Janelle Rampton

From: Admin @ ASTPD <admin@astpd.com.au>
Sent: Thursday, 16 January 2025 10:00 AM
To: Planning
Cc: Lisa Pienaar; Aspen Dunn
Subject: ASTP 210312.01 | Change to App and Response to IR for TPC-77 at 1133-1139 Yabba Creek Road, Imbil
Attachments: ASTP-Resp_To_IR.pdf; Att 1 - Revised Proposal Plans.pdf; Att 2 - Bushfire Hazard Assessment & Mgt Plan.pdf; Att 3 - Flood Risk Management Plan.pdf; Att 4 - Stormwater Management Plan.pdf; Att 5 - Water Management Plan.pdf

Categories: Hannah

Good morning Lisa,

Please see attached combined correspondence in relation to;

- Change to the Application; and
- Response to Council's Information Request

In relation to the Change (under Section 25.1 of the DA Rules), it's understood that Council (as the assessment officer) must give notice to SARA of the change.

We note the application requires Public Notification, this will be prepared once we have submitted our response to SARA's information request.

If you have any questions in relation to the project, please feel free to contact myself or Aspen Dunn.

Kind regards,

Erin.

Erin Coghlan

Office Manager

ADAMS + SPARKES Town Planning

07 5231 3200
admin@astpd.com.au
www.astpd.com.au
Level 3, 26 Duporth Ave, Maroochydore QLD 4558
PO Box 1000, Buddina QLD 4575

adams+sparkes
TOWN PLANNING

Our ref: 210312.01
Council Ref: TPC-77

15 January 2025

The Chief Executive Officer
Gympie Regional Council
PO Box 155
Gympie QLD 4570

Attention: **Development Assessment – Lisa Pienaar**
Via Email: planning@gympie.qld.gov.au

Dear Lisa,

Re: **Change to the Application and Response to Council's Information Request**
Other Change to Town Planning Consent Permit TPC 77 for modifications to existing Deer Farm, Tourist and Accommodation Facility
1133-1139 Yabba Creek Road, Imbil
Lot 4 on RP894556
Council ref: TPC-77

Change to the Application:

In response to Council's Information Request, it is requested to change the application in accordance with sections 25 & 26 of the Development Assessment Rules. This correspondence also constitutes a notice to the assessment manager pursuant to section 52 of the Act ("*changing or withdrawing development applications*").

The lodged development application sought to include the following as an Other Change to the development permit:

- Introduce wording/conditions to the approval to allow for ancillary entertainment events to occur onsite; and,
- Alter the distribution of approved accommodation sites to remove old/unused buildings and replace with new cabin accommodation.

Council's Information Request raises significant concerns around the intent to allow entertainment events onsite. As such, this component has been removed from the proposal entirely. It is now proposed only to maintain the existing tourist park accommodation activities and no events will be held onsite as a result of this application to Council.

Further, Council raised concerns about the number of campsites available onsite (and therefore the total number of people using the premises), suggesting that the camping capacity has expanded over time without approval. In response to this matter, the Proposal Plans have been revised (**Attachment 1**) to clarify the total number of campsites currently available to guests, with an estimate of how many persons would therefore be onsite during a peak camping period (i.e. easter holidays). A total of 113 campsites (capacity for 1344 persons) have been recorded, resulting in a 38 tent/trailer site increase to the approved number of tent/trailer sites under the 1994 town planning consent permit (75 sites approved).

It is therefore requested to change the Development Application to include these additional tent/trailer sites as part of the assessment. The revised Proposal Plans in **Attachment 1** nominate the approved sites versus the proposed new sites to be included spatially to demonstrate the way in which the camping facilities have grown. All specialist reporting discussed below has been updated to reflect this proposal and assess the additional campsites accordingly.

As demonstrated in **Table 1** below, due to the proposal to include the abovementioned 38 additional tent/trailer sites, add additional cabins and remove unused bunk houses/caravan sites, the proposal results in a **net increase** of 28 accommodation sites overall.

Table 1 Net increase of accommodation facilities

Approved	**Proposed**
75 tent/trailer sites	113 tent/trailer sites
10 caravan sites	0 caravan sites
2 bunk houses	0 bunk houses
8 cabins	20 cabins
10 permanent caravan sites	0 permanent caravan sites
TOTAL 105 Sites	**TOTAL 133 Sites**
Net increase = 28 sites	

It is noted that Council define a 'campsite' as being able to contain a maximum of three (3) tents in an area of up to 60m^2. Further, Council officers have advised that this would permit 12 people per site (4 per tent). This may be reasonable for a caravan park style of camping but does not accurately reflect the realistic function of acreage 'farm-stay' type camping, which the Deerk Park is known for.

As demonstrated on the revised Proposal Plans in **Attachment 1**, it is proposed to allow a more fluid setting of boundaries for campsites that reflects the scale/nature of the premises and sizes campsites according to the location (paddock sites are larger while roadside or creekside camping provides smaller sites and fewer people permitted per site). As demonstrated on the accommodation schedule, each campsite will accommodate a maximum of twelve (12) people in three (3) tents, regardless of area size. Campers will, however, be able to spread out on larger sites (exceeding 60m^2) to create a less dense camping setting and offer greater user amenity. This outcome is appropriate on the basis that the number of campsites and persons permitted to camp per site remains capped.

Section 26.1 of the Development Assessment Rules provides that the application process does not stop for the changed application if the assessment manager is satisfied the change is in response to an Information Request. This change is made in direct response to Council's Information Request Accordingly, the development assessment process does not stop.

Regarding the referral agency, I note that Section 25.1 of the DA Rules states that if an applicant gives a notice to the assessment manager under section 52(1) of the Act to change the application before it is decided, the **assessment manager must**—

a) *give a copy of the notice to each referral agency for the original application, and any other referral agency required to be referred the application as a result of the change; and*
b) *advise each referral agency, with a copy to the applicant, of the effect of the change on the development assessment process.*

Detailed below is the applicant's response to Council's Information Request items.

Response to Information Request:

I refer to Council's Information Request, dated 17 January 2024 in relation to the abovementioned development and the extension of the response period agreed to by Council until 17 January 2025.

On behalf of the applicant, Yabba Deer Park, and in accordance with **Section 13** of the *DA Rules*, we provide a response to all the issues raised. A response to the item(s) raised in Councils Information Request is outlined below:

> **ITEM 1-3:**
> *The application material specifies up to 2000 people attend the site at any one time during peak periods. Under the existing approval, the site has 105 sites (noting there is no mention of numbers of people). This equates to 19 people per site, which is unusually high for a tourist park. There is a need to understand what constitutes a 'site' relative to the number of people within the camping area. There is a concern, that the camping area/numbers have expanded over time since the original approval.*
>
> *<u>Information Required</u>*
> 1. *Provide further evidence to substantiate the claim that the current approval permits 2000 people to be located onsite or that the sites were undefined/unlimited by size.*
> 2. *Provide a detailed site plan, showing the area for the existing approval for all tent/trailer sites, caravan, bunk houses, cabins and permanent caravan sites and additionally provide a site plan for the proposed 75 tent/trailer sites, caravan sites and 12 cabins. On the plan, include a legend to indicated numbers in each grouping ie. Tent/campers/cabins etc.*
> 3. *Advise the maximum number of people allowed or that can fit per site.*

RESPONSE

As detailed above, the revised Proposal Plans in **Attachment 1** nominate the approved sites (hatched) versus the proposed sites to be added to the approval, with an accommodation schedule included to detail the number of people able to be accommodated in each camping area/site. In total, a 28 site net increase is proposed (105 sites approved, 133 sites proposed) across the cabin and tent/trailer sites to remain/be delivered, with all other forms of accommodation having been removed. Each tent/trailer site will accommodate a maximum of twelve (12) people in three (3) tents as per Council's advice, but the land size of the sites varies based on location, given the nature and scale of the premises.

In total, it is determined that the Borumba Deer Park has capacity to accommodate up to 1,424 people on any given day, however, peak capacity is only recorded over a handful of times during the year (i.e. easter 4 day holiday). Typically, the park operates at 50% capacity for a regular weekend and significantly less during the week.

Given that the existing approval did not nominate the location of tent/trailer sites, size of sites or number of people able to be accommodated on each site, it is not possible to quantify what the number of people originally intended to be permitted onsite. We have however determined that the net increase of 28 accommodation sites is minor in nature and will not result in any adverse impacts for the surrounding area.

ITEM 4:

No consideration or assessment has been made against the Temporary Local Planning Instrument- Protection of Biodiversity Values (TLPI). Of particular concern is the impact of the introduction of events producing 86- 90dB(A) (and additional lighting and vibration which has not been assessed) within Core Ecological Linkage and Priority Species Habitat overlay and near the waterway.

Several Priority Species (TLPI Schedule 1) may occur within the waterway and mapped habitat overlay areas and use the riparian zone as a movement corridor, the impact of the new proposed activity on these fauna species is undefined, with no mitigation measures provided. Noting the concerns identified above, it remains unclear why this area has been identified to accommodate these proposed events.

<u>Information Required</u>

Modify the overall development layout such that the newly proposed 'event' areas are in an area that minimises the impact on the environmental values mapped under the TLPI. Alternatively, provide an assessment against the TLPI, ensuring to consider the following:

a. *Provide a plan that demonstrates that all new infrastructure and required services will be located within existing cleared and approved areas;*
b. *Placement of new 'stage area' within TLPI overlay areas and assessment of subsequent noise/vibration/activity/light (particular reference to PO17) impacts on the values as mapped under the TLPI (note possible priority fauna species within creek and priority species habitat and corridor overlay areas);*
c. *Increased or changed activity levels within the 'Event/Community use area' and potential impact on the values as mapped under the TLPI;*
d. *What measures will be taken to ensure that biodiversity values (as mapped under the TLPI) will be protected and enhanced.*

N.B. In the absence of any compelling justification provided to date and noting the environmental values outlined above, council staff are unable to envisage how the proposed 'event areas' in the location as currently proposed could be supported.

RESPONSE

As detailed above, the proposal to allow entertainment events onsite has been <u>removed</u> from the proposal entirely. It is now proposed only to maintain the existing tourist park accommodation activities and no events will be held onsite as a result of this application to Council. As such, there will be no 'events area' within areas of high ecological value.

The existing campsites down by the creek remain, as roughly shown on the approved plan included as **Figure 1** below. This is shown on the revised Proposal Plans in **Attachment 1**.

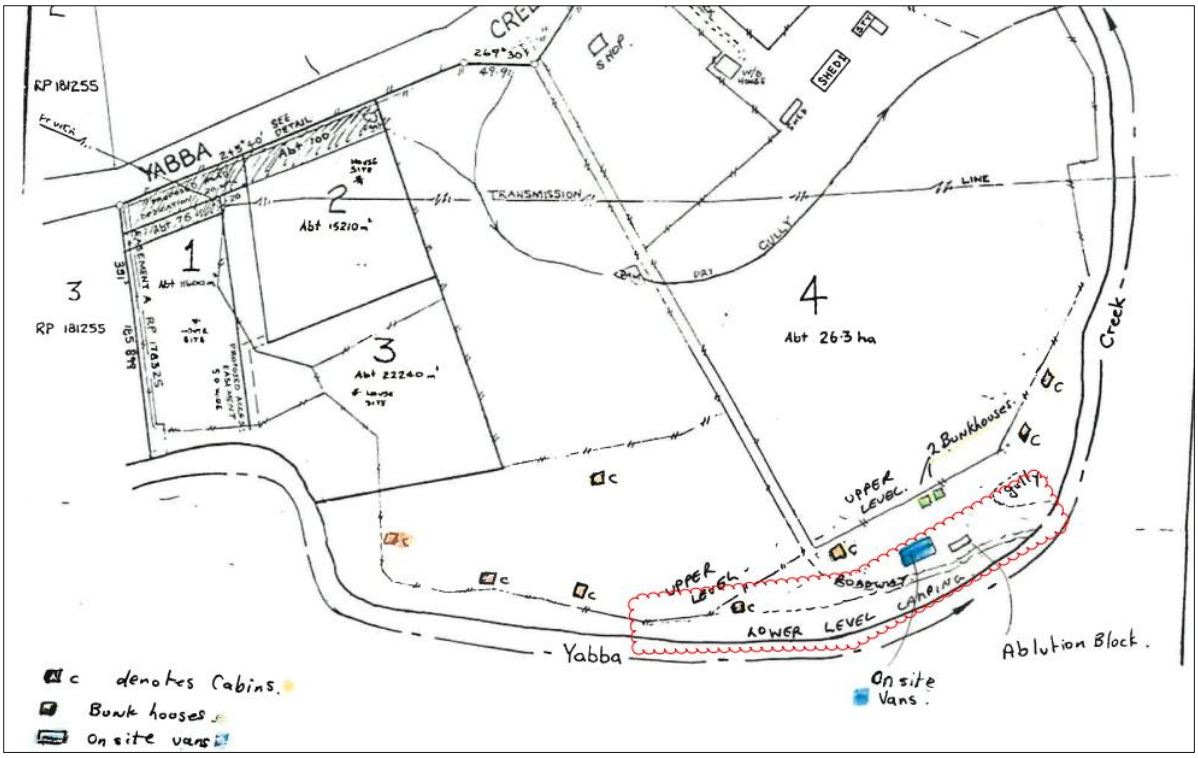


Figure 1 Approved Site Plan

ITEM 5:

No detail of the construction of the stage is given. The proposal states that no earthworks are required to facilitate the change, however there is no documentation to demonstrate how the 'stage' area will be constructed, especially relevant given its location within TLPI overlay areas.

Information Required

Supply a design drawing and description of the new 'stage' and how it will be constructed without any vegetation clearing, earthworks or impact to biodiversity values mapped under the TLPI.

RESPONSE

As discussed above, as the events component is removed from the proposal, no stage will be constructed onsite.

ITEM 6:

The site has day use areas, open to visitors. The application material states that the events will only be accessible to those camping on site and not day use/visitors to the site. However, it needs to be understood how this is to be managed. There is a concern that events will draw in additional people when they are held, introducing additional impacts on and off the site.

Information Required

Provide information regarding how day use/visitors will be managed when events are held, as the site is currently physically accessible to anyone, including those accessing Yabba Creek and other day use areas.

RESPONSE

As discussed above, as the events component is removed from the proposal.

ITEM 7-9:

The application material identifies there are 'strict operational procedures in place' where the property would be closed or evacuated in response to flood hazard or where there is a bushfire threat. However, there is no mention, what these procedures are. The management is critical when dealing with up to 2000 people.

Information Required

7. *Provide the extent of the Q100 flood levels for the Yabba Creek catchment on the site plan, relevant to all existing and proposed structures.*
8. *Provide an operational procedural document that outlines responses to flood and bushfire hazards when they arise.*
9. *Regarding flood, a Flood Evacuation Management Plan (FEMP), prepared by a suitably qualified person is to be submitted. It should take into consideration that the external road network becomes inundated during a major storm event, with no access to and from the site. Council's Disaster Management Advisor should be consulted in the formation of this document.*

RESPONSE

Please refer to the Bushfire Hazard Assessment and Management Plan prepared by Urban Catalyst 3 in **Attachment 2**. Further, please refer to Flood Risk Emergency Management Plan prepared by Contour Consulting in **Attachment 3**.

ITEM 10:

Although, the new cabins are proposed to be raised off the ground in response to the flood hazard, it is not known if the floor levels are flood immune.

Information Required

Provide evidence of a flood search to determine flood levels and provide amended plans identifying that the new cabins will achieve Q100 flood immunity. Alternatively, further justification for the proposal in the context of the State Planning Policy with respect to flood hazard and mitigating the risk to people and property to an 'acceptable or tolerable level' will be required.

RESPONSE

Please refer to Flood Risk Emergency Management Plan prepared by Contour Consulting in **Attachment 3** and the Stormwater Management Plan prepared by Contour Consulting in **Attachment 4**.

ITEM 11:

In addition to the planned events outlined in the application material, the applicant's website advertises karaoke & disco, where 'the music will be cranked up so you sing and dance the night away'. Insufficient information is contained in Environmental Noise Assessment – Proposed Outdoor Event Use - 21BRA0081RP01_0 - TTM Consulting Pty Ltd supplied with the application material to satisfactorily permit such an activity.

Information Required

An amended acoustic report which addresses the following:

a. *Environmental Noise Assessment does not acknowledge the generator at the rear of the stage as a noise source. The applicant is requested to specify the expected impact of the use of the generator at the rear of the stage on the nearest noise sensitive receiver and confirm that there are no other generators used for commercial purposes at the site;*
b. *Provide clarification or document reference as to the nomination of '7db noise attenuation for an open window' as a measurement (6.3 - Calculation Assumptions).*
c. *Provide clarification or document reference for Appendix C - Calculations, including units of measurement;*
d. *Provide an 'Event Noise Management Plan' addressing items not limited to the following:*
    i. *Provide details of expected noise sources;*
    ii. *Resident notification procedures;*
    iii. *Details/restriction of external amplified music;*
    iv. *Measures and procedures to monitor noise emissions;*
    v. *Details of complaint response procedures;*
    vi. *Identify procedures to monitor and review the event noise management plan*.

RESPONSE

The Borumba Deer Park website includes a list of a number of activities provided onsite for guest entertainment, including mini-golf, kids playground, nature walks, non-motorised water sports, animal feeding etc. This list also includes a karaoke and disco night that occurs on "*special occasions"* (not a regular offering) aimed primarily at kids and teens. The music is played using a small PA system for a small-scale social gathering and is not intended to be taken as a large scale music/entertainment event. This activity has been part of the regular park operations since opening and **does not form part of this Other Change application**.

The original town planning consent does not prohibit this activity, but conditions compliance with the *Campground Regulations 1987*, and the current park operations do not conflict with the 1987 Regulation in any way. Further, these activities will continue to comply with the noise criteria under the *Environmental Protection Act 1994*.

As discussed above, the formal events component is removed from the proposal. As such, the above item is no longer required to be addressed.

ITEM 12 & 13:

The application material suggests there is an effluent disposal system on site and there is no evidence of an ERA approval relating to the land. Given there are more than 21 EP on site, evidence of an ERA approval is required. If there is no approval, an ERA will need to be

obtained and evidence that this is achievable will need to be demonstrated. That aside, the site has been operating for some time, and evidence that the sewerage treatment system is operating in accordance with the appropriate standards.

Information Required

12. *Provide full details of current effluent system on site are required and evidence that it is in compliance with current health standards is to be submitted. Notably, it is to be demonstrated that any existing/proposed effluent disposal system if 'fit for purpose' and sufficient for the total number of persons to be accommodated on site. The report should be prepared and certified by a suitably qualified person. The report should identify plumbing, collection equipment, storage and treatment tanks, irrigation/disposal areas, control systems, housing, structures, etc. It should also include details about the Carvan dump point.*
13. *Identify the number of toilets on site.*

RESPONSE

Please find enclosed Water Management Plan (Effluent Report and Potable Water Supply Assessment) prepared by Arris in **Attachment 5**.

ITEM 14:

There is no detail regarding the on-site water storage or treatment. Nor is there any detail regarding ablution facilities.

Information Required

Provide information regarding the amount of water storage available to users of the site, the location of ablution facilities and details of water treatment facilities.

RESPONSE

Please find enclosed Water Management Plan (Effluent Report and Potable Water Supply Assessment) prepared by Arris in **Attachment 5**.

ITEM 15:

A stormwater management plan has not been provided for the proposed cabins.

Information Required

Submit a stormwater management plan, prepared by a suitably qualified person (RPEQ), that addresses stormwater quantity to demonstrate the management of the site's stormwater and the non-worsening downstream at the lawful point of discharge.

RESPONSE

Please refer to the Stormwater Management Plan prepared by Contour Consulting in **Attachment 4**.

ITEM 16:
Proposal plans for the new use areas following conventional plan making standards has not been supplied (i.e., scale, north point, use area dimensions etc).

Information Required:
Submit updated proposal plans addressing the above concerns.

RESPONSE
Please refer to the revised Proposal Plans prepared by Ace Space Design in **Attachment 1**.

This represents our complete response to the Information Request issued by Council. We will now commence proceedings to undertake Public Notification in accordance with the DA Rules.

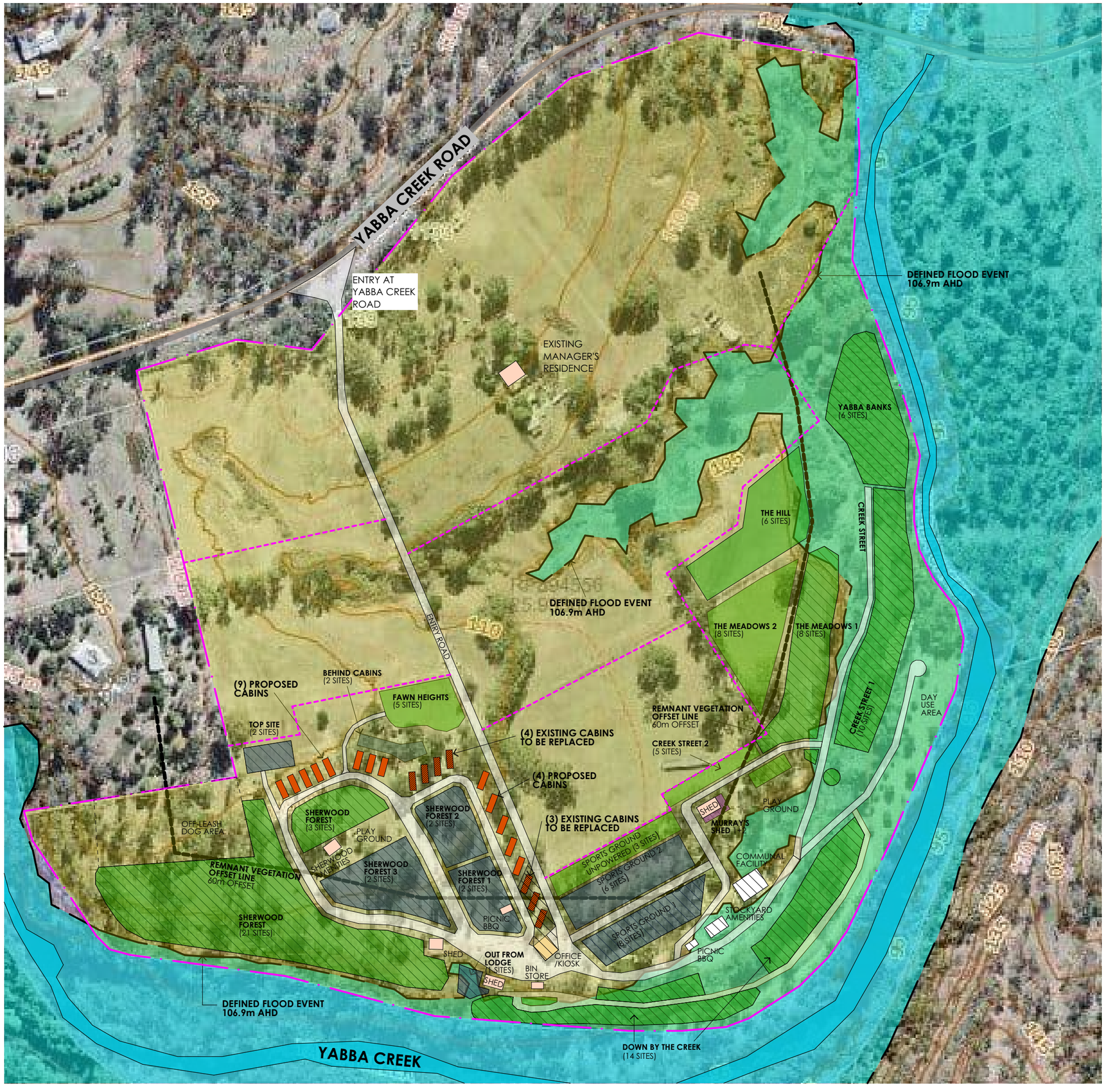
As always, please feel free to contact me direct should you require any additional information or clarification.

Yours faithfully,

ADAMS + SPARKES
TOWN PLANNING

Aspen Dunn
SENIOR TOWN PLANNER

Encl: Revised Proposal Plans prepared by Ace Space Design (**Attachment 1**)
Bushfire Hazard Assessment and Management Plan prepared by Urban Catalyst 3 (**Attachment 2**)
Flood Risk Emergency Management Plan prepared by Contour Consulting (**Attachment 3**)
Stormwater Management Plan prepared by Contour Consulting (**Attachment 4**)
Water Management Plan (Effluent Report and Potable Water Supply Assessment) prepared by Arris (**Attachment 5**)



ACCOMODATION SCHEDULE

No.of sites	UNPOWERED SITES	No of people
10	Creek Street	120
5	Creek Street 2	60
14	Down By the Creek	168
24	Sherwood Forest	288
5	Fawn Heights	60
6	The Meadows	72
8	The Meadows 2	96
6	The Hill	72
6	Yabba Banks	72
3	Sports Gounds - Unpowered	36
	POWERED SITES	
6	Sports Ground 1	156
8	Sports Ground 2	
1	Murray's Shed 1+2	12
6	Sherwood Forest 1+2+3	72
2	Behind the cabins	24
2	Top Sites	24
1	Out from Lodge	12
	CABINS	
20	4 persons per cabin	80
133	Total campsites/persons	1424

Existing approved campsites (75 sites)

EXISTING/PROPOSED CAMPING/CABINS AREAS. DEFINED FLOOD LINE

1:2500

SITE INFORMATION

RP Description: Lot 4 on RP894556
Site Area: 25.9930 ha

LEGEND

- PROPOSED UNPOWERED SITES
- PROPOSED POWERED SITES
- EXISTING UNPOWERED/ POWERED SITES
- PROPOSED CABINS
- EXISTING CABINS TO BE REPLACED
- DEFINED FLOOD EVENT EXTENT. 106.9m AHD

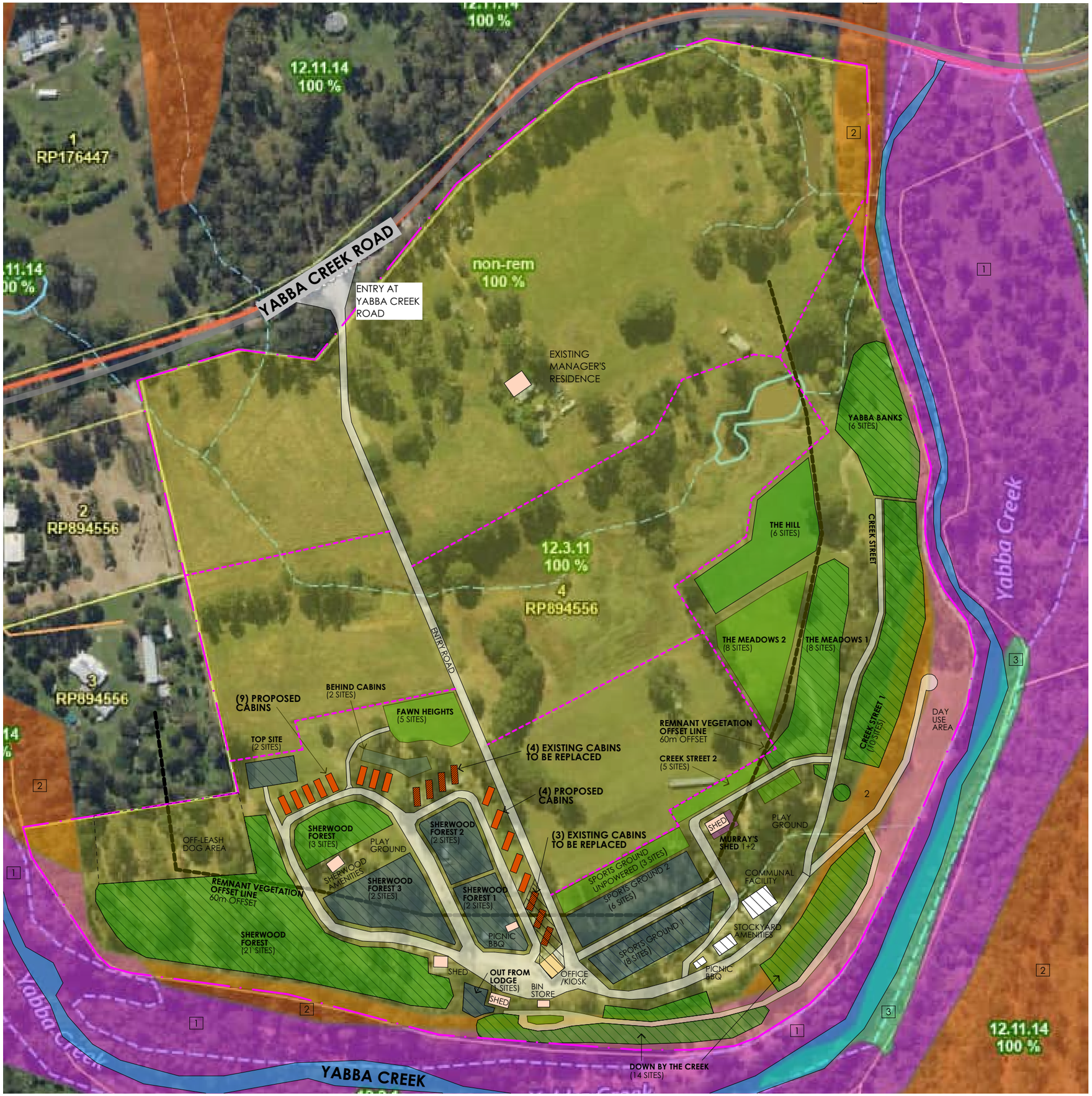
Issue	Amendment	Date
G	Remnant vegetation plan	30.10.24
F	revised existing campsites	04.10.24
E(1)	Defined flood extent 106.9m	18.09.24
E	adjusted schedule	30.08.24
D	added sched, exist. cabins	29.08.24
C	Existing cabin locations	16.08.24
B	Issue for Application	02.07.24
A	Issue for Client Review	30.04.24

ACE SPACE DESIGN
COMMERCIAL • RESIDENTIAL • INDUSTRIAL
BUILDING DESIGNERS
(07) 5456 4411 0412 264 685 QBCC Lic.065570

CLIENT:
BORUMBA DEER PARK.

PROJECT and LOCATION:
Proposed accommodation cabins at 1139 Yabba Creek Road, Imbil.

DRAWN BY: CS	CHECKED BY: CS
SCALE at A3 PAPER	
DRAWING TITLE: Site Plan/Defined Flood	
Drawing: 01 of 03	PROJECT No: 23.670
	ISSUE G



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	CABINS	
20	4 persons per cabin	80
133	Total campsites/persons	1424

Existing approved campsites (75 sites)

REMNANT VEGETATION AREAS.

1:2500

SITE INFORMATION

RP Description: Lot 4 on RP894556
Site Area: 25.9930 ha

LEGEND

- PROPOSED UNPOWERED SITES
- PROPOSED POWERED SITES
- EXISTING UNPOWERED/ POWERED SITES
- PROPOSED CABINS
- EXISTING CABINS TO BE REPLACED

STATE OVERLAYS

VEGETATION MANAGEMENT REGIONAL ECOSYSTEM

- 1 CATEGORY B ENDANGERED
- 2 CATEGORY B AREAS OF CONCERN
- 3 CATEGORY B AREAS OF LEAST CONCERN

Issue	Amendment	Date
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BUILDING DESIGNERS
(07) 5456 4411 0412 264 685 QBCC Lic.065570

CLIENT:
BORUMBA DEER PARK.

PROJECT and LOCATION:
Proposed accommodation cabins at 1139 Yabba Creek Road, Imbil.

DRAWN BY: CS	CHECKED BY: CS
SCALE 1:2500, 1:1.13, 1:3295.41 at A3 PAP	
DRAWING TITLE: Site Plan Remnant Vegetation	
Drawing: 02 of 03	PROJECT No: 23.670
	ISSUE G

ELEVATION 1
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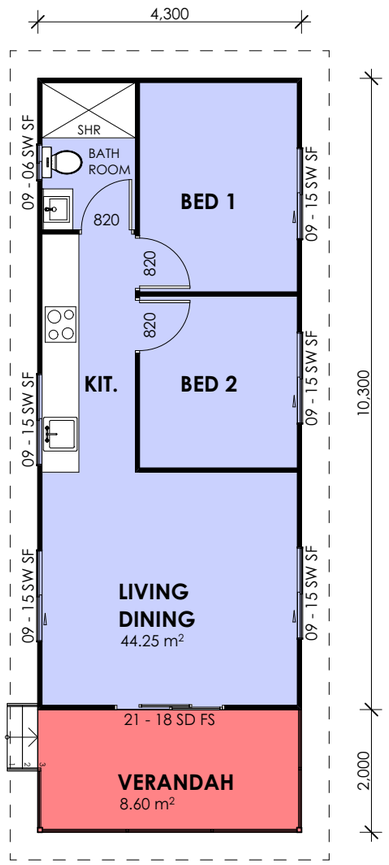

CABIN LAYOUT EXAMPLE.
2 BEDROOM
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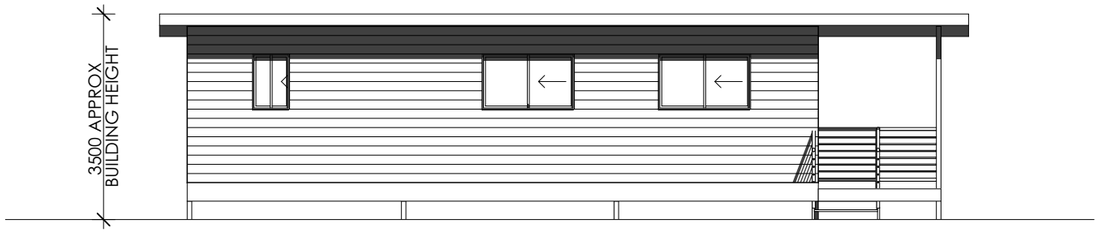

ELEVATION 2
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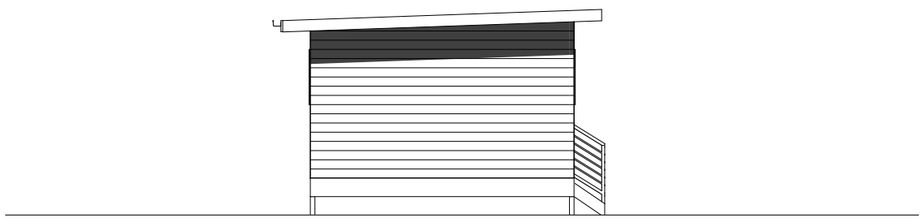

ELEVATION 3
1:100

ELEVATION 4
1:100

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G	Remnant vegetation plan	30.10.24
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BUILDING DESIGNERS
(07) 5456 4411 0412 264 685 QBCC Lic.065570

CLIENT:
BORUMBA DEER PARK.
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Proposed accommodation cabins at 1139 Yabba Creek Road, Imbil.

DRAWN BY: CS	CHECKED BY: CS
SCALE	1:100 at A3 PAPER
DRAWING TITLE:	Cabin Layout

Drawing:	PROJECT No:	ISSUE
03 of 03	23.670	G

URBAN CATALYST 3

ABN: 74 622 643 421

PO BOX 7044 SIPPY DOWNS QLD 4556
contact@urbancatalyst3.com
+61 412 788 532

Reference: 24-005

Borumba Deer Park

BUSHFIRE HAZARD ASSESSMENT AND MANAGEMENT PLAN

Proposed Cabin Development
1139 Yabba Creek Rd, Imbil

TABLE OF CONTENTS

LIST OF FIGURES

Disclaimer

This assessment has been prepared by Urban Catalyst 3 Pty Ltd for Borumba Deer Park (Client) and may only be used and relied upon by the Client and Gympie Regional Council for the purposes set out in Section 1.1 of this report. No responsibility is held to any person other than the Client for any decision or action arising from or in connection with this report. All implied warrantees and conditions are excluded to the extent permitted by law. All opinions and conclusions are based on assumptions detailed in this report and no responsibility is held for any error or omission arising from these assumptions being incorrect.

This assessment has been based on site conditions present at the time of preparation and the setbacks and nature of the building proposed, relying on current hazard assessment methodologies as described in this report. These methodologies are not based on assessments of catastrophic bushfire events which may occur from time to time. By their nature, bushfires are unpredictable, and no guarantee is able to be provided or should be assumed that the area will not be affected by bushfire at some time. Property owners and tenants should be aware of the often unpredictable nature of bushfire and potential consequences of such events, and should be responsible for their property and personnel by being prepared for extreme events accordingly.

Document Issue

Urban Catalyst 3 Pty Ltd
ABN: 74 622 643 421
PO Box 7044 Sippy Downs QLD 4556
contact@urbancatalyst3.com
+61 412 788 532

Revision No.	Authorised for Issue	Date
Draft	D. Willis	25 October 2024

1.0 INTRODUCTION

1.1 PURPOSE

This report documents the outcomes of a bushfire hazard assessment completed for the Borumba Deer Park located at 1139 Yabba Creek Road, Imbil to support a material change of use application for additional cabins and confirmation of camping sites on the existing facility.

Particulars relating to the lot are as follows:

Real Property Description:	Lot 4 on RP894556
Address:	1139 Yabba Creek Road, Imbil
Area:	25.993ha
Tenure:	Freehold
Improvements:	Existing caravan and tent camping sites, cabins, office and kiosk, storage sheds, amenities and associated support infrastructure.

1.2 GYMPIE REGIONAL COUNCIL BUSHFIRE HAZARD OVERLAY

The majority of the subject land is mapped within a potential impact buffer to a medium bushfire hazard area under the *Gympie Regional Council Planning Scheme 2013* Bushfire hazard overlay mapping. Areas within the central eastern extent of the property are not mapped as being subject to bushfire, while vegetation in the far north, north east and south west of the site is mapped as medium risk for bushfire (refer to Figure 1).

