Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address: Lot 4131 on Deposited Plan 61991, Smiths Beach Road, Yallingup

Site visit: Yes ☑ No ☐

Date of site visit (if applicable): Day 16 Month September Year 2020

Report author or reviewer: Linden Wears

WA BPAD accreditation level (please circle):

Not accredited ☐ Level 1 BAL assessor ☐ Level 2 practitioner ☐ Level 3 practitioner ☑

If accredited please provide the following.

BPAD accreditation number: 19809 Accreditation expiry: Month June Year 2022

Bushfire management plan version number: Rev 1

Bushfire management plan date: Day 6 Month December Year 2021

Client/business name: Smiths 2014 Pty Ltd

	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	✔	
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the bushfire protection criteria elements)?	✔	

Is the proposal any of the following (see SPP 3.7 for definitions)?

	Yes	No
Unavoidable development (in BAL-40 or BAL-FZ)		✔
Strategic planning proposal (including rezoning applications)		✔
High risk land-use		✔
Vulnerable land-use	✔	

None of the above ☐

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Vulnerable land use, Touris Position Statement, Performance Solutions

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author or reviewer

Date 6 December 2021

Smiths 2014 Pty Ltd (Smiths 2014)

Bushfire Management Plan

Smiths 2014 Development
Lot 4131 Smiths Beach Road, Yallingup

6 December 2021

59550/ 137,925 (Rev 1)

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Executive Summary

Proposed Development

Smiths 2014 Pty Ltd (Smiths 2014; the Proponent) is submitting a Development Application (DA) for a new mixed-use tourism development on Lot 4131 on Deposited Plan 61991 (the project area) on Smiths Beach Road.

The vision for the project is to create a sensitive coastal village, deeply rooted in place and culture. Guided by landscape and the natural assets of the site, the philosophy is to retain, rehabilitate and create with purpose. The project will deliver a sustainable village that provides tourism, community and economic benefits to the south-west region of Western Australia.

The proposed development is to consist of the following elements:

- Community Hub building (Cape-to-Cape Welcome Centre, Surf Life Saving Club, Café and General Store/Bakery and Reception Hall)
- A 65 room hotel including restaurant, hotel lounge and bar, Wellness Centre comprising day spa and gym, a swimming pool and a below-ground carpark
- A campground, within a standalone lot, including 36 tent platforms, boardwalks, a communal hub building, and an amenity/maintenance shed
- 61 holiday homes located either side of the main entrance road, “Cape Arrival”
- New internal road network and associated carparking for the hotel, campground, holiday home buildings and communal areas
- New public road (“Leeuwin Way”) and public carpark on the southern boundary
- Upgrades to the existing Smith Beach Road, the driveway access along the foreshore reserve to Smiths Point and universal beach access ramp
- Internal pathways suitable for pedestrians and golf buggies
- Servicing infrastructure throughout the development including new Water Corporation WTP and WWTP buildings/sheds/containers and tanks on the southern boundary
- Revegetation, rehabilitation and landscaping throughout the project area, Foreshore Reserve, “Leeuwin Way” road and parts of Smiths Beach Road
- Undeveloped portion of the project area to be ceded to the National Park, as the National Park Extension

A combination of short-term tourist and holiday home accommodation is to be created. Tourism, commercial and community facilities, including short-term accommodation, will be provided in the Tourist Development, community hub and campground areas. The holiday homes will be available for short stay accommodation, controlled by the hotel management and can also be used interchangeably by the owner for holiday accommodation or extended length of stay.

The development is to be established under newly formed Community Title Legislation, which allows for co-ordinated precinct management control by the Community Corporation, enforceable under the scheme by-laws, which has a variety of benefits from a bushfire risk management perspective.

Existing Location, Access and Infrastructure

The project area is currently undeveloped and is surrounded by the following:

- Two existing tourism accommodation facilities immediately to the north-east, namely Smiths Beach Resort and Canal Rocks Beachfront Apartments, with Chandlers Smiths Beach Villas to the east.
- Smiths Beach to the north-east, including existing carpark and ablutions block

- Canal Rocks carpark and boat ramp is located 1.5 km to the south-west
- Undisturbed native vegetation within Leeuwin -Naturaliste National Park immediately to the south-east, south and south-west of the project area, as well to the north-east of Smiths Beach carpark
- The Cape-to-Cape track wraps around the northern and western boundaries of the project area and heads north to Yallingup and south to Wyadup Bay

Existing vehicular access to the project area and immediate surrounds is as follows:

- External access is from Caves Road, via Canal Rocks Road and Smiths Beach Road, which is approximately 1.75 km (to the new "Cape Arrival" entrance road to development) and 2.5 km (to existing Smiths Beach Road cul-de-sac). Travel from Caves Road can be north, south and east (at Wildwood Rd)
- From Smiths Beach Road, Canal Rocks Road extends further west to the Canal Rocks carpark, with total travel distance of 3.4 km from Caves Road.

Existing services to the project area are as follows:

- No existing Water Corporation water supply infrastructure, or existing sewer or gas services, to the project area
- Power supply to the project area and surrounds is from above-ground power supply.

Previous approval history

The Smiths Beach Development Guide Plan (now referred to as Structure Plan) for the project area, was endorsed by the Western Australian Planning Commission (WAPC) in 2011 and remains valid until October 2025. The Structure Plan allows for tourist and residential development on the eastern portion of the site, and Public Open Space and reserves on the western portion of the site.

The Structure Plan is supported by a Fire Management Plan approved prior to the Western Australia bushfire planning legislation reforms in 2015. While the original Fire Management Plan was appropriate for the regulatory framework at the time given the new bushfire regulatory requirements, there is an opportunity to review and improve on the existing risk mitigation strategy in light of current practices. The opportunity has been taken to produce a Bushfire Management Plan (BMP) that not only demonstrates compliance with the current bushfire planning requirements, but also presents a more holistic approach to bushfire risk management and seeks to better resolve the legacy vehicular access non-compliance while improving the vegetation modification and management strategies to achieve better balance with environmental and visual amenity objectives.

