INTEGRATED DEVELOPMENT PROPOSAL FOR PUBLIC COMMENT

The following development proposal has been submitted to Council and although not designated, is notified as Integrated Development in accordance with Section 4.46 of the Environmental Planning & Assessment Act, 1979 for public comment:

Portal Application Number	DA No.	Location	Proposal
PAN-495695	166/2024	LOT: 2 DP: 710263, 24 Horns Crossing Road VACY Applicant: Alva Property Group Pty Ltd Owners: TJ and AJ Pty Ltd Consent Authority: Dungog Shire Council	1-into-3 Lot Subdivision

This application is Integrated Development as an approval is required under Section 100B of the Rural Fires Act, 1997 from the NSW Rural Fire Service.

Details of the above proposal are available for inspection on the NSW Planning Portal website from **Wednesday 15 January 2025.**

https://www.planningportal.nsw.gov.au/publications/exhibitions-and-publications/development-applications-exhibition

Submissions can be made via the NSW Planning Portal until **Wednesday 29 January 2025**. If you require assistance making a submission via the Planning Portal, please contact Council.

In accordance with *Section 10.4* of the *Environmental Planning & Assessment Act 1979*, a person who makes a public submission to Council in relation to this application is required to disclose all reportable political donations within two years prior to the submission being made and ending when the application is determined.

If the submission includes an objection to the proposal, the grounds of objection must be given. Council may also be obliged to release your submission as required by the *Government Information (Public Access) Act 2009* and *the Environmental Planning and Assessment Act 1979.*

Further, as stipulated in Council's Public Submissions Policy C1.19, Council will not place any weight on anonymous submissions when determining the respective development application.

DUNGOG SHIRE COUNCIL
EXHIBITED COPY

Commencement Date 15 January 2025

Closing Date 29 January 2025

Statement of Environmental Effects

1-into-3 Lot Subdivision

24 Horns Crossing Road
Vacy NSW 2421
Date: December 2024 Reference: 24029

Contents

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Introduction

This Statement of Environmental Effects (SEE) has been prepared to accompany the Development Application (DA) for the 1-into-3 Lot Subdivision at 24 Horns Crossing Road, Vacy NSW 2421. The aim of this SEE is to assist Council with the assessment of the DA by outlining the following matters:

- The site background and context;
- Details of the proposed development;
- The environmental impacts of the proposed development, and how these have been identified;
- How environmental impacts have been mitigated or minimised;
- Council development controls;
- Any other relevant matters as set out in the relevant legislation.

Applicant

Alva Planning has been authorised to lodge this Development Application to Council with the consent of the landowner, TJ and AJ Pty Ltd.

Site Details

Property Address	24 Horns Crossing Road, Vacy NSW 2421
Lot/Section/Deposit Plan	Lot: 2, Sec: -, DP: 710263
Zone	R5 – Large Lot Residential
Property Size	23,395m^2
Property Constraints	Bushfire Prone Land
Consent Authority	Dungog Shire Council

The site is located at 24 Horns Crossing Road, Vacy NSW 2421. There is a single-storey dwelling currently situated on the site with an Ancillary Awning and Sheds. The site is of a generally regular shape with no significant native vegetation existing on the site which is proposed to be removed as part of the development.

The site is surrounded by other residential accommodation and is a predominantly single dwellings with ancillary structures. Surrounding allotments are a mixtures of sizes, most commonly around 8,000m^2 in size.

Figure 1: Site Location (SixMaps, December 2024)

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Past and Current Use

The site is currently being used for residential accommodation, in the way of a dwelling house. After review of Dungog Shire Council's DA Tracker, it is not evident that other recent applications or approvals have been lodged or granted on the site.

Approvals Sought

The application seeks development consent for the 1-into-3 Lot Subdivision of the existing allotment in accordance with Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Consultation

The proposal has been reviewed against the applicable planning controls, including the Dungog Local Environmental Plan 2014 (LEP) and the Dungog Shire-wide Development Control Plan (DCP). Informal consultation has been held with Council staff prior to the preparation of this document, relating to the merits of the proposed subdivision and associated Clause 4.6 Variation, and application lodgement requirements.

Proposed Development

1-into-3 Lot Subdivision

The subdivision of the existing lot from 1-into-3 Lots as follows:

- Lot 1 – 8,000m^2
- Lot 2 – 8,000m^2
- Lot 3 – 7,395m^2

The existing dwelling will be retained on the proposed Lot 2, while the intended future use of Lot's 1 and 3 are intended to facilitate dwelling houses, consistent with the surrounding area. Through the subdivision works, available services will be extended to the new lots, including water, electricity and communications. Driveway crossovers and fencing will also be installed to provide a point of access, and divide the lots.

The proposed lot layout is shown in the plan below, and this document will address further requirements in relation to the subdivision.

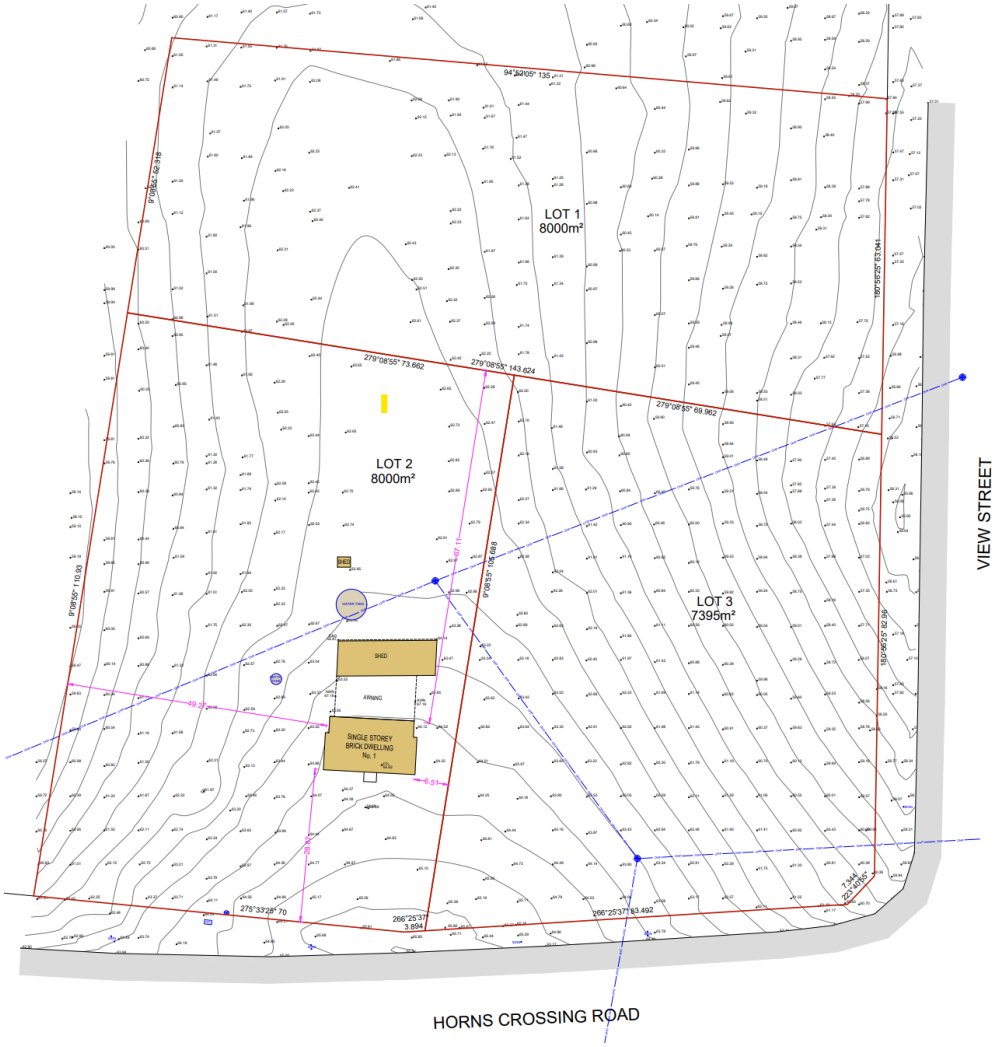

Figure 2: Proposed Lot Layout

Summary

It is considered that the development strongly aligns with the aims and objectives as listed in Councils LEP and DCP. Namely, it is considered to provide for the orderly and economic use of an existing residential site, with suitable intensification to provide further housing opportunities, inspire innovative design, ensure the development does not have an unacceptable level of impact on residential amenity, respond to the existing, and desired-future, character of the site, and the qualities of the surrounding built and natural environments, and addresses Council's development controls. The development further addresses an opportunity to contribute toward State and Local Government

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Housing Targets with a low impact, moderate intensification, and practical infill solution, while responding to the existing, and desired future, character of the area.

Planning Controls

The following planning controls have been considered in relation to proposed development, and are addressed within this SEE to support the proposal.

Environmental Planning & Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the relevant legislation under which approval for the proposed development is sought. This SEE has been prepared in accordance with the matters of consideration under *section 4.15 Evaluation* of the EP&A Act, as outlined in within this document.

Integrated Development

Integrated Development is development that, in order for it to be carried out, requires development consent and one or more approvals from a NSW State Government Agency. Integrated Development links development consent for matters under Part 4 of the Environmental Planning & Assessment Act 1979 with any associated approval, licence, consent, permission, or permit required under other legislation.

The aim of Integrated Development is to promote a unified, whole of government approach to the assessment of development in New South Wales.

Act	Provision	Approval	Comment
Fisheries Management Act 1994 (NSW Fisheries)	s144	Aquaculture permit.	Not Applicable
	s201	Permit to carry out dredging or reclamation work.	Not Applicable
	s205	Permit to cut, remove, damage, or destroy marine vegetation on public water land or an aquaculture lease, or on the foreshore of any such land or lease.	Not Applicable
	s219	Permit to: a) Set a net, netting or other material, or	Not Applicable

		b) Construct or alter a dam, floodgate, causeway, or weir, or c) Otherwise create an obstruction across or within a bay, inlet, river of creek, or across or around a flat.	
Heritage Act 1977 (NSW Office of Environment & Heritage)	s58	Approval in respect of the doing or carrying out of an act or matter referred to in s57(1).	Not Applicable
National Parks & Wildlife Act 1974 (NSW Office of Environment & Heritage)	s90	Grant of an Aboriginal heritage impact permit.	Not Applicable
Protection of the Environment Operations Act 1997 (Environment Protection Authority)	ss 43(a), 47 and 55	Environment protection licence to authorise carrying out of schedule development works at any premises.	Not Applicable
	ss 43(b), 48 and 55	Environment protection licence to authorise carrying out of schedule activities at any premises (excluding any activity described as a "waste activity" but including any activity described as a "waste facility".	Not Applicable
	ss 43(d), 55 and 122	Environment protection licence to control carrying out of non-scheduled activities for the purposes of regulating water pollution resulting from the activity.	Not Applicable
Roads Act 1993 (Roads & Maritime Services)	s138	Consent to: a) Erect a structure or carry out a work in, or over a public road, or b) Dig up or disturb the surface of a public road, or c) Remove or interfere with a structure, work or tree on a public road, or	Not Applicable

		d) Pump water into a public road from any land adjoining the road, or e) Connect a road (whether public or private) to a classified road Development is NOT Integrated Development under s138 if in order for the development to be carried out, it requires the development consent of Council and the approval under s138 of the same Council. i.e. works on roads under the care and control of Council including classified roads. Development is ONLY Integrated Development for works on or impacting on motorways i.e., M7 & M5.	
Rural Fires Act 1997 (NSW Rural Fire Service)	s100B	Authorisation under Section 100B in respect of bushfire safety of subdivision of land that could lawfully be used for residential or rural residential purposes or development of land for special fire protection purposes.	Referral required
Water Management Act 2000 (Department of Primary Industries – Water)	ss 89, 90, 91	Water use approval, water management work approval or activity approval under Part 3 of Chapter 3 of the Act.	Not Applicable

Designated Development

Designated Development refers to developments that are high-impact developments (e.g., likely to generate pollution) or are located in or near an environmentally sensitive area (e.g., a wetland). There are two ways a development can be categorised as 'designated development':

- The class of development can be listed in Schedule 3 of the EP&A Regulation as being designated development, or
- An LEP or SEPP can declare certain types of development to be designated.

The proposed development is not deemed Designated Development.

Section 4.15 EP&A Act

Section 4.15 of the EP&A Act outlines the matters for consideration in the determination of a Development Application. The relevant matters for consideration are addressed individually below.

Environmental Planning Instruments

Dungog Local Environmental Plan 2014

LEP Provision	Details	Comment
Objectives of Zone R5	• To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality. • To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future. • To ensure that development in the area does not unreasonably increase the demand for public services or public facilities. • To minimise conflict between land uses within this zone and land uses within adjoining zones. • To isolate housing from existing intensive agriculture or future intensive agricultural areas.	The proposal strongly aligns with the objectives as listed in the Zone R5 land use table in that it directly responds to each of the objectives, providing opportunity for housing in a rural setting, maximizing the land use in the context of the surrounding area, and not resulting in unreasonable impact to the public domain.
Land Use Table	Permitted with Consent Agritourism; Bed and breakfast accommodation; Boarding houses; Boat launching ramps; Car parks; Cellar door premises; Centre-based child care facilities; Community facilities; Dual occupancies; Dwelling houses; Emergency services facilities; Environmental facilities; Environmental protection works; Exhibition homes; Exhibition	The subject site is Zone R5 Large Lot Residential. The proposed land use is consistent with the existing land use, with the intention that Dwelling Houses will be constructed by

	villages; Farm buildings; Farm stay accommodation; Flood mitigation works; Function centres; Home-based child care; Home businesses; Information and education facilities; Jetties; Kiosks; Neighbourhood shops; Oyster aquaculture; Places of public worship; Plant nurseries; Pond-based aquaculture; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Research stations; Respite day care centres; Rural supplies; Sewerage systems; Signage; Tank-based aquaculture; Vehicle body repair workshops; Vehicle repair stations; Veterinary hospitals; Water recreation structures; Water supply systems.	future residents. Dwelling Houses are permissible with consent in the subject zone.
4.1 Minimum Subdivision Lot Size	The minimum lot size for the subject site is 8,000m2	The existing allotment is proposed to be subdivided into 3 lots of the following sizes: - Lot 1 – 8,000m^2 - Lot 2 – 8,000m^2 - Lot 3 – 7,395m^2 Refer to Clause 4.6 below for further commentary.
4.6 Exception to Development Standards	Clause 4.6 outlines the requirements when a proposal seeks to contravene/vary a principal development standard.	The proposal includes a Clause 4.6 variation request relating to the minimum lot size. It is proposed that one of the lots will be 7,395m^2, being 605m^2 (7.5%) under the minimum lot size.

		Please refer to the Clause 4.6 Variation Report submitted as part of this application.
7.2 Earthworks	The objectives of Part 7.2 are as follows: (a) to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land, (b) to allow earthworks of a minor nature without requiring a separate development consent	There are no foreseen impacts of the minimal earthworks that will be required for the proposed development. They are considered standard for normal subdivision construction, noting that no civil road works are required, and only typical services installation.

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

The proposal is not defined as BASIX Affected Development, as it is not:

- A New Dwelling
- Alterations or Additions to a Dwelling with a Value of $50,000 or more
- A Swimming Pool with a Volume of Greater than 40,000 Litres.

State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 4, Clause 4.6 states that a consent authority must not consent to the carrying out of any development on and unless:

a) it has considered whether the land is contaminated, and
b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

In response to Clause 4.6, it is confirmed that:

- The land is not within an investigation area; and
- The land is not known to have been used for a purpose referred to in Table 1land on which development for a purpose referred to in Appendix 1, Table 1 of the NSW Contaminated Land Planning Guidelines.

Proposed Environmental Planning Instruments

Nil

Potential Impacts for Consideration

Aboriginal Archaeology

The proposed development is not anticipated to cause any impact or damage to Aboriginal objects, as it is located within an existing residential site area with existing ground disturbances. The site is not mapped as an area containing known Aboriginal Archaeology.

Access and Traffic

It is proposed that each of the resulting lots from the subdivision will be accessed from View Street by a driveway crossover meeting the existing road. It is intended that these driveway crossovers will be constructed as part of the subdivision process. Due to the residential nature of the development, resulting in only two additional residential lots, the level of existing road traffic, and the local road status, the development it is not considered to be significant with regard to traffic generation, and is unlikely to result in any unacceptable level of impact on the local road network.

Bushfire

The site is located within a bushfire prone mapped area.

A Bushfire Report has been prepared by Bushfire Environmental Management Consultancy in relation to the proposed development. It is further understood that Council will refer the Development Application to the NSW Rural Fire Service for concurrence under s100B of the Rural Fires Act 1997.

The Bushfire Report demonstrates that the resulting lots from a subdivision can accommodate dwellings constructed to a Bushfire Attack Level (BAL) of no greater than BAL-29. The report demonstrates that the BAL-29 setback is on each of Horns Crossing Rd, and View Street, while the existing dwelling is sufficiently separated from the setback to the west of the site.

Please refer to the Bushfire Assessment Report by Bushfire Environmental Management Consultancy submitted as part of this application confirming the suitability of the site in relation to bushfire threat.

Ecology

There are no foreseen ecological impacts anticipated as result from the proposed development.

Flooding

The site is not located within a Flood Prone Area.

Heritage

The site does not contain any Heritage Listed items, is not within a Heritage Conservation Area, and is not anticipated to impact on any other items of Heritage significance.

Noise and Vibration

No potential noise or vibration impacts to the proposed development have been identified. Noise generated as a result of construction noise will be in accordance with the *Protection of the Environment Operations Act 1997* and any conditions of the development consent.

Public Domain

Considering the nature of the proposal within an existing residential site, it is not anticipated there will be an unacceptable level of impact to the public domain.

Services

All services to the site are existing including Water, Electricity, and Communications, servicing the existing dwelling. These services are proposed to be provided to the new lots through the subdivision process to allow connection to future dwellings.

The existing dwelling is connected to an on-site waste management system wholly contained within the proposed lot containing the dwelling. It is intended that future dwelling applicants will also apply to Council for an on-site waste management system, to be installed as part of the dwelling works.

Please refer to the On-Site Wastewater Report by GSL Environmental submitted as part of this application confirming the suitability of the site to cater for the existing and future systems and dwellings.

Site Context

The proposed development considered to be consistent with the surrounding locality, and the existing, and future-desired, character of the area.

Social and Economic Impact

The proposed development is for the subdivision of a residential lot to create further residential lots. It is not considered that the development will result in a negative social or economic impact. It is anticipated that the development will have a positive social and impact through the provision of housing opportunities, jobs creation through construction, and additional rate revenue to Council.

Visual Impact

The proposed subdivision is not anticipated to have an adverse impact to the surrounding community and is consistent with the existing streetscape. It is further anticipated that future dwellings to be constructed on the new lots will have sufficient scope to meet the requirements of Dungog's DCP, and can be designed to mitigate and minimize visual impact, and to align with the objectives of the Dungog LEP and DCP.

Site Suitability

The subject site is zoned R5 Large Lot Residential, and the proposed development strongly aligns with the objectives of this zone. The site is considered appropriate for the proposed development as it is surrounded by similar residential development of the same nature, and provides a suitable intensification of the site in the context of the surrounding area.

Submissions

The development application may require notification to adjoining landowners in accordance with Council's Community Participation Plan. Given the minimal impacts of the proposal, and its consistency with the state and local planning instruments and strategies, as well as surrounding development, it is not anticipated to raise significant or material objection.

Public Interest

The proposed development is in the public interest as:

- It provides for the orderly and economic use of an existing residential site, with suitable intensification to provide further housing opportunities;
- It caters for modern day requirements in a large lot / rural setting;
- It will provide employment with associated social and economic benefits during the construction of the development.

Conclusion

As demonstrated within this SEE and the supporting documentation, the proposed development is considered to achieve the following outcomes:

- Provide for the orderly and economic use of an existing residential site, with suitable intensification to provide further housing opportunities
- Inspire innovative design;
- Ensure the development does not have an unacceptable level of impact on residential amenity;
- Respond to the existing, and desired-future, character of the site, and the qualities of the surrounding built and natural environments;
- Addresses Council's development controls.

The proposal is for the 1-into-3 Lot Subdivision of 24 Horns Crossing Road, Vacy NSW 2421. It is considered that the development will contribute to the residential surrounds through suitable intensification of site, and the provision of housing opportunities, responding to, and respecting, the local context.

The SEE demonstrates that the development strongly aligns with the objectives of Council's LEP and DCP, and that health, safety, and amenity have all been carefully considered in the design, while ensuring the proposal will not have an adverse impact on the environment.

The development further addresses an opportunity to contribute toward State and Local Government Housing Targets with a low impact, moderate intensification, and practical infill solution, while responding to the existing, and desired future, character of the area.

It is recommended that Council approve the application as proposed.

Supporting Documentation

- Site Survey and Proposed Lot Layout
- Clause 4.6 Report
- Bushfire Assessment Report
- On-Site Wastewater Report
- Cost of Development Estimate
- Signed Owners Consent

Disclaimer

While we have made every attempt to ensure that the information contained within this document is correct, Alva Planning (author) is not responsible for any errors or omissions, or for the results obtained from the use of this information. The author has relied upon a range of external data/information in the preparation of this documentation. In no event will the author be liable for any decision made or action taken in reliance on the information within this document, or for any consequential, special, or similar damages.

Clause 4.6
Variation Report

Minimum Lot Size
1-into-3 Lot Subdivision

24 Horns Crossing Road
Vacy NSW 2421
Date: December 2024 Reference: 24029

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Introduction

This Clause 4.6 Variation Report (Report) has been prepared to accompany the Development Application (DA) for the 1-into-3 Lot Subdivision at 24 Horns Crossing Road, Vacy NSW 2421. The aim of this Report is to request that Council consider the granting for the development even though the development, in part, would contravene a development standard imposed by the Dungog Local Environmental Plan 2014 (LEP).

This Report will demonstrate that:

- compliance with the development standard is unreasonable or unnecessary in the circumstances, and
- there are sufficient environmental planning grounds to justify the contravention of the development standard.

Applicant

Alva Planning has been authorised to lodge this Clause 4.6 Variation Report to Council with the consent of the landowner, TJ and AJ Pty Ltd.

Site Details

Property Address	24 Horns Crossing Road, Vacy NSW 2421
Lot/Section/Deposit Plan	Lot: 2, Sec: -, DP: 710263
Zone	R5 – Large Lot Residential
Property Size	23,395m^2
Property Constraints	Bushfire Prone Land
Consent Authority	Dungog Shire Council

Figure 1: Site Location (SixMaps, December 2024)

Proposed Development

1-into-3 Lot Subdivision

The subdivision of the existing lot from 1-into-3 Lots as follows:

- Lot 1 – 8,000m^2 (compliant)
- Lot 2 – 8,000m^2 (compliant)
- Lot 3 – 7,395m^2 (non-compliant)

The proposed lot layout is shown in the plan below, and this document will address further requirements in relation to the subdivision.