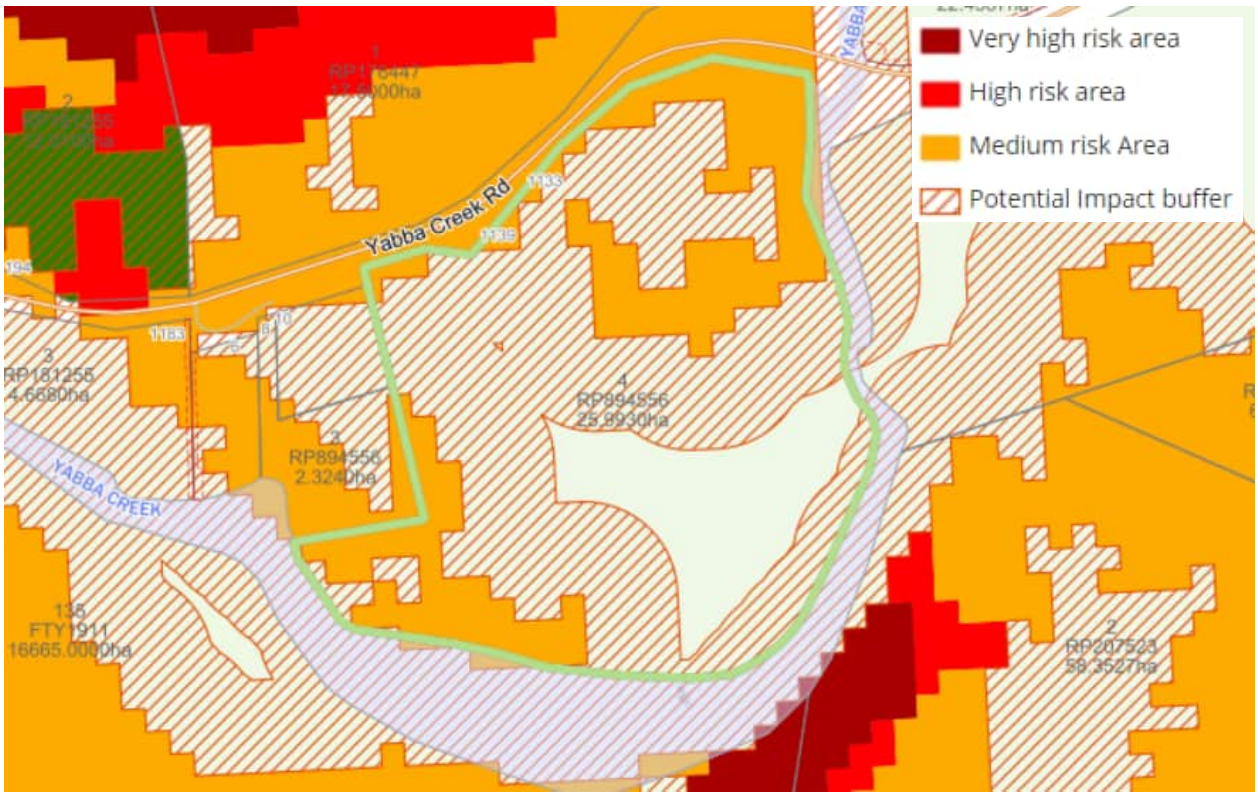


Figure 1: *Gympie Regional Council Planning Scheme 2013* Bushfire hazard overlay

1.3 STATE PLANNING POLICY BUSHFIRE HAZARD OVERLAY

The vegetated areas along the perimeter of the subject land are mapped as medium potential bushfire intensity under the State Planning Policy (SPP) bushfire hazard mapping. An associated potential impact buffer area extends 100m from the mapped hazard area and is mapped across much of the site (refer to Figure 2). This is largely consistent with the information included in the *Gympie Regional Council Planning Scheme 2013* Bushfire hazard overlay mapping. Portions of the existing caravan park including areas along the creek are mapped as being within a potential impact buffer, with areas of medium potential bushfire intensity mapped in the south west and the north east of the property.

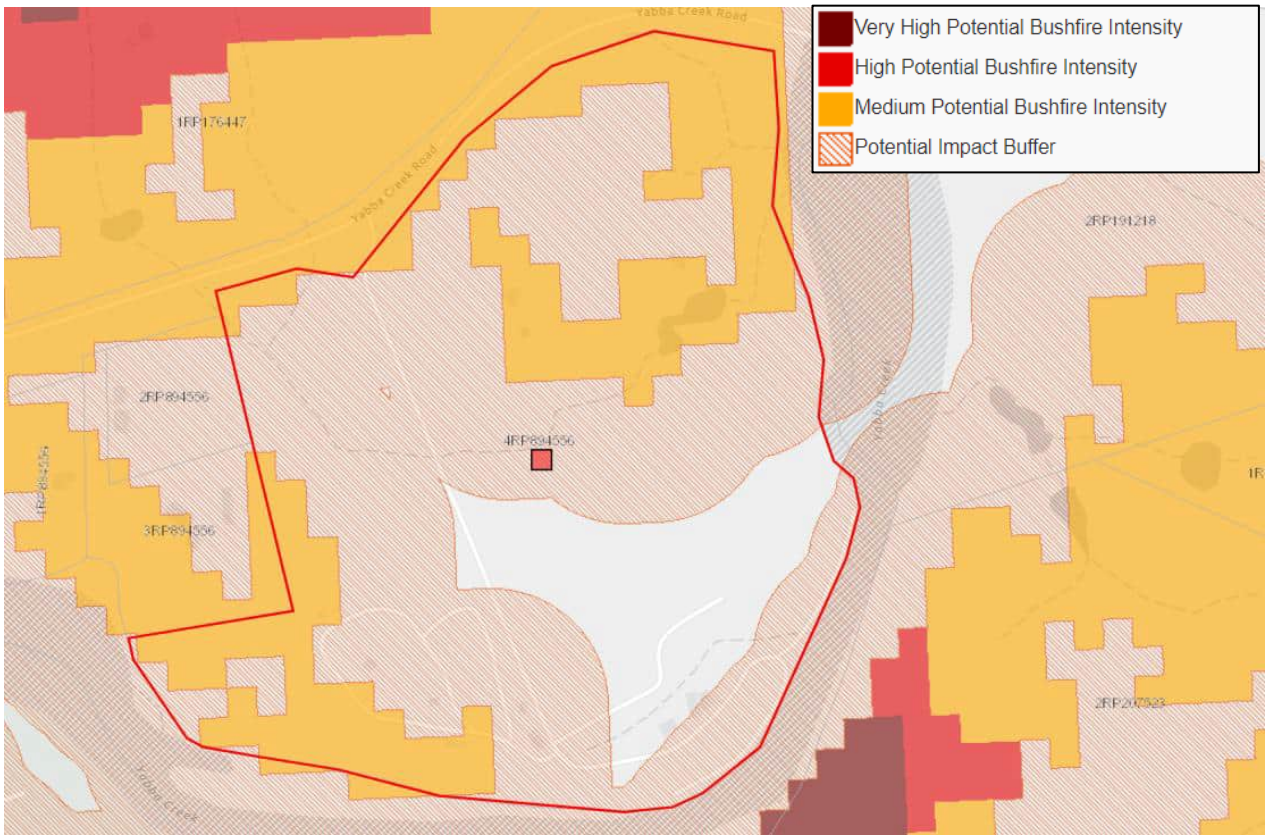


Figure 2: State Planning Policy bushfire hazard mapping

2.0 SITE DESCRIPTION

2.1 SURROUNDING LAND USES

The subject land is located within an area characterised by a range of small rural allotments with hoop pine plantations located on the southern side of Yabba Creek (refer to Figure 3). Cleared rural land parcels are located further the east on the opposite side of Yabba Creek.

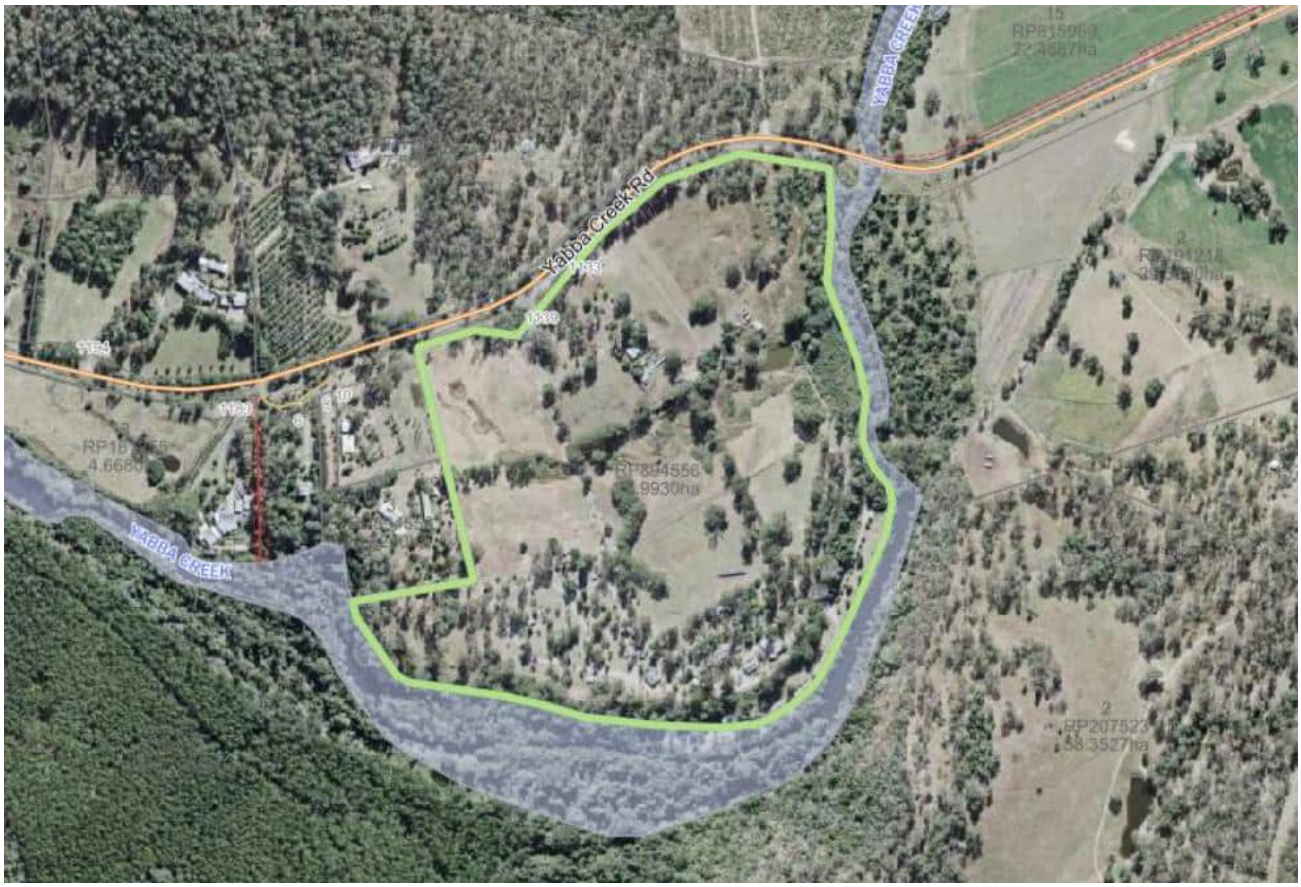


Figure 3: Site locality and adjoining land uses

The existing tourist park is largely cleared of remnant vegetation, although a number of individual trees have been planted around the park for shade and amenity purposes. Vegetation remains along the high bank and down to the waterway, and vegetation is also present on surrounding land to the south, east and north. The largest patches of hazardous vegetation present within the wider landscape consist of mapped remnant vegetation on properties to the east and north which are separated from the subject land by Yabba Creek and Yabba Creek Road, respectively. A plan showing surrounding land uses is included as Figure 4.

Figure 4: Surrounding land uses

2.2 TOPOGRAPHY

The property extends from approximately 124m AHD on the northern property boundary proximal to the site entry to approximately 96 m AHD on the eastern boundary adjacent to Yabba Creek (refer Figure 5). The existing camping and caravan sites are situated on the elevated country adjacent to the kiosk between 112m AHD and 106m AHD, with some camping sites located on the lower river floodplain around 97m AHD. The new development is located west of the kiosk on land between 116m AHD and 109m AHD. The land in the west falls gently to the south south-east at around 6 percent while the land from the top of the bank to the floodplain associated with Yabba Creek falls sharply at approximately 35 percent.

Yabba Creek is a significant waterbody present on the eastern and southern side of the property and is generally cloaked by rainforest on either side (refer Plate 1). Land within the central eastern portion of the site above the high bank comprises a relatively flat river terrace gently grading to the east. Much of this area is grassed and is surrounded by narrow bands of rainforest type vegetation along the edge of the creek bank as well as along a gully that traverses the area.

Land on the southern side of Yabba Creek climbs rapidly to the south, while land on the eastern side of Yabba Creek also climbs rapidly toward the ridgeline. Vegetation within these areas is located upslope of the site.

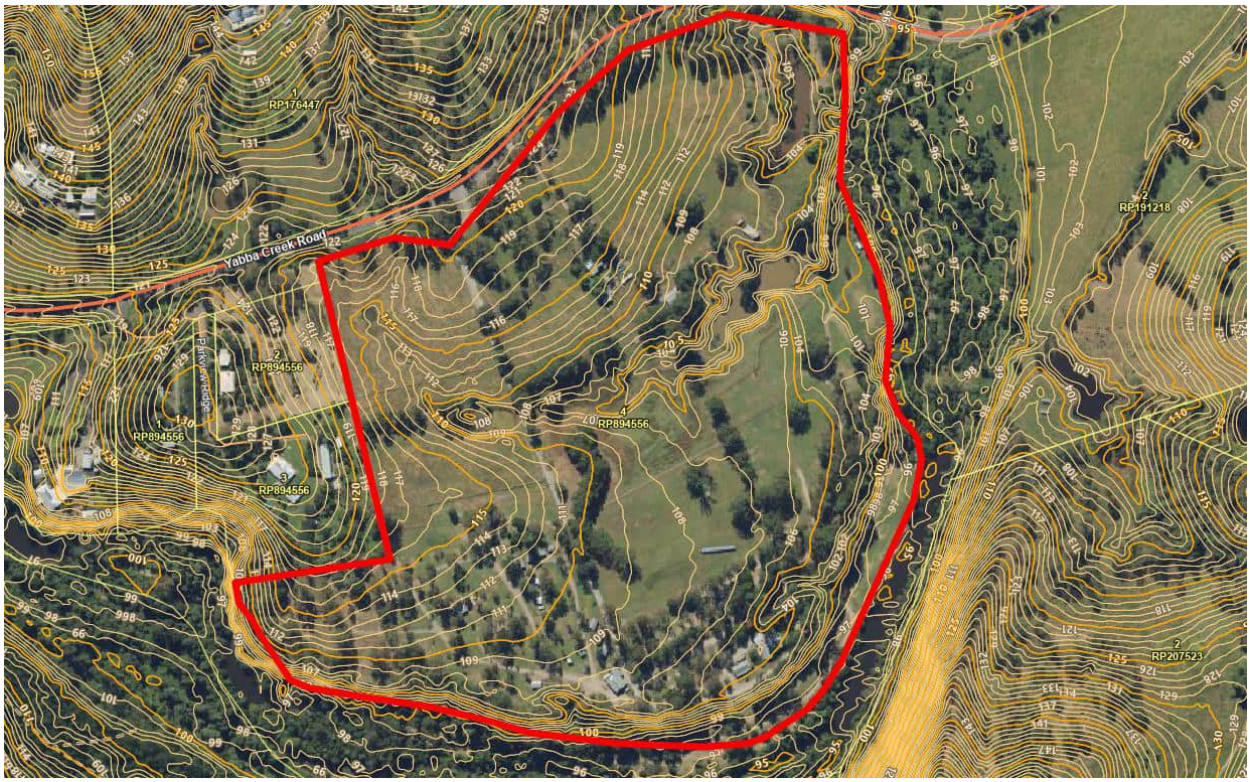


Figure 5: Site topography

Plate 1 – Yabba Creek on southern side of the lot (left) and eastern side of the lot (right)

2.3 VEGETATION

Reference to the vegetation management supporting map indicates that the existing camping areas are proximal to the remnant vegetation comprising two regional ecosystems (REs) as shown in Figure 6. An area is also mapped as high value regrowth extending across predominantly cleared areas associated with a gully in the centre of the site. Each RE is described as follows:

- RE12.3.1 described as gallery rainforest (notophyll vine forest) on alluvial plains listed as 'endangered' under the *Vegetation Management Act 1994* (VM Act)

- RE12.3.11 described as *Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near coast and located in association with the dam. This RE is listed as 'of concern' under the VM Act
- RE12.11.14 described as *Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics and listed as 'of concern' under the VM Act.

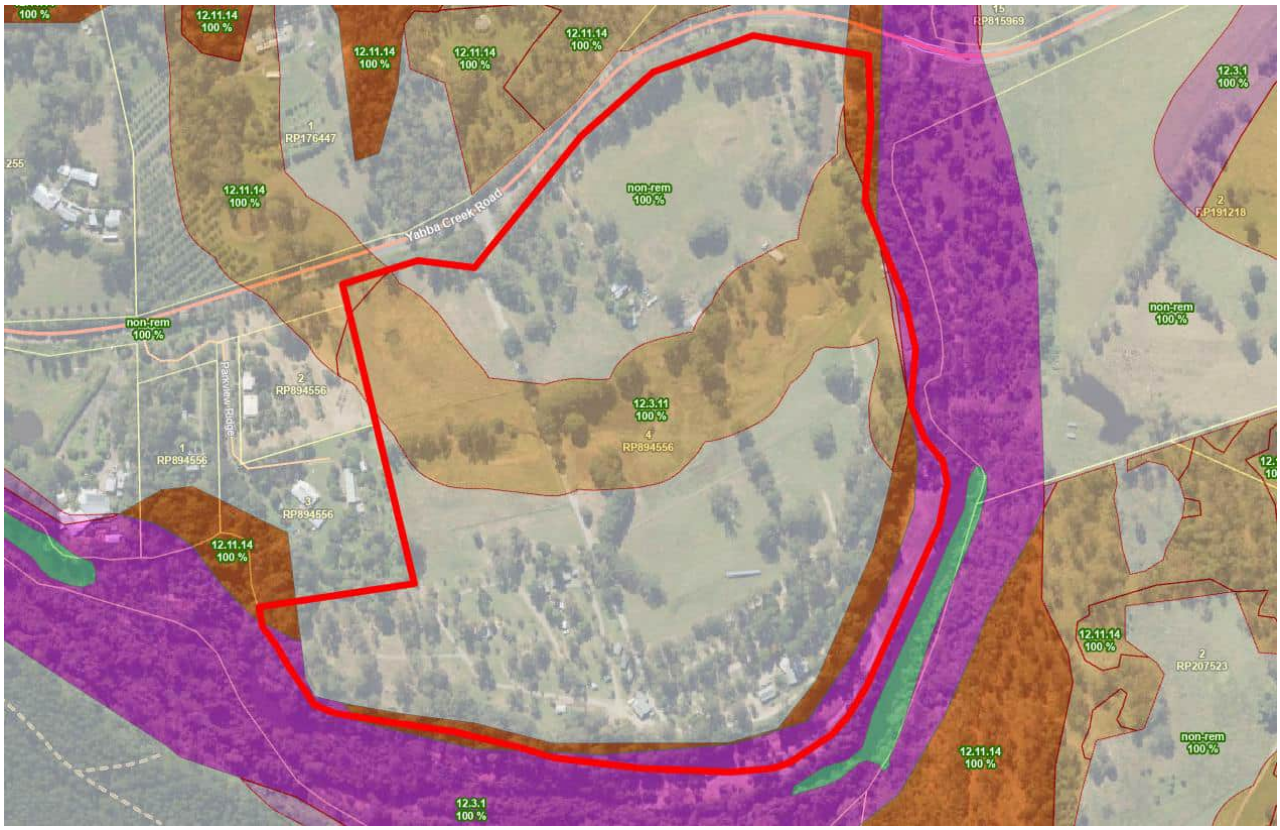


Figure 6: Regional ecosystem mapping

A site investigation completed for the project determined that the majority of the existing camping and caravan sites as well as the facilities were located in proximity to vegetation of low bushfire hazard, comprising rainforest type communities along Yabba Creek. The site inspection indicated the presence of the following key vegetation communities within or immediately adjacent to the site:

- Gallery rainforest extending from the top of the high bank through to the river is typically dominated by *Castanospermum austale* (blackbean) with *Waterhousea floribunda* (weeping satinash) toward the bottom of the embankment and along the edge of the waterway (refer Plate 2). *Ficus virens* (rock fig) and *Diploglottis campbellii* (small-leaved tamarind) were also observed. *Adiantum formosum* (giant maidenhair fern) and *Alpinia caerulea* (native ginger) were present within the ground storey, while a series of tall shrubs including *Aphananthe philippinensis* (handle wood), *Cryptocarya laurina* (glossy laurel), *Guioa semiglauca* (guioa), *Neolitsea dealbata* (white bolly gum) were present. *Lomandra hystrix* (mat rush) was common along the creek. The class 3 restricted plant, *Dolichandra unguis-cati* (cat's claw creeper) was

prevalent in areas within this community, although evidence of ongoing management by the park was observed through cut stumps and areas of dead vine. Along the waterway and to the west, *Casuarina cunninghamiana* (river oak) was observed as an emergent up to 20m in height over the *Waterhousea floribunda* canopy in proximity to the creek which extended to 10m in height. This vegetation community extends along both sides of Yabba Creek and appears to be associated with the lower banks and terraces associated with the waterway.

Plate 2 – Gallery rainforest below the high bank and adjoining Yabba Creek

- Vegetation to the far west above the high bank comprised a woodland dominated by *Eucalyptus tessellaris* (Moreton Bay ash) and *Eucalyptus tereticornis* (Queensland blue gum), with *Corymbia intermedia* (pink bloodwood) also present up to 20m in height (refer Plate 3). This area of open woodland supported an understorey of *Acacia disparrima* (hickory wattle) which grows to 8m in height. *Lantana camara* (lantana) dominates the understorey with *Senna pendula* (Easter cassia) also present.
- Vegetation above the high banks to the south of Yabba Creek comprised *Araucaria cunninghamii* (hoop pine) plantation, with rainforest understorey observed from the edge of the waterway (refer Plate 4).

Plate 3 – Eucalypt woodland on western extent of the allotment

Plate 4 – Hoop pine plantation to the south of the site on the opposite side of Yabba Creek

- Vegetation to the east of the waterway where it adjoins the eastern property boundary comprises *Eucalyptus tereticornis* and *Corymbia intermedia* on the steep slopes climbing to the east (refer Plate 5). *Corymbia citriodora* (lemon scented gum) was also present toward the upper slopes. This is separated from the waterway by a narrow strip of gallery rainforest for a width of around 25m width

Plate 5 – Eucalypt forest within the western extent of the allotment and outside of the clearing area

In addition to the above, the caravan park included a number of isolated trees over a grassy understorey, with *Eucalyptus tereticornis* and *Corymbia citriodora* commonly observed, and planted specimens of *Melaleuca viminalis* (bottle brush), *Melaleuca leucadendra* (weeping paper-bark), *Melia azedarach* (white cedar), *Citharexylum spinosum* (fiddlewood), *Grevillea robusta* (silky oak) and *Syzygium oleosum* (blue lily pilly) also observed (refer Plate 6). The balance of the site typically comprised grassy fields regularly maintained by mowing or by grazing activity associated with the deer paddocks.

Plate 6 – *Melaleuca quinquenervia* woodland surrounding the dam

3.0 BUSHFIRE HAZARD ASSESSMENT

3.1 STATE ASSESSMENT METHODOLOGY

3.1.1 General

The *Gympie Regional Council Planning Scheme 2013* requires a site-specific bushfire hazard assessment to be undertaken when a development site is located within a mapped Bushfire Hazard Area. While Council's Bushfire hazard overlay mapping is comparable to the SPP mapping, the site-specific hazard mapping required by the Bushfire hazard overlay code is to be prepared consistent with the more recent methodology adopted to prepare the SPP mapping.

The State government have described the methodology used to prepare the SPP mapping in the following publications:

- *Natural Hazards, Risk and Resilience — Bushfire State Planning Policy – state interest guidance material* (The Department of Infrastructure, Local Government and Planning, 2019)
- *Bushfire Resilient Communities. Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'* (Queensland Fire and Emergency Services, 2019).

The preparation of a Local Hazard Area Map has been undertaken for the site in accordance with the methodology described in the above referenced documents. The input parameters used to determine the bushfire hazard acting on the site are detailed in the sections below.

3.1.2 Vegetation Hazard Classes

Fuel loads need to be determined when preparing a bushfire hazard assessment. The Queensland Fire and Emergency Services (QFES) refers to the process for identifying, classifying and mapping vegetation hazard classes as a Vegetation Hazard Class Assessment. In accordance with the methodology outlined in Section 6 of the *Bushfire Resilient Communities* (QFES (2019)), the following vegetation hazard classes (VHC) were identified within the assessment area (which includes a 150m buffer surrounding the location of the subject site):

- VHC 4.1 Notophyll and notophyll palm or vine forest
- VHC 13.2 Dry to moist eucalypt woodlands on undulating metamorphics and granite
- VHC 37.1 Hoop plantations
- VHC 40.4 Continuous low grass or tree cover
- VHC 41.4 Discontinuous low grass or tree cover
- VHC 43.6 Water bodies or very low vegetation cover, which included Yabba Creek.

3.1.3 Maximum Landscape Slope

The slope of land underlying hazardous vegetation to the north of the site along Yabba Creek Road and on the adjoining land to the north is located upslope. Hazardous vegetation within the far western extent of the site and the adjacent land is typically located upslope, while hazardous

vegetation to the east on the opposite side of Yabba Creek is also located upslope of the existing and proposed cabins and camping sites.

Where the slope under hazardous vegetation is located across slope, it is considered 'upslope' irrespective of the slope of land between the site and the edge of the hazardous vegetation. Note that for the purposes of undertaking a bushfire hazard assessment, where the topography is flat or where vegetation is located upslope of an assessment site, a slope of 1 degree is required to be used to satisfy the mathematical formula, however it has negligible impact on the calculations.

3.1.4 Forest Fire Danger Index

The Queensland government produce a publicly available data package which includes selected inputs and information used by the CSIRO in conjunction with the QFES to prepare the State-wide Bushfire Hazard Area (Bushfire Prone Area) mapping (July 2014). The data includes Fire Weather Severity (Fire Danger Index - FDI). A review of the dataset for the subject site indicates that the site is located within a band of FDI 46.

4.0 LOCAL HAZARD MAP

4.1 GENERAL

The SPP reference documentation sets out the following methodology for preparing a Local Hazard Area Map:

- Categorising the vegetation within the site in accordance with the vegetation hazard classes derived from QFES (2019)
- Using the patch and corridor filtering process to remove narrow corridors and small patches of hazardous vegetation
- Subdividing the identified vegetation hazard classes into bushfire hazard sub-units based on slope differences and vegetation hazard classes
- Assigning SPP Potential Bushfire Intensity classes to the sub-units
- Application of 100m Potential Impact Buffers to the amended sub-units to derive an overall Local Hazard Map.

4.2 PATCH AND CORRIDOR FILTERING

Section 4.2.6 of *Bushfire Resilient Communities* (QFES (2019) outlines the patch and corridor filtering process to modify potential intensity of small patches and corridors (based on Leonard *et. al.* 2017). The process involves the following three stages:

- Merging small patches of a single Vegetation Hazard Class less than 0.5ha;
- Merging small Vegetation Hazard Class patches between 0.5 and 1ha with higher or moderate fuel loads (greater than 8 tonnes/ha); and
- Removing narrow corridors of vegetation less than 50m wide through a process of patch erosion and dilation. These small patches are merged with surrounding vegetation by allocating a patch to the Vegetation Hazard Class that is most common to the patch boundary (Leonard *et al*., 2017).

This process has resulted in patch filtering of the very narrow band of eucalypts along the top of the bank adjacent to the rainforest along the waterway. This applies to the southern extent of the property as well as to the small patch of eucalypt dominated vegetation to the west.

4.3 CALCULATION OF POTENTIAL BUSHFIRE INTENSITY

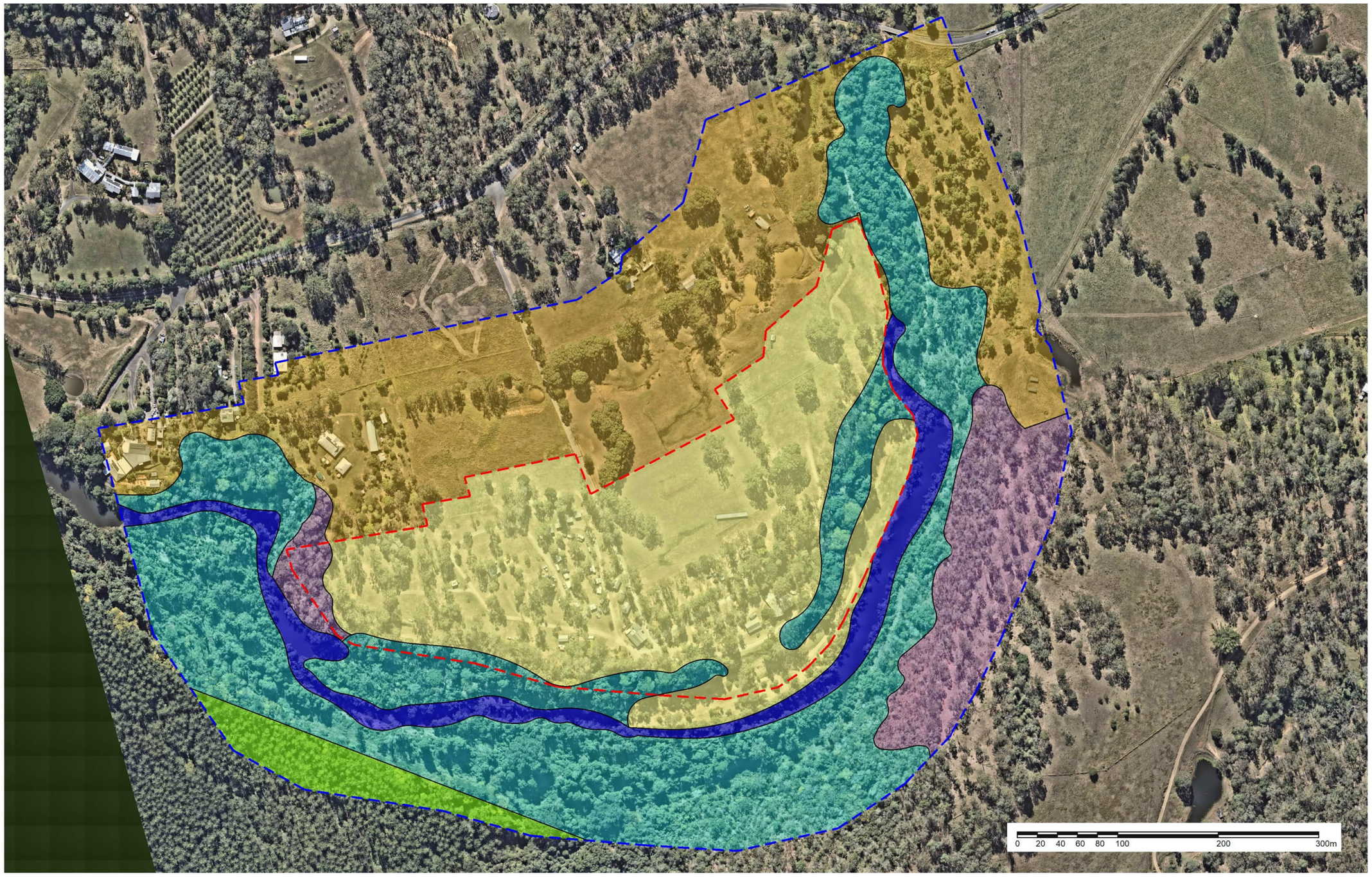
Potential Bushfire Intensity is calculated by inputting the site-specific input parameters discussed in Section 3.1 into the FLAMESOL computer model. FLAMESOL uses industry standard bushfire equations and allows numerous input variables to be adjusted including fuel loads, fire danger index, site slope and distance to vegetation.

Table 1 details the Potential Bushfire Intensity classes and their corresponding potential fire-line intensity (KW/m) values as prescribed within Leonard *et. al.* 2017.

Figure 7, Figure 8 and Figure *9* presented below have been prepared as per the above referenced methodology.

Table 1. Potential Bushfire Intensity

Potential Bushfire Intensity	Potential Fireline Intensity
Very High	>40,000 kW/m
High	20,000-39,999 kW/m
Medium	4,000 – 19,999 kW/m



LEGEND

- DEVELOPMENT AREA
- 150m ASSESSMENT BUFFER
- VHC 4.1 NOTOPHYLL VINE FOREST
- VHC 13.2 - DRY TO MOIST EUCALYPT WOODLANDS
- VHC 37.1 - HOOP PINE PLANTATION
- VHC 40.4 - CONTINUOUS GRASS AND TREE COVER
- VHC 41.4 - DISCONTINUOUS GRASS AND TREE COVER
- VHC 42.6 - NIL TO VERY LOW VEGETATION

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ADDRESS: 1133-1139 YABBA CREEK ROAD, IMBIL
PROJECT NUMBER: 24-005
DATE: 24/10/2024

FIGURE 7 - VEGETATION HAZARD CLASSES

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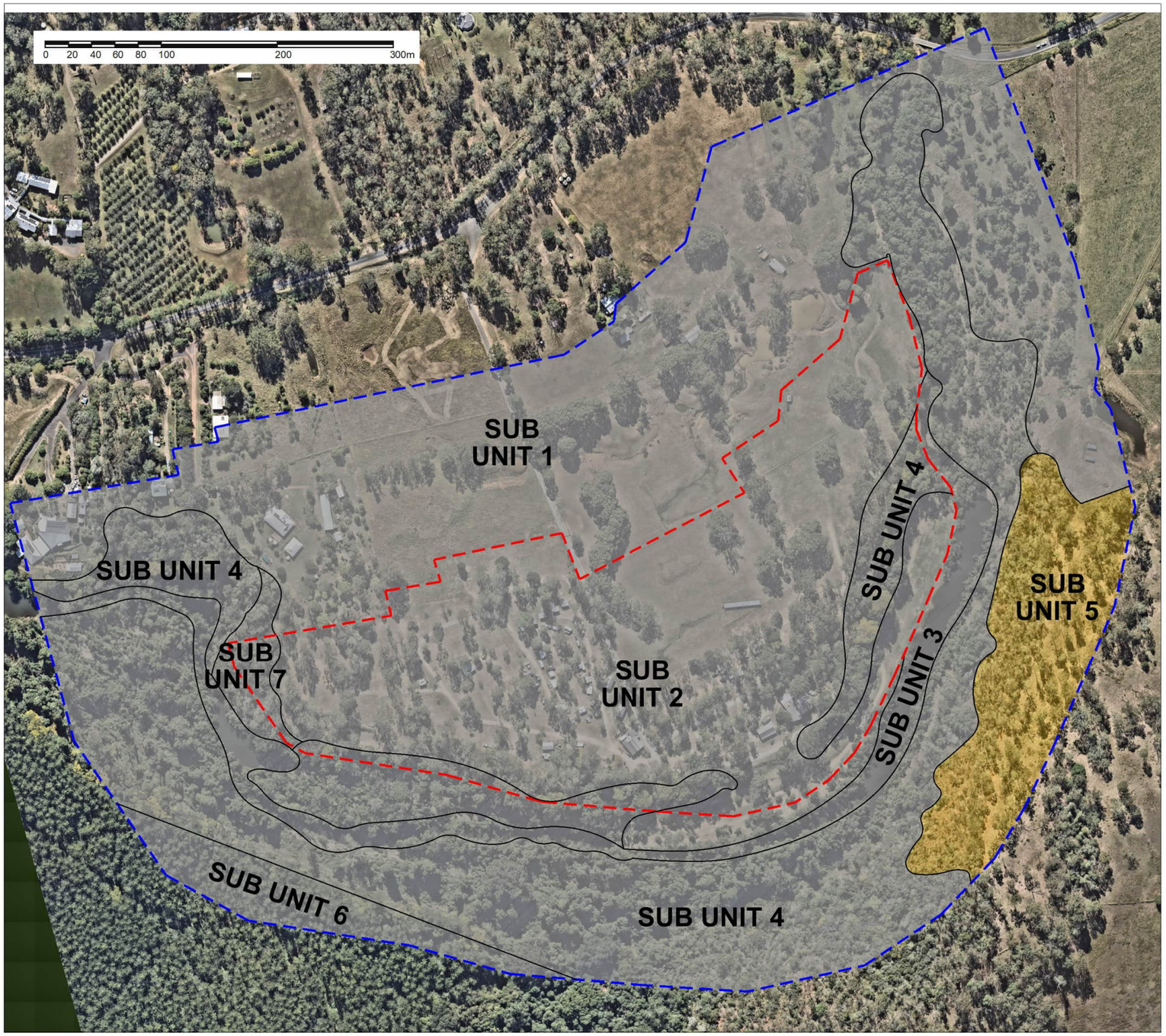

LEGEND

- DEVELOPMENT AREA
- 150m ASSESSMENT BUFFER
- MEDIUM POTENTIAL BUSHFIRE INTENSITY
- LOW POTENTIAL BUSHFIRE INTENSITY

Sub Unit 1

Vegetation Hazard Class	Combined Surface and Near Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Forest Fire Index	Maximum Landscape Slope (degrees)	Fire Intensity (kw/m)	Potential Bushfire Intensity
VHC 40.4 - Continuous Low Grass and Tree Cover	4.5	5	46	0	641	Low

Sub Unit 2

Vegetation Hazard Class	Combined Surface and Near Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Forest Fire Index	Maximum Landscape Slope (degrees)	Fire Intensity (kw/m)	**Potential Bushfire Intensity**
VHC 41.4 - Discontinuous Low Grass and Tree Cover	2.5	3	46	0	213	Low

Sub Unit 3

Vegetation Hazard Class	Combined Surface and Near Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Forest Fire Index	Maximum Landscape Slope (degrees)	Fire Intensity (kw/m)	**Potential Bushfire Intensity**
VHC 43.6 - Nil to Very Low Vegetation	0	0	46	1	0	Low