Bushfire regulatory requirements and application

As the project area is entirely designated as bushfire prone, it requires a BMP to support the DA, to address the requirements of *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) and the *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines). It is also assessed as a 'vulnerable land use', and requires a Bushfire Emergency Management Plan (BEMP) to detail the emergency management measures for all occupants in a bushfire emergency.

In accordance with SPP 3.7, the proposed development aims to comply with the prescriptive Acceptable Solutions for each of the Bushfire Protection Criteria (Elements 1 to 4) of the Guidelines where practical, however several deviations from the Acceptable Solutions are required as follows:

- Element 2 – Siting and Design of Development
    - Performance-based landscaping treatments are proposed, which deviate from Acceptable Solution A2.1, to better balance environmental and visual amenity objectives with bushfire risk management, especially prioritisation of vegetation retention, especially trees.
- Element 3 - Vehicular access

- The legacy 2 km long dead-end public road exceeds the 200 m maximum length for a dead-end road which deviates from Acceptable Solutions A3.1 and A3.3. Due to the legacy non-compliance, the proposed "Leeuwin Way" road will also not be able to fully comply with A3.1 and A3.3.
- Several turnarounds with proposed private driveways and a single battle-axe leg deviate from Acceptable Solutions A3.4 and A3.5

- Element 4 - Water
  - Bushfire water supply to the holiday home area is via street hydrants connected to a town main supply, however given the location of the WTP in close proximity to the development, this is not necessarily a "standard" water authority main as anticipated by Acceptable Solution A4.1, and the overall water supply strategy is not strictly compliant with Acceptable Solutions A4.1 or A4.2, but uses a combination of both with the Tourism Land Use Position Statement.

The deviations from the Acceptable Solutions are to be addressed as follows:

- Using Performance Principle-Based Solutions (PPBS's) to demonstrate compliance with the Policy Intent and Performance Principles of the relevant Element from the Guidelines for the following:
  - Performance-based landscaping treatments is compliant with Element 2
  - Battle-axe leg and private driveway turnarounds are compliant with Element 3
  - Bushfire fighting water supply is compliant with Element 4
- Using a bushfire risk assessment to demonstrate that the residual risk is appropriately reduced to life and property, and that:
  - for the proposed tourism land uses, compliance is achieved with the Tourism Land Use Position Statement Policy Objectives where it is not possible to fully comply with Element 3 of the Guidelines (i.e. single road access to development).
  - for the extended length of stay capability of the holiday homes , compliance is achieved directly with the SPP 3.7 Policy Intent and Policy Objectives, where Element 3 of the Guidelines (i.e. single road access to development) can't be achieved. The Proposal will also need to demonstrate why it represents 'exceptional circumstances', that it has considered the history of the site, and how it reduces bushfire risk to the community.

Further information regarding the bushfire regulatory framework, and its application to this project, is detailed in Section 3.

Bushfire Risk Management Strategy

The bushfire risk management strategy considers a variety of measures to ensure compliance with the various planning and building instruments (SPP 3.7, the Guidelines, National Construction Code [NCC]), and incorporates the core principles of bushfire risk management, to create a development suitably resilient to the anticipated bushfire impact.

Before developing the risk management strategy, it is important to understand the various existing risk controls are already in place to mitigate bushfire impact on the development which include:

- Planning, Development and Building Controls and Guidance (e.g. State Planning Policies, guidance documents, National Construction Code, Australian Standards etc)
- Bushfire and Emergency Management Policies and Procedures (e.g. State Emergency Management Policy and Plan, including the State Hazard Plan Fire, City of Busselton Bushfire Risk Management Plan, Local Emergency Management Arrangement (LEMA) and Local Evacuation Plan, City of Busselton Firebreak Notice)

- Capes Zone Response - a rapid, aggressive and coordinated interagency response from ground and aerial based suppression resources to bushfires between the Capes.
- Emergency forecasting and alert systems such as the forecast Fire Danger Rating and Total Fire Ban systems, and the bushfire warning system (Advice, Watch and Act, Emergency Warning and All-Clear) which is utilised for a variety of emergencies.
- Public education initiatives to promote greater understanding of bushfire preparedness and response, and arson prevention programs

Following review of the existing bushfire risk controls, the bushfire compliance obligations from the Guidelines, Tourism Land Use Position Statement and NCC, and the iterative process of the bushfire risk assessment, the following management measures (see summary figure for spatial layout) have been proposed to preserve life and reduce impact on property by reducing residual risk to appropriate levels:

Community Bushfire Refuge

- Establish a community bushfire refuge building to provide temporary shelter for people should offsite evacuation using the road network be unsafe in a bushfire emergency.
- Given the potential for the single public road access to and from the development to be obstructed during a bushfire, creating another suitably protected location for occupants to shelter is a key management measure, and provides the second safe destination that having two access roads seeks to achieve.
- Is contained within the Community Hub, Hotel public areas, Gym and Spa buildings with 1920 m^2 useable area to house up to 2037 occupants, with overflow areas for additional capacity. This area is sufficient to accommodate occupants from the proposed Smiths Beach development (circa 870 in peak periods) plus circa 1168 of peak general public occupants (anticipated to be using surrounding developments and land uses e.g. Smiths Beach Resort).
- To be designed, constructed, maintained and audited in accordance with requirements of the ABCB Design and Construction of Community Bushfire Refuges Handbook, the Tourism Land Use Position Statement and constructed to a BAL-12.5 construction standard. Other measures such as Asset Protection Zones, perimeter fire hose reel and landscaping reticulation are also proposed.
- Refer to Section 6.1 and Figure 10 for further information on the proposed refuge.