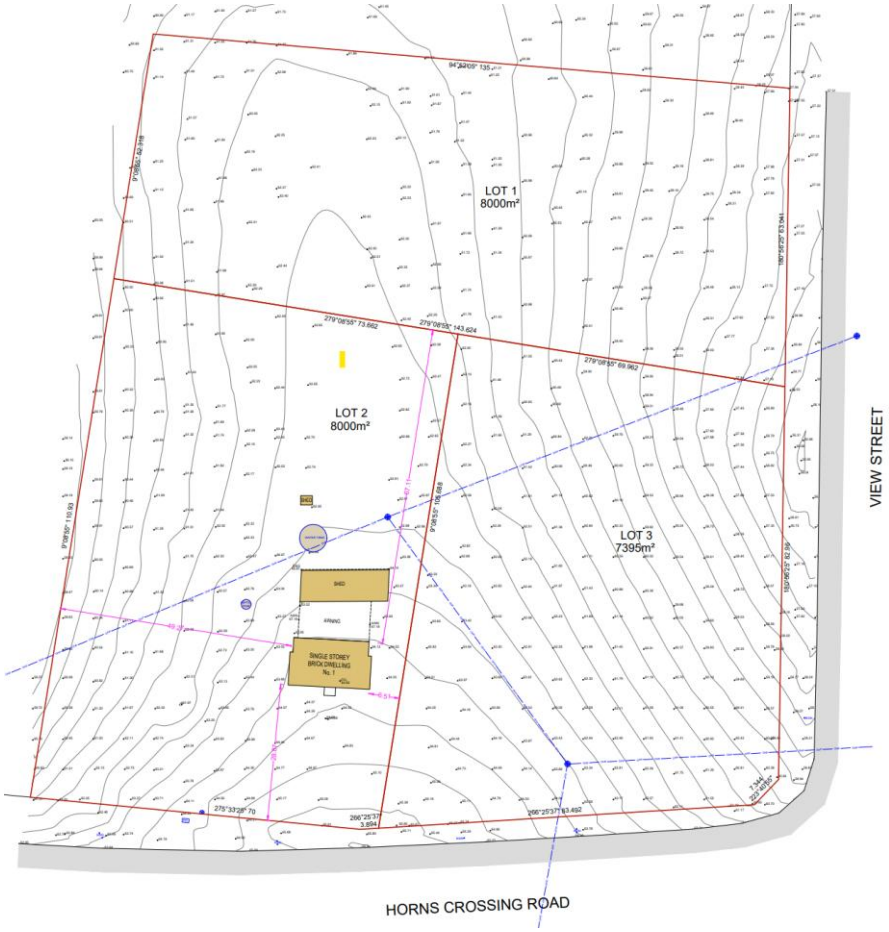

Figure 2: Proposed Lot Layout

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Clause 4.6 – Exceptions to Development Standards

This request to vary a development standard has been prepared in accordance with the provisions of Clause 4.6 - Exceptions to Development Standards. The request seeks a variation to the Minimum subdivision lot size development standards adopted under clause 4.1 of the Dungog Local Environmental Plan 2014 (LEP). The LEP includes a minimum lot size map, which overlays different minimum lot size requirements for land throughout the Local Government Area (LGA). A minimum lot size of 8,000m^2 applies to the site.

Clause 4.1 (3) states:

> *The size of any lot resulting from a subdivision of land to which this clause applies is not to be less than the minimum size shown on the Lot Size Map in relation to that land.*

The objectives of Clause 4.6 are:

a) to provide an appropriate degree of flexibility in applying certain development standards to particular development,
b) to achieve better outcomes for and from development by allowing flexibility in particular circumstances.

Clause 4.6(6) also provides guidance around limitations in the variation of minimum subdivision lot size for Zone R5 Large Lot Residential land, stating that development consent must not be granted under this clause for a subdivision if:

a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or
b) the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.

The extent of the proposed variation to the proposed Lot 3 is outlined in the table below:

Development Standard	Minimum Lot Size	Proposed Lot Size	Proposed Variation	Extent of Variation
Clause 4.1 Minimum Subdivision Lot Size	8,000m^2	7,395m^2	605m^2	7.5%

With regard to Clause 4.6(6):

a) The subdivision WILL NOT result in 2 or more lots of less than the minimum area specified for such lots by the development standard, or
b) The subdivision WILL NOT result in at least one lot that is less than 90% of the minimum area specified for such a lot by the development standard. The single lot proposed less than the minimum area specified is 92.5% of the minimum area specified.

Objectives of the Zone

Objectives	Comment
• To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality. • To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future. • To ensure that development in the area does not unreasonably increase the demand for public services or public facilities. • To minimise conflict between land uses within this zone and land uses within adjoining zones. • To isolate housing from existing intensive agriculture or future intensive agricultural areas.	The proposal strongly aligns with the objectives as listed in the Zone R5 land use table in that it directly responds to each of the objectives, providing opportunity for housing in a rural setting, maximizing the land use in the context of the surrounding area, and not resulting in unreasonable impact to the public domain.

Objectives of the Development Standard

Objectives	Comment
a) to ensure that subdivision reflects and reinforces the predominant subdivision pattern of the area, b) to minimise any likely impact of subdivision and development on the amenity of neighbouring properties, c) to ensure that lot sizes and dimensions are able to accommodate development consistent with relevant development controls, d) to ensure that lot sizes and dimensions allow dwellings to be sited to protect natural	The proposed subdivision, inclusive of the single lot proposed less than the minimum area specified is reflective of the predominant subdivision pattern of the area, with reference to View Street and Wakaya Close, and reinforced this pattern for future development of the area. The proposal has been designed in such a way to minimise any likely impact of the subdivision, and future single residential development, on the amenity of neighbouring properties, with lot

features and retain special features such as trees and views,	sizes and dimensions certainly capable of facilitating compliance of future dwelling's with development controls, and not encouraging over-densification of the land. The existing lot features minimal significant natural features in terms of trees and native vegetation, which have sufficient scope for retention. With regard to views and vistas, the contour of the land allows for the siting of dwellings to capture these features, while also retaining these for neighbouring dwellings.
e) to protect and enhance waterways by restricting the creation of new riparian rights through subdivision so as to prevent increased direct access onto rivers.	Not Applicable

Clause 4.6(3)(a) – How is strict compliance with the development standard unreasonable or unnecessary in this particular case

It is considered that strict compliance with the minimum subdivision lot size development standard is unreasonable or unnecessary in this circumstance for the following reasons:

- Compliance with the objectives will be achieved notwithstanding the non-compliance with the numerical standard in that, the proposed subdivision, inclusive of the single lot proposed less than the minimum area specified is reflective of the predominant subdivision pattern of the area, with reference to View Street and Wakaya Close, and reinforced this pattern for future development of the area.

  The proposal has been designed in such a way to minimise any likely impact of the subdivision, and future single residential development, on the amenity of neighbouring properties, with lot sizes and dimensions certainly capable of facilitating compliance of future dwelling's with development controls, and not encouraging over-densification of the land.

  The existing lot features minimal significant natural features in terms of trees and native vegetation, which have sufficient scope for retention. With regard to views and vistas, the contour of the land allows for the siting of dwellings to capture these features, while also retaining these for neighbouring dwellings.

- The proposal strongly aligns with the objectives as listed in the Zone R5 land use table in that it directly responds to each of the objectives, providing opportunity for housing in a rural setting, maximizing the land use in the context of the surrounding area, and not resulting in unreasonable impact to the public domain.

- Clause 4.6(6) of the LEP provides scope for variation in instances such as this, stating that development consent must not be granted under this clause for a subdivision if:

  a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or
  b) the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.

It is noted that:

a) The subdivision WILL NOT result in 2 or more lots of less than the minimum area specified for such lots by the development standard, or
b) The subdivision WILL NOT result in at least one lot that is less than 90% of the minimum area specified for such a lot by the development standard. The single lot proposed less than the minimum area specified is 92.5% of the minimum area specified.

- The proposed subdivision will provide greater planning outcome relative to strict compliance with the development standard, by creating a lot size (Lot 3) which meets the scope of Clause 4.6(6), that is well-suited for contributing to housing in the area.

- The proposed development promotes efficient land use, optimal infrastructure utilisation, and sustainable urban development. By integrating these elements, the proposal will contribute to a well-designed and vibrant community that meets the needs of residents while enhancing the overall liveability and functionality of the area.

- The proposed subdivision will not have an adverse impact on the streetscape of the locality.

- There is no foreseen public benefit for strict compliance.

- The proposal will enhance the large lot residential area character by facilitating the subdivision of land to create a lot that aligns with the existing patterns, sizes, and configurations of properties in the area.

The proposed subdivision is believed to offer a better planning and housing outcome compared to a strictly compliant development, supported by sufficient environmental planning grounds. The development further aligns with the goals of meeting housing targets, and community needs, while maintaining a large lot residential setting. It meets the requirements of Clause 4.6 (6) of the LEP, with the exception to the development standard considered reasonable and appropriate in this context.

Clause 4.6(3)(b) – Are there sufficient environmental planning grounds to justify contravening the development standard

The request refers to Wehbe v Pittwater Council (2007) LEC 827. In the decision of Wehbe v Pittwater Council [2007] NSW LEC 827, Chief Justice Preston outlined the rationale for development standards, and the ways by which a standard might be considered unnecessary and/or unreasonable.

Wehbe V Pittwater [2007] NSW LEC 827 also established the 'five-part test' to determine whether compliance with a development standard is unreasonable or unnecessary based on the following:

1. Would the proposal, despite numerical non-compliance, be consistent with the relevant environmental or planning objectives;

2. Is the underlying objective or purpose of the standard not relevant to the development thereby making compliance with any such development standard is unnecessary

3. Would the underlying objective or purpose be defeated or thwarted were compliance required, making compliance with any such development standard unreasonable;

4. Has Council by its own actions, abandoned or destroyed the development standard, by granting consent that depart from the standard, making compliance with the development standard by others both unnecessary and unreasonable; or

5. Is the "zoning of particular land" unreasonable or inappropriate so that a development standard appropriate for that zoning was also unreasonable and unnecessary as it applied to that land. Consequently, compliance with that development standard is unnecessary and unreasonable.

With regard to the first test outlined in Wehbe, it is noted that the objectives of Clause 4.1 are:

a) to ensure that subdivision reflects and reinforces the predominant subdivision pattern of the area,
b) to minimise any likely impact of subdivision and development on the amenity of neighbouring properties,
c) to ensure that lot sizes and dimensions are able to accommodate development consistent with relevant development controls,
d) to ensure that lot sizes and dimensions allow dwellings to be sited to protect natural features and retain special features such as trees and views.

As outlined previously in this report under Objectives of the Development Standard, the proposed subdivision, inclusive of the single lot proposed less than the minimum area specified is reflective of the predominant subdivision pattern of the area, with reference to View Street and Wakaya Close, and reinforced this pattern for future development of the area.

The proposal has been designed in such a way to minimise any likely impact of the subdivision, and future single residential development, on the amenity of neighbouring properties, with lot sizes and dimensions certainly capable of facilitating compliance of future dwelling's with development controls, and not encouraging over-densification of the land.

The existing lot features minimal significant natural features in terms of trees and native vegetation, which have sufficient scope for retention. With regard to views and vistas, the contour of the land allows for the siting of dwellings to capture these features, while also retaining these for neighbouring dwellings.

With regard to the second test, the underling objectives and purpose of the minimum subdivision lot size are relevant to the proposed development.

The underlying objective and purpose of the minimum subdivision lot size development standard is relevant to the subject request, and it is considered that compliance with the objectives will be achieved notwithstanding the non-compliance with the numerical standard. It is considered that compliance in this case is unnecessary, as Clause 4.6(6) of the LEP provides scope for variation in instances such as this, stating that development consent must not be granted under this clause for a subdivision if:

a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or
b) the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.

As such, it is noted that:

a) The subdivision WILL NOT result in 2 or more lots of less than the minimum area specified for such lots by the development standard, or
b) The subdivision WILL NOT result in at least one lot that is less than 90% of the minimum area specified for such a lot by the development standard. The single lot proposed less than the minimum area specified is 92.5% of the minimum area specified.

With regard to the third test, it is considered that the underlying objective or purpose be defeated or thwarted were compliance required, given that it can be demonstrated that the proposal can suitably respond to achieving these objectives, as previously outlined. It is further noted that the parameters outlined under Clause 4.6(6) would also be defeated or thwarted should strict compliance be required. As such, it is considered that strict compliance with the minimum subdivision lot is not considered necessary for the proposed Lot 3 in this circumstance.

The fourth and fifth tests set down in Wehbe are not considered relevant to the proposal, for the following reasons:

- Council has not abandoned or destroyed the development standard through other approvals in the area.
- The zoning of the subject site is not considered to be unreasonable or inappropriate.

Conclusion

The proposed variation will not result in any detrimental impact or an outcome which differs from that which is expected on the site, considering its residential zoning and objectives. It is considered that there is an appropriate contextual fit of the proposed subdivision, of which adequate environmental planning grounds have been provided to support the proposed variation. The variation will not impact on the adjoining sites or on the existing and desired future character of the streetscape.

Strict compliance with Clause 4.1 of the LEP is considered to be unreasonable and unnecessary in this instance, and it is requested that Council apply flexibility in this particular circumstance, particularly considering the variation fits within the guides and limitations set out in Clause 4.6(6) – being that the single lot proposed which is less than the minimum area specified is not less than 90% (92.5%) of the minimum area specified.

The proposed development is considered to be consistent with the objectives of Clause 4.6, given the application of flexibility to Clause 4.1 will achieve the objectives of both the zone and minimum subdivision lot size development standard.

With regard to the proposal, the objectives of Clause 4.1 are achieved notwithstanding non-compliance in that, the overall development will be only 7.5% under the minimum lot size of 8,000m2. The proposal is considered to be appropriate in the context of the site.

The proposed development also promotes the 'orderly and economic use and development of land' in accordance with the objects of the Environmental Planning and Assessment Act 1979 (the Act).

The proposed subdivision is believed to offer a better planning and housing outcome compared to a strictly compliant development, supported by sufficient environmental planning grounds. The development further aligns with the goals of meeting housing targets, and community needs, while maintaining a large lot residential setting. It meets the requirements of Clause 4.6 (6) of the LEP, with the exception to the development standard considered reasonable and appropriate in this context.

It is requested that Council support the proposal on the grounds outlined in this report.

Disclaimer

While we have made every attempt to ensure that the information contained within this document is correct, Alva Planning (author) is not responsible for any errors or omissions, or for the results obtained from the use of this information. The author has relied upon a range of external data/information in the preparation of this documentation. In no event will the author be liable for any decision made or action taken in reliance on the information within this document, or for any consequential, special, or similar damages.

LEGEND

ALL SYMBOLS - NOT TO SCALE

- BENCH MARK
- POWER POLE
- GAS METER
- TELECOMM. PIT
- WATER METER
- SEWER INSPECTION POINT
- SEWER CHAMBER
- BOLLARD
- SIGN
- OVERHEAD POWER LINE
- SEWER LINE
- WATER LINE
- CONTOUR LINE
- BOUNDARY LINE
- TREE
- HEIGHT/SPREAD/DIAMETER

DIAL1100 BEFORE YOU DIG

CAUTION

Levels have been taken from PM25264 and are shown to Topographical accuracy only.

Surface features of underground services have been located by survey only. Prior to any development, all underground services should be investigated.

This Caution is an integral part of this plan.

L.G.A.: DUNGOG
Parish:
Locality: VACY
Client:

Ratio: 1:400(A1) 1:800(A3)
Datum: AHD
Origin:
Drawn: AM

Date Surveyed: 16.09.2024
Date Printed: 18.09.2024
Reference: 180057
Drawing: 180057_1.dwg

DETAIL SURVEY & CONCEPT SUBDIVISION
LOT 2 DP710263
24 HORNS CROSSING ROAD

EARTH SURVEYING PTY LTD

EARTH SURVEYING
CONSULTING SURVEYORS
PO Box 4, NEWCASTLE NSW 2300
02 4929 1900 0405 223133
andrew@earthsurveying.com.au

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Bushfire Environmental Management Consultancy

BUSHFIRE ASSESSMENT REPORT
SUBDIVISION

1 into 3 Lots

24 Horns Crossing Road, Vacy, NSW, 2421

Lot 2 / DP 710263

Reference #:242095

FPA AUSTRALIA BRONZE MEMBER Fire Protection Association Australia

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Disclaimer

Please note that every effort has been made to ensure that information provided in this report is accurate. It should be noted that the information is for the client for the specific purpose for which it is supplied, that is to support a DA application. This report is strictly limited to the purpose including the facts and matters stated within it and is not to be used, directly or indirectly, for any other application, purpose, use or matter.

Due consideration has been given to site conditions and to appropriate legislation and documentation available at the time of preparation of the report. As these elements are liable to change over time, the report should be considered current at the time of preparation only. Should further information become available regarding the conditions at the site, BEMC reserves the right to review the report in the context of the additional information. BEMC has made no allowance to update this report and has not considered events occurring after the time its assessment was conducted.

Bushfire and Environmental Management Consultancy (BEMC) Pty Ltd will not be liable in respect of any losses arising out of any event or events beyond our reasonable control. Samantha Jennings or Duncan Scott-Lawson or will not be liable in respect of any business losses, including without limitation, loss of or damage to profits, income, revenue, use, production, anticipated savings, business, contracts, commercial opportunities, or goodwill. Samantha Jennings or Duncan Scott-Lawson will not be liable to you in respect of any special, indirect, or consequential loss or damage.

Title	Bush Fire Assessment Report - Subdivision			
Description	Subdivision development – 1 into 3 Lots 24 Horns Crossing Road, Vacy, NSW, 2421 - Lot 2 / DP 710263			
Created By	Duncan Scott-Lawson			
	0408 667 137 duncan@emconsultancy.com.au			
Prepared For	Alva Planning tom@alvapg.com.au 0421 254 505			
Version Number	**Modified By**	**Modifications Made**	**Date Modified**	**Status**
1	SJ	Draft	09/11/2024	Completed
2	DSL	Final	16/11/2024	Completed

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TABLES

FIGURES

PLATES

Abbreviations and Acronyms

APZ	Asset Protection Zone
AS/NZS 1221:1997	Australian Standard – Fire hose reels
AS1596-2014	Australian Standard – The storage and handling of LP Gas
AS2419-2021	Australian Standard – Fire hydrant installations
AS2441:2005	Australian Standard – Fire hose reels installation
AS3745:2010	Australian Standard – Planning for emergencies in facilities
BAL	Bush fire Attack Level
BCA	Building Code of Australia
BFAR	Bush Fire Assessment Report
BFSA	Bush Fire Safety Authority
BFSS	Bush Fire Strategic Study
BPA	Bush fire Prone Area (Also Bush fire Prone Land)
BPL Map	Bush fire Prone Land Map
BPMs	Bush fire Protection Measures
BV	Biodiversity Values
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
FFDI	Forest Fire Danger Index
GFDI	Grass Fire Danger Index
ha	Hectare
HOC	Heat Of Combustion
IPA	Inner Protection Area
kJ/kg	Kilo Joules per Kilo gram
LAT	Large Air Tanker
LGA	Local Government Area
NCC	National Construction Code
NoD	Notice of Determination
OPA	Outer Protection Area
PBP	Planning for Bush fire Protection
RF Act	*Rural Fires Act 1997*
RF Regs	*Rural Fires Regulations 2013*
RHG	Restricted Head Growth
SEED	Sharing and Enabling Environmental Data in NSW
SFR	Short Fire Run

1 EXECUTIVE SUMMARY AND RECOMMENDATIONS

BEMC Pty Ltd was engaged by Alva Planning to complete a Bush Fire Assessment Report (BFAR) on proposed subdivision located at 24 Horns Crossing Road, Vacy, NSW, 2421 - Lot 2 / DP 710263 (**Figure 1, page 7**). The proposed development includes a 1 lot into 3 lot subdivision.

BEMC has used Method 1 assessment pathway from PBP 2019 to undertake this assessment and to prepare the Bush Fire Assessment Report (BFAR).

Based upon the assessment, perusal of the concept subdivision plan prepared by Earth Surveying **(Appendix 1, page 30)**, and a site visit, it is recommended that development consent be granted subject to the following conditions to comply with PBP 2019:

Recommendation 1 - Asset Protection Zones and Landscaping
The identified APZ within the subdivision surrounding proposed building envelopes currently complies with Asset Protection Zone standards' as of Appendix 4 of PBP 2019.

Recommendation 2 - Construction
Each proposed lot is provided a BAL 29 or lower building envelope.

The existing dwelling on the residual Lot shall be upgraded to improve ember protection. This will be achieved by enclosing all openings (excluding roof tile spaces) or covering openings with a with steel, bronze, or aluminium to maximum allowable aperture of 2mm or weather strip with a flammability index not greater than 5 (AS1530.2). Where applicable, this includes any sub floor areas, openable, windows, doors, vents, weepholes, and eaves.

Recommendation 3 - Access
Access to the property and development site is noted on **Figure 2, page 8** of this report and in the site plan provided in **Appendix 1, page 30.**

Private property access between the road and lot boundary shall comply with the below requirements:

- Minimum carriageway width of 4m,
- A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches,
- Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress,
- The minimum distance between inner and outer curves is 6m,
- The crossfall is not more than 10°,
- Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads.

Recommendation 4 - Water Supply
The existing static water supply on the existing residential house to be upgraded to provide:

- A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; a 65mm Storz outlet with a ball valve is fitted to the outlet.
- Ball valve and pipes are adequate for water flow and are metal.
- Supply pipes from tank to ball valve have the same bore size to ensure flow volume.
- A hardened ground surface for truck access is supplied within 4m of the access hole.
- Unobstructed access is always provided.
- Static water supply (SWS) signage to be provided on the front gate and on the tank to guide responding fire agencies to the water supply.

Recommendation 5 - Electricity services

Were possible electricity should be placed underground. If overhead power supply is provided, lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

Recommendation 6 - Gas services

The proposed layout provides ample opportunity for future residential development to comply with gas acceptable solutions.

Furthermore, the applicant wishes the Commissioner, when determining the application, to consider whether it would be appropriate for the future erection of the dwelling houses, dual occupancies or secondary dwellings concerned to be excluded from the application of section 4.14 of the *Environmental Planning and Assessment* Act 1979.

Consent conditions referred to in this report can be applied for subsequent '*build-outs'*. Furthermore, BAL29 easements shall be identified on the title of individual lots to ensure '*build-outs'* conform with bushfire requirements.

Finally, the implementation of the adopted measures and recommendations forwarded within this report comply with Planning for Bush fire Protection (2019) and will contribute to the amelioration of the potential impact of any bush fire upon the development, but they do not and cannot guarantee that the area will not be affected by bush fire at some time.

