish a building or structure;
- Change the use of land or a building;
- Subdivide land;
- Display an advertisement;
- Any other development that requires consent from the Lord Howe Island Board.

To minimise delay in receiving a decision about your application, please ensure you submit all relevant information. To complete the form, please place a cross in the boxes ☐ and fill out the sections provided as appropriate. When your application has been assessed, you will receive a Notice of Determination. If you need help please phone or call the Board's office and discuss your queries with a development officer.

APPLICANT DETAILS

☒ Mr ☐ Mrs ☐ Ms Other:

Name: Fletcher Owens

Organisation: Lorhiti Apartments ABN: [REDACTED]

Postal Address: [REDACTED]

Telephone: [REDACTED] Fax:

Email: [REDACTED]

OWNER CONSENT

Has Owner Consent been issued? ☐ Yes ☒ No Owner Consent No.:

IDENTIFY THE LAND YOU PROPOSE TO DEVELOP

Portion/Lot No.: Lot 2 Deposited Plan No.: DP1261010

Lease No.: NO. 2021.02

Address: [REDACTED]

PROPOSED DEVELOPMENT

Describe the proposed development; give a detailed outline of what you are going to do. If it involves a building, indicated what it will be used for.

Installation of irrigation pipework for existing waste water system

Building Material: N/A

Roofing Material: N/A

PAST/PRESENT LAND USES

State the past known uses of the site: No use to date

State the present known uses of the site: No use to date

STAGED DEVELOPMENT

You can apply for development consent for only part of your proposal now, and for the remaining part/s at a later time.

Are you applying for development consent in stages? ☐ Yes ☒ No

If yes please attach:

- Information which describes the stages of your development;
 - A copy of any development consents you already have which relate to your development.
-

PLANS OF THE LAND AND DEVELOPMENT

You need to provide a number of different plans that show what you intend to do. Step 4 of the Development Application Guide sets out which plans to provide and the details to include. **3 copies** of the plans must be submitted with the application. Please attach:

- A site plan of the land, drawn to scale;
 - Plans or drawings of the proposal, drawn to scale and, where relevant;
 - An A4 size plan of the proposed building and other structures on the site;
 - A plan of any existing buildings (and uses), drawn to scale.
-

ENVIRONMENTAL EFFECTS OF YOUR DEVELOPMENT

To assess your proposal, we need to understand the impacts it will have. Depending upon the nature and scale of your proposal, you need to provide one or more of the statements listed below to explain the environmental effects of your proposal.

Is your proposal likely to cause a major environmental impact (e.g. designated development)?

- ☐ Yes Please attach an environmental impact statement.
- ☒ No Please attach a statement of environmental effects (SEE).

Is your proposal likely to cause have significant effect on threatened species, populations, ecological communities or their habitats?

- ☐ Yes Please attach a species impact statement.
- ☒ No
-

SUPPORTING INFORMATION

You can support your application with additional material such as photographs (including aerial photographs), slides and models to illustrate your proposal.

Please list what you have attached.

Description of proposal, Property maps, map of intended installation, Plans of all existing buildings on property using wastewater system, Waste water load and specs prepared by Brad Jospehs, Licensed maintenance plumber for servicing

NOTE: It will be necessary for you to place pegs showing the location of all building extremities and height of buildings within seven days of lodging your development application. These pegs will allows inspection by Board staff at an early stage of your development assessment.

APPLICATION FEE

For development that involves a building or other work, the fee for your application is based on the estimated cost of the development. If your development needs to be advertised to the public you may also need to include an advertising fee. Clauses 246 to 263 of the Environmental Planning and Assessment Regulation 2000 provide a schedule of fees.

NOTE: Fees will be calculated in accordance with Cordell's Building estimates and will form the basis for the fee. To save time and any delays in processing your application, please contact us if you need help to calculate the fee for your application.

Estimated cost of the development: **\$500.00**
Total fees lodged: **\$110.00** Date: **29/05/2023** Receipt No.: **Rec: 23968**

APPLICANT/S OR APPLICANT'S AGENT DECLARATION

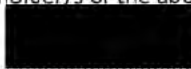
Have you or any associated persons with a financial interest in this application in the last two years made any political donations or given any gifts to any local Board Member or Board employee? ☐ Yes ☐ No

If you ticked yes please fill out a Political Donations and Gift Disclosure Statement.

IMPORTANT NOTICE: It is an offence under the EP&A Act 1979 if you fail to disclose reportable donations and gifts.


LEASEHOLDER AUTHORISATION – All leaseholder/s of the land must sign this application.

As the leaseholder/s of the above property, I/we consent to this application.

Signature:  Signature:
Name: **Fletcher Owens** Name:
Date: **29/04/2023** Date:

APPLICANT AUTHORISATION – The applicant/s or the applicant's agent must sign the application.

I apply for consent to carry out the development described in this application. I declare that all the information given is true and correct. I also understand that, if incomplete, the application may be delayed or rejected and more information may be requested within 21 days of lodgement.

Signature:  Signature:
Name: **Fletcher Owens** Name:
Date: **29/04/2023** Date:

State the capacity in which you are signing if you are not the applicant:

PRIVACY POLICY

The information you provide in this application will enable us, and any relevant state agency, to assess your application under the Environmental Planning and Assessment Act 1979 and other applicable state legislation. If the information is not provided, your application may not be accepted.

If your application is for designated development or advertised development, it will be available for public inspection and copying during a submission period. Written notification of the application will also be provided to the neighbourhood. You have the right to access and have corrected information provided in your application. Please ensure that the information is accurate and advise us of any changes.

LODGEMENT

Before submitting your application, please ensure you have attached all the information the consent authority needs to assess your proposal. You can use the following checklist. Please place a cross in the box ☐ next to any items you have attached:

Plans

- ☒ A site plan of the land — **all applications**
- ☒ Plans or drawings of the proposal showing all dimensions — **all applications**
- ☒ An A4 size plan of the proposed building and other structures on the site - **all applications**
- ☒ A plan which is drawn to scale of all existing buildings.

Environmental effects

- ☐ An environmental impact statement for a designated development proposal and an electronic version of the executive summary
- ☒ A statement of environmental effects — **required for all applications** that are not designated development
- ☐ An environmental report — **if required under clause 42 of the LHI LEP 2010**. Contact the Board to see if you need to prepare an environmental report.
- ☐ A species impact statement
- ☐ A Basix Certificate – The Building Sustainability Index (BASIX) applies to all residential dwelling types and is part of the development application process in NSW. A BASIX certificate **MUST** be obtained for “**BASIX affected development**”. For further information please refer to www.basix.nsw.gov.au
- ☐ Electrical supply form must be completed (for new / alteration / addition to existing supply).

Staged development

- ☐ Information which describes the stages of the development
- ☐ A copy of any consents already granted for part of the development

Supporting information

- ☐ Other material to support your application, such as photos, slides and models. *Please ensure any items listed as an Advisory Note as part of the Owner Consent approval have been addressed.*

Application fee

- ☒ Your application fee — **required for all applications**.

Where to lodge your application

You can lodge your completed application form, together with attachments and fees at the Lord Howe Island Board's office. Contact details below.

CONTACT DETAILS FOR YOUR INFORMATION

Lord Howe Island Board

Bowker Avenue
(PO Box 5)
LORD HOWE ISLAND NSW 2898
Phone: 02 6563 2066
Fax: 02 6563 2127
Email: administration@lhib.nsw.gov.au
Website: www.lhib.nsw.gov.au

Lord Howe Island Marine Park Authority

Phone: 02 6563 2359
Fax: 02 6563 2367
Email: lordhowe.marinepark@npws.nsw.gov.au
Website: www.mpa.nsw.gov.au

Department of Infrastructure, Planning and Natural Resources – General Enquiries

Internet: www.dipnr.nsw.gov.au
Phone: 02 9228 6111
Email: infocentre@dipnr.nsw.gov.au

Department of Infrastructure, Planning and Natural Resources – North Coast Office

49 Victoria Street
(PO Box 6)
GRAFTON NSW 2460
Phone: 02 6642 0622
Fax: 02 6642 0640
Email: northcoast@dipnr.nsw.gov.au
Website: www.dipnr.nsw.gov.au also for BASIX
Certificate www.basix.nsw.gov.au

LORD HOWE ISLAND BOARD

Statement of Environmental Effects

A Statement of Environmental Effects must be completed and submitted with your development application, this is a requirement under the *Environmental Planning & Assessment Act 1979*. The Statement of Environmental Effects report explains the likely impacts of the development proposal taking into consideration relevant planning and environmental matters. If you require any clarification about what information needs to be included, please contact the Board's office on (02) 6563 2066.

Failure to submit a completed Statement of Environmental Effects report will result in the development application being rejected or incurring unnecessary delays before the application can be determined. This report must be signed by applicant on last page.

APPLICANT DETAILS

Name: **Fletcher Owens**

Preferred Contact Phone No.: [REDACTED]

PROPOSED DEVELOPMENT

Portion/Lot No.: **Lot 2** Deposited Plan No.: **DP1261010**

Lease No.: **NO. 2021.02**

Address: [REDACTED]

Please tick the type/s of development you are applying for:

- | | |
|--|---|
| <input type="checkbox"/> Dwelling House | <input type="checkbox"/> Shed or Garage |
| <input type="checkbox"/> Additions to Dwelling House | <input type="checkbox"/> Dual Occupancy |
| <input type="checkbox"/> Home Business | <input type="checkbox"/> Additions to Dual Occupancy |
| <input type="checkbox"/> Commercial | <input type="checkbox"/> Subdivision including Boundary Realignment |

☒ Other – please describe: **Waste water irrigation pipe installation**

DEVELOPMENT DESIGN ATTRIBUTES

EXISTING BUILDINGS

What buildings and/or structures already exist on the subject site? Existing structures located on the subject site (including their gross floor area where applicable) as well as adjoining properties need to be shown on a site plan. Please show floor space.

Infrastructure Building/ Dwelling 2 - 91m2

Dwelling 1/Shearwater Cottage - 86m2

Commercial Unit block - 296m2

Class 7 Commercial garage - 52m2

Class 10a Storage/Workshop - 27m2

DEVELOPMENT CONSENTS

If known, please list previous development and building approvals for the last 10 years which are considered relevant to this application. If necessary please consult Board staff.

DA Number	Development Description	Date of Consent
DA2016.26	Commercial garage	10/05/2016
DA2020.10 (pending)	Change use of building to dwelling	Pending
DA2021.01	Workshop/storage area	08/07/2021
DA2017.14	Wastewater irrigation approved but timelapsed	22/05/2017

OWNERS CONSENT

Please provide the reference number for the Owners Consent application. Please confirm that all conditions of owners consent have been met for this development application.

Submitted with this document

DEVELOPMENT REQUIREMENTS

DWELLINGS/RESIDENTIAL

Does your development comply with the **maximum gross floor area** and the **minimum dwelling area** (under Clause 20 & 23 LHI Local Environmental Plan 2010)? If yes, this must be demonstrated below.

N/A

Please specify if your development complies with the enlargements or extensions of a dwelling (under clause 27 LHI Local Environmental Plan 2010)? If yes, this must be demonstrated below.

N/A

COMMERCIAL

Please specify if your development complies with the requirements in Clause 22 for tourist accommodation, staff accommodation and commercial premises? If yes, this must be demonstrated below.

N/A

ALL BUILDINGS – MAXIMUM BUILDING HEIGHT

Please specify if your development complies with the maximum building height (under clause 29 LHI LEP 2010)? If yes, this must be demonstrated below.

N/A

SUBDIVISION

Please specify if your development complies with the subdivision requirements under clause 21 of LHI LEP 2010? If yes, this must be demonstrated below.

N/A

ZONING – Does your development meet the objectives of the zone in which the site is in? Please provide how the development meets these objectives (clause 13-19 LHI LEP 2010).

N/A

ENERGY EFFICIENCY

Does the development achieve the minimum BASIX requirements? To determine whether a BASIX certificate needs to be submitted with your application, please refer to www.basix.nsw.gov.au/information/index.jsp. Each development application for a residential dwelling and each development application for alterations and additions must have a BASIX certificate.

N/A

BOUNDARY SETBACKS

How far is your development setback from the front boundary?

10m

How far is your development setback from the side and rear boundaries?

5m

Does the development comply with the Board's minimum setback requirements? If no, provide reasons why the development should be supported?

Yes

LANDSCAPING – Please specify if the development complies with the landscaping requirements for Zone 2 land (clause 33 LHI LEP 2010)? If yes, this must be demonstrated below.

N/A

LAND ADJACENT TO ZONE 7 OR 8 – Please specify if your development complies with the requirements for land adjacent to Zone 7 or 8 (under clause 34 LHI LEP 2010)? If yes, this must be demonstrated below.

N/A

CONSTRAINTS

FORESHORE DEVELOPMENT

Is your land within the foreshore development area? If yes, please how the development complies with foreshore development requirements (Clause 35 LHI LEP 2010).

N/A

AIRCRAFT NOISE

Is your land subject to the Australian Noise Exposure Forecast? If yes, the development may need to include an Acoustic Report with the application.

N/A

FLOODING

Is your land flood prone? If yes, what measures will be undertaken to ensure that:

- water is efficiently drained from your property without impacting upon any adjoining neighbours.
- the proposed development will not be adversely affected by flooding.

N/A

HERITAGE

Is the development listed as a heritage item, located in a heritage conservation area or located adjacent to any known heritage item or archaeological site? If yes, a Statement of Heritage Impact and referral to NSW Heritage Branch may be required.

N/A

SIGNIFICANT VEGETATION

Will the development require the removal of any vegetation in areas mapped as 'significant vegetation' in LHI LEP 2010 Sheet 3 as well as the proposed 'significant vegetation' map on exhibition? If yes, the proposed development may be prohibited.

No

RETENTION OF TREES AND LANDSCAPING

Will the development require the removal of any native trees and/or shrubs? If yes, please specify how many trees/shrubs need to be removed and indicate their location on the site/landscape plan.

No

RECOVERY PLANS AND HABITAT AREAS

Is the development consistent with approved Recovery Plans for the island? Does the development have any impacts on threatened species? If the answer to this question is yes then an Environmental Report, a seven part test or a Species Impact Statement may be required (Clause 42 of LHI Local Environment Plan 2010). It is important to remember that it is illegal to clear, modify, underscrub or remove any vegetation within areas of identified habitat.

No

Can the development be sited to retain existing vegetation? If no, explain why this is not possible.

No interference with any vegetation

Do you intend to provide any landscaping to compensate for the removal of vegetation? If yes, please include a landscape plans specifying the species to be used. If no, please explain why supplementary landscaping is not necessary.

N/A

VISUAL APPEARANCE

Explain how the external appearance of the development has been designed to take into consideration of the adjoining properties and character of the area.

N/A

VISUAL AND ACOUSTIC PRIVACY

Describe how the development has been designed to reduce any possible impact on the visual or acoustic privacy of adjoining properties. Consider the use of screening, landscaping, offsetting windows and balconies.

N/A

SOLAR ACCESS

Has the development been designed so that the main indoor and outdoor living spaces face north and east to take advantage of solar access? If yes, please specify the parts of the dwelling facing north and east.

N/A

Does the development overshadow adjoining properties?

N/A

VIEWS

Does the development obstruct any views from adjoining properties?

No

Is it possible to site the development to minimise the obstruction of views? If no, explain why this is not possible.

N/A

PARKING AND TRAFFIC

How many on-site parking spaces are existing and how many will result from the proposed development?

N/A

Does the development provide adequate manoeuvring areas without impacting on existing access and parking arrangements? If no, please justify why the development should be supported.

N/A

EARTHWORKS AND RETAINING WALLS

Does the site need to be excavated or filled? If yes, specify the maximum retaining wall heights and type of construction. Retaining wall details need to be shown on the development plans.

No

WASTEWATER MANAGEMENT

Have you completed the Lord Howe Island Board Onsite Wastewater Management System checklist for Applicants and submitted with this application?

Yes, Brad Josephs the LHIB wastewater officer has inspected the property and existing wastewater system and i have submitted his information in my DA.

STORMWATER RUNOFF DISPOSAL

How will excess stormwater runoff be disposed?

N/A

EROSION AND SEDIMENT CONTROL

What erosion and sediment control measure will be used to keep the soil on your site? Consider siltation fencing, diversion channels, stockpile protection, stormwater pit protection and gravel vehicle access.

N/A

Where will the erosion and sediment control measures be provided on-site? Please identify the location of the erosion and sediment control measures on the site plan.

N/A

OTHER CONSIDERATIONS

Are there any other particular measures proposed to mitigate and/or offset any significant impact caused by the development?

There will be little to no impact by installing my irrigation on the propose land. This land was already approved for this use in DA2017.14

APPLICANT AUTHORISATION

Name: Fletcher Owens

Signature: 

Date: 29/04/2023

On-site Wastewater Treatment

16/05/2023

Lorhiti

Fletcher Owens, Lot 2 of DP1261010

Prepared; Brad Josepns A/Manager Infrastructure & Engineering

P/L No. DP1261010

System Install Overview

Considerations with this report: Please note that a DA has been previously applied for the installation of this system which was **approved**. The older approved DA's noted that the irrigation required for this system was 2,870m². This included additional sources of water disposal which increased the hydraulic load. The new DA has taken out several of these sources as they are no longer relevant the main ones being;

- Lorhiti Restaurant is no longer operational.
- Di Owens has submitted a DA to remove her residential premises from the ES9000 system.

Please note that the old DA's included within the application have been approved in the past, as such please **ignore** the 7 X 410m² irrigation area, this information is purely for refencing. This DA is to decrease the size of the irrigation area due to the changes since. This information has been supplied to show that a larger plan has been approved in the past.

The new DA has also included the addition of several additional EP's within the hydraulic load calculations to ensure that the system is still able to handle future loads if extensions/development are to occur on existing infrastructure. The system comes with its own visual alarm to alert of system malfunctions such as high water, aeration pump failure etc.

Diane Owens has applied for a DA to install her own system, as such the pipework from her residence will be removed, the following pipework will be going to the system. The original DA pipework plans have been included with the application as these were originally approved.

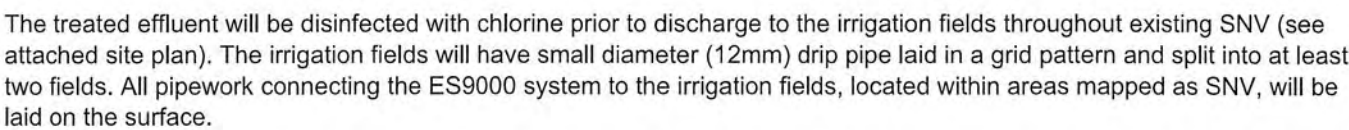


An ES9000 installation location has not been changed with the system located SSW of the existing dwelling used for staff accommodation. As per the original DA the irrigation area will be located on the southern part of the lease across Anderson Rd. This has been approved in the old DA. A Pipe connecting the ES9000 wastewater system to the irrigation area will run under Anderson Rd via a stormwater drain located midway down the Anderson Rd hill. Once on the otherwise of Anderson Rd, the pipe will run partially over the neighbouring Lot – Bruce Thompson who has given written permission for this to happen.

The system itself has been approved and is more than capable of handling the projected hydraulic load.

The daily hydraulic load of effluent to be treated is 2490lt. This is calculated by the following flow rates:

Source	Number	Lt/day	Total Lt/day
1 Bedroom tourists units X 5	10pax	150	1500
2 X Bedroom Shearwater cottage	3EP		360
2 X Bedroom Cyclone Alley	3EP	150	360
Non-residential staff			30
Potential Future upgrades			240
Total Daily Hydraulic Load			2490



In summary, as the old DA's have been approved for the system in the past and this DA is a variation regarding **less** hydraulic load I have no problem approving and supplying internal referral for this system.