Sub Unit 4

Vegetation Hazard Class	Combined Surface and Near Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Forest Fire Index	Maximum Landscape Slope (degrees)	Fire Intensity (kw/m)	**Potential Bushfire Intensity**
VHC 4.1 - Notophyll vine forest	4.5	4.5	46	0	577	Low

Sub Unit 5

Vegetation Hazard Class	Combined Surface and Near Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Forest Fire Index	Maximum Landscape Slope (degrees)	Fire Intensity (kw/m)	**Potential Bushfire Intensity**
VHC 13.2 - Eucalypt woodland	12.8	14.4	46	0	5,632	Medium

Sub Unit 6

Vegetation Hazard Class	Combined Surface and Near Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Forest Fire Index	Maximum Landscape Slope (degrees)	Fire Intensity (kw/m)	**Potential Bushfire Intensity**
VHC 37.1 - Hoop Plantation	5	5	46	0	712	Low

Sub Unit 7

Vegetation Hazard Class	Combined Surface and Near Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Forest Fire Index	Maximum Landscape Slope (degrees)	Fire Intensity (kw/m)	**Potential Bushfire Intensity**
VHC 13.2 - Eucalypt woodland (reduced fuel load	6.4	7.2	46	0	1,314	Low

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PROJECT: BUSHFIRE HAZARD ASSESSMENT
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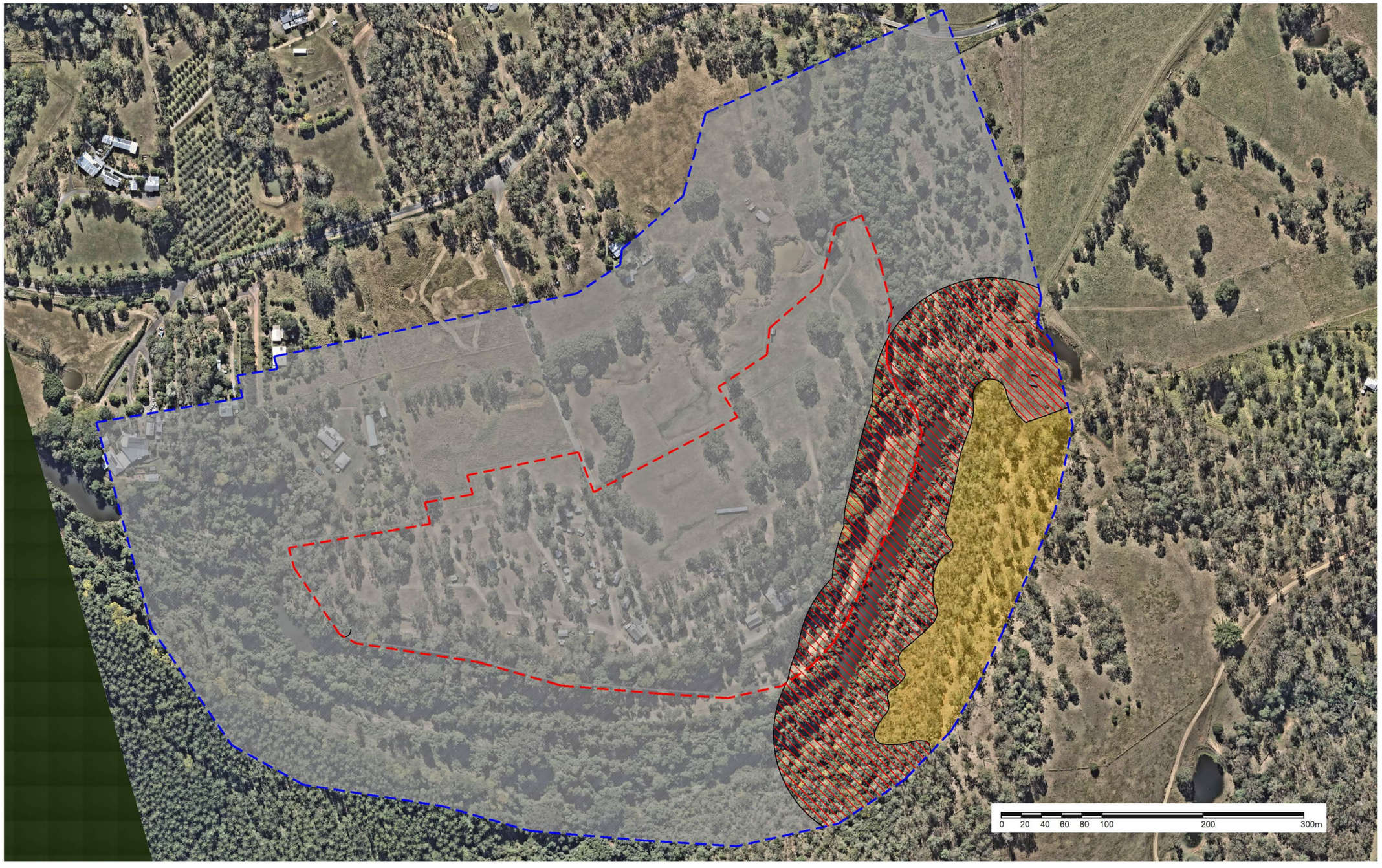
PROJECT NUMBER: 24-005
DATE: 24/10/2024

FIGURE 8 - SUB-UNIT HAZARD MAP

N



LEGEND

- DEVELOPMENT AREA
- 150m ASSESSMENT BUFFER
- MEDIUM POTENTIAL BUSHFIRE INTENSITY
- LOW POTENTIAL BUSHFIRE INTENSITY
- POTENTIAL IMPACT BUFFER

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FIGURE 9 - LOCAL HAZARD MAP

N

5.0 BUSHFIRE IMPACT REDUCTION

5.1 GENERAL

The site assessment concluded that the proposed camping area is located outside of a bushfire prone area, however the existing Creek Street 1 and northern most Down by the Creek camping areas are located within the potential impact buffer to the medium potential bushfire vegetation associated with the vegetation on the eastern side of Yabba Creek and upslope from the site. As the proposed development will not be located within areas identified as very high potential intensity, high potential intensity or medium intensity or within a potential impact buffer, the proposed development accords with AO39.1 of Council's bushfire provisions within the Rural zone code.

5.2 SETBACKS THROUGH ASSET PROTECTION ZONES

There are no specific setback criteria between the proposed development and hazardous vegetation for a material change of use development application under the Gympie Planning Scheme or the SPP Assessment Benchmarks. Assessment Benchmark 4 of the State Planning Policy – state interest guidance material states: Development supports, and does not hinder, disaster management response or recovery capacity or capabilities. The SPP Guideline includes specific provisions for reconfiguring a lot creating lots of greater than 2000 square metres to ensure emergency access and operational space for firefighters the subdivision layout results in lots that are sited so that they are separated from the closest edge to the adjacent medium, high or very high potential bushfire intensity area by a distance that achieves a radiant heat flux level of 29 kilowatt per square metre or less at:

1. The building envelope, if identified at RaL stage, or
2. Where a building envelope is not identified, at all the lot boundaries.

Bushfire can impact infrastructure via several attack mechanisms: direct flame, radiant heat and ember attack. Asset protection zones (APZ) provide the most strategically valuable defence against direct flame and radiant heat, and to a lesser extent embers. The zone may include a combination of elements such as perimeter road, fire trail and working area and open space where vegetation is managed. Figure 10 shows the general components of an APZ.

Compliance with Assessment Benchmark 4 can be attained where existing buildings are sufficiently separated from the nearby vegetation hazard so that a radiant heat flux level at the building does not exceed 29 kW/m². In the case of a tourist facility, which is a vulnerable use, the setback should be sufficient to achieve exposure to radiant heat energy less than 10kW/m^2. The setback must be maintained as a dedicated asset protection zone (APZ) which comprises only low threat vegetation, such as rainforest, maintained lawns and cultivated gardens or are designed to ensure a potential available fuel load is maintained at less than 8 tonnes/hectare in aggregate and with a fuel structure that remains discontinuous. Setbacks for the proposed camping areas and cabin sites from hazardous vegetation is not required in this instance as none of the new facilities are

located within an area of medium, high or very high bushfire intensity or within a potential impact buffer.

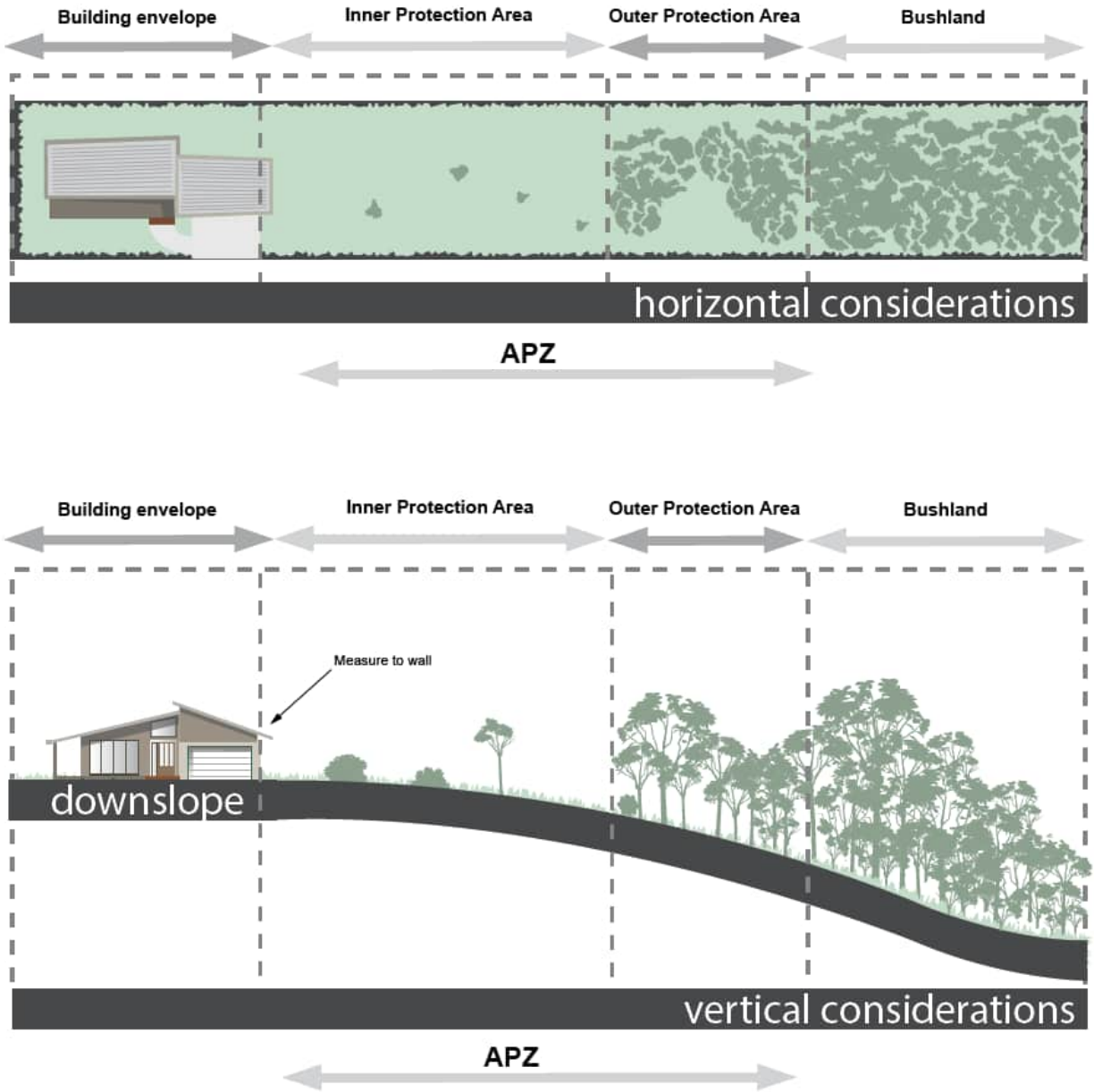

Figure 10: Asset Protection Zone
(Source: NSW RFS, 2019)

5.3 FIRE LINE INTENSITY AND SETBACK CALCULATIONS

Modelling has been undertaken to determine the fire line intensity of adjacent vegetation and the relevant setback distances required to achieve the recommended separation for the proposed camping areas from the hazardous vegetation. These have been summarised in Figure 8 of this report with further details provided in this section. The models used comprise industry standard bushfire equations using the FLAMESOL computer model. The FLAMESOL Minimum Distance calculator has been used and comprises an AS3959 Method 2 based calculator which can determine a suite of bushfire behaviour variables including the minimum distances required to

achieve a range of different radiant heat level exposures. The quantitative modelling output has been used to identify both the fire line intensity associated with each vegetation type and the setback requirements to achieve the <10 kW/m² radiant heat flux SPP requirement for vulnerable uses. The modelling output for the continuous low grass or tree cover (VHC 40.4) attributed to the deer paddocks has been shown in Figure 11 while the output for the discontinuous low grass or tree cover has been shown in Figure 12.

FLAMESOL
FPA AUSTRALIA

Calculated October 24, 2024, 2:43 pm (MDc v.4.9)

SUB UNIT 1 - VHC 40.4

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	46	Rate of spread	0.24 km/h
Vegetation classification	Forest	Flame length	2.21 m
Understorey fuel load	4.5 t/ha	Flame angle	67 °, 73 °, 79 °, 83 °, 84 ° & 88 °
Total fuel load	5 t/ha	Elevation of receiver	1.01 m, 1.05 m, 1.08 m, 1.09 m, 1.1 m & 1.1 m
Vegetation height	n/a	Fire intensity	641 kW/m
Effective slope	0 °	Transmissivity	0.899, 0.894, 0.886, 0.875, 0.868 & 0.801
Site slope	0 °	Viewfactor	0.3954, 0.2838, 0.1908, 0.127, 0.103 & 0.0279
Flame width	100 m	Minimum distance to < 40 kW/m²	2.8 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	3.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	5.7 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	8.6 m
		Minimum distance to < 10 kW/m²	10.6 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Figure 11: FLAMESOL modelling for continuous low grass or tree cover

FLAMESOL
FPA AUSTRALIA

Calculated October 24, 2024, 2:47 pm (MDc v.4.9)

SUB UNIT 2 - VHC 41.4

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	46	Rate of spread	0.13 km/h
Vegetation classification	Forest	Flame length	1.25 m
Understorey fuel load	2.5 t/ha	Flame angle	67 °, 73 °, 79 °, 83 °, 84 ° & 88 °
Total fuel load	3 t/ha	Elevation of receiver	0.57 m, 0.6 m, 0.61 m, 0.62 m, 0.62 m & 0.62 m
Vegetation height	n/a	Fire intensity	213 kW/m
Effective slope	0 °	Transmissivity	0.903, 0.901, 0.895, 0.889, 0.884 & 0.831
Site slope	0 °	Viewfactor	0.3928, 0.2856, 0.1848, 0.1256, 0.09959999999999999 & 0.0268
Flame width	100 m	Minimum distance to < 40 kW/m²	1.6 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	2.2 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	3.4 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	4.9 m
		Minimum distance to < 10 kW/m²	6.2 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Figure 12: FLAMESOL modelling for discontinuous low grass or tree cover

The modelling output for the notophyll and notophyll palm or vine forest (VHC 4.1) is shown in Figure 13 while the output for the dry to moist eucalypt woodlands on undulating metamorphics and granite (VHC 13.2) located on the eastern side of Yabba Creek has been shown in Figure 14. The modelling output for the hoop pine plantation on the southern side of Yabba Creek has been included as Figure 15. The modelling indicates that adequate separation distance is available from the mapped VHC 13.2 which corresponds to the medium potential bushfire intensity in Figure 9.

FLAMESOL
FPA AUSTRALIA

Calculated October 24, 2024, 2:54 pm (MDc v.4.9)

SUB UNIT 4 - VHC 4.1

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	46	Rate of spread	0.24 km/h
Vegetation classification	Rainforest	Flame length	2.15 m
Understorey fuel load	4.5 t/ha	Flame angle	67 °, 74 °, 79 °, 83 °, 84 ° & 88 °
Total fuel load	4.5 t/ha	Elevation of receiver	0.99 m, 1.03 m, 1.05 m, 1.06 m, 1.07 m & 1.07 m
Vegetation height	n/a	Fire intensity	577 kW/m
Effective slope	0 °	Transmissivity	0.899, 0.895, 0.887, 0.876, 0.868 & 0.802
Site slope	0 °	Viewfactor	0.3847, 0.2834, 0.1888, 0.1264, 0.1022 & 0.0278
Flame width	100 m	Minimum distance to < 40 kW/m²	2.8 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	3.8 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	5.6 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	8.4 m
		Minimum distance to < 10 kW/m²	10.4 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Figure 13: FLAMESOL modelling for notophyll and notophyll palm or vine forest

FLAMESOL
FPA AUSTRALIA

Calculated October 20, 2024, 10:25 pm (MDc v.4.9)

Borumba Deer Park - VHC13.2

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	46	Rate of spread	0.75 km/h
Vegetation classification	Woodland	Flame length	6.64 m
Understorey fuel load	12.8 t/ha	Flame angle	55 °, 65 °, 74 °, 79 °, 81 ° & 86 °
Total fuel load	14.4 t/ha	Elevation of receiver	2.62 m, 2.88 m, 2.99 m, 2.97 m, 2.92 m & 2.29 m
Vegetation height	n/a	Fire intensity	5,632 kW/m
Effective slope	1 °	Transmissivity	0.888, 0.878, 0.862, 0.842, 0.831 & 0.756
Site slope	1 °	Viewfactor	0.5886, 0.434, 0.2891, 0.1946, 0.158 & 0.0433
Flame width	100 m	Minimum distance to < 40 kW/m²	5.5 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	7.5 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	11.3 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	16.7 m
		Minimum distance to < 10 kW/m²	20.5 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Figure 14: FLAMESOL modelling for dry to moist eucalypt woodlands

FLAMESOL
FPA AUSTRALIA

Calculated October 24, 2024, 2:59 pm (MDc v.4.9)

SUB UNIT 6

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	46	Rate of spread	0.27 km/h
Vegetation classification	Forest	Flame length	2.39 m
Understorey fuel load	5 t/ha	Flame angle	67 °, 73 °, 79 °, 83 °, 84 ° & 88 °
Total fuel load	5 t/ha	Elevation of receiver	1.1 m, 1.14 m, 1.17 m, 1.18 m, 1.19 m & 1.19 m
Vegetation height	n/a	Fire intensity	712 kW/m
Effective slope	0 °	Transmissivity	0.898, 0.893, 0.884, 0.873, 0.865 & 0.796
Site slope	0 °	Viewfactor	0.386, 0.2849, 0.1898, 0.127, 0.1026 & 0.028
Flame width	100 m	Minimum distance to < 40 kW/m²	3.1 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	4.2 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	6.2 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	9.300000000000001 m
		Minimum distance to < 10 kW/m²	11.5 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Figure 15: FLAMESOL modelling for hoop pine plantation

5.4 LANDSCAPING & VEGETATION MANAGEMENT

APZs are provided as part of the facility are required to be maintained in a low fuel state in perpetuity. This assessment has identified benefits in retaining an APZ between the existing Creek Street 1 and northern most Down by the Creek camping areas and the eucalypt dominated vegetation located upslope on the eastern side of Yabba Creek. The Yabba Creek waterbody and associated rainforest vegetation is situated within this buffer area. Assessment Benchmark 5 of the SPP Bushfire 2019 requires landscaping within the APZ to comprise protective landscape treatments that:

1. Comprise only low threat vegetation (e.g., maintained lawns, cultivated gardens, rainforest); or
2. Are designed to ensure a potential available fuel load is maintained at less than 8 tonnes/hectare in aggregate and with a fuel structure that remains discontinuous. The

vegetation contained within the dedicated AZP shall satisfy Assessment Benchmark 5 of the SPP Bushfire 2019 and the low threat vegetation criteria prescribed in Section 2.2.3.2 of AS3959.

5.5 VEHICULAR ACCESS

All weather access to proposed camping areas and cabins will connect directly to the public road, is at low grades and does not extend into bushfire prone areas. There is low potential for egress to be constrained. No specific access provisions are recommended.

5.6 GYMPIE REGIONAL COUNCIL PLANNING SCHEME BUSHFIRE HAZARD OVERLAY

The proposed development is considered assessable development and therefore is assessable against the performance outcomes relevant to bushfire for the Rural zone which have been reproduced as Table 4.

Table 4 – Bushfire performance outcomes within the Rural zone

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	PROPOSED SOLUTION
Safety of people and property		
PO39 Development maintains the safety of people and property, including the function of community infrastructure, during and immediately after bushfire events	AO39.1 Development is not located in areas identified in the Bushfire Hazard Overlay as: i. Very High Potential Bushfire Intensity; ii. High Potential Bushfire Intensity; iii. Medium Potential Bushfire Intensity; or iv. Potential Impact Buffer. or AO39.2 Road access for fire-fighting appliances and firebreaks are provided through a perimeter road that separates the use from areas of bushfire hazard and that road has a minimum cleared width of 20 metres; and AO39.3 For a development requiring MCU involving new or existing buildings with a gross floor area greater than 50m^2 where a reticulated water supply is not available and a water tank is provided for the purpose of household water supply, one tank within 100m of each class 1, 2, 3 or 4 building has:	A Local hazard Map has been prepared which identifies that the development footprint is not mapped as medium, high or very high potential bushfire intensity or within a potential impact buffer. The proposed development therefore complies with AO39.1. While Creek Street 1 and northern most Down by the Creek camping areas are shown in this assessment as falling within a potential impact buffer to open eucalypt woodland located on the eastern side of Yabba Creek and classified as medium potential bushfire intensity, these sites are existing and do not form part of the material change of use. All of the existing amenities, site office, camp kitchens and communal areas are located outside of the potential impact buffer.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	PROPOSED SOLUTION
	(a) fire brigade tank fittings; and (b) the building's take off connection from the tank is at a level that allows 5,000 litres to be dedicated for fire fighting purposes, if the buildings are in an area identified in the Bushfire Hazard Overlay as: i. Very High Potential Bushfire Intensity; ii. High Potential Bushfire Intensity; iii. Medium Potential Bushfire Intensity; or iv. Potential Impact Buffer.	
PO40 Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on hazardous materials manufactured or stored in bulk.	AO40 No Acceptable Outcome identified	N/A – The proposed development will not involve the manufacture of hazardous materials and no new storage of hazardous materials is proposed as part of the development. Existing storage of gas occurs outside of areas subject to medium, high or very high potential bushfire intensity or a potential impact buffer associated with these areas.

6.0 CONCLUSION

A Bushfire Hazard Assessment has been prepared to support a material change of use application for the extension of the Borumba Deer Park located on land at 1139 Yabba Creek Road, Imbil. The Bushfire Hazard Assessment has been prepared to assess the degree of bushfire hazard and potential bushfire risk acting on the proposed camping, van and cabin sites. A Local Hazard Map has been prepared for the site consistent with the State Planning Policy – Natural Hazards, Risk and Resilience – Technical Manual. The Local Hazard Map has identified that the land in which the extension and cabins are proposed are not situated within an area or medium, high or very high potential bushfire intensity or within a potential buffer area. The assessment maps the existing unpowered camping sites within the Creek Street 1 and northern most Down by the Creek locations within a potential impact buffer to vegetation subject to a medium potential bushfire intensity located on the eastern side of Yabba Creek and upslope from the site. These areas are existing and do not form part of the material change of use application.

This assessment has considered that as the proposed camping areas and cabins are located external to the potential impact buffer, the provisions associated with bushfire under Council's Rural zone code can be easily satisfied.

Of note, bushfire can be unpredictable and requires adequate preparatory planning and actions to be undertaken in order to minimise impacts to property and potential loss of life. This assessment has been prepared with consideration of site conditions observable at the time of inspection, the distance between the proposed development and potentially hazardous vegetation, the extent of fragmentation occurring within the landscape and the nature of the buildings proposed. The hazard assessment methodologies described in this report are not based on assessments of catastrophic bushfire events which may occur from time to time. The unpredictable nature of bushfires prevents any guarantee being provided that the area will not be affected by bushfire at some time. Property owners and site users should be aware of the potential consequences of such events and should take responsibility for the protection of property and personnel accordingly.

7.0 REFERENCES

Leonard, J., Opie, K. (2017). *Estimating the potential bushfire hazard of vegetation patches and corridors. An enhancement of Queensland's methodology for State-wide mapping of bushfire prone areas*. CSIRO Land & Water, Australia.

Queensland Fire and Emergency Services. (2019). *Bushfire Resilient Communities - Technical Reference Guide for the State Planning Policy - State Interest Guideline - Natural Hazards, Risk and Resilience 2- Bushfire*.

The State of Queensland, Department of State Development, Manufacturing, Infrastructure and Planning (2019). *Natural hazards, risk and resilience - Bushfire State Planning Policy – state interest guidance material*.

FLOOD RISK EMERGENCY MANAGEMENT PLAN

BORUMBA DEER PARK

1133 YABBA CREEK RD, IMBIL

Prepared for:
The Trustee for the Yabba Deer Trust
c/- Adams & Sparkes Town Planning
06 November 2024
Reference: CIV02862-FRMP01

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TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

LIST OF APPENDICES

1 INTRODUCTION

1.1 LOCATION AND BACKGROUND

This Flood Risk Emergency Management Plan (FRMP) has been commissioned by The Trustee for the Yabba Deer Trust (Client) and is intended to form part of a Material Change of Use application lodged with Gympie Regional Council (Council).

The development application relates the extension of an existing camping facility at the existing Borumba Deer Park which is located at 1133 Yabba Creek Rd, Imbil, on land properly described as Lot 4 on RP894556 ('Subject Site'). Further details on the application are available in the Town Planning Report by Adams & Sparkes.

The subject site is located directly adjacent to the Yabba Creek which is prone to water levels rising during flood events. This results in partial flooding of the subject site and drives the need for a Flood Risk Emergency Management Plan. A site locality plan is presented in Figure 1-1 below.

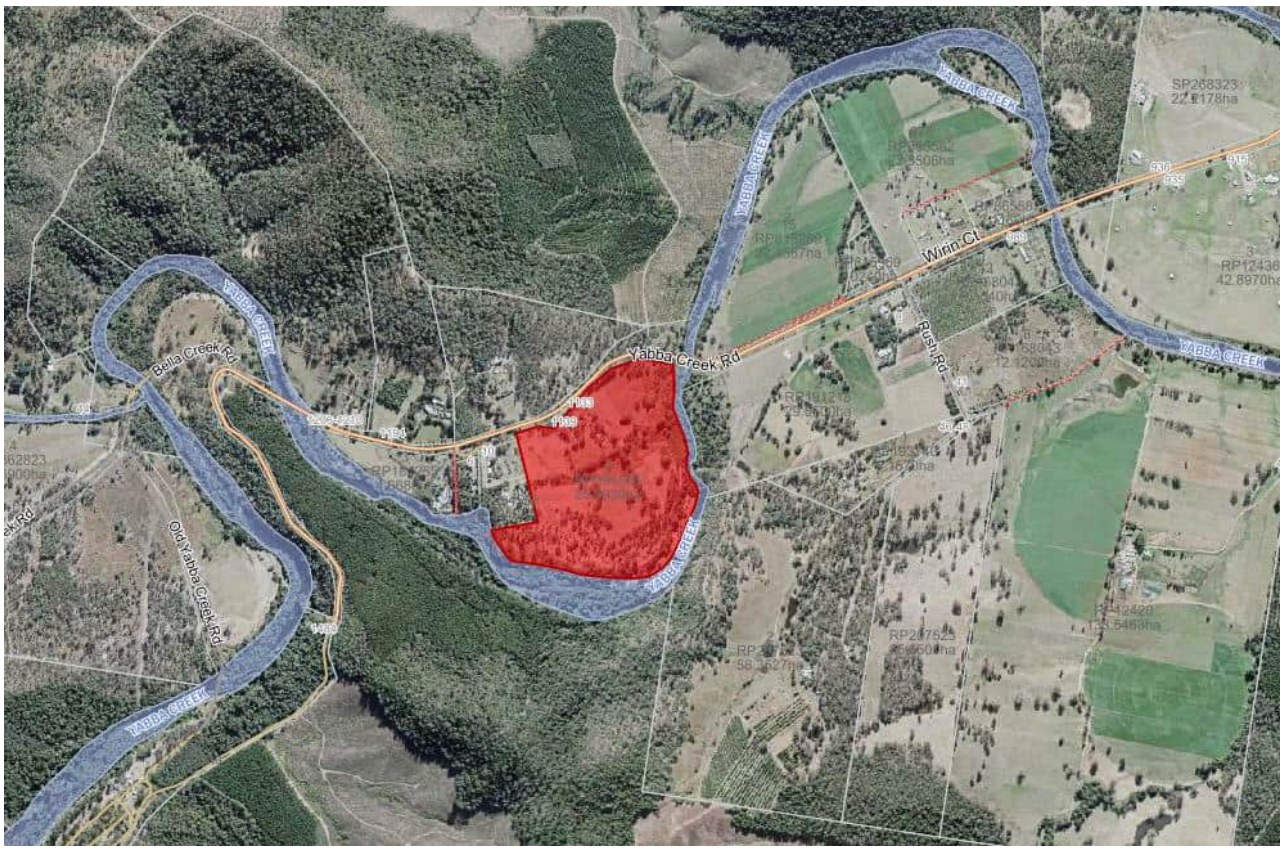


FIGURE 1-1 SITE LOCALITY PLAN

1.2 SCOPE OF REPORT

The purpose of this Flood Risk Emergency Management Plan is to ensure that the development achieves an acceptable or tolerable level of risk for personal safety, environmental harm and damage to property due to flooding from Yabba Creek.

This report will therefore:

- Determine risks associated with a natural flood hazard at the Subject Site.
- Assess their impacts and need for mitigation measures.
- Investigate existing controls.
- Identify and recommend additional measures to minimise risks to public safety and the environment.

2 DECRIPTION OF SITE

2.1 GENERAL

The existing site has an overall area of approximately 25.99ha. The site has frontage to Yabba Creek Rd, and backs on to the Yabba Creek. The west side of the site shares a common boundary with existing rural lots.

The existing site is occupied by a deer park which covers 16.5 ha the central and northern areas of the site. To the south of the deer park, an existing caravan site stretches from the west to east extents and covers an area of 8.57ha. The caravan site was approved under a development application in 1994 and has capacity for 105 sites and associated amenities.

2.2 TOPOGRAPHY

2009 LiDAR levels show that the site grades from the north (125m AHD) at Yabba Creek Road to the South (95m AHD) where the site meets the Yabba Creek. The site encompasses a stream which collects upstream water from the northwestern corner of the site and discharges into the Yabba Creek in the northeastern corner of the site. There does not appear to be any formalised stormwater infrastructure within the Subject Site.

An extract of site elevation is presented in Figure 2-1 below:

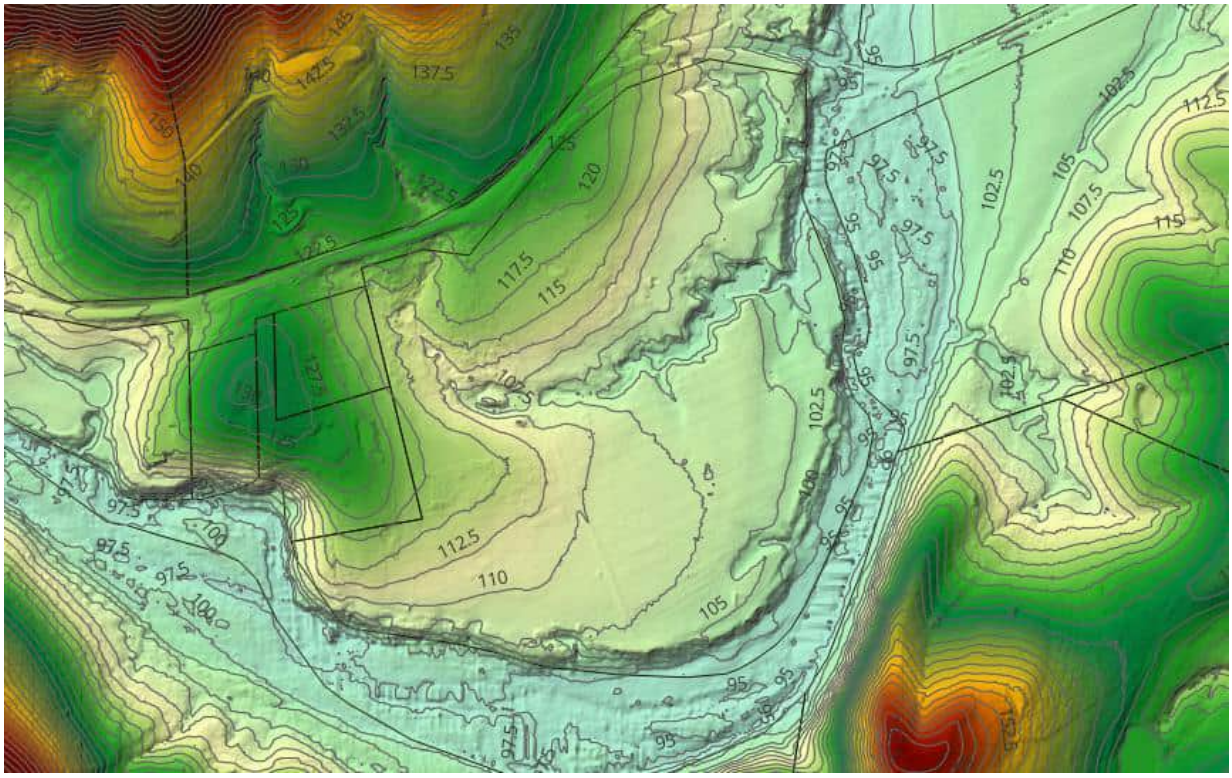


FIGURE 2-1 EXISTING SITE ELEVATION (SOURCE: QGIS USING 2009 LIDAR)

2.3 PROPOSED DEVELOPMENT

The proposed development is an extension to the existing camping facilities to include new cabins and tent sites. The site is currently approved for 105 sites and proposes an additional 177 sites taking the total sites to 282. Contour understands that the existing sites were approved by Widgee Shire Council in 1993 as part of approval number TPC77.

A proposed site layout showing the existing site features and proposed changes is presented in **Appendix A** and shown below as Figure 2-2.

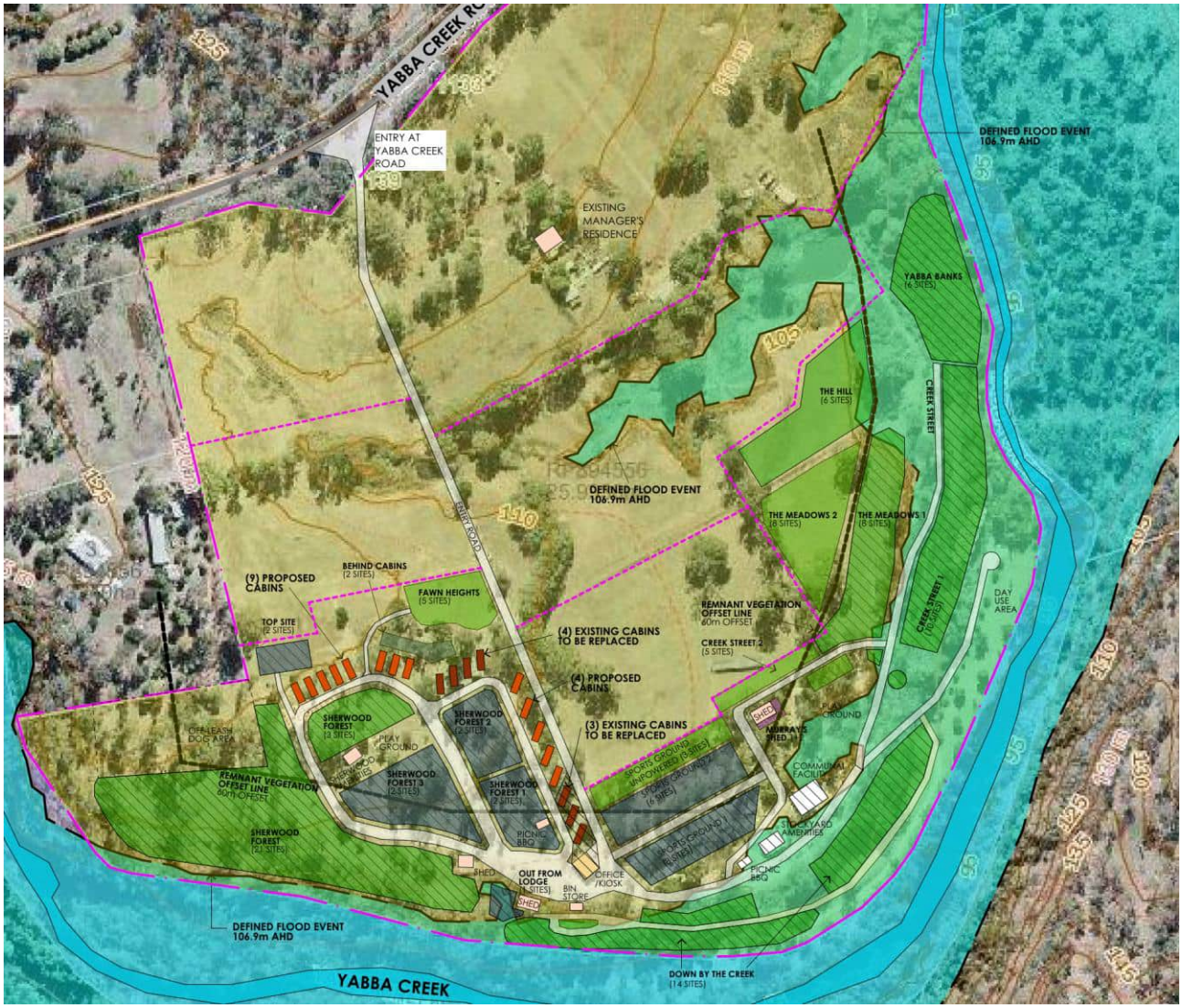


FIGURE 2-2 PROPOSED SITE LAYOUT

3 FLOODING CHARACTERISTICS AND FLOOD INFORMATION

3.1 NATURE OF FLOOD THREATS

The site and surrounding areas are subject to flooding from Riverine flood events from Yabba Creek.