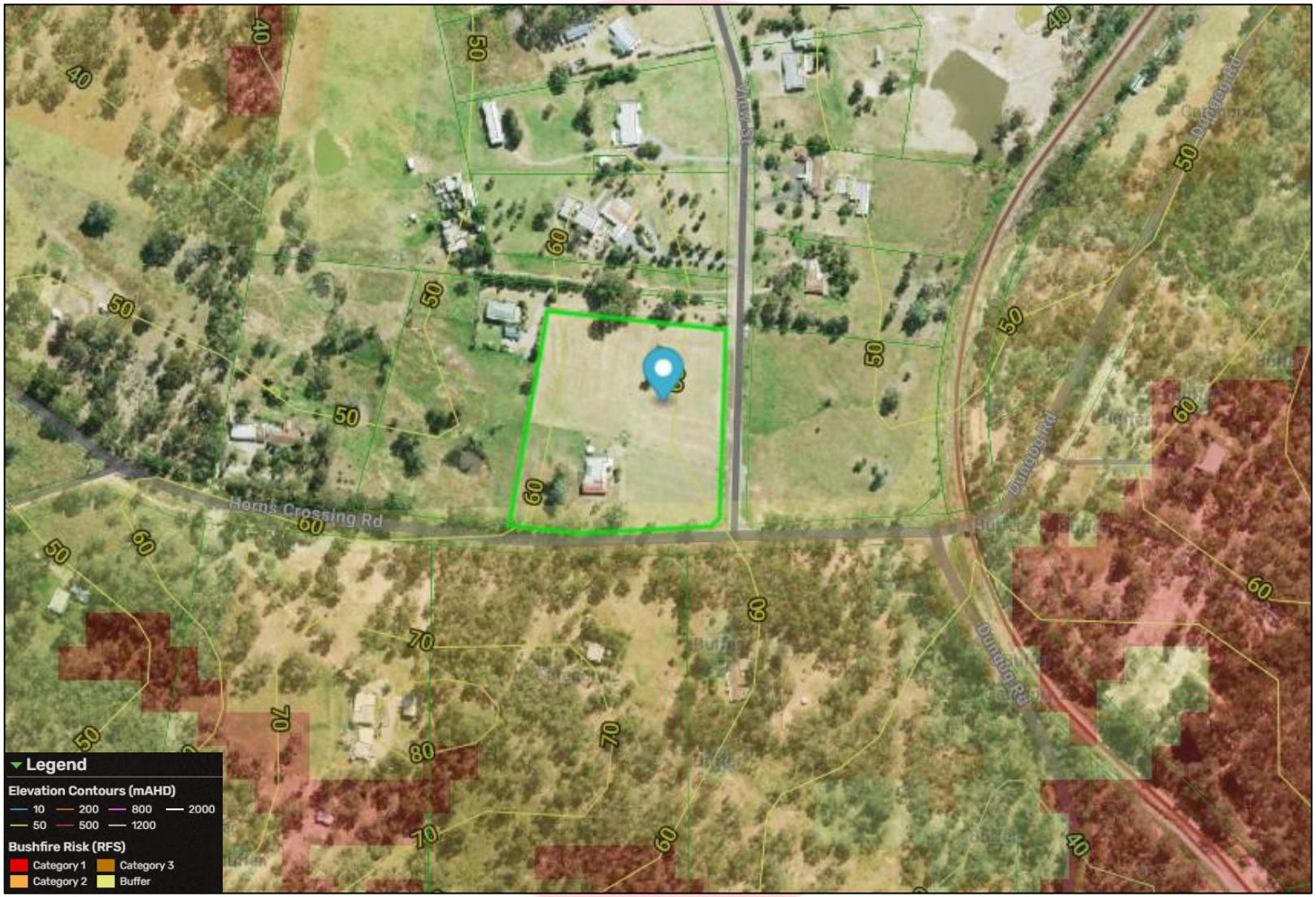

Figure 1 *Property Location of 24 Horns Crossing Road, Vacy, NSW, 2421 - Lot 2 / DP 710263 (Mecone Mosaic, 2024)*

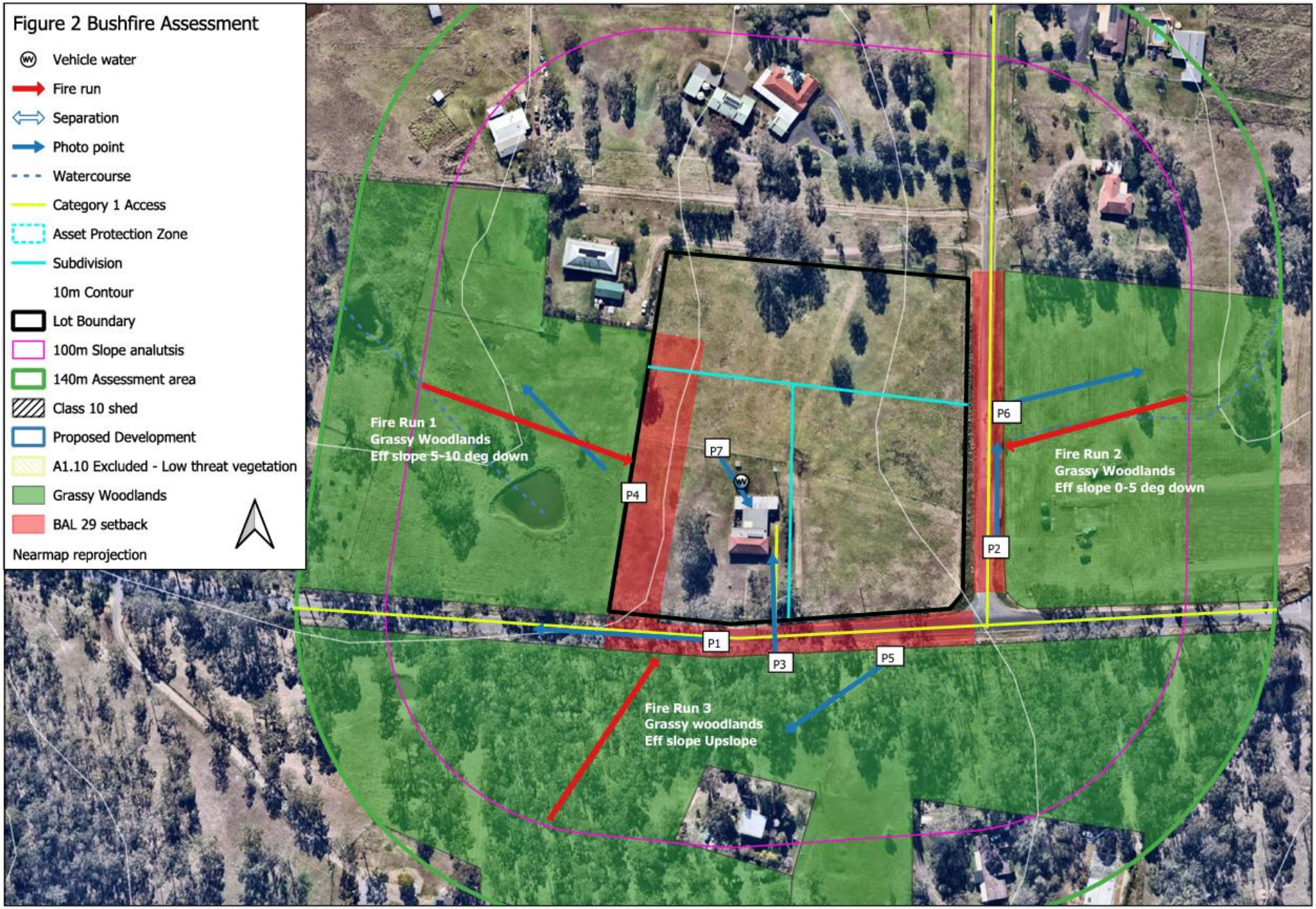
Figure 2 Bushfire Assessment
Vehicle water
Fire run
Separation
Photo point
Watercourse
Category 1 Access
Asset Protection Zone
Subdivision
10m Contour
Lot Boundary
100m Slope analutsis
140m Assessment area
Class 10 shed
Proposed Development
A1.10 Excluded - Low threat vegetation
Grassy Woodlands
BAL 29 setback
Nearmap reprojection
Fire Run 1
Grassy Woodlands
Eff slope 5-10 deg down
Fire Run 2
Grassy Woodlands
Eff slope 0-5 deg down
Fire Run 3
Grassy woodlands
Eff slope Upslope
P1
P2
P3
P4
P5
P6
P7

2 INTRODUCTION

BEMC Pty Ltd was engaged by Alva Planning to complete a Bush Fire Assessment Report (BFAR) to accompany a Development Application for a proposed subdivision at 24 Horns Crossing Road, Vacy, NSW, 2421 - Lot 2 / DP 710263, hereafter referred to as the 'site' (**Figure 1, page 7**).

The identification of bush fire prone lands (BPL Map) in NSW is required under s 10.3 of the *EP&A Act*. S. 4.14 of the *EP&A Act* requires development to compliance with Planning for Bushfire Protection, 2019 (PBP 2019) if any part of a development site is affected by bush fire hazard as indicated within the BPL Map.

It is clear from the investigation and assessment of proposal, the site is located within Bush fire Prone Land. This development falls within bush fire affected land within the Dungog Council bush fire prone land map and the applicant is required to submit a bush fire assessment consistent with PBP 2019.

If the applicant determines that the project is integrated through the Development Application process, this document can support an application for *General Terms of Agreement* via a *Bush Fire Safety Authority* (BFSA) from NSW Rural Fire Service (RFS) as the report adheres to the requirements of s 45 of the *Rural Fires Regulation* 2013 (RF Regs), Appendix 1, A2.1, A2.1.1 of PBP 2019. The proposed development is not listed under s 46 of the Rural Fire Regulation 2013 (*RF Regs*) excluded from requirements for BFSA.

Site Particulars are illustrated within **Table 2 below** and **Figure 1, page 7,** and concept subdivision plans in **Appendix 1, page 30**.

2.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development includes the subdivision of 1 lot into 3 lots. As a result, the required objectives of subdivision Development have been considered in this assessment.

Table 1 *Description of Proposed development*

Boundaries	Rural land use in all directions, Horns Crossing Road south, forested vegetation south.
Topography	Slight downslope west and east.
Type of development	3 Lot subdivision
Urban Release Area	No
Proposed dwellings	No
Vegetation proposed to be cleared	No
Current land-use	Residential
Fire weather	Dungog Council – FFDI – 100

2.2 Objectives of Assessment

To assess the proposed development in consideration of s4.14 of the EP&A Act 1979, PBP 2019 and AS 3959:2018 to enable council to make a determination.

This report assesses whether the development meets the six objectives listed in section 1.1 of PBP 2019, which provide for the protection of human life and minimize impacts on property as follows:

1. Afford buildings and their occupants protection from exposure to a bushfire.
2. Provide for a defendable space to be located around buildings.
3. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings.
4. Ensure appropriate operation access and egress for emergency services personnel and residents is available.
5. Provide for ongoing management and maintenance of Bush fire Protection Measures (BPMs); and
6. Ensure the utility services are adequate to meet the needs of firefighters.

2.3 Specific Objectives of Residential and Rural Residential Subdivisions

The aims and objectives listed in section 1.1 of PBP 2019 remain applicable to residential and rural residential development, however further consideration has been given to these types of developments to ensure BPMs are fully incorporated at the design stage of the development. The specific objectives of residential and rural residential development are outlined in section 5.2 of PBP 2019 are:

- Minimise perimeters of the subdivision exposed to the bush fire hazard (hourglass shapes, which maximise perimeters and create bottlenecks should be avoided).
- Minimise vegetated corridors that permit the passage of bush fire towards buildings.
- Provide for the siting of future dwellings away from ridge-tops and steep slopes, within saddles and narrow ridge crests.
- Ensure that APZs between a bush fire hazard and future dwellings are effectively designed to address the relevant bush fire attack mechanisms; ensure the ongoing maintenance of APZs.
- Provide adequate access from all properties to the wider road network for residents and emergency services.
- Provide access to hazard vegetation to facilitate bush fire mitigation works and fire suppression; and
- Ensure the provision of an adequate supply of water and other services to facilitate effective firefighting.

3 BUSH FIRE RISK STRATEGIC STUDY

Planning for Bushfire Protection (2019) is based on the worst-case scenarios for each of the bush fire behaviour elements of fire weather, vegetation, slope and assumes not human intervention. All development shall be assessed on an individual basis as broad-brush approaches of documents such as PBP 2019 may not be applicable in every instance.

A Bush Fire Risk Strategic Study (BFRSS) was prepared to inform the context of the Bush Fire Assessment Report (BFAR). The level of information gathered and analysis within the BFRSS depends upon the nature and scale of the development. The BFRSS provides a broad-brush approach to determine landscape wildfire risk in considerations of vegetation continuity, distribution, and proximity to development; human intervention; access and evacuation. This enables an assessment the *actual* bushfire risk, determine if strict adherence to PBP 2019 is warranted, and if a proposed development is appropriate in the bush fire hazard context.

Table 2 *Bush fire risk strategic study*

ELEMENT	Low Threat		Moderate Threat		High Threat		Extreme Threat	
Adjoining Lands	The proposed development and changing land use will have positive impacts on the ability of adjoining landowners to implement Bush fire Protection Measures		The proposed development and changing land use do not impact on the ability of adjoining landowners to implement Bush fire Protection Measures	√	The proposed development and changing land use will impact on the ability of adjoining landowners to implement Bush fire Protection Measures		The proposed development will significantly impact on the wildfire risk profile of adjoining lands.	
Surrounding infrastructure	The proposed development does not significantly impact on community water, electricity, or gas services.		The proposed development is associated with community water, electricity, or gas services but will not have significant impact.	√	The proposed development impact on community water, electricity, or gas services.		The wildfire risk profile of significant infrastructure will increase due to this development.	
Emergency services	The proposed development does not significantly impact on the ability of emergency services to plan, prepare, respond, or recover prior, during or after a bush fire event.		The proposed development is located within 30-minute flight from a Large Air Tanker (LAT) airbase and within 30-minutes of multiple fire response units.	√	The proposed development is located more than 30-minute flight from a Large Air Tanker (LAT) airbase and only 1 or 2 fire response units within 30-minutes.		It is unlikely emergency services will respond to wildfire in this location during extreme and catastrophic events.	

ELEMENT	Low Threat		Moderate Threat		High Threat		Extreme Threat	
Access	Good, multiple route evacuation is possible and connects with the public road network in a direction away from the wildfire threat to shelter location.		More than one access or egress routes is provided from the property to a safer location which then can access the public road network with multiple access/egress routes o shelter location.	√	One access or egress routes is provided, which is <200m from the property to a safer location.		Only one access or egress route with no nearby safe location.	
Emergency egress	Seamless integration with existing settlement - no effect on evacuation.		Short bushland pinch points that may restrict access temporarily or carry fire across roads. Unlikely impact on evacuation.	√	Pinch points that are likely to restrict access along evacuation routes for short periods (15-30mins) and carry fire across roads.		Large areas of bushland or multiple pinch points along evacuation routes that could block evacuation routes for an extended time.	
Vegetation continuity	Forested vegetation beyond 140m form the site is scattered with low continuity due to built development.		Forested vegetation beyond 140m form the site is scattered and isolated, forming a dominate fast moving grassland or open woodland fire event.	√	Patches of forested vegetation associated riparian and isolated ridgelines beyond 140m from the site may result in localised forest fire event.		Continuous forested areas within mountainous terrain beyond 140m from the site will result in broadscale landscape emergency management operations.	
Vegetation connectiveness	Forested vegetation corridors beyond 140m are restricted and do not enable landscape fire to enter and move through the site by a continuous fire path.		Forested vegetation corridors beyond 140m from the site exist, although grasslands >100m provide separations between forested vegetation restricting the fire head progression of landscape fire.	√	Forested vegetation corridors beyond 140m from the site exist, although grasslands <100m provide separations between forested vegetation restricting the fire head progression of landscape fire.		Forested vegetation corridors beyond 140m from the site provide for passage of landscape fire to enter and move through the site.	
Vegetation Location	Wildfire within forests can only approach from one direction surrounded by a suburban, township or urban area managed in a minimum fuel condition.		Wildfire within forests can only approach from two directions and the site is within a suburban, township or urban area managed in a minimum fuel condition.	√	Wildfire within forests can approach from several directions although gaps within forested vegetation or are present.		Wildfire within forests can approach from several directions and have hours or days to grow and develop before impacting and/or site is surrounded by unmanaged vegetation.	
Separation	Hazard separation between forested hazard and buildings of greater than 100m.		Hazard separation between forested hazard and buildings of 50-100m		Hazard separation between forested hazard and buildings of 30-50m	√	Hazard separation between forested hazard and buildings of <30m	

ELEMENT	Low Threat		Moderate Threat		High Threat		Extreme Threat	
Vegetation flammability	Within the dominated fire direction, the fire fuel is restricted to surface, partially managed and separated through land use practises.		Within the dominated fire direction, the fire fuel is highly aerated, with significant separations (>50m) between these patches with partially managed vegetation between.		Within the dominated fire direction, the fire fuel is highly aerated, with <50m between these patches with partially managed vegetation between	√	Within the dominated fire direction, the fire fuel is highly aerated, continuous continuity vertically and horizontally with flammable species.	
Wildfire Behaviour	Extreme Wildfire behaviour at the site is not possible given the broader landscape.		Extreme Wildfire behaviour at the site is unlikely given the broader landscape.	√	Extreme Wildfire behaviour at the site is likely given the broader landscape.		Extreme Wildfire behaviour at the site is very likely given the broader landscape.	
Overall Threat Rating:			Wildfire provides **MODERATE** threat to this proposal	√				

In this case, a **moderate** threat has been determined and strict compliance with PBP is not warranted due to:

- More than one access or egress routes is provided from the property to a safer location which then can access the public road network with multiple access/egress routes o shelter location.
- Forested vegetation beyond 140m form the site is scattered and isolated, forming a dominate fast moving grassland or open woodland fire event.
- Wildfire within forests can only approach from two directions and the site is within a suburban, township or urban area managed in a minimum fuel condition.

4 BUSHFIRE HAZARD ASSESSMENT

This section details the site assessment methodology in Appendix 1 of PBP2019 and includes the requirements of s44 of the RF Regs. It provides detailed analysis of the vegetation, slope, vegetation exclusions and downgrades to quantify the required Bush fire Protection Measures (BPMs).

4.1 FIRE DANGER INDEX

This assessment utilises Dungog Council area with a FFDI 100.

4.2 ASSESSMENT METHODOLOGY

Vegetation classification over the site has been carried out as follows:

- Nearmap, sixmap aerial Photograph Interpretation.
- Kogan 6*25 Laser distance finder.
- Photo theodolite application supported by contour and LiDAR DEMs terrain profiles.
- SEED Portal - Sharing and Enabling NSW Environmental Data portal.
- Reference to regional vegetation community mapping, and
- Site assessment in November 2024.

4.3 VEGETATION ASSESSMENT

In accordance with PBP 2019, an assessment of the vegetation over 140m in all directions from the building was undertaken.

Vegetation that may be considered a bush fire hazard was identified and classification based on available fuel loads for sub-formations are provided through vegetation fuel monitoring project administered by the University of Wollongong, University of Melbourne and CSRO Ecosystems Science and Bush fire Dynamics and Applications. The results of this research are commonly referred to as the '*NSW Comprehensive Fuel Loads'*.

An arborist or biodiversity report has not been provided to inform the vegetation assessment.

Stream order watercourses (Strahler system - *Water Management (General) Regulation 2018*) within the 140m assessment area have been identified. This vegetation is not proposed to be impacted the proposal bushfire protection measures.

No vegetation within the 140m Assessment has been identified within the Biodiversity Values (BV) Map provided in **Appendix 3, page 35**.

The area is identified within the Areas of Regional Koala Significance (ARKS).

SEED Portal (State Vegetation Type Mapping) and where available regional vegetation community mapping has been analysed to determine the vegetation in and around the development, which is illustrated in **Figure 3, page 15**.

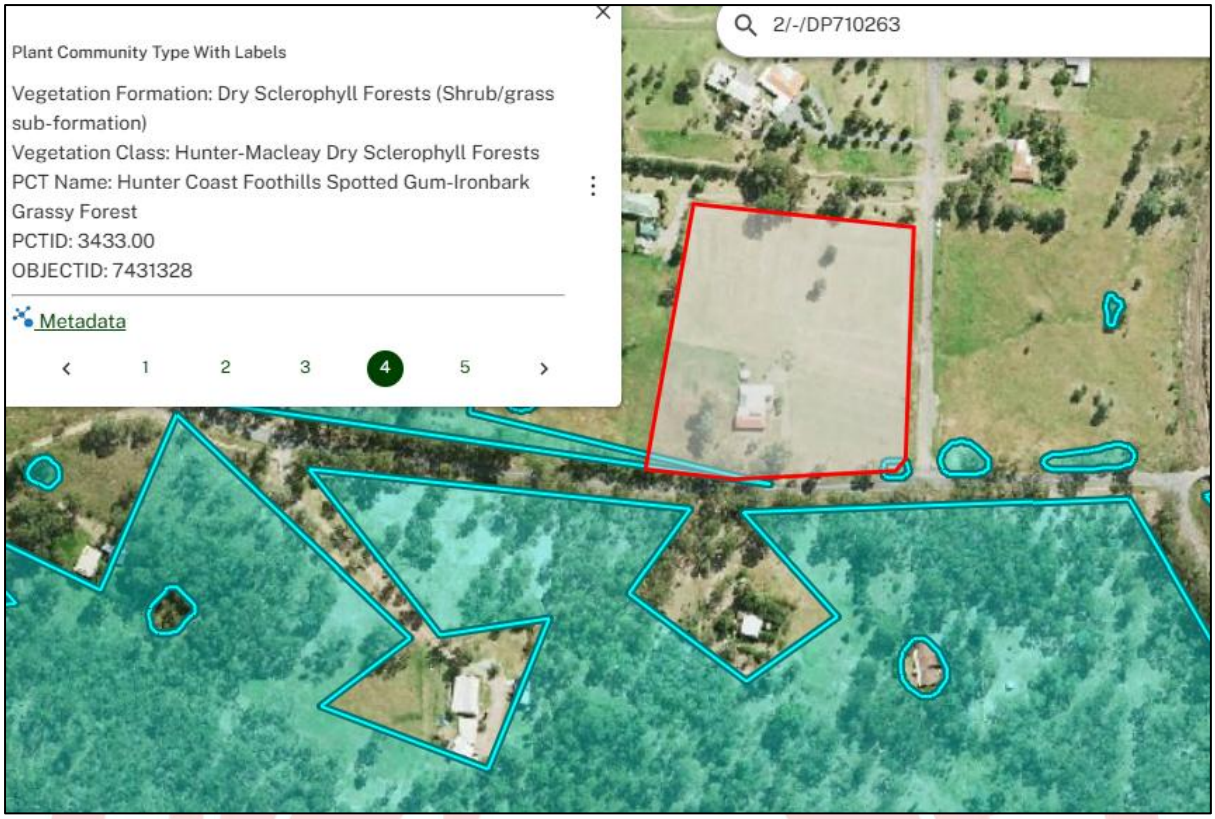

Figure 3 *Vegetation in and around the site (Extract from the SEED Portal)*

4.3.1 Vegetation classification, exclusions, and downgrades

An analysis of the vegetation in and around the site has determined that no vegetation exclusions or down grades are included in this assessment**.**

4.3.2 Predominant Vegetation Classification

Vegetation in and around the site is classified as PCTID: *Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest* which is *Grassy Woodlands in accordance with PBP 2019*.

4.4 Separation Assessment

The separation between the proposed building envelope and the classifiable vegetation that creates bush fire threat one of the significant BPMs to reduce the risk of bush fire impacting on the development. The land within the separation must conform to the standards of an Asset Protection Zones to be accepted within the separation areas.

The separations between the classifiable vegetation and the proposed dwellings are provided in **Table 3, page 17**, illustrated in **Figure 2 page 8.**

4.5 Slope Assessment

This section details the site assessment methodology in Appendix 1 of PBP2019 to assess the effective slope (under classified vegetation) and site slope (slope between the vegetation and proposed development) within the 100m of the proposed building envelope.

The effective and site slopes use within this assessment are provided in **Table 3, page 17** illustrated in **Figure 2 page 8.**

4.6 Effective and Site Slope Assessment

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux.

The effective slope is the slope of the ground under the hazard (vegetation). The slope between the vegetation and the proposed building envelope is the site slope. When identifying the effective and site slopes, it may be found that there are a variety of slopes covering different distances. The effective slope is the slope under the vegetation which will most significantly influence the bush fire behaviour for each aspect.

The topography of the site and surrounds has been assessed to identify the maximum slope present under the classified vegetation (hazard). Slope data has been calculated from a 1m LiDAR Digital Elevation Model (DEM). The source data sets have been captured to standards that are generally consistent with the Australian ICSM LiDAR Acquisition Specifications with require a fundamental vertical accuracy of at least 0.30m (95% confidence) and horizontal accuracy of at least 0.80m (95% confidence). The slope arrows indicated in **Figure 4, below** represent the slope calculated across the length of the arrow utilising LiDAR data within ERSI software. These values help determine the vegetation that poses a bush fire threat and significantly influences fire behaviour. Figure 4 illustrates the analysis of the LiDAR DEMs terrain profiles to determine the slope of the potential fire runs towards the site.

***Figure 4** LiDAR 1m DEMS slope analysis*

4.7 Wildfire Growth

An analysis of the size and shape of the classifiable vegetation in and around the site has determined no Short Fire Run (SFR) or Restricted Head Growth (RHG) considerations within this assessment.

Outcomes of the Bushfire Attack Level assessment implementing Method 1 PBP2019 are outlined in **Table 3, below**.

Table 3 *Bushfire Hazard Assessment (PBP 2019)*

Elements	Method (unit)	Fire Run 1	Fire Run 2	Fire Run 3
Vegetation	NSW Comprehensive Fuel Loads	Grassy woodlands	Grassy woodlands	Grassy woodlands
Separation	Spatial analysis	>20m	>16m	>12m
Effective slope	Site visit – Theodolite (°)	5-10 deg down	0-5 deg down	Upslope
Fire Danger Index	Council Area	100	100	100
OUTPUTS - Table A1.12.2 of PBP 2019				
BAL FZ		<15m	<12m	<9m
Separation to Achieve BAL40		15 - <20m	12 - <16m	9 - <12m
Separation to Achieve BAL29		20 - < 28m	16 - < 23m	12 - < 18m
Separation to Achieve BAL19		28 - < 39m	23 - < 32m	18 - < 26m
Separation to Achieve BAL12.5		39 - < 100m	32 - < 100m	26 - < 100m
Separation for BAL29 building @		**20m**	**16m**	**12m**

5 ADDITIONAL S. 45 RURAL FIRES REG

S. 45 of the RF Reg indicates the assessment requirements for s 100B RF Act developments to obtain a bush Fire Safety Authority. This section illustrates the remaining elements identified within S. 45 of the RF Reg that are not covered within bush fire hazard assessment process (section 3 and 4 of this report) or within the performance criteria of PBP 2019 (section 6 of this report).

5.1 CL (2) (E) AND (F) S.45 RF REGS - THREATENED SPECIES, POPULATIONS AND COMMUNITIES

A search on the NSW Government Central Resource for Sharing and Enabling Environmental Data for significant environmental values was completed.

The search identified no Critical Endangered Ecological Communities (CEEC) or species listed under the *Biodiversity Conservation Act 2016* near or within the site.

The results of the Sharing and Enabling Environmental Data is provided in **Appendix 3, page 35.**

There will be no additional impacts on natural heritage values.

A search of the Aboriginal Historic Information Management System (AHIMS) was completed on the 9th November 2024 which indicated the site is not known to be of Aboriginal significance.