Brad Josephs

A/Manager Infrastructure & Engineering

PLAN FORM 21A2

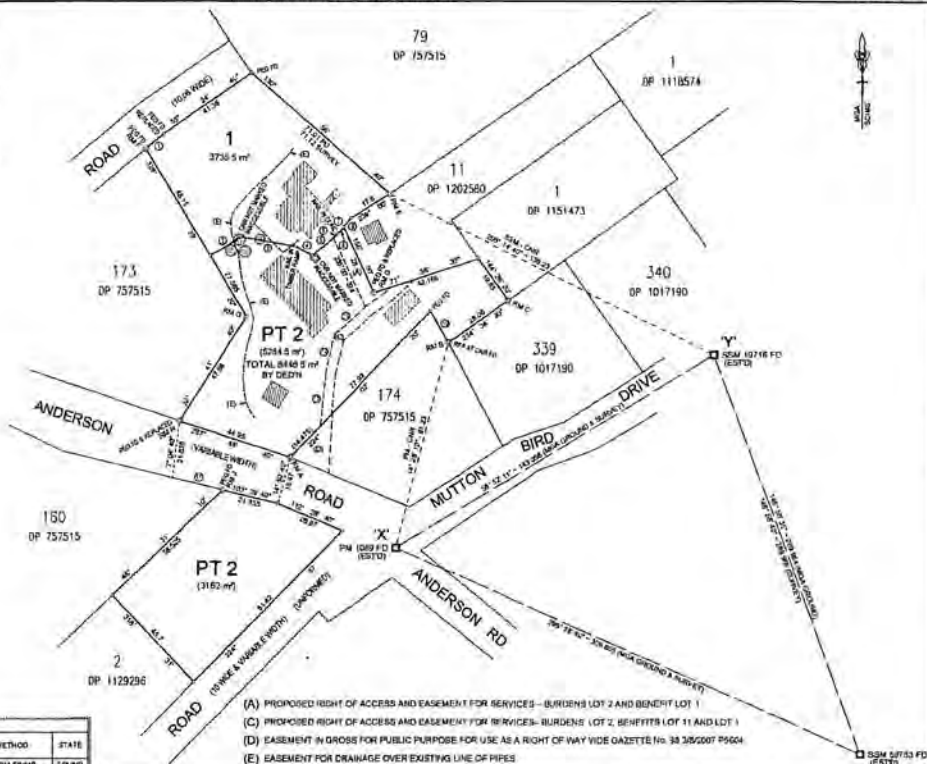
WARNING: TREADING OR FOLDING WILL LEAD TO REJECTION

Sheet 1 of 1 Covers

SCHEDULE OF REFERENCE MARKS				
NO.	DESCRIPTION	BEARING	DISTANCE	ORIGIN
A	NM G.P.T.D.	84° 01' 45"	0.78	UN 129-2698
B	NM G.P.T.D.	84° 48' 27"	5.40	UN 129-2698
C	NM G.P.T.D.	144° 16' 00"	1.00	DP 1115473
D	NM G.P.T.D.	18° 30' 45"	0.335	DP 1202580
E	NM G.P.T.D.	23° 31' 00"	0.255	DP 1115474
F	NM TREE P.D.	338° 42' 42"	7.31	120 127-2698
G	NM STAR PICKET	139° 37' 01"	15.51	PLACED
H	NM STAR PICKET	170° 18' 32"	7.520	PLACED
I	NM TREE P.D.	142° 30' 42"	3.385	UN 127-2698
J	NM G.P.T.D.	128° 38' 01"	1.83	PLACED
K	NM G.P.T.D.	228° 30' 10"	1.255	UN 129-2698

SCHEDULE OF SHORT BOUNDARIES			
NO.	BEARING	DISTANCE	COMMENTS
(1)	238° 34' 30"	8.89	BOUNDARY
(2)	238° 58' 00"	24.135	BOUNDARY
(3)	188° 08' 30"	31.125	BOUNDARY
(4)	238° 08' 30"	7.3	BOUNDARY
(5)	238° 30' 00"	9.5	BOUNDARY
(6)	238° 30' 00"	12.211	EASEMENT
(7)	232° 03' 00"	8.1	BOUNDARY
(8)	232° 03' 00"	1.8	BOUNDARY
(9)	232° 03' 00"	4.5	BOUNDARY
(10)	133° 12' 00"	18	BOUNDARY
(11)	132° 33' 00"	20.585	BOUNDARY
(12)	234° 18' 45"	18.225	EASEMENT
(13)	187° 15' 00"	25.74	EASEMENT
(14)	187° 54' 15"	14.88	EASEMENT
(15)	228° 34' 15"	11.5815	EASEMENT

COORDINATE SCHEDULE					
MARK	NGA COORDINATES	CLASS	ORDER	METHOD	STATE
PM 1081	UN 414 757 9 512 801 081	C	4	FROM SCMS	TOLSON
125M 10116	UN 538 145 9 517 801 021	C	4	FROM SCMS	TOLSON
325M 10783	UN 538 225 9 517 801 071	A	1	FROM SCMS	TOLSON
DATE OF SCMS COORDINATES: 30-6-2017 MGA ZONE 58 MGA DATUM: GDA 94					
CONVERSION SCALE FACTOR: 10 000 000					



SURVEYOR		PLAN/READING		LGA - UNINCORPORATED		REGISTERED	
Name: DALLAS BRYAN LAURIE		SUBDIVISION OF LOT 10 IN DP 1202580		Locality: LONAROWE 45489		DP	
Date: 30-6-2017				Production Date: 1 800			
Reference: 592 J/L 873				Lengths are in meters			

Survey plan showing Lots 1 (Diane Owens) and 2 (Fletcher Owens)



SNV areas

Development Application
Installation of Wastewater Irrigation Pipework
Lot 2 DP1261010
Lease No. 2021.02
FLETCHER CHASE OWENS

16 May 2023

Lord Howe Island Board

[Redacted]

Bruce Thompson

[Redacted]

Fletcher Owens

[Redacted]

Corhi Apartments

[Redacted]

To whom it may concern

I agree to allow Fletcher Owens to place irrigation pipework across my special lease Lot 160 DP757515 as it leaves the road reserve to reach the irrigation field on the southern component of Lot 2 DP1261010.

Signed

[Redacted Signature]

Bruce Thompson

Date 16 May 2023

2. A statement of the objectives of the proposed development.

- To ensure that any further development on the Island does not destroy the natural environment and does not adversely affect the lifestyle of the residents.
- To satisfy objectives of Zone 2 (settlement) LEP 2010.
- To have no impact on the environment.
- To upgrade the existing ES9000 wastewater system

Specific objectives of the proposed development are;

- To maintain present levels of weed eradication and re-vegetation on both the proposed portions.
 - To comply with the LHI Board Wastewater Management Plan
 - To maintain minimal impact on the ecology of the Island.
 - To maintain floristic integrity of the site.
 - To conserve the World Heritage values of Lord Howe Island.
- (b) that development is only permitted in locations where, in the consent authority's opinion:
- (i) that the development will not involve unacceptable infrastructure costs for the Board or the community of the Island. **There are no infrastructure costs.**
 - (ii) that there is an adequate area available for the treatment or disposal of any effluent arising from the proposed development by an appropriate effluent treatment or disposal system. **Existing waste disposal and management plan**
 - (iii) that the land can support the proposed development and is suitable in terms of the land's physical constraints (such as vulnerability to erosion, slip or flooding), and
 - (iv) that any effluent treatment or disposal system referred to in subparagraph (ii)) will not adversely affect groundwater quality,
- (c) to avoid or minimise environmental damage and protect areas that:
- (i) comprise significant habitat for species of animals that are native to the Island, or
 - (ii) Have significant native vegetation.
- To ensure that no part of the proposed development will:
 - (i) result in any damage to, or the removal of, significant native vegetation, or
 - (ii) have a significantly adverse impact on the habitat of any plants, or animals, that are native to the Island,
 - (iii) not be adversely affected by any landform limitations, including flooding, landslip, unstable soils and steep slopes,
 - (iv) cause significant additional cost to the Board or the community of the Island,
 - (v) have any significant adverse impact on the locality or appearance (when considered by itself or in conjunction with existing buildings and works)
 - (vi) cause any significant overshadowing of adjoining land,
 - (vii) Cause any significant reduction in the privacy of occupiers of adjoining land.

• An analysis of the proposed development

• Details of any existing development that may be superseded by the proposal.

None

(c) A general description of the environment that, in the opinion of the consent authority, is likely to be adversely affected by the proposed development.

The proposal is for installation of irrigation pipework. The environment will not be effected. No native vegetation will be removed.

(d) A detailed description of any aspects of the environment that, in the opinion of the consent authority, are likely to be significantly adversely affected by the proposed development, including an assessment of whether there is any significant native vegetation that is likely to be significantly adversely affected by the proposed development.

The environment will not be effected. No native flora or fauna will be removed.

(e) The likely impacts of the proposed development on the environment, having regard to the following

- The nature and extent of the proposed development.
- Any rehabilitation measures to be undertaken in relation to the proposed development.

A rehabilitation plan has been submitted and approved by the Board and the applicant will continue to:

- Conserve of World heritage values
- Protect significant vegetation
- Protect existing habitat of threatened species
- Protect potential habitat of threatened species

Re-vegetate existing disturbed areas with native plants suited to the area approved by the Lord Howe Island Board.

The proposal complies with the Lord Howe Island Act 1953 Transfers and subleases

The proposal complies with the LHI DCP 2005 3-3.1 *Objectives*, 1.2 and 3.1.2 *Development Requirements*, and 3.1.3 *Design Principles* and Section 2.

The proposal complies with the REP2005, **Clause 11** "Matters that must be satisfied before Development Consent is granted"

(f) A full description of the measures proposed to mitigate any adverse impacts of the proposed development on the environment.

The DA is for subdivision which will not affect the environment.

- There is no effect on soil suitability, stability, slope, natural drainage patterns and erosion control.
- There is no effect on plants or animals that are native to the island.
- There will be no change to air, noise or water pollution arising from the proposed subdivision
- There is no impact on the health of people in the neighbourhood
- There are no hazards arising from the proposed development.
- There will be no impact on traffic in the neighbourhood
- There is no impact on the local climate
- There is no change to visual impact.
- There is no impact on soil erosion
- There is no impact on heritage significance
- There is no visual exposure.
- The existing access is landscaped and established. There is no requirement for cut and fill.

The measures that can be taken to improve:

The landscaped areas will continue to use vegetation as a screen, to create privacy, to define boundaries, to provide shade in summer and sun in winter.

- The existing landscaping design provides pleasant outdoor living in character with the Island. The already established gardens reflect this.
- The area will be continually monitored for weeds and these will be removed in compliance with remediation and Revegetation plans.
- Eradication of rodents and ants

• **The reasons justifying the carrying out of the proposed subdivision in the manner proposed having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development**

(a) Biophysical

The site satisfies Zone 2 (settlement) objectives LEP and DCP 2010;

1. The proposal does not involve any negative impacts on significant native vegetation.
2. The proposal will not impact on the ecology. There is sufficient site area.
3. Endangered or protected species or habitats will not be disturbed.
4. Landscape Unit: for Lot2, DP 1261010 lies within the East Coast Unit.

Terrain: The proposed area is gently sloping to the West.

Soil: The RES (RES1984, Land Resources, p.8.) classifies the soil on the proposed site as weakly__structured sandy soil. The soil profile is deep. The Great Soil Group is Calcareous Litho sol. Slope: There is a minor slope of 5-10% to the North West.

Surface drainage: The site drains generally to the North West. There are no discernible drainage lines on the site.

Surface Geology: is described as Ned's Beach Calcareanite. This is cross-bedded calcareous sandstone composed of fragments of coralline algae, pulverised coral, foraminifera and fragmented mollusc shells.

The depth at which Ned's beach Calcareanite is encountered on the proposed subdivision site is variable and can range from 20cm to 2 metres.

Urban Capacity: Sub-Class: B-sec. This category covers the entire proposed subdivision site. The negligible constraints identified are slope, erodibility and permeability.

Degree of Physical Constraint: Low

Capabilities: Residential, Zone 2 Settlement

Rural Capabilities: The land is classified (iv), which is suitable for grazing and fruit and vegetable gardens due to the sandy soil.

Fire Hazard: is low. The RES (1984, Bushfire Hazard) indicates that the threat posed by bushfires on Lord Howe Island is insufficient to warrant special planning controls or management programs.

Vegetation: The proposal will not affect vegetation.

Fauna: The proposal will not affect fauna.

The proposal meets shape and size requirements of the LEP2010 and the DCP (refer to map of Lord Howe Island Zone 2 Perpetual Leases) and the LHI

Soil stability, gentle slope, natural drainage and no erosion.

No visual exposure - trees provide privacy.

The tree canopy of both parts protects the area from strong winds.

There is potential for additional visual and climatic screening by additional planting.

The proposed irrigation is located towards the South West of the Lease

(b) Economic.

The Economic reasons justifying the subdivision are;

- The applicant will comply with the LHI Board Wastewater Policy

(c) Social

The social reasons justifying the proposed subdivision and development are;

The applicant will comply with the LHI Board Wastewater Policy

6. A list of approvals that may be obtained under any other Act or Law before the development may be lawfully carried out.

Owner Consent approval

DA approval

DEECC approval and Land

A letter of agreement obtained from Bruce Thompson (included in DA).

A service Contract from Warren O'Brien (Earth Safe accredited service agent) will be obtained

Evidence of Compliance LHI Board

7. An assessment of the compatibility of the proposal with World Heritage values of the Island.

World Heritage values will not be compromised. The applicant's proposal is compatible with World Heritage values as both aim:

(a) to conserve the World Heritage values of Lord Howe Island

(b) to restore or enhance lost or disturbed natural resources of the Island,

(c) to protect threatened species, populations and ecological communities, and their habitats,

(d) to encourage the ecologically sustainable use of resources,

(e) to encourage community appreciation of the World Heritage values of the Island,

(f) to enhance the wellbeing and welfare of individuals and the Island's community by pursuing economic development that safeguards the welfare of future generations,

(g) to facilitate the proper management, development and conservation of the Island's World Heritage natural environment, the Island's cultural heritage and the Island lifestyle,

8. A detailed evaluation of the visual impact of the proposed development and measures to be taken to reduce any detrimental visual impact, including the extent to which vegetation may be used to restore a natural landscape character.

There is no visual impact created by the proposal. The irrigation will be in an area which is unseen and dripper type irrigation.

9. A detailed evaluation of any effect of the proposed development upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.

Locality

No effect.

Aesthetic

No effect.

Anthropological

No effect.

Archaeological

No effect.

Architectural

No effect.

Scientific

No effect.

Cultural

No effect.

Historical

No effect.

10. Justification of the proposal in terms of the aims of the Lord Howe Island Local Environmental Plan 2010.

- The proposal complies with the LHI DCP 3-3.1 *Objectives*, 1.2 and 3.1.2 *Development Requirements*, and 3.1.3 *Design Principles* and Section 2.

The proposal satisfies the LEP2010. The proposal will not affect vegetation.

- The proposal complies with the LEP2010, Clause 11 "*Of what matters must the Consent Authority be satisfied before granting development consent?*"

The applicants' proposal supports the aims of the LEP2010 and he intends:

- (a) to conserve the World Heritage values of Lord Howe Island and to restore or enhance lost or disturbed natural resources of the Island,
- (b) to ensure that there are no adverse environmental, economic, or social impacts.
- (c) to protect threatened species, populations and ecological communities, and their habitats,
- (d) to encourage the ecologically sustainable use of resources,
- (e) to encourage community appreciation of the World Heritage values of the Island,
- (f) to enhance the well-being and welfare of individuals and the Island's community by pursuing economic development that safeguards the welfare of future generations,
- (g) to facilitate the proper management, development and conservation of the Island's World Heritage natural environment, the Island's cultural heritage and the Island lifestyle.

The applicant will ensure that no part of the proposed development:

- (i) will result in any damage to, or the removal of, significant native vegetation, or
- (ii) will have a significantly adverse impact on the habitat of any plants, or animals, that are native to the Island,
 1. **Access** will not affect SNV or habitat.
 - (i) Access already exists from Anderson Road to the irrigation area. There will be no damage to, or the removal of, **significant native vegetation. No native plants will be removed or damaged.**
 - (ii) have a significantly adverse impact on the habitat of any plants, or animals, that are native to the Island,
 2. any proposed **landscaping** will use species of plants that are native to the Island and common in the locality to enhance any significant native vegetation,
 3. the proposed development will not be adversely affected by any landform limitations, including flooding, landslip, unstable soils, and steep slopes,
 4. **Adequate services** in respect of the proposed development have been provided without cost to the Board or the community of the Island,
 5. the **appearance** of the proposed development (when considered by itself or in conjunction with existing buildings and works) will not have any significantly adverse impact on the locality,
 6. the proposed development will not cause any significant **overshadowing** of adjoining land,
 7. The proposed development will not cause any significant reduction in the **privacy** of occupiers of adjoining land.

11. An assessment of whether there are any feasible alternatives to carrying out of the proposed development including: of any feasible alternatives to the carrying out of the development, having regard to its objectives including;**(a) The consequences of not carrying out the proposed development.**

If the proposal is not approved the applicant cannot comply with the LHI Board Wastewater Management Plan.

(b) The reasons justifying the carrying out of the development.

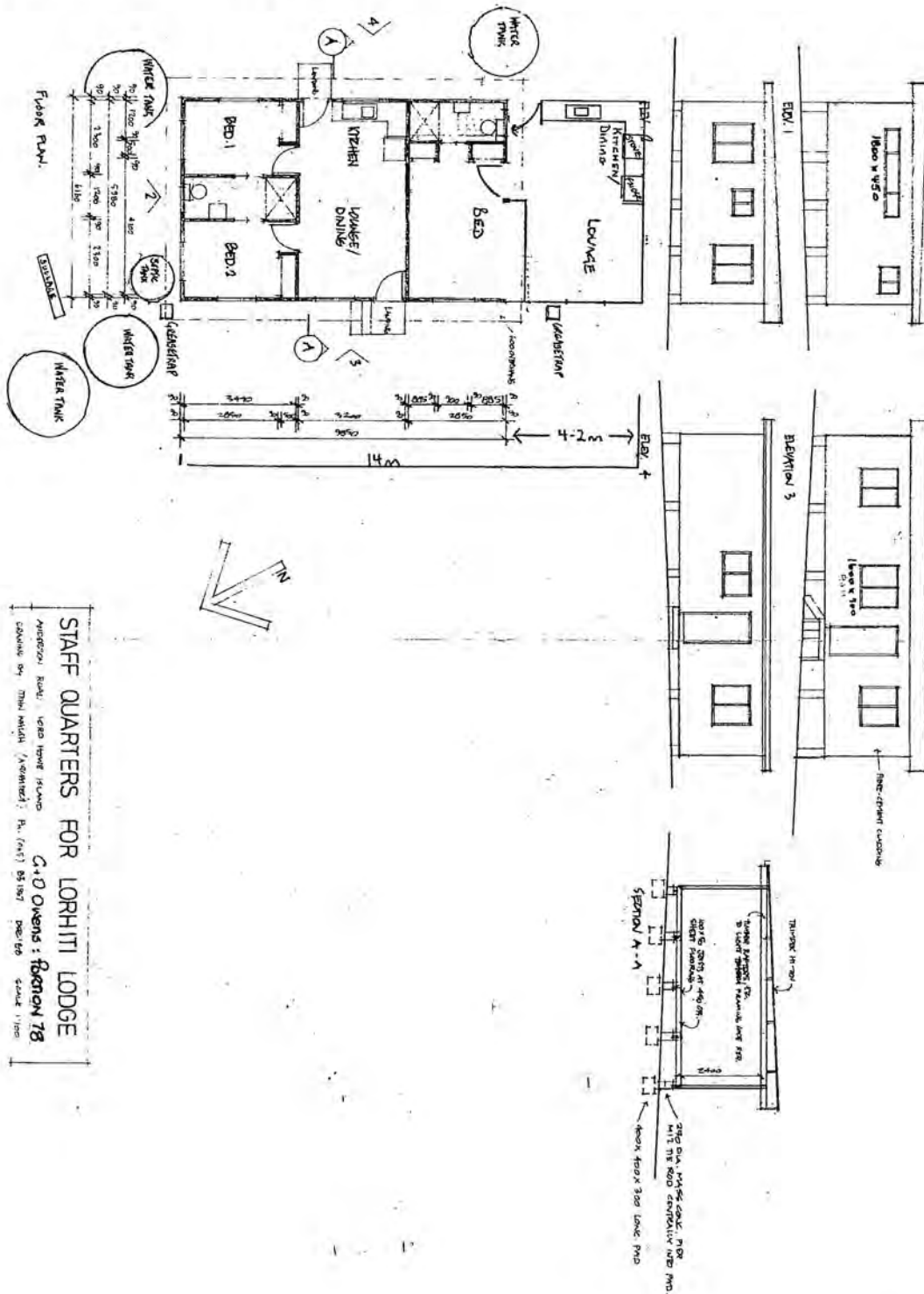
To comply with the LHI Board Wastewater Management Plan.