Vegetation Modification Treatments

- The creation and enforcement of low fuel zones around these buildings or structures, through the use of Asset Protection Zones (APZ's) and low threat vegetation, is an important mechanism to achieve sufficient separation from bushfire prone vegetation, as well as reducing and fragmenting fuel loads, to protect the building, its occupants (who may be sheltering within the building), and attending firefighters (who may be sheltering from bushfire impact).
- Given the high environmental and visual amenity values that exist at the site, it is important to take a holistic perspective and ensure these values are viewed equally with bushfire risk mitigation as part of the planning approval process. The blanket application of the current APZ standards across the entire area of habitable development is not considered an appropriate approach to balance environmental and visual amenity objectives with bushfire risk management.
- To achieve a better balance of all considerations, a bespoke vegetation modification approach is proposed, using several landscaping treatments to ensure all habitable buildings are located in areas of BAL-29 or lower, while retaining as much onsite vegetation as practical to preserve environmental and visual amenity objectives.

- The following landscaping treatments are proposed:
  - Asset Protection Zones
    - High level of modification to a specification compliant with the APZ standards, where buildings directly interface with unmanaged vegetation.
  - APZ-Modified Zones
    - Recognises the lesser bushfire behaviour in areas away from direct interfaces, but still near habitable buildings.
    - Largely complies with the principles of the APZ standards but deviates to enable flexibility for targeted and structured retention of more trees and shrubs.
  - Low Threat Vegetation
    - Recognises the lesser bushfire behaviour in areas generally not at direct interfaces, but also not adjacent to habitable buildings, and occurs mainly in the campground and park spine, but also the campground and public road verge and entry garden.
    - Similar treatment concept as that for APZ-Modified, but given separation from buildings, has increased tree overstorey and proposes isolated shrub "islands".
- Outside of the above landscaping treatments, revegetation and rehabilitation of any existing cleared areas with native vegetation, will occur in areas such as parts of the Foreshore Reserve, onsite Public Open Space and the ceded National Park (National Park Extension).
- Refer to Section 6.2, in particular Table 10, for a summary of the proposed vegetation treatments for the development, with Figure 11 showing the extent of each of the zones at completion.
- The development will seek to eventually incorporate traditional indigenous vegetation management practices into the ongoing vegetation management strategy. Initial review shows it could present targeted fuel load reduction with a lighter environmental impact, however further studies are required to assess further (see Appendix D).

Vehicular Access

- Given the single public road access to the site, it is important to establish a flexible internal vehicular access network that enables occupants to conduct offsite evacuation prior to bushfire impact, and to enable fire appliances to move around and throughout the site.
- Internal roads will generally have a minimum width of 6 m to accommodate two fire appliances, with the fire appliance driveway in the north-west to be a 4 m wide with a central 6 m passing bay.
- Constructing a new public road from Smiths Beach Road to "Leeuwin Way", that will be at least 6 m wide.
- Refurbishing the existing foreshore reserve driveway to Smiths Point to improve access for the public.
- If offsite evacuation by vehicle is not safe to conduct, occupants are to walk to the community bushfire refuge using the network of roads and the boardwalks and paths.
- Refer to Section 6.3 and Figure 5 for further information on the proposed vehicular access network, including PPBS's to address several driveway turnarounds.

Bushfire Construction Requirements

- To ensure ***all buildings***, not considered a tolerable loss, have sufficient construction resilience to withstand the anticipated bushfire impact, buildings on perimeter interfaces are to be constructed to BAL-29 regardless of assessed BAL rating or building classification (other than the bushfire refuge). All other buildings and tent platforms/boardwalks away

from perimeter to be constructed to the assessed BAL rating, but no less than BAL-12.5 to ensure resilience to ember attack.

- All WTP/WWTP building/shed/enclosures are to comply with a BAL-40 standard.
- Refer to Section 6.4 and Figure 11 for further information regarding the BAL rating for each building.

Water supply (including bushfire fighting supply)

- Providing a secure and reliable bushfire fighting water supply for attending bushfire fighters is critical, with sufficient flexibility for it to be used in various ways during a bushfire.
- The water supply, and bushfire water supply, for the development, will be available from:
  - New potable water supply via the WTP, with the WTP balance tank/s having overall capacity >200 kL and at least 100 kL capacity for bushfire.
  - Below-ground street hydrants, fed from the WTP, within the holiday home precincts.
  - A dedicated 50 kL bushfire fighting water tank is to be sited adjacent to the WTP
  - A dedicated onsite fire hydrant and fire hose reel system for the hotel and community hub building complete with firewater tanks (no less than 225 kL capacity).
  - A standalone fire hose reel system to provide coverage of the campground.
- Protection of the WTP from bushfire impact is achieved through oversized APZs to the south, enhanced BAL-40 construction, steel tanks and a non-combustible fence.
- Refer to Section 6.5 and Figure 4 for further information on the proposed town main water supply and bushfire water supplies for the development.

Essential Infrastructure

- Protect essential infrastructure from bushfire impact, as much as practical, including power supply, telecommunications, gas supply and sewer (wastewater) systems as per Section 6.6.
- Ensure the proposed green roofs, production garden and landscaping surrounding the refuge, are covered by a landscaping reticulation system as outlined in Section 6.7.

Bushfire Emergency Management

- The potential for access to be obstructed during a bushfire emergency and trapping occupants, is minimised by having an onsite refuge, but also by ensuring it is well-prepared, has as much warning as possible, and has a clear plan to ensure the safety of occupants. To achieve this, a BEMP has been developed to detail the emergency management arrangements required throughout the year, prior to bushfire season and daily during bushfire season, and how the onsite Emergency Response Team (comprised primarily of hotel staff) are to respond upon becoming aware of a bushfire in the local area.
- The primary response action in a bushfire emergency is early notification and offsite evacuation, however if this is unsafe to conduct or there is significant traffic congestion, the response action is to be onsite shelter-in-place at the community bushfire refuge.
- Refer to Section 6.8 and project BEMP for further detail on the bushfire emergency management plan.