The output of the search is provided in **Appendix 5, page 37.**

There will be no additional impacts on cultural heritage values**.**

5.2 CL (2) (G) ADDITIONAL BUSH FIRE ASSESSMENT

The capacity of nearby public roads to handle increased volumes of traffic when a bush fire emergency occurs.

The surrounding public road system is two-way, sealed with multiple routes to safer places away from the bush fire threat. This designed will be able to accommodate the elevated level of traffic created by this development.

Whether or not nearby public roads that link with the fire trail network have two-way access.

No linkages between the public road system and fire trails exist within the assessment area.

The adequacy of sprinkler systems and other fire protection measures to be incorporated into the development.

There are no bushfire spray systems or fire protection measure proposed outside the performance criteria for subdivisions.

Registered fire trails on the property.

No registered fire trails are located on the property.

6 BUSHFIRE ASSESSMENT AND PERFORMANCE MEASURES

This section assesses Bushfire Performance Measures (BPMs) for the proposed development at 24 Horns Crossing Road, Vacy, NSW, 2421 - Lot 2 / DP 710263 in consideration of the acceptable solutions required for each performance criteria within PBP 2019. Outcomes are outlined in Table 4, below. Where acceptable solutions are not met details of the performance-based solution are provided.

Table 4 *Planning for bush fire protection compliance (PBP 2019) - Chapter 5 – Rural and Residential subdivisions developments on bushfire prone lands*

PERFORMANCE CRITERIA		ACCEPTABLE SOLUTION	COMPLIANCE for 24 Horns Crossing Road, Vacy, NSW, 2421 - Lot 2 / DP 710263
APZs	Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	• APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	**COMPLIES - ACCEPTABLE SOLUTION** A >20m APZ is provided in accordance with Table A1.12.2. The existing dwelling on the residual Lot shall be upgraded to improve ember protection. This will be achieved by enclosing all openings (excluding roof tile spaces) or covering openings with a with steel, bronze, or aluminium to maximum allowable aperture of 2mm or weather strip with a flammability index not greater than 5 (AS1530.2). Where applicable, this includes any sub floor areas, openable, windows, doors, vents, weepholes, and eaves.
	APZs are managed and maintained to prevent the spread of a fire towards the building.	• APZs are managed in accordance with the requirements of Appendix 4.	**REFER TO LANDSCAPING COMPLIANCE REQUIREMENTS**
	The APZs is provided in perpetuity	• APZs are wholly within the boundaries of the development site	**COMPLIES - ACCEPTABLE SOLUTION** The APZ on this site is wholly within the site boundaries.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	• APZs are located on lands with a slope less than 18 degrees.	**COMPLIES - ACCEPTABLE SOLUTION** The APZ is not located on land >18 degrees slope.

ELECTRICITY	Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	• Where practicable, electrical transmission lines are underground; and
		• Where overhead, electrical transmission lines are proposed as follows:
		  ○ Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and
		  ○ No part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.
			COMPLIES - ACCEPTABLE SOLUTION
			Were possible electricity should be placed underground.
			
			If overhead power supply is provided, lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

GAS	Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	• Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used. • All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side. • Connections to and from gas cylinders are metal. • Polymer-sheathed flexible gas supply lines are not used; and • Above-ground gas service pipes are metal, including and up to any outlets	**COMPLIES - ACCEPTABLE SOLUTION** The proposed layout provides ample opportunity for future residential development to comply with gas acceptable solutions.
LANDSCAPING	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	• Landscaping is in accordance with Appendix 4; and • Fencing is constructed in accordance with section 7.6.	**COMPLIES - ACCEPTABLE SOLUTION** The identified APZ within the subdivision surrounding proposed building envelopes currently complies with Asset Protection Zone standards' as of Appendix 4 of PBP 2019.
ACCESS	Firefighting vehicles are provided with safe, all-weather access to structures.	• Property access roads are two-wheel drive, all-weather roads. • Perimeter roads are provided for residential subdivisions of three or more allotments.	**COMPLIES - ACCEPTABLE SOLUTION** The concept plans provided by Earth Surveying illustrate each lot within the proposed subdivision provides direct access to the public road system.

		• Subdivisions of three or more allotments have more than one access in and out of the development. • Traffic management devices are constructed to not prohibit access by emergency services vehicles. • Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient. • All roads are through roads. • Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; • Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road. • Where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and • One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression	Furthermore, the proposed subdivision provides an opportunity for the most distant external part of the dwelling to be less than 70m unobstructed path from a public road with a speed limit <70km/hr, offering future s4.14 developments the opportunity to meet access acceptable solutions.
	The capacity of access roads is adequate for firefighting vehicles	• The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	**COMPLIES - ACCEPTABLE SOLUTION** Where the most distant external part of the dwelling is less than 70m unobstructed path from a public road with a speed limit <70km/hr, no bush fire access provisions are required.
	There is appropriate access to water supply	• hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression. • Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2017 - Fire hydrant	**COMPLIES - ACCEPTABLE SOLUTION** Where the most distant external part of the dwelling is less than 70m unobstructed path from a public road with a speed limit <70km/hr, no bush fire access provisions are required.

		installations System design, installation and commissioning; and • There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	
PERIMETER ROADS	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	• Are two-way sealed roads. • Minimum 8m carriageway width kerb to kerb. • Parking is provided outside of the carriageway width. • Hydrants are located clear of parking areas. • Are through roads, and these are linked to the internal road system at an interval of no greater than 500m. • Curves of roads have a minimum inner radius of 6m. • The maximum grade road is 15 degrees and average grade of not more than 10 degrees. The road crossfall does not exceed 3 degrees; and • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	**N/A** Perimeter road not proposed.
NON-PERIMETER ROADS	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	• Minimum 5.5m carriageway width kerb to kerb. • Parking is provided outside of the carriageway width. • Hydrants are located clear of parking areas. • Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m. • Curves of roads have a minimum inner radius of 6m. • The road crossfall does not exceed 3 degrees; and • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	**N/A** Non-perimeter road not proposed.

PROPERTY ACCESS	Firefighting vehicles can access the dwelling and exit the property safely.	• There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. In circumstances where this cannot occur, the following requirements apply: • Minimum 4m carriageway width. • In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay. • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches. • Provide a suitable turning area in accordance with Appendix 3. • Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress. • The minimum distance between inner and outer curves is 6m. • The crossfall is not more than 10 degrees. • Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and • A development comprising more than three dwellings has access by dedication of a road and not by right of way. *Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide,*	**MADE CONDITION OF CONSENT** Private property access between the road and lot boundary shall comply with the below requirements: •Minimum carriageway width of 4m, •A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, •Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress, •The minimum distance between inner and outer curves is 6m, •The crossfall is not more than 10°, •Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads.

		extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.	
WATER SUPPLIES	Adequate water supplies is provided for firefighting purposes.	• Reticulated water is to be provided to the development where available. • A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and static water supplies shall comply with Table 5.3d.	**MADE CONDITION OF CONSENT** Static water supplied for firefighting purposes. The existing static water supply on the existing residential house to be upgraded to provide: • A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; a 65mm Storz outlet with a ball valve is fitted to the outlet. • Ball valve and pipes are adequate for water flow and are metal. • Supply pipes from tank to ball valve have the same bore size to ensure flow volume. • A hardened ground surface for truck access is supplied within 4m of the access hole. • Unobstructed access is always provided. • Static water supply (SWS) signage to be provided on the front gate and on the tank to guide responding fire agencies to the water supply.
	Water supplies are located at regular intervals, and The water supply is accessible and reliable for firefighting operations.	• Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2021. • Hydrants are not located within any road carriageway; and • Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	**N/A** Static water supplies proposed.

	Flows and pressure are appropriate	• Fire hydrant flows and pressures comply with Table 2.2 of AS 2419.1:2005.	**N/A** This report has not tested or determined if the fire hydrant flow and pressures to comply with Table 2.2 of AS 2419.1:2017.
	The integrity of the water supply is maintained	• All above-ground water service pipes are metal, including and up to any taps; and • Above-ground water storage tanks shall be of concrete or metal.	**N/A** Site layout plans or construction schedules do not identify construction materials of above ground water supplies.

7 CONCLUSION AND RECOMMENDATIONS

It is clear from this investigation and assessment that the site is located within Bushfire Prone Land. An assessment in accordance with Appendix 1 of PBP2019 has been undertaken implementing. This BFAR found the classifiable vegetation of grassy woodlands as described by PBP 2019 downslope to the west of the site creates the greatest bushfire threat.

In accordance with the provisions of PBP 2019, the recommendations outlined within this assessment will reduce the risk of damage and/or harm in the event of a bushfire event to acceptable levels. The following recommendations are provided to inform the planning of the development to obtain development consent.

Asset Protection Zones and Landscaping
The identified APZ within the subdivision surrounding proposed building envelopes currently complies with Asset Protection Zone standards' as of Appendix 4 of PBP 2019.

Construction
Each proposed lot is provided a BAL 29 or lower building envelope.

The existing dwelling on the residual Lot shall be upgraded to improve ember protection. This will be achieved by enclosing all openings (excluding roof tile spaces) or covering openings with a with steel, bronze, or aluminium to maximum allowable aperture of 2mm or weather strip with a flammability index not greater than 5 (AS1530.2). Where applicable, this includes any sub floor areas, openable, windows, doors, vents, weepholes, and eaves.

Access
Access to the property and development site is noted on **Figure 2, page 8** of this report and in the site plan provided in **Appendix 1, page 30.**

Private property access between the road and lot boundary shall comply with the below requirements:

- Minimum carriageway width of 4m,
- A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches,
- Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress,
- The minimum distance between inner and outer curves is 6m,
- The crossfall is not more than 10°,
- Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads.

Water Supply
The existing static water supply on the existing residential house to be upgraded to provide:

- A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; a 65mm Storz outlet with a ball valve is fitted to the outlet.
- Ball valve and pipes are adequate for water flow and are metal.
- Supply pipes from tank to ball valve have the same bore size to ensure flow volume.
- A hardened ground surface for truck access is supplied within 4m of the access hole.
- Unobstructed access is always provided.
- Static water supply (SWS) signage to be provided on the front gate and on the tank to guide responding fire agencies to the water supply.

Electricity services

Were possible electricity should be placed underground. If overhead power supply is provided, lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

Gas services

The proposed layout provides ample opportunity for future residential development to comply with gas acceptable solutions.

Emergency Management

There are no performance criteria requirements for this type of development within PBP 2019.

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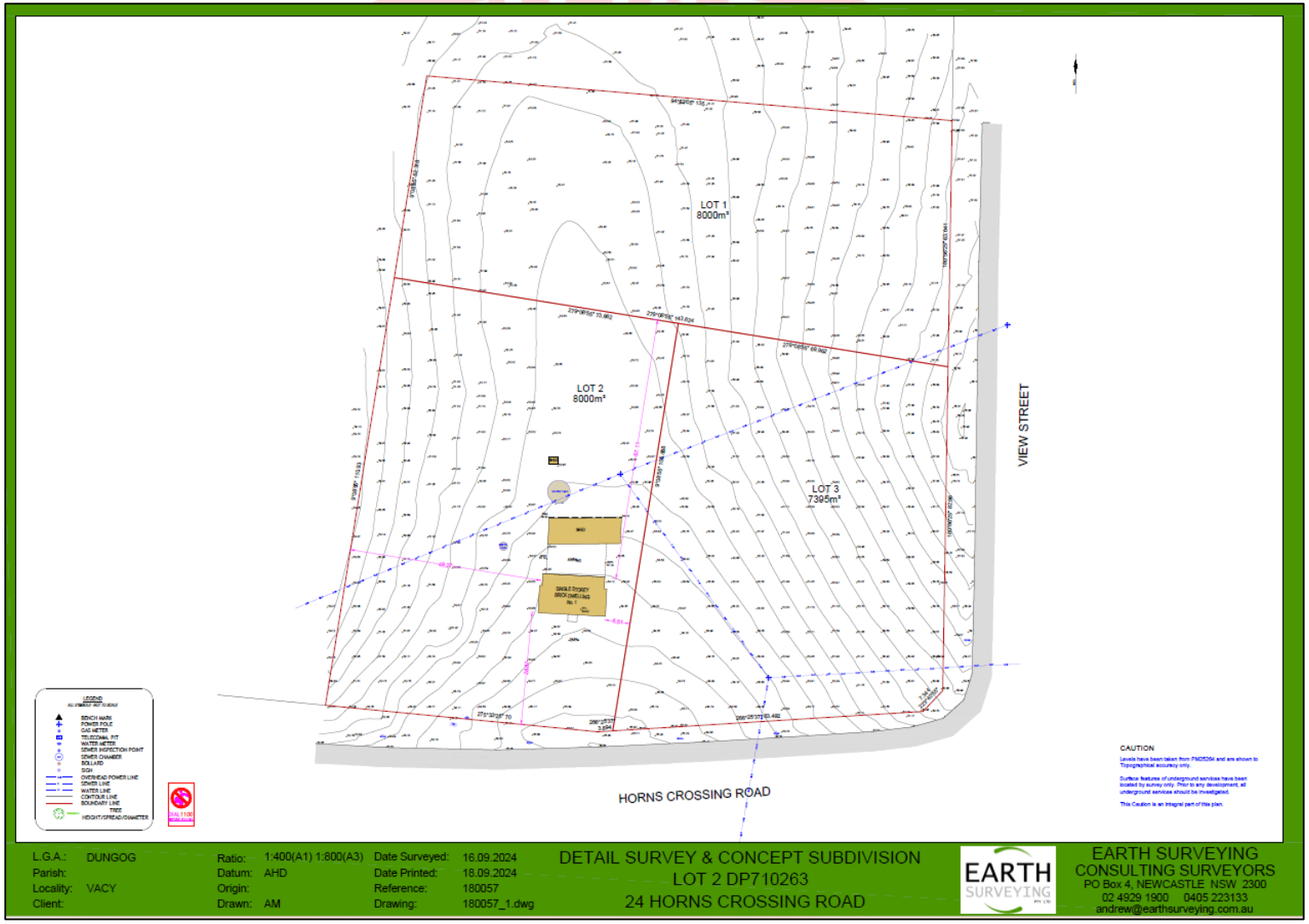
9 APPENDIX 1 CONCEPT SUBDIVISION PLANS



10 APPENDIX 2 PLATES (PHOTOGRAPHS)

Plates 1 – 7 depict the elements in and around the site that are considered within the bush fire hazard assessment. The classified vegetation, separations, effective and site slope are identified in **Table 3, page 17** and displayed in **Figure 2, page 8**.

Plate 1 *(P1) Access along Horns Crossing Road*

Plate 2 *(P2) Access along Horns View Street*

Plate 3 *(P3) Proposed access into existing property*

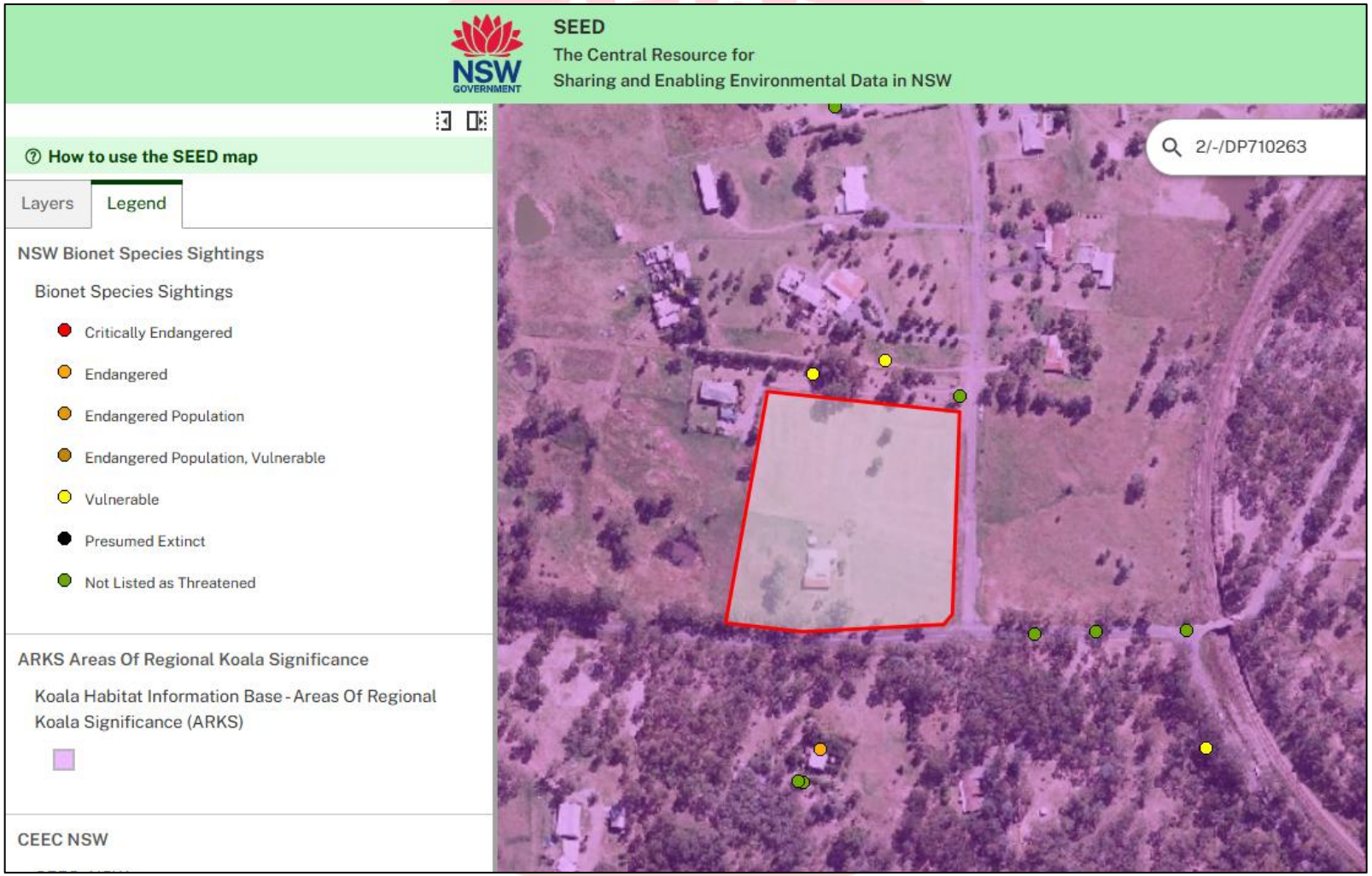
Plate 4 *(P4) Vegetation that creates the greatest bushfire threat to the west of the site*

Plate 5 *(P5) Vegetation that creates a bushfire threat to the south of the site*

Plate 6 *(P6) Vegetation that creates a bushfire threat to the east of the site*

Plate 7 *(P7) Existing statice water Supply for existing dwelling*

11 APPENDIX 3 NSW SHARING AND ENABLING ENVIRONMENTAL DATA



12 APPENDIX 4 BIODIVERSITY MAP

Biodiversity Values Map and Threshold Tool

The Biodiversity Values (BV) Map and Threshold Tool identifies land with high biodiversity value, particularly sensitive to impacts from development and clearing.

The map forms part of the Biodiversity Offsets Scheme threshold, which is one of the factors for determining whether the Biodiversity Offset Scheme (BOS) applies to a clearing or development proposal. You can use the Threshold Tool in the map viewer to generate a BV Threshold Report for your nominated area. The report will calculate results for your proposed development footprint and determine whether or not you will need to engage an accredited assessor to prepare a Biodiversity Development Assessment Report (BDAR) for your development.

This report can be used as evidence for development applications submitted to councils, native vegetation clearing not requiring development consent in urban areas and areas zoned for environmental conservation under State Environmental Planning Policy (Biodiversity and Conservation) 2021 - Chapter 2 vegetation in non-rural areas.

What's new?

For more information about the latest updates to the Biodiversity Values Map and Threshold Tool go to the updates section on the Biodiversity Values Map webpage.

Map Review: Landholders can request a review of the BV Map where they consider there is an error in the mapping on their property. For more information about the map review process and an application form for a review go to the Biodiversity Values Map Review webpage.

If you need help using this map tool see our Biodiversity Values Map and Threshold Tool User Guide. or contact the Map Review Team at map.review@environment.nsw.gov.au or on 1800 001 490.

13 APPENDIX 5 AHIMS SEARCH

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Vacy
Client Service ID : 948784

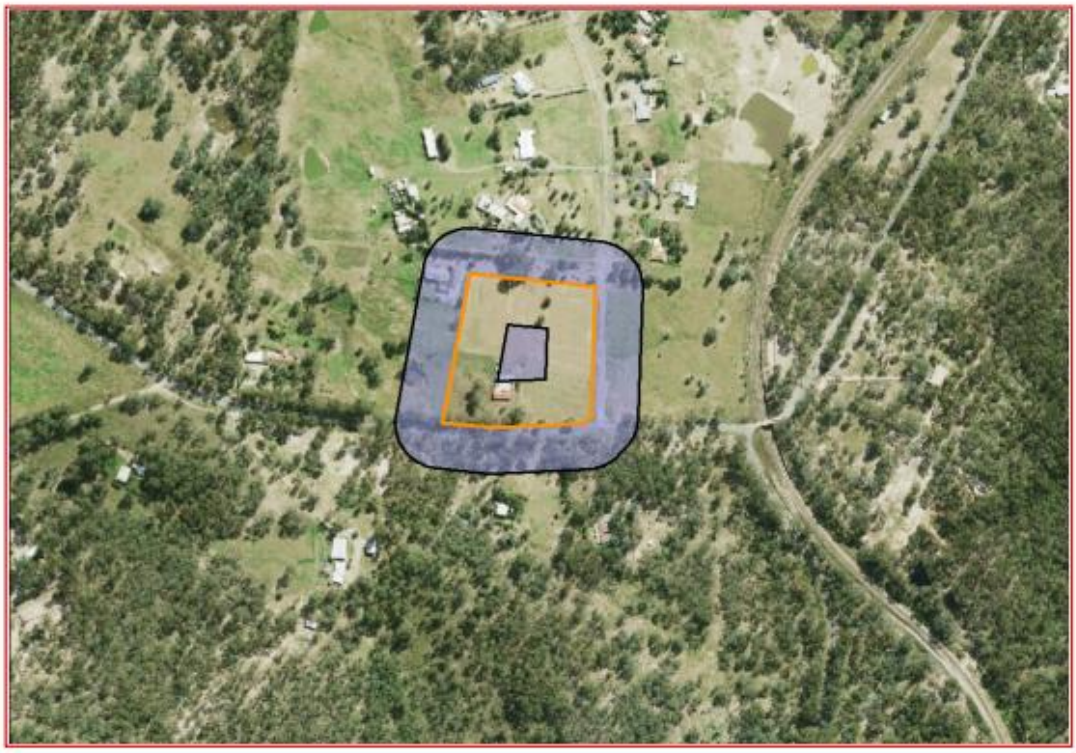
Date: 09 November 2024

Salamander Bay New South Wales 2317
Attention: Duncan Scott-Lawson
Email: duncan@emconsultancy.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 2, DP:DP710263, Section : - with a Buffer of 50 meters, conducted by Duncan Scott-Lawson on 09 November 2024.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

14 APPENDIX 6 NSW BUSHFIRE PLANNING PROTECTION MEASURES

The following information on building survivability and the application of Bushfire Protection Measures should be considered continually for the life of the development. These measures facilitate meeting the aims and objectives of PBP 2019 and mitigating bushfire risk and are provided to inform the client.

Why do buildings burn during bush fires?

Research has been undertaken to over the last decades to analysis and determine the elements that determine the survivability of a building during a bush fire event. As the research is validated, these elements are incorporated into planning documentation that guides construction in bush fire prone areas, such as Australian Standard 3959 and NSW RFS Planning for Bushfire Protection.

Research has illustrated that there are three ways a bush fire impacts a building:

1. Direct flame contact,
2. Radiant heat from the bush fire, and
3. Embers generated by the bush fire.

Most people expect direct flame contact to be the biggest risk to homes in a bush fire, but this is not the case. Over 80% of house loss during bush fires occurs because of ember attack; the burning firebrands of bark, leaves and twigs with winds drive away from the main fire front. They find weaknesses in houses such as gaps, cracks to combustible construction materials and can quickly lead to ignition of the building.

Significantly, vegetation that is established adjacent to the building and within the Asset Protection Zone following the construction of the building, which provides fuel for burning embers to ignite and increase the ignitability of the building. It is critical that the Asset Protection Zone are maintained throughout the life of the property, so that wildfire is not encouraged closer to the building.