2. Ecologically sustainable development

- The consideration of the environment has been set out above
- There will be no pollution generated.
- The present generation is currently preserving the environment and social wellbeing for future generations.
- There are no threats to the environment with this proposed subdivision.

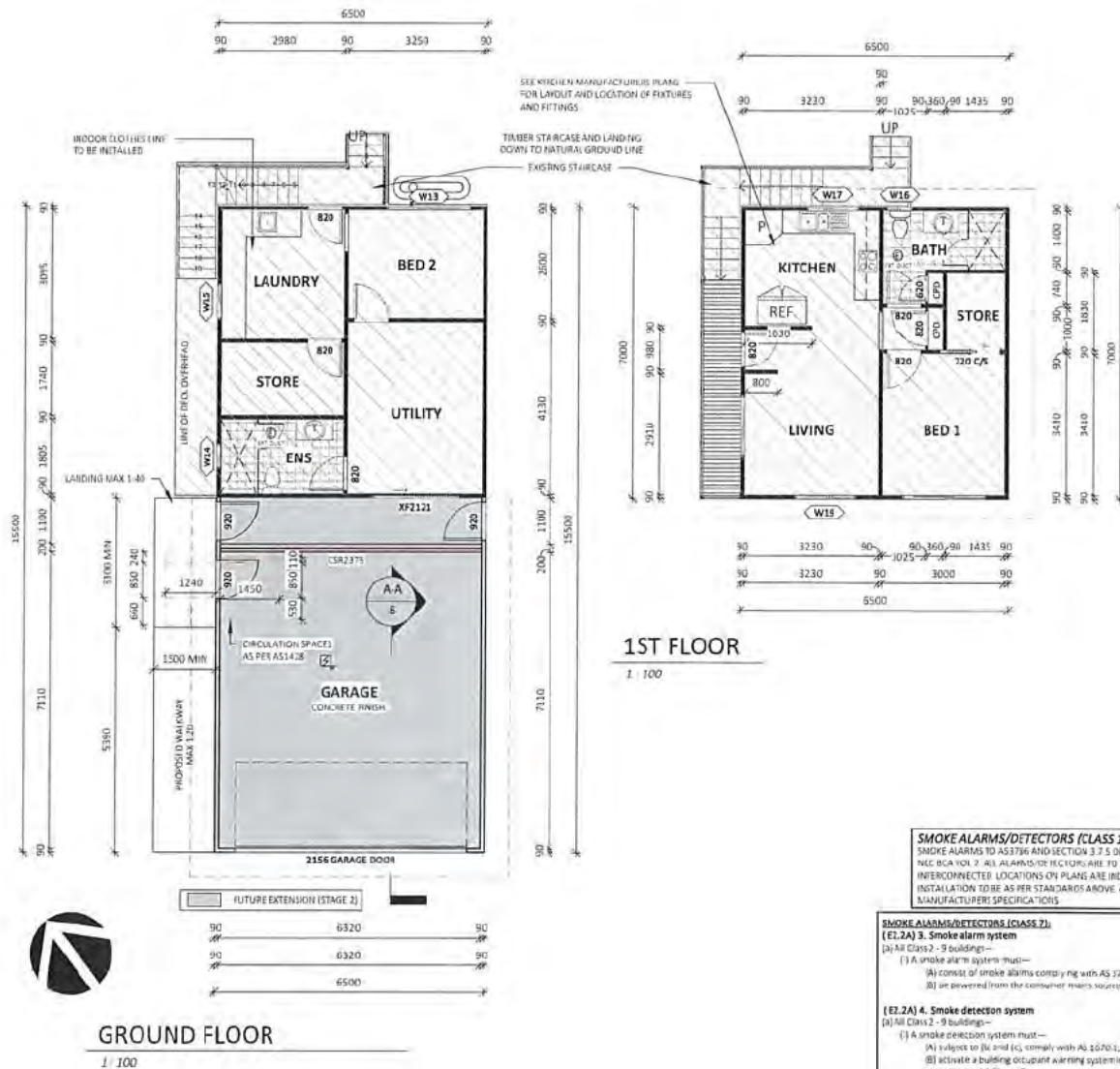
Approved Right of way entrance to Lorhiti from Anderson Road

Dwelling 1 – Applicants residence



Dwelling 1 Plan (formerly staff quarters)

Dwelling 2 – Shearwater dwelling entitlement. (old Infrastructure Building)



SMOKE ALARMS/DETECTORS (CLASS 1):
SMOKE ALARMS TO AS3786 AND SECTION 3.7.5 OF THE NCC BCA VOLUME 3. ALL ALARMS/DETECTORS ARE TO BE INTERCONNECTED. LOCATIONS ON PLANS ARE INDICATIVE (INSTALLATION TO BE AS PER SPECIFICATIONS ABOVE AND) MANUFACTURER SPECIFICATIONS.

SMOKE ALARMS/DETECTORS (CLASS 2):

(E1.2A) 3. Smoke alarm system

(a) All Class 2 - 9 buildings—

(1) A smoke alarm system must—

(A) consist of smoke alarms complying with AS 3786, and

(B) be powered from the consumer mains supply.

(E1.2A) 4. Smoke detection system

(a) All Class 2 - 9 buildings—

(1) A smoke detection system must—

(A) be subject to (b) and (c), comply with AS 1670-1, and

(B) activate a building occupant warning system in accordance with Clause 7.

(E1.2A) 7. Building occupant warning system

Subject to (4.3), a building occupant warning system provided as part of a smoke hazard management system must comply with clause 3.22 of AS 1670-1 to sound through all occupied areas except:

FIRE RATED COMMON WALL - 90/90/90

SYSTEM SPECIFICATION			ACOUSTIC OPINION: PKA Predictor V18				
FRL	SYSTEM	WALL LININGS	STUD DEPTH mm				
			75	90	120	140	
~ 120/120/90/90/90	CSR 2275	Bath Slab • 2 x 12mm Gypsum Fynthek plasterboard	CAVITY INFILL				
			Rate 10 TUBS 100				
FRL 120	CSR 2275	Bath Slab • 2 x 12mm Gypsum Fynthek plasterboard	R1 75 Glast Elms 1.5	10/52	11/53	12/55	13/55
			R1 75 Soundscreen 2.0	10/53	11/54	12/56	13/56
FRL 120	CSR 2275	Bath Slab • 2 x 12mm Gypsum Fynthek plasterboard	R1 100G3 Polyester	10/54	11/55	12/57	13/57
			Minimum Void Thickness mm:	212	252	312	362

FLOOR AREAS	
*FLOOR AREA MEASURED FROM EXTERNAL FACE	
*UPPER FLOOR AREAS EXCLUDE STAIRS & VOIDS	
NAME	AREA
DECK	5.3 m ²
GARAGE (stage 1)	47.5 m ²
GROUND FLOOR	45.5 m ²
PROPOSED GROUND FLOOR	7.8 m ²
UPPER FLOOR	45.5 m ²
TOTAL	151.5 m ²

ROOF AREAS	
Name	Area
DWELLING ROOF	60.8 m ²
GARAGE ROOF	69.9 m ²
TOTAL	130.7 m ²

BASIC NOTES:

PLEASE REFER TO THE "SUMMARY OF BASIC COMMITMENTS" ON PAGE 2 FOR FURTHER INFORMATION. PLEASE REFER TO THE BASIC CERTIFICATE FOR EXACT DETAILS.

GENERAL PLAN SET NOTES:

CHECK ALL DIMENSIONS ON SITE. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT CONTRACTS, SPECIFICATIONS, REPORTS, DRAWINGS, LEGENDS, NATIONAL CONSTRUCTION CODE, AUS & NZ STANDARDS, ENGINEERING & COUNCIL APPROVALS.



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PROJECT: CHANGE OF USE

STATUS: CONSTRUCTION PLANS

LOT No: 173 DP No: 1118574

STREET: [REDACTED]

CLIENT: OWENS

SHEET: 3 OF 9

FLOOR PLAN

SCALE: 1 : 100

SHEET SIZE: A3

START DATE: 26.02.21

DWG No: D4672

DRAWING REVISION + NOTES

Date: Revision:

12.03.21 INITIAL ISSUE

24.08.21 FIRE SEP / ACC ACCESS

15.10.21 PLAN CHANGES

03.04.22 BCA CHGS

Issue: Drawn:

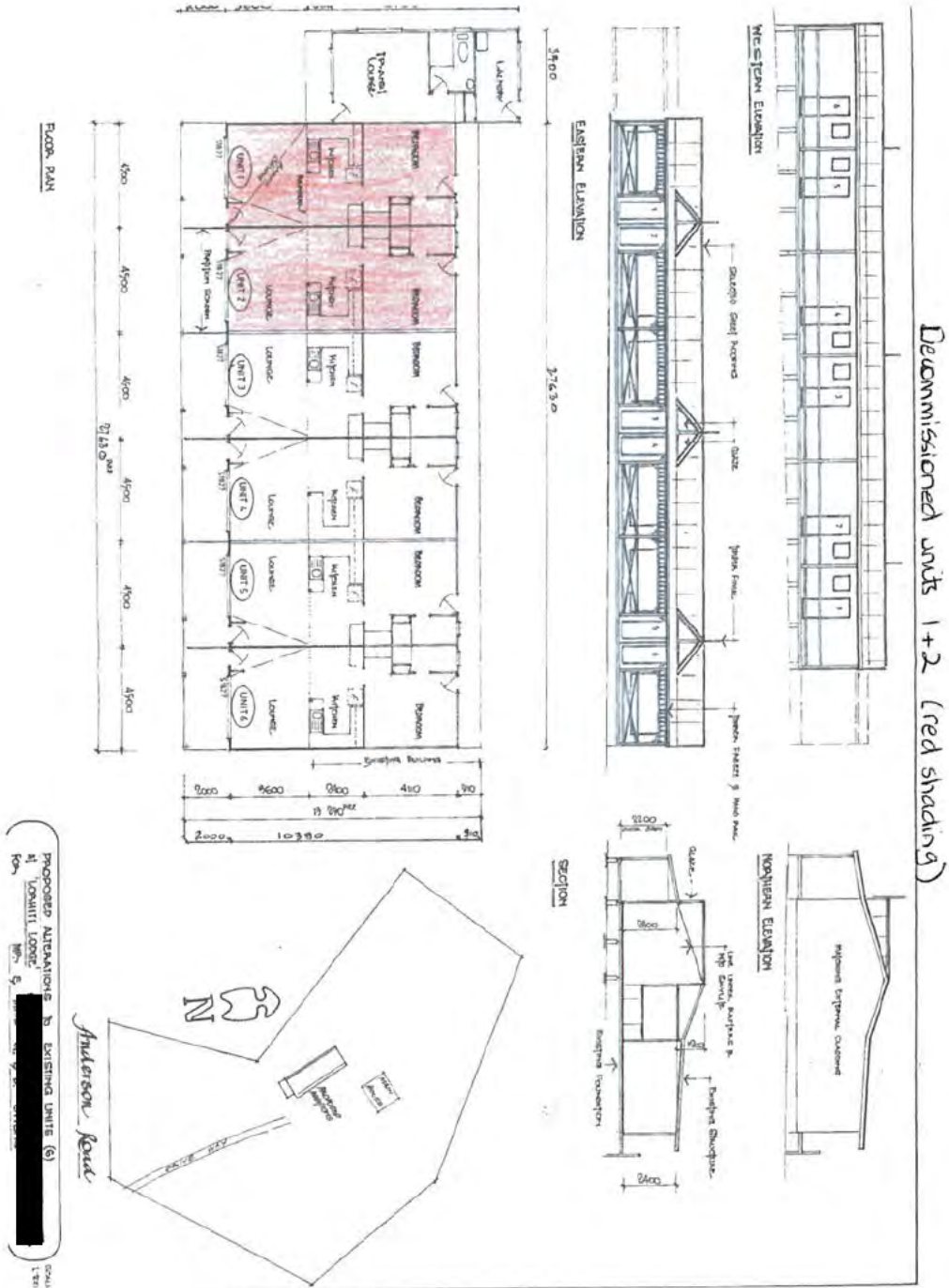
A MW

E MS

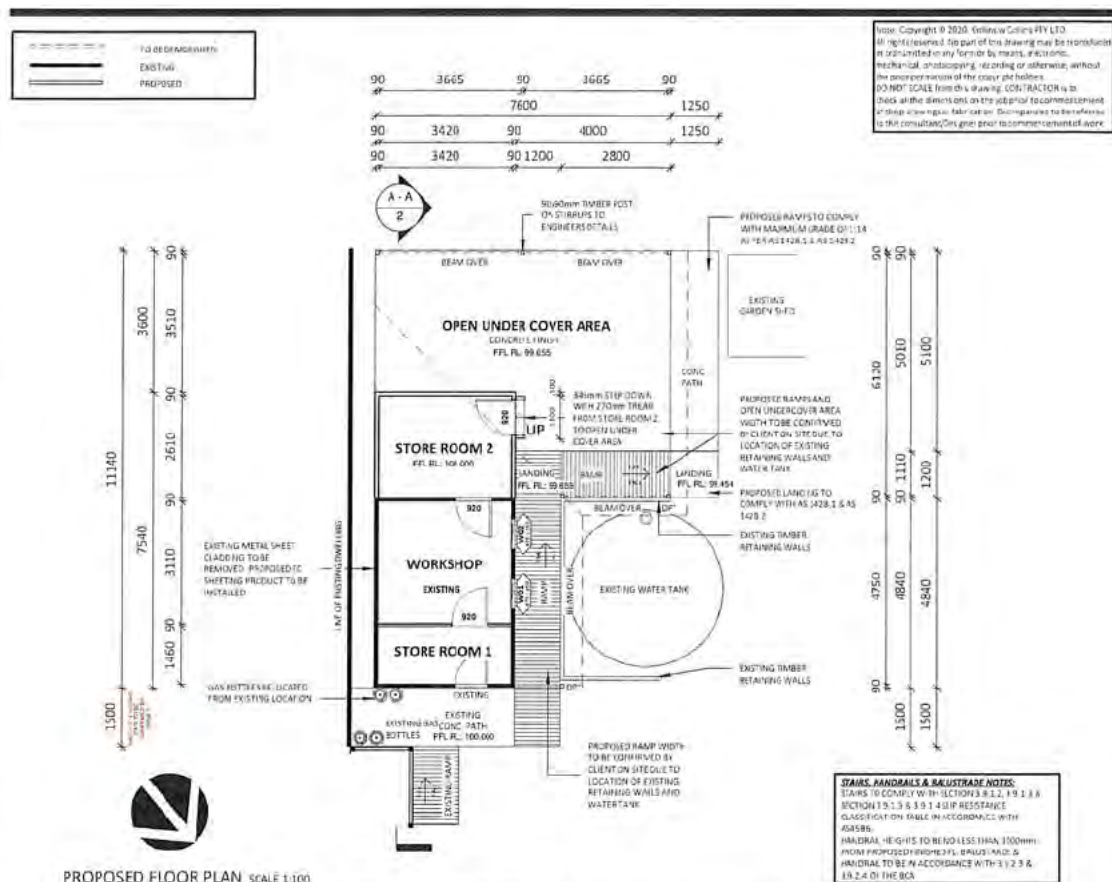
F MS

G DC

Lorhiti Accommodation Block Floor Plan – 6x Apartments



Workshop / Storage Area



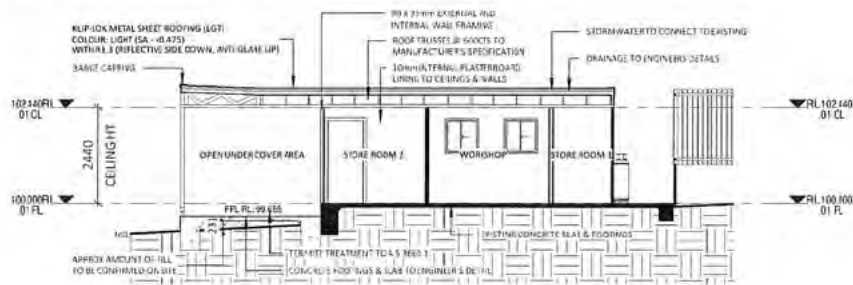
PROPOSED FLOOR PLAN SCALE 1:100

AREAS - FLOOR - PROPOSED	
*FLOOR AREA CALCULATED FROM EXTENSION, ETC.	
ITEM	AREA
PROPOSED OPEN SUIT DOOR AREA	31.4 m ²
PROPOSED STORE/ROOM 1 AREA	97 m ²
EXISTING STORE/WORKSHOP AREA	11.4 m ²
EXISTING CONCRETE AREA	6.3 m ²
PROPOSED TILLED DECK BAMP	12.4 m ²
PROPOSED CONCRETE BAMP AREA	7.8 m ²
TOTAL	186.7 m ²

AREAS - ROOF AREA - PROPOSED	
Type	Area
PROPOSED ROOF AREA	78.0 m ²
TOTAL	78.0 m ²

AREAS - FLOOR - EXISTING	
MEASURED FROM INTERNAL FACE OF EXISTING WALL	
NAME	AREA
EXISTING CONCRETE AREA	6 m ²
EXISTING UTILITY AREA	17 m ²
EXISTING CONCRETE PAD AREA	10 m ²
TOTAL	33 m ²

AREAS ROOF AREA EXISTING	
NAME	AREA
EXISTING ROOF AREA	2.5 m ²
TOTAL	2.5 m ²



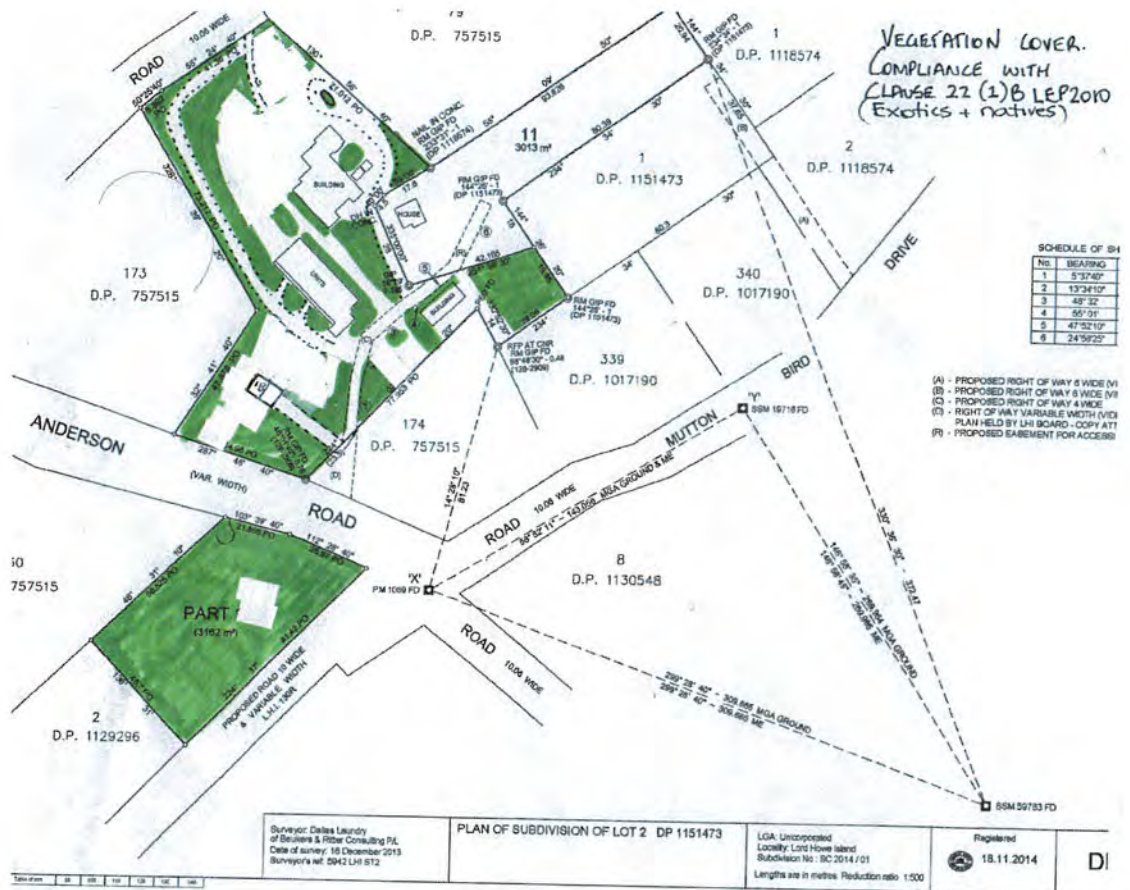
SECTION A-A

SCALE 1/100

CHECK ALL DIMENSIONS ON SITE. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT CONTRACTS, SPECIFICATIONS, REPORTS, DRAWINGS, ENGINEERING & COUNCIL APPROVALS



Areas showing SNV includes site and surrounding leases



Earthsafe ES 9000 System (installed 2008).