Yabba Creek is situated within the Mary River Catchment. Upstream of the site and located along Yabba Creek is Borumba Dam, a large water storage dam. The catchment to Borumba Dam is approximately of 465 square kilometres and has a full supply capacity of 4,600 megalitres (ML). Yabba Creek passes Imbil township on the way to discharging to the Mary River.

MARY CATCHMENT - ASSESSMENT OF THE FLOOD POTENTIAL

Major flooding requires a large scale rainfall situation over the Mary River catchment. The following can be used as a rough guide to the likelihood of flooding in the catchment:

Average catchment rainfalls of in excess of 200mm in 48 hours may cause significant moderate to major flooding and traffic disabilities to develop, particularly in the middle to lower reaches between Kenilworth and Gympie, and extending downstream to Maryborough.

Average catchment rainfalls of in excess of 300mm in 48 hours may cause significant major flooding and traffic disabilities to develop, particularly in the middle to lower reaches between Kenilworth and Gympie and extending downstream to Maryborough.

Contour has obtained a Flood search for the subject site and has included this within **Appendix C.** The search indicates that the site is subject to flooding during the Defined Flood Event(DFE). The DFE represents the 1% Annual Exceedance Probability (AEP) at the year 2100 climate horizon. The flood level of the defined flood event is RL 106.9 m AHD. An extract of the DFE mapping is included in Figure 3-1.

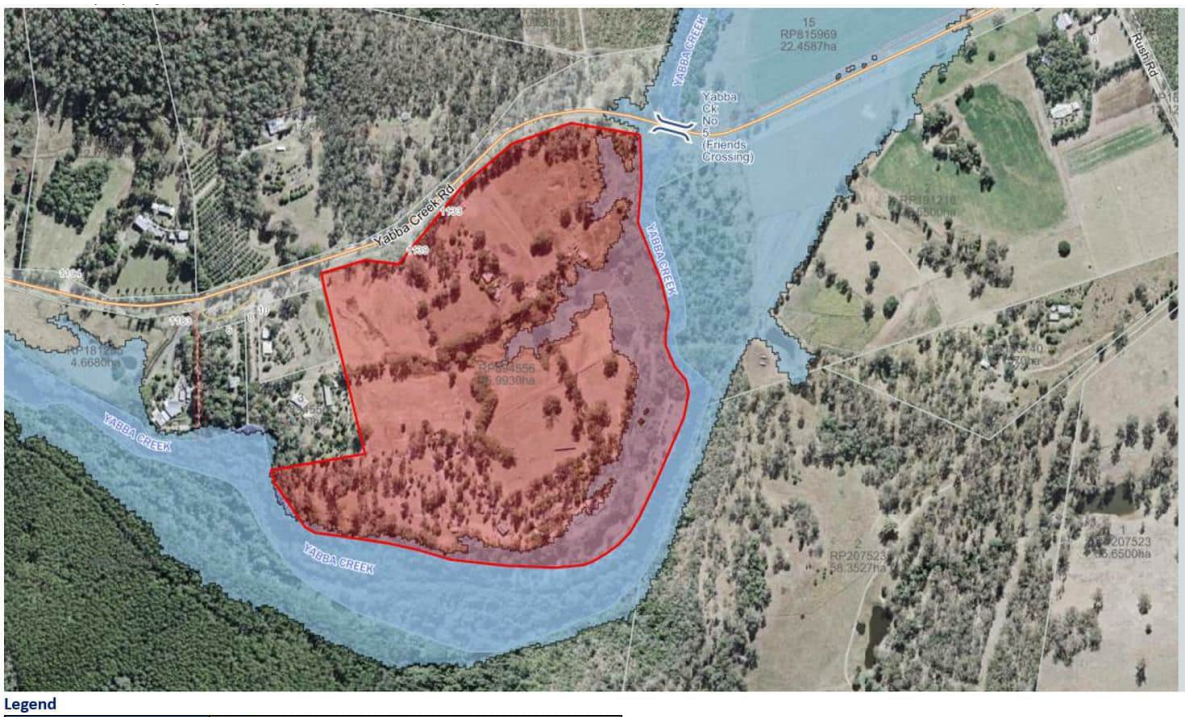


FIGURE 3-1 1% AEP CLIMATE CHANGE FLOOD

Being downstream of Borumba dam the subject site is also potentially exposed to residual flooding risks less frequent than the DFE, including events up to the Possible Maximum Flood (PMF) and Dam Failure events. Flood extents for the PMF event and a sunny day dam failure have been sourced surrounding the site. Extracts from the flood extents are detailed in Figure 3-2.

Management of a dam failure event is not within the scope of this management plan; however, the sunny day dam failure extents have been shown to demonstrate that there are areas within the site that are immune to dam failure event.

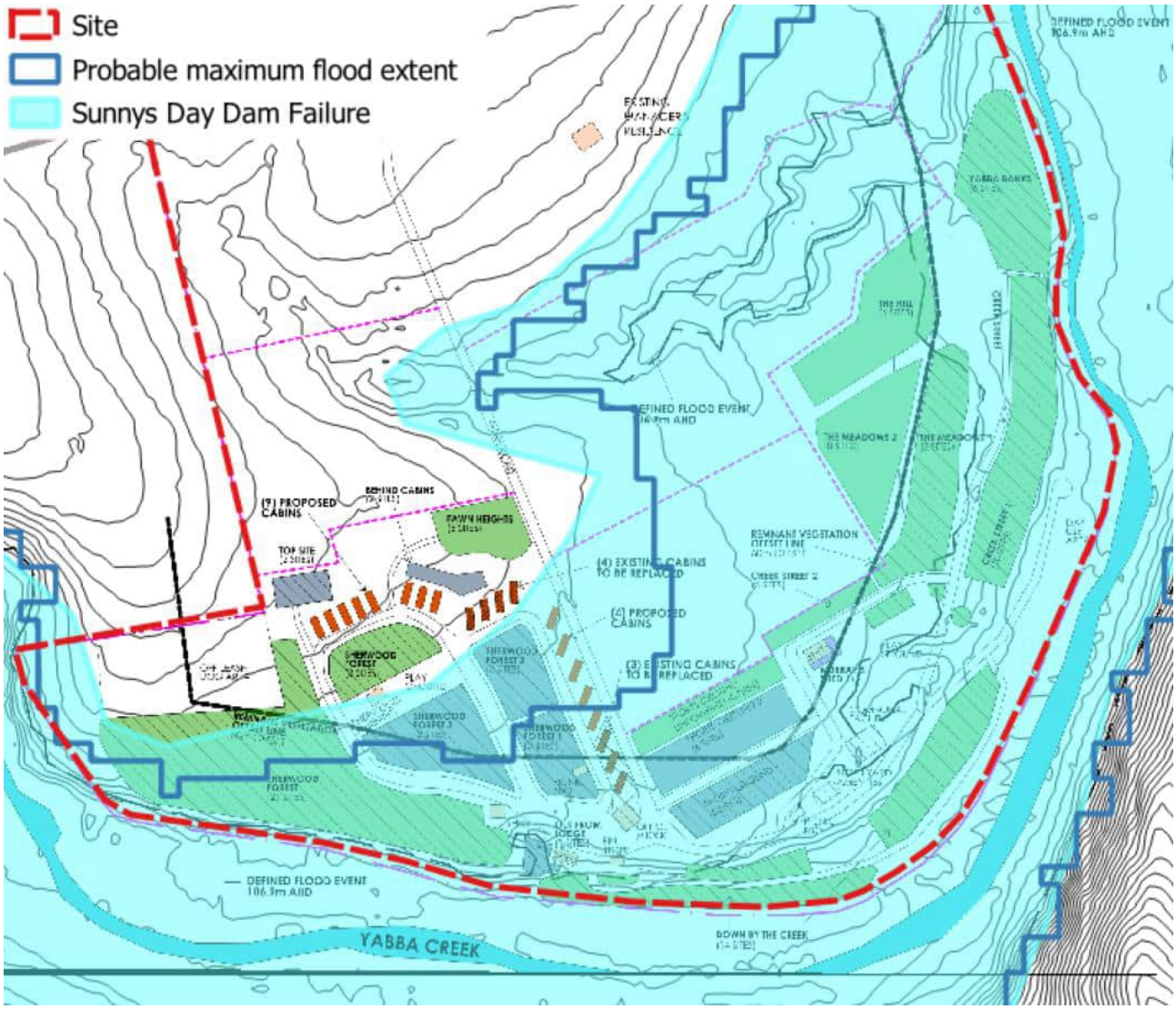


FIGURE 3-2 PMF AND DAM FAILURE EXTENTS

3.1.1 Flood Warning Time Actual

Yabba Creek has been subject to a number of historical flood events. These historic flood events provide a guide to the available warning time available at the site from upstream flood sources (Borumba Dam). Historic Flood information at the Borumba Dam has been sourced from the BOM's website. Figure 3-3 presents the historical head water elevation at the dam from 1999 to 2003. Significant flood events are notated in the figure.

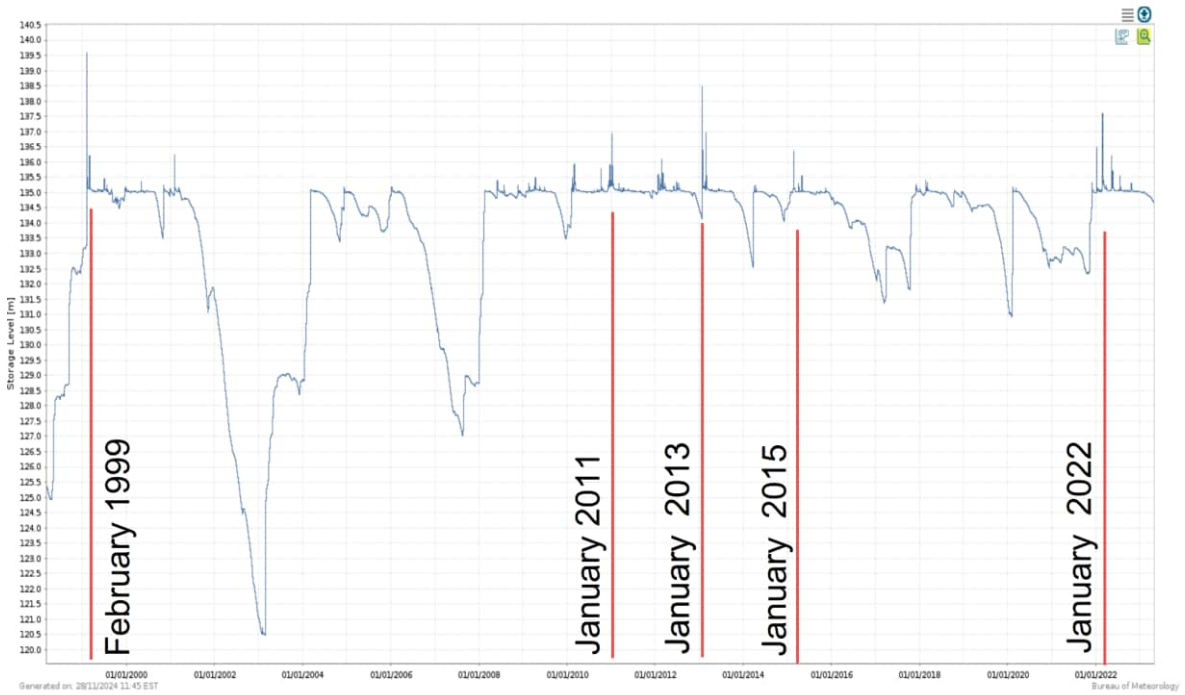


FIGURE 3-3 HISTORICAL FLOOD LEVELS BORUMBA DAM HW

Hyetographs for the events of January 2013 and February 1999 have been analysed. The peak headwater level during these events was RL141.07 for the 1999 event and RL141.0 for the 2013 event. Based on the Borumba Dam- Emergency Action Plan (SEQ Water, 2024) a peak lake level of RL141.07m AHD would correspond with an approximately 1in 500-year AEP event. Flood hyetographs for both events are present in Figures 3-4 and 3-5.

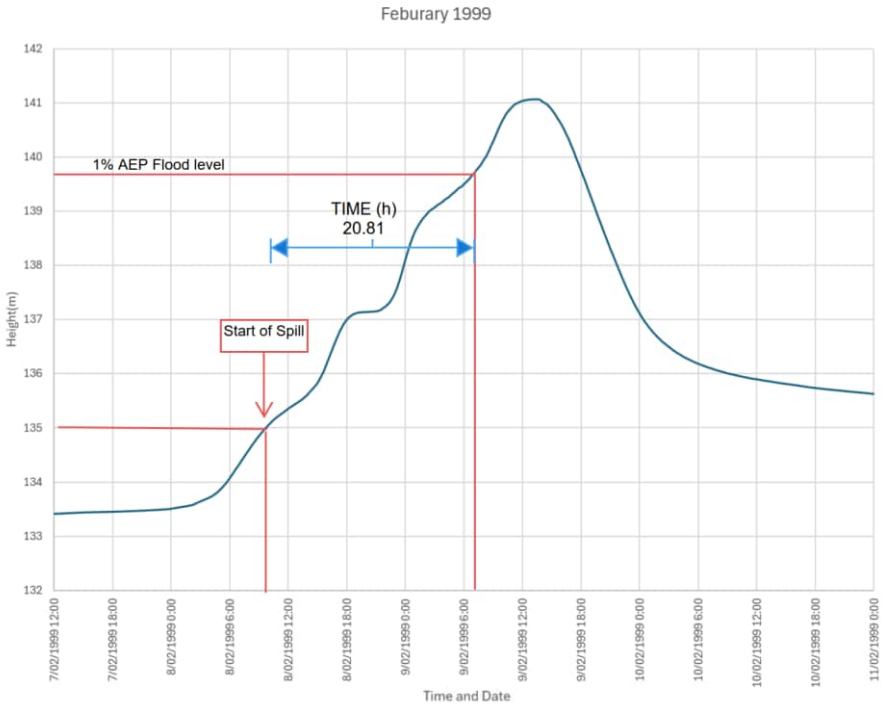


FIGURE 3-4 FEBRUARY 1999 EVENT

Analysis of the Borumba Dam hyetographs from the 1999 to 2013 events indicates that the time between the initiation of the dam spilling and the water level approximating a 1% AEP event is in the order of 12 to 20 hours. The available time between the start of the dam spilling and 1% AEP flood would be adequate to arrange the evacuation from the site or relocation to areas of the site suitable for “shelter in place”

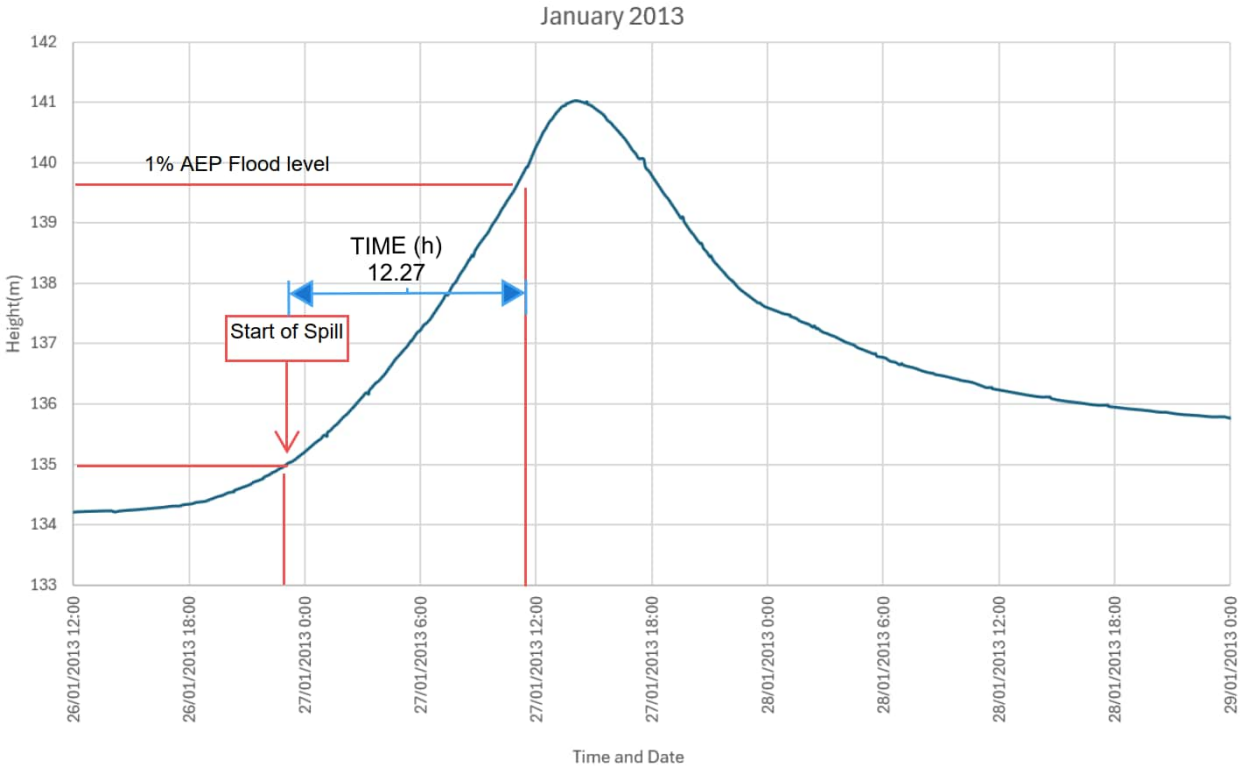


FIGURE 3-5 JANUARY 2013 EVENT

3.2 SOURCES OF FLOOD INTELLIGENCE.

3.2.1 Flood Level Gauges

Council and the Bureau of Meteorology maintain multiple river height gauges which provide real-time level information. During flood events, forecasts are made with respect to the likely levels to occur at these gauges. With respect to flooding at the site, the following gauges are the most relevant:

- Yabba Creek at Borumba Dam Spillway (Station No. 540575).
- Yabba Creek at Borumba Dam Spillway (Station No. 540264).
- Yabba Creek at Imbil Post Office (Yabba Creek Bridge) (Station No. 040777).

The respective alarms for the river height gauges are below in Table 4-4:

TABLE 4-4 UPSTREAM RIVER HEIGHT GAUGES AND WARNINGS

Station ID	Location	First Report	Minor	Moderate	Major
540575	Borumba Dam Spillway HW	-	2.0	3.0	4.0
540264	Borumba Dam Spillway	-	2.0	3.0	4.0
040777	Yabba Creek Bridge	3.0	5.0	6.5	8.0

The real-time river height data for Borumba Dam Spillway and Yabba Creek Bridge can be accessed at the below links.

http://www.bom.gov.au/fwo/IDQ65390/IDQ65390.040777.plt.shtml

http://www.bom.gov.au/fwo/IDQ65390/IDQ65390.540575.plt.shtml

3.2.2 RIVER DEPTH WARNING DEFINITIONS

Terms used in Flood Warnings are based on the following definitions[1] in Table 4-5:

TABLE 4-5 BUREAU OF METEOROLOGY FLOOD WARNING CLASSIFICATIONS

Minor Flooding	*Causes inconvenience. Low-lying areas next to watercourses are inundated. Minor roads may be closed and low-level bridges submerged. In urban areas inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas removal of stock and equipment may be required.*
Moderate Flooding	*In addition to the above, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas removal of stock is required.*
Major Flooding	*In addition to the above, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted.*

3.2.3 ALERTS AND COMMUNCICATIONS

The Bureau's Flood Warning Centre issues Flood Warnings and River Height Bulletins for the Mary River catchment during flood events. Quantitative flood forecasts are issued when moderate flood levels are likely to be exceeded. These events are reported on the following communications channels:

Radio
Radio stations, particularly the local ABC, and local commercial stations, broadcast Flood Warnings and River Height Bulletins soon after issue.

Local response organisations
These include the Councils, Police, and State Emergency Services in the local area.

Internet/World Wide Web
Flood Warnings, River Height Bulletins and other weather-related data is available on the Bureau's Web page at http://www.bom.gov.au.

The Queensland Flood Warning Centre website is:
http://www.bom.gov.au/qld/flood.

Telephone Weather
Flood Warnings are available through a recorded voice retrieval system, along with a wide range of other weather related and climate information.

Main Directory Phone: **1900 955 360**

Flood Warnings Phone: **1300 659 219**

It is required that the communications channels are monitored, see section 4.3.1.

[1] http://www.bom.gov.au/qld/flood/brochures/mary/mary.shtml

3.2.4 GYMPIE REGIONAL COUNCIL DISASTER HUB

Gympie Regional Council facilitate a website to monitor local disasters and emergencies.

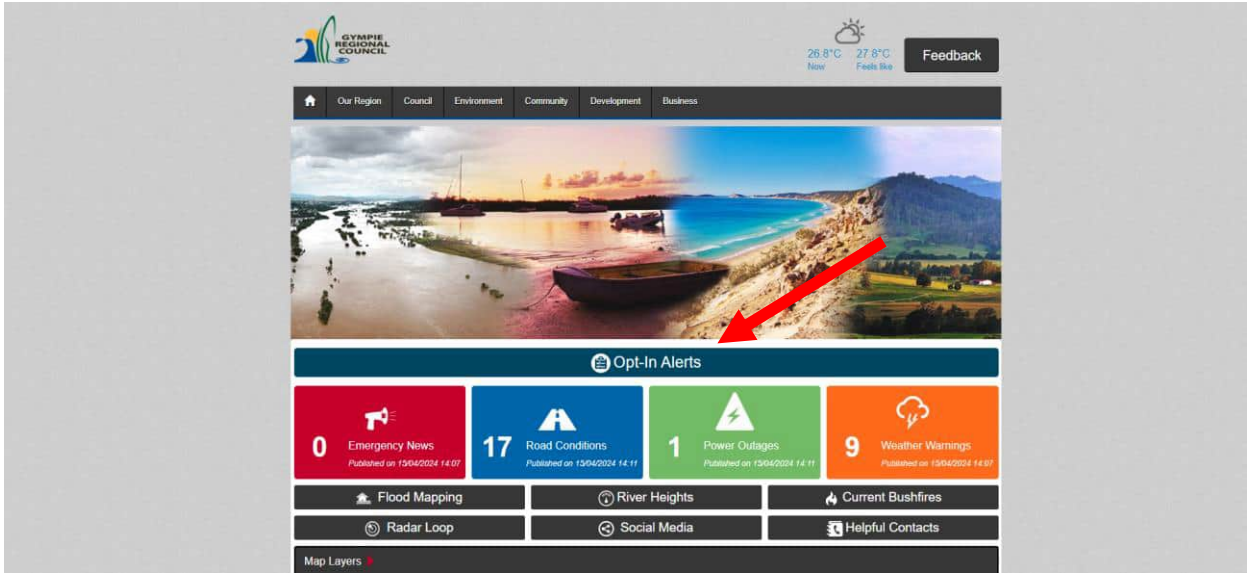
https://disaster.gympie.qld.gov.au/

This website (Figure 4-1) includes emergency support information and opt in alerts. Below they have identified an area specific State Emergency Service (SES) number for storm and flood emergency assistance:

132500 for SES storm and flood emergency assistance
When to call the 132 500 number:

- Damaged Roof.
- Rising Flood Water.
- Fallen Trees on Buildings.
- Storm Damage.
- Sandbags.

FIGURE 4-1 GYMPIE REGIONAL COUNCIL DISASTER MANAGEMENT PORTAL



It is required that the Gympie Regional Council alerts are opted in to by the nominated Site Warden/s and responsible Site Managers.

3.2.5 SEQ Water Dam release notification service

SEQ Water provides a dam release notification service that notifies when dams are releasing. It is available at the below link.

https://www.seqwater.com.au/dam-release-notification-service

4 RISK MANAGEMENT ASSESSMENTS

The risk assessment was conducted following the guidelines provided in the following documents:

- Queensland Prevention, Preparedness, Response and Recovery Disaster Management Guideline (January 2018) issued by Queensland Fire and Emergency Services.
- AS 31000 Risk Management.
- "Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia – Handbook 7," part of the Australian Disaster Resilience Handbook Collection (2017).
- National Emergency Risk Assessment Guidelines (Australian Institute for Disaster Resilience, Second Edition 2015, updated 2020).

These documents outline the recommended steps for identifying and assessing risks, particularly in relation to flood risks for specific situations or developments. The risk assessment adopts the below parameters for assessing the consequence and likelihood of risks:

TABLE 3-1 CONSEQUENCE OF OCCURRENCE

Level	Consequence	Health and Safety
5	Catastrophic	*Multiple critical injuries with long term or permanent incapacitation; Fatality(ies) directly from the emergency; permanent destruction of environmental values.*
4	Major	*Single death&/or long-term illness or multiple serious injuries. Severe damage to environmental values.*
3	Moderate	*Injury; Possible hospitalisation & numerous days lost. Significant damage to environmental values; widespread inconveniences.*
2	Minor	*Minor injury; Medical treatment & some days lost; minor impact on the environment.*
1	Insignificant	*No or minor personal injury; First aid needed but no days lost; inconsequential environmental impact detected.*

TABLE 3-2 LIKELIEHOOD OF OCCURRENCE

Likelihood	Likelihood to Occur	Frequency
A	Almost Certain	*The event is expected to occur at least once each year.*
B	Likely	*The event will probably occur on average once every 10 years.*
C	Unlikely	*The event may occur on average once per 100 years.*
D	Rare	*The event could occur once on average once per 1,000 years.*
E	Very Rare	*The event could only occur once on average once per 10,000 years.*
F	Extremely Rare	*The event could only occur once on average once per 100,000 years.*

TABLE 3-3 RISK CLASSIFICATION MATRIX (SOURCE: NATIONAL EMERGENCY RISK ASSESSMENT GUIDELINES)

Likelihood		Consequence Level				
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
A	Almost Certain	Medium	Medium	High	Extreme	Extreme
B	Likely	Low	Medium	High	Extreme	Extreme
C	Unlikely	Low	Low	Medium	High	Extreme
D	Rare	Very Low	Low	Medium	High	High
E	Very Rare	Very Low	Very Low	Low	Medium	High
F	Extremely Rare	Very Low	Very Low	Low	Medium	High

TABLE 3-4: RISK PRIORITY LEVELS AT MODERATE CONFIDENCE (SOURCE: NATIONAL EMERGENCY RISK ASSESSMENT GUIDELINES)

Likelihood	Consequence Level				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	3	3	2	1	1
Likely	4	3	2	1	1
Unlikely	4	4	3	2	1
Rare	5	4	3	2	2
Very Rare	5	5	4	3	2
Extremely Rare	5	5	4	3	3

TABLE 3-5: PRIORITY DESCRIPTIONS (SOURCE: NATIONAL EMERGENCY RISK ASSESSMENT GUIDELINES)

Priority	General Description/Action Pathway
1	*Highest priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment must be formally informed of risks. Each risk must be examined, and any actions of further investigation and/ or risk treatment are to be documented, reported to and approved by that highest authority.*
2	*High priority for further investigation and/or treatment, and the highest authority relevant to context of risk assessment should be formally informed of risks. Further investigations and treatment plans should be developed.*
3	*Medium priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.*
4	*Low priority for further investigation and/or treatment. Actions regarding investigation and risk treatment should be delegated to appropriate level of organisation, and further investigations and treatment plans may be developed.*
5	*Broadly acceptable risk. No action required beyond monitoring of risk level and priority during monitoring and review phase.*

4.1 RISK IDENTIFICATION AND ANALYSIS MATRIX

TABLE 3-6 SITE FLOOD RISK MATRIX

Hazard	Vulnerable Element	Risk/ Consequence	Likelihood Rating	Consequence Rating	Risk Rating
Flooding due to events caused by rainfall	*Occupants/Visitors*	*Patrons present during a flood event may be impacted by flooding of the site. Persons staying in the sites closer to Yabba Creek (Yarra Banks, Creek Street, Down by the Creek) may be more significantly impacted and have less response time.*	*C (Rare)*	*3 (Moderate)*	**Medium**
	Staff	*Staff may attempt to access/egress or enter through flood waters in order to assist customers, prevent flood damages and/or escape further harm.*	*D (Rare)*	*3 (Moderate)*	**Medium**
	Vehicles	*Patrons and staff cars parked onsite may be subject to being submerged and dislodged by flood waters.*	*C (Rare)*	*2 (Minor)*	**Low**
	Buildings and Equipment	*Floodwaters may infiltrate structures, buildings including amenities or other camping facilities.*	*D (Unlikely)*	*2 (Minor)*	**Low**
	Buildings and Equipment Environment	*Submersion of electrical systems and equipment.*	*D (Rare)*	*2 (Minor)*	**Low**
		During a flooding event, debris, structures, or vehicles may become dislodged from the site and carried away by floodwaters, with the potential to reach nearby water bodies flowing at high speeds.	*C (Unlikely)*	*2 (Minor)*	**Low**
	Emergency services	*Emergency services during a flood event may be unable to access the subject site, due to inundation of downstream bridges.*	*C (Rare)*	*2 (Minor)*	**Low**
	Egress from site	*Patrons and staff are unable to leave/evacuate the site during a flood event. There are 4 low level bridges along Yaba Creek Road between the site and Imbil.*	*C (Rare)*	*2 (Minor)*	**Low**

4.2 RISK EVALUATION AND PRIORITY

TABLE 3-7 RISK EVALUATION

Vulnerable Element	Risk	Risk Rating	Risk Evaluation	Risk Priority
Occupants/Visitors	*Patrons present during a flood event may be impacted by flooding of the site. Persons staying in the sites closer to Yabba Creek (Yarra Banks, Creek Street, Down by the Creek) may be more significantly impacted and have less response time.*	**Medium**	*Campers and visitors could encounter flood waters on-site during a flood event. Particularly for the sites close to Yabba Creek.*	**2**
Staff	*Staff may attempt to access/egress or enter through flood waters in order to assist customers, prevent flood damages and/or escape further harm.*	**Medium**	*Staff may be isolated on site and unable to leave during a flood event due to downstream road closures. Staff may also be exposed to flood risk, attempting to assist campers and visitors who do not follow directions from flood wardens.*	**3**
Vehicles	*Patrons and staff cars parked onsite may be subject to being submerged and dislodged by flood waters.*	**Low**	*Vehicles may not be able to be relocated away from floodwaters and could float downstream.*	**4**
Buildings and Equipment	*Floodwaters may infiltrate structures, buildings including amenities or other camping facilities.*	**Low**	*Damage to buildings and equipment may occur.*	**4**
	Submersion of electrical systems and equipment.	**Low**	*Risk of electrocution resulting from submerged electrical systems.*	**4**
Environment	*During a flooding event, debris, structures, or vehicles may become dislodged from the site and carried away by floodwaters, with the potential to reach nearby water bodies flowing at high speeds.*	**Low**	*During a flood, on-site debris, including discarded rubbish from campers, belongings, camping equipment, etc, could be dislodged and float downstream.*	**4**
Emergency services	*Emergency services during a flood event may be unable to access the subject site, due to inundation of downstream bridges.*	**Low**	*The access road to the site is subject to flooding in relatively frequent events due to the low-level bridges between the site and Imbil.*	**5**
Egress from site	*Patrons and staff are unable to leave/evacuate the site during a flood event. There are 4 low level bridges along Yaba Creek Road between the site and Imbil.*	**Low**	*The access road to the site is subject to flooding in relatively frequent events due to the low-level bridges between the site and Imbil. When the first bridge immediately to the east of the site is, inundated, evacuation is no longer possible.*	**5**

TABLE 3-8 IDENTIFICATION AND EVALUATION OF TREATMENT OPTIONS

Vulnerable Element	Risk	Risk Priority	Treatment/Mitigation	Evaluation of Mitigation
Occupants/Visitors	*Patrons present during a flood event may be impacted by flooding of the site. Persons staying in the sites closer to Yabba Creek (Yarra Banks, Creek Street, Down by the Creek) may be more significantly impacted and have less response time.*	**2**	*Refer Section 5.*	*Reduces the likelihood of patrons being on site and in locations subject to flooding during a flood event.*
Staff	*Staff may attempt to access/egress or enter through flood waters in order to assist customers, prevent flood damages and/or escape further harm.*	**3**	*Refer Section 5.*	*Clear procedures reduce the likelihood staff undertaking hazardous tasks or being present during a severe storm event.*
Vehicles	*Patrons and staff cars parked onsite may be subject to being submerged and dislodged by flood waters.*	**4**	*Refer Section 5.*	*Correct procedures and closure of site, reduce the likelihood of vehicles being present on site during a flood event.*
Buildings and Equipment	*Floodwaters may infiltrate structures, buildings including amenities or other camping facilities.*	**4**	*Refer Section 5.*	*Location of building/s equipment to be located in areas of lower flood risk.*
Buildings and Equipment	*Submersion of electrical systems and equipment.*	**4**	*Refer Section 5.*	*Isolation of electrical systems reduces the risk of damage to the system, fires and harm to people.*
Environment	*During a flooding event, debris, structures, or vehicles may become dislodged from the site and carried away by floodwaters, with the potential to reach nearby water bodies flowing at high speeds.*	**4**	*Refer Section 5.*	*Evacuating the site and or sheltering in place reduces the likelihood of debri being in a location that could be dislodged by floodwaters.*
Emergency services	*Emergency services during a flood event may be unable to access the subject site, due to inundation of downstream bridges.*	**5**	*Refer Section 5.*	*Early evacuation of site reduces the likelihood of requiring emergency services during a flood event.*
Egress from site	*Patrons and staff are unable to leave/evacuate the site during a flood event. There are 4 low level bridges along Yaba Creek Road between the site and Imbil.*	**5**	*Refer Section 5.*	*Appropriate warning for evacuation procedures reduces the likelihood of campers being on-site during an event. Appropriate resources are available to enable shelter in place.*

5 Flood Risk Management Strategy

5.1 FLOOD RISK MANAGEMENT APPROACH

Flood Risk Management of the site has been considered against the opportunities and constraints of the site and surrounding area. The flood risk management approach for the site generally consists of the following stages.

- Monitoring and Alert;
- Self-evacuation external to the site
- Shelter in place – when no longer safe to evacuate site.

The primary emergency management measure to be adopted is for occupants to self-evacuate to locations outside the flood impacted area, either friends/relatives or to managed evacuation centres.

Should occupants not be able to evacuate in time or choose not to despite warnings and ample time to, occupants will be able to shelter in place for within the bounds of the site. Sites within and adjacent to Fawh Heights and Sherwood Forest are above the site's PMF level. As such the direct risk to life from flood waters (Drowning) is negligible. Notwithstanding, Sheltering in place results in residual risks such as;

- Isolation;
- Fire within units/building, without adequate fire control due to pumps being located on ground floor; or
- coincident medical emergencies.

For these reasons occupants are encouraged to evacuate from the site at the earliest possible time where safe to do so. Shelter in place is only intended as a backup option to evacuating prior to flooding arriving at the site.

Flood emergency triggers are based on forecast flood levels from the BoM, flood gauge levels at Borumba Dam and rainfall conditions. The triggers and actions have been set to enable evacuation from the site.

5.2 Flood Response Procedure - Activation and Triggers

Disaster management procedures and triggers for action follow a four-level escalation model in accordance with the Queensland Disaster Management Arrangements (2018). Table 5-1 summarises the levels of activation. Table 5-2 details the flood response actions and responsibilities required at trigger events.

Table 5-1 Flood Level Triggers

Level of Activation	Definition
Alert	A heightened level of vigilance and preparedness due to the possibility of an event in the area of responsibility. Some action may be required and the situation should be monitored by staff capable of assessing and preparing for the potential threat.
Lean Forward	An operational state prior to 'stand up' characterised by a heightened level of situational awareness of a disaster event (either current or impending) and a state of operational readiness. Disaster coordination centres are on stand-by, prepared but not activated.
Stand Up	The operational state following 'lean forward' whereby resources are mobilised, personnel are activated and operational activities commenced. Disaster coordination centres are activated.
Stand Down	Stand down Transition from responding to an event back to normal core business and/or recovery operations. There is no longer a requirement to respond to the event and the threat is no longer present.

Table 5-2 Flood Response Procedure

Level of Activation	Trigger	Response
Alert	Flood Watch is issued by the BoM for the Mary Basin Catchment, or A Tropical Cyclone Warning is issued that impacts the Mary Basin catchment. or BoM weather forecasts predict possible daily rainfall totals in excess of 100mm. or Borumba Dam is spilling without rainfall forecast.	Flood Wardens to begin to monitor BoM information. Wardens to advise occupants that a flood watch has been issued.
Lean Forward	Borumba Dam is spilling and rainfall is forecast. Bom Issues Flood Warning for Minor, Moderate or Major Flooding at Borumba Dam or Imbil and Dam is not spilling.	Chief Flood Warden to issue flood warning message as per Section 3.2.1 to all occupants. Occupants are to undertake check of resources as per Section 4.2 including filling water containers. Chief Warden to continue to monitor BoM warnings.
Stand Up	BoM issues Flood Warning for Moderate or Major Flooding and Borumba Dam is spilling. OR Emergency services issue direction for evacuation from the site/area.	Chief Warden to issue flood evacuation message as per Section 3.2.1. From the time the dam begins spilling to the site having inundation to a 1% AEP depth is approximately 12 hours. Occupants that are unable to find alternative accommodation with friends/relatives outside the floodplain, shall proceed to an evacuation centre. Chief Warden to undertake sweep of site to ensure all occupants have evacuated the site. If occupants are refusing to evacuate Warden is to record details of sites for those not evacuating. Chief warden to remain on site until site has been evacuated.
Stand Up	Bridge immediately to the east of the site is inundated.	Evacuation is no longer possible. Occupants are to commence shelter-in-place in areas immune to the PMF event. Reference is made to Map 1. Flood warden to issue Shelter in Place message.
Stand Down	Rainfall has ceased and Yabba Creek Bridges are open and/or Borumba Dam has stopped Spilling.	Warden to return to site to assess damage to structure and advise other occupants if safe to return to site. Essential on-site systems such as, Electrical and telecommunications systems, etc are to be checked for operation. In the event that systems are un-operational/damaged site management is required to undertake repairs

5.2.1 FLOOD MESSAGES

It is recommended that a flood warning message be sent to occupants and flood wardens via text message and/or email. The wording in the message could read:

FLOOD WARNING: BORUMBA DEER PARK, YABA CREEK ROAD AND IMBIL, MAY BE SUBECT TO FLOODING FROM YABBA CREEK. ALL OCCUPANTS ARE TO CHECK THEIR FLOOD RESOURCES AND PREPARE TO EVACUATE IF DIRECTED.