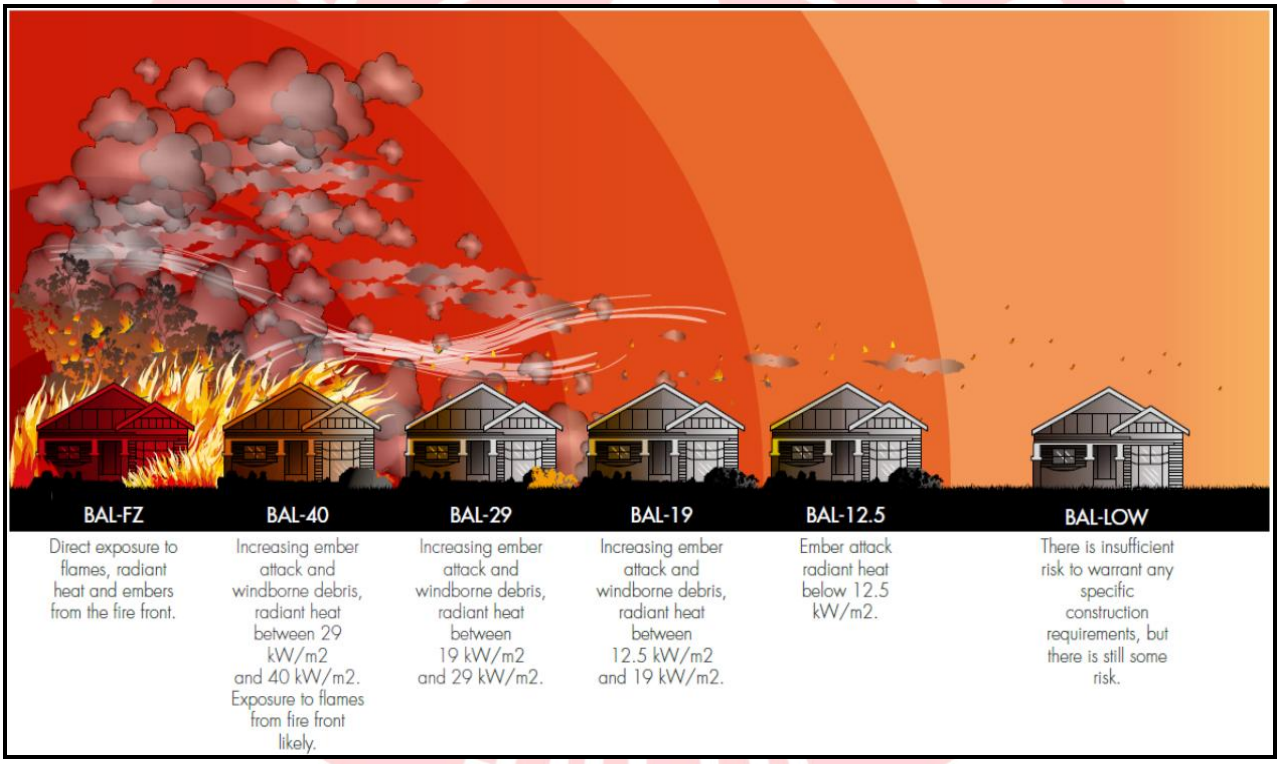
The research has illustrated the separation between the bushfire threat and building; and the construction standards of the building are the principal elements to building survivability. It is critical that:

1. Any future alterations and additions to the building are undertaken with materials that comply with the relevant BAL of the building.
2. The separations between the building and bush fire threat (known as the Asset Protection Zones (APZ)) are maintained to low flammability. This means restricted gardens and combustible elements, such as timber landscaping and furnishings. It is critical to maintain '*fire hygiene'* around the building.

Australia Standard 3959 Construction of buildings in Bush fire prone areas and Bush fire Attack Level (BAL)

Bush fire Attack Level (BAL) ratings refer to the fire intensity your house is likely to be subjected to in a bush fire, expressed in terms of radiant heat. The BAL assessment forms the construction component of the bush fire assessment process. The other component is the Bush fire planning, which includes Asset Protection Zones (APZ), separation to provide defendable spaces, access, water, electricity, gas, landscaping and emergency management.

Furthermore, the measures contained in the *Australian Standard 3959 Construction of buildings in Bushfire Prone Areas* for each BAL construction level are not for fire resistance. The building will burn. The construction standards are aimed at slowing the ignition and fire spread of the building to provide adequate time to enable occupants to shelter within the building as the bushfire front passes. The degree of vegetation management within the APZ, the unpredictable nature of behaviour of fire, and extreme weather conditions make building adjacent to vegetation very dangerous.



Relationship between fire behaviour and BAL (WA Guidelines for Planning in Bush fire Prone Areas, 2017)

Design and Siting

The design and siting of a building can be of critical importance during bush fire attack event. The appropriate design and siting can reduce the impact of bush fire attack mechanisms of direct flame, radiant heat, ember attack, smoke, and wind. Key principles to consider when designing and siting a new development include the following:

- Avoid building on ridges, saddles and build on level ground wherever possible.
- Utilise cut-in benches, rather than elevating the building when building on sloping land.
- Avoid raised floors and protect the sub-floor areas by enclosing or screening.

- Provide an appropriate shelter room that is located on the lowest or non-bush fire hazard side of the building, near building exits and provides the occupant views of the outside environment.
- Reduce bulk of building, limit re-entrant corners, and incorporate simplified roof that are able to self-clean of debris.
- No gutters on second or consecutive storeys of building and avoid box gutters.
- If gutters are installed, incorporate gutter guards with a flammability index more than 5 when tested to AS1530.2, or aluminium, bronze, or stainless steel with maximum aperture of 5mm.
- Limit glazing elements on the sides of the building exposed to the bush fire threat and use shutters to protect glazing elements.
- Carparking provided in a location that does not interfere with escape routes.
- Position development so any gas supplies and overhead electricity are positioned not to impede egress to and from the site.
- Class 10a buildings (such as shed, carport, and garages) should be a minimum of 6m away from any other building. Consider the storage of hazardous materials (petrol, kerosene, alcohol, LPG, natural gas, acetylene, vehicle, machinery etc.) within Class 10a buildings when siting in proximity to Class 1a occupied building and escape routes.
- Provide unobstructed access around the entire building supported by a minimum 1m wide concreted path to the external wall.

Asset Protection Zones

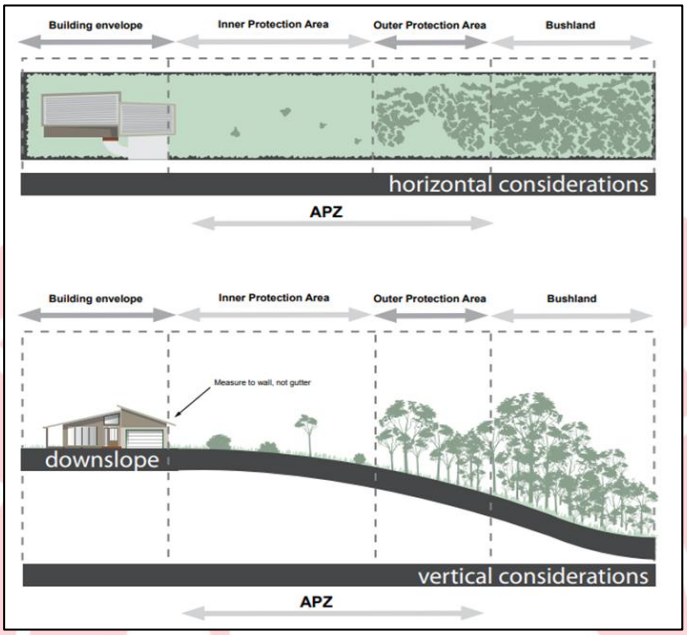
An APZ is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property. The required width of the APZ varies with slope and the type of hazard. An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance to the below standards should be undertaken on an annual basis, in advance of the fire season, as a minimum.

For a complete guide to APZs and landscaping, download the NSW RFS document Standards for Asset Protection Zones at www.rfs.nsw.gov.au/resources/publications .

An APZ can consist of both an Inner Protection Area (IPA) and an Outer Protection Area (OPA) as indicated below. An APZ can include the following:

Footpaths	Driveways
Lawns	Unattached non-combustible garages as long as suitably separated
Discontinuous gardens	Open space / parkland
Swimming pools	Car parking

Isolated areas of shrub and timbered vegetation are generally not a bush fire hazard as they are not large enough to produce fire of an intensity that will threaten dwellings. These areas include narrow strips of vegetation along road corridors.



Components of an APZ (Figure A4.1 - PBP 2019)

Any areas that are designated Asset Protection Zones, should be delineated by rural fencing, signposted or bollards (whatever is practical in the circumstances) to ensure vegetation creep does not occur and further landowners and ground management are aware that the area is to be maintained for Bush fire protection purposes. Examples are provided below:

Inner Protection Area (IPA)

The IPA extends from the edge of the OPA to the development. The IPA is the area closest to the asset and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and be a defendable space. The intent of an IPA is to stop the transmission of flame and reduce the transmission of radiant heat by the elimination of available fire fuel. This area also allows

airborne embers to fall safely without igniting further outbreaks and provides a safer firefighting position and is operationally important for implementation of clear fire control lines.

In practical terms the IPA is typically the curtilage around the dwelling, consisting of a mown lawn and well-maintained gardens. When establishing and maintaining an IPA the following requirements apply:

- Vegetation within the IPA should be kept to a minimum level. Litter fuels (leaves and vegetation debris) within the IPA should be continually removed and kept below 1cm in height and be discontinuous. There is minimal fine fuel at ground level which could be set alight by a bushfire.
- Canopy cover should be less than 15% (at maturity). Trees (at maturity) should not touch or overhang the building and should be separated by 2 to 5m.
- Lower limbs of canopy trees should be removed up to a height of 2m above ground.
- Preference should be given to smooth barked and evergreen trees.
- Large discontinuities or gaps in the shrub vegetation shall be established to slow down or break the progress of fire towards buildings.
- Shrubs should not be located under trees and not form more than 10% ground cover
- Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- Grasses should be kept mown (as a guide grass should be kept to no more than 100mm in height), and
- Woodpiles, wooden sheds, combustible material storage areas, large areas / quantities of garden mulch, stacked flammable building materials etc. are not permitted in the IPA.

Outer Protection Area (OPA)

An OPA is located between the IPA and the unmanaged vegetation. Vegetation within the OPA can be managed to a more moderate level. The reduction of fuel in this area substantially decreases the intensity of an approaching fire and restricts the pathways to crown fuels, reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

In practical terms the OPA is an area where there is maintenance of the understorey and some

separation in the canopy. When establishing and maintaining an OPA the following requirements apply:

- Tree canopy cover should be less than 30%, canopies should be separated by 2 to 5m
- Shrubs should not form a continuous canopy and form no more than 20% of ground cover
- Grasses should be kept to no more than 100mm in height with leaf and other debris should be mown, slashed or mulched.

Furthermore, the edge of the APZ should be clearly delineated to ensure vegetation creep does not occur over time, reducing the separation between the bushfire hazard and building.

Gardens and vegetation within the APZ

All vegetation will burn under the right conditions.

In choosing plants for landscaping consideration should be given to plants that possess properties, which help to protect buildings. If the plants themselves can be prevented from ignition, they can improve the defence of buildings by:

- Filtering out wind-driven burning debris and embers.
- Acting as a barrier against radiation and flame, and
- Reducing wind forces.

Consequently, landscaping with vegetation of the site should consider the following:

- Meet the specifications of an Inner Protection Area (IPA) detailed in PBP 2019.
- Priority given to retaining or planting species which have a low flammability and high moisture content.
- Priority given to retaining or planting species which do not drop much litter in the bushfire season, and which do not drop litter that persists as ground fuel in the bush fire season, and
- Create discontinuous or gaps in the vegetation to slow down or break the progress of fire towards the dwellings.
- Avoid gardens within 10m of the exterior building envelop.
- Trees and shrubs within 40m are not continuous, but instead arranged as discrete patches separated by a ground layer with low fuel hazard, such as mown grass.
- Position courtyards, gardens, and grassed areas in locations that facilitate the protection of the building.
- Install pebble/rock garden beds avoiding the use of mulch and wood chip.

Consideration should be given to vegetation fuel loads present on site. Careful thought must be given to the type and physical location of any proposed site landscaping.

Inappropriately selected and positioned vegetation has the potential to 'replace' any previously removed fuel load.

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a suitable balance between visual and safety concerns be considered. The below list of well know ground fire-retardant plants is intended as a guide only, check with your local council for information more specific to your area.

Lomandra longifolia	*Dampiera*
Lomandra hystrix	*Scaevola aemula*
Anigozanthos hybrids	*Succulents (most)*
Agapanthus orientalis	*Carpobrotus (Pigface)*
Liriope muscari	*Cotyledon*
Carpobrotus glaucescens	*Ajuga australis*
Casuarina glauca	*Myroporum*
Ajuga	*Nepeta* (catmint)
Brachyscome	*Mesembryanthemum*

Strategically positioned elevated vegetation (fire-retardant tree and shrub species) can act as 'windbreaks' and 'ember filter', reducing wind velocities and suppressing the density of embers attacking a building. It is critical that this vegetation is:

- On flat ground place >30m from the building (ideally 40m forming the outer perimeter of the IPA).
- >20m separation from the hazardous vegetation.
- Located on the side of the bush fire hazard.
- No gardens of shrubs under the trees.
- Shrub patches no greater than $10m^2$.

The below list of well know fire-retardant trees and shrubs is intended as a guide only, check with your local council for information more specific to your area:

Melia azederach (Cape Lilac)	*Citrus trees*
Brachychiton aecerifolius (Flame tree)	*Loquot*
Magnolia grandiflora	*Arbutus Quercus (only the deciduous oak)*
Pyrus (most ornamental pears)	*Feijoa*
Magnolia Little Gem	*Gleditzia*
Ulmus chinensis (Chinese Elm)	*Ficus (all including edible)*
Acacia howitii	*Aloe (all)*
Cercis (Judus Tree)	*Correa*
Acmena smithii (Lilypily)	*Acacia iteaphyla*
Prunus (all including ornamental)	*Scaevola crassifolia*
Cupaniopsis anacardiopsis (Tuckeroo)	*Viburnum tinus*
Malus (apple trees)	*Atriplex (saltbush)*
Eleocarpus	*Escallonia*
Mullbery	*Maireana (Cottonbush)*
Eremophila (Emu bush)	*Leucophyta brownii*
Melaleuca nodosa	*Plectranthus*
Syzygium (lilypilly)	*Santolina*
Photinia	*Coprosma*
Rhagodia (saltbush)	*Strelitzia*
Acacia Cyclops	*Senna (Silver Cassia)*

Recent post-fire research from the 2019/20 bushfire season suggests greenness factor (the extent to which plants are actively growing) had an impact on building survivability to a bushfire, indicating that maintained green grasses and landscape watering features are beneficial during a bushfire.

It is essential that any vegetation and landscaped areas and surrounds are subject to ongoing fuel management and reduction to ensure that fine fuels do not build up.

Landscaping features within the APZ

A combination of hard (materials) and soft (design) landscaping will benefit the survivability of a building during a bushfire event. The type, quantity and condition of fuel has a very important effect on bushfire behaviour in proximity to a building. Poorly located vegetation that burns readily may expose a house to increased levels of radiant heat and flame contact.

- Non-flammable features such as tennis courts, swimming pools, dams, patios, driveways or paths should be incorporated into the proposal, especially on the northern and western sides of the proposed building.
- Remove other flammable objects from around the house. These include sheds, caravans, outdoor furniture, barbeques, gas bottles, wood piles and organic mulch.
- Avoid flammable mulches within the APZ. Alternatives include gravel, scoria, pebbles, shells or recycled crushed bricks.
- Use non-combustible, moveable containers and pots that can be relocated in the summer.
- Restrict the use of door mats and place firewood stacks >10m from building.
- Restrict the use of timber and use materials such as brick, earth, stone, concrete and galvanised iron
- Metal screens can help to shield your house from radiant heat, direct flame contact and ember attack.
- An intensive area of planting centred on a contoured garden mound provide an effective screening.
- Fencing in BAL 29 or within 6m of a building should be of non-combustible materials.
- Establish a path immediately around the external wall of the building. Do not place garden beds adjacent to the external fabric of the building and under windows.
- Clumping shrubs and trees so they do not form a continuous canopy and are separated by areas of low fuel (maintained green grass lawn).

Further information can be found here - Landscaping for bushfires

Access Requirements

In the event of a serious bushfire threat to the proposed development, it will be essential to ensure that adequate ingress/ egress and the provision of defendable space are afforded in the development/building design.

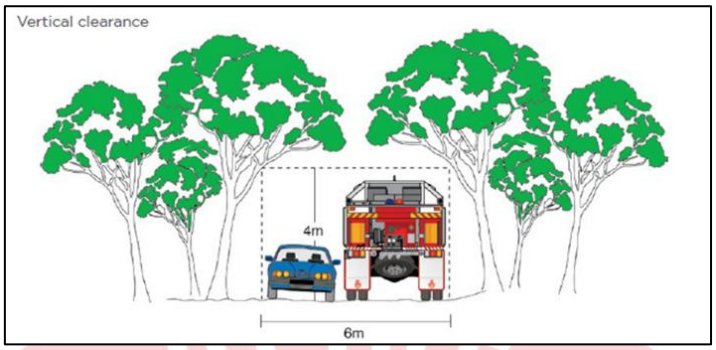
Local Area Traffic Management (LATM)

The objective of LATM is to attain an acceptable level of speed, volume, and composition of traffic within a local area and reduce the number of road accidents. This is achieved by modifying the street environment through the installation of various traffic control devices. LATM devices by their nature are designed to restrict and or impede the movement of traffic, especially large vehicles, which conflicts with the intent for access required by the NSW RFS and may significantly increase response times for emergency services.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

Vertical clearance

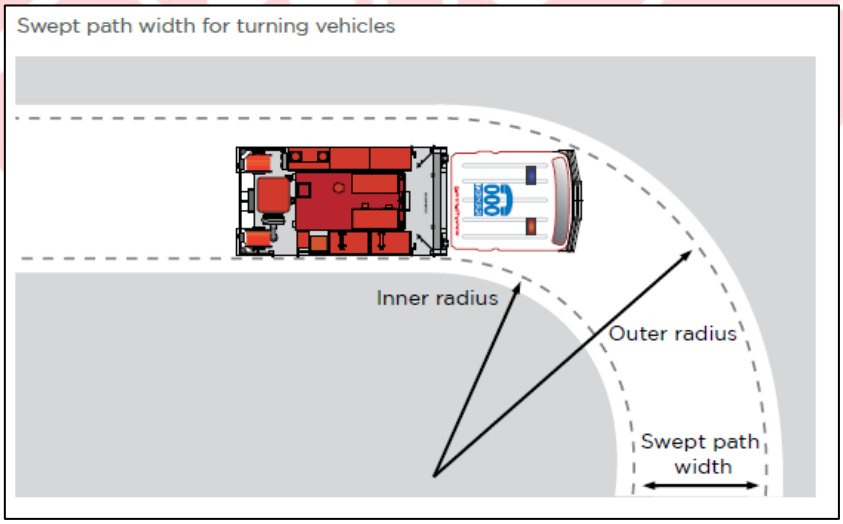
An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways/doorways, and overhanging structures (e.g., ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads and fire trails.

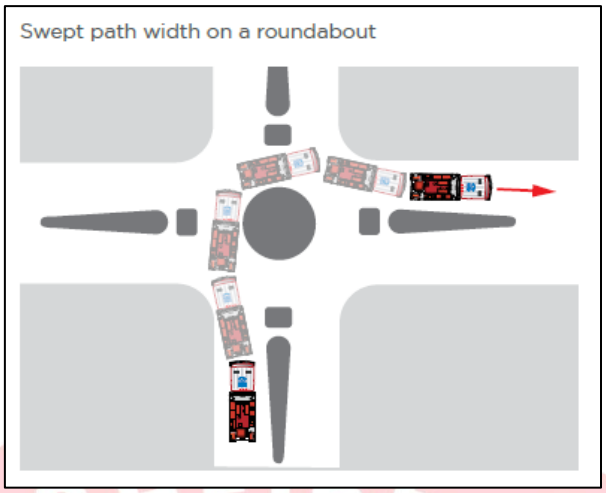


Vehicle Turning Requirements

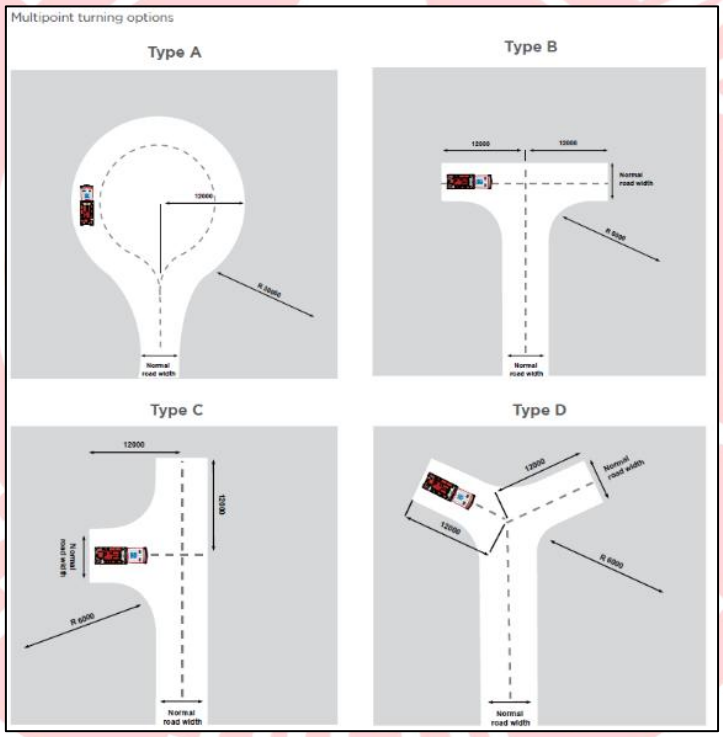
Fire crews must have rapid access and egress for vehicles, therefore curved carriageways should be constructed using the minimum swept path. The below diagrams from PBP2019 provide indication of the requirements to be achieved.

Minimum curve radius (inside edge (m))	Swept path (m) wide
<40	4.0
40 -69	3.0
70 - 100	2.7
>100	2.5





Where a turning head is proposed the NSW RFS requires that dead ends having a length greater than 20 metres should be provided with a turning head area which avoids multipoint turns.



Passing Bays

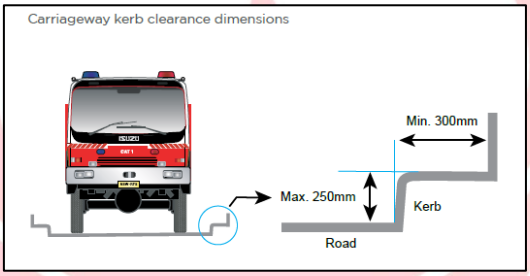
The construction of passing bays, where required, shall be 20m in length, provide a minimum trafficable width at the passing point of 6m.

Parking

Parking can create a pinch point within the road reserve. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants should be located clear of any parking areas to ensure that access is always available.

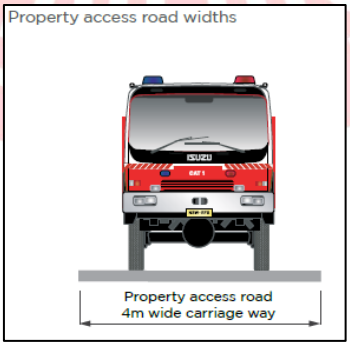
Kerb Dimensions

All kerbs constructed around access lanes should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.



Road Types

Property access is required to be 4m wide all-weather road. Can be sealed or unsealed.