The Earthsafe ES9000 system is a commercial version of the Earthsafe advanced AWTS.

The system comprises of 3 main tanks performing the following functions

Tank 1: 3000 litre Collection Well/Primary Treatment unit

Tank 2: 3000 litre Aeration Cell/Secondary Treatment

Tank 3; 2000 litre clarifier and 1000 litre pump well.

Filter, Flush valve, air filter and pump alarm have been installed. Chlorine is used for disinfection.

The simplified operation is as follows:

Effluent flows into Tank 1 through the drainage lines from the internal plumbing. This liquid is retained for a designed retention of 24 hours. In this stage the anaerobic process occurs with some elements settling as sludge and some floating to the surface forming a crust. The internal biological processes digest around 60% of the solids in what is termed primary treatment.

The incoming effluent displaces the earlier treated effluent which flows into tank 2. At this stage the liquid is subject to large volumes of aeration across a large biological media area. The action of the aeration stirs the liquid and provides dissolved oxygen for further biological treatment which is generally termed secondary treatment.

The secondary treated effluent then flows into tank 3 where it settles in a clarification chamber. At this stage some solids settle out as sludge and are returned to the primary tank for further treatment. Any floating debris is skimmed off and recirculated back to the aeration chamber.

The final treated effluent is then passed through a solid tablet chlorinator which disinfects the liquid prior to pumping out into the irrigation area. Lord Howe Island Management Strategy requires secondary treated effluent to meet the following standards:

Parameter Expected Failure

Biological Oxygen Demand mg/l <20 >50

Suspended Solids mg/l <30 >50

Faecal Coliforms (disinfected) mpn/100ml <30 >100

Dissolved Oxygen (aerated) mg/l >2 and <8 <2

Although operating conditions may vary Earthsafe Systems have undergone compliance testing as required by the NSW Health Department and these performance tests are reviewed annually by Benchmark Australia as part of the Earthsafe Quality Plan and Ongoing Accreditation. Between June 2003 and December 2003 Earthsafe conducted extensive independent testing on its advanced Earthsafe DGTS system. These tests were carried out by ALS Australia in their NATA accredited laboratories and audited by SAI Global. These tests were carried out at weekly intervals during the period.

The results are listed below:

Parameter Maximum Average

Biological Oxygen Demand mg/l 19 5.3

Suspended Solids mg/l 41 5.6

Faecal Coliforms mpn/100 ml 66 5.6

Total Nitrogen 28.8 4.8

Total Phosphorous 10.9 9.0

Free Chlorine 2 .2

Under these test conditions the Earthsafe DGTS passed on every required parameter.

System Nutrient Loading

Based on these findings the typical design nutrient loading for an Earthsafe advanced AWTS

is Total Nitrogen 5 – 10 mg/L

Total Phosphorous 10 mg/L

Given the reductions in nutrients the irrigation area required is now only limited by the site conditions, soil types and hydraulic loading across the available land disposal area.

System Hydraulic Loading Based on the Lord Howe Island Management Plan the typical design requirements

Nominated Area Water Balance & Storage Calculations

Site Address: Fletcher Owens - Lohiti

INPUT DATA

Design Wastewater Flow	Q	2490	L/day
Daily Design Percolation Rate	DPR	4.0	mm/day
Nominated Land Application Area	L	1410	m ²
Crop Factor	C	0.7-0.8	unitless
Effective Rainfall/Runoff Coefficient	R _c	0.75	unitless
Rainfall Data	Lord Howe Island Aero BOM 200839		
Evaporation Data	Norfolk Island BOM 200298		

Equivalent to litres per m² per day - based on LHI Strategy for secondary effluent

Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type
Proportion of rainfall that remains onsite and infiltrates; function of slope/cover, allowing for any runoff
Mean Monthly Data
Mean Monthly Data

OCCUPANCY

Flow Allowance	120	Lp/d
No. of bedrooms		
Occupancy	1	Beds + 1
Design Flow	120	L/d

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	365
Rainfall	R		mm/month	117.5	118.2	134.9	134.2	157.7	173.1	141.0	107.7	110.7	158.1	110.3	102.4	1,512
Evaporation	E		mm/month	167.4	148.4	151.9	129	102.3	90	93	105.4	117	133.5	153	179.5	1,558
Daily Evaporation			mm/day	5.4	5.3	4.9	4.0	3.3	3.0	3.0	3.4	3.8	4.3	5.1	5.8	
Crop Factor	C		unitless	0.80	0.80	0.80	0.70	0.70	0.70	0.70	0.70	0.70	0.80	0.80	0.80	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	133.9	116.7	121.5	84.0	71.6	63.0	65.1	73.8	81.9	111.6	122.4	136.4	1184.0
Percolation	B	(DPR)/7x0	mm/month	124.0	112	124.0	120.0	124.0	120.0	124.0	124.0	120.0	124.0	120.0	124.0	1469.0
Outputs		ET+B	mm/month	257.9	230.72	245.5	204.0	195.6	183.0	189.1	197.8	201.9	235.6	242.4	260.4	2644.0
INPUTS																
Released Rainfall	RR	R _c	mm/month	68.125	87.15	101.175	100.05	118.275	129.825	105.75	80.775	83.025	79.575	82.725	76.8	1133.9
Effluent Irrigation Inputs	W	(Qx0)/L	mm/month	54.7	49.4	54.7	53.0	54.7	83.0	54.7	54.7	83.0	54.7	53.0	54.7	644.6
Inputs		RR+W	mm/month	142.9	138.6	155.9	153.6	173.0	182.8	160.5	135.5	136.0	134.3	135.7	131.5	1778.4
STORAGE CALCULATION																
Storage remaining from previous month	S	(RR+W)-(ET+B)	mm/month	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
Storage for the month			mm/month	-115.1	-94.1	-88.6	-50.4	-22.5	-0.2	-28.6	-62.3	-65.9	-101.3	-108.7	-129.9	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Maximum Storage for Nominated Area	N		mm	0.00												
	V	NxL	m ³	455	406	935	723	599	1405	926	660	628	493	468	420	
LAND AREA REQUIRED FOR ZERO STORAGE																
MINIMUM AREA REQUIRED FOR ZERO STORAGE:				1,489			m ²									

Produced by Brad Josephs – 27/02/2023

Nutrient Balance

Site Address: **Fletcher Owens Lorhiti**

Please read the attached notes before using this spreadsheet.

SUMMARY - LAND APPLICATION AREA REQUIRED BASED ON THE MOST LIMITING BALANCE =

1,410 m²

INPUT DATA ⁽¹⁾					
Wastewater Loading			Nutrient Crop Uptake		
Hydraulic Load	2,450	L/day	Crop N Uptake	200	kg/ha/yr which equals 55 mg/m ² /day
Effluent N Concentration	4.8	mg/L	Crop P Uptake	20	kg/ha/yr which equals 5 mg/m ² /day
% Lost to Soil Processes (Geary & Gardner 1996)	0.2	Decimal	Phosphorus Sorption		
Total N Loss to Soil	2,390	mg/day	P-sorption result	400	mg/kg which equals 5,120 kg/ha
Remaining N Load after soil loss	9,582	mg/day	Bulk Density	1.6	g/cm ³
Effluent P Concentration	9	mg/L	Depth of Soil	0.8	m
Design Life of System	50	yrs	% of Predicted P-sorp. ⁽²⁾	0.5	Decimal

METHOD 1: NUTRIENT BALANCE BASED ON ANNUAL CROP UPTAKE RATES					
Minimum Area required with zero buffer			Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)		
Nitrogen	174	m ²	Nominated LAA Size	1,410	m ²
Phosphorus	1,149	m ²	Predicted N Export from LAA	-24.71	kg/year
			Predicted P Export from LAA	-1.86	kg/year
			Phosphorus Longevity for LAA	67	Years
			Minimum Buffer Required for excess nutrient	0	m ²

PHOSPHORUS BALANCE

STEP 1: Using the nominated LAA Size

Nominated LAA Size	1,410	m ²			
Daily P Load	0.02241	kg/day	→ Phosphorus generated over life of system	408.9825	kg
Daily Uptake	0.007726	kg/day	→ Phosphorus vegetative uptake for life of system	0.100	kg/m ²
Measured p-sorption capacity	0.512	kg/m ²			
Assumed p-sorption capacity	0.256	kg/m ²	→ Phosphorus adsorbed in 50 years	0.256	kg/m ²
Site P-sorption capacity	360.96	kg	→ Desired Annual P Application Rate	10.039	kg/year
				which equals	0.02750 kg/day
P-load to be sorbed	5.36	kg/year			

NOTES

Irrigation

The area around Lorhiti is Ned's Beach Calcarenite ranging between sand loam to loam. Based on the Design Loading Rate for irrigation area with secondary treated effluent is 4-5 mm per day.

It is proposed to use 7 irrigation zones each 410 sq m with a feeder pipe on the northwest side and perforated dripper pipework running perpendicular to the feeder pipe using air valves on the north east points (high side) and flush valves on the south west points (low side).

It is proposed to use existing septic systems connected to macerator pumps and connect irrigation pipework to the existing ES9000 (see diagrams) so the total property will be connected to the system. The macerator pump uses a fast-rotating cutting blade to break up waste and toilet paper and convert the water and waste into a fine slurry that is discharged under pressure through piping and expelled into the sewer or septic tank.

The ES9000 system will achieve the following effluent quality perimeters required by the Board:

Total nitrogen	10mg/L
Total phosphorous	10mg/L
BOD	10mg/L
Suspended solids	10mg/L
Faecal coliforms	10 cfu/100ml
Free Chlorine residual	2.2mg/L

A flow metre is installed on the inlet pipe to the ES9000 system to measure flows into the system, prior to connection to sewer line.

Earthsafe uses Netafim TYRAN product purple pipe which is especially designed for this application. It complies with the Board's Wastewater Policy requirements. The system has been installed in separate zones to spread the load in times of maximum flows. Each zone is fitted with vacuum breakers and flush valves as per the recommended design rules.

There is adequate area available for irrigation.

Irrigation: Used for highly treated effluent (tertiary treated). Effluent is applied through the use of dripper systems. The length of the irrigation line is based on 1 metre spacing (also equal (metre square) to be irrigated).

To eliminate all chance of human contact we have installed warning signs marked:

"WARNING Recycled Effluent in Use Please Do Not Drink No Unauthorised Access"

Ongoing System Management

As set out in the Lord Howe Sewage Management Requirements the Earthsafe ES9000 is an AWTS and will continue service by an approved technician, in accordance with the LHIB Wastewater Management Strategy 2015.

CERTIFICATE OF ANALYSIS ES9000**Work Order : ES0904618**Client : **EARTHSAFE PTY LTD** Laboratory : Environmental Division Sydney Contact : MR OWEN HILL Contact : Charlie PierceAddress : [REDACTED] Address : [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Project : ENV AWTS QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement Order number : E1 TEST

C-O-C number : ---- Date Samples Received : 30-MAR-2009 Sampler : DS

Issue Date : 06-APR-2009

Site : STP

No. of samples received : 6

Quote number : ---- No. of samples analysed : 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825 This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories Position Accreditation Category Duyen Nguyen
Senior Microbiologist Microbiology Hoa Nguyen Inorganic
Chemist Inorganics Environmental Division Sydney

Page : 2 of 4

Work Order :

Client :

ES0904618

EARTHSAFE PTY LTD

Project : ENV AWTS

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client

Owens

From: [REDACTED]
Sent: Tuesday, 2 September 2008 3:54 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: Earthsafe System on Lorhiti Apartments

Dianne

Further to your request we confirm that the Earthsafe ES9000 system we recently supplied to you through Warren O'Brien has been designed to handle over 3000 litres per day. It is essentially the same as the treatment system at Humpty Micks and the black water A/WTs installed at Earls Anchorage.

Based on our experience on the mainland you will need around 500 to 800 square metres spray irrigation for the entire system. This can be achieved using simple garden sprinklers or 'wobblers' as we supplied to Warren. The Australian standard governing irrigation of waste water is AS1547.2000. Council should have their own copy. There is absolutely no way you need 300 sq metres per person!

All the best with council tomorrow.

Regards

Owen Hill
Managing Director
Earthsafe

[REDACTED]

LIC No. [REDACTED]
JOSH OWENS PLUMBING
SERVICE AGREEMENT

Phone: [REDACTED]

Email: [REDACTED]

Date: 14 February 2023

Lorhiti Apartments
[REDACTED]

Dear Fletcher Owens

I agree to service the Earth Safe ES9000 wastewater system as per Lord Howe Island Board Wastewater Policy and Earth Safe wastewater quarterly servicing policy.

Sincerely

Josh Owens
[REDACTED]

LORD HOWE ISLAND BOARD

ELECTRICAL SUPPLY

NOTIFICATION OF PROPOSED ADDITIONS AND/OR ALTERATIONS TO EXISTING ELECTRICAL SUPPLY

To be submitted in duplicate and signed by the customer or the electrical contractor.

NAME OF APPLICANT: Fletcher Owens

ADDRESS OF PREMISES: [REDACTED]

PORITION NO. _____ SERVICE NO. _____

PARTICULARS OF PROPOSED ADDITIONS AND/OR ALTERATIONS:

LIGHTING POINTS		GPO'S		OTHER APPARATUS (Motors, Solar Heaters etc.)		
NO.	WATTS	SINGLE	DOUBLE	TYPE	NO.	WATTS

Particulars of any work to be disconnected:

No Alteration to existing Electrical set up. The waste water pump already exists and the
installation of the irrigation will not affect electricity supply.

Name and Address of Electrical Contractor:

_____ Licence No. _____

Signature of Applicant: [REDACTED] Date: 29/04/2023

Lord Howe Island Board

Onsite Wastewater Management Systems

Checklist for Applicants to Streamline Development Consent

The installation of onsite wastewater management systems on Lord Howe Island requires development consent as they are not listed as exempt development under the LHI Local Environmental Plan 2010.

A streamlined assessment process has been put in place for minor developments that, in the opinion of the Board, are of minimal social and environmental impact.

This checklist has been developed to ensure applicants provide all necessary information to support their application. If your answers match those required for all of the 3 stages in the form, then the application will be deemed to be minor and can be determined by the CEO under delegated authority. Applications that fall outside of this will need to be considered under the standard development application process.

The Board will accept Owner Consent (OC) and Development Application (DA) information as one (1) submission, however the DA will not be able to be lodged until the OC is approved. You will receive written advice when the OC is approved, at which time you will need to attend the Board offices and pay the DA lodgement fee. Subject to the provision of the adequate information, Owner Consent will be processed in 5 working days and Development Application within 15 working days.

Pre-Lodgement Meeting

Have you had a pre-lodgement meeting with LHIB staff?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes, have you incorporated comments and suggestions into your submission?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Owner Consent Requirements – Please include information below in the application

Stage	Forms, Plans	
1	Have you completed an OC application form (incl signatures from all lessees)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Have you provided a scaled site plan showing the lease, system and disposal areas?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
All answers to Stage 1 must be 'Yes' before proceeding to Stage 2.		
2	Environment & Heritage	
	Is the treatment or disposal area mapped as containing significant native vegetation?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Is construction access to the area for the system through significant native vegetation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	If a heritage item (as per Schedule 2 of the LHI Local Environmental Plan 2010) is located on the land, then is the system located within 10m of the Heritage item?	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Is the treatment or disposal area mapped as flood hazard? <i>The LHIB holds flood mapping GIS layers.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No N/A
	Is the disposal area an insufficient size for the soil type? <i>Note disposal areas should not be within areas of SNV, heritage and flooding.</i>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	System	
	Is the application for a commercial wastewater management system?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>If all Stage 2 answers are 'No', and you wish to lodge a DA at this stage, proceed to Stage 3.</p> <p>If all Stage 2 answers are 'No', and you wish to only lodge Owner Consent (OC) at this stage, the OC application can be determined by the CEO.</p> <p>If any answer to Stage 2 answer is 'Yes', then the application will be considered under the standard DA process. Please contact LHIB to discuss.</p>		

Development Application Requirements – Please include information below in the application

Stage	Forms, Plans	
3	Have you completed a Development Application form?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Have you provided a site plan & soil plan (including plans from the supplier, irrigation area, lease boundaries, vegetation, underground pipes, pumps, tanks, buffer distances)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Is the system from the list of LHIB preferred suppliers—Truewater, Rootzone, Earthsafe or Supertreat?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Is the system being installed in full compliance with the NSW Health accreditation?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

If the system is not from a preferred supplier, is it accredited with NSW Health?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
Design – to be completed by your supplier	
Does the proposal meet the LHIB Onsite Wastewater Management Strategy?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the design meet the domestic performance standards in Table 5.1.1?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Has your supplier calculated the predicted daily wastewater load on the system & is this included in your DA?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Has the soil type & presence of any subsoil barriers on the site been checked?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Has your supplier calculated the water & nutrient balance for your site & is it in the DA?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If your system has a pump to move wastewater, has your supplier assessed the pumping heights against the pump capacity & included this in your DA?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Where a wastewater pipe goes under a road or vehicle track, has the supplier ensured it will be buried at least 500mm?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Has the irrigation system for effluent disposal being specifically designed for your property and taken consideration of your specific soil types?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the irrigation system include a flushing point?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is there adequate disposal area for the treated effluent?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the proposed system only use sub-soil or dripper irrigation?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the proposed system include a visual alarm which is visible on approach to the dwelling and is it shown on the plans?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Site Arrangements	
Is the treatment area and disposal area on the same lease? <i>If No, you will need a written agreement with the other leaseholder(s) permitting the disposal of effluent.</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is the disposal area more than 20m from all neighbouring property boundaries? <i>If No, you will need a written agreement with neighbouring leaseholder(s) incl in application.</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is the system or disposal area more than 100m from permanent surface waters?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is the system & disposal area more than 50m from a well/bore used for human supply?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is the system or disposal area more than 20m from non-permanent water ways (eg. drainage gullies or channels)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
For surface irrigation, is the irrigation area not used for food production?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
Is the irrigation area unaffected by flooding? <i>The LHIB holds flood mapping GIS layers.</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is the irrigation area unaffected by stormwater from above?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is the property more than 1,500sqm in size?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Based on 2 people for the 1 st bedroom and 1 person\ bedroom for remaining bedrooms in the dwelling, are there less than 10 people being serviced by the proposed system?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Have you provided: <ul style="list-style-type: none"> • Statement of warranty and service life; • Quality Assurance Certification; • Installation Manual; • Service Manual for use by service technicians, • Household Operators Manual • Service Report Form suitable for use by service technicians; • Engineering Drawings on A3 format & system specifications; • A4 site plans showing location of system and associated irrigation areas; • Accreditation from NSW Health (if not from an LHIB preferred supplier); and • Service agreement with the agent who will maintain the systems. 	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>If Stage 3 answers are 'Yes', the application can be determined by the CEO. If any Stage 3 answer is 'No', then the application will be considered under the standard DA process. Please contact LHIB to discuss.</p> <p>Office use only</p> <p>Approved by: _____ Date received: _____</p> <p>Signature: _____ Date approved: _____</p>	

DEVELOPMENT APPLICATION**WASTEWATER SYSTEM UPGRADE Lot 10 DP1202580 DIANE OWENS**

Total Area: 12,177 sqm

Diane Owens

Lorhiti Apartments

15 January 2017

DESCRIBE THE PROPOSED DEVELOPMENT

The proposal is to upgrade the existing wastewater System and additional irrigation areas on the applicant's Perpetual Lease (12,177 sqm) to comply with the LHI Board's Wastewater Management Plan. Area required for irrigation is 1.738 sqm.