FLOOD EVACUATION: BORUMBA DEER PARK, OCCUPANTS ARE ADVISED THAT EVACUATION OF THE SITE IS REQUIRED. PLEASE PROCEED TO THE NEAREST EVACUATION CENTRE.

SHELTER IN PLACE: BORUMBA DEER PARK, OCCUPANTS ARE ADVISED THAT EVACUATION OF THE SITE IS NO LONGER POSSIBLE. PLEASE MOVE TO FLOOD-FREE AREAS AS DIRECTED BY STAFF.

5.2.2 Evacuation Routes

Evacuation of the site is only possible via Yabba Creek Rd to heading east towards Imbil. There are 4 low-level bridges between the site and Imbil. Flood wardens are to monitor if the 1st bridge to the east of the site is passable during a flood event.

5.3 ROLLS AND RESPONSIBILITIES

Management shall appoint a Chief and Deputy Flood Warden for the site. The Chief Flood Warden would generally be the duty manager, with another rostered staff member being the deputy manager. A chief and deputy flood warden is to be on-site at all times that patrons are staying at the facility. The roles of the Chief, Deputy and other Wardens are outlined in this section. Table 3-3 details the name and contact numbers of the nominated wardens.

5.4 CHIEF WARDEN

The chief warden is required to implement this flood emergency plan. His/her responsibilities may include.

- Manage and make the decision to evacuate, based on information presented in this plan and/or as directed by authorities;
- Coordinate the Deputy Wardens, Wardens, residents and guests where required by this plan;
- Implement reviews of this plan as required to meet community expectations, Local and State Government policies and desired outcomes of management;
- Provide information to residents on the predicted extent of flooding;
- Obtain and maintain first aid training to a minimum level of HLTAID011.
- Arrange training or education for staff as required by this plan;
- Record onsite flood heights to assist with further reviews of this plan; and
- Ensuring that equipment, food, water, medical supplies and other supply stocks are maintained, as necessary and are within use-by-dates and in adequate supply.

5.5 DEPUTY WARDEN AND OTHER WARDENS

The Deputy Warden is to assist the Chief Warden and act as Chief Warden in the Chief Wardens absence.
The roles of the Deputy and other wardens may include.

- Follow directions of the Chief Warden and other procedures set out in this plan;

- Assist guests with evacuation to an evacuation centre should it be directed by the Chief Warden; and
- Maintain a calm atmosphere among the occupants and staff during flooding emergencies.

Table 5-3 Flood Warden Contacts

	Name	Contact Phone Number	Mobile Phone Number
Chief Warden			
Deputy Warden			
Warden 1			

5.6 MEDICAL EMERGENCY RESPONSE

During an event that has resulted in occupants being required to Shelter in place there is some risk of a Medical Emergency coinciding with the period of isolation. As per section 5.4 the chief warden is responsible for obtaining First Aid training to a minimum of HLTAID011. The Chief warden is to manage medical emergencies during a flood event.

Should the medical emergency require additional assistance emergency services shall be contacted on 000.

5.7 RESOURCE REQUIREMENTS

The use of the development is for a camping facility. As such, it is expected that occupants would be self-sufficient for the length of their planned stay. As such it is expected that most patrons would have the below resources, including food and water for a period of a minimum of 3 days.

- Adequate supplies of Food and Water for approximately 3 days.
    - As a guide 15L of water per person per day (4L drinking and 11L for other purposes) would be required.
    - As per Section 3.2, water storage containers, such as bottles, canteens or food storage containers must be filled prior to the flooding impacting the site.
- Battery operated torches

in addition to the above Management are required to maintain the following resources on site for use during a flood event.

- Additional food and water supplies
- First Aid Kits
- Battery powered radio

Management is required to own and maintain a portable generator (minimum 2.0kW) and or portable battery system for the exclusive use in the event of a flood emergency that requires shelter in place. The portable generator/battery may be utilised by the flood warden and connected to a fridge for the purposes of essential medicines, perishable food or lighting. Sufficient quantities of the appropriate fuel shall be stored on site for approximately 3 days. Fuel requirements will vary based on the specific model chosen. As example a 2.0kW generator uses approximately 0.6L/hour at half load, this would require approximately 40L of fuel storage.

5.8 MANAGEMENT AND MAINTENANCE OF EQUIPMENT

It is the responsibility of site Management to ensure that regular checks of the above resources are undertaken.
If a portable generator is utilised annual maintenance in accordance with the manufacture specifications of the generator shall be undertaken, stored fuel is to be replaced on an annual basis. If a portable battery system is used, electrical safety checks including “test and tag” are required to be undertaken in accordance with AS/NZS 3760 on a yearly basis. Management is responsible for maintenance of the above emergency power systems.

5.9 DOCUMENTATION AND AUDITING

It is the responsibility of management to ensure that the FHMP is maintained and reviewed on an annual basis, and after major flood events, to include new operating practices to improve the FHMP.

5.10 EMERGENCY CONTACTS

The below provide a list of contacts that may be utilised for assistance preceding/during a flood event.

Emergency Services (Police/Fire/Ambulance): 000

State Emergency Services (SES): 132 500

Energex (For fallen power lines and electrical hazards): 13 19 62

Seqwater: 1300 737 928

Gympie Council (Local Disaster Coordination Group) 1300 307 800

6 SUMMARY

- The subject site is prone to flooding during a severe flood event (1% AEP + Climate Change) such that a risk management assessment and plan has been carried out.
- Risks associated with a flood event at the Subject Site were identified and evaluated with it deemed necessary to enforce evacuation and shelter in place at the site in the event of flooding at the subject site.
- A risk management approach has been adopted which includes the Implementation of a 4 Stage Risk Management Plan – (Monitor, Evacuate, Shelter and Return). The philosophy of the plan is to allow adequate time to evacuate before the site, surrounding roads, or infrastructure become inundated.
- Risks to property, the environment and people have been assessed with control measures proposed to mitigate these to within a reasonably acceptable level.
- High risks identified have been mitigated, with appropriate time and alerts available to allow for adequate time to evacuate the site.
- It is required that the Risk Management Approach and associated mitigation measures be carried out in full. The FRMP is to be regularly reviewed and where required, revised to incorporate any changes or improvements.

7 QUALIFICATIONS

This report has been prepared by Contour Consulting Engineers Pty Ltd, under the direction of a Registered Professional Engineer of Queensland. This report has been tailored to investigate issues in the context of the proposal and at the area of interest, as detailed herein.

The information contained in this report is not to be used outside of the subject area.

We consider that this report accurately reflects the conditions of the area of interest, at the time the study was undertaken. The results/recommendations/conclusions of this report are to be reviewed if the details of proposal change, or if conditions change, or if the amendment are made to built-infrastructure in the future,

This report is only to be used in full and may not be used to support objectives other than those set out herein, except where written approval, with comments, are provided by Contour Consulting Engineers Pty Ltd.

Contour Consulting Engineers Pty Ltd accepts no responsibility for the accuracy of information supplied to them by second and third parties.

Should further information be required please contact:

Contour Consulting Engineers

Tower 2, Level 5, Suite 512/513, Kon-Tiki Building

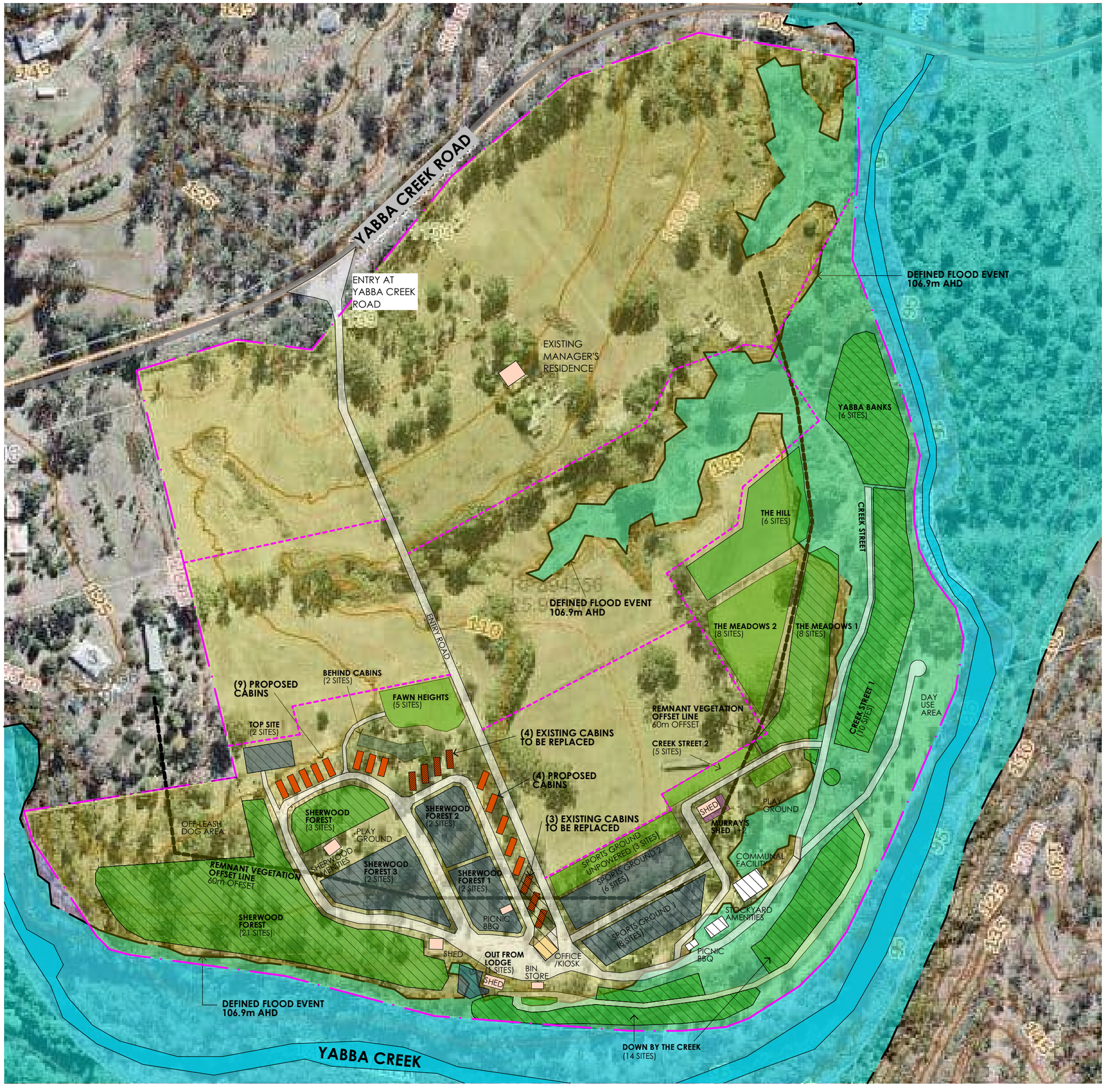
55 Plaza Parade

MAROOCHYDORE QLD 4558

P: 07 5493 9777

E: admin@contource.com.au

Appendix A. Development Plans



ACCOMODATION SCHEDULE

No.of sites	UNPOWERED SITES	No of people
10	Creek Street	120
5	Creek Street 2	60
14	Down By the Creek	168
24	Sherwood Forest	288
5	Fawn Heights	60
6	The Meadows	72
8	The Meadows 2	96
6	The Hill	72
6	Yabba Banks	72
3	Sports Gounds - Unpowered	36
	POWERED SITES	
6	Sports Ground 1	156
8	Sports Ground 2	
1	Murray's Shed 1+2	12
6	Sherwood Forest 1+2+3	72
2	Behind the cabins	24
2	Top Sites	24
1	Out from Lodge	12
	CABINS	
20	4 persons per cabin	80
133	Total campsites/persons	1424

Existing approved campsites (75 sites)

EXISTING/PROPOSED CAMPING/CABINS AREAS. DEFINED FLOOD LINE

1:2500

SITE INFORMATION

RP Description: Lot 4 on RP894556
Site Area: 25.9930 ha

LEGEND

- PROPOSED UNPOWERED SITES
- PROPOSED POWERED SITES
- EXISTING UNPOWERED/ POWERED SITES
- PROPOSED CABINS
- EXISTING CABINS TO BE REPLACED
- DEFINED FLOOD EVENT EXTENT. 106.9m AHD

Issue	Amendment	Date
G	Remnant vegetation plan	30.10.24
F	revised existing campsites	04.10.24
E(1)	Defined flood extent 106.9m	18.09.24
E	adjusted schedule	30.08.24
D	added sched, exist. cabins	29.08.24
C	Existing cabin locations	16.08.24
B	Issue for Application	02.07.24
A	Issue for Client Review	30.04.24

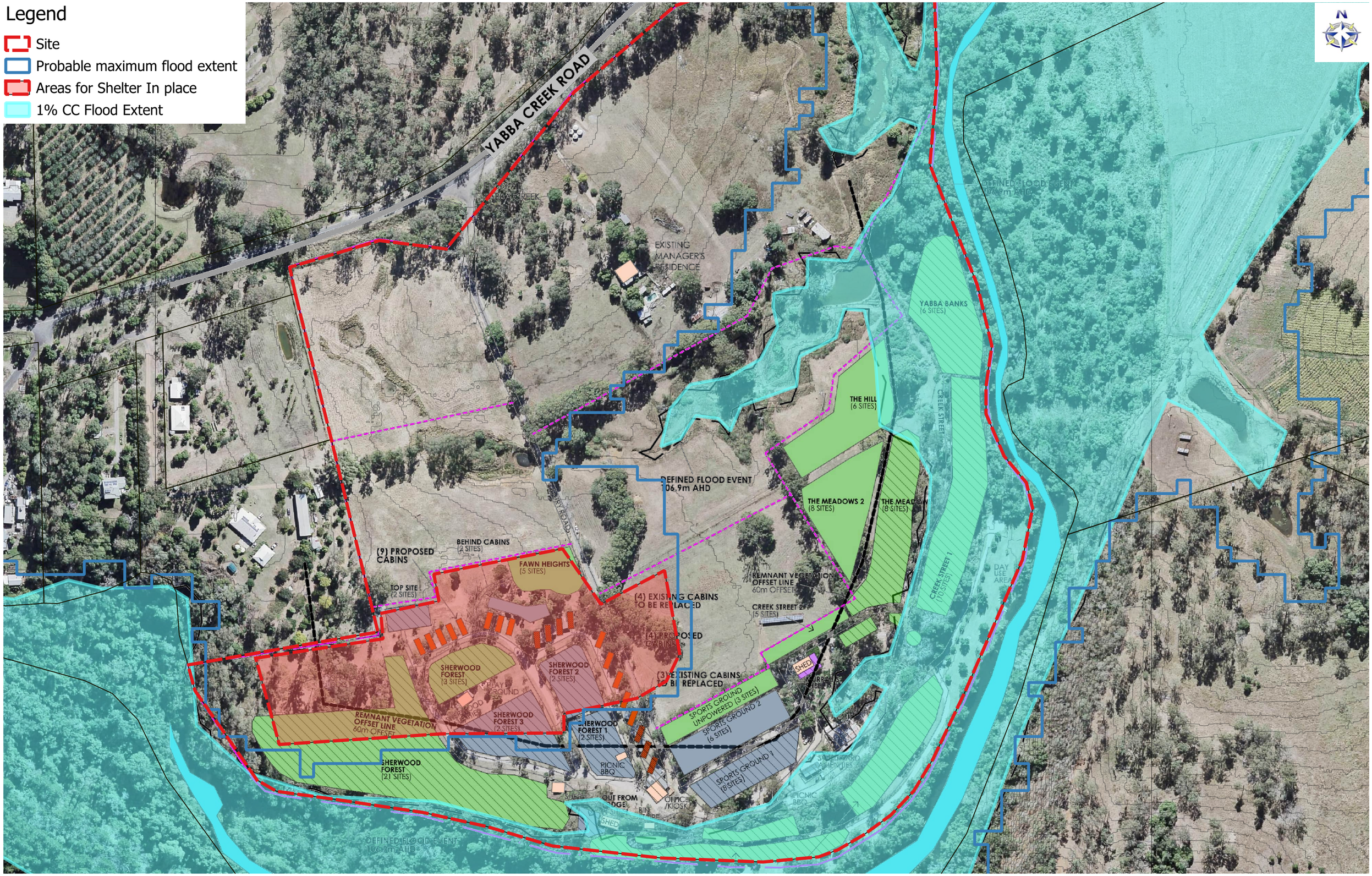
ACE SPACE DESIGN
COMMERCIAL • RESIDENTIAL • INDUSTRIAL
BUILDING DESIGNERS
(07) 5456 4411 0412 264 685 QBCC Lic.065570

CLIENT:
BORUMBA DEER PARK.

PROJECT and LOCATION:
Proposed accommodation cabins at 1139 Yabba Creek Road, Imbil.

DRAWN BY: CS	CHECKED BY: CS
SCALE at A3 PAPER	
DRAWING TITLE: Site Plan/Defined Flood	
Drawing: 01 of 03	PROJECT No: 23.670
	ISSUE G

Appendix B. Shelter in Place Areas



CONTOUR
A.B.N 62 117 061 659

SUNSHINE COAST HEAD OFFICE
PO Box 5923, Maroochydore BC, 4558
Suite 512 & 513, Level 5
Tower 2, 55 Plaza Pde
Maroochydore, QLD 4558

BRISBANE OFFICE
Building 5 Office 5i
2-4 Flinders Parade
North Lakes, QLD 4509

www.contource.com.au Ph (07) 5493 9777

MAP 1
Areas Suitable for Shelter in Place

0 30 60 90 120 150 m

C:\12d\data\CCE2K16DC01\02862 - Borumba Deer Park, Imbil_81\Design - Civil\GIS\Borumba Deer Park.qgz

Our Reference: CIV02862 (OD/SC)

06 November 2024

Gympie Regional Council
Via: council@gympie.qld.gov.au

Attn: Development Services

RE: STORMWATER MANAGEMENT PLAN
PROPOSED CAMPGROUND EXTENSION
LOCATED AT BORUMBA DEER PARK – 1133 YABBA CREEK RD, IMBIL

1 INTRODUCTION

Contour Consulting Engineers (Contour) has been engaged by the Trustee for the Yabba Deer Trust c/- Adams & Sparkes Town Planning to prepare a stormwater management plan. The stormwater management plan is in relation to a proposed campground extension at the Borumba Deer Park.

This stormwater management plan provides an assessment of the existing site stormwater characteristics and features and the post-development site conditions.

The proposed drainage strategy has been developed in accordance with the Gympie Regional Council (Council) planning scheme, the Queensland Government State Planning Policy (SPP), and Queensland Urban Drainage Manual 2017 (QUDM).

2 SITE DESCRIPTION

The proposed development is located at 1133 Yabba Creek Road, Imbil and has a real property description of Lot 4 on RP894556 ('Subject Site'). The existing site has an overall area of approximately 25.99ha. The site has frontage to Yabba Creek Rd, and backs onto Yabba Creek. The west side of the site shares a common boundary with existing rural lots.

The existing site is occupied by a deer park which covers 16.5 ha the central and northern areas of the site. At the south of the site, an existing caravan site stretches from the west to east extents and covers an area of approximately 8.57ha. The caravan site was approved under a development application in 1994 and has a capacity for 155 sites and associated amenities.

The Subject Site is largely pervious, containing grassed areas and light vegetation. The south portion of the site comprises cabins dwellings and sheds associated with the caravan park, however these are disproportionate to the surrounding pervious areas. The caravan park is accessed by an internal gravel road that links the south of the site to Yabba Creek Road.

An aerial image of the Subject Site is included below as Figure 2-1.

CONTOUR
PO Box 5923, Maroochydore BC QLD 4558
SUNSHINE COAST: S.512/513, L.5, Tower 2, Kon-Tiki Bldg, 55 Plaza Pde ,Maroochydore QLD 4558
NORTH LAKES: Suite 5I, Lakes Vista Office Park, 2-4 Flinders Parade, North Lakes, QLD 4509
admin@contource.com.au
07 5493 9777
ABN: 62 117 061 659

FIGURE 2-1 EXISITNG SITE AERIAL IMAGE

3 PROPOSED DEVELOPMENT

The proposed development is an extension to the existing camping facilities to include new cabins and tent sites. The site is currently approved for 105 sites and proposes an additional 177 sites taking the total sites to 282. Contour understands that the existing sites were approved by Widgee Shire Council in 1993 as part of approval number TPC77.

A proposed site layout showing the existing site features and proposed changes is presented in **Appendix A** and shown below as Figure 3-1.

FIGURE 3-1 PROPOSED DEVELOPMENT LAYOUT (SOURCE: ACE SPACE DESIGN PLAN 23.670 G)

4 STORMWATER MANAGEMENT

4.1 GENERAL

The post-development stormwater runoff conditions are to generally comply with the requirements of the Queensland Urban Drainage Manual - 2017 (QUDM), Council Planning Scheme and AS3500.3.

4.2 EXISTING SITE

2009 LiDAR levels show that the site grades from the north (125m AHD) at Yabba Creek Road to the South (95m AHD) where the site meets Yabba Creek. The site encompasses a stream that collects upstream water from the northwestern corner of the site and discharges into the Yabba Creek in the northeastern corner of the site. Stormwater discharge from the site generally flows overland concentrating in centrally located stream gully or discharging as sheet flow into the Yabba Creek. Formalised stormwater infrastructure within the Subject Site is limited, with stormwater runoff from impervious and roofed areas discharging to the ground.

Yabba Creek is classified as a high-order waterway and is designated as a watercourse under the Water Act 2000. It flows downstream from the Borumba Water Storage Dam, which has a storage capacity of 4,600 megalitres (ML) and is situated within a catchment area of 465 square kilometres.

An extract from GIS software demonstrating the surface elevations at the Subject Site using 2009 LiDAR is presented below as Figure 5-1.

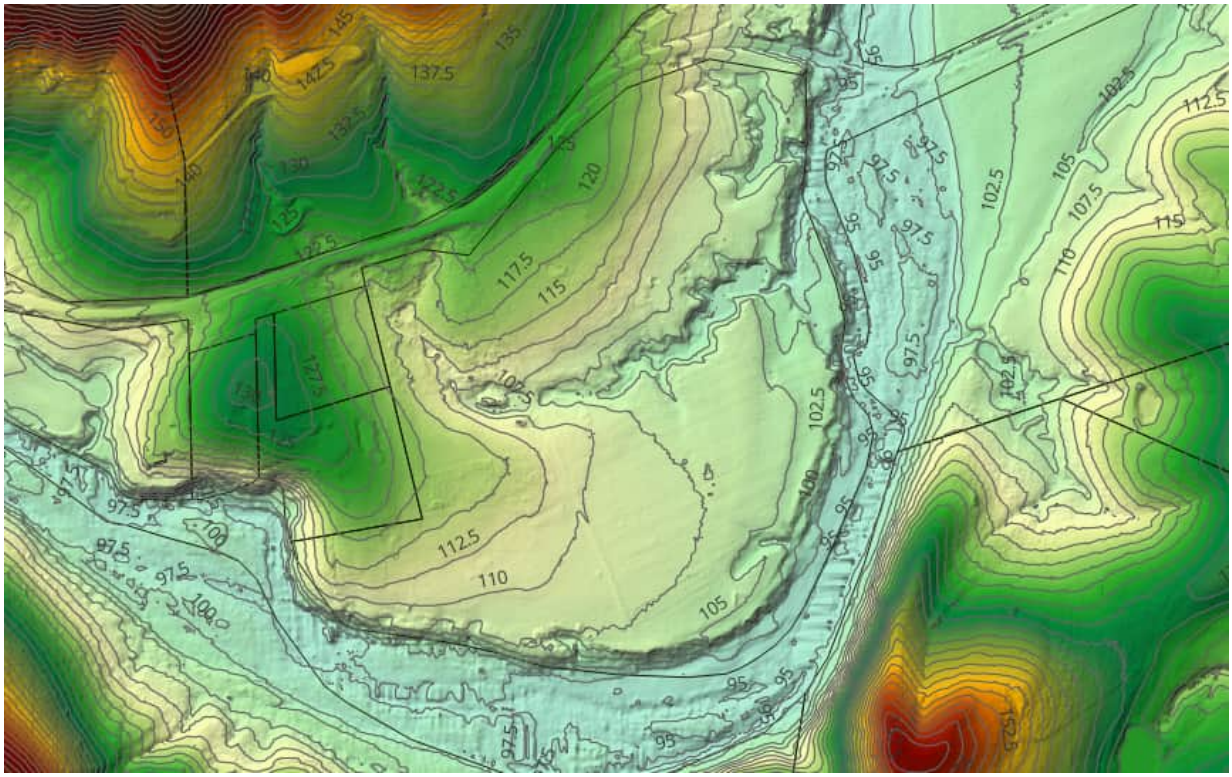


FIGURE 5-1 EXISTING SITE ELEVATION (SOURCE: QGIS USING 2009 LIDAR)

4.3 QUANTITY MANAGEMENT

Contour considers that formalised water quantity management is not required for the proposed development. The primary grounds used as the basis for this include:

- Surrounding catchment zoning includes a significant proportion of rural lands, with limited potential for future development.
- The site is located directly adjacent to Yabba Creek, downstream of Borumba Dam. The Catchment area to Borumba Dam is 465 km2. The site represents less than 0.06% of the catchment of Borumba Dam. As such any increase to discharge from the subject site would not be perceivable within Yabba Creek;
- The development proposes minimal impervious areas totalling 694m^2, which is less than 0.5% of the total site area.
- The site immediately discharges to areas impacted by the Council's Flood Hazard Overlay.

4.4 LAWFUL POINT OF DISCHARGE

QUDM states that the criteria for determining the lawful point of discharge is:

(i) Will the proposed development alter the site's stormwater discharge characteristics in a manner that may substantially damage a third-party property ii (see Section 3.6)?

- If not, then no further steps are required to obtain tenure for a lawful point of discharge (assuming any previous circumstances and changes were lawful).
- If there is a reasonable risk of such damage, then consider issue (ii) or (iii).

(ii) Is the location of the discharge from the development site under the lawful control of the local government or other statutory authority from whom permission to discharge has been received? This will include a park, watercourse, drainage or road reserve, stormwater registered drainage easement, or land held by local government (including freehold land).

With respect to the discharge to Yabba Creek, the existing watercourse is under are under the lawful control of the local authority. Contour maintain that discharge will continue in the same manner as to not cause an actionable nuisance. As such we consider that a lawful point of discharge has been achieved for these flows via point (ii) above.

4.5 QUALITY MANAGEMENT

The subject site is less than 25% impervious, and therefore does not trigger water quality design objectives in accordance with the Queensland State Planning Policy.

5 FLOODING

Contour has obtained a Flood search for the subject site and has included this within **Appendix C.** The search indicates that the site is subject to flooding during the defined flood events. The flood level of the defined flood event is RL 106.9 m AHD. In general, the proposed new infrastructure and sites are located outside the Defined Flood Extent. Reference is made to Ace Space Design Plan included in **Appendix A.**

6 SUMMARY

Investigations regarding stormwater management have been undertaken for the proposed development being an extension to an existing camping facility. Based on the investigations undertaken Contour has concluded the following key points:

- Stormwater drainage infrastructure is to be designed, generally in accordance with the QUDM and relevant Council guidelines;
- Formalised stormwater quantity mitigation measures are not required for the site. reference is made to section 4.3;
- The proposed development does not trigger the requirement for stormwater quality management in accordance with the State Planning Policy.
- The site is subject to flooding during the defined flood event. The proposed infrastructure is located outside the extent of the Defined Flood Event.

Based on our investigative works, we consider that the proposed works address stormwater management requirements, in accordance with the Council Planning Scheme and QUDM. We therefore recommend that Council approves the application subject to reasonable, relevant, equitable and justifiable conditions.

Yours Faithfully,

Scott Campbell
BE CPEng RPEQ NER APEC Engineer IntPE(Aus) MIEAust
Civil Engineer

7 QUALIFICATION

This report has been prepared by Contour Consulting Engineers Pty Ltd, under the direction of a Registered Professional Engineer of Queensland. This report has been tailored to investigate issues in the context of the proposal and at the area of interest, as detailed herein.

The information contained in this report is not to be used outside of the subject area.

We consider that this report accurately reflects the conditions of the area of interest, at the time the study was undertaken. The results/recommendations/conclusions of this report are to be reviewed if the details of proposal change, or if conditions change, or if the amendment are made to built-infrastructure in the future,

This report is only to be used in full and may not be used to support objectives other than those set out herein, except where written approval, with comments, are provided by Contour Consulting Engineers Pty Ltd.

Contour Consulting Engineers Pty Ltd accepts no responsibility for the accuracy of information supplied to them by second and third parties.

Should further information be required please contact:

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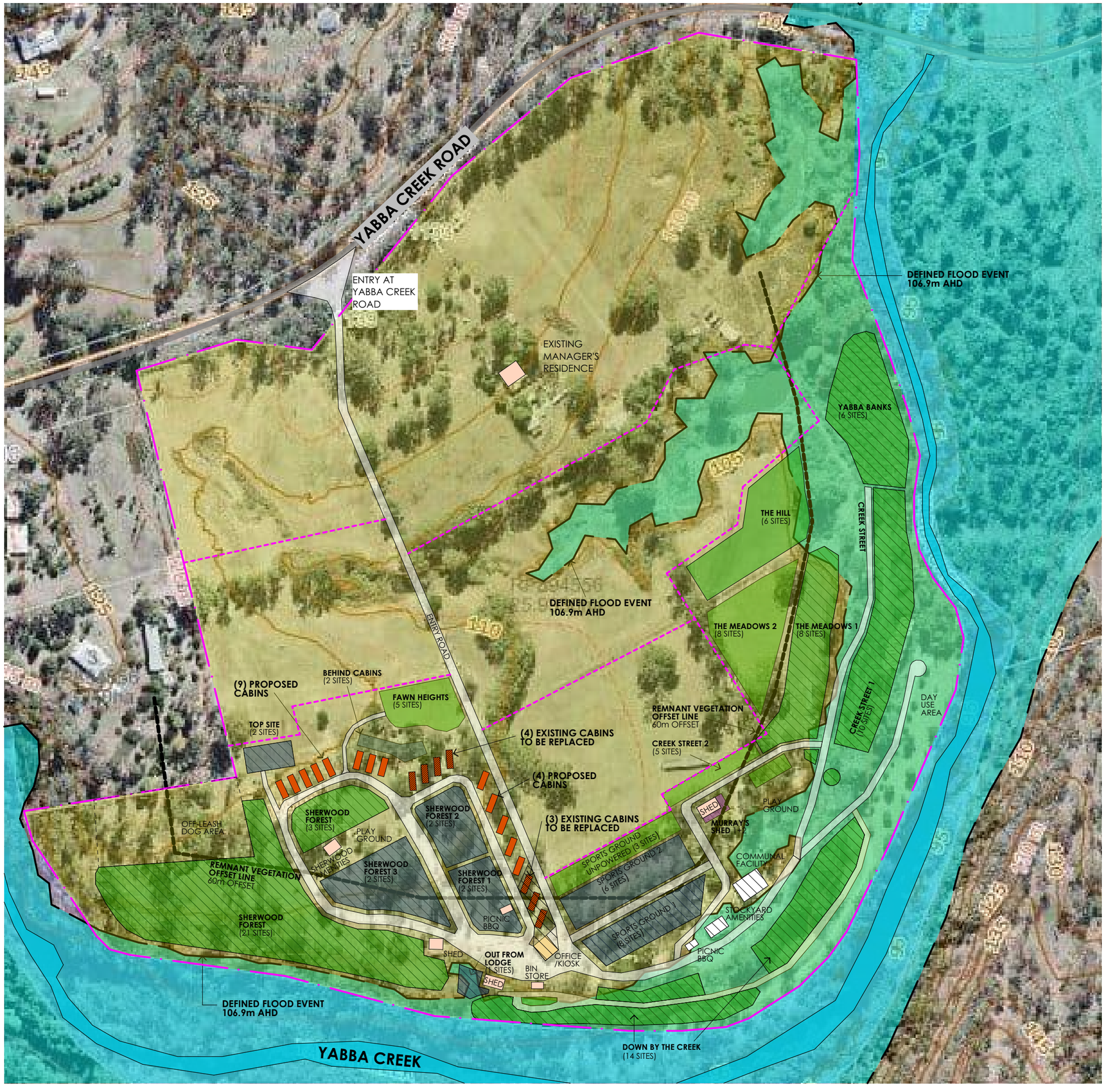
55 Plaza Parade

MAROOCHYDORE QLD 4558

P: 07 5493 9777

E: admin@contource.com.au

Appendix A. Proposal plan



ACCOMODATION SCHEDULE

No.of sites	UNPOWERED SITES	No of people
10	Creek Street	120
5	Creek Street 2	60
14	Down By the Creek	168
24	Sherwood Forest	288
5	Fawn Heights	60
6	The Meadows	72
8	The Meadows 2	96
6	The Hill	72
6	Yabba Banks	72
3	Sports Gounds - Unpowered	36
	POWERED SITES	
6	Sports Ground 1	156
8	Sports Ground 2	
1	Murray's Shed 1+2	12
6	Sherwood Forest 1+2+3	72
2	Behind the cabins	24
2	Top Sites	24
1	Out from Lodge	12
	CABINS	
20	4 persons per cabin	80
133	Total campsites/persons	1424

Existing approved campsites (75 sites)

EXISTING/PROPOSED CAMPING/CABINS AREAS. DEFINED FLOOD LINE

1:2500

SITE INFORMATION

RP Description: Lot 4 on RP894556
Site Area: 25.9930 ha

LEGEND

- PROPOSED UNPOWERED SITES
- PROPOSED POWERED SITES
- EXISTING UNPOWERED/ POWERED SITES
- PROPOSED CABINS
- EXISTING CABINS TO BE REPLACED
- DEFINED FLOOD EVENT EXTENT. 106.9m AHD

Issue	Amendment	Date
G	Remnant vegetation plan	30.10.24
F	revised existing campsites	04.10.24
E(1)	Defined flood extent 106.9m	18.09.24
E	adjusted schedule	30.08.24
D	added sched, exist. cabins	29.08.24
C	Existing cabin locations	16.08.24
B	Issue for Application	02.07.24
A	Issue for Client Review	30.04.24

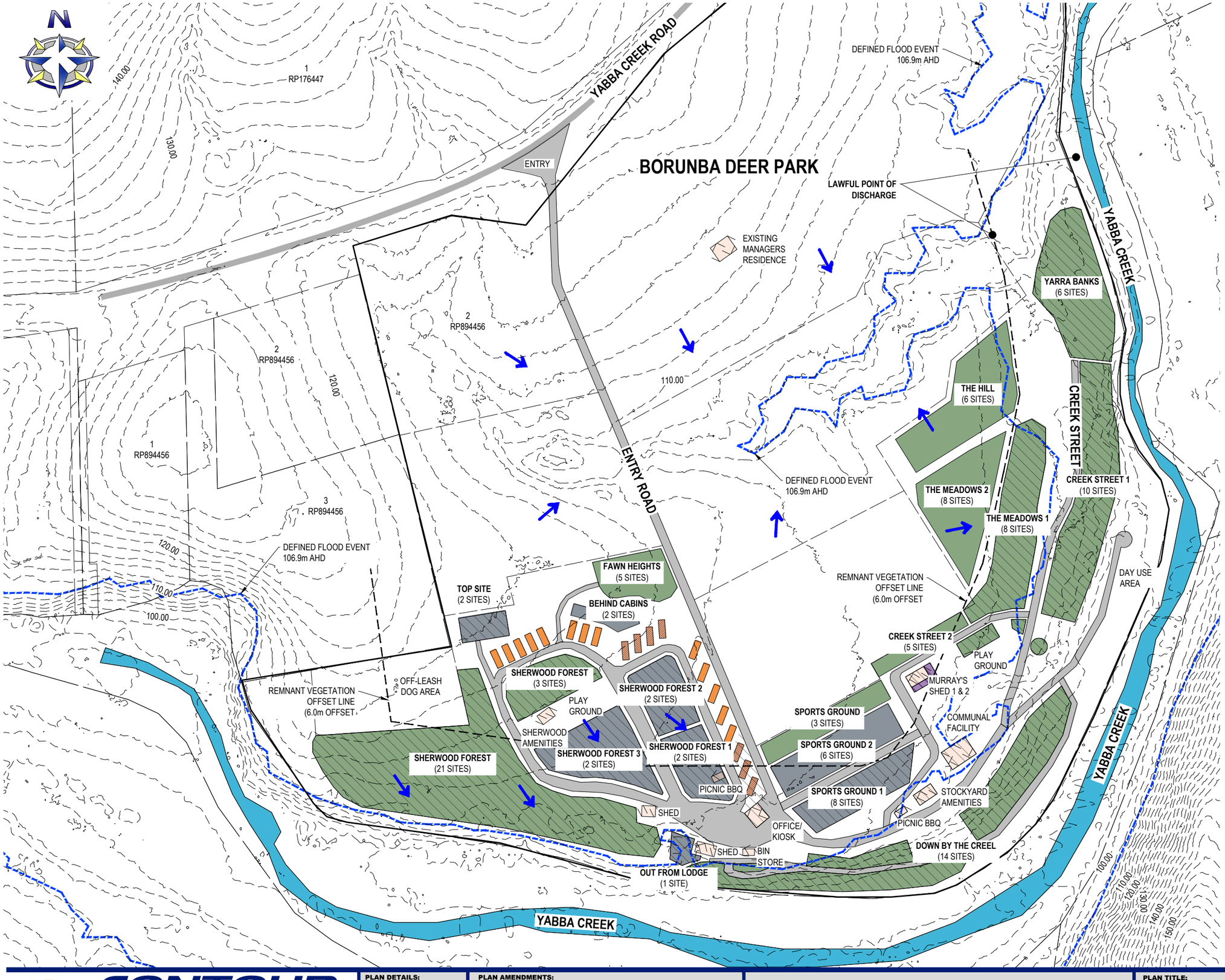
ACE SPACE DESIGN
COMMERCIAL • RESIDENTIAL • INDUSTRIAL
BUILDING DESIGNERS
(07) 5456 4411 0412 264 685 QBCC Lic.065570

CLIENT:
BORUMBA DEER PARK.