Implementation, Maintenance, Auditing and Enforcement

- An appropriate implementation and ongoing maintenance and auditing program, enforceable under the Community Corporation, is critical to ensure the management measures are established correctly and are effective for the life of the development.
- A Vegetation Management Plan (VMP), conditioned as part of the development approval, will include preparation of detailed landscaping plans (informed by further detailed vegetation studies) to depict the landscaping treatments required to comply with the BMP

and visual landscape amenity report. The approved detailed plans are to be updated to "as-constructed" landscaping plans, following completion of works, to depict the final vegetation locations, and are to be used as the baseline for ongoing maintenance and auditing.

- The implementation of the measures is largely to be conducted by the Proponent, other than holiday home construction which is by the future holiday home owner.
- Ongoing maintenance, auditing and enforcement is the responsibility of the Community Corporation, who will be required to conduct the following:
  - Review and implement the project BEMP, including establishing the EMT and ERT.
  - Maintain and audit the community bushfire refuge, onsite landscaping treatments (using "as-constructed" landscaping plans in the VMP), building construction, internal vehicular access routes (including access-control), water supply and wet fire systems, essential infrastructure, and communication systems each year prior to bushfire season.
  - Engage a BPAD Level 3 bushfire practitioner, accompanied by a fire engineer as required, to conduct the audit, and submit a compliance report to the City of Busselton, and where defects are identified, enforce their rectification.
- Refer to Sections 6.9, 6.11 and 8 for further information on the responsibilities for implementation, maintenance, auditing and enforcement of the management measures.

SPP 3.7 Compliance Assessment

The proposed development has been assessed against the SPP 3.7 Policy Intent and Policy Objectives, and demonstrates that *"effective, risk-based land use planning and development*" has been used to produce a bushfire risk management strategy that:

- ***Preserves life***
  - By detailing emergency management arrangements in the BEMP, to ensure the onsite ERT is sufficiently prepared and trained to manage a bushfire emergency, with a focus on providing rapid notification and conducting early offsite evacuation when safe to do.
  - By establishing the community bushfire refuge to provide occupants with the option to shelter onsite, should offsite evacuation by unsafe to conduct or roads congested.
  - By delivering appropriate onsite vegetation modification and building construction to withstand the anticipated bushfire behaviour, for both occupants and firefighters.
  - By providing secure and flexible bushfire water supplies for firefighters.
- ***Reduces the impact of bushfire on property and infrastructure, while avoiding any increase in the threat***
  - Using a combination of landscaping treatments and enhanced building construction, commensurate with the anticipated bushfire behaviour, including increasing proposed APZ along the southern interface to 25 m and mandating BAL-29 construction on perimeter boundaries, but where bushfire behaviour is not likely to be as intense, the APZ widths are minimised and treatments modified to balance with other objectives.
  - Not proposing any high-risk land uses or any significant revegetation that would increase the threat to the proposed development.
- ***Achieves an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection, landscape amenity, with consideration of the potential impacts of climate change.***
  - Rather than blanket application of the APZ standards, landscaping within the development has been rationalised to prioritise overstorey vegetation retention for fauna habitat and visual amenity, while structuring the understorey vegetation to limit bushfire growth and spread through the development and impact on buildings.

- Climate change has been reviewed as part of the Forest Fire Danger Index (FFDI) analysis of local weather at Cape Naturaliste, producing FDI 49.1 over a 1:200 return period, which indicates sufficient safety factor from the state-adopted FDI 80 used to size the APZs at this project. On this basis, long-range climate change won't exceed FDI 80 at this coastal location, and the APZ widths would remain appropriate.

Most of the Proposal is compliant with the SPP 3.7 Policy Measures and the Bushfire Protection Criteria of the Guidelines, using Acceptable Solutions and/or Performance Principle-Based Solutions (PPBS's). However, where compliance is not possible with the Guidelines, a bushfire risk assessment has been used to demonstrate how the residual risk of the development has been appropriately reduced, and the compliance is achieved with the Tourism Land Use Position Statement Policy Objectives (for tourism land uses) or directly against the SPP 3.7 Policy Intent (for extended length stay use of holiday homes).

Below is a high-level overview of the SPP 3.7 compliance, using the Bushfire Protection Criteria to guide the assessment.