The proposal will not impact on any threatened species or SNV.

Site Description

The subject site is legally described as Lot 10 DP1202580, Lord Howe Island. The lot is irregular in shape and has an area of 12,177sqm. Anderson Road intersects the site into southern and northern parts. The southern part has not been developed. The site is zoned 2 settlement and contains mapped SNV in the north and north –eastern parts of the northern part. The existing buildings on the site are outside of the mapped SNV.

The northern part of the site contains the following buildings and structures:

- Main Dwelling comprising attached garage and detached shed (cool room, laundry/washroom).
- Restaurant, kitchen and bathroom (attached to Main dwelling), staff quarters
- Tourist accommodation, transit lounge, guest laundry
- Dwelling 2 (Cyclone Alley)
- Staff accommodation apartment
- Infrastructure building
- Day Spa

Justification

- **No application has been made to develop** the lease so this will not affect the dispersed nature of development on the Island.
- The proposal has **no negative impact** on the environment.
- The proposal is a requirement by the Lord Howe Island Board.

The proposal complies with the LHI DCP 2010 3-3.1 Objectives, 1.2 and 3.1.2 Subdivision Development Requirements, and 3.1.3 Design Principles and Section 2.

The proposal complies with the LEP2010, Clause 11 "Of what matters must the Consent Authority be satisfied before granting development consent?" Zone objectives, Adequate area available for disposal or treatment of effluent, no damage to the environment or native plants, animals and habitat, access already exists, no landscaping required, the site is not flood prone, no impact on locality, no physical change

The proposal satisfies LEP Clause 31. A Revegetation plan will be followed.

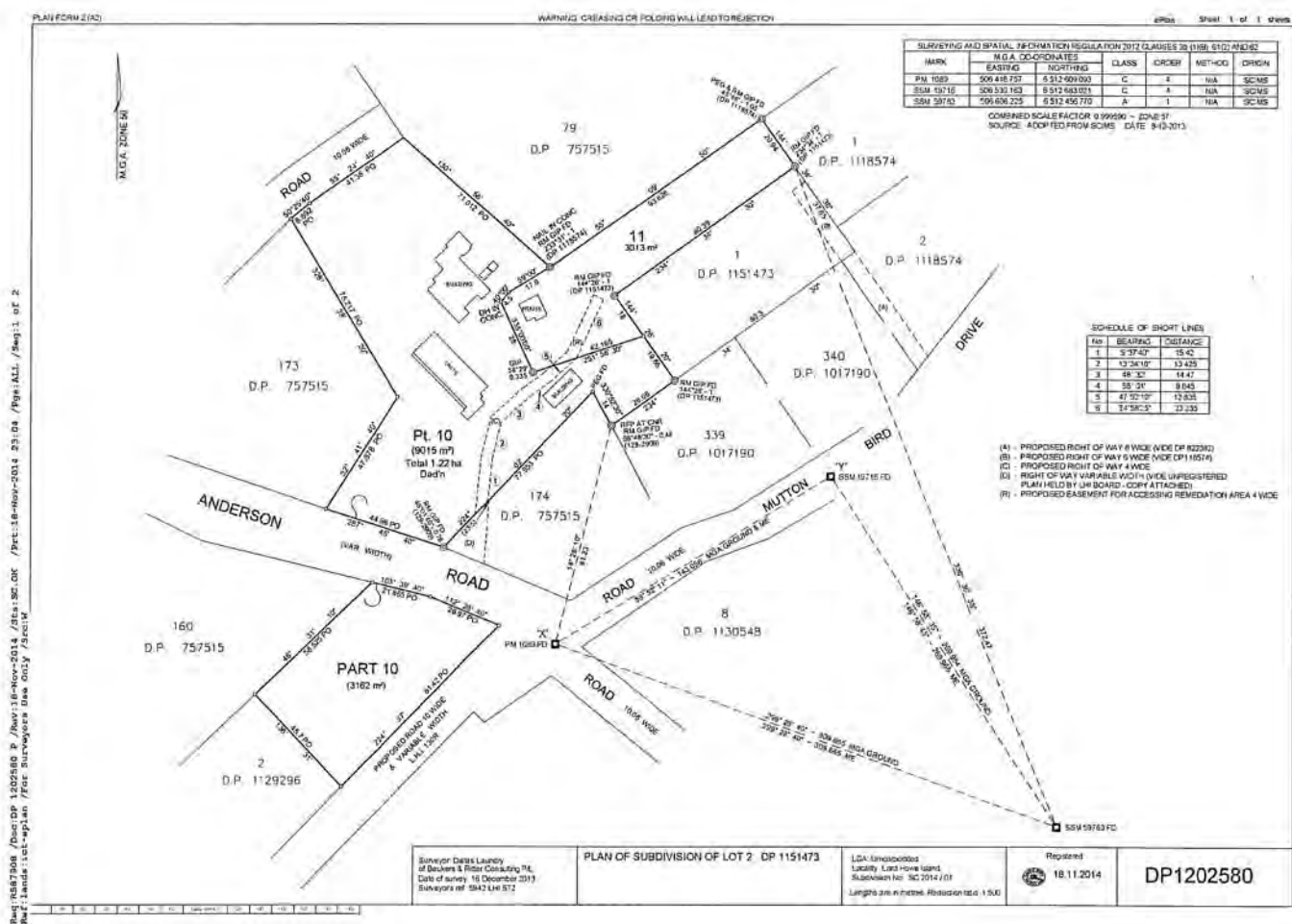
The proposal complies with Commonwealth legislation (Environmental protection and Biodiversity Conservation Act 1999), NSW legislation (Threatened species Conservation Act), NSW World Heritage Act, Local Statutory Plans and Policies (LHILEP2010). Revegetation plan was approved and signed off when DA 2006-19 (Josh Owens's Category A dwelling)

Wastewater disposal issues were addressed when the DA2006-19 was approved by the Lord Howe Island Board for Josh Owens dwelling and DA2006-06 Infrastructure building.

A wastewater plan for the whole site was approved by the Lord Howe Island Board and an upgrade to comply with the Wastewater Policy has been approved. OC2017-01 (Upgrade to wastewater system) was approved on 22 December 2016 and will be compliant with the LHI On-site Wastewater Management strategy.

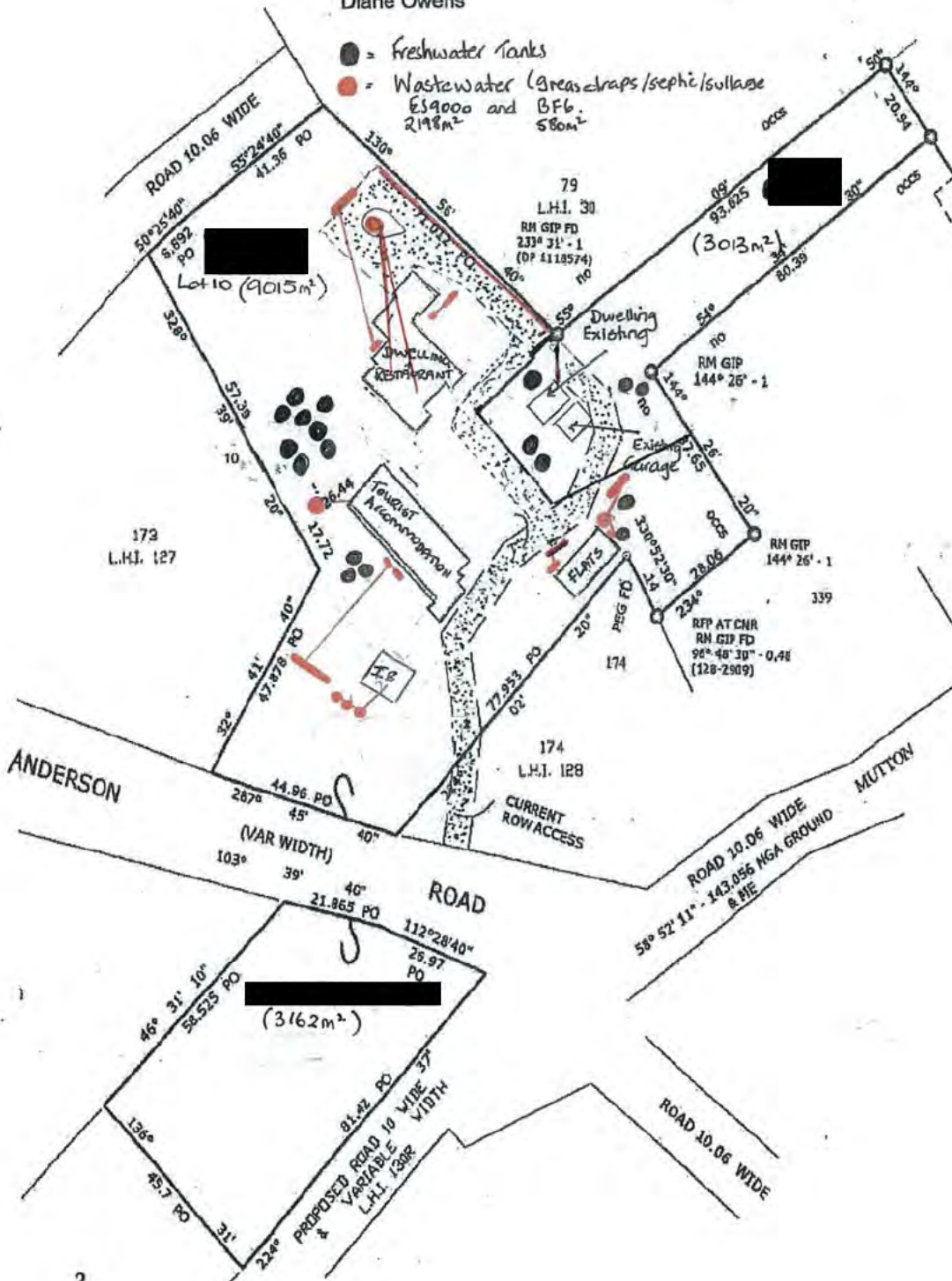
An Earth Safe 9000 system was installed in 2008 and all buildings on site will connect to this system.

Any new wastewater policies implemented by the Lord Howe Island Board will be addressed and any effluent standards will be complied with. There is adequate area available for effluent treatment and disposal on the southern part of the Lease.(see plans below)



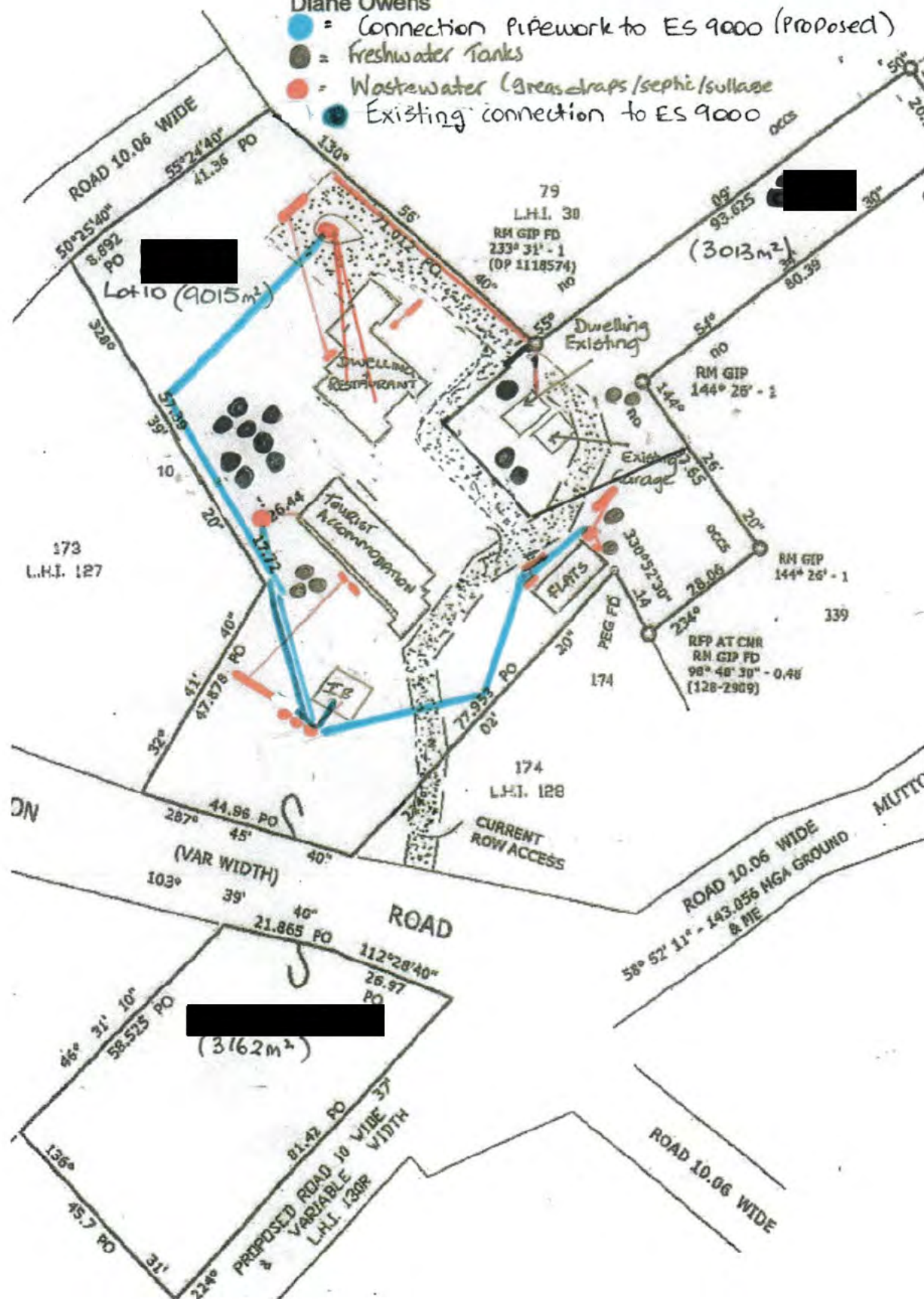
Enlarged subdivision DP 1202580 (12,177 m²)
Diane Owens

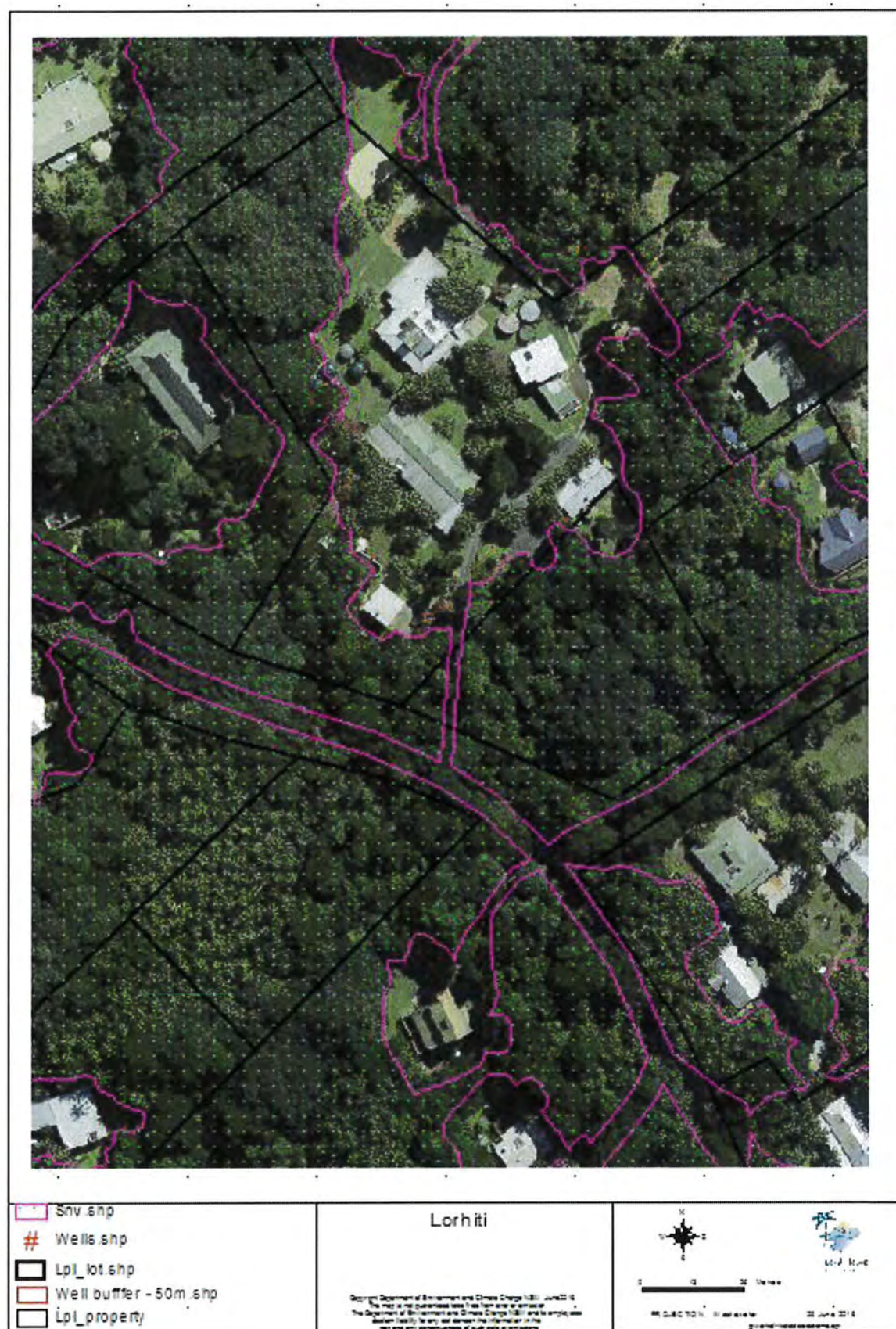
- = Freshwater Tanks
● = Wastewater (Grease traps/septic/sullage)
ES9000 and BF6.
2198m² 580m²