Water Supply

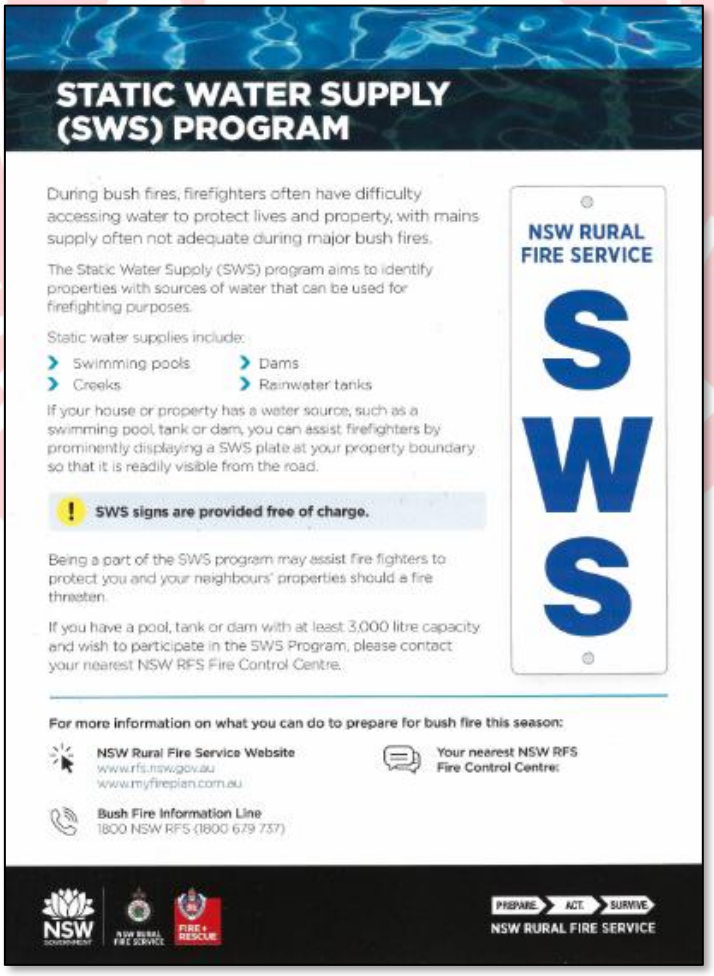
The intent of water measures is to provide adequate services of water for the protection of dwellings during and after the passage of a bush fire.

Where reticulated water supply is not provided, a static water supply for fire-fighting purposes should be above-ground, accessible, clearly marked and manufactured from concrete or metal. If raised, the tank stand should be made from non-combustible material. These static water supplies (tanks) should be positioned on the non-hazard side of the building and have 65mm Storz outlet with a ball valve fitted to the outlet within the IPA. If not appropriate, they should be appropriately shielded to protect the tank and fire fighters accessing the water. Category 1 fire appliances should be able to access within 4 m of static water supply with a hardened ground surface to support this access.

All exposed water pipes, values, taps and fittings should be metal and the supply line from tank to ball valve have the same bore size.

Where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump and are shielded against bush fire attack. Any hose and reel for firefighting connected to the pump shall be 19mm (internal diameter), and fire hose reels are constructed in accordance with AS/NZS 1221:1997 Fire hose reels and installed in accordance with AS 2441:2005 Installation of fire hose reels.

Where static water supply is provided the following signage should be installed at the front gate and at a location that is clearly visible (assume smoke) to approaching emergency services to guide them to the static water supply.



Electricity, Gas supplies and Hazardous materials

The intent of electricity, gas and hazardous material measures is to locate these utilities and materials so as not to contribute to the risk of fire to a building.

Electricity

Location of electricity services should limit the possibility of igniting the surrounding bush land or the fabric of buildings. Where practicable, electrical transmission lines are underground. If overhead, electrical transmission lines are installed with short pole spacing (30m), unless crossing gullies, gorges, or riparian areas, then no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

For further information visit https://www.electricitysafety.com.au/

Gas

Any reticulated or bottled gas should be installed and maintained according to the requirements of the relevant authorities and AS/NZS 1596:2014. All fixed gas cylinders are kept clear of all flammable materials to 10m and shielded on the hazard side. All above-ground pipes and connections to and from gas cylinders are metal, and polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not permitted. Furthermore, if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion. Gas utilities should be positioned to not impede fire fighters accessing water supplies while undertaking suppression operations.

Hazardous Materials

Hazardous materials are any materials that can fuel the fire, such as leaf litter, grass, garden mulch and woodpiles. They can also be made up of solid combustibles or flammable liquids and gases such as petrol, kerosene, alcohol, LPG, natural gas, and acetylene. Vehicle, machinery, and other mechanical equipment that utilise fuels for operations can also be considered hazardous. The incorrect design and placement of carport and garages in residential developments could propagate fire towards the residential dwelling. Any liquids or fuels that are considered hazardous should be positioned away from the dominant bush fire threat. If located in a building/structure, it should be a minimum of 6m away from any other building. Vegetation surrounding these locations shall be maintained to IPA standards and the construction standards shall minimise the impact of ember attack to ignite the structure.

Construction Requirements

Groundwork and Sub-structure construction phase

During the ground phase potential ignition sources of the subject development may include hot works, incorrect disposal of cigarette butts and hot exhausts from vehicles, electrical failures, and sparks from metal contact.

Groundwork and Sub-structure construction phase fire management plan should be developed. Preparation of the site should include mitigating fire ignition sources. This should include vegetation management such as slashing and mowing long grasses in and around the development site, car parking and access tracks. This is especially important during summer months where Rates of Spread of fire can significantly increase due to the prevailing weather condition.

Handheld fire extinguishers should be carried on each vehicle and on site for quick access and suppression of fires.

Where neither reticulated water nor an existing static water supply is available during the construction phase, a temporary 10,000 litre Static Water Supply within proximity of the development site shall be provided before the commencement of any construction works. This temporary supply will allow for the replenishment of attending fire services which will facilitate the rapid suppression of any potential ignitions. The temporary supply may be removed when the prescribed fire-fighting water supply is installed.

Ongoing Operations

Routine inspections of bush fire safety systems and equipment generally occur annually and are supported by a Bushfire Plan. Ideally these inspections should occur moving out of the colder months in preparation for the bushfire season. The most common types of inspections that are required are surface, near surface (grasses and debris) and elevated (shrub) fire fuel level accumulation in APZs, canopy separation reequipments in APZs, and maintaining building fire hygiene such as cleaning gutters and down pipes.

Developing and annually reviewing a bushfire plan, no matter how big or small the development, is critical to the ongoing maintenance of the Bushfire Protection Measures identified within this report.

Construction Standards

Australian Standard 3959 ''Construction of buildings in bushfire-prone areas" provides for six (6) levels of building construction these being BAL - Low, BAL - 12.5, BAL - 19, BAL - 29, BAL - 40 and BAL - FZ. The Australian Standard 3959 specifies construction standards for buildings within various Bushfire Attack Levels as determined by the Planning for Bushfire Protection – 2019 document.

Retrofitting

Any future alterations, extension to structures, even if they are complying, should consider the appropriate bushfire construction standards at that time. Homes built prior to August 2002 were not required to be built to meet bush fire construction standards. Constructions in Bush fire prone lands after August 2002 required bush fire construction standards, which have also changed over time.

The current construction standards are based on your Bush fire Attack Level (BAL). Evidence from large wildfire events over the last 20 years illustrate that house ignition is concentrated within 100m from the vegetation, although it can occur kilometres from the burning vegetation under worst case scenarios. Developments outside the bush fire prone area (100m from the vegetation) will benefit from increasing construction standards to withstand ember-attack to protect the building during a bush fire event.

When undertaking alterations and additions to a dwelling in Bush fire prone land only the new construction is required to conform with the current requirements, although this only partially protects your home.

Research has illustrated that ember-attack from the wildfire is the principal mechanism that ignites homes. The most vulnerable elements are timber decks, Eave fascia boards, gutters timber window frames and timber stairs. Furthermore, house-to-house fires occur following the ignition of a neighbouring property. Appropriate amount of effort should be placed to ensure that vegetation and landscaping should be maintained to reduce the likelihood of ember attack igniting fire fuels near the house, and separation between neighbouring houses is achieved to reduce house-to-house fires. The use of non-

combustible fencing and appropriately positioned windows can go a long way to reducing the risk of house-to-house fires.

While retrofitting identifies available construction protection methods as per *AS3959 – Construction of buildings in Bushfire Prone Area*, **it should be clearly understood that such building enhancements are complementary to good site preparation and vegetation management in the context of the bushfire survival plan**.

Routine maintenance is an important part of bushfire protection for your home, out-buildings and garden. For example, if a window/door metal shutter is fitted, it needs to work at the time of a bushfire threat just like your fire equipment needs to be ready to go.

Each retrofitting measure is a step towards making your home safer against the impact of embers and radiant heat in the event of a bushfire. If you want your home to be comparable to the construction requirements under AS 3959, then *ALL* the works associated with a particular BAL category will need to be undertaken.

Some of the basic retrofitting that can be undertaken:

- Enclose existing sub floors with suitable materials or construct the floor and structure with non-combustible materials
- Cover, seal, overlap, back or butt-joint all joints in the external surface material of walls to prevent gaps greater than 2mm.
- Seal vents, weepholes, breathers and openings with metal screens of aperture <2mm.
- Replace flammable external walls with non- combustible materials.
- Apply sarking-type material (flammability index >5) over the outer face of the building frame prior to re-fixing of any external cladding.
- Screen all windows and doors with metal screens of aperture <2mm and metal frames.
- Establish weather strips, draught excluders or draught seals around doors and panel lift garage doors.
- Garage roller doors could have guide tracks with a maximum gap area of 3mm and be fitted with a nylon brush in contact with the door.
- Above-ground, exposed water, gutter downpipes and gas supply pipes should be metal.
- incorporate gutter guards with a flammability index more than 5 when tested to AS1530.2, or aluminium, bronze, or stainless steel with maximum aperture of 5mm.
- Only use Bushfire resisting timber as specified in AS 3959 Appendix F.

Further information can be found at Guide-retrofit-your-home-for-better-bushfire-protection.

Electric Vehicles (EVs)

EVs are an ever-growing part of the transport environment with government aims of EV vehicles dominating throughout the 2030's. There are a variety of different technologies, battery types, and chemistries in vehicles, e-scooter and e-bikes creating complexity on the risk of '*thermal runaway'*.

Thermal runaway is an unstable chemical process that begins when heat generated within a battery exceeds the amount of heat that is dissipated to its surroundings, which can lead to the battery catch fire. EV batteries tend to put out toxic fumes resulting in suppression difficulties.

Although the chances of batteries catching fire is relatively small <0.1%, approximately 1/3rd of fires occur during charging. the location of residential parking of Plug-in Hybrid Electric Vehicles (PHEVs) vehicles

should be considered when planning inconsideration of occupied buildings and extinguishment requirements.

Having a smoke/heat alarm, a F-500 (class A, B and F) Lithium-Ion Battery fire extinguisher in an open-air charging station (unenclosed building) that is location >6m from any building or flammable vegetation will significantly mitigate risk of a EV fire spreading.

Further information can be obtained at: https://www.evfiresafe.com/

Bushfire Emergency / Survival Plan

No matter how big or small the development is within a bush fire prone area, a bush fire plan is critical to preparing the property in the event of a bush fire. To ensure appropriate measures are taken, the worst-case scenario bush fire behaviour should be used to determine the course of action.

There is extreme noise, smoke, heat, and wind during the passing of a bush fire front under worst-case conditions. Vision, hearing, breathing, and communication are significantly affected during this period.

State bush fire authorities have established kits to help residential and small property owners to develop appropriate plans to plan and prepare for bush fire events. In NSW Bush fire survival Plans can be accessed from https://www.rfs.nsw.gov.au/plan-and-prepare/bush-fire-survival-plan.

The principal elements of the Bush fire survival Plans are:

- Know your risk.
- Know and understand the bush fire alert levels.
- Access to 'Fires Near Me' app.
- Knowledge of Local radio, local ABC/emergency broadcaster frequency, and TV.
- Prepare yourself, your home and your family.
- Leave early or prepare to stay.
    - If leaving, when to leave, where will you go, how will I get there, what will I take, who will you call, what is your back-up plan.
    - If you stay, do you have all the equipment you need, what are the signal to start defending the dwelling, what to do before, during and after the passing of the fire front, do all members of the household know what to do, check your equipment, develop action checklist, what is your back-up plan.
- Discuss all elements with your family and neighbours.

Furthermore, knowledge of escape routes (generally the public road system around your dwelling), refuges and location of any nearby Neighborhood Safer Places is critical knowledge prior to a bush fire event.

A bushfire emergency management and evacuation plans are prepared consistent with Australian Standard AS 3745:2010 Planning for emergencies in facilities. State agencies also have developed guidelines to facilitate the development of the documents and other Australian Standards are relevant for different development type. Bushfire emergency management and evacuation plans should be complemented with a Bushfire Management Plan (BMP).

A simple 4 step process can be undertaken to develop a basic bushfire emergency survival plan:

DISCUSS

STEP 1

DISCUSS WHAT TO DO IF A BUSH FIRE THREATENS YOUR HOME

Many households find that having a discussion over dinner works best as everybody is together and focussed.

Download the Step 1 discussion guide (PDF, 985.3 KB).

PREPARE

STEP 2

PREPARE YOUR HOME AND GET IT READY FOR BUSH FIRE SEASON

There are simple things you can do around your home to prepare it for a bush fire, like keeping the grass low and having a cleared area around your home.

Download the Step 2 checklist (PDF, 595.5 KB).

KNOW

STEP 3

KNOW THE BUSH FIRE ALERT LEVELS

If there is a fire in your area you will find its alert level on the NSW RFS website and in the 'Fires Near Me' app. You need to keep track of the alert level so you know what you should do.

Download Step 3 (PDF, 166.1 KB).

KEEP

STEP 4

KEEP ALL THE BUSH FIRE INFORMATION NUMBERS, WEBSITES AND THE SMARTPHONE APP

In a bush fire, it's important that you stay up to date on conditions in your area.

Download Step 4 (PDF, 219.1 KB).

Bushfire Management Plan

No matter how big or small the development is within a bushfire prone area, a bushfire plan is critical to preparing the property in the event of a bushfire. To ensure appropriate measures are taken, the worst-case scenario bushfire behaviour should be used to determine the course of action.

State bushfire authorities have established kits to help residential and small property owners to develop appropriate plans to plan and prepare for bushfire events. These can be accessed by contacting your local fire authority.

For larger development such as industrial, commercial and developments that accommodate vulnerable people, more comprehensive emergency management requirements and procedures should be developed.

At a minimum, the Bushfire Management Plan should illustrate the Bushfire Protection Measures (location and type of hazard (vegetation), defendable space, access, water, and construction standards) that will be implemented as part of the development to reduce the risk from bushfire to an acceptable level and should be clearly displayed within the property to ensure current occupants are aware of the bush fire risk.

Furthermore, the BMP can provide information that assists in wildfire suppression operations, such as:

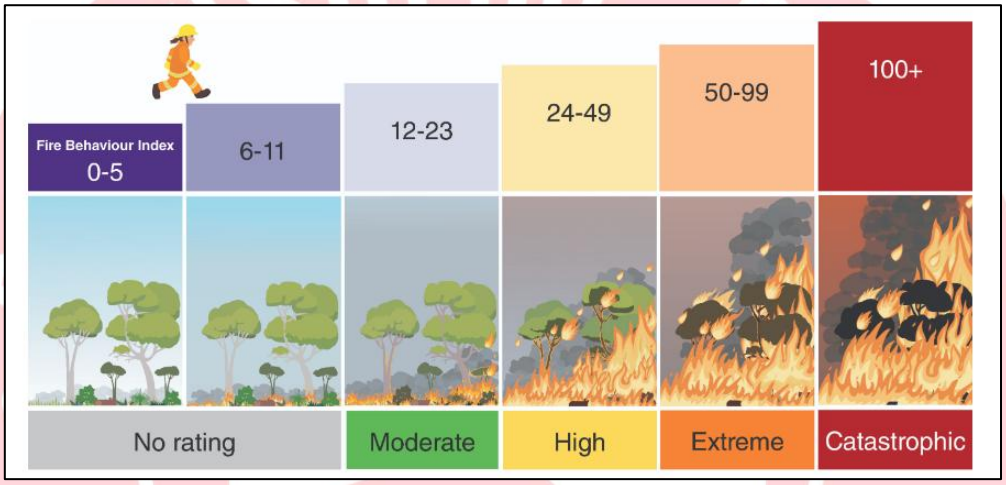
- 24/7 emergency contact details including alternative telephone contact.
- Location of site infrastructure and assets.
- Fire-fighting water supply plan.
- Site access and neighbour/ internal road plan.
- Identification of built, natural and cultural assets in and around the site.
- Emergency escape routes, refuges, and location of any nearby Neighbourhood Safer Places.
- Location of Fire Management Zone, specifically Asset Protection Zones.
- Location of hazards (Physical, Chemical and Electrical) that will impact on fire-fighting operations and procedures to manage identified hazards during fire-fighting operations.
- Aviation assets (helipads and aviation water supplies) and risks (powerlines).
- Fire history in and around the site, and
- Schedule of on-ground works and review and updating schedule.

Updated Australian Fire Danger Rating System

The principal objective of the new Australian Fire Danger Rating System (AFDRS) is to implement a more accurate and nationally consistent system that will enable improved decision-making by response agencies and industry and provoke the desired community response to messaging in order to improve public safety. More information at https://www.rfs.nsw.gov.au/news-and-media/newfdr and eLearning at https://www.afac.com.au/initiative/afdrs/afdrs-training .

The AFDRS uses the latest scientific understanding about weather, fuel and how fire behaves in different types of vegetation to improve the reliability of fire danger forecasts. This strengthens the ability of those working in emergency services to be better prepared, make improved decisions, and provide better advice to the community.

It is aimed at a simplified, action-oriented Fire Danger Rating System.



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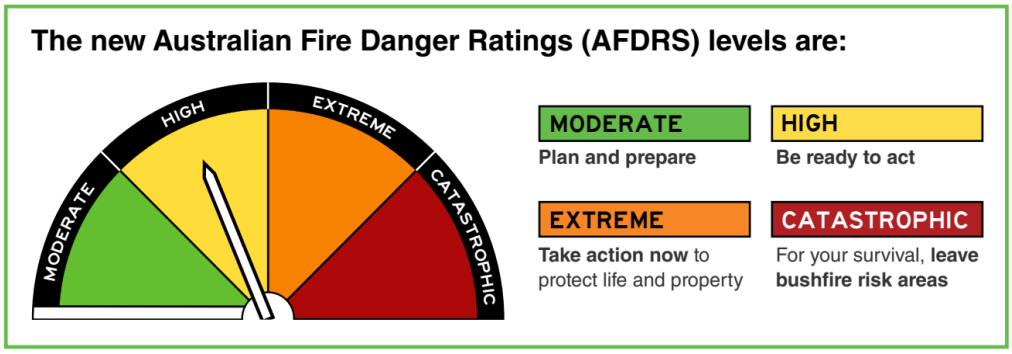


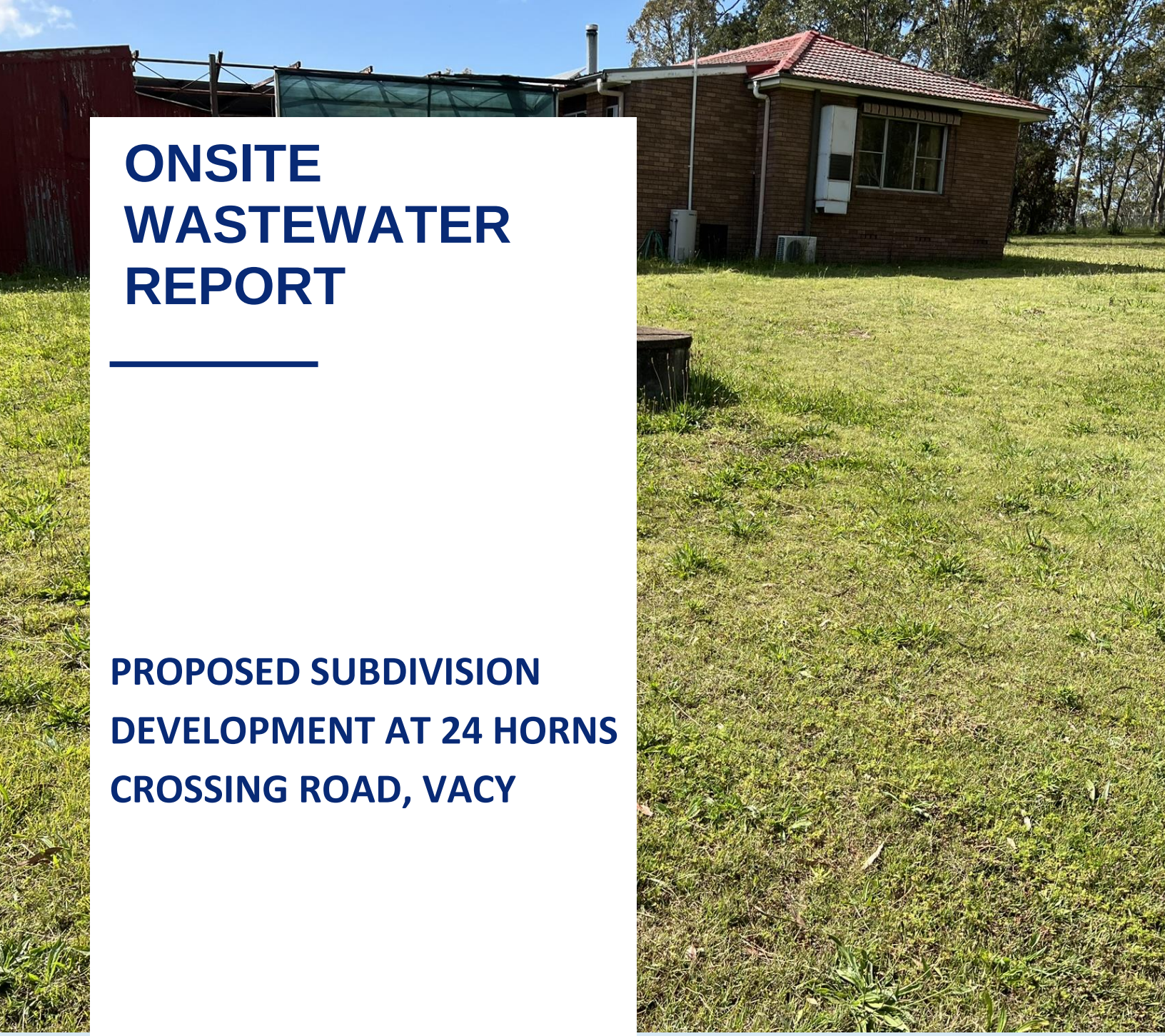
Accessed from AFAC: https://www.afac.com.au/initiative/afdrs/afdrs-faqs

MODERATE: *Plan and Prepare* - Have a plan and be ready to act if a fire starts.

HIGH: *Be ready to act* - Be alert for fires in your area and be ready to leave or be ready to defend.

EXTREME: *Take action* - Act before a fire starts.

CATASTROPHIC: *Leave high risk areas* - Protect your life, leave early.



ONSITE WASTEWATER REPORT

PROPOSED SUBDIVISION DEVELOPMENT AT 24 HORNS CROSSING ROAD, VACY

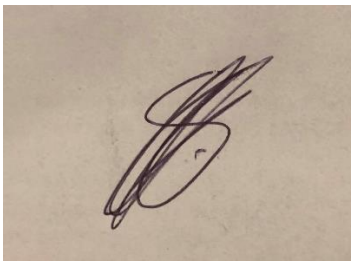
GSL Environmental
Authored by: Simon Doberer B.Sc. (ENV)
Job Reference #: 145124
Date: 15th October 2024

GSL Environmental
Environmental Consultants

Limitations

This report has been developed based on agreed requirements between the client and GSL Environmental as understood by GSL Environmental at the time of investigation. This report only applies to the subject scope of works undertaken at the subject site. Other interpretations should not be made, including changes of scope or application to other projects. The contents of this report are based on a professional appraisal of the conditions that existed onsite at the time of this investigation. Where a subsurface soil investigation has been undertaken the results are only applicable to the specific sampling locations and the depths undertaken. Because of natural geological variability and possible anthropogenic influences, the subsurface conditions reported can change abruptly. Such changes can also occur after the site investigation has been undertaken. The accuracy of the results provided in this assessment is limited by these possible variations along with limitations by budget constraints imposed by others and by inadequate site accessibility.

Copyright



Simon Doberer
Principle Environmental Scientist
B.Sc. (ENV)

Contents

1. Introduction

GSL Environmental has been commissioned by Alva Planning to assess the suitability of an on-site sewage management system for the proposed three allotment rural residential subdivision at 24 Horns Crossing Road, VACY NSW. This report will be submitted to Dungog Council in accordance with the relevant details in the 'Dungog Council Onsite Sewage DAF 2015'. Other guiding documents include,

- Australian Standard AS1547: 2012"On-site Domestic Wastewater Management"
- Dept. Local Government 1998, On-site Sewage Management for Single Households
- Water NSW, "Designing and Installing Onsite Wastewater Systems", 2019

This assessment is required to show that treated wastewater generated by the proposed allotments from the subdivision can be sustainably managed on the site.