Acceptable Solution	Method of Compliance	Compliance Assessment
Bushfire Protection Criteria		
Element 1 - Location		
A1.1 Development location	**AS**	• Compliance with Acceptable Solution achieved by locating all development in areas of BAL-29 or lower
Element 2 - Siting and design of development		
A2.1 Asset Protection Zone (APZ)	**AS** **PPBS 1**	• Compliance achieved using a combination of Acceptable Solutions and PPBS's • APZs around refuge, WTP/WWTP and perimeter of habitable building extent are largely compliant with A2.1 • Within the habitable building extent, the use of APZ-Modified standards to balance bushfire management with environmental and visual amenity objectives is addressed by PPBS 1 (see Section 7.5.1) ○ PPBS 1 demonstrates that while the APZ-Modified treatment is not fully compliant with the APZ standards, it uses an approach of reduction and fragmentation of fuel loads similar to other states, which is appropriate given this zone is away from direct interfaces with unmanaged vegetation.
Element 3 – Vehicular Access		
A3.1 Two Access Routes **A3.3 Cul-de-sac**	**AS** **TLU PS** **BRA**	• Compliance with Acceptable Solutions A3.1 and A3.3 are unable to be achieved due to the legacy dead-end public road network (>200 m length), terminating at Smiths Beach. The construction of a second public road, from the project area to Caves Road, is not achievable by the Proponent. • Proposed "Leeuwin Way" will be constructed to comply with A3.3, other than length. It is noted that this road falls outside of the Development application and will be delivered in consultation with the City of Busselton, however it has been included in this assessment for completeness. • The length without a point of choice of the existing roads and the proposed "Leeuwin Way", is non-compliant with A3.1 and A3.3. A PPBS is not possible to demonstrate full compliance with Element 3 Intent or Performance Principle. ○ The bushfire risk assessment conducted in Appendix J of this BMP, shows that following implementation the bushfire risk management strategy and suite of management measures, that despite a second public road not being able to be provided to the project area, life is able to be preserved primarily through the provision of the bushfire refuge supported by the project BEMP, and that bushfire impact to proposed property and infrastructure can be reduced to acceptable or tolerable levels ○ This is compliant with the Tourism Land Use Position Statement (for tourism land uses) and the SPP 3.7 Policy Intent and Objectives (for the extended length stay of holiday homes)
A3.2 Public road	**NA**	• Not applicable. The only new public road proposed as part of the Proposal, is "Leeuwin Way" which is assessed against A3.3.
A3.4 Battle-axe	**AS** **PPBS 2**	• Compliance with A3.4 is achieved largely using A3.4, however PPBS 2 (see Section 7.5.2) justifies the omission of the turnaround at the house site, given it is

Acceptable Solution	Method of Compliance	Compliance Assessment
		<50 m from the internal road network which will essentially function as a public road with street hydrants.
A3.5 Private driveway longer than 50 m	**AS** **PPBS 2**	• Compliance is largely achieved using A3.5, although most internal roads will be 6 m wide to enable fire appliances to pass each other. • The fire appliance driveway and foreshore driveway will be 4 m wide with passing bays • PPBS 2 (see Section 7.5.2) justifies the proposed turnaround arrangements at three locations within the development.
A3.6 Emergency access way	**NA**	• Not applicable. No Emergency Access Ways are proposed.
A3.7 Fire service access routes	**NA**	• Not applicable. No Fire Service Access Routes are proposed.
A3.8 Firebreak width	**AS**	• Given perimeter access will be provided around the development, through the public and private road network, and the undeveloped portion of the project area is to be ceded to the National Park, full compliance with the perimeter firebreak requirements of the City of Busselton firebreak notice is not considered appropriate.
Element 4 - Water		
A4.1 Reticulated areas	**AS** **PPBS 3** **TLU PS**	• The proposed town main supply, static tanks and fire hydrant and hose reel systems largely comply with the specifications from Acceptable Solutions A4.1 and A4.2 • PPBS 3, (see Section 7.5.3) details the overall firewater design philosophy in order to demonstrate the proposed systems comply with the Element 4 Intent and with Performance Principle 4, in particular the holiday home street hydrants which are connected to a water supply authority system that is not necessarily 'standard', and the use of multiple systems (WTP, static tanks and street hydrants) which are a combination of A4.1 and A4.2.
A4.2 Non-reticulated areas		

Methods of Compliance: Acceptable Solution (AS), Performance Principle-Based Solution (PPBS), Tourism Land Use Position Statement (TLU PS), Bushfire Risk Assessment for direct compliance with SPP 3.7 Intent (BRA)

While the deviation from the Guidelines for the hotel and campground is addressed via the Tourism Land Use Position Statement, the ability for holiday homes to allow an extended period of stay requires further justification for the deviation:

- The entire precinct is identified as a Tourism Node and zoned for Tourism purposes.
- The site has previously been identified and approved for tourism and residential development, and the existing single public road access can't be resolved by the Proponent.
- Whilst the proposal comprises holiday homes, and there is the potential for these homes to also be used for extended length of stay by owners, anecdotal evidence in adjoining Yallingup and Eagle Bay suggests that the majority of homes are used for short stay accommodation interchangeably with personal use as a second dwelling for holiday home purposes, rather than as a primary residence.

  Given the likely interchangeable use of the holiday homes, it is expected that many holiday home owners may display characteristics more aligned with vulnerable occupants (e.g. tourists) who require assistance to appropriately respond to a bushfire emergency. Additionally, home owners are less likely to remain to defend property from bushfire, and will be advised not to as per the BEMP, although it is noted that should they choose to defend, the community bushfire refuge provides a nearby place of safety for sheltering.
- A coordinated and holistic approach to bushfire management is proposed. The Community Corporation will implement the BMP and BEMP for the entire precinct. Visitors and holiday home owners will be required to comply with the management requirements and conditions of the BMP which will be enshrined within the Community bylaws.
- There are significant environmental and visual amenity considerations that require a holistic vegetation modification strategy to appropriately balance with bushfire risk management, rather than blanket application of the APZ standards across the site.
- This development will provide benefit to the existing local community by:

- Establishing the community bushfire refuge that can be used by occupants in the local area including the public, and avoid use of Smiths Beach or Canal Rocks for open space refuge.
- Shields Smiths Beach Resort and Canal Rocks Beachfront Apartments from direct bushfire impact from the south, where they are currently highly exposed.
- The project BEMP promotes the sharing of bushfire status information with adjacent accommodations and nearby public areas, to encourage early evacuation when safe to do so, or relocation to the bushfire refuge if offsite egress is unsafe.

Based on the above, although the holiday homes can be used for extended length stays, the interchangeable use with short-term accommodation is not consistent with a "typical" standalone residential development, and is considered to represent unique and exceptional circumstances that have been a consistent part of the planning history of the site, which also offers net benefit in terms of reducing bushfire risk to the community. On this basis, it is considered there is justification to deviate from SPP 3.7 Policy Measures and the Guidelines regarding single road access to the holiday homes, where the residual bushfire risk can be appropriately reduced.