PROJECT and LOCATION:
Proposed accommodation cabins at 1139 Yabba Creek Road, Imbil.

DRAWN BY: CS	CHECKED BY: CS
SCALE at A3 PAPER	
DRAWING TITLE: Site Plan/Defined Flood	
Drawing: 01 of 03	PROJECT No: 23.670
	ISSUE G

Appendix B. Contour Stormwater Management Plan



LEGEND

EXISTING FEATURES

- OVERALL RP BOUNDARY
- CADASTRAL RP BOUNDARY
- BUILDING
- BUILDING REMOVE
- CABINS TO BE REPLACED
- FLOOD EVENT EXTENT 106.9m AHD
- EXISTING UNPOWERED / POWERED SITES
- 12 NATURAL 2m CONTOUR

LEGEND

PROPOSED FEATURES

- CABINS - IMPERVIOUS AREA = 694m²
- POWERED SITES
- UNPOWERED SITES
- FLOW DIRECTION

PROPERTY DESCRIPTION

Lot 4 on RP894556 (25.9930 ha)
Local Government - Gympie Regional Council
SEQ Service Provider - Unitywater
Locality - Imbil

0 25 50 75 100 125m

SCALE 1:2500 A3

CONTOUR

SUNSHINE COAST OFFICE
Suite 512 & 513, Level 5
Tower 2, 55 Plaza Pde
Maroochydore, Qld 4558

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ISO 9001 Quality Assured International 3rd Party Accredited

UKAS MANAGEMENT SYSTEMS 8327

PLAN DETAILS:

Designed:	SC
Drawn:	SF
Checked:	SC
Vert. Datum:	AHD
Hori. Datum:	MGA GDA 2020
Date:	NOVEMBER 1

DRAFT

PLAN AMENDMENTS:

Rev	Date	Comment	Alt	Chkd	RPEQ

EXTENSION TO EXISTING CAMPING FACILITY AT 1139 YABBA CREEK ROAD, IMBIL FOR THE TRUSTEE FOR THE YABBA DEER TRUST

PLAN TITLE:

STORMWATER MANAGEMENT PLAN

FOR APPROVAL - NOT FOR CONSTRUCTION

PLAN No: 2862 - SW-001 **REVISION:** A

FILE LOCATION: C:\12DS\DATA\CCE2K16DC01\02862 - BORUMBA DEER PARK, IMBIL_81\DESIGN - CIVIL\AUTOCAD\SWMP\2862 0 SWMP-001.DWG

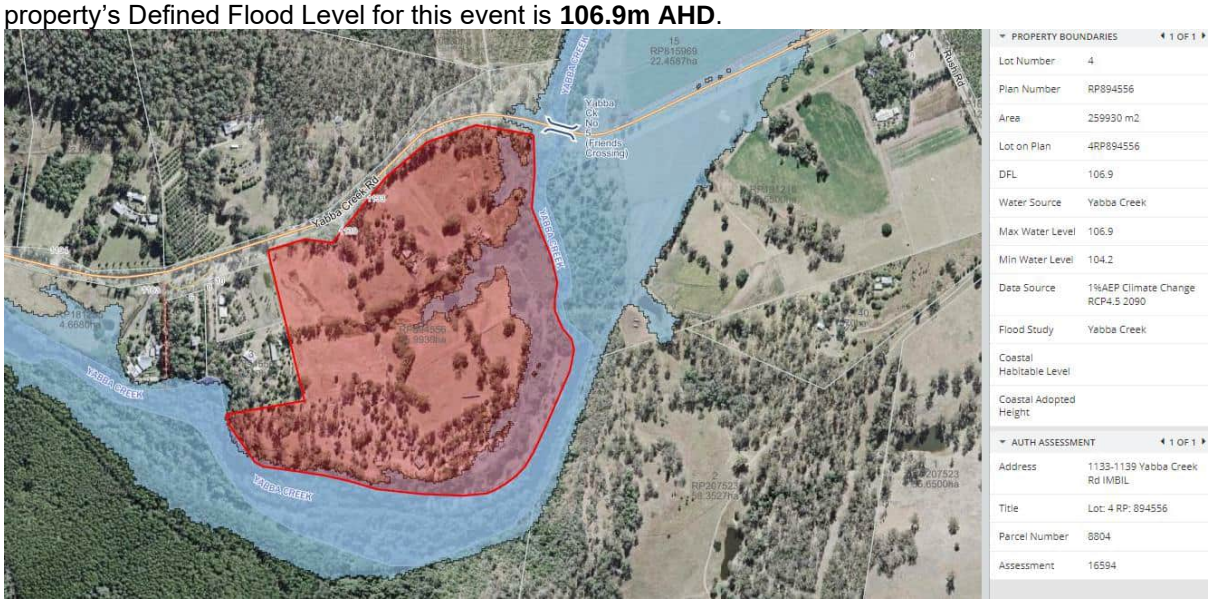
Appendix C. Flood Search

Hi Scott,

There is some variation between flood information provided to you in October 2021, and current flood information for the property.

As of 2024, the defined flood event (DFE) has been updated from the existing 1% AEP (or 1-in-100 year) flood event to include an allowance for the impacts of climate change, in line with the SPP. The newly adopted DFE is referred to as the Future Climate 1% AEP flood event.

Additionally, Yabba Creek flood information has since been finalized and consolidated in the *Yabba Creek Flood Study 2022* – I have attached an image (below) of the area surrounding Lot 4 RP894556 showing the updated flood extents in the area for a Future Climate 1% AEP flood event. The property's Defined Flood Level for this event is **106.9m AHD**.



Legend

	1% AEP (+ climate change) flood extent Source: *Yabba Creek Flood Study 2022*

If further information is required, flood modelling data may be also requested through **adminsupport@gympie.qld.gov.au**, although fees apply.

Please note:

- *Gympie Regional Council (GRC) does not warrant the accuracy of information in this advice and any person using or relying upon such information does so on the basis that GRC shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. The contours shown above in yellow numbering are based on Aerial Laser Scanning (ALS) Survey undertaken in 2009. The contour levels are approximate and for general information only. Accurate ground levels should be obtained/determined by a Registered Surveyor.*
- *The flood level is based on current climate conditions and information available to Council at the date of issue. The flood level may change in the future if new information becomes available. The 1% AEP flood is the flood adopted by Council for planning controls. Rarer and more extreme flood events will have a greater effect on the property.*
- *This property is shown on Council's flood mapping as potentially so affected.*
- *Council imposes flood related planning controls where, in its opinion, such controls are justified. Such controls may or may not be imposed with respect to this property in the event of an application for a development.*
- *If a development proposal is submitted with respect to this property, Council will consider the possibility of flood and/or overland flow in the context of the application. Council may impose a requirement that the applicant for development consent carry out a detailed assessment of the possible overland water flows affecting the property (a*

flood study) and/or may impose other controls on any development designed to ameliorate flood risk.

- *Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this advice, having regard to the information disclosed in Notes "1" to "4". As such you should carry out and rely upon your own investigations.*

Please do not hesitate to let me know if you have any further queries.

Kind regards
Daniel Hughes
CADET – DEVELOPMENT ENGINEERING

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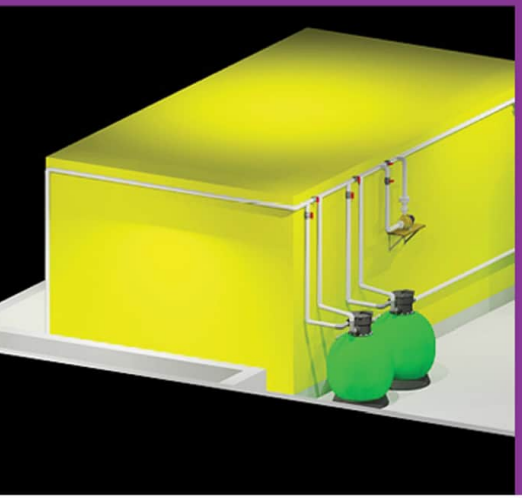
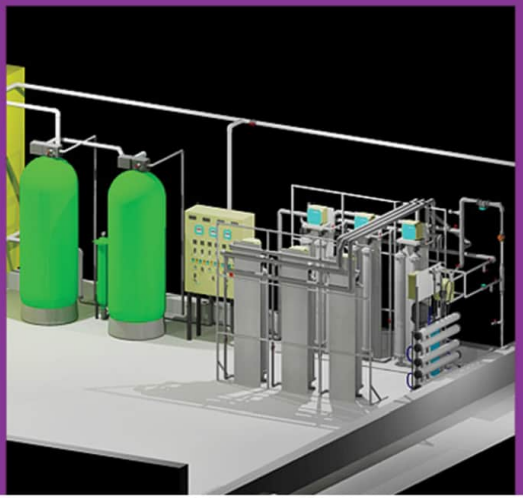
arris

water treatment
& technology

Borumba Deer Park

Water Management Plan





Document Number:	20250108
Client:	Yabba Deer Pty Ltd. ATF the Yabba Deer Trust T/A Borumba Deer Park
Project Manager:	Ben Kele
Date:	8th of January 2025
Description:	Water Management Plan for Borumba Deer Park

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TABLE OF CONTENTS

Table of Figures

Table of Tables

Revision	Purpose	Author	Approval	Date
Draft	Submission review	Ben Kele	Ben Kele	

1. INTRODUCTION

Background

Borumba Deer Park is a family-owned and operated campground offering a variety of accommodation options and outdoor activities for campers and day visitors. Arris was commissioned by the owners of Borumba Deer Park to build a new wastewater treatment system at the site and comply with the Queensland Legislation to operate under an Environmental Authority.

The activities at the site generate wastewater which is treated and irrigated at the site and trigger the submission of an ERA63 for sewage treatment under the Environmental Protection Act 1994. Given the proposed site expansion and increase in offer for caravaning and accommodation, the application is a site-specific one, where daily wastewater generation is larger than 100 Equivalent Persons (EP).

The proposed expansion of activities is estimated to produce 32kL/d of wastewater for average dry weather flow.

Scope of this Report

The objectives of this report are to provide;

- A description of the drinking water system
- A description of wastewater generation activities
- An explanation of the treatment of process and location of new infrastructure for the treatment of wastewater
- A site characterisation, as well as characterisation of the surrounding environment, with respect to sensitive receptors to be protected. Constraints at the site related to the irrigation with wastewater will be identified
- A modelling of the possible wastewater irrigation options at the site using MEDLI.
- The impact the wastewater generation and irrigation may have on sensitive receptors and how to mitigate those impacts

Legislative Requirements, Guidelines and Standards

This document has been prepared in accordance with requirements of Section 125 of the EP Act 1994 and Schedule 2, Section 63 of the Environmental Protection Regulation 2019.

The SBMP and proposed wastewater management activities anticipated at the site also comply with:

- AS/NZS 1547: 2012 On-site Domestic Wastewater Management
- AS/NZS 1546 On-site domestic wastewater treatment
- Environmental Protection Act 1994
- Environmental Protection and Biodiversity Conservation Act 1999
- Environmental Protection (Air) Policy 2019
- Environmental Protection (Noise) Policy 2019
- Environmental Protection (Water and Wetland Biodiversity) Policy 2019
- Environmental Protection Regulation 2019
- Integrated Planning Act 1997
- Public Health Act 2005
- Plumbing and Drainage Act 2018 and regulations

- Australian Drinking Water Guidelines
- Queensland Water Quality Guidelines
- Queensland Plumbing and Wastewater Code 2024
- State code 22: Environmentally Relevant Activities
- Nature Conservation (Plants) Regulation 2020

2. ENVIRONMENTAL VALUES

Arris Pty Ltd: Environmental Management Expertise

Arris Pty Ltd. specialises in decentralised water treatment solutions, offering practical experience in the design, construction, and long-term operation and maintenance of water treatment plants that handle high-strength, highly variable wastewater. With extensive expertise in batching treatment plants, we ensure long-term successful operation, supported by an alliance with international ozone specialists and in-house chemistry expertise in metal removal, oxidation and groundwater remediation.
We pride ourselves on a strong environmental track record, having operated water treatment and recycled water dispersal systems without any environmental breaches, fines, or adverse court rulings.

Key Projects and Relevant Experience

Keppel Sands Caravan Park: Livingstone Shire Council
Arris designed, constructed and maintains a Rhizopod® system for the treatment and dispersal of on-site wastewater at the Keppel Sands Caravan Park. The system is designed to manage a peak flow of 20 kL/day. The no-release nature of the system prevents any run-off from entering the Great Barrier Reef Marine Park Authority.

Great Keppel Island Hideaway
Arris provided the resort assistance with the drinking water system, the sewage treatment plant and the recycled water management system. This includes obtaining the necessary permits and planning permissions required for water treatment infrastructure in the Great Barrier Reef Marine Park. The work involves the installation of new equipment, the maintenance and repair of existing equipment and the regulatory monitoring of the engineered water cycle.

Breeze Holiday Parks
Breeze owns holiday parks across Australia. Arris is working on drinking water, sewage treatment plants and recycled water dispersal systems in multiple Breeze parks in Queensland, Victoria and the Northern Territory. This includes the installation of new water treatment infrastructure, the operation and maintenance of existing water treatment installations and the design and regulatory approvals required for park expansions.

Wilderness Lodge Carnarvon Gorge
The original installers of the drinking water and wastewater treatment plant at this site ceased operations. Arris was employed to bring the water infrastructure at the site back into regulatory compliance, make repairs/replacements where required and to provide ongoing operational support.

Woodfordia STP (2009–Present)
Operates during festivals at the Woodford Folk Festival site, treating high-strength wastewater in a batching treatment plant. The plant handles an average flow of 1.5 ML/day and has been upgraded to accommodate increased site demands. The Woodford Folk Festival Engineered Water Cycle was shortlisted as a finalist in the 2024 Australian Water Association Queensland Water Awards for the

Infrastructure Project Innovation Award (Metro). This recognition highlights Arris's commitment to excellence and innovation in the water sector.

Sunrise at 1770 STP (2007–Present)
A batching plant treating wastewater from a 192 lot eco-development, with a peak flow of 250 kL/day. The treated water meets Class A+ standards and is reused within properties for toilet flushing and laundry use.

WestSide Corporation Coal Seam Gas Water Treatment (2013–Present)
Designed to treat varying groundwater quality due to changing well conditions in the coal seam gas industry. Specialised treatment is required for water with high salinity, SAR and total suspended solids, ensuring effective and sustainable management.

OZ Minerals/BHP mining camp wastewater and recycling system (2021 - Present)
Arris designed, obtained regulatory approval, and managed construction of a 6132m2 ABSORBS Filter to treat 275 kL of mining camp wastewater. The system is a passive treatment to advanced secondary quality effluent with multi barrier disinfection. The treated wastewater is compliant with WA Health radium risk reuse, fit for process water dust suppression, amenity irrigation and food crops where water does not come in contact with the food.

Our Core Strengths

The success of Arris lies in the expertise and experience of our staff. We provide services across the water, resources, industrial, and agricultural sectors in Australia, with a focus on:

- Design & Construction (D&C)
- Operation & Maintenance (O&M)
- Regulatory Compliance
- Asset Management
- Utility Services

Our skilled team includes

Water treatment design experts for potable, wastewater, and associated water streams.

- Process engineers optimising plant operations
- Energy specialists integrating sustainable energy systems, conducting energy audits, and finding cost-effective treatment processes
- Global leaders in sustainable water reuse
- Environmental scientists ensuring minimal ecological impact

Our Research Collaborations

Arris maintains strong partnerships with leading research institutions, including:

- Central Queensland University
- The University of Adelaide
- Sydney University: Applied Horticultural Research
- Victoria University
- University of Queensland
- CSIRO Land and Water
- Primary Industries and Regions SA
- SARDI
- DPI Victoria

Clients

See Arris strategic partners & major clients list in Appendix C.

Recognition and Awards

Arris has been recognised for its commitment to sustainability and environmental responsibility, including:

- 2008: Urban Development Institute of Australia - Most Sustainable Subdivision in Queensland
- 2009: FIABCI Prix d'Excellence Silver Medal - First Runner-Up
- 2009: Urban Development Institute of Australia - Most Sustainable Subdivision in Australia
- 2009: Queensland EPA Environmental Award - Finalist for Most Sustainable Water
- 2009: United Nations World Environment Day Awards - Finalist for Most Sustainable Water Design
- 2024: Finalist for the Qld Australian Water Association (AWA) Infrastructure Award

Commitment to Integrity and Innovation

Through our progressive approach, commitment to sustainability, and dedication to delivering high-quality solutions, Arris consistently provides exceptional service to a diverse range of clients. Our mission is to make a lasting, positive impact on the communities we serve by developing efficient, safe, and responsible environmental management solutions.

3. SITE DESCRIPTION AND PROJECT ACTIVITIES

General Site Description

The site is located in lot 4 and plan RP894556, in a rural area, on 1133-1139 Yabba Creek Road, Imbil, Queensland as part of the Gympie Regional Council. The site is known by the name Borumba Deer Park (BDP). An aerial view of the site is shown in Figure 3-1. The perennial Yabba Creek surrounds the east, south and west boundaries of the site. The total area of the property is approximately 27.41 hectares.

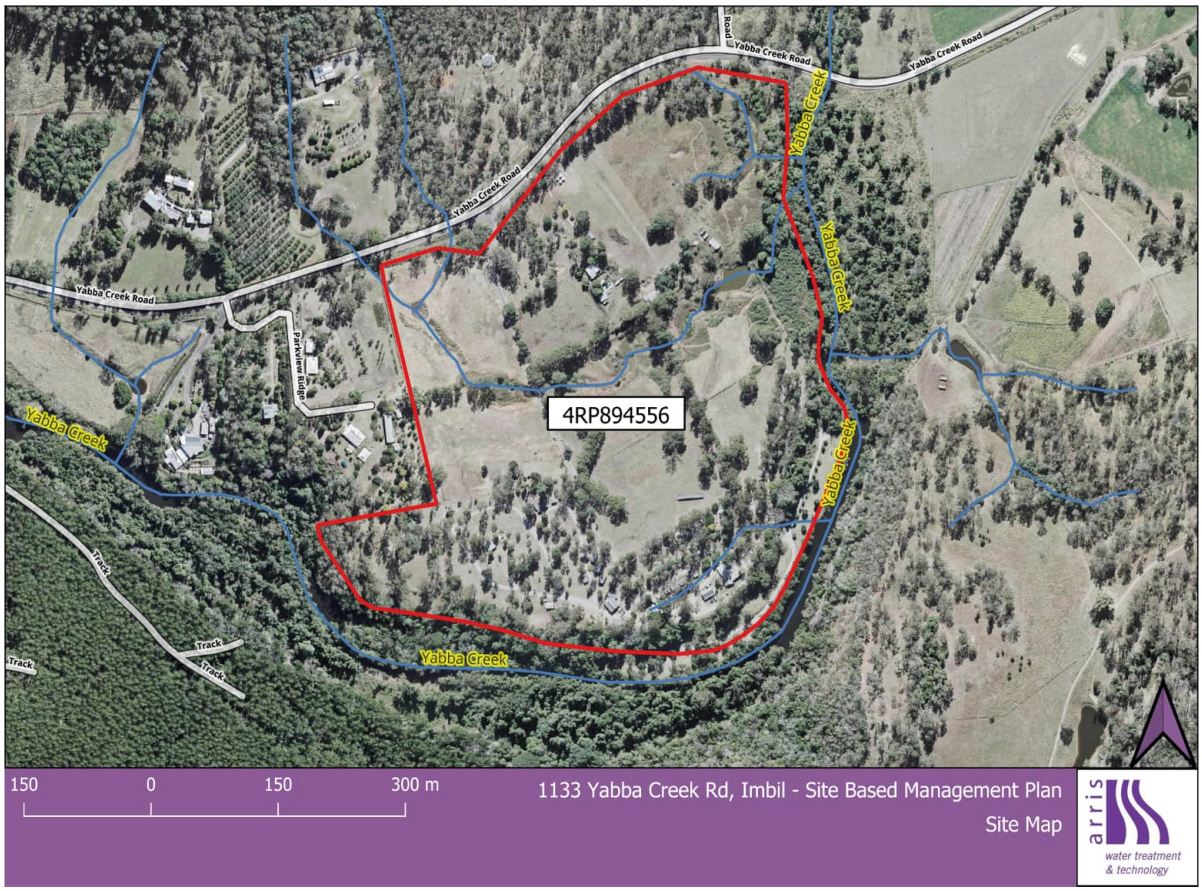


Figure 3-1. Scaled site map

Site History

BDP is a family-owned and operated campground offering a variety of accommodation options and outdoor activities for its campers and day visitors. The current owners of BDP have owned the park since April 2020 and purchased the park as a going concern.

Approx 30 years ago, the original owners Rick & June Gibson purchased the property as an undeveloped parcel of land and started a deer farm. A house was built which is currently the Managers residence.

The original owners then started the campground which is now known as Borumba Deer Park, adding amenity blocks and the stockyard and grew the business to become one of the most popular campgrounds in the region whilst still deer farming, which became part of the attraction of the park.

Approximately 15 years later, Col & Rosa Huddy bought the property and continued running the Borumba Deer Park campground. They discontinued the deer farming part of the business but kept deer onsite with what fencing they had. The park became run down over the course of the next 10 years when the property was purchased by the current owners in April 2020.

The current owners spent the first 4 months during the Covid lockdown in 2020 renovating the park and bringing it back to life, and have run the park ever since, whilst building up the deer stock again in the background with new fencing.

Project Activities

The Borumba Deer park currently has 4 on-site wastewater systems; a 4000 L/day greywater system, a 4000 L/day blackwater system, a 20 000-litre septic tank, and a 1800 litre septic tank (Managers House).

With the new cabins the design flow rate has been calculated at 32 kL/day.

We are looking at combining the flows from 3 of the systems (excluding the Manager's residence), and putting the wastewater through an anaerobic baffled reactor (ABR), then a woodchip filter with zeolite media, a disinfection system, then to irrigation tanks (which also incorporate wet weather storage).

The greywater is dilute (but high in volume), the blackwater very concentrated (but low in volume). The 20kL septic produces primary treated effluent. The existing on-site systems are in relatively good condition for their age and have been well maintained. The tanks can be reused and do not need replacement. The revamped wastewater treatment system will be capable of at least secondary quality, and will be suitable for irrigation under an ERA63 licence.

Future Planned Development

The BDP management has plans to develop the site further (See Figure 3-2). Yellow dashed line represents the future proposed cabins, the orange areas represent the powered sites and amenities, purple areas represent unpowered sites, and the red areas indicate potential irrigation areas (need ERA 63 approval)

Figure 3-2. Map of future developments

Site assessment

Climate

Grid point data at -26.50°, 152.6°, the premises location, was obtained from SILO Long paddock, which has also been used for the MEDLI modelling, and is available here: https://www.longpaddock.qld.gov.au/silo/point-data/.

The following summary are daily averages calculated for the last forty years, between 01/01/1984 and 31/12/2023.

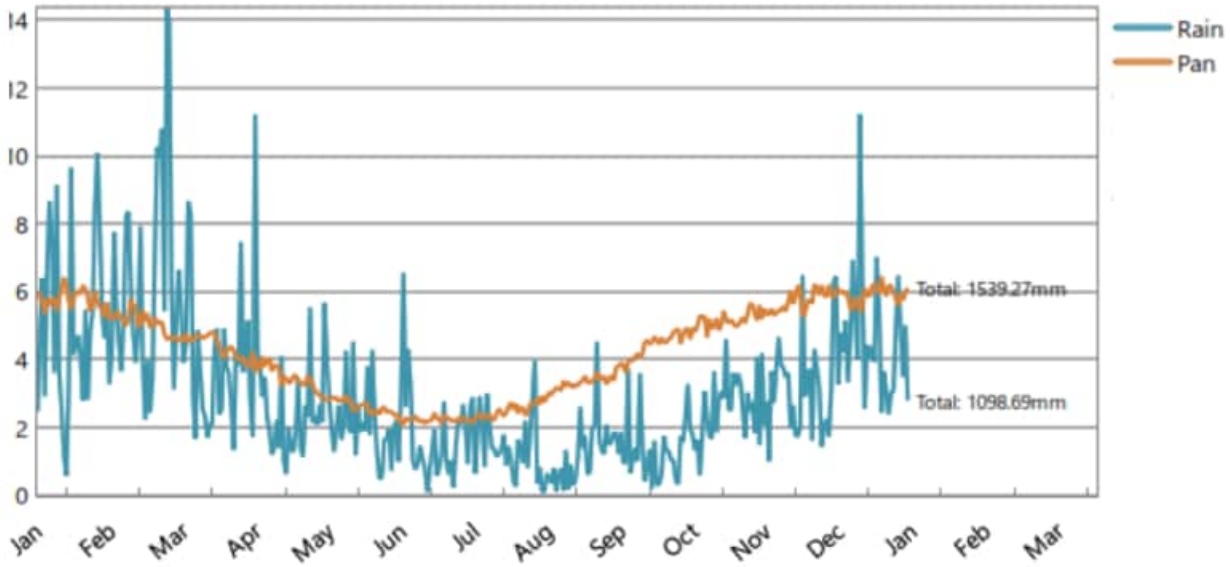


Figure 3-3. Daily average rainfall and pan evaporation across 40 years at Borumba Deer Park

Table 3-1. Climate statistics for rainfall and pan evaporation at Borumba Deer Park

	5th percentile	50th percentile (Average)	95th percentile
Rainfall (mm/year)	687	990	1721
Pan evaporation (mm/year)	1306	1552	1728

Elevation and slope gradient

The site is on a slope running NW-SE, the highest being at approximately 124m AHD and the lowest point at approximately 100m AHD. The maximum slopes at the site are ranging between 2.9 and 11%.

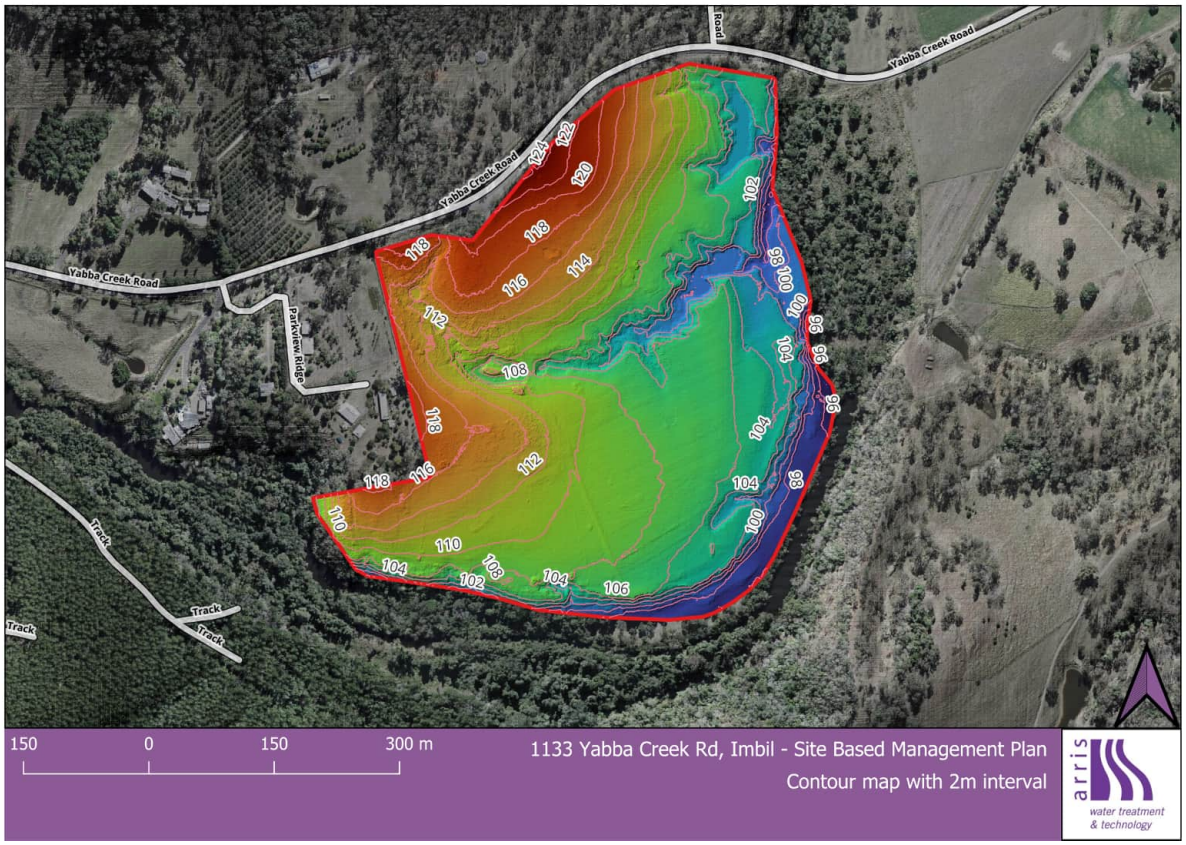


Figure 3-4. Contour map with 2m intervals

Vegetation

Most of the site is pasture other than the riparian vegetation along the tributary to Yabba Creek (in the middle of the site) and south of the property along Yabba Creek. The significance of the remnant vegetation is discussed further (in section Sensitive areas/receptors).

Soils

A desktop study has shown that a soil profile was done on the property (site 357, observation 1 of project COOL – SALI4320 report – See https://qldglobe.information.qld.gov.au/) and is a dermosol (See soil report in Appendix).
Most of the site is located within the Strategic Cropping Land overlay. The profile morphology is recorded as follows:

Table 3-2. Profile morphology for the site

Name	Upper depth	Lower depth	Texture	pH	Australian Soil Classification
A	0	0.2	Light clay	6	Black Dermosol
B	0.2	0.8	Medium heavy clay	4.5	

Furthermore, from the land resources evaluation and planning for the Coastal Burnett region survey (name of survey ABU), the site is located adjacent to a stream alluvial polygon, more particularly: “level to undulating river terraces and floodplains”.
A site inspection was done on Thursday 11th April, 2024 where soil samples were collected in three different locations on the site, at 0-15cm. The texture has been analysed as being a loam. Other soil parameters are provided in Appendix.

Site Flood Potential

The AS1547:2012 Code for On-site Domestic Wastewater Management specifies that the potential for land to be affected by floodwaters should be assessed by identifying the 1:20 year flood level on the plans. This data (1:20 year flood levels) was not available however some other information regarding flood levels is presented underneath.
As stated on the Open data portal of the Queensland Government (https://www.data.qld.gov.au/dataset/queensland-floodplain-assessment-overlay), "the Queensland Floodplain Assessment Overlay (QFAO) represents a floodplain area within drainage sub-basins in Queensland. It has been developed for use by local governments as a potential flood hazard area. It represents an estimate of areas potentially at threat of inundation by flooding. The data has been developed through a process of drainage sub-basin analysis utilising data sources including 10m contours, historical flood records, vegetation and soils mapping and satellite imagery. This data represents an initial assessment and will be subject to refinement by respective Local Government Authorities".

The floodplain overlay assessment is represented in Figure 3-5. It shows that the site is located within the floodplain and some small sections of the site are at risk of being inundated by flooding.

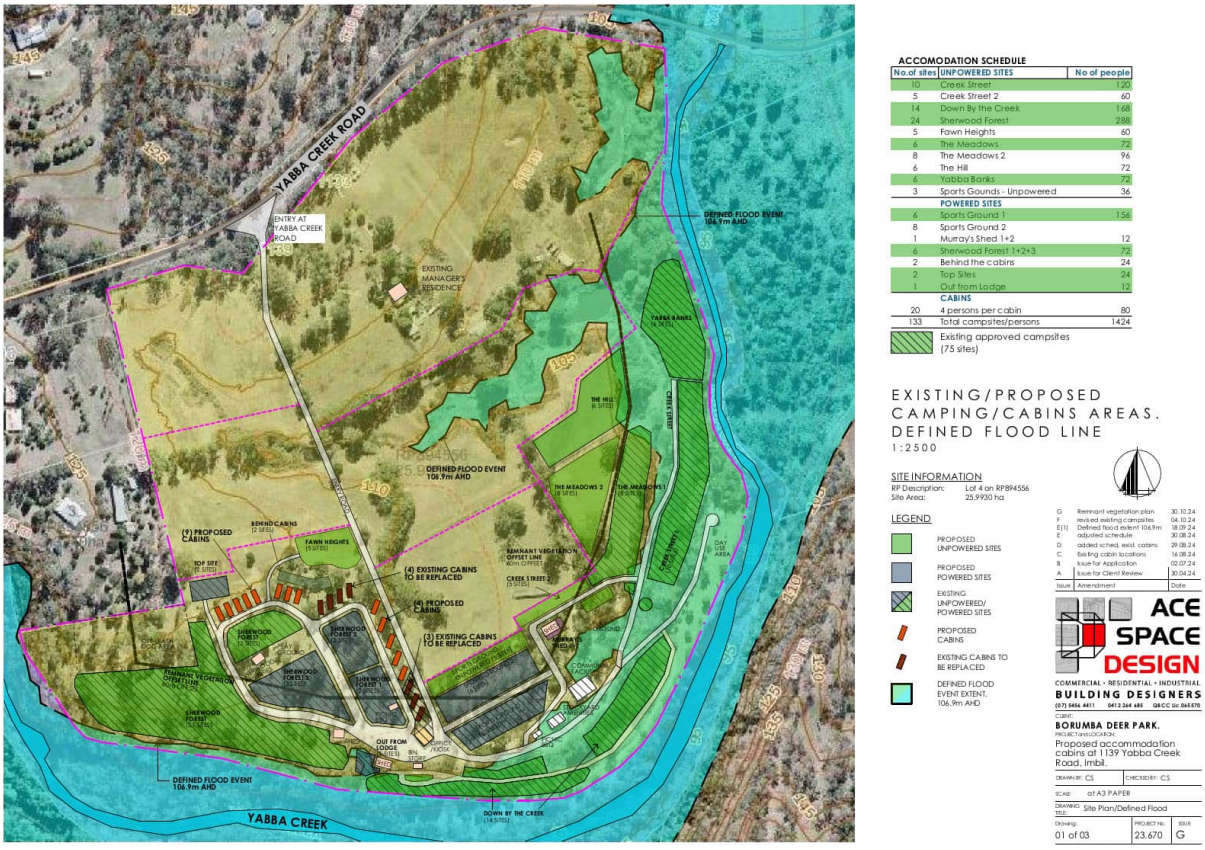
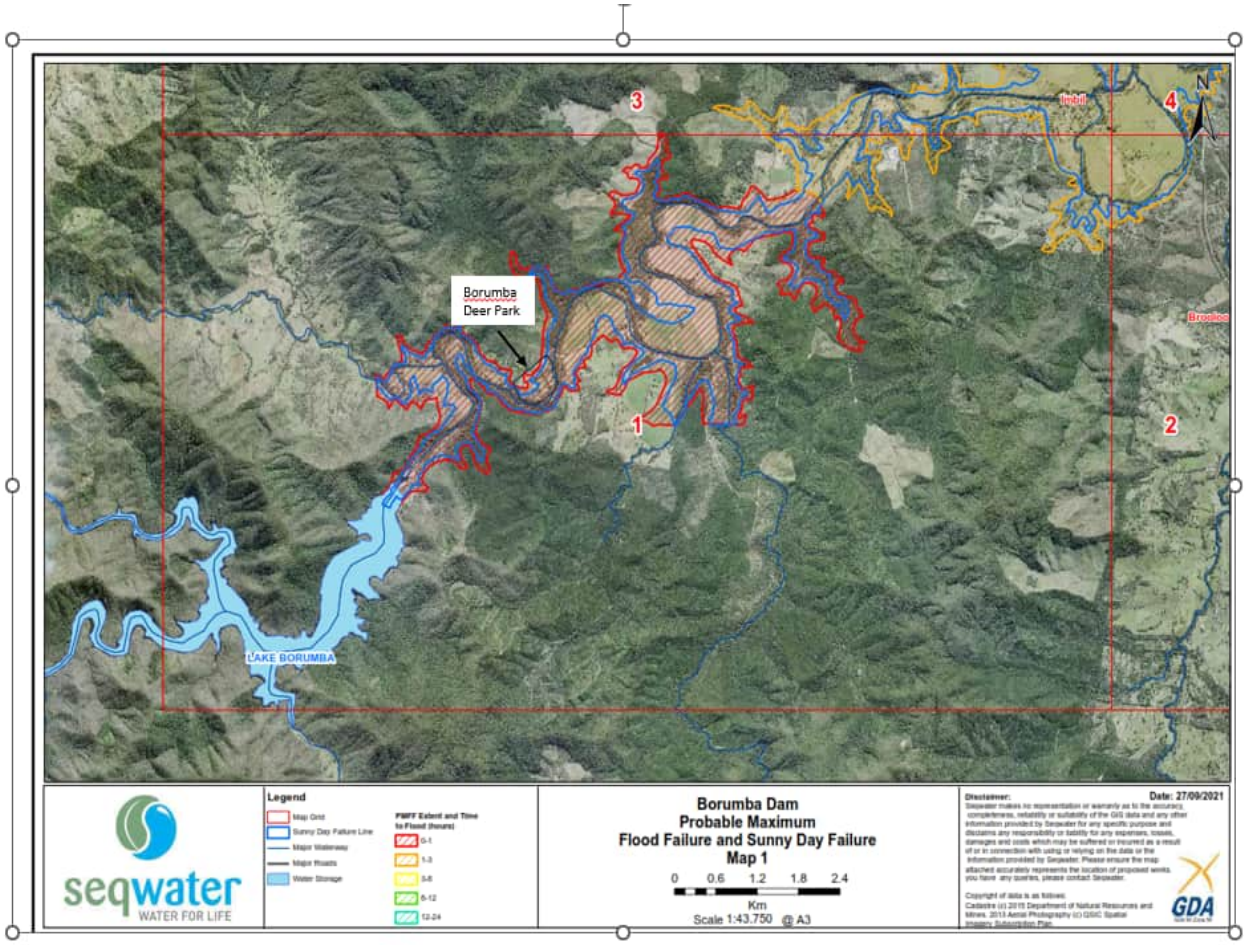


Figure 3-5. Floodplain overlay at the Borumba Deer Park

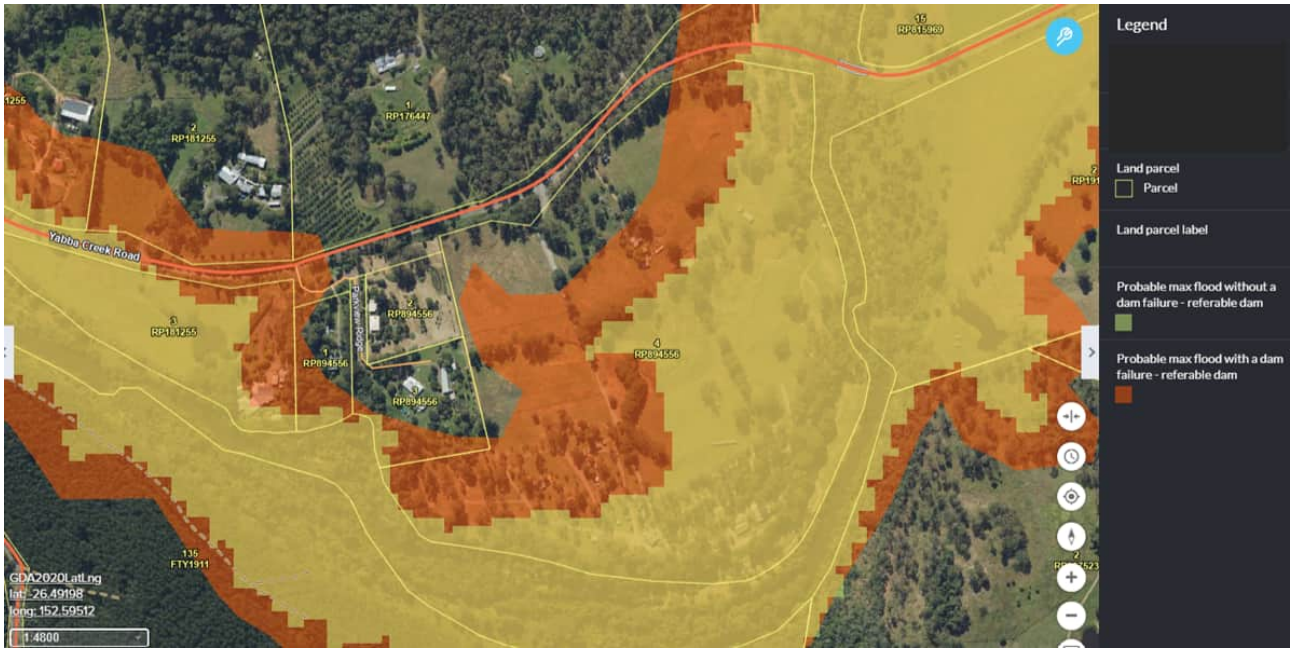
Further to this, the Borumba Dam Emergency Action Plan provides dam failure flood maps.
Caution when interpreting the map in Figure 3-5 and Figure 3-6: The maps do not represent the probability of a flood or the probability of dam failure. The following map does not represent the BDP flood risk from natural flood event that does not involve a failure of the dam.