2. Site Description

The subject allotment is rectangular in shape and approximately 2.34 hectares in size. The site is very gently inclined and can be considered mid-slope waning landforms. The proposed EDAs have been located within very gently inclined mid slope landscapes. The closest significant water body, Shingle Splitter Creek flows approximately 1km to the east of the site. There are no waterbodies onsite.

According to the Port Stephens 1:100 000 Soil Map the proposed dispersal areas onsite are underlain by "Brecon" residual soils. The Brecon Soil Landscape areas generally consist of undulating rises to low hills on Carboniferous sediments and ignimbrites of the Paterson Mountains and Clarencetown Hills regions. Slope gradients are generally between 2 - 10%. Underlying soils mostly consist of brown sandy loams traversing to brown clays.

The proposal is for a three lot rural residential subdivision, proposed plans in Appendix B. As at subdivision stage the new allotments have been designed for 5 bedroom residences. The existing residence is a four habitable room residence and is currently serviced by a septic followed by absorption. To be compliant to current standards the existing dwelling septic system is to be upgraded per below recommendations. Bedroom density on the future dwellings at DA stage may be altered subject to a site specific onsite wastewater assessment.

Figure 1: Subject Site, care of six maps showing property boundaries and associated landmarks.

3. Site Information

Site Address: 24 Horns Crossing Road, VACY

Water Supply: Tank

Proposed Development: Three lot rural residential subdivision

Equivalent Population: Up to 8 persons/day – 5 habitable room residence – Proposed Allotments
Up to 7 persons/day – 4 habitable room residence – Existing dwelling

Wastewater Flow Allowance: 120L per person per day

Design Flowrate: 960L per day – Proposed Allotment
840L per day – Existing dwelling

Proposed Effluent Dispersal Type: Sub-Surface Drip

System Design: Aerated wastewater treatment systems

Most restrictive Soil Texture: brown clays

Minimum Dispersal Area: 518m2 – proposed allotment
453m2 – existing dwelling

Buffer Distances: All required buffer distances can be achieved without any variation required.

4. Physical Site Assessment

A site inspection was undertaken on the 3rd October 2024. The fieldwork included an assessment of the site's physical parameters as well as hand excavation of boreholes to determine the underlying soil structures. This was undertaken to delineate the most suitable location for the proposed dispersal area. Potential onsite limitations have been investigated and are discussed below.

4.1 Landform

Varying landforms pose differing potential limitations to an effluent dispersal area. Risk of run-on and runoff may be enhanced dependent on the site's landform.

The proposed EDAs have been located within very gently inclined mid slope landscapes.

Limitation: **LOW**

4.2 Slope Gradient

Excessive slope within an EDA can potentially lead to effluent leaching away from the EDA.

The proposed EDAs have been located within very gently inclined mid slope landscapes. The EDAs have slope gradients between 3 – 6%.

Limitation: **LOW**

4.3 Exposure

Providing the EDA with maximum wind and sun exposure is preferable. This will enhance the evapotranspiration properties of the EDA and should add to the life of the EDA.

The proposed EDAs are within areas of very high exposure.

Limitation: **LOW**

4.4 Flood Potential

The proposed AWTS and dispersal area will be located above the council given flood planning levels. Some areas onsite are considered flood prone lands. As such the proposed EDAs are not to be in these locations. Subsurface irrigation is recommended to minimise any spray drift from leaching from the EDA into levels below the flood planning levels.

The proposed EDAs are outside of any flood planning levels and above the 1:20 Flood level.

Limitation: **LOW**

4.5 Vegetation

All effluent dispersal areas should be covered with vegetation or mulch-based covers. A vegetated EDA provides the possibility of that area in enhancing nutrient uptake and evapotranspiration. Low vegetation cover can cause effluent runoff and low nutrient and evapotranspiration uptake rates.

The proposed EDAS are located within areas of dense grassland vegetation coverage. Future EDAs will need to be regularly mowed and maintained.

Limitation: **LOW**

4.6 Stormwater Run-on

Stormwater runoff through the EDA has the potential to transport effluent away from the EDA to more sensitive receivers.

There were no visible signs of stormwater entering the proposed EDAs. The proposed EDAs have been located within very gently inclined mid slope landscapes. The EDAs have slope gradients between 3 – 6%.

Limitation: **LOW**

4.7 Site Drainage

Damp and wet areas should be avoided for EDAs. These areas indicate seepage of waters and could become a transport option for effluent if placed in these areas.

Site appears to be well drained with semi-permeable soils. No visible signs of wet/damp areas in the proposed EDA. The soil profile did not show evidence of water logging

Limitation: **LOW**

4.8 Erosion Potential

Areas of visible soil movement and erosion should be avoided.

No visible signs of erosion within the EDA. Proposed EDA areas are densely vegetated and very gently inclined.

Limitation: **LOW**

4.9 Evidence of Fill

No evidence of fill was seen onsite or in the excavated boreholes. Soil logs are consistent of the description for underlying soils within the Brecon Soil Areas.

Limitation: **LOW**

4.10 Groundwater Depth

Groundwater not observed in bore holes.

Limitation: **LOW**

4.11 Surface Rock

No surface boulders or rock outcrops were observed within the proposed EDAs. Whilst depth was found in boreholes excavated within the proposed EDA, if during installation a “floater” is found it is to be removed from the proposed EDA.

Limitation: **LOW**

4.12 Groundwater Bores

A search of Water’s all groundwater mapping was undertaken to determine the proximity of any bores to the EDAs. There are no domestic bores within 250m of the proposed EDAs.

Limitation: **LOW**

4.13 Watercourse Proximity

The closest significant water body, Shingle Splitter Creek flows approximately 1km to the east of the site. There are no waterbodies onsite. Recommended setbacks to water bodies from the EDAs will be met.

This report proposes that subsurface irrigation be installed as the EDA on the subject site. Treatment is to be provided via a NSW Health accredited AWTS. The secondary effluent is further treated during

the subsurface absorption/transpiration processes. These measures will help the effluent to not leach from the proposed EDA.

Limitation: **LOW**

4.14 Stock Present

Stock can cause damage to irrigation systems and must be kept out of the EDA by fencing or other physical barrier.

4.15 Buffer Distances

All buffer distances in accordance within AS 1547:2012 will be achieved.

Limitation: **LOW**

Buffer distances from the EDA are required to minimise risk to public health, maintain public amenity and protect sensitive environments. Table below from 'Dungog Council Onsite Sewage DAF'.

Table 6-8 Minimum Buffer Distances for On-site System Land Application Systems

System / Land Application Type	Limiting Factor	Minimum Buffer Distance (m)
All Land Application Systems	Permanent surface waters such as: Lakes, rivers, creeks and streams	➢ 100m
	Domestic groundwater wells and bores	➢ 250m
	Other waters such as: Farm dams, intermittent waterways and drainage channels	➢ 40m
	Retaining wall, embankments, escarpments and cuttings.	➢ 15
Surface Spray Irrigation (Standard Spray Heads)	Driveways and property boundaries	➢ 6m if area up gradient ➢ 3m if area down gradient
	Dwellings and buildings	➢ 15m
	Paths and walkways	➢ 3m
	Swimming pools	➢ 6m
	Retaining wall, embankments, escarpments and cuttings.	➢ 12m if area up gradient ➢ 3m if down gradient
Surface Drip and Trickle Irrigation	Dwellings and buildings, swimming pools, property boundaries and driveways. Retaining wall, embankments, escarpments and cuttings.	➢ 6m if area up gradient ➢ 3m if area down gradient
Subsurface Irrigation	Dwellings and buildings, swimming pools, property boundaries and driveways Retaining wall, embankments, escarpments and cuttings.	➢ 6m if area up gradient[1] ➢ 3m if area down gradient[1]
	Depth to Hardpan or Bedrock	➢ 0.6m below level of pipework[2]
Absorption System	*Property boundary* *Retaining wall, embankments, escarpments and cuttings.*	➢ 12m if area up gradient ➢ 6m if area down gradient
	Dwellings and buildings, swimming pools and driveways	➢ 6m if area up gradient ➢ 3m if area down gradient
	Depth to Hardpan or Bedrock	➢ 0.6m below base of trench/bed

Permanent Watercourse: *Any river, creek, stream or chain of ponds, whether artificially modified or not, in which water usually flows, either continuously or intermittently, in a defined bed or channel*
Intermittent Watercourse: *A low point with no or little defined bed or channel that carries water during rainfall events, but dries out quickly when rainfall stops. A gully or incised drainage depression is considered to be an intermittent watercourse.*

Figure 2: Proposed EDA onsite

Figure 3: Proposed EDA onsite

Figure 4: Proposed EDA onsite

5. Onsite Soil Assessment

During the site inspection 6 boreholes were hand excavated with a 100mm auger within the proposed EDAs. 2 boreholes within each proposed EDA. The following are the results from the excavation. The auger holes were used to determine the underlying soil properties. No groundwater was observed in the excavated boreholes.

According to the Port Stephens 1:100 000 Soil Map the proposed dispersal areas onsite are underlain by “Brecon” residual soils. The Brecon Soil Landscape areas generally consist of undulating rises to low hills on Carboniferous sediments and ignimbrites of the Paterson Mountains and Clarencetown Hills regions. Slope gradients are generally between 2 - 10%. Underlying soils mostly consist of brown sandy loams traversing to brown clays.

Borehole 1

0 – 350mm - brown sandy loams,
350 – 1000mm – brown clays,

Figure 5: Borehole 1

Borehole 2

0 – 300mm - brown sandy loams,
300 – 1000mm – brown clays,

Borehole 3

0 – 250mm - brown earthy sandy loams,
250 – 1000mm – brown clays,

Figure 6: Borehole 3

Borehole 4

0 – 300mm - brown earthy sandy loams,
300 – 1000mm – brown clays,

Borehole 5

0 – 350mm - brown earthy sandy loams,
350 – 1000mm – brown clays,

Figure 7: Borehole 5

Borehole 6

0 – 300mm - brown earthy sandy loams,
300 – 1000mm – brown clays,

Ph and EC

An insitu probe, tested the soil layers for pH and EC, results as below.

Borehole 1

Depth	pH	EC_e (µS/cm)
0 – 350mm	6.2	544
350 – 1000mm	5.9	919

Borehole 2

Depth	pH	EC_e (µS/cm)
0 – 300mm	6.1	623
300 – 1000mm	5.8	1287

Borehole 3

Depth	pH	EC_e (µS/cm)
0 – 250mm	6.3	493
250 – 1000mm	5.8	618

Borehole 4

Depth	pH	EC_e (µS/cm)
0 – 300mm	6.0	399
300 – 1000mm	5.6	1187

Borehole 5

Depth	pH	EC_e (µS/cm)
0 – 350mm	6.1	442
350 – 1000mm	5.7	814

Borehole 6

Depth	pH	EC_e (µS/cm)
0 – 300mm	5.9	747
300 – 1000mm	5.8	1387

The pH of a soil influences its ability to supply nutrients to vegetation. If the soil is too acidic vegetative growth is inhibited. The electrical conductivity of the soil relates to the amount of salts present. A high salt concentration inhibits vegetative growth.

The electrical conductivity of the soils is less than 4 dS/m. This will not inhibit vegetative growth. The pH of the soil is between 5.6 and 6.3. A regular application of lime and gypsum is recommended to maintain healthy vegetation growth.

Three samples were sent to ALS Australia, a NATA accredited laboratory to determine the insitu reliability as well as the testing of further parameters. Results below and in appendix.

The samples tested at the laboratory were from

- borehole 1, 0-350mm – TP1
- borehole 3, 0-250mm – TP3
- borehole 5, 0-350mm – TP5

Coarse fragments

Coarse fragments are those over 2 mm in diameter. They can pose limitations to vegetative growth by lowering the soil's ability to supply water and nutrients.

<2% of course fragments within the boreholes. There were some peds which could be crushed easily using fingers.

Limitation: **LOW**

Exchangeable Sodium Percentage

The exchangeable sodium percentage (ESP) measures the proportion of cation exchange sites occupied by sodium. Soils are considered sodic when the ESP is greater than 6, and highly sodic when the ESP is greater than 15.

TP1 - ESP 6.1 %, suggesting sodic soils within this area
TP3 – ESP 6.3 %, suggesting sodic soils within this area
TP5 - ESP 6.0 %, suggesting sodic soils within this area

Lime 0.5kg/m2 – Subject site calculation = A minimum 227kg across the proposed 453m2 EDAs.
Gypsum 0.5kg/m2 – Subject site calculation = A Minimum 227kg across the proposed 453m2 EDAs.

Lime 0.5kg/m2 – Subject site calculation = A minimum 259kg across the proposed 518m2 EDAs.
Gypsum 0.5kg/m2 – Subject site calculation = A Minimum 259kg across the proposed 518m2 EDAs.

Cation Exchange Capacity

Cation exchange capacity (CEC) is a measure of the soil's ability to hold positively charged ions. It is a very important soil property influencing soil structure stability, nutrient availability, soil pH and the soil's reaction to fertilisers and other ameliorants. A figure above 10 meq/100g is preferred for plant production. You can improve CEC in weathered soils by adding lime and raising the pH.

TP1 - CEC = 12.3 meq/100g
TP3 - CEC = 14.0 meq/100g
TP5 - CEC = 15.7 meq/100g

Once EDA is installed an annual maintenance application rate of the following is to be implemented.

Lime 0.5kg/m2 – Subject site calculation = A minimum 227kg across the proposed 453m2 EDAs.
Gypsum 0.5kg/m2 – Subject site calculation = A Minimum 227kg across the proposed 453m2 EDAs.

Lime 0.5kg/m2 – Subject site calculation = A minimum 259kg across the proposed 518m2 EDAs.
Gypsum 0.5kg/m2 – Subject site calculation = A Minimum 259kg across the proposed 518m2 EDAs.

Phosphorus Sorption Index

The capacity of a soil to adsorb phosphorus is expressed as its phosphorus sorption capacity.

TP1 P sorb = 1160mg P sorbed/kg – laboratory
TP3 P sorb = 1090mg P sorbed/kg - laboratory
TP5 P sorb = 1290mg P sorbed/kg - laboratory

P sorb = 400mg P sorbed/kg – given figure within literature for clay loam soils

For nutrient balance calculations the lesser of value above is to be utilized

Emerson Aggregate Test

The combination of slaking and dispersion caused a reduction in macroporosity and, therefore, lower infiltration rates and hydraulic conductivities as well as an increase in soil strength and other undesirable soil physical properties. This test classifies the behavior of soil aggregates, when immersed, on their coherence in water. This test was competed inhouse. Soils are divided into seven classes on the basis of their coherence in water, with one further class being distinguished by the presence of calcium-rich minerals.

EAT Class = 2(2). Some slight dispersion potential within underlying soils onsite.

6. System Design/Selection

For the subject site there are a number of methods to treat the wastewater generated onsite. A general septic followed by an absorption pit/trench should not be recommended for the subject site. Effluent should be treated to a secondary level followed by subsurface dispersal. A number of dispersal options could be considered, subsurface irrigation, pressure dosed absorption bed and mounds. Subsurface irrigation was the dispersal method recommended and designed. Subsurface irrigation reduces the chance of human contact with the effluent and significantly reduces any potential public health risk.

Proposed Treatment Node

The proposal is to install a NSW Health Accredited AWTS system onsite for the new proposed allotments. An Aerated Wastewater Treatment System (AWTS) uses aerobic treatment to promote oxidation and microbiological consumption of organic matter by bacteria through facilitated biological processes.

Proposed Effluent Dispersal

The proposal is to install subsurface irrigation onsite. Subsurface irrigation reduces the chance of human contact with the effluent and significantly reduces any potential public health risk. By placing the effluent in the root zone of plants or grasses, beneficial reuse of both the hydraulic and nutrient components of the effluent is maximised, offering enhanced environmental benefits. There are also potential amenity benefits offered by subsurface irrigation, such as less chance of surface saturation and effluent runoff.

Hydraulic Sizing

As per section 6.4.3 of ''Dungog Council Onsite Sewage DAF 2015' the hydraulic sizing was calculated using the following formula.

$$LAA = q/(DLR - CAF)$$

LAA = EDA
Q = Design Daily Loading Rate (L/day)
DLR = Design Loading Rate (mm/day)
CAF = Climate Adjustment Factor (mm/day)

Future Dwellings on Proposed Allotments

LAA = 960/(2 – 0)

LAA = 480m2

Annual Nutrient Balance

Minimum Area Required for Nitrogen Uptake: 467m2
Minimum Area Required for Phosphorus Uptake: 518m2

As such a minimum 518m2 of subsurface irrigation is to be installed onsite for proposed allotments.

Existing Dwelling Allotment

LAA = 840/(2 – 0)
LAA = 420m2

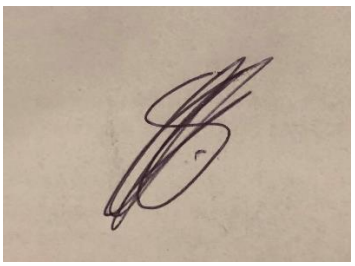
Annual Nutrient Balance

Minimum Area Required for Nitrogen Uptake: 409m2
Minimum Area Required for Phosphorus Uptake: 453m2

As such a minimum 453m2 of subsurface irrigation is to be installed onsite for existing dwelling allotment.

7. Recommendations

- Installation of NSW Health Accredited AWTS system onsite to treat the calculated flowrate of 960L/day for the future dwellings on proposed allotments.
- Installation of subsurface effluent dispersal field of a minimum 518m2 for future dwellings on proposed allotments.
- Installation of NSW Health Accredited AWTS system onsite to treat the calculated flowrate of 840L/day for the existing dwelling on proposed allotment.
- Installation of subsurface effluent dispersal field of a minimum 453m2 for the existing dwelling on proposed allotment
- Stock must be kept out of the EDAs by fencing or other physical barrier.
- Decommission existing septic currently servicing dwelling onsite.
- This design assumes at least three-star rated plumbing fixtures are used in any new development.



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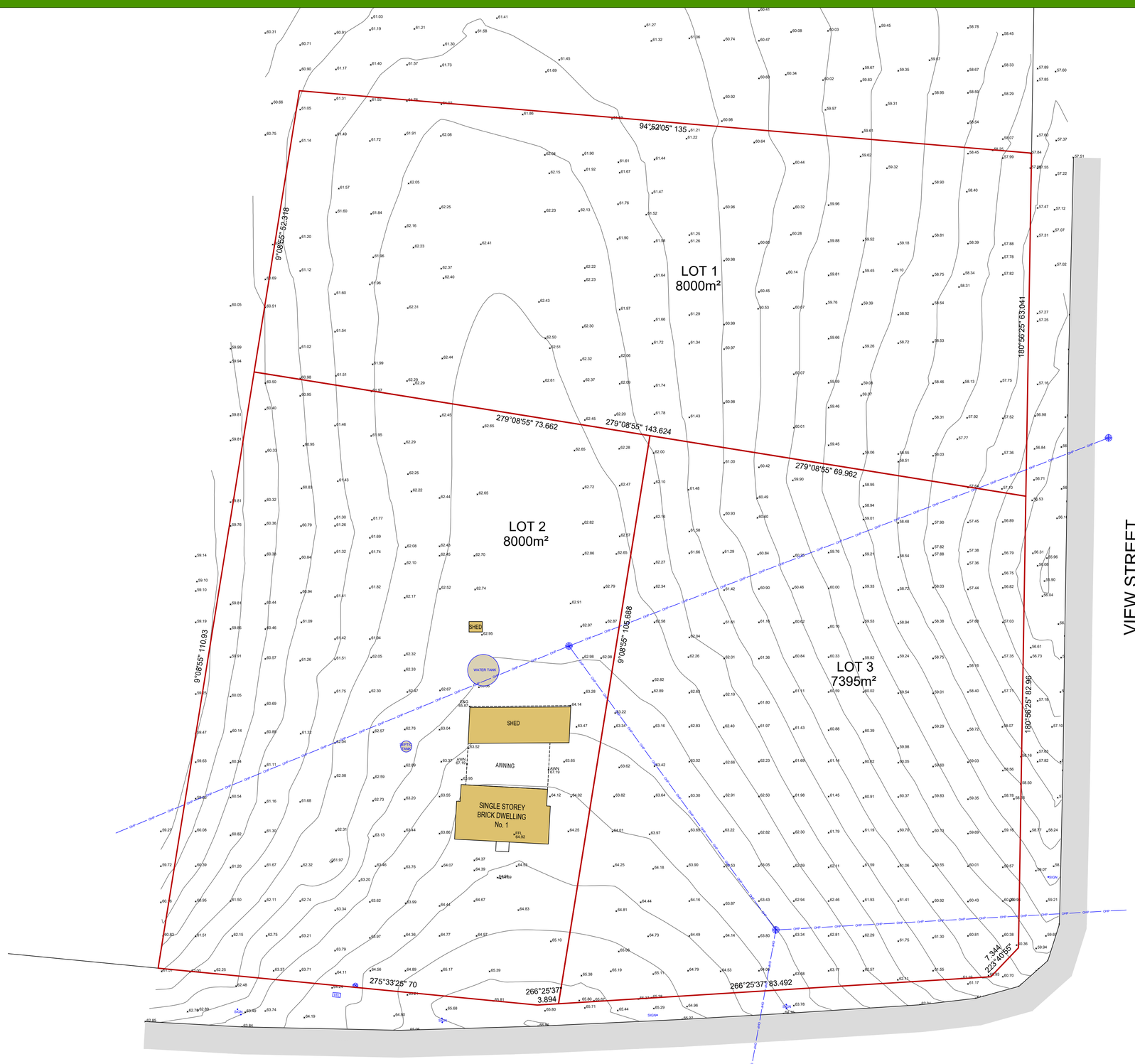
Appendix A – Site Plans


18000
20720
Proposed AWTS
(Approx Position Only)
23000
25000
X3
518m2 Irrigation Area
(Subsurface Drip)
X4
Potential
Building
Envelope
3000
12500
X2
6000
28000
X1
453m2 Irrigation Area
(Subsurface Drip)
16180
6000
X5
25000
518m2 Irrigation Area
(Subsurface Drip)
X6
20720
46000
Proposed AWTS
(Approx Position Only)
Proposed AWTS
(Approx Position Only)
Farm
Dam
Shed
Garage
Dwelling
16000
Potential
Building
Envelope

Appendix B – Proposed Plans



LEGEND

ALL SYMBOLS - NOT TO SCALE

- BENCH MARK
- POWER POLE
- GAS METER
- TELECOMM. PIT
- WATER METER
- SEWER INSPECTION POINT
- SEWER CHAMBER
- BOLLARD
- SIGN
- OVERHEAD POWER LINE
- SEWER LINE
- WATER LINE
- CONTOUR LINE
- BOUNDARY LINE
- TREE
- HEIGHT/SPREAD/DIAMETER

DIAL1100 BEFORE YOU DIG

CAUTION

Levels have been taken from PM25264 and are shown to Topographical accuracy only.

Surface features of underground services have been located by survey only. Prior to any development, all underground services should be investigated.

This Caution is an integral part of this plan.

L.G.A.: DUNGOG
Parish:
Locality: VACY
Client:

Ratio: 1:400(A1) 1:800(A3)
Datum: AHD
Origin:
Drawn: AM

Date Surveyed: 16.09.2024
Date Printed: 18.09.2024
Reference: 180057
Drawing: 180057_1.dwg

DETAIL SURVEY & CONCEPT SUBDIVISION
LOT 2 DP710263
24 HORNS CROSSING ROAD

EARTH SURVEYING PTY LTD

EARTH SURVEYING
CONSULTING SURVEYORS
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Appendix C – Operation and Maintenance Guideline

ON-SITE SEWAGE MANAGEMENT SYSTEMS

If you live in or rent a house that is not connected to the main sewer then chances are that your yard contains an on-site sewage management system. If this is the case then you have a special responsibility to ensure that it is working as well as it can.

The aim of this pamphlet is to introduce you to some of the most popular types of on-site sewage management systems and provide some general information to help you maintain your system effectively. You should find out what type of system you have and how it works.

More information can be obtained from the pamphlets:

Your Septic System
Your Aerated Wastewater Treatment System
Your Composting Toilet
Your Land Application Area

You can get a copy of these pamphlets from your local council or the address marked on the back of this pamphlet.

It is important to keep in mind that maintenance needs to be performed properly and regularly. Poorly maintained on-site sewage management systems can significantly affect you and your family's health as well as the local environment.

What is an on-site sewage management system?