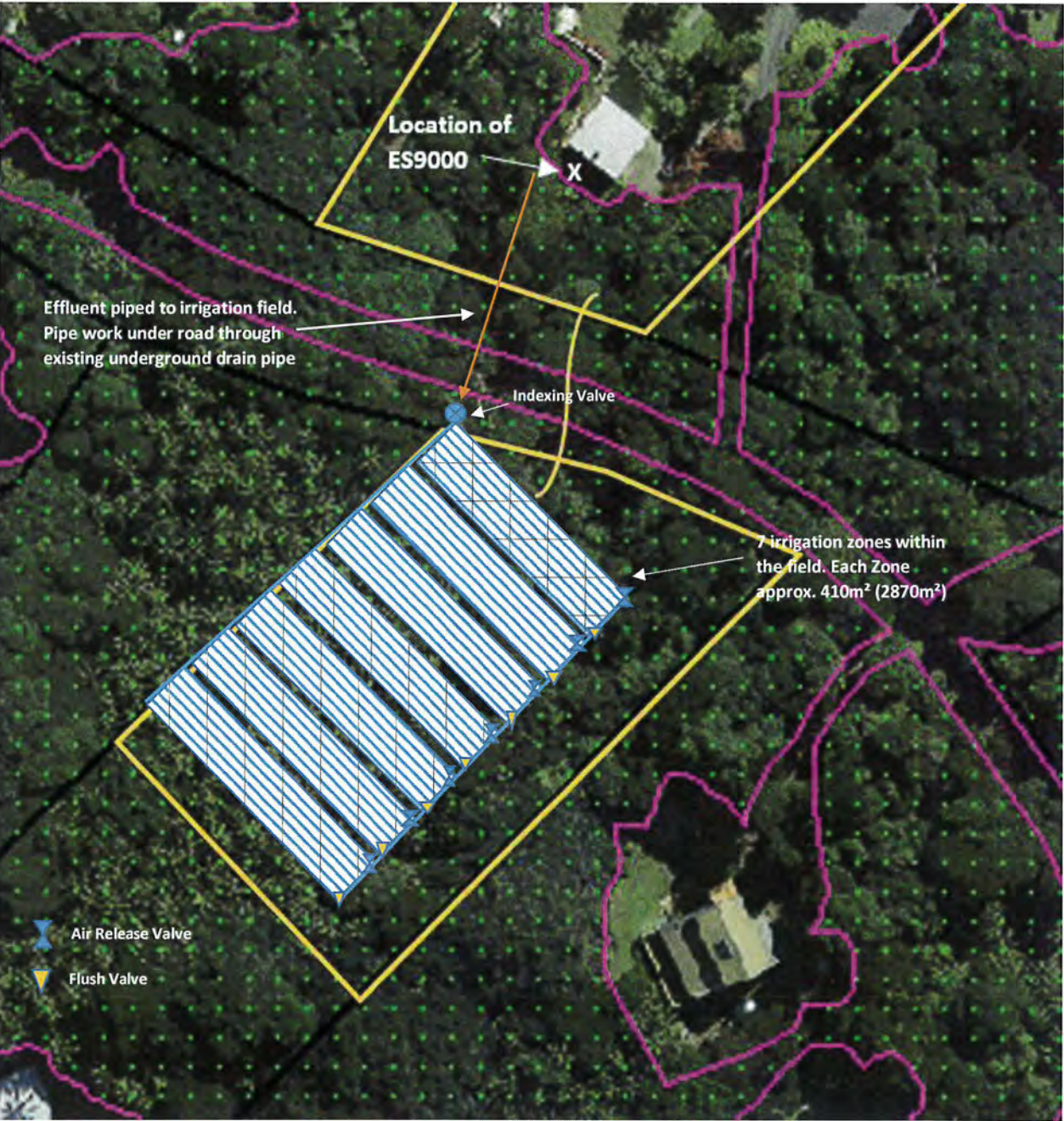
Enlarged subdivision DP 1202580 (12,177 m²)
Diane Owens

- = Connection Pipework to ES 9000 (Proposed)
- = Freshwater Tanks
- = Wastewater (Grease traps/septic/sullage)
- = Existing connection to ES 9000





SNV areas



Daily Hydraulic Load and Irrigation required: 1,738 sqm

Reference: OC2017-01
Enquiries: Megan Bennett

22 December 2016

Diane Owens

Lord Howe
ISLAND BOARD



Administrative Office
P.O. Box 5
Lord Howe Island 2898

Phone: 02 6563 2066
Facsimile: 02 6563 2127
Email: administration@lhib.nsw.gov.au

Dear Mrs Owens

RE: OWNER CONSENT APPLICATION OC2017-01

I am writing to advise that your request for Owner Consent to lodge a development application for upgrades to the wastewater management system and additional irrigation areas within Lot 10 DP 1202580, [REDACTED] has been approved by the Board subject to the following conditions of owner consent and advisory note:

Conditions of Owner Consent:

1. The applicant will need to provide updated plans showing the disposal area and whether this complies with the required setbacks from permanent surface waters, drainage lines, and wells/bores. The site plan is to include all components associated with the WMS including pipes, tank, treatment system, location of visual alarm, flushing point for irrigation area, and filter for irrigation area.
2. The development application must include a statement addressing the Board's Options analysis for wastewater systems proposed within SNV. If the irrigation area is proposed within SNV, information is required ensuring it does not impact on the SNV or threatened species.

Advisory Notes:

Significant Native Vegetation

Damage to, or removal of Significant Native Vegetation is prohibited, as per Clause 11 the LHI Local Environmental Plan, 2010.

LHI Gecko and LHI Placostylus

A future condition of Development Consent will specify if any live LHI Gecko or LHI Placostylus are found during works they must be moved away from the work site into adjacent bushland and placed under dense leaf litter or other suitable sheltering habitat where they are sheltered from predation by predators such as LHI Currawong and LH Woodhen.

Easements

An easement will be required for the part of the system crossing the road reserve from the northern component of the site (former Portion 78) to the southern component (former Portion 172).

Survey

A survey should be conducted to ascertain if the system pipe work crosses Portion 160 (Bruce Thompson SL-2011.12) as it leaves the road reserve to reach the irrigation field on the southern component of Lot 10 DP 1202580 (former portion 172). A letter of agreement from Mr Thompson will



WORLD HERITAGE AREA

be required to allow the system on his lease. An easement will be required for the part of the system on Portion 160.

Service agreement

Evidence of a Contract or Service Agreement between the applicant and a Lord Howe Island Board accredited Service Agent will be required prior to issuing of a Licence to Operate a Wastewater Management System.

Evidence of compliance

Evidence of compliance with any/all conditions imposed by the Board throughout the wastewater installation process is required prior to issuing of a Licence to Operate a Wastewater Management System.

Soil type & irrigation field

A soil sample is to be provided to the Board to confirm soil type for sizing the irrigation land application area. The sample is to be taken within the proposed irrigation field from a depth from 1m to 1.5m. The depth of any impediment (water table, bleached or mottled sand, heavy clay or indurated rock is to be recorded). The sizing of the irrigation field is correct for the daily hydraulic load, nominated soil type and expected output nutrient level for an Earth Safe ES9000 system with chlorine disinfection. The sizing of the irrigation field will need to be confirmed once a soil sample is received and classified by the Board.

Please note that it will be necessary for you to place pegs showing the location of all building extremities and height of buildings before lodging your development application. These pegs will allow inspection by Board staff at an early stage of your development assessment.

I would also like to bring to your attention that your Owner Consent approval is valid for 12 months only. Should you require any further information please ring Megan Bennett on (02) 6563 2066 extension 18.

Yours sincerely



Penny Holloway
CHIEF EXECUTIVE OFFICER

2. A statement of the objectives of the proposed development.

- To ensure that any further development on the Island does not destroy the natural environment and does not adversely affect the lifestyle of the residents.
- To satisfy objectives of Zone 2 (settlement) LEP 2010.
- To have no impact on the environment.
- To upgrade the existing ES9000 wastewater system

Specific objectives of the proposed development are;

- To maintain present levels of weed eradication and re-vegetation on both the proposed portions.
 - To comply with the LHI Board Wastewater Management Plan
 - To maintain minimal impact on the ecology of the Island.
 - To maintain floristic integrity of the site.
 - To conserve the World Heritage values of Lord Howe Island.
- (b) that development is only permitted in locations where, in the consent authority's opinion:
- (i) that the development will not involve unacceptable infrastructure costs for the Board or the community of the Island. **There are no infrastructure costs.**
 - (ii) that there is an adequate area available for the treatment or disposal of any effluent arising from the proposed development by an appropriate effluent treatment or disposal system. **Existing waste disposal and management plan**
 - (iii) that the land is capable of supporting the proposed development and is suitable in terms of the land's physical constraints (such as vulnerability to erosion, slip or flooding), and
 - (iv) that any effluent treatment or disposal system referred to in subparagraph (ii)) will not adversely affect groundwater quality,
- (c) to avoid or minimise environmental damage and protect areas that:
- (i) comprise significant habitat for species of animals that are native to the Island, or
 - (ii) Have significant native vegetation.
- To ensure that no part of the proposed development will:
 - (i) result in any damage to, or the removal of, significant native vegetation, or
 - (ii) have a significantly adverse impact on the habitat of any plants, or animals, that are native to the Island,
 - (iii) not be adversely affected by any landform limitations, including flooding, landslip, unstable soils and steep slopes,
 - (iv) cause significant additional cost to the Board or the community of the Island,
 - (v) have any significant adverse impact on the locality or appearance (when considered by itself or in conjunction with existing buildings and works)
 - (vi) cause any significant overshadowing of adjoining land,
 - (vii) Cause any significant reduction in the privacy of occupiers of adjoining land.

• An analysis of the proposed development

• Details of any existing development that may be superseded by the proposal.

None

(c) A general description of the environment that, in the opinion of the consent authority, is likely to be adversely affected by the proposed development.

The proposal is for installation of irrigation pipework. The environment will not be effected. No native vegetation will be removed.

(d) A detailed description of any aspects of the environment that, in the opinion of the consent authority, are likely to be significantly adversely affected by the proposed development, including an assessment of whether there is any significant native vegetation that is likely to be significantly adversely affected by the proposed development.

The environment will not be effected. No native flora or fauna will be removed.

(e) The likely impacts of the proposed development on the environment, having regard to the following

- The nature and extent of the proposed development.
- Any rehabilitation measures to be undertaken in relation to the proposed development.

A rehabilitation plan has been submitted and approved by the Board and the applicant will continue to:

- Keep rats controlled
- Conserve of World heritage values
- Protect significant vegetation
- Protect existing habitat of threatened species
- Protect potential habitat of threatened species

Re-vegetate existing disturbed areas with native plants suited to the area approved by the Lord Howe Island Board.

Rehabilitation issues were addressed when the DA was approved by the Lord Howe Island Board for Josh Owens's dwelling construction in the form of a Revegetation plan for the whole site in 2010.

The proposal complies with the Lord Howe Island Act 1953 Transfers and subleases

The proposal complies with **the LHI DCP 2005** 3-3.1 *Objectives*, 1.2 and 3.1.2 *Development Requirements*, and 3.1.3 *Design Principles* and Section 2.

The proposal complies with the REP2005, **Clause 11** "Matters that must be satisfied before Development Consent is granted"

(f) A full description of the measures proposed to mitigate any adverse impacts of the proposed development on the environment.

The DA is for subdivision which will not affect the environment.

- There is no effect on soil suitability, stability, slope, natural drainage patterns and erosion control.
- There is no effect on plants or animals that are native to the island.
- There will be no change to air, noise or water pollution arising from the proposed subdivision
- There is no impact on the health of people in the neighbourhood
- There are no hazards arising from the proposed development.
- There will be no impact on traffic in the neighbourhood
- There is no impact on the local climate
- There is no change to visual impact.
- There is no impact on soil erosion
- There is no impact on heritage significance
- There is no visual exposure.
- The existing access is landscaped and established. There is no requirement for cut and fill.

The measures that can be taken to improve:

The landscaped areas will continue to use vegetation as a screen, to create privacy, to define boundaries, to provide shade in summer and sun in winter.

- The existing landscaping design provides pleasant outdoor living in character with the Island. The already established gardens reflect this.
- The area will be continually monitored for weeds and these will be removed in compliance with remediation and Revegetation plans.
- Eradication of rodents and ants

- **The reasons justifying the carrying out of the proposed subdivision in the manner proposed having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development**

(a)Biophysical

The site satisfies Zone 2 (settlement) objectives LEP and DCP 2010;

1. The proposal does not involve any negative impacts on significant native vegetation.
2. The proposal will not impact on the ecology. There is sufficient site area.
3. Endangered or protected species or habitats will not be disturbed.
4. Landscape Unit: for DP1202580 lies within the East Coast Unit.

Terrain: The proposed area is gently sloping to the West.

Soil: The RES (RES1984, Land Resources, p.8.) classifies the soil on the proposed site as weakly__structured sandy soil. The soil profile is deep. The Great Soil Group is Calcareous Litho sol. Slope: There is a minor slope of 5-10% to the North West.

Surface drainage: The site drains generally to the North West. There are no discernible drainage lines on the site.

Surface Geology: is described as Ned's Beach Calcaranite. This is cross-bedded calcareous sandstone composed of fragments of coralline algae, pulverised coral, foraminifera and fragmented mollusk shells.

The depth at which Ned's beach Calcareanite is encountered on the proposed subdivision site is variable and can range from 20cm to 2 metres.

Urban Capacity: Sub-Class: B-sec. This category covers the entire proposed subdivision site. The negligible constraints identified are slope, erodibility and permeability.

Degree of Physical Constraint: Low

Capabilities: Residential, Zone 2 Settlement

Rural Capabilities: The land is classified (iv), which is suitable for grazing due to the sandy soil. The cleared area of Parts A and B were and still are fruit and vegetable gardens and chicken pens.

Fire Hazard: is considered to be low. The RES (1984, Bushfire Hazard) indicates that the threat posed by bushfires on Lord Howe Island is insufficient to warrant special planning controls or management programs.

Vegetation: The proposal will not affect vegetation.

Fauna: The proposal will not affect fauna.

The proposal meets shape and size requirements of the LEP2010 and the DCP (refer to map of Lord Howe Island Zone 2 Perpetual Leases) and the LHI

Soil stability, gentle slope, natural drainage and no erosion.

No visual exposure - trees provide privacy.

The tree canopy of both parts protects the area from strong winds.

There is potential for additional visual and climatic screening by additional planting.

The proposed irrigation is located towards the South West of the Lease

(b) Economic.

The Economic reasons justifying the subdivision are;

- The applicant will comply with the LHI Board Wastewater Policy

(c) Social

The social reasons justifying the proposed subdivision and development are;

The applicant will comply with the LHI Board Wastewater Policy

6. A list of approvals that may be obtained under any other Act or Law before the development may be lawfully carried out.

Owner Consent approval

DA approval

DEECC approval and Land

Survey crossing Portion 160 (Bruce Thompson SL-2011.12) as it leaves the road reserve to reach the irrigation field to the south of the lease obtained when a surveyor is on the island.

A letter of agreement obtained from Bruce Thompson (included in DA).

A service Contract from Warren O'Brien (Earth Safe accredited service agent) will be obtained

Evidence of Compliance LHI Board

Soil samples to confirm soil type (completed September 2016)

7. An assessment of the compatibility of the proposal with World Heritage values of the Island.

World Heritage values will not be compromised. The applicant's proposal is compatible with World Heritage values as both aim:

- (a) to conserve the World Heritage values of Lord Howe Island
- (b) to restore or enhance lost or disturbed natural resources of the Island,
- (c) to protect threatened species, populations and ecological communities, and their habitats,
- (d) to encourage the ecologically sustainable use of resources,
- (e) to encourage community appreciation of the World Heritage values of the Island,
- (f) to enhance the wellbeing and welfare of individuals and the Island's community by pursuing economic development that safeguards the welfare of future generations,
- (g) to facilitate the proper management, development and conservation of the Island's World Heritage natural environment, the Island's cultural heritage and the Island lifestyle,

8. A detailed evaluation of the visual impact of the proposed development and measures to be taken to reduce any detrimental visual impact, including the extent to which vegetation may be used to restore a natural landscape character.

There is no visual impact created by the proposal. The irrigation will be in an area which is unseen.

9. A detailed evaluation of any effect of the proposed development upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.

Locality

No effect.

Aesthetic

No effect.

Anthropological

No effect.

Archaeological

No effect.

Architectural

No effect.

Scientific

No effect.

Cultural

No effect.

Historical

No effect.

10. Justification of the proposal in terms of the aims of the Lord Howe Island Local Environmental Plan 2010.

- The proposal complies with the LHI DCP 3-3.1 *Objectives*, 1.2 and 3.1.2 *Development Requirements*, and 3.1.3 *Design Principles* and Section 2.

The proposal satisfies the LEP2010. The proposal will not affect vegetation.

- The proposal complies with the LEP2010, Clause 11 "*Of what matters must the Consent Authority be satisfied before granting development consent?*"

The applicants' proposal supports the aims of the LEP2010 and she intends:

- (a) to conserve the World Heritage values of Lord Howe Island and to restore or enhance lost or disturbed natural resources of the Island,
- (b) to ensure that there are no adverse environmental, economic or social impacts.
- (c) to protect threatened species, populations and ecological communities, and their habitats,
- (d) to encourage the ecologically sustainable use of resources,
- (e) to encourage community appreciation of the World Heritage values of the Island,
- (f) to enhance the well-being and welfare of individuals and the Island's community by pursuing economic development that safeguards the welfare of future generations,
- (g) to facilitate the proper management, development and conservation of the Island's World Heritage natural environment, the Island's cultural heritage and the Island lifestyle.

The applicant will ensure that no part of the proposed development:

- (i) will result in any damage to, or the removal of, significant native vegetation, or
- (ii) will have a significantly adverse impact on the habitat of any plants, or animals, that are native to the Island,
 1. **Access** will not affect SNV or habitat.
 - (i) Access already exists from Anderson Road to the irrigation area. There will be no damage to, or the removal of, **significant native vegetation. No native plants will be removed or damaged.**
 - (ii) have a significantly adverse impact on the habitat of any plants, or animals, that are native to the Island,
 2. any proposed **landscaping** will use species of plants that are native to the Island and common in the locality to enhance any significant native vegetation,
 3. the proposed development will not be adversely affected by any landform limitations, including flooding, landslip, unstable soils and steep slopes,
 4. **Adequate services** in respect of the proposed development have been provided without cost to the Board or the community of the Island,
 5. the **appearance** of the proposed development (when considered by itself or in conjunction with existing buildings and works) will not have any significantly adverse impact on the locality,
 6. the proposed development will not cause any significant **overshadowing** of adjoining land,
 7. The proposed development will not cause any significant reduction in the **privacy** of occupiers of adjoining land.

11. An assessment of whether there are any feasible alternatives to carrying out of the proposed development including: of any feasible alternatives to the carrying out of the development, having regard to its objectives including;

(a)The consequences of not carrying out the proposed development.