A detailed review of compliance with SPP 3.7, the Guidelines and the Tourism Land Use Position Statement, is in Section 7 of the BMP.

Conclusion

Bushfire risk management within the project area is one of the primary design considerations, with a focus on preservation of life not only for the proposed occupants of this development, but also for the other accommodation facilities, residents and public also impacted by the legacy single road access. The BMP proposes a suite of management measures to achieve this, as detailed above, that acknowledge the additional challenges posed by the single access road and provides the greatest chance of safe offsite evacuation, but with the option to shelter-in-place onsite within the community bushfire refuge should travel offsite be unsafe.

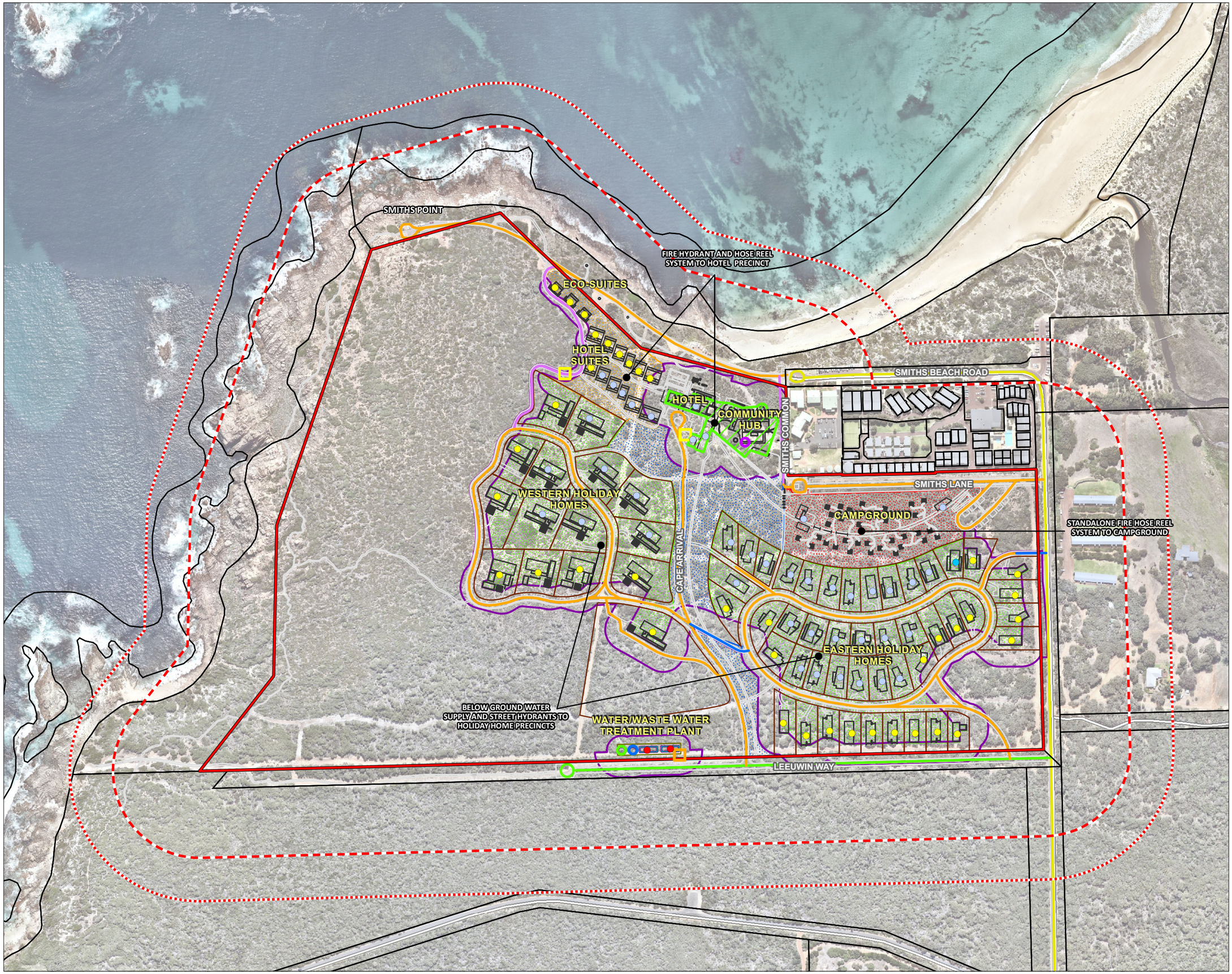
While the Proponent will be required to implement the proposed management measures, there will be an ongoing commitment for the Community Corporation to maintain, audit and enforce these measures in perpetuity, limiting the burden on local government.

The Proposal also provides significant benefit to the existing local community and the visitors to the area by providing a place of refuge for people who might otherwise be trapped if a bushfire closed Smiths Beach Road or Canal Rocks Road Furthermore, the Proposal will shield some existing development from direct bushfire impact from the south, and promotes collaborative bushfire emergency management arrangements with other developments and land uses in the area. Bushfire emergency management is a shared responsibility across a variety of stakeholders, and while the project BEMP requires the ERT will assume responsibility for managing bushfire emergencies onsite and at the refuge, the optimal risk management outcomes are achieved with all parties working collectively. The project BEMP highlights potential opportunities to share information on forecast and current bushfire conditions with local occupants (visitors to beaches, adjacent tourism accommodation, local landowners) and ideally guiding these potentially vulnerable people to either evacuate early or relocate to the bushfire refuge if required.