A domestic on-site sewage management system is made up of various components which - if properly designed, installed and maintained - allow the treatment and utilisation of wastewater from a house, completely within the boundary of the property.

Wastewater may be blackwater (toilet waste), or greywater (water from showers, sinks, and washing machines), or a combination of both.

Partial on-site systems - eg. pump out and common effluent systems (CES) - also exist. These usually involve the preliminary on-site treatment of wastewater in a septic tank, followed by collection and transport of the treated wastewater to an off-site management facility. Pump out systems use road tankers to transport the effluent, and CES use a network of small diameter pipes.

How does an on-site sewage management system work?

For complete on-site systems there are two main processes:

1. treatment of wastewater to a certain standard
2. its application to a dedicated area of land.

The type of application permitted depends on the quality of treatment, although you should try to avoid contact with all treated and untreated wastewater, and thoroughly wash affected areas if contact does occur.

Treatment and application can be carried out using various methods:

Septic Tank
Septic tanks treat both greywater and blackwater, but they provide only limited treatment through the settling of solids and the flotation of fats and greases. Bacteria in the tank break down the solids over a period of time. Wastewater that has been treated in a septic tank can only be applied to land through a covered soil absorption system, as the effluent is still too contaminated for above ground or near surface irrigation.

AWTS
Aerated wastewater treatment systems (AWTS) treat all household wastewater and have several treatment compartments. The first is like a septic tank, but in the second compartment air is mixed with the wastewater to assist bacteria to break down solids. A third compartment allows settling of more solids and a final chlorination contact chamber allows disinfection. Some AWTS are constructed with all the compartments inside a single tank. The effluent produced may be surface or sub-surface irrigated in a dedicated area.

Composting Toilets
Composting toilets collect and treat toilet waste only. Water from the shower, sinks and the washing machine needs to be treated separately (for example in a septic tank or AWTS as above). The compost produced by a composting toilet has special requirements but is usually buried on-site.

These are just some of the treatment and application methods available, and there are many other types such as sand filter beds, wetlands, and amended earth mounds. Your local council or the NSW Department of Health have more information on these systems if you need it.

Regulations and recommendations

The NSW Department of Health determines the design and structural requirements for treatment systems for single households. Local councils are primarily responsible for approving the installation of smaller domestic septic tank systems, composting toilets and AWTSs in their area, and are also responsible for approving land application areas. The NSW Environment Protection Authority approves larger systems.

The design and installation of on-site sewage management systems, including plumbing and drainage, should only be carried out by suitably qualified or experienced people. Care is needed to ensure correct sizing of the treatment system and application area.

Heavy fines may be imposed under the Clean Waters Act if wastewater is not managed properly.

Keeping your on-site sewage management system operating well

What you put down your drains and toilets has a lot to do with how well your system performs. Maintenance of your sewage management system also needs to be done well and on-time. The following is a guide to the types of things you should and should not do with your system.

DO

- ✓ Learn how your sewage management system works and its operational and maintenance requirements.
- ✓ Learn the location and layout of your sewage management system.
- ✓ Have your AWTS (if installed) inspected and serviced four times per year by an approved contractor. Other systems should be inspected at least once every year. Assessment should be applicable to the system design.
- ✓ Keep a record of desludgings, inspections, and other maintenance.
- ✓ Have your septic tank or AWTS desludged every three years to prevent sludge build up, which may 'clog' the pipes.
- ✓ Conserve water. Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.
- ✓ Discuss with your local council the adequacy of your existing sewage management system if you are considering house extensions for increased occupancy.

DON'T

- ✗ Don't let children or pets play on land application areas.
- ✗ Don't water fruit and vegetables with effluent.
- ✗ Don't extract untreated groundwater for cooking and drinking.
- ✗ Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your system via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't install or use a garbage grinder or spa bath if your system is not designed for it.

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby waterway.

Your sewage management system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

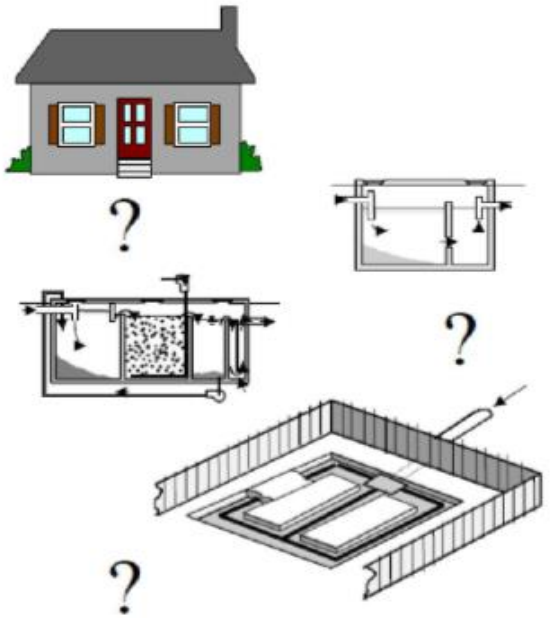
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained sewage management systems are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your management system you can do your part in helping to protect the environment and the health of you and your community.

For more information please contact:

Managing Wastewater In Your Backyard



Aerated Wastewater Treatment Systems (AWTS)

In unsewered areas, the proper treatment and utilisation of household wastewater on-site is critical in preserving the health of the public and the environment. AWTS have been developed as a way of achieving this.

What is an AWTS?

An AWTS is a purpose built system used for the treatment of sewage and liquid wastes from a single household or multiple dwellings.

It consists of a series of treatment chambers combined with an irrigation system. An AWTS enables people living in unsewered areas to treat and utilise their wastewater.

How does an AWTS work?

Wastewater from a household is treated in stages in several separate chambers. The first chamber is similar to a conventional septic tank. The wastewater enters the chamber where the solids settle to the bottom and are retained in the tank forming a sludge layer. Scum collects at the top, and the partially clarified wastewater flows into a second chamber. Here the wastewater is mixed with air to assist bacteria to further treat it. A third chamber allows additional clarification through the settling of solids, which are returned for further treatment to either the septic chamber (as shown) or to the aeration chamber. The clarified effluent is disinfected in another chamber (usually by chlorination) before irrigation can take place.

Bacteria in the first chamber break down the solid matter in the sludge and scum layers. Material that cannot be fully broken down gradually builds up in the chamber and must be pumped out periodically.

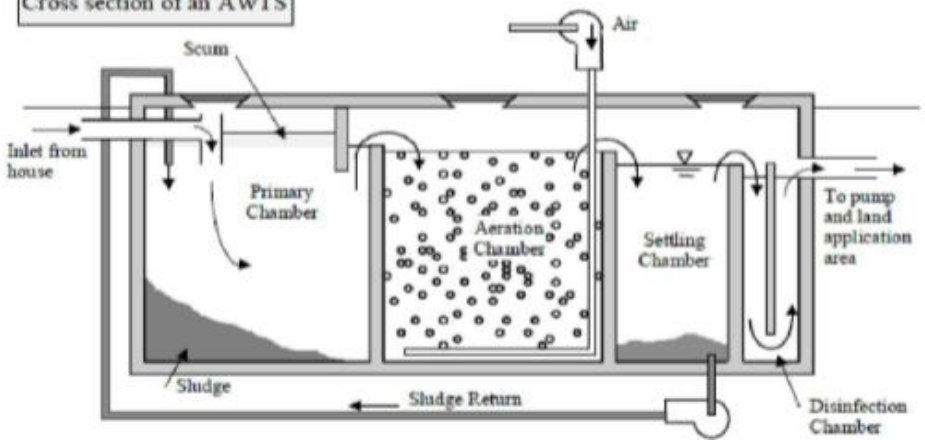
Regulations and recommendations

Local councils are primarily responsible for approving the smaller, domestic AWTSs in their area. The Environment Protection Authority (EPA) approves larger units, whilst the NSW Department of Health determines the design and structural requirements for all AWTSs.

At present AWTSs need to be serviced quarterly by an approved contractor at a cost to the owner. Local councils should also maintain a register of the servicing of each system within their area.

AWTSs should be fitted with an alarm having visual and audible components to indicate mechanical and electrical equipment malfunctions. The alarm should provide a signal adjacent to the alarm and at a relevant position inside the house. The alarm should incorporate a warning lamp which may only be reset by the service agent.

Cross section of an AWTS



Maintaining your AWTS

The effectiveness of the system will, in part, depend on how it is used and maintained. The following is a guide on good maintenance procedures that you should follow:

DO

- ✓ Have your AWTS inspected and serviced four times per year by an approved contractor. Assessment should be applicable to the system design.
- ✓ Have your system service include assessment of sludge and scum levels in all tanks, and performance of irrigation areas.
- ✓ Have all your tanks desludged at least every three years.
- ✓ Have your disinfection chamber inspected and tested quarterly to ensure correct disinfectant levels.
- ✓ Have your grease trap (if installed) cleaned out at least every two months.
- ✓ Keep a record of pumping, inspections, and other maintenance.
- ✓ Learn the location and layout of your AWTS and land application area.
- ✓ Use biodegradable liquid detergents such as concentrates with low sodium and phosphorous levels.
- ✓ Conserve water.

DON'T

- ✗ Don't put bleaches, disinfectants, whiteners, nappy soakers and spot removers in large quantities into your AWTS via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't use more than the recommended amounts of detergents.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't switch off power to the AWTS, even if you are going on holidays

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your AWTS. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system entering a nearby river, creek or dam.

Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.

Your AWTS is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

Warning signs

You can look out for a few warning signs that signal to you that there are troubles with your AWTS. Ensure that these problems are attended to immediately to protect your health and the environment.

Look out for the following warning signs:

- Water that drains too slowly.
- Drain pipes that gurgle or make noises when air bubbles are forced back through the system.
- Sewage smells, this indicates a serious problem.
- Water backing up into your sink which may indicate that your system is already failing.
- Wastewater pooling over the land application area.
- Black coloured effluent in the aerated tank.
- Excess noise from the blower or pumping equipment.
- Poor vegetation growth in irrigated area.

Odour problems from a vent on the AWTS can be a result of slow or inadequate breakdown of solids. Call a technician to service the system.

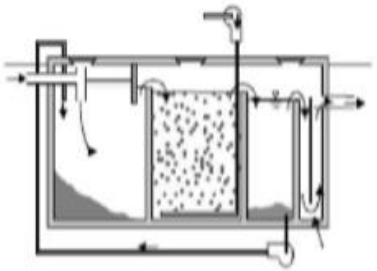
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained AWTSs are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

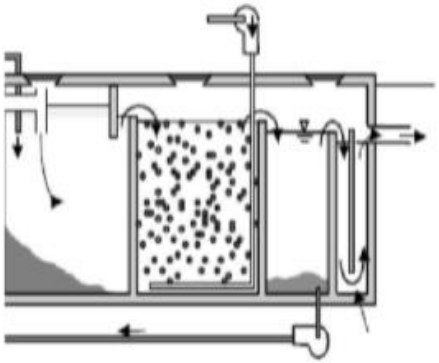
By looking after your treatment system you can do your part in helping to protect the environment and the health of you and your family.

If you would like more information please contact:

Your Aerated Wastewater Treatment System



Your Aerated Wastewater Treatment System



- Black coloured effluent in the aerated tank.
- Excess noise from the blower or pumping equipment
- Poor vegetation growth in irrigated area.

LAND APPLICATION AREAS

The reuse of domestic wastewater on-site can be an economical and environmentally sound use of resources.

What are land application areas?

These are areas that allow treated domestic wastewater to be managed entirely on-site.

The area must be able to utilise the wastewater and treat any organic matter and wastes it may contain. The wastewater is rich in nutrients, and can provide excellent nourishment for flower gardens, lawns, certain shrubs and trees. The vegetation should be suitably tolerant of high water and nutrient loads.

How does a land application area work?

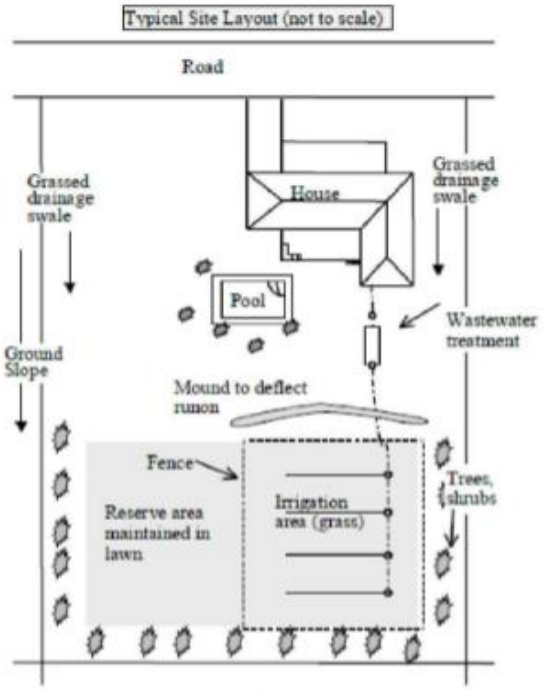
Treated wastewater applied to a land application area may be utilised or simply disposed, depending on the type of application system that is used. The application of the wastewater can be through a soil absorption system (based on disposal) or through an irrigation system (based on utilisation).

Soil absorption systems do not require highly treated effluent, and wastewater treated by a septic tank is reasonable as the solids content in the effluent has been reduced. Absorption systems release the effluent into the soil at a depth that cannot be reached by the roots of most small shrubs and grasses. They rely mainly on the processes of soil treatment and then transmission to the water table, with minimal evaporation and up-take by plants. **These systems are not recommended in sensitive areas as they may lead to contamination of surface water and groundwater.**

Irrigation systems may be classed as either subsurface or surface irrigation. If an irrigation system is to be used, wastewater needs to be pre-treated to at least the quality produced by an aerated wastewater treatment system (AWTS).

Subsurface irrigation requires highly treated effluent that is introduced into the soil close to the surface. The effluent is utilised mainly by plants and evaporation.

Surface irrigation requires highly treated effluent that has undergone aeration and disinfection treatments, so as to reduce the possibility of bacteria and virus contamination.



The effluent is then applied to the land area through a series of drip, trickle, or spray points which are designed to eliminate airborne drift and run-off into neighbouring properties.

There are some public health and environmental concerns about surface irrigation. There is the risk of contact with treated effluent and the potential for surface run-off. Given these problems, subsurface irrigation is arguably the safest, most efficient and effective method of effluent utilisation.

Regulations and recommendations

The design and installation of land application areas should only be carried out by suitably qualified or experienced people, and only after a site and soil evaluation is done by a soil scientist. Care should be taken to ensure correct buffer distances are left between the application area and bores, waterways, buildings, and neighbouring properties.

Heavy fines may be imposed under the Clean Waters Act if effluent is managed improperly.

At least two warning signs should be installed along the boundary of a land application area. The signs should comprise of 20mm high Series C lettering in black or white on a green background with the words:

RECLAIMED EFFLUENT
NOT FOR DRINKING
AVOID CONTACT

Depending on the requirements of your local council, wet weather storage and soil moisture sensors may need to be installed to ensure that effluent is only irrigated when the soil is not saturated.

Regular checks should be undertaken of any mechanical equipment to ensure that it is operating correctly. Local councils may require periodic analysis of soil or groundwater characteristics

Humans and animals should be excluded from land application areas during and immediately after the application of treated wastewater. The longer the period of exclusion from an area, the lower the risk to public health.

The householder is required to enter into a service contract with the installation company, its agent or the manufacturer of their sewage management system, this will ensure that the system operates efficiently.

Location of the application area

Treated wastewater has the potential to have negative impacts on public health and the environment. For this reason the application area must be located in accordance with the results of a site evaluation, and approved landscaping must be completed prior to occupation of the building. Sandy soil and clayey soils may present special problems.

The system must allow even distribution of treated wastewater over the land application area.

Maintaining your land application area

The effectiveness of the application area is governed by the activities of the owner.

DO

- ✓ Construct and maintain diversion drains around the top side of the application area to divert surface water.
- ✓ Ensure that your application area is kept level by filling any depressions with good quality top soil (not clay).
- ✓ Keep the grass regularly mowed and plant small trees around the perimeter to aid absorption and transpiration of the effluent.
- ✓ Ensure that any run off from the roof, driveway and other impermeable surfaces is directed away from the application area.
- ✓ Fence irrigation areas.
- ✓ Ensure appropriate warning signs are visible at all times in the vicinity of a spray irrigation area.
- ✓ Have your irrigation system checked by the service agent when they are carrying out service on the treatment system.

DON'T

- ✗ Don't erect any structures, construct paths, graze animals or drive over the land application area.
- ✗ Don't plant large trees that shade the land application area, as the area needs sunlight to aid in the evaporation and transpiration of the effluent.
- ✗ Don't plant trees or shrubs near or on house drains.
- ✗ Don't alter stormwater lines to discharge into or near the land application area.
- ✗ Don't flood the land application area through the use of hoses or sprinklers.
- ✗ Don't let children or pets play on land application areas.
- ✗ Don't water fruit and vegetables with the effluent.
- ✗ Don't extract untreated groundwater for potable use.

Warning signs

Regular visual checking of the system will ensure that problems are located and fixed early.

The visual signs of system failure include:

- ⚠ surface ponding and run-off of treated wastewater
- ⚠ soil quality deterioration
- ⚠ poor vegetation growth
- ⚠ unusual odours

Volume of water

Land application areas and systems for on-site application are designed and constructed in anticipation of the volume of waste to be discharged. Uncontrolled use of water may lead to poorly treated effluent being released from the system.

If the land application area is waterlogged and soggy the following are possible reasons:

- Λ Overloading the treatment system with wastewater.
- Λ The clogging of the trench with solids not trapped by the septic tank. The tank may require desludging.
- Λ The application area has been poorly designed.
- Λ Stormwater is running onto the area.

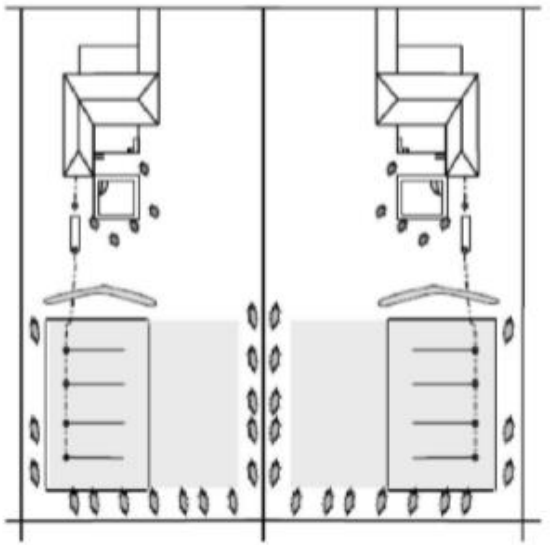
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained land application areas are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your sewage management system you can do your part in helping to protect the environment and the health of you and your family.

For more information please contact:

Your Land Application Area



Appendix D – Laboratory Results

CERTIFICATE OF ANALYSIS

Work Order	: **EW2404595**	Page	: 1 of 3
Client	: **GSL Environmental**	Laboratory	: Environmental Division NSW South Coast
Contact	: Simon Doberer	Contact	: Mechelle Sahyoun
Address	: 71 Moona Creek Road Vincentia	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 NSW Australia
Telephone	: ----	Telephone	: 02 42253125
Project	: Horns Crossing Road, VACY	Date Samples Received	: 03-Oct-2024 17:00
Order number	: 145124	Date Analysis Commenced	: 04-Oct-2024
C-O-C number	: ----	Issue Date	: 14-Oct-2024 13:06
Sampler	: Client - S Doberer		
Site	: ----		
Quote number	: EW23GSLENV0001		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP1	TP3	TP5	----	----
			Sampling date / time	03-Oct-2024 00:00	03-Oct-2024 00:00	03-Oct-2024 00:00	----	----
Compound	CAS Number	LOR	Unit	EW2404595-001	EW2404595-002	EW2404595-003	--------	--------
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**6.2**	**6.4**	**6.0**	**----**	**----**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**32**	**29**	**26**	**----**	**----**
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**5.7**	**6.5**	**7.2**	**----**	**----**
Exchangeable Magnesium	----	0.1	meq/100g	**5.6**	**6.4**	**7.3**	**----**	**----**
Exchangeable Potassium	----	0.1	meq/100g	**0.2**	**0.2**	**0.2**	**----**	**----**
Exchangeable Sodium	----	0.1	meq/100g	**0.7**	**0.9**	**0.9**	**----**	**----**
Cation Exchange Capacity	----	0.1	meq/100g	**12.3**	**14.0**	**15.7**	**----**	**----**
Exchangeable Sodium Percent	----	0.1	%	**6.1**	**6.3**	**6.0**	**----**	**----**
EK072: Phosphate Sorption Capacity								
Phosphate Sorption Capacity	----	250	mg P sorbed/kg	**1160**	**1090**	**1290**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry / Biology).

(SOIL) EA010: Conductivity (1:5)

(SOIL) EA002: pH 1:5 (Soils)

(SOIL) EK072: Phosphate Sorption Capacity

(SOIL) ED007: Exchangeable Cations

Appendix E – Balances

Nutrient Balances

Parameters	Symbol	Value	
Daily Wastewater (L/Day)	Q	840	
Total Nitogen in Effluent (mg/L)	TN	40	
Total Phosphorus in Effluent (mg/L)	TP	12	
Design Life of System (Years)	L	50	
P Sorption Soil Capacity (mg/kg)	Psorp	400	
P Sorption Soil Capacity Field Coefficient (%)	PsorpC	0.5	
Soil Depth for P Sorption	D	0.8	
Bulk Density of Soil (g/cm3)	B	1.6	
Nitrogen Plant Uptake (kg/Ha/year)	NPU	240	
Phosphorus Plant Uptake (kg/Ha/year)	PPU	30	
Model Inputs			
Applied Total Nitrogen (kg/year)	TN_A	12.26	$TN_A = (Q*TN*365)/1{,}000{,}000$
Applied Total Phosphorus (kg/year)	TP_A	3.68	TPA = (Q*TP*365)/1,000,000
Model Outputs			
Subsoil Nitrogen Soil Losses (kg/year)	NL	2.45	$NL = TN_A*20\%$
Phosphorus Sorption by Soil (kg/m2)	PS	0.26	PS = ((Psorp/1,000,000)*(B*1,000))*D*PsorpC
Phosphorus Plant Uptake Over Design Life (kg/m2)	PPU_L	0.15	$PPU_L = (PPU/10{,}000)*L$
Model Results			
Minimum Area Required for Nitrogen Uptake (m2)	NUA_N	409	NUA_N $(TN_A-NL)/NPU)*1{,}000$
Minimum Area Required for Phosphorus Uptake (m2)	NUA_P	453	$(TP_A*L)/(PS+PPU_L)$
Maximum Area for Nutrient Uptake (m2)	NUA	453	Max Value of NUA_N and NUA_P

Nutrient Balances

Parameters	Symbol	Value	
Daily Wastewater (L/Day)	Q	960	
Total Nitogen in Effluent (mg/L)	TN	40	
Total Phosphorus in Effluent (mg/L)	TP	12	
Design Life of System (Years)	L	50	
P Sorption Soil Capacity (mg/kg)	Psorp	400	
P Sorption Soil Capacity Field Coefficient (%)	PsorpC	0.5	
Soil Depth for P Sorption	D	0.8	
Bulk Density of Soil (g/cm3)	B	1.6	
Nitrogen Plant Uptake (kg/Ha/year)	NPU	240	
Phosphorus Plant Uptake (kg/Ha/year)	PPU	30	
Model Inputs			
Applied Total Nitrogen (kg/year)	TN_A	14.02	$TN_A = (Q*TN*365)/1{,}000{,}000$
Applied Total Phosphorus (kg/year)	TP_A	4.20	TPA = (Q*TP*365)/1,000,000
Model Outputs			
Subsoil Nitrogen Soil Losses (kg/year)	NL	2.80	$NL = TN_A*20\%$
Phosphorus Sorption by Soil (kg/m2)	PS	0.26	PS = ((Psorp/1,000,000)*(B*1,000))*D*PsorpC
Phosphorus Plant Uptake Over Design Life (kg/m2)	PPU_L	0.15	$PPU_L = (PPU/10{,}000)*L$
Model Results			
Minimum Area Required for Nitrogen Uptake (m2)	NUA_N	467	NUA_N $((TN_A-NL)/NPU)*1{,}000$
Minimum Area Required for Phosphorus Uptake (m2)	NUA_P	518	$(TP_A*L)/(PS+PPU_L)$
Maximum Area for Nutrient Uptake (m2)	NUA	518	Max Value of NUA_N and NUA_P