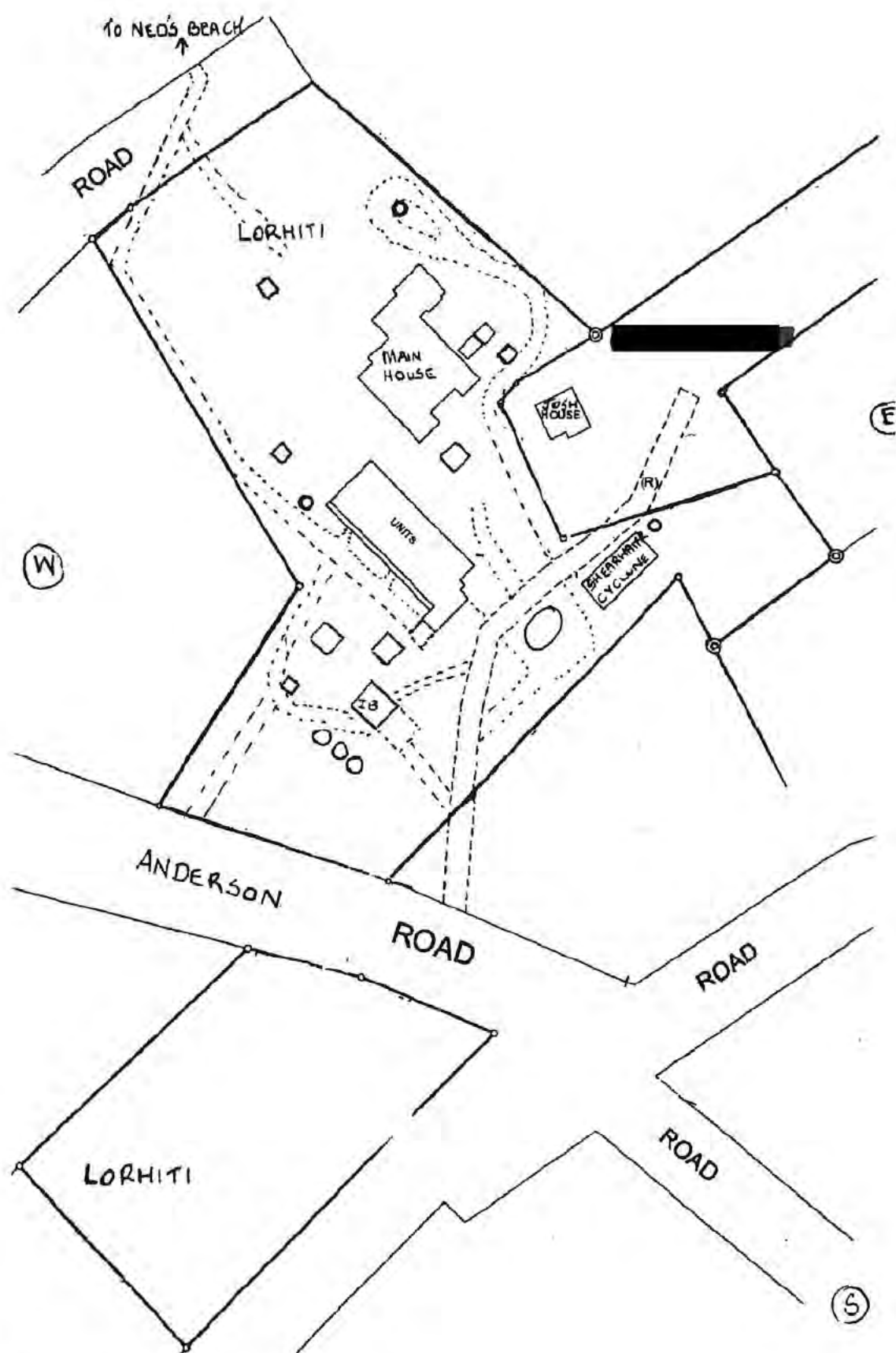
If the proposal is not approved the applicant cannot comply with the LHI Board Wastewater Management Plan.

(b) The reasons justifying the carrying out of the development.

To comply with the LHI Board Wastewater Management Plan.

2. Ecologically sustainable development

- The consideration of the environment has been set out above
- There will be no pollution generated.
- The present generation is currently preserving the environment and social wellbeing for future generations.
- There are no threats to the environment with this proposed subdivision.



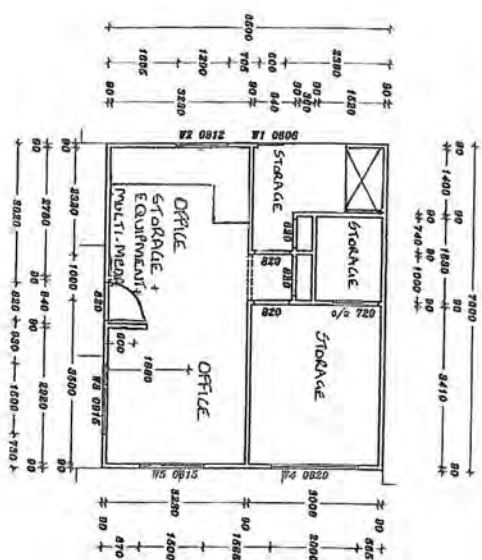
Paths and driveways on site

1:100

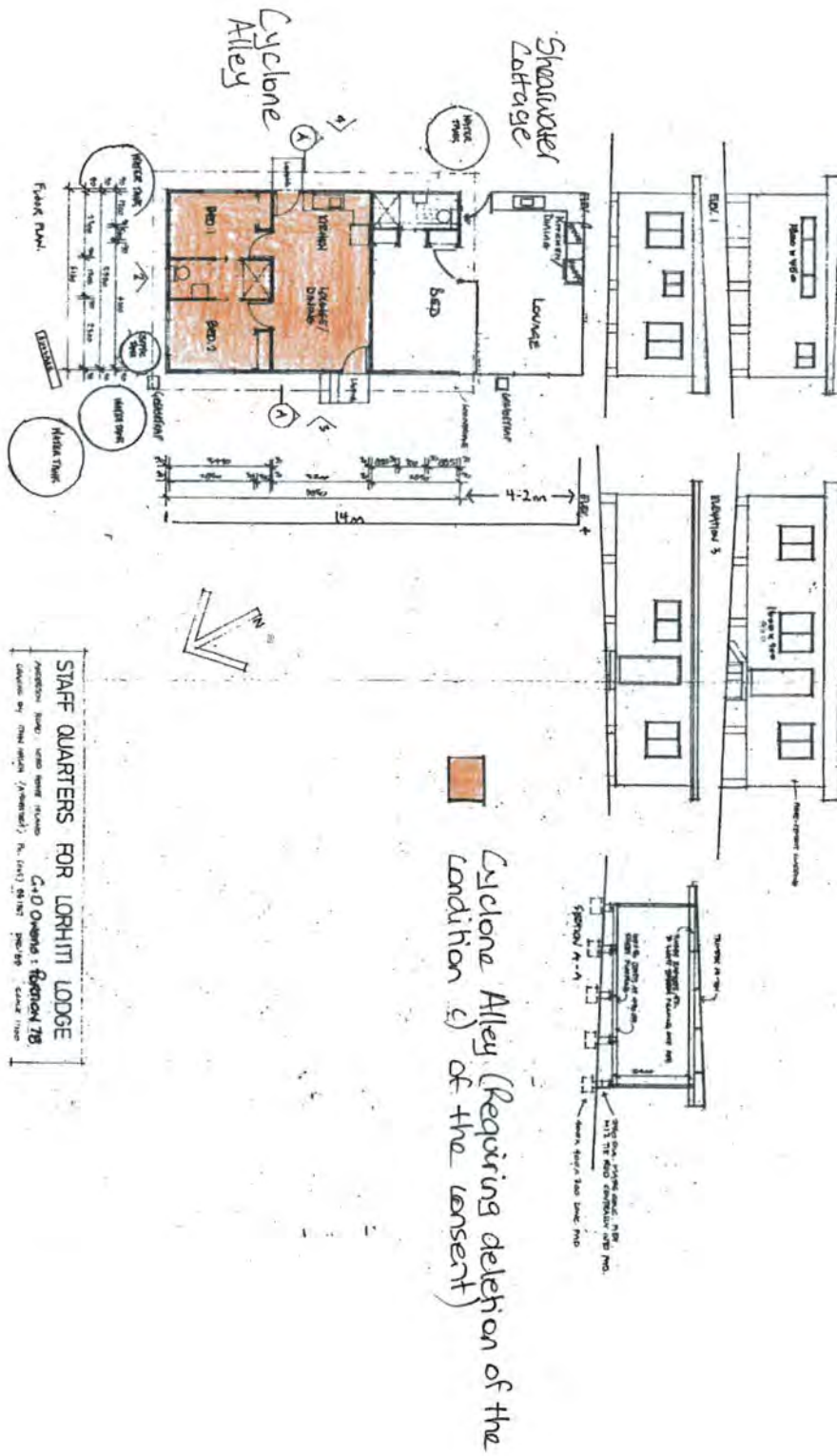
26 MARCH 2010



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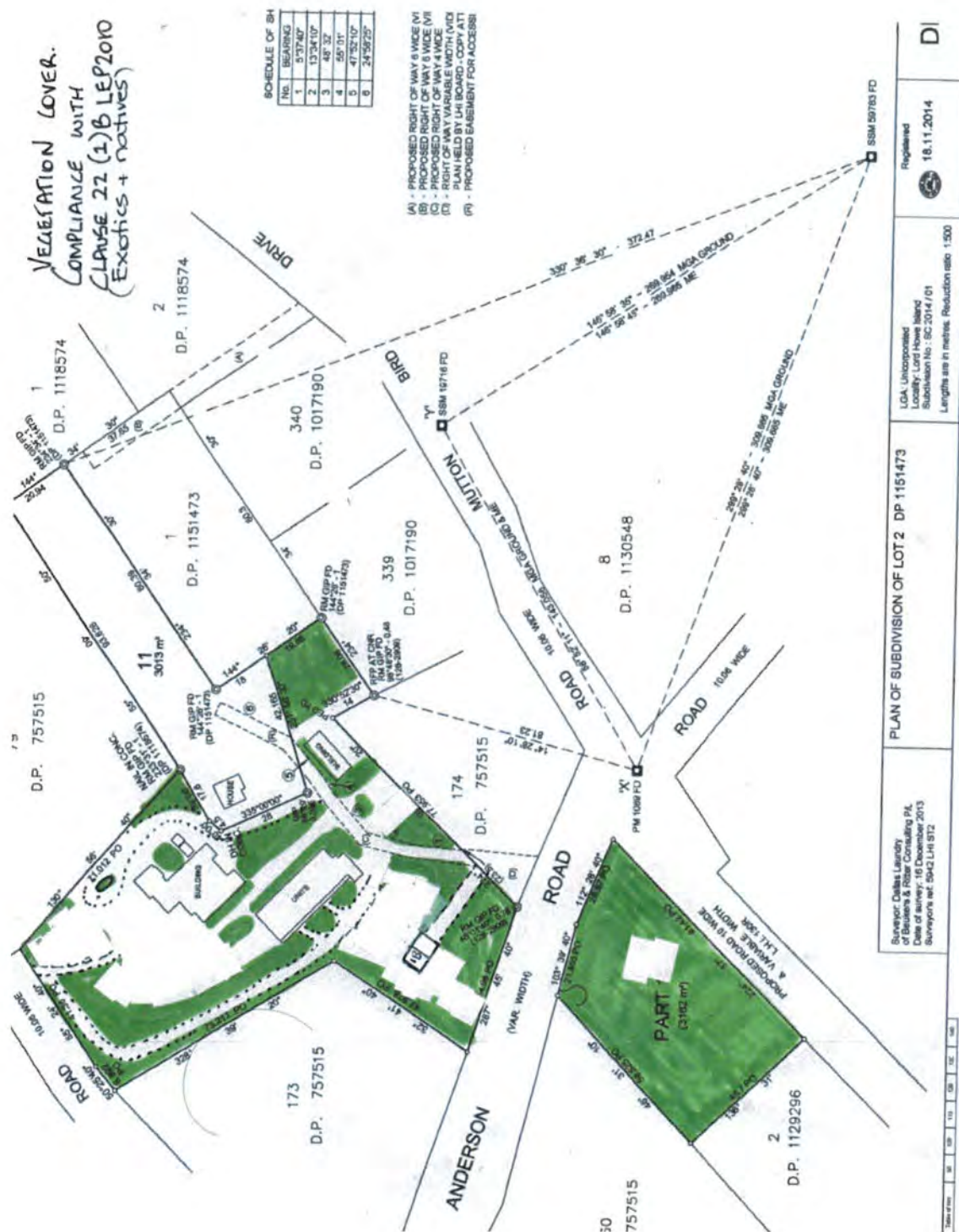


Red shading indicates Cyclone Alley (Dwelling 2) in the original Staff Quarters approved on 21-8-16





Areas showing SNV includes site and surrounding leases



An easement will be created for the irrigation when a surveyor next visits the Island.

Warren O'Brien will be installing the irrigation (authorised ES9000 agent)

Waste Water Management Plan for Lorhiti Apartments

15-1-17

DP1202580 Lot 10. 12,177 square metres

Lorhiti Apartments

The ES9000 Wastewater System was approved with the DA2006-06 and CC2009-11 and final inspection carried out by Andrew Logan on 09 December 2013 and subsequently approved for use.

The lot includes 2 dwellings, 6 tourist apartments, one restaurant Max 25 people , not in use since), one 1 bedroom staff dwelling, one laundry/storage/office building.

Soil samples were taken in 2008 and 2016 which ensured the soil is suitable for irrigation. Soil is calcareous

earth Soil Phosphorous sorption	400mg/kg
Percentage of Predicted Phosphorous Sorption	0.5
Soil bulk density	1.6g/cm cubed
Daily design Percolation rate	4.0mm/day
Rainfall Runoff Co-efficient	0.75
Vegetation type (existing irrigation)	kikuyu
Vegetation type (remaining possible irrigation)	SNV
Secondary system treatment	AWTS

The irrigation system pump is designed to pump minimum dose of 200L, or 3 times the volume of the lines.

Irrigation areas are divided into zones so the capacity of the pump delivers an even distribution. The pipe is purple and are pressure compensating and maintained regularly to avoid clogging.

Chlorine is used as the disinfecting agent and helps clear the lines.

A filter and a flush valve are installed

An alarm has been installed by licensed plumber, Warren O'Brien

Subsurface irrigation has been installed (see maps). Drip irrigation is proposed in SNV area (see map)

There is adequate site area on DP1202580 Lot 10 for an increase in irrigation area if required for the wastewater system upgrade and/or another dwelling on site. Cyclone Alley and Shearwater Cottage (Self-contained accommodation) has been calculated into the original Wastewater Management Plan for Lorhiti and approved by the LHI Board on 09 December 2013.

Earthsafe ES 9000 System (installed 2008) to service the total lease.

The Earthsafe ES9000 system is a commercial version of the Earthsafe advanced AWTS.

The system comprises of 3 main tanks performing the following functions

Tank 1: 3000 litre Collection Well/Primary Treatment unit

Tank 2: 3000 litre Aeration Cell/Secondary Treatment

Tank 3: 2000 litre clarifier and 1000 litre pump well.

Filter, Flush valve, air filter and pump alarm have been installed. Chlorine is used for disinfection.

The simplified operation is as follows:

Effluent flows into Tank 1 through the drainage lines from the internal plumbing. This liquid is retained for a designed retention of 24 hours. In this stage the anaerobic process occurs with some elements settling as sludge and some floating to the surface forming a crust. The internal biological processes digest around 60% of the solids in what is termed primary treatment.

The incoming effluent displaces the earlier treated effluent which flows into tank 2. At this stage the liquid is subject to large volumes of aeration across a large biological media area. The action of the aeration stirs the liquid and provides dissolved oxygen for further biological treatment which is generally termed secondary treatment.

The secondary treated effluent then flows into tank 3 where it settles in a clarification chamber. At this stage some solids settle out as sludge and are returned to the primary tank for further treatment. Any floating debris is skimmed off and recirculated back to the aeration chamber.

The final treated effluent is then passed through a solid tablet chlorinator which disinfects the liquid prior to pumping out into the irrigation area. Lord Howe Island Management Strategy requires secondary treated effluent to meet the following standards:

Parameter Expected Failure

Biological Oxygen Demand mg/l <20 >50

Suspended Solids mg/l <30 >50

Faecal Coliforms (disinfected) mpn/100ml <30 >100

Dissolved Oxygen (aerated) mg/l >2 and <8 <2

Although operating conditions may vary Earthsafe Systems have undergone compliance testing as required by the NSW Health Department and these performance tests are reviewed annually by Benchmark Australia as part of the Earthsafe Quality Plan and Ongoing Accreditation. Between June 2003 and December 2003 Earthsafe conducted extensive independent testing on its advanced Earthsafe DGTS system. These tests were carried out by ALS Australia in their NATA accredited laboratories and audited by SAI Global. These tests were carried out at weekly intervals during the period.

The results are listed below:

Parameter Maximum Average

Biological Oxygen Demand mg/l 19 5.3

Suspended Solids mg/l 41 5.6

Faecal Coliforms mpn/100 ml 66 5.6

Total Nitrogen 28.8 4.8

Total Phosphorous 10.9 9.0

Free Chlorine 2 .2

Under these test conditions the Earthsafe DGTS passed on every required parameter.

System Nutrient Loading

Based on these findings the typical design nutrient loading for an Earthsafe advanced AWTS

is Total Nitrogen 5 – 10 mg/L

Total Phosphorous 10 mg/L

Given the reductions in nutrients the irrigation area required is now only limited by the site conditions, soil types and hydraulic loading across the available land disposal area.

System Hydraulic Loading Based on the Lord Howe Island Management Plan the typical design requirements

Lorhiti Resort - Waste Water Design Flow Calculations

Source	L/person/day		Number of persons	Flow/day
Cyclone Alley (dwelling)	120 (number of bedrooms +1)		3	360
Shearwater Cottage (dwelling)	120 (number of bedrooms +1)		2	240
Dwelling	120 (number of bedrooms +1)		4	360
Resort Guest (Units)	150		12	1800
Restaurant Dinner only (not in use)	30		25	750

MAXIMUM WATER HYDRAULIC WATER LOAD

3630

The calculated area required for irrigation using ES9000 wastewater system is 1,738 sqm

Irrigation

Existing subsurface irrigation is applied along the root zone of exotic gardens and plants and in Kikuyu lawns and uses evapotranspiration to dispose of the treated effluent. This was installed in 2008 under the LHIB Wastewater Management Strategy 2007

The area around Lorhiti is Ned's Beach Calcarene ranging between sand loam to loam. Based on the Design Loading Rate for irrigation area with secondary treated effluent is 4-5 mm per day.

Maximum size of irrigation disposal area was calculated in 2008 for an area of 2198 sq m (for Lorhiti) and 580sq m (for Josh Owens). Josh now has his residence subdivided so the 580sqm is no longer required as he will put his wastewater irrigation onto his land.

A meeting with Kate Dignam on 27 June 2016 (Team leader Compliance and Projects) confirmed the best area for wastewater irrigation is in the SNV to the west of the portion across Anderson Road (1,738 sq m calculated on 12-1-17) using dripper pipes. Kate assessed the ES9000 wastewater system and confirmed the area required under the LHIB Wastewater Management Strategy 2015 is 1,738 sq m of for irrigation, which is available. The current subsurface irrigation under lawns and exotic gardens is 6 years old and high traffic areas (pathways, driveways and tracks and removes potential for future development. It is proposed to use 7 irrigation zones each 410 sq m with a feeder pipe on the north west side and perforated pipework running perpendicular to the feeder pipe using air valves on the north east points (high side) and flush valves on the south west points (low side).