The Proposal represents an opportunity to produce a unique development that showcases the natural beauty of Smiths Beach locality, with retention of onsite vegetation the key to achieving this, by limiting impact on environmental values and visual amenity. While full compliance with the bushfire Guidelines is not possible due to the legacy single public road access to the project area, the Proposal has acknowledged both the single access and vegetation modification challenges, and responded to them both through a suite of targeted management measures. It has been demonstrated that occupant and firefighter life safety can be preserved in a bushfire emergency, through the establishment of the community bushfire refuge, supported by the project BEMP, in

conjunction with the curated onsite landscaping treatments, enhanced building construction and a flexible internal vehicular access network and water supplies. These measures ensure residual risk from bushfire to proposed property and infrastructure, can be reduced to appropriate levels.

Compliance with the Guidelines has largely been achieved using the Acceptable Solutions and three Performance Principle-Based Solutions, however where it is not achievable for Element 3, this BMP demonstrates that the proposed bushfire risk management strategy is able to comply with the SPP 3.7 Policy Intent and Policy Objectives (for extended stay use of holiday homes) and the Tourism Land Use Position Statement Policy Objectives (for tourism land uses).



Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Overall APZ extent
- APZ (Modified) - Hotel/Suites
- APZ (Modified) - Holiday Homes
- Low Threat Vegetation – Park Spine
- Low Threat Vegetation – Campground
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Emergency driveway
- Internal fire appliance driveway
- Private driveway
- Existing public roads
- New public road
- WTP/WWTP Fence
- Indicative WTP/WWTP infrastructure
- Roads (MRWA)

BAL building construction

- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- 50kL standalone bushfire water tank
- Balance tank/s with additional 100kL for bushfire fighting
- Fire hydrant tanks (min capacity 225 kL)
- External fire hydrant connection to water main
- Additional hydrants for bushfire

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Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 06-Dec-2021
Drawn By: IA	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

PROPOSED BUSHFIRE MANAGEMENT MEASURES

EXCECUTIVE SUMMARY

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_ExecSummary_A3_ProposedBF_Measures.mxd
Image Reference: www.nearmap.com® - Imagery Date: 20. March 2021.

1. Introduction

1.1 Background

Smiths 2014 Pty Ltd (Smiths 2014; the Proponent) is submitting a Development Application (DA) for a new mixed-use tourism development, adjacent to the existing Canal Rocks Beachfront Apartments and Smiths Beach Resort south of Yallingup. The development site consists of approximately 40.53 ha of coastal land within Lot 4131 on Deposited Plan 61991 (the project area) on Smiths Beach Road, Yallingup in the City of Busselton (CoB; the City). The development also extends over the Public Road reserve located directly south of Lot 4131, which is the proposed site for the new public road, and also along the Foreshore Reserve to the north of the project area.

The vision for the project is to create a sensitive coastal village deeply rooted in place and culture. Guided by landscape and the natural assets of the site, the philosophy is to retain, rehabilitate and create with purpose. The project will deliver a sustainable village that provides tourism, community and economic benefits to the south-west region of Western Australia.

1.2 Proposal overview

The overall site and proposed development are summarised in Table 1. The development plan is depicted in Figure 1 with a site overview outlined in Figure 2 and additional detailed development plans in Appendix A. Further detail on the project area and proposed development is provided in Section 2.

Table 1: Proposal summary

Site details	

Size of DA area	• 40.5 ha (overall)
	  ○ Approx. 23.7 ha (development within lot)
	  ○ Approx. 16.8 ha (ceded to National Park as National Park Extension)
	• 2.01 ha (road reserve to south of project area)
	• Approx. 2 ha (within foreshore reserve to the north)

Local government area	City of Busselton
Development application	

Proposed development	The proposed development is to include the following elements:
	• Community Hub building (containing Cape-to-Cape Welcome Centre, Surf Life Saving Club. Café and General Store/Bakery and Reception Hall)
	• New hotel facility, with 24/7 onsite staffing, including
	  ○ Hotel public areas building (containing arrival lobby, restaurant, lounge, bar, communal and back-of-house facilities and external facilities (pool, outside terrace)
	  ○ Wellness Centre comprising the spa and gym buildings
	  ○ 59 hotel suites across 12 buildings, divided into the Northern and Southern wings
	  ○ 6 eco-suites across 3 buildings
	  ○ Below-ground carpark
	• New campground including
	  ○ 36 tent platforms and boardwalks
	  ○ Campground Hub building with communal, cooking and amenity areas
	  ○ Amenities block/maintenance shed building
	• 61 holiday homes located either side of “Cape Arrival”, the new main entrance road
	  ○ Western Holiday homes containing 15 homes
	  ○ Eastern Holiday homes containing 46 homes
	  ○ Holiday homes will have the option of forming part of hotel accommodation pool
	• New internal road network and associated carparking for the hotel, campground, holiday homes and communal areas
	• New “Leeuwin Way” public road to Water Treatment Plant (WTP) and Wastewater Treatment Plant (WWTP), and public carpark

Site details	

	• Refurbished road along the Foreshore Reserve to Smiths Point and new beach access ramp
	• Pathways and boardwalks suitable for pedestrians and golf buggies
	• New servicing infrastructure throughout the development including:
	  ○ Water infrastructure including new WTP buildings/sheds/containers and tanks located along the southern boundary
	  ○ Electrical supply infrastructure, including above-ground transformers
	  ○ Telecommunications and site communications infrastructure
	  ○ Gas supply infrastructure including LPG bullet and bottles
	  ○ Sewer infrastructure including the WWTP adjacent to the WTP
	• Revegetation, rehabilitation and landscaping throughout the project area, Foreshore Reserve and "Leeuwin Way".
	• Undeveloped portion of the project area to be ceded to the National Park (National Park Extension)
	
	The development is to be established as a Community Title Scheme, which enables the creation of a mixture of planning and building developments and allows for co-ordinated management control by the Community Corporation, enforceable under the scheme by-laws.
	
	The proposed development will result in a new green title lot for the campground, with each of the proposed holiday home lots being Community Title.