Source: Modified from Borumba Dam Emergency Action Plan (Seqwater, 2024).

Figure 3-6. Borumba Dam Probable Maximum Flood Failure and Sunny Day failure

As specified in the Borumba Dam EAP (Seqwater, 2024), the 'Time to Flood' extents shown on the maps should be regarded as an indication only. In an actual dam failure scenario, 'Time to Flood' extents will be heavily influenced by factors that cannot be predicted with any degree of certainty. These factors include the nature of the dam failure, the speed at which the failure develops, the final size of the dam breach, and concurrent rainfall and flooding. Borumba Deer Park is located within the 0-1h time to flood.



Source: Queensland Globe – Layer: Referable dam inundation map

Figure 3-7. Probable maximum flood with (orange) and without (yellow) a dam failure

Important notice and disclaimer regarding flood maps; Borumba Deer Park is advised to seek advice from the Gympie Regional Council regarding the probable maximum flood levels. A search on the Council website (https://maps.gympie.qld.gov.au/IntraMaps23A/?project=PublicWeb&module=Town%20Planning) indicates that the designated flood level at the property is 106.9m (Lot on plan: 4RP894556).

The information presented above has been sourced from reliable sources of information: Government Department public portals and the water authority administering the Borumba dam (SEQWater). However, in no event shall Arris Pty Ltd. be liable for any special, indirect, or consequential damages or any damages whatsoever.

Surface Water and Ground Water

- Surface water

The site is bordered by Yabba Creek, a major perennial waterway, in its eastern and southern boundaries and a tributary of Yabba creek is also running through the property (see Figure 3-8). To be noted also, is the presence of a farm dam on the property. Setback distances to these waterways will have to be implemented as developed in the site-specific ERA 63 licence and will demonstrate the risk assessment as well as mitigation strategies to ensure the irrigation of treated wastewater in dedicated areas does not impact on surface water quality.

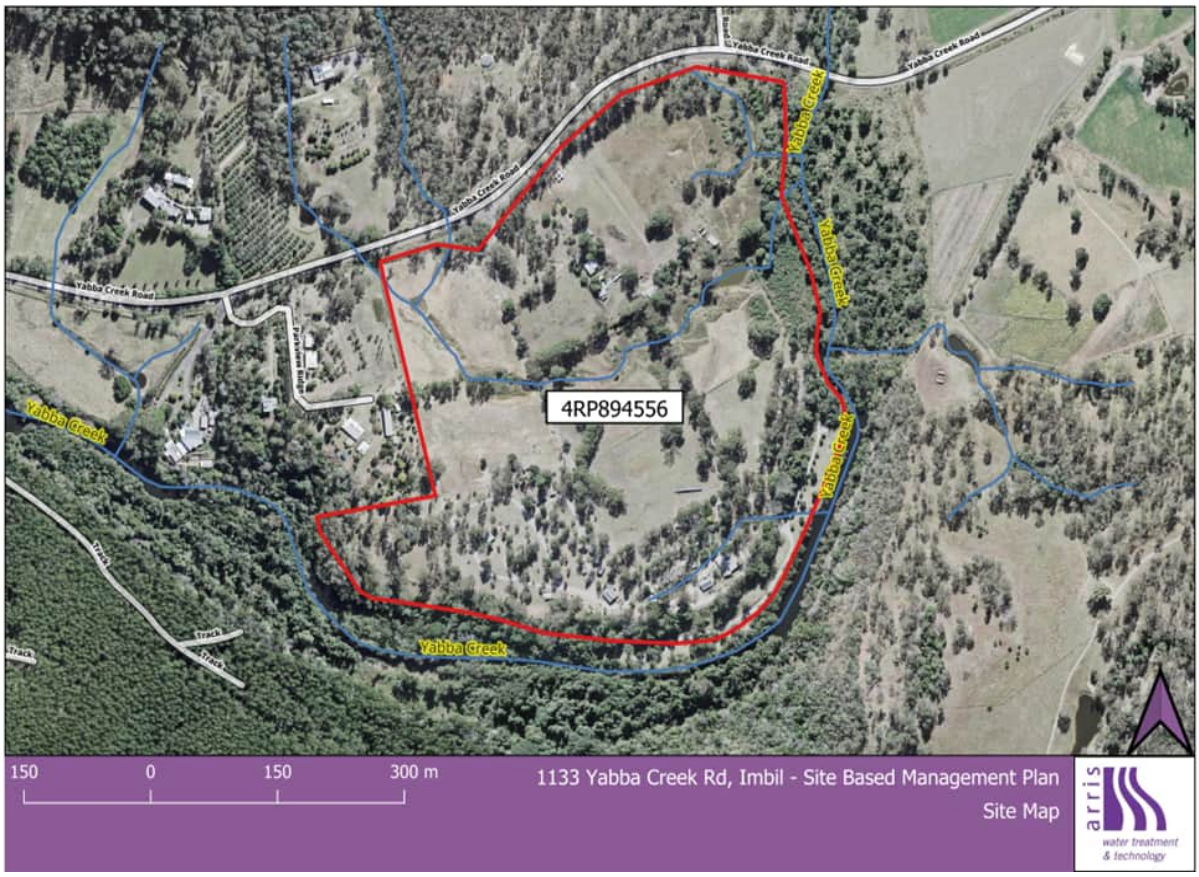


Figure 3-8. Watercourses present at and around the property (represented in blue lines)

- Groundwater

There is a registered bore located outside of the property (Figure 3-9). A buffer of 250m around the bore has been drawn as shown in the figure underneath. No irrigation will happen within this exclusion zone. The bore report does not make any mention of its purpose, nor of any results of standing water levels.

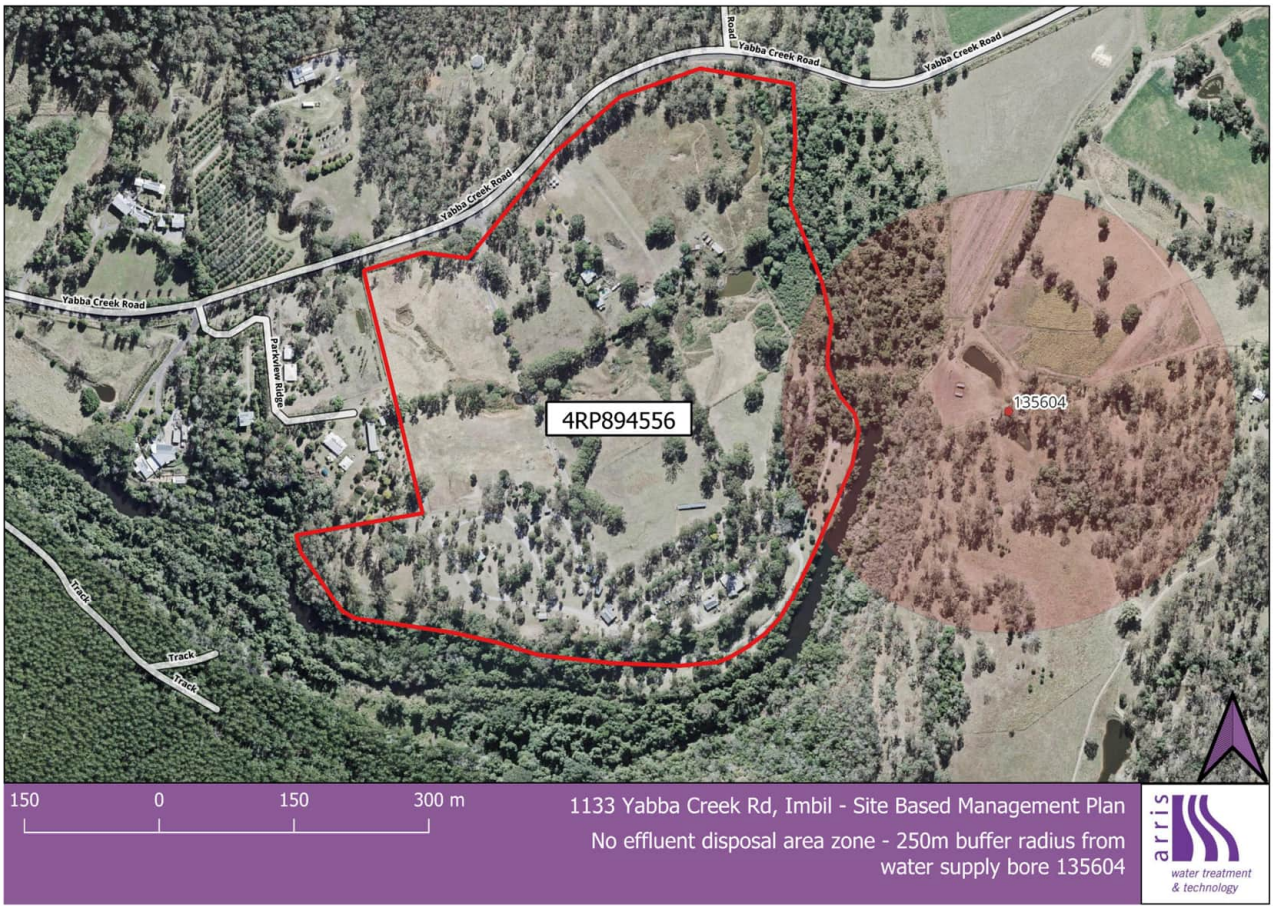


Figure 3-9. Registered bore east of the property and 250m radius buffer protection zone

Sensitive areas/receptors

The site contains some Matters of State Environmental Significance (MSES) listed below and presented in Figure 3-10.

- Wildlife habitat:
  - endangered or vulnerable (around Yabba Creek)
  - special least concern animal
- High ecological significance wetland (around Yabba Creek)
- Regulated vegetation:
  - category B: endangered or of concern: (around Yabba Creek)
  - category R: GBR Riverine (the tributary in the middle of the parcel and buffer zone surrounding it)
  - essential habitat: (around Yabba Creek)
  - intersecting a watercourse

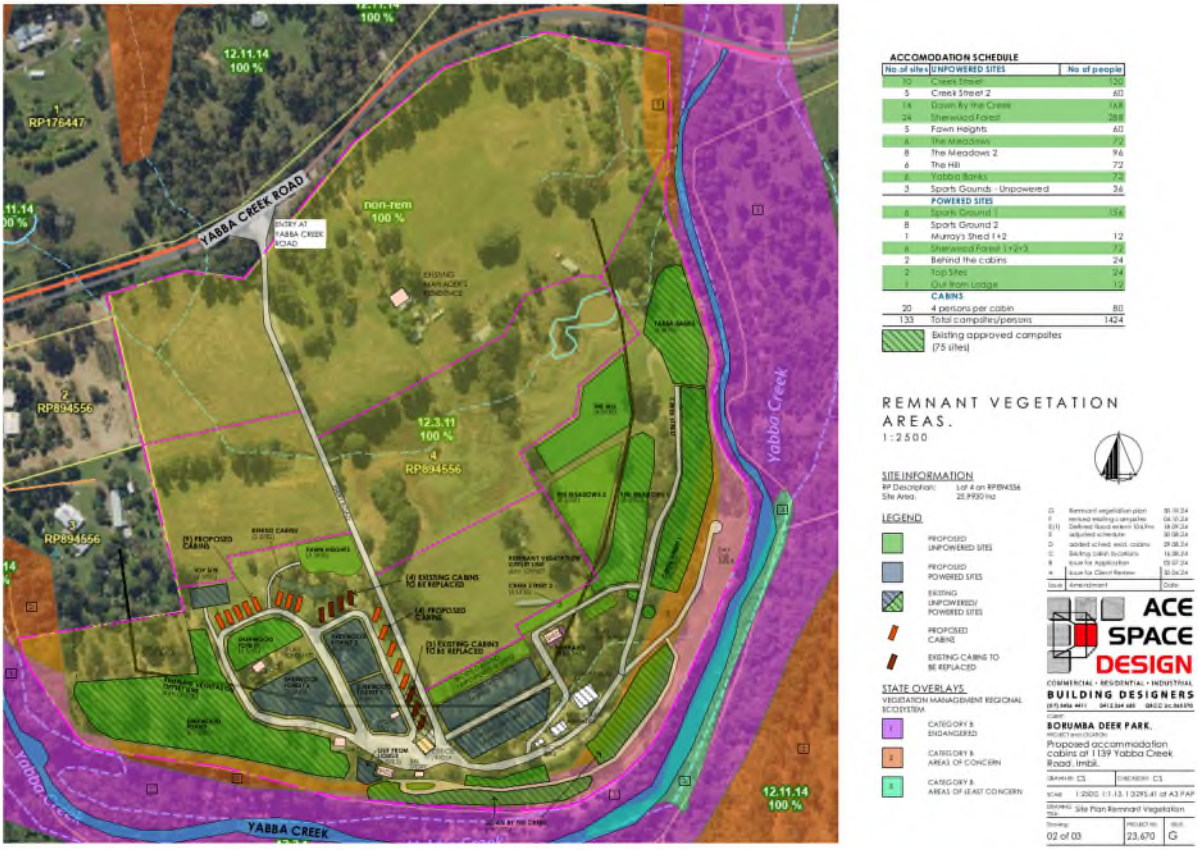


Figure 3-10. Matters of State Environmental Significance at the site

These are being managed by the Town Planning process and the engineered water cycle (drinking, wastewater, and stormwater) is being incorporated as required.

4. DRINKING WATER SYSTEM

The property has a water extraction licence from the creek of 24 megalitres per year. This water is treated to provide drinking water for the site. A new drinking water treatment plant has been recently installed at the site. The treatment system uses filtration, UV, and chlorine to meet the Australian Drinking Water Standards; see attached results in the appendices. The treatment system is capable of treating 100kL per day. The system has been installed in duplicate to provide redundancy, i.e. 2 sets of filters, UV, pumps, etc. The variable speed pumps and attached pressure vessel provide the required pressure through the distribution system throughout the site to the amenities blocks, camp kitchens, cabins, and staff facilities. There is a 5kL tank at the treatment shed that stores treated water and 4 x 22.5kL tanks plumbed together as one tank to provide 90kL of treated water storage for the site. Staff check the drinking water plant daily as per the standard operating procedures. Water quality tests are taken as required.

Figure 4-1. Overview of filtration and UV disinfection

Figure 4-2. Variable speed pump controllers, pumps and pressure vessel

Figure 4-3. Filtration and chlorine dosing on the drinking water plant

5. WASTEWATER GENERATION & MANAGEMENT

ERA 63 Process

The volume of wastewater being generated at the site requires and ERA 63 from the Queensland State Government. This process is currently underway with the relevant Regulators. Soil tests have been taken and a MEDLI model has been performed. A proposed STP design has been developed and discussions are underway in regards to the ERA 63 licence and the associated treated water quality requirements, wet weather storage, and irrigation area. To help minimise the size of the STP, wet weather storage and irrigation areas, water efficient infrastructure such as toilets, showerheads, etc are being used.

Resource Efficiency: Water Efficiency Labelling and Standards (WELS)

The Water Efficiency Labelling and Standards (WELS) scheme is Australia's urban water saving scheme. The purpose of the WELS scheme is to:

- conserve water supplies by reducing water consumption;
- promote the adoption of efficient and effective water-using and water-saving technologies;
- provide information for purchasers of water-using and water-saving products.

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- provide information for purchasers of water-using and water-saving products.

The WELS scheme has been used in the existing amenities blocks, camp kitchens, and will be implemented in the new cabins.

Inflow Water Chemistry for Treatment Technology Design

The inflow chemistry has been estimated. Based upon our experience of similar decentralised installations the wastewater will be between medium and high strength (closer to medium). See Table 5-1 and 5-2. Our predicted inlet wastewater strength is shown in Table 5-3. Chemical predictions are provided for the inlet of the tank (first treatment stage).

Table 5-1. Untreated Wastewater General Characteristics

Contaminants	Unit	Low Strength	Medium Strength	High Strength
Total Solids (TS)	mg/L	390	720	1230
Total Dissolved Solids (TDS)	mg/L	270	500	860
TDS Fixed	mg/L	160	300	520
TDS Volatile	mg/L	110	200	340
Total Suspended Solids (TSS)	mg/L	120	210	400
TSS Fixed	mg/L	25	50	85
TSS Volatile	mg/L	95	160	315
Settleable Solids	mg/L	5	10	20
Biochemical Oxygen Demand (BOD) five (5) day test	mg/L	110	190	350
Total Organic Carbon (TOC)	mg/L	80	140	260

Faecal Coliform	No/100 ml	10^{3}-10^{5}	10^{4}-10^{6}	10^{5}-10^{8}
Cryptosporidum oocysts	No/100 ml	10^{-1}-10^{0}	10^{-1}-10^{1}	10^{-1}-10^{2}
Giardia Lamblia cysts	No/100 ml	10^{-1}-10^{1}	10^{-1}-10^{2}	10^{-1}-10^{3}

We have provided an expected range of between medium and high strength due to the nature of the site, and the water efficiency measures. While water efficient Site does reduce volume it also increases the concentrations of contaminants of concern.

Table 5-2. Untreated wastewater mineral characteristics

Constituent	Increment Range mg/L
Bicarbonate (HCO3)	50-100
Carbonate (CO3)	0-10
Chloride (Cl)	20-50
Sulphate (SO4)	15-30
Calcium (Ca)	6-16
Magnesium (Mg)	4-10
Potassium (K)	7-15
Sodium (Na)	40-70+
Aluminium (Al)	0.1-0.2
Boron (B)	0.1-0.2
Fluoride (F)	0.2-0.4
Total Alkalinity (CaCO3)	60-120

Table 5-3. Inflow wastewater chemistry expected at the tank

Characteristic	Inflow Pump-Wells	Inflow Woodchip Filter
Five (5) day Biological Oxygen Demand (BOD_5)	300mg/L	150mg/L
Total Suspended Solids (TSS)	550mg/L	185mg/L
pH	5.0 -8.5	6.0 – 8.0
Total Nitrogen	70mg/L	50mg/L
Total Phosphorous	12mg/L	8mg/L
Grease and Oil	400mg/L	150mg/L
Total Dissolved Solids (TDS)	700 mg/L	650mg/L
Faecal Coliforms	10^{5}-10^{8} cfu's per 100ml	10^{3}-10^{5} cfu's per 100ml

Summary of Wastewater Management

The treatment technologies have first and foremost been selected due to their robustness and reliability. Many on-site systems fail due to 'cheap' components such as pumps and aerators. This installation uses world leading technologies with a proven track record of excellent performance in remote and regional locations. All selected technologies are energy efficient, and are able to use less energy in periods of low flow. Any facility of this nature has changes in occupancy. While care needs to be taken to ensure the development can handle the peak flows; attention also needs to be paid to energy consumption and greenhouse gas emissions during periods of low occupancy. This treatment chain has been designed to use less energy during periods of low flow.

Sewage Treatment Design Philosophy

Caravan parks and campgrounds tend to have very variable flows of wastewater generation due to changes in occupancy. Peak periods during school holidays can have significantly higher flows than off-peak periods. This makes treating the wastewater challenging as systems designed for the peak flows tend to be oversized during non-peak periods and vice-versa. We have selected technologies that are suited to variations in wastewater generation volumes. That is, the quality of the treated water will not be adversely impacted by the expected changes in wastewater generation volumes over time. The existing treatment systems will be reused as part of the new treatment system. The Manager's residence on-site wastewater treatment system will be left as a stand-alone installation.

Wastewater Treatment System Sizing Details

Sizing and influent details for the STP at Borumba Deer Park are shown in Table 5-4. The equivalent person (EP) volume has been calculated at 200 litres per EP.

Table 5-4. Inflow Wastewater Calculation in Volume and Equivalent People for Borumba Deer Park STP

Parameter	Detail	EP	Total L (200 L per EP)
Total EP and Volume	Sites + Cabins	160	32kL

The predicted design flow for the wastewater management system is 32 kL/day (Average Dry Weather Flow ADWF). This is an average volume from across the calendar year.

Sewers and Pump Stations

There are relatively small sewers at the site as the camp sites are unsewered. The existing sewers at the amenities blocks will be kept. The new cabins will have sewer lines installed to the existing amenities blocks. New pressure sewer lines from the existing treatment systems to the inlet of the new STP will be installed. The pump stations for the pressure sewer lines will be installed adjacent to the existing treatment systems.

Sewage Treatment Plant (STP)

The new STP design is currently under discussion with the relevant State Regulators as part of the ERA63 process. The proposed design is as follows:

- Wastewater enters an Anaerobic Baffled Reactor (ABR)
    - Multiple baffled septic tank
    - Suitable for variable flows
    - Reduces the risk of hydraulic surges
    - Maximises the primary treatment capacity
    - Suited to medium to high strength wastewater
- Then treated by a woodchip filter with zeolite media
    - Excellent nitrogen, BOD5, and total suspended solids (TSS) reductions

    - Also reduces phosphorus concentrations
    - Suitable for variable flows
    - Reduces the risk of hydraulic surges
    - Provides secondary treatment
- Water disinfected by a UV unit and chlorine dosing
    - Provides a dual disinfection barrier
    - Disinfection residual via the chlorine
    - UV also disinfects viruses and protozoa
- Irrigation tanks and wet weather storage
    - Allows for best practice irrigation techniques as per the MEDLI model
    - Wet weather storage ensures no irrigation during wet periods
    - Will allow for pump-outs
        - Will have level sensor and basic SCADA communications to notify if a pump-out is required

The MEDLI model has been completed and the new irrigation and wet weather storage tanks have been installed.

Figure 5-1. Combination irrigation and wet weather storage tanks

6. MEDLI MODEL SUMMARY

Objective

MEDLI modelling or wastewater irrigation at the Borumba Deer Park was conducted. The objective of this is to:

i. propose suitable scenarios for the management of the wastewater dispersal area that provides acceptable and sustainable environmental outcomes; and

ii. compare different scenarios for the BDP Management to make a decision on preferred irrigation plan.

This phase of the project relies on MEDLI modelling where the outputs provide estimates of parameters used to assess the risk to the environment, effluent reuse rate, concentration of nutrients in deep drainage, and pasture health.

Scenarios tested

Main input variables

For the MEDLI modelling, the following options (inputs) have been considered and tested:

1) Plant cover:
- Vetiver grass
- Lucerne

2) Irrigation type:
   - Subsurface drip
   - Fixed sprinkler

3) Balance tank size
   - 40kL
   - 50kL
   - 60kL

4) Irrigation land area
   - 6ha
   - 7ha
   - 8ha
   - 9ha
   - 10ha
   - 11ha
   - 12ha

Other (non-variable) inputs

1) Climate data: retrieved from SILO for Borumba (-26.50°, 152.60°).
2) Soil: based on information from the Soil and Landscape Grid of Australia, the soil profile has been modelled as 1250mm depth with three layers. First layer is a clay loam, second and third layer are both light clays.
3) Flow volumes: average 8.6 ML/a.
4) Treated effluent wastewater nutrient concentration:
   - Average effluent concentrations: 50mg/L total Nitrogen, 15mg/L Phosphorus, EC 0.625dS/m
5) Irrigation rate:
   - 4mm/d

The soil parameters in Table 6-1 were estimated from the Soil and Landscape of Australia and MEDLI user manual guide, based on the texture measured and other information that were site specific.

Table 6-1. Soil hydraulic properties and layers

	Layer 1 (clay loam)	Layer 2 (Light clay)	Layer 3 (Light clay)
Depth (cm)	0-20	20-80	80-125

Thickness (cm)	20	60	45
Air Dry (%/v)	2	3.2	3.7
Lower storage limit (%/v)	15	20	15
Drained upper limit (%/v)	30	30	30
Saturated water content (%/v)	46	38	38
Bulk Density (g/cm^3)	1.4	1.6	1.6
Porosity (%/v)	46	38	38
K_{sat} (mm/h)	5	2.5	2.5

Outputs

Indicators of performance

The main outputs of the modelling reported here are:

- Effluent reuse (percentage): Indicates the amount actually used for irrigations compared to the amount of water entering the pond. Ideally, effluent reuse >95%.
- Delta soil N (kg/ha/y): The amount of total N left in the soil between N input and output (through plant uptake or losses via runoff or deep drainage). Generally, crop uptake (output) is more than inputs from irrigation, i.e., delta N is negative. A negative delta can be corrected through an appropriate fertilisation practice which in turn will improve crop health if N stress index is a concern.
- N leaching: < 5kg/ha/y
- Nitrate concentration of deep drainage: <5mg/L should be fine
- P leaching: May not occur but <1kg/ha/y is acceptable
- P storage life: >25y
- Average rootzone salinity (dS/m): Needs to be less than crop's salinity threshold
- Average dry matter yield (t/ha/y): In the range of 5 to 25 t/ha/y
- Shoot N concentration (fraction): ≥1%dwt
- Shoot P concentration (fraction): ≥1%dwt

The outputs are shown in the following three tables, grouped per plant cover and irrigation type: Vetiver grass with subsurface drip irrigation, lucerne with subsurface irrigation and lucerne with sprinkler irrigation. Various indicators of performance are discussed depending on the scenario and plant considered.

Main results

Effluent reuse is excellent (97%~99%) for both plants under all scenarios, showing the site has sufficient area to accommodate the flow. The main variable that governs effluent reuse rate is wastewater storage volume, i.e., the size of balance tank., where a larger balance tank increases reuse rate. The size of land application area and irrigation type do not affect effluent reuse rate.

Delta soil N is negative under all scenarios. Fertilisation practice may be required to improve crop health if N stress index is a concern.

N leaching under all scenarios is far less than 5kg/ha/y.

Nitrate concentration of deep drainage is far less than 5mg/L under all scenarios.

P leaching occurs but is less than1kg/ha/y.

P storage life under all scenarios is far greater than 25 years, and there is a positive correlation between P storage life and size of land application area.

Average rootzone salinity is less than plants' salinity threshold (8dS/m for vetiver grass; 1.5dS/m for lucerne). Average salinity decreases as size of land application area increases.

Average dry matter yield for both plants are considered in the normal range. Vetiver grass produces a higher yield than lucerne.

Shoot N concentration is equal to 1% dry matter weight for both plants.

Shoot P concentration is equal to or greater than 1% dry matter weight for both plants.

Table 6-2. MEDLI scenarios tested and results for vetiver grass with subsurface irrigation

Irrigation	Plant	WW storage (m^3)	Land area (ha)	Effluent reuse (fraction)	Delta soil N (kg/ha/y)	N leaching (kg/ha/y)	Nitrate concentration of deep drainage (mg/L)	P leaching (kg/ha/y)	P storage life (y)	Average rootzone salinity (dS/m) < plant threshold	Salinity at base of rootzone (dS/m)	Average dry matter yield (t/ha/y)	Shoot N conc. (fraction)	Shoot P conc. (fraction)
				>95%		*<5kg/ha/y*	*<5mg/L*	*<1kg/ha/y*	*>25y*	*Vetiver 8*		*5 to 25 t/ha/y*	*≥1% dwt*	*≥0.1% dwt*
Subsurface Drip	**Vetiver**	**40**	6	0.97	-96.14	1.18	0.63	0.03	81.95	0.11	0.72	24.5	0.01	0.001
			7	0.97	-95.91	1.15	0.62	0.02	90.96	0.1	0.65	23.8	0.01	0.001
			8	0.97	-95.73	1.13	0.64	0.02	96.29	0.1	0.64	23.04	0.01	0.001
			9	0.97	-95.46	1.12	0.63	0.02	104.57	0.09	0.57	22.43	0.01	0.001
			10	0.97	-95.57	1.11	0.65	0.02	107.73	0.09	0.59	22.03	0.01	0.001
			11	0.97	-95.28	1.1	0.63	0.02	116.26	0.08	0.52	21.48	0.01	0.001
			12	0.97	-95.24	1.09	0.63	0.02	119.26	0.08	0.48	21.21	0.01	0.001
Subsurface Drip	**Vetiver**	**50**	6	0.99	-96.17	1.18	0.63	0.03	81.53	0.11	0.73	24.5	0.01	0.001
			7	0.99	-95.91	1.16	0.62	0.03	90.51	0.1	0.65	23.9	0.01	0.001
			8	0.99	-95.73	1.13	0.64	0.02	95.82	0.1	0.64	23	0.01	0.001
			9	0.99	-95.46	1.12	0.63	0.02	104.09	0.09	0.57	22.4	0.01	0.001
			10	0.99	-95.5	1.11	0.64	0.02	107.5	0.09	0.59	22.05	0.01	0.001
			11	0.99	-95.27	1.1	0.63	0.02	115.86	0.08	0.53	21.49	0.01	0.001
			12	0.99	-95.25	1.09	0.63	0.02	118.8	0.08	0.48	21.22	0.01	0.001

Table 6-3. MEDLI scenarios tested and results for lucerne with subsurface irrigation

Irrigation	Plant	WW storage (m^3)	Land area (ha)	Effluent reuse (fraction)	Delta soil N (kg/ha/y)	N leaching (kg/ha/y)	Nitrate concentration of deep drainage (mg/L)	P leaching (kg/ha/y)	P storage life (y)	Average rootzone salinity (dS/m) < plant threshold	Salinity at base of rootzone (dS/m)	Average dry matter yield (t/ha/y)	Shoot N conc. (fraction)	Shoot P conc. (fraction)
				>95%		*<5kg/ha/y*	*<5mg/L*	*<1kg/ha/y*	*>25y*	*Lucerne 1.5*		*5 to 25 t/ha/y*	*≥1% dwt*	*≥0.1% dwt*
Subsurface Drip	**Lucerne**	**40**	6	0.97	-94.42	0.41	0.25	0.02	80.99	0.12	0.8	13.17	0.01	0.002
			7	0.97	-94.27	0.39	0.25	0.02	88.52	0.11	0.73	12.63	0.01	0.002
			8	0.97	-94.09	0.37	0.24	0.02	95.01	0.11	0.69	12.32	0.01	0.002
			9	0.97	-94.01	0.36	0.24	0.02	100.95	0.1	0.64	11.98	0.01	0.002
			10	0.97	-93.92	0.35	0.23	0.02	106.33	0.09	0.61	11.77	0.01	0.002
			11	0.97	-93.88	0.35	0.23	0.02	111.23	0.09	0.58	11.55	0.01	0.002
			12	0.97	-93.87	0.33	0.23	0.02	115.75	0.08	0.56	11.41	0.01	0.002
Subsurface Drip	**Lucerne**	**50**	6	0.99	-94.43	0.41	0.25	0.02	80.58	0.12	0.79	13.17	0.01	0.002
			7	0.99	-94.28	0.39	0.25	0.02	88.08	0.11	0.73	12.63	0.01	0.002
			8	0.99	-94.12	0.38	0.24	0.02	94.6	0.11	0.68	12.29	0.01	0.002
			9	0.99	-94.02	0.36	0.24	0.02	100.5	0.1	0.64	11.98	0.01	0.002
			10	0.99	-93.93	0.35	0.23	0.02	105.87	0.09	0.61	11.77	0.01	0.002
			11	0.99	-93.89	0.35	0.23	0.02	110.77	0.09	0.58	11.56	0.01	0.002
			12	0.99	-93.88	0.34	0.23	0.02	115.29	0.08	0.56	11.42	0.01	0.002
Subsurface Drip	**Lucerne**	**60**	6	0.99	-94.46	0.43	0.26	0.02	80.47	0.12	0.78	13.12	0.01	0.002
			7	0.99	-94.28	0.4	0.25	0.02	87.94	0.11	0.73	12.63	0.01	0.002
			8	0.99	-94.12	0.38	0.24	0.02	94.46	0.11	0.68	12.29	0.01	0.002
			9	0.99	-94.02	0.36	0.24	0.02	100.35	0.1	0.64	12	0.01	0.002
			10	0.99	-93.93	0.35	0.23	0.02	105.73	0.09	0.61	11.77	0.01	0.002
			11	0.99	-93.89	0.35	0.23	0.02	110.62	0.09	0.58	11.55	0.01	0.002
			12	0.99	-93.88	0.34	0.23	0.02	115.14	0.08	0.56	11.43	0.01	0.002

Table 6-4. MEDLI scenarios tested and results for lucerne with sprinkler irrigation

Irrigation	Plant	WW storage (m^3)	Land area (ha)	Effluent reuse (fraction)	Delta soil N (kg/ha/y)	N leaching (kg/ha/y)	Nitrate concentration of deep drainage (mg/L)	P leaching (kg/ha/y)	P storage life (y)	Average rootzone salinity (dS/m) < plant threshold	Salinity at base of rootzone (dS/m)	Average dry matter yield (t/ha/y)	Shoot N conc. (fraction)	Shoot P conc. (fraction)
				>95%		*<5kg/ha/y*	*<5mg/L*	*<1kg/ha/y*	*>25y*	*Lucerne 1.5*		*5 to 25 t/ha/y*	*≥1% dwt*	*≥0.1% dwt*
Sprinkler	**Lucerne**	**40**	6	0.97	-94.95	0.41	0.25	0.02	81.02	0.12	0.79	12.93	0.01	0.002
			7	0.97	-94.28	0.38	0.24	0.02	88.52	0.11	0.73	12.43	0.01	0.002
			8	0.97	-94.12	0.37	0.24	0.02	95.05	0.11	0.68	12.14	0.01	0.002
			9	0.97	-94.01	0.36	0.23	0.02	100.95	0.1	0.64	11.84	0.01	0.002
			10	0.97	-93.94	0.35	0.23	0.02	106.31	0.09	0.61	11.61	0.01	0.002
			11	0.97	-93.9	0.34	0.23	0.02	111.24	0.08	0.58	11.43	0.01	0.002
			12	0.97	-93.86	0.33	0.23	0.02	115.75	0.08	0.56	11.29	0.01	0.002
Sprinkler	**Lucerne**	**50**	6	0.99	-94.46	0.41	0.25	0.02	80.6	0.12	0.79	12.94	0.01	0.002
			7	0.99	-94.27	0.39	0.25	0.02	88.08	0.11	0.73	12.46	0.01	0.002
			8	0.99	-94.12	0.37	0.24	0.02	94.61	0.11	0.68	12.14	0.01	0.002
			9	0.99	-94.01	0.36	0.23	0.02	100.5	0.1	0.64	11.85	0.01	0.002
			10	0.99	-93.94	0.35	0.23	0.02	105.87	0.09	0.61	11.65	0.01	0.002
			11	0.99	-93.9	0.34	0.23	0.02	110.78	0.09	0.58	11.44	0.01	0.002
			12	0.99	-93.83	0.33	0.23	0.02	115.25	0.08	0.56	11.32	0.01	0.002
Sprinkler	**Lucerne**	**60**	6	0.99	-94.46	0.42	0.25	0.02	80.47	0.12	0.78	12.94	0.01	0.002
			7	0.99	-94.27	0.39	0.25	0.02	87.94	0.11	0.73	12.46	0.01	0.002
			8	0.99	-94.12	0.37	0.24	0.02	94.46	0.11	0.68	12.14	0.01	0.002
			9	0.99	-94.02	0.36	0.23	0.02	100.35	0.1	0.64	11.85	0.01	0.002
			10	0.99	-93.94	0.35	0.23	0.02	105.73	0.09	0.61	11.65	0.01	0.002
			11	0.99	-93.9	0.34	0.23	0.02	110.63	0.09	0.58	11.44	0.01	0.002
			12	0.99	-93.87	0.33	0.23	0.02	115.15	0.08	0.56	11.3	0.01	0.002

MEDLI Summary

MEDLI modelling indicates that both vetiver grass and lucerne are suitable for sustainable irrigation management. Tables 6-2 to 6-3 above shows that with different sizes of land application area tested in the MEDLI model, all scenarios pose minimum or no risks to the environment. Two plants produce different dry weight yield however both may require an appropriate fertilisation program to alleviate nitrogen deficiency in the crop as the modelling suggests that nitrogen in soil plus wastewater may not be sufficient to meet crop nitrogen demand.