It is proposed to use existing septic systems at Cyclone Alley, Shearwater Cottage, Units and the applicant's dwelling connected to macerator pumps connected to pipework to the existing ES9000 (see diagrams) so the total property will be connected to the system. The macerator pump uses a fast-rotating cutting blade to break up waste and toilet paper and convert the water and waste into a fine slurry that is discharged under pressure through piping and expelled into the sewer or septic tank.

The ES9000 system will achieve the following effluent quality perimeters required by the Board:

Total nitrogen	10mg/L
Total phosphorous	10mg/L
BOD	10mg/L
Suspended solids	10mg/L
Faecal coliforms	10 cfu/100ml
Free Chlorine residual	2.2mg/L

A flow metre is installed on the inlet pipe to the ES9000 system to measure flows into the system, prior to connection to sewer line.

Earthsafe uses Netafim TYRAN product purple pipe which is especially designed for this application. It complies with the Board's Wastewater Policy requirements. The system has been installed in separate zones to spread the load in times of maximum flows. Each zone is fitted with vacuum breakers and flushvalves as per the recommended design rules.

The existing irrigation is subsurface in lawns and exotic garden. Given that the total site area is 12,177 sq m there is adequate area

available for irrigation which will not impact on native bush and habitats. However, there is suitable SNV area should extra area be required.

Irrigation: Used for highly treated effluent (tertiary treated). Effluent is applied to the root zone of exotic garden plants through the use of dripper systems. The length of the irrigation line is based on 1 metre spacing (also equal (metre square) to be irrigated). This will require 2198 metres of irrigation line. Irrigation will be on established exotic garden areas and not paths, lawns and areas where humans and animals will use including guest areas.

The map enclosed indicates the existing subsurface irrigation areas and proposed dripper irrigation area in SNV. We have intentionally kept the irrigation area away from guest areas.

To eliminate all chance of human contact we have installed warning signs marked:

"WARNING Recycled Effluent in Use Please Do Not Drink No Unauthorised Access"

Ongoing System Management

As set out in the Lord Howe Sewage Management Requirements the Earthsafe ES9000 is an AWTS and will continue service by an approved technician, in accordance with the LHIB Wastewater Management Strategy 2015.

CERTIFICATE OF ANALYSIS ES9000**Work Order : ES0904618**Client : **EARTHSAFE PTY LTD** Laboratory : Environmental Division Sydney Contact : MR OWEN HILL Contact : Charlie PierceAddress [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Project : ENV AWTS QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement Order number : E1 TEST

C-O-C number : ---- Date Samples Received : 30-MAR-2009 Sampler : DS

Issue Date : 06-APR-2009

Site : STP

No. of samples received : 6

Quote number : ---- No. of samples analysed : 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825 This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories Position Accreditation Category Duyen Nguyen
Senior Microbiologist Microbiology Hoa Nguyen Inorganic
Chemist Inorganics Environmental Division Sydney

Page : 2 of 4

Work Order :

Client :

ES0904618

EARTHSAFE PTY LTD

Project : ENV AWTS

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis. Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client

Owens

From: Owen Hill [REDACTED]
Sent: Tuesday, 2 September 2008 3:54 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: Earthsafe System on Lorhiti Apartments

Dianne

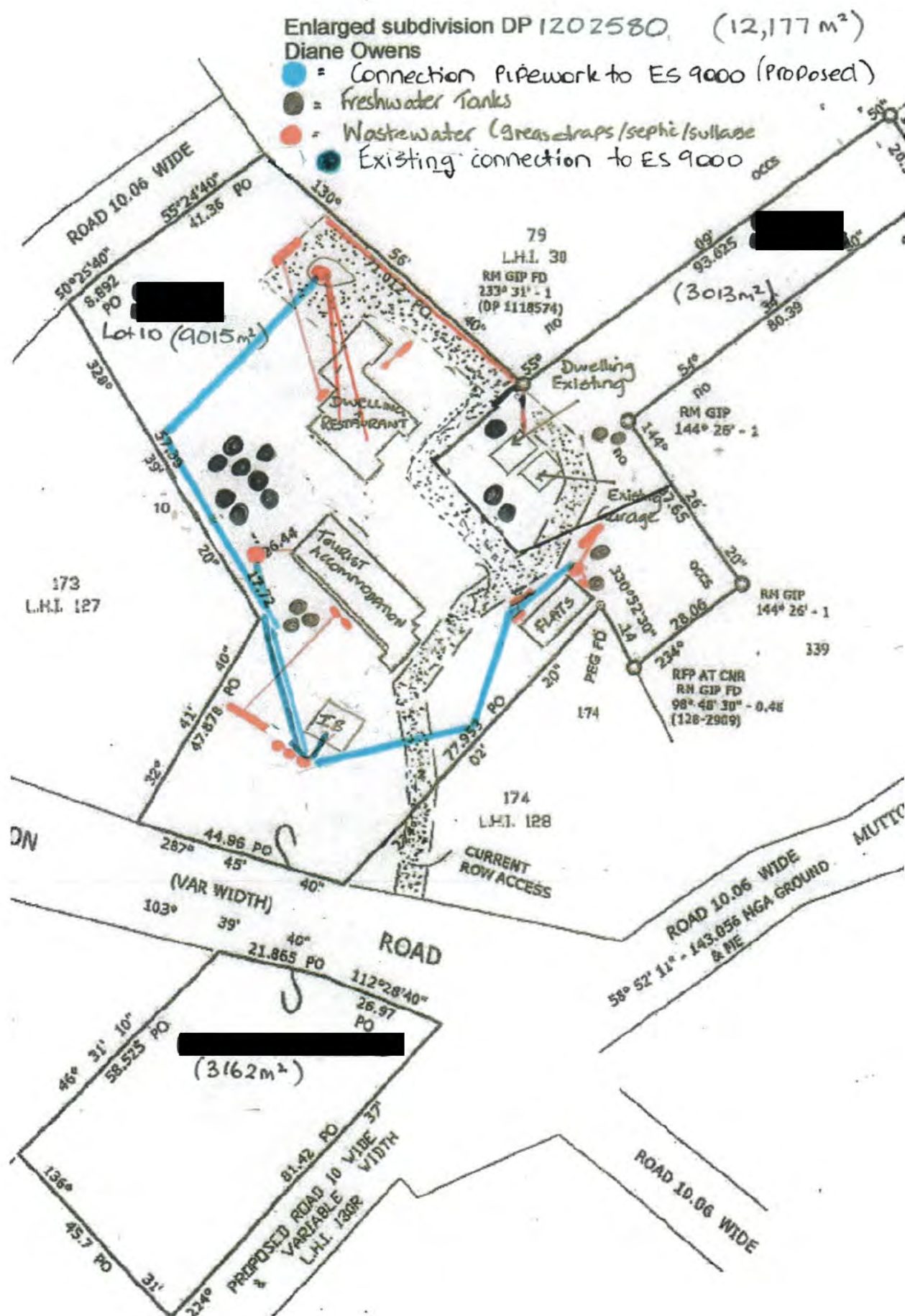
Further to your request we confirm that the Earthsafe ES9000 system we recently supplied to you through Warren O'Brien has been designed to handle over 3000 litres per day. It is essentially the same as the treatment system at Humpty Micks and the black water AWTS installed at Earls Anchorage.

Based on our experience on the mainland you will need around 500 to 800 square metres spray irrigation for the entire system. This can be achieved using simple garden sprinklers or 'wobblers' as we supplied to Warren. The Australian standard governing irrigation of waste water is AS1547.2000. Council should have their own copy. There is absolutely no way you need 300 sq metres per person!

All the best with council tomorrow.

Regards

Owen Hill
Managing Director
Earthsafe
[REDACTED]



Earth safe Contact Details

Telephone:

[REDACTED]

[REDACTED]

Email:

[REDACTED]

Address:

[REDACTED]

[REDACTED]

Opening hours:

Monday to Friday 7:30am - 4:00pm

24-hour after hours support hotline:

[REDACTED]

Areas serviced:

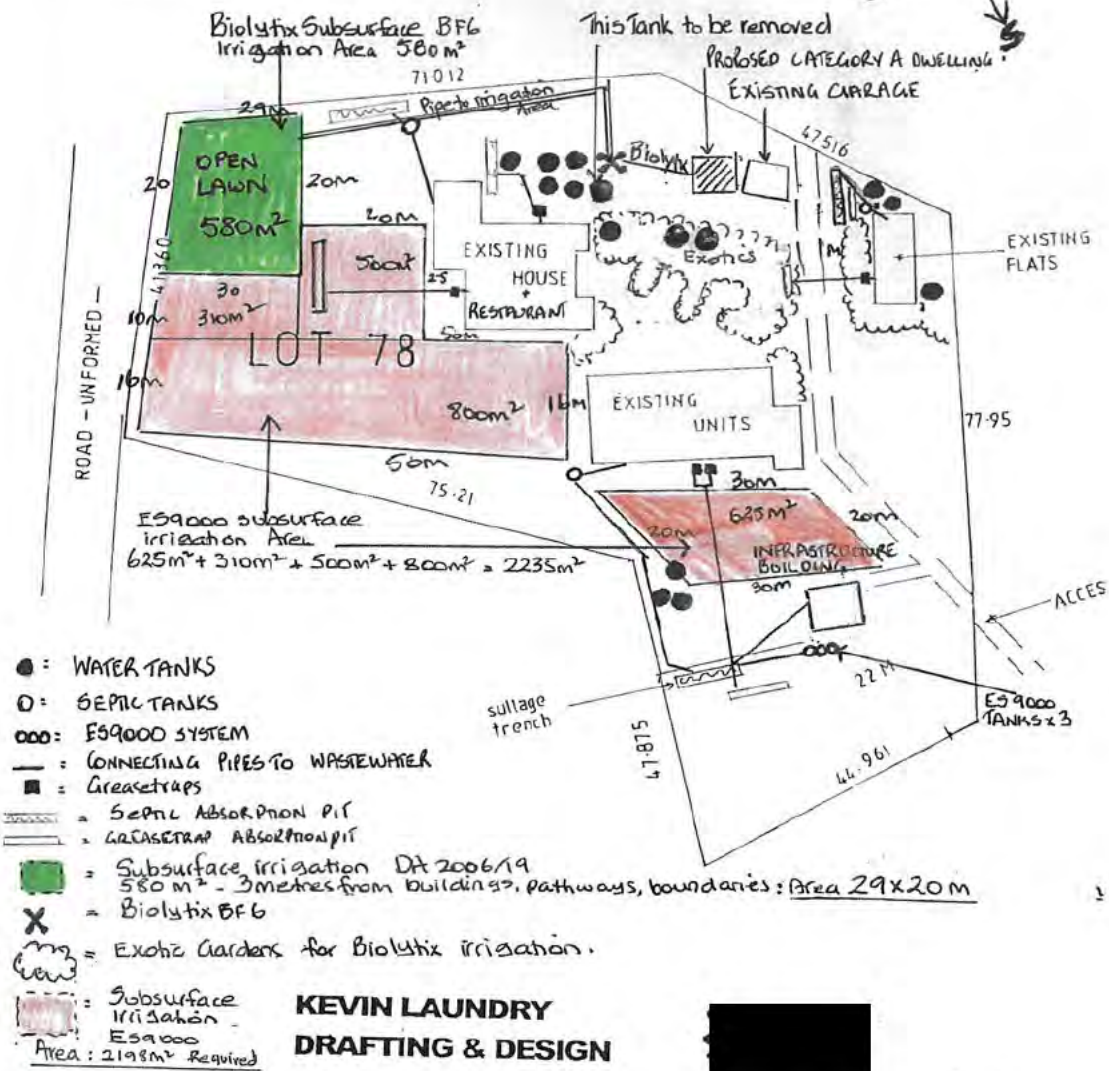
Central Coast, Hunter Region

Subsurface Irrigation area existing including Josh Owens which won't be required (shaded green)

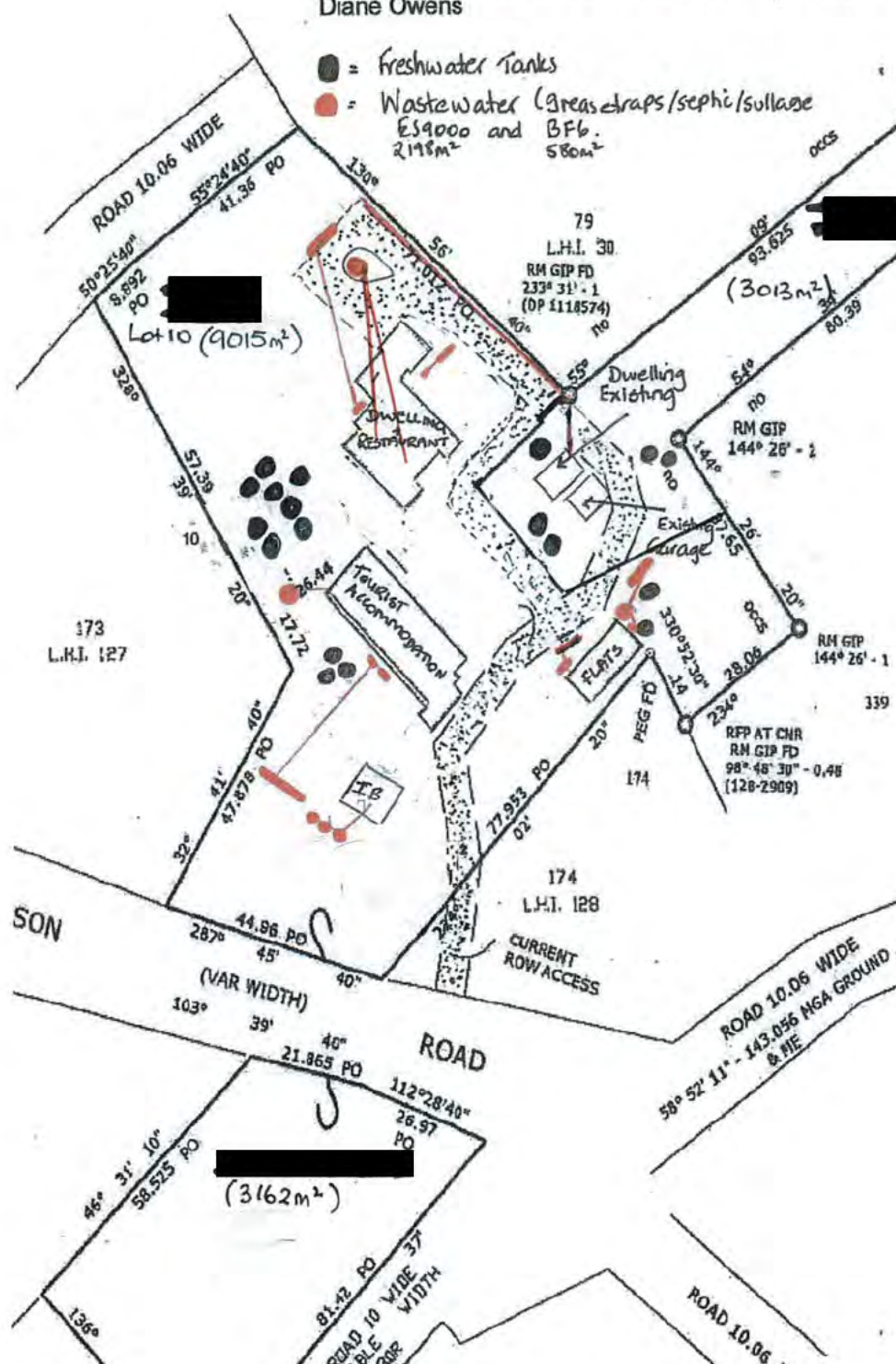
WASTEWATER PLAN 17 JULY 2009

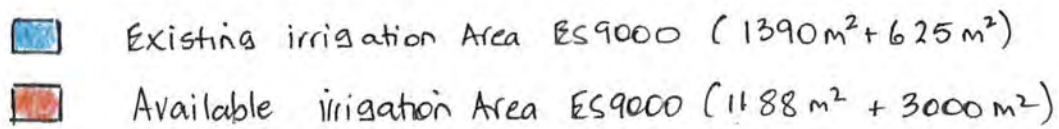
PORTION 78 SITE PLAN

Scale 1:1250



Enlarged subdivision DP 1202580 (12,177 m²)
Diane Owens





Existing irrigation Area ES9000 ($1390\text{m}^2 + 625\text{m}^2$)

 Available irrigation Area ES9000 ($1188 \text{ m}^2 + 3000 \text{ m}^2$)

Email from Kate Dignam on 12-1-17

Re: Lorhiti On-site Wastewater Management System

This email is to confirm that the soil sample provided to the Board by Josh Owens (26 September 2016) for the proposed Lorhiti irrigation area on the southern extent of Lease No. 2015.02 is sand.

Regards,

[REDACTED]

Team Leader - Compliance & Projects

LORD HOWE ISLAND BOARD

[REDACTED]

[REDACTED]

DEVELOPMENT APPLICATIONWASTEWATER SYSTEM UPGRADE Lot 10 DP1202580 DIANE OWENS

Total Area: 12,177 sqm

15 January 2017

Lord Howe Island Board



Bruce Thompson



Diane Owens



To whom it may Concern

I agree to allow Diane Owens to place irrigation pipework across my Special lease (Portion 160; SL-2011.12) as it leaves the Road Reserve to reach the irrigation field on the southern component of Lot 10 DP1202580 (former Portion 172).

Signed

Bruce Thompson



Date: 15 January 2017.

Nutrient Balance

Site Address: Lorhiti Complex 01.12.16 - soil sample provided

Please read the attached notes before using this spreadsheet.

SUMMARY - LAND APPLICATION AREA REQUIRED BASED ON THE MOST LIMITING BALANCE =

1,738 m²

INPUT DATA ⁽¹⁾					
Wastewater Loading			Nutrient Crop Uptake		
Hydraulic Load	3,960	L/Day	Crop N Uptake	200	kg/ha/yr which equals 55 mg/m ² /day
Effluent N Concentration	18.11	mg/L	Crop P Uptake	20	kg/ha/yr which equals 5 mg/m ² /day
% Lost to Soil Processes (Cenry & Gardner 1998)	0.2	Decimal	Phosphorus Sorption		
Total N Loss to Soil	14,307	mg/day	P-sorption result	300	mg/kg which equals 4,080 kg/ha
Remaining N Load after soil loss	57,228	mg/day	Bulk Density	1.7	g/cm ³
Effluent P Concentration	2	mg/L	Depth of Soil	0.8	m
Design Life of System	50	yr	% of Predicted P-sorp. ⁽²⁾	0.5	Decimal

METHOD 1: NUTRIENT BALANCE BASED ON ANNUAL CROP UPTAKE RATES

Minimum Area Required with Zero Buffer		Determination of Buffer Zone Size for a Nominated Land Application Area (LAA)	
Nitrogen	1,044 m ²	Nominated LAA Size	1,738 m ²
Phosphorus	474 m ²	Predicted N Export from LAA	-13.87 kg/year
		Predicted P Export from LAA	-7.88 kg/year
		Phosphorus Longevity for LAA	-598 Years
		Minimum Buffer Required for excess nutrient	0 m ²

PHOSPHORUS BALANCE

STEP 1: Using the nominated LAA Size

Nominated LAA Size	1,738 m ²		
Daily P Load	0.0070 kg/day	→ Phosphorus generated over life of system	144.175 kg
Daily Uptake	0.000523 kg/day	→ Phosphorus vegetative uptake for life of system	0.100 kg/m ²
Measured p-sorption capacity	0.408 kg/m ²		
Assumed p-sorption capacity	0.204 kg/m ²	→ Phosphorus adsorbed in 50 years	0.204 kg/m ²
Site P-sorption capacity	354.55 kg	→ Desired Annual P Application Rate	10.587 kg/year
		which equals	0.02895 kg/day
P-load to be sorbed	-0.50 kg/year		

NOTES