Conclusion

The drinking water system is capable of treating the required volumes of water for the site to the Australian Drinking Water guidelines. An ERA 63 licence is in the process of being obtained for the site. As part of this process the STP is being upgraded to provide treatment to the required standard. A MEDLI model has been performed that shows that sustainable irrigation is achievable at the site and the appropriate combination irrigation and wet weather storage tanks have already been installed.

7. REFERENCES

Gympie Regional Council Public mapping scheme. Accessed 31/10/2024.
PublicWeb > Town Planning
Seqwater, 2024. Borumba Dam Emergency Action Plan – Version 10.1. Expires 1st June 2027.

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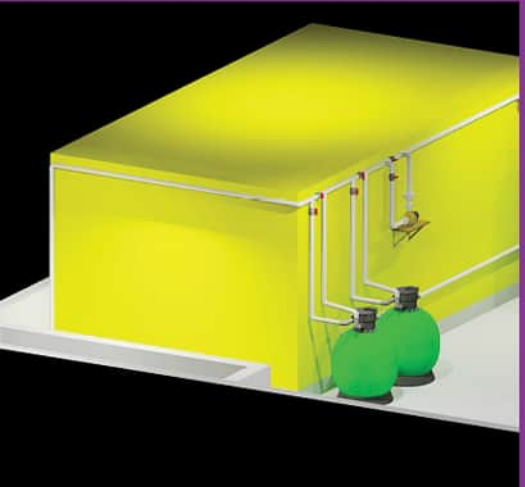
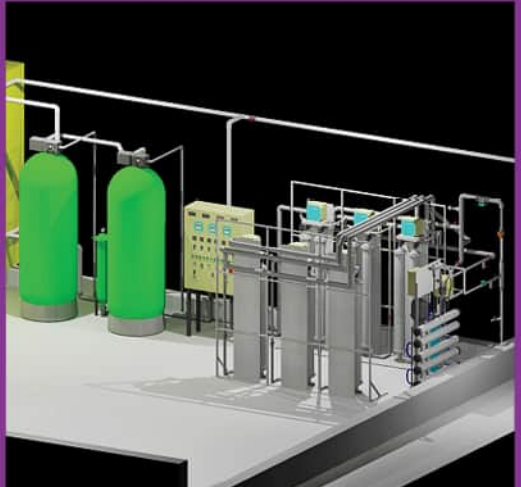
Borumba Deer Park
Water Management Plan
Appendicies






APPENDIX LIST

Appendix A: Soil Test Results

Appendix B: Water Test Results

Appendix C: Arris Strategic Partners & Major Client List

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Appendix A:

Borumba Deer Park - Soil Test Results

Phone Office/Lab (02) 6775 1157

email: lanfaxlabs@bigpond.com.au
Website: http://www.lanfaxlabs.com.au
Lab address: 493 Old Inverell Road
Postal address: PO Box 4690 Armidale NSW 2350
Director: Dr Robert Patterson CPSS
Soil Scientists and Environmental Engineers

Lanfax Laboratories
ABN 72 212 385 096
Quality Assurance and Quality Control by Approved Methods

Analysis of Soil Sample for Wastewater System Design

Client... Arris Pty Ltd, Rockhampton *Date*....3rd May 2024
Soil sample received 24th April 2024 *Analysis completed*. 3rd May 2024
Soil sample date: 15th April 2024
Source of soil: Property –irrigation area

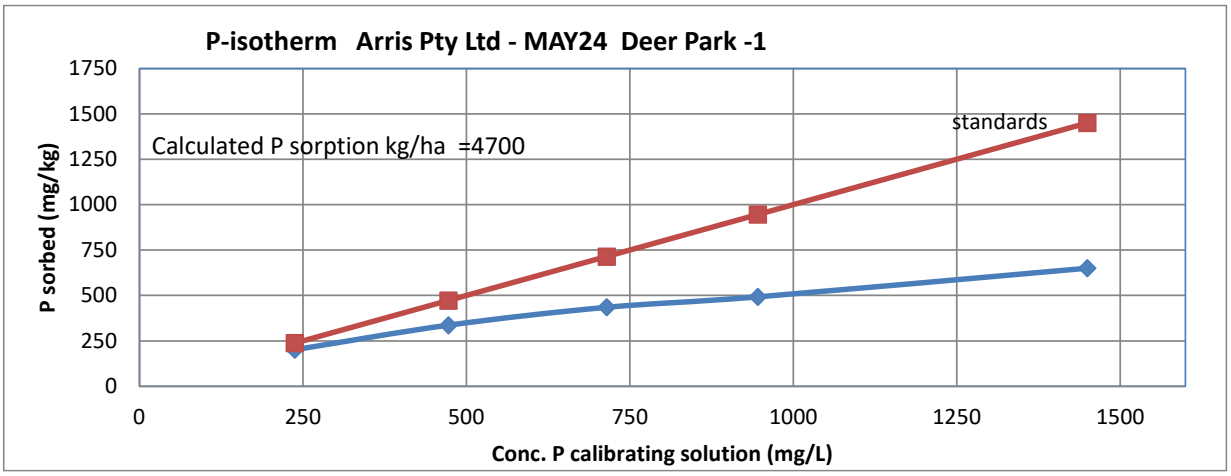
RESULTS – Deer Park

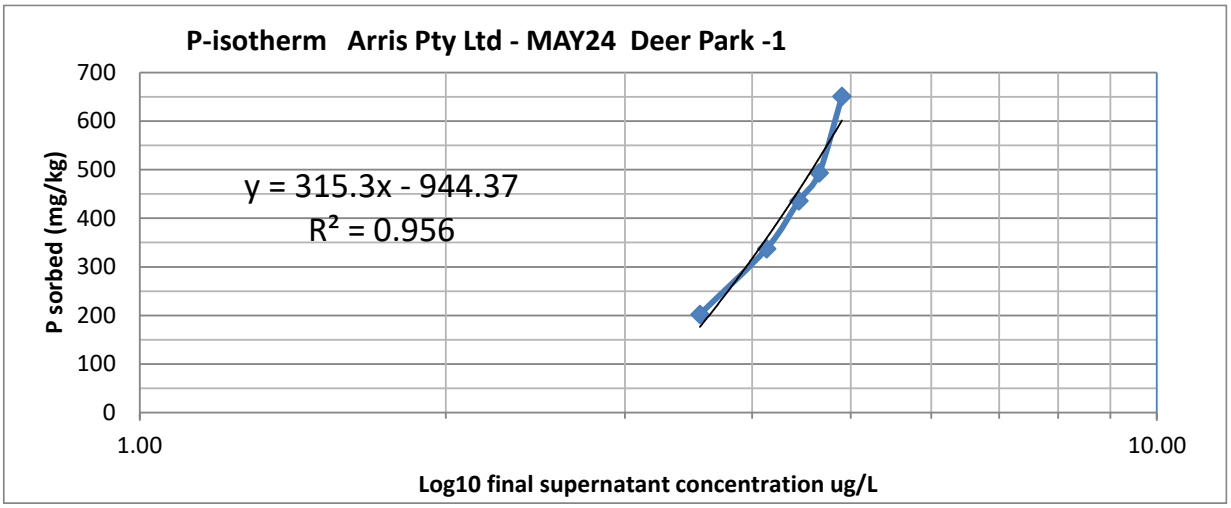
(all units in milligrams per kilogram unless otherwise stated)

Parameter /Sample No.	Deer Park -1	Deer Park -2	Deer Park -3	Method
Client reference no.				
pH 1:5 in water	5.87	5.89	6.11	4A1
pH 1:5 in $CaCl_2$	4.88	4.88	5.39	4B1
E.C. (uS/cm)	123	109	160	3A1
Salinity hazard	Non-saline	Non-saline	Non-saline	EC/texture class'n
Exch. calcium (mg kg^{-1})	996	1019	1828	15D3
Exch. potassium (mg kg^{-1})	323	306	719	15D3
Exch. magnesium (mg kg^{-1})	570	480	604	15D3
Exch. sodium (mg kg^{-1})	165	164	67	15D3
Exch. acidity (cmol(+) kg^{-1})	0.4	0.4	0.2	15 G1.
Cation Exchange Capacity (meq+/100g)	11.6	10.9	16.5	calculation
Exch. Sodium Percentage	6.2	6.4	1.8	
Sodicity	Slightly-sodic	Slightly-sodic	Non-sodic	
Base Saturation (%)	96.6	96.3	98.5	
Ca: Mg ratio	1.0	1.3	1.8	
Field Texture	Loam	Loam	Loam	Northcote 1979
Soil Colour (moist)	10YR 4/1 brownish grey	10YR 4/3 dull yellowish brown	10YR 4/2 greyish yellow brown	Munsell Colour
Permeability Class	3	3	3	AS/NZS 1547:2000
LTAR (trenches) mm/day	15-25	15-25	15-25	AS/NZS 1547:2000
DLR (irrigation) mm/day	4.0	4.0	4.0	AS/NZS 1547:2000
Initial dispersion test	Water stable, swell	Water stable, swell	Water stable, swell	SAR5, EC 1 dS/m
Emerson's Aggregate Test	Class 7	Class 7	Class 7	

Reference: Rayment, G.E. and Lyons, D. J.(2011) *Soil Chemical Methods - Australasia.* CSIRO Publishing. Canberra. All methods in accordance with accreditation procedures.

NOTE: The dispersion test is done in solution that represents domestic wastewater, with sodium adsorption ratio of 5 and EC of 1 dS/m. See the attached sheet for explanation.
w/s = water stable in SAR5, EC 1 dS/m solution
Slake - severity of slaking 1,2 or 3. Reported slaking means no dispersion.





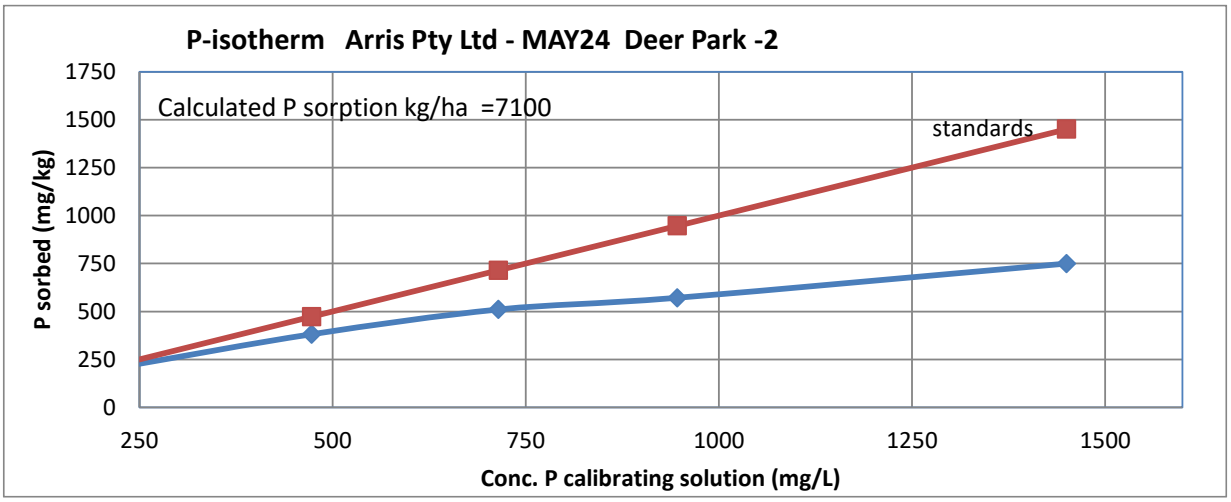
Percent sorbed is the proportion of the initial P sorbed during equilibration

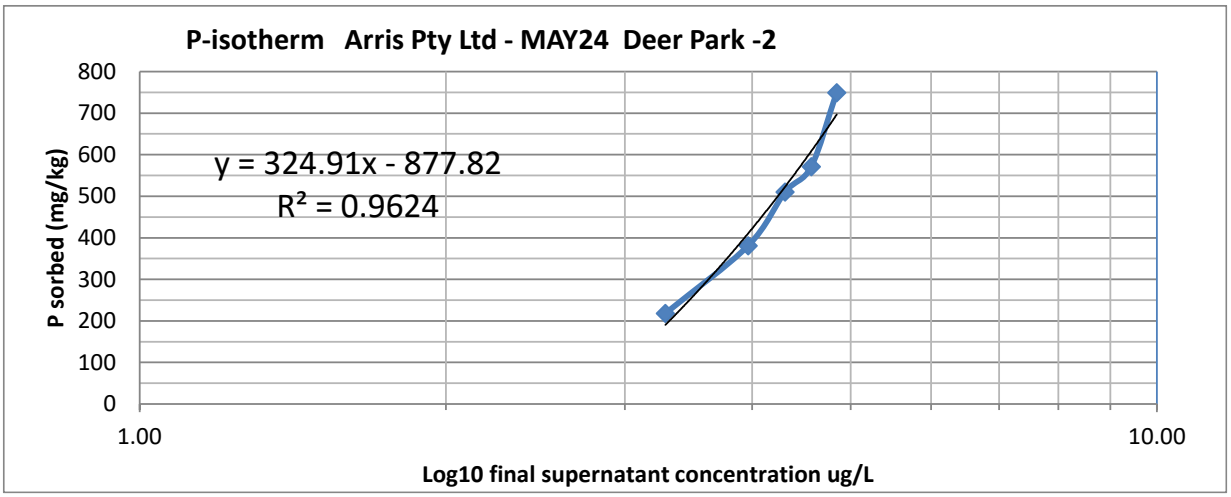
Initial P	filtrate	sorbed P	Sample	Percent
mgP/L	P	mg/kg	I.D.	sorbed
	mg/L			(%)
23.8	3.58	201.8	Arris Pty Ltd - MAY24	84.9
47.3	13.58	337.1	Deer Park -1	71.3
71.5	27.95	435.4		60.9
94.6	45.33	492.9		52.1
145.0	79.94	650.6		44.9

Calculated P sorption kg/ha = 4700

P-isotherm Arris Pty Ltd - MAY24 Deer Par

Std line	filtrate	X-axis	Y-axis
	C	Log C	
	ugP/L		
238	3584	3.55	201.8
473	13581	4.13	337.1
715	27946	4.45	435.4
946	45329	4.66	492.9
1450	79938	4.90	650.6



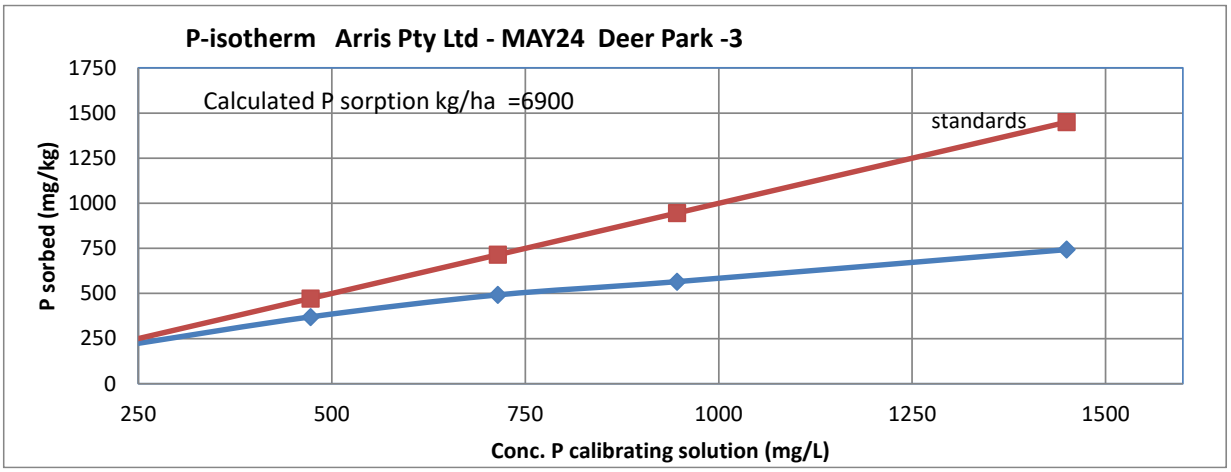


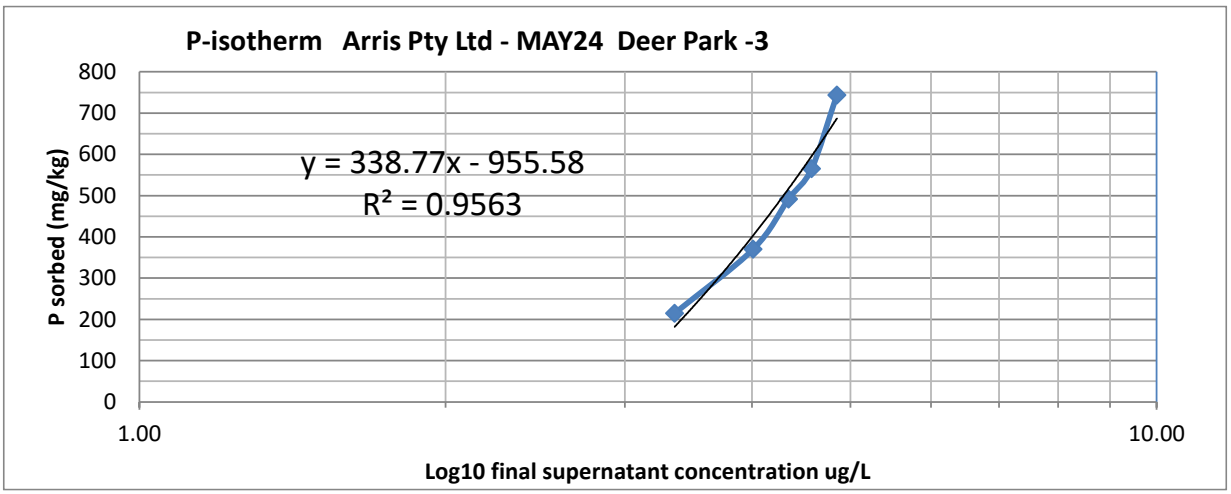
Percent sorbed is the proportion of the initial P sorbed during equilibration

Initial P	filtrate	sorbed P	Sample	Percent
mgP/L	P	mg/kg	I.D.	sorbed
	mg/L			(%)
23.8	1.94	218.3	Arris Pty Ltd - MAY24	91.8
47.3	9.22	380.7	Deer Park -2	80.5
71.5	20.50	509.9		71.3
94.6	37.54	570.9		60.3
145.0	70.08	749.2		51.7
Calculated P sorption kg/ha =			7100	

P-isotherm Arris Pty Ltd - MAY24 Deer Par

Std line	filtrate	X-axis	Y-axis
	C	Log C	
	ugP/L		
238	1940	3.29	218.3
473	9216	3.96	380.7
715	20497	4.31	509.9
946	37535	4.57	570.9
1450	70079	4.85	749.2





Percent sorbed is the proportion of the initial P sorbed during equilibration						P-isotherm Arris Pty Ltd - MAY24 Deer Par			
Initial P	filtrate	sorbed P	Sample	Percent		Std line	filtrate	X-axis	Y-axis
mgP/L	P	mg/kg	I.D.	sorbed			C	Log C	
	mg/L			(%)			ugP/L		
23.8	2.28	214.8	Arris Pty Ltd - MAY24	90.4		238	2281	3.36	214.8
47.3	10.28	370.1	Deer Park -3	78.3		473	10278	4.01	370.1
71.5	22.28	492.1		68.8		715	22277	4.35	492.1
94.6	38.06	565.6		59.8		946	38063	4.58	565.6
145.0	70.63	743.7		51.3		1450	70634	4.85	743.7
Calculated P sorption kg/ha =			6900						

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Appendix B:

Borumba Deer Park – Water Test Results

Ecoscope Environmental P/L
PO Box 3338
Rockhampton
QLD 4701

NATA Accredited
Accreditation Number 1261
Site Number 20794 & 2780

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Ecoscope Laboratory**

Report **1106219-W**
Project name ARRIS060624.DPP
Received Date Jun 11, 2024

Client Sample ID			**DP DRINKING WATER**
Sample Matrix			**Water**
Eurofins Sample No.			**B24-Jn0021793**
Date Sampled			**Jun 06, 2024**
Test/Reference	LOR	Unit	
Chloride	1	mg/L	38
Colour(Pt/Co) true	2	Pt/Co unit	12
Conductivity (at 25 °C)	10	uS/cm	300
Fluoride	0.5	mg/L	0.6
Nitrate & Nitrite (as N)	0.05	mg/L	0.15
Nitrate (as N)	0.02	mg/L	0.14
Nitrite (as N)	0.02	mg/L	< 0.02
pH (at 25 °C)	0.1	pH Units	8.1
Reactive Silica (as SiO2)	2	mg/L	18
Sulphate (as SO4)	5	mg/L	< 5
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	180
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4
Total Nitrogen (as N)*	0.2	mg/L	0.6
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	< 5
Turbidity	1	NTU	1.9
Hardness mg equivalent CaCO3/L	5	mg/L	89
Phosphate total (as P)	0.01	mg/L	0.02
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	100
Carbonate Alkalinity (as CaCO3)	20	mg/L	< 20
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20
Total Alkalinity (as CaCO3)	20	mg/L	100
Heavy Metals			
Aluminium	0.05	mg/L	0.12
Arsenic	0.001	mg/L	0.001
Barium	0.005	mg/L	0.011
Beryllium	0.001	mg/L	< 0.001
Boron	0.05	mg/L	0.06
Cadmium	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	0.001
Cobalt	0.001	mg/L	< 0.001
Copper	0.001	mg/L	0.15
Iron	0.05	mg/L	0.19
Lead	0.001	mg/L	< 0.001
Manganese	0.005	mg/L	0.015
Mercury	0.0001	mg/L	< 0.0001

Client Sample ID			DP DRINKING WATER
Sample Matrix			**Water**
Eurofins Sample No.			**B24-Jn0021793**
Date Sampled			**Jun 06, 2024**
Test/Reference	LOR	Unit	
Heavy Metals			
Molybdenum	0.005	mg/L	< 0.005
Nickel	0.001	mg/L	0.002
Selenium	0.001	mg/L	< 0.001
Tin	0.005	mg/L	< 0.005
Uranium	0.005	mg/L	< 0.005
Zinc	0.005	mg/L	0.027
Alkali Metals			
Calcium	0.5	mg/L	13
Magnesium	0.5	mg/L	14
Potassium	0.5	mg/L	1.6
Sodium	0.5	mg/L	26

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F			
Chloride	Brisbane	Jun 11, 2024	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Fluoride	Melbourne	Jun 13, 2024	28 Days
- Method: in-house method LTM-INO-4390 Fluoride by Discrete Analyser			
Sulphate (as SO4)	Brisbane	Jun 11, 2024	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Brisbane	Jun 12, 2024	14 Day
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			
Colour(Pt/Co) true	Melbourne	Jun 14, 2024	28 Days
- Method: APHA 2120C – Spectrophotometric Single-wavelength Method			
Conductivity (at 25 °C)	Brisbane	Jun 11, 2024	28 Days
- Method: APHA 2510B			
pH (at 25 °C)	Brisbane	Jun 11, 2024	6 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Reactive Silica (as SiO2)	Melbourne	Jun 13, 2024	5 Days
- Method: APHA 4500-SiO2 C			
Total Suspended Solids Dried at 103 °C to 105 °C	Brisbane	Jun 13, 2024	7 Days
- Method: APHA 2540 D			
Turbidity	Brisbane	Jun 12, 2024	2 Days
- Method: LTM-INO-4140 Turbidity by Nephelometric Method			
Phosphate total (as P)	Brisbane	Jun 11, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals	Brisbane	Jun 11, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 13, 2024	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Jun 13, 2024	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jun 13, 2024	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Brisbane	Jun 12, 2024	7 Days
- Method: APHA 2540 C			
Hardness mg equivalent CaCO3/L	Brisbane	Jun 11, 2024	28 Days
- Method: APHA 2340B Hardness by Calculation			
Alkali Metals	Brisbane	Jun 11, 2024	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Site# 2554

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

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35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Company Name: Ecoscope Environmental P/L
Address: PO Box 3338
Rockhampton
QLD 4701

Project Name: ARRIS060624.DPP

Order No.: 7742
Report #: 1106219
Phone: 07 4926 0630
Fax: 07 4926 0367

Received: Jun 11, 2024 10:00 AM
Due: Jun 14, 2024
Priority: 3 Day
Contact Name: Ecoscope Laboratory

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Aluminium	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Colour(Pt/Co) true	Conductivity (at 25 °C)	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	pH (at 25 °C)	Phosphate total (as P)	Reactive Silica (as SiO2)	Selenium	Tin	Total Suspended Solids Dried at 103 °C to 105 °C	Turbidity	Uranium	Zinc	Eurofins Suite B11D: Na/K/Ca/Mg and Hardness	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Eurofins Suite B11F: Cl/SO4/Alkalinity/Total F	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254														X											X									X	X	
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
External Laboratory																																				
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																															
1	DP DRINKING WATER	Jun 06, 2024	3:00PM	Water	B24-Jn0021793	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Colour(Pt/Co) true	Pt/Co unit	< 2			2	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Reactive Silica (as SiO2)	mg/L	< 2			2	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	mg/L	< 5			5	Pass	
Turbidity	NTU	< 1			1	Pass	
Hardness mg equivalent CaCO3/L	mg/L	< 5			5	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Method Blank							
Alkalinity (speciated)							
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Barium	mg/L	< 0.005			0.005	Pass	
Beryllium	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Molybdenum	mg/L	< 0.005			0.005	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Selenium	mg/L	< 0.001			0.001	Pass	
Tin	mg/L	< 0.005			0.005	Pass	
Uranium	mg/L	< 0.005			0.005	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Chloride	%	109			70-130	Pass	
Colour(Pt/Co) true	%	104			70-130	Pass	
Conductivity (at 25 °C)	%	99			70-130	Pass	
Fluoride	%	126			70-130	Pass	
Nitrate & Nitrite (as N)	%	98			70-130	Pass	
Nitrite (as N)	%	103			70-130	Pass	
Reactive Silica (as SiO2)	%	98			70-130	Pass	
Sulphate (as SO4)	%	105			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Dissolved Solids Dried at 180 °C ± 2 °C	%	100			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	104			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	99			70-130	Pass	
Turbidity	%	95			70-130	Pass	
Phosphate total (as P)	%	102			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Total Alkalinity (as CaCO3)	%	108			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	102			80-120	Pass	
Arsenic	%	96			80-120	Pass	
Barium	%	98			80-120	Pass	
Beryllium	%	99			80-120	Pass	
Boron	%	100			80-120	Pass	
Cadmium	%	95			80-120	Pass	
Chromium	%	96			80-120	Pass	
Cobalt	%	95			80-120	Pass	
Copper	%	92			80-120	Pass	
Iron	%	97			80-120	Pass	
Lead	%	96			80-120	Pass	
Manganese	%	100			80-120	Pass	
Mercury	%	101			80-120	Pass	
Molybdenum	%	97			80-120	Pass	
Nickel	%	94			80-120	Pass	
Selenium	%	94			80-120	Pass	
Tin	%	95			80-120	Pass	
Uranium	%	100			80-120	Pass	
Zinc	%	93			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	106			80-120	Pass	
Magnesium	%	106			80-120	Pass	
Potassium	%	104			80-120	Pass	
Sodium	%	98			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Chloride	B24-Jn0021793	CP	%	106			70-130	Pass	
Fluoride	M24-Jn0000207	NCP	%	81			70-130	Pass	
Nitrate & Nitrite (as N)	M24-Jn0027552	NCP	%	118			70-130	Pass	
Nitrite (as N)	M24-Jn0027552	NCP	%	101			70-130	Pass	
Sulphate (as SO4)	B24-Jn0021793	CP	%	101			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Jn0021011	NCP	%	106			70-130	Pass	
Phosphate total (as P)	B24-Jn0020819	NCP	%	106			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	B24-Jn0006917	NCP	%	98			75-125	Pass	
Arsenic	B24-Jn0006917	NCP	%	102			75-125	Pass	
Barium	B24-Jn0006917	NCP	%	105			75-125	Pass	
Beryllium	B24-Jn0006917	NCP	%	96			75-125	Pass	
Boron	B24-Jn0020797	NCP	%	83			75-125	Pass	
Cadmium	B24-Jn0006917	NCP	%	102			75-125	Pass	
Chromium	B24-Jn0006917	NCP	%	96			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cobalt	B24-Jn0006917	NCP	%	95			75-125	Pass	
Copper	B24-Jn0006917	NCP	%	93			75-125	Pass	
Iron	B24-Jn0006917	NCP	%	94			75-125	Pass	
Lead	B24-Jn0006917	NCP	%	92			75-125	Pass	
Manganese	B24-Jn0006917	NCP	%	97			75-125	Pass	
Mercury	B24-Jn0006917	NCP	%	98			75-125	Pass	
Molybdenum	B24-Jn0006917	NCP	%	104			75-125	Pass	
Nickel	B24-Jn0006917	NCP	%	93			75-125	Pass	
Selenium	B24-Jn0006917	NCP	%	96			75-125	Pass	
Tin	B24-Jn0006917	NCP	%	100			75-125	Pass	
Uranium	B24-Jn0006917	NCP	%	99			75-125	Pass	
Zinc	B24-Jn0006917	NCP	%	92			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	B24-Jn0020819	NCP	%	86			75-125	Pass	
Magnesium	B24-Jn0022621	NCP	%	96			75-125	Pass	
Potassium	B24-Jn0006917	NCP	%	76			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chloride	B24-Jn0021793	CP	mg/L	38	38	<1	30%	Pass	
Colour(Pt/Co) true	B24-Jn0021793	CP	Pt/Co unit	12	12	1.3	30%	Pass	
Fluoride	M24-Jn0014424	NCP	mg/L	2.8	2.9	3.5	30%	Pass	
Nitrate & Nitrite (as N)	M24-Jn0027551	NCP	mg/L	0.10	0.11	3.2	30%	Pass	
Nitrite (as N)	M24-Jn0027551	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
pH (at 25 °C)	B24-Jn0004896	NCP	pH Units	6.3	6.2	1.8	30%	Pass	
Reactive Silica (as SiO2)	B24-Jn0021793	CP	mg/L	18	18	3.4	30%	Pass	
Sulphate (as SO4)	B24-Jn0021793	CP	mg/L	< 5	< 5	<1	30%	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	B24-Jn0015061	NCP	mg/L	510	510	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M24-Jn0017848	NCP	mg/L	13	10	28	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	B24-Jn0015061	NCP	mg/L	130	130	<1	30%	Pass	
Turbidity	B24-Jn0021793	CP	NTU	1.9	2.4	23	30%	Pass	
Phosphate total (as P)	B24-Jn0006916	NCP	mg/L	7.9	8.3	4.8	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	B24-Jn0021793	CP	mg/L	100	100	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	B24-Jn0021793	CP	mg/L	< 20	< 20	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	B24-Jn0021793	CP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	B24-Jn0021793	CP	mg/L	100	100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	B24-Jn0006916	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic	B24-Jn0006916	NCP	mg/L	0.006	0.006	4.8	30%	Pass	
Barium	B24-Jn0006916	NCP	mg/L	0.012	0.012	3.9	30%	Pass	
Beryllium	B24-Jn0006916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron	B24-Jn0006916	NCP	mg/L	0.24	0.25	4.8	30%	Pass	
Cadmium	B24-Jn0006916	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	B24-Jn0006916	NCP	mg/L	0.001	0.001	2.5	30%	Pass	
Cobalt	B24-Jn0006916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	B24-Jn0006916	NCP	mg/L	0.020	0.023	11	30%	Pass	
Iron	B24-Jn0006916	NCP	mg/L	0.50	0.53	6.8	30%	Pass	
Lead	B24-Jn0006916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Manganese	B24-Jn0006916	NCP	mg/L	0.092	0.096	4.5	30%	Pass	
Mercury	B24-Jn0006916	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum	B24-Jn0006916	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel	B24-Jn0006916	NCP	mg/L	0.005	0.005	<1	30%	Pass	
Selenium	B24-Jn0006916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Tin	B24-Jn0006916	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Uranium	B24-Jn0006916	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	B24-Jn0006916	NCP	mg/L	0.029	0.031	7.3	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	B24-Jn0006916	NCP	mg/L	120	130	3.0	30%	Pass	
Magnesium	B24-Jn0006916	NCP	mg/L	57	59	4.1	30%	Pass	
Potassium	B24-Jn0006916	NCP	mg/L	34	36	5.4	30%	Pass	
Sodium	B24-Jn0006916	NCP	mg/L	420	450	5.1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Paige Howarth	Analytical Services Manager
Jonathon Angell	Senior Analyst-Inorganic
Jonathon Angell	Senior Analyst-Metal
Mary Makarios	Senior Analyst-Inorganic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

MICROBIOLOGY REPORT.

CLIENT ORDER NO:	**N/A**	**RESULTS TO:**	**Arris Pty Ltd**	**79 Elphinstone Street**
CLIENT REF NO:	**Deer Park**		44 Wentworth Terrace	**Berserker, QLD, 4701**
ATTENTION:	**Ben Kele**		Rockhampton, QLD, 4700	**Telephone: (07) 4926 0630 Fax: (07) 4926 0367**
POSITION:	Director			**Email: LABORATORY@ecoscope.com.au**
				Website: www.ecoscope.com.au

ECOSCOPE REF NO:	**ARRIS060624MR.DPP**	**SAMPLES RECEIVED: 07/06/2024 10.30am**	**REPORT DATE:**	**09/06/2024**

ANALYSIS RESULTS	**SAMPLE TYPE**	**METHOD**	**TESTING COMMENCED (DATE / TIME)**	**SAMPLE ID & DATE** *Results reported relate only to samples analysed as supplied to laboratory **DP Drinking Water** **06/06/2024 3.00pm**
Total Coliforms MPN/100ml	Water	QP25-3 APHA 9223	7/06/2024 10.40am	**<1**
E.coli MPN/100ml	Water	QP25-3 APHA 9223	7/06/2024 10.40am	**<1**
Heterotrophic Plate Count - 36˚C/48Hrs CFU/ml	Water	QP25-8 AS 4276.3	7/06/2024 10.40am	**130**

QP25-8 R2A Agar Pour Plate Method
<1 = nil detected
NDA- No date advised, NTR - no time recorded
 # - Sample received outside of recommended holding time
< less than, > greater than, EST – estimated

Results Approved By: Howard Howell
B.App.Sc (Biol)
Principal Biologist

NATA Accredited
Laboratory No. 14956

Measurement uncertainty of test data is available on request.
Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

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Appendix C:

Arris Strategic Partners & Major Client List

Arris Pty Ltd Strategic Partners and Major Clients

Alliance Partners

- Hydroscape Pty Ltd
- VEK Environmental
- Clearflow Group US Inc.
- Mazzei Injector Company
- GromEng Pty Ltd
- H2orizons
- Mousellis & Sons Pty Ltd
- AR & Associates
- Wastewater Systems Pty Ltd
- everGREEN wastewater
- B & Y Services Group
- Wastewater Clinic
- Rocdon Development Pty Ltd
- Central Queensland University
- Midell Water Pty Ltd
- Joel Fitzgerald Plumbing & Gas

Mining and Energy Projects

- OzMinerals/BHP
- WestSide Corporation Ltd
- AGL
- Blue Energy
- Glencore Xstrata
- Santos
- Lanco Group

Research and Development Projects

- Horticulture Australia Limited
- Grape and Wine RDC
- Department of Agriculture, Forestry and Fisheries
- Incitec Pivot Ltd (Technical & training manual)
- SA Water

Water Charities

- Wastewater Education (International)
- Operators Without Borders (International)

Association Memberships

- NOWRA: National Onsite Wastewater Recycling Association
- AWA: Australian Water Association
- IOA: International Ozone Association
- WIOA: Water Industry Operations Association of Australia
- WRA: Water Research Australia
- Soil Science Australia
- Irrigation Australia
- Hydrological Society of South Australia
- Water Industry Alliance
- Protected Cropping Australia

Decentralised Water and Wastewater Projects - including recycled water projects, passive & nature-based solutions

- Woodfordia Inc.
- 12 Apostles Hot Springs and Resort
- OzMinerals/BHP
- Australian-Singapore Military Training Initiative
- Department of Defence
- Great Keppel Island Hideaway
- Breeze Holiday Parks
- Carnarvon Gorge Tourist Park
- Bottle Tree Farms
- Sunrise at 1770
- Middleton Caravan Park
- Moreton Bay Regional Council
- Merideth Music Festival
- Livingstone Shire Council
- Noosa Shire Council
- Costerfield Gold Mine
- Yarrabee Coal
- Oaks Retirement Village
- Environmental Health Australia
- Melbourne Water
- Point Boston Community Corporation
- City West Water
- Water Corporation WA (feasibility study)
- Arup Pty Ltd for (Melbourne Cricket Club and Berri Barmera Council)
- Sydney Water
- Central Highland Regional Council
- Wannon Water
- Samford Valley Steiner School
- St Laurence's College – Camp Laurence
- Downer Group
- Borumba Deer Park

Environmental Approvals Compliance and Reporting, Modelling and Technical Consulting

- Sailors Grave Brewing
- Riverside Investments (WA)
- Silver Lining Foundation Australia Ltd
- Teys (Australia)
- Strike Energy (PEL128)
- WestSide Corporation Ltd. (BUA & UWIR)
- Sundrop Farms
- Melbourne Health
- Space Down Under (Site Cont. & Code of Pract.)
- Melbourne Water
- Water Services Association of Australia
- Masters Plumbers Mechanical Services Association
- CSIRO
- GRDC

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