1.3 Purpose of the BMP

The Map of Bush Fire Prone Areas designates the project area as being wholly within a designated bushfire prone area (refer to Plate 1), which triggers requirements under *State Planning Policy 3.7: Planning in Bushfire Prone Areas* (SPP 3.7; WAPC 2015) and the accompanying *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines).

Plate 1: Map of Bushfire Prone Areas (DFES 2021)

This BMP has been prepared to satisfy the requirements of SPP 3.7 and other bushfire requirements, but also specifically to provide guidance on how to plan for and manage the bushfire risk to future life and property assets of the project area through incorporation of a range of bushfire management measures into the development application and future planning/building stages.

Given the unique nature of this Proposal, the compliance pathway and assessment criteria of the proposed development against SPP 3.7 and other relevant requirements, has been detailed in Section 3. As the development includes proposed tourism land uses including short-term

accommodation and public visitation, the development is a 'vulnerable land use' as defined by SPP 3.7.

1.4 Other plans/reports

Other reports prepared for the project area/proposed development include:

- Bushfire Emergency Management Plan (Strategen-JBS&G 2021a.
- Environmental Assessment Report (Strategen-JBS&G 2021b).
- Foreshore Management Plan (Strategen-JBS&G 2021c).
- Landscape Report (McGregor Coxall 2021).
- Engineering Report (Stantec 2021).

1.5 Previous planning approval and Fire Management Plan

The Smiths Beach Development Guide Plan (now referred to as Structure Plan) for the subject site was endorsed by the WAPC in February 2011 and remains valid until October 2025. The Structure Plan allows for tourist and residential (R15 - R25) development on the eastern portion of the site, and Public Open Space and reserves on the western portion of the site.

A Fire Management Plan (FMP; now known as a BMP) supporting the Structure Plan, was prepared assessing bushfire risk against the *Planning for Bush Fire Protection Guidelines* (WAPC 2010), which was approved by the City and FESA (now DFES) in 2011. Since that approval, there have been subsequent reforms to bushfire planning legislation in Western Australia (WA) including the release of SPP 3.7 and the Guidelines.

A brief outline of the bushfire risk management measures proposed by the FMP are outlined below and depicted in Plate 2:

- Vegetation and fuel management
    - A 50 m wide hazard separation zone along the southern and eastern interfaces comprising:
        - 20 m wide Building Protection Zone (BPZ) around the proposed residential area and extending 20 m to the west and south, to a prescriptive standard outlined in the FMP. Along the southern interface, the BPZ is to incorporate a 10 m wide remnant vegetation strip (building setback).
        - 30 m Hazard Protection Zone (HPZ) with fuel loads managed to 4-6 t/ha with clumped retention of heathland vegetation (5 m diameter with 8 m separation by slashed grass).
    - A temporary 10 m wide BPZ extending into the proposed tourism lots during subdivision, to protect the holiday home lots.
- External strategic firebreaks along perimeter road with internal firebreaks within the perimeter of the tourism cells.
- Buildings
    - Compliance with AS 3959 for building construction as per assessed BAL rating with perimeter holiday home lots to south and south-west, to be BAL-29 to enable retention of vegetation onsite.
    - FMP notes the CoB may adopt a minimum BAL-19 standard for all lots, but is not certain.

- CoB responsible for annual inspection of all buildings as per FMP and firebreak notice.

- Roads
  - 15-20 m wide road reserves with a perimeter loop road connecting to Smiths Beach Road at two locations, albeit one connection is to be made by others.
  - Carparking was proposed along the foreshore.
  - Roads are to comply with CoB specifications.
- Water supply is via a reticulated main being extended to site, complete with street hydrants.
- Compliance with CoB firebreak notice e.g. restricted and prohibited burnings times.
- Ongoing fire management of the National Park by DEC (now DBCA).
- Public education/community awareness
  - Notification to be placed on lot titles advising of existence of FMP.
  - Broader public education and community awareness at discretion of CoB and FESA, including fire awareness campaigns, field days, seminars, signage and other media.
  - CoB firebreak notice to be issued to every landowner with Shire rates.
- Fire Safer Areas
  - CoB was implementing a system of designating and signposting bushfire safer areas. The Developer and future landowners are to contribute financially to this scheme.
- Future landowners
  - Contribute to annual DFES levy.
  - Ensure ongoing compliance with the FMP, the CoB firebreak notice and FESA Home Owners Bushfire Survival Manual Guidelines.
  - Owners of the 8 tourism lots are to produce their own FMP to accompany those development applications.

While the original FMP was appropriate for the regulatory framework at the time, given the new bushfire regulatory requirements, there is an opportunity to review and improve on the existing risk mitigation strategy considering current practices. The original FMP notes the difficulty in achieving a balance between the competing principles of bushfire risk management and environmental considerations, so there is a chance to revisit vegetation modification requirements.

There are concerns with the approved Structure Plan relating to the significantly denser and more visible development, lack of foreshore offering and poorly defined tourism vision. In contrast, this Proposal seeks to address many of these concerns. From a bushfire perspective, the reduced density of this development Proposal results in a significant reduction in occupant numbers, which improves the ability of the development to respond to a bushfire emergency.

This BMP seeks to improve on the previous approved FMP, by providing a more holistic bushfire risk management strategy, that not only shows compliance with the current bushfire planning requirements but also addresses:

- The legacy single public road access to the site, which forms a long dead-end road.
- Providing clarity on the level of vegetation modification required, or proposed, across the entire site, including the tourism land uses.

- Providing redundancy to the proposed water supply, to avoid disruption in supply, should bushfire impact offsite mains pipework.
- Lighten the burden on the CoB by:
    - Assuming the responsibility to design, construct and maintain the bushfire refuge.
    - Having the maintenance and auditing of building construction compliance be the responsibility of the Community Corporation, in addition to vegetation management and water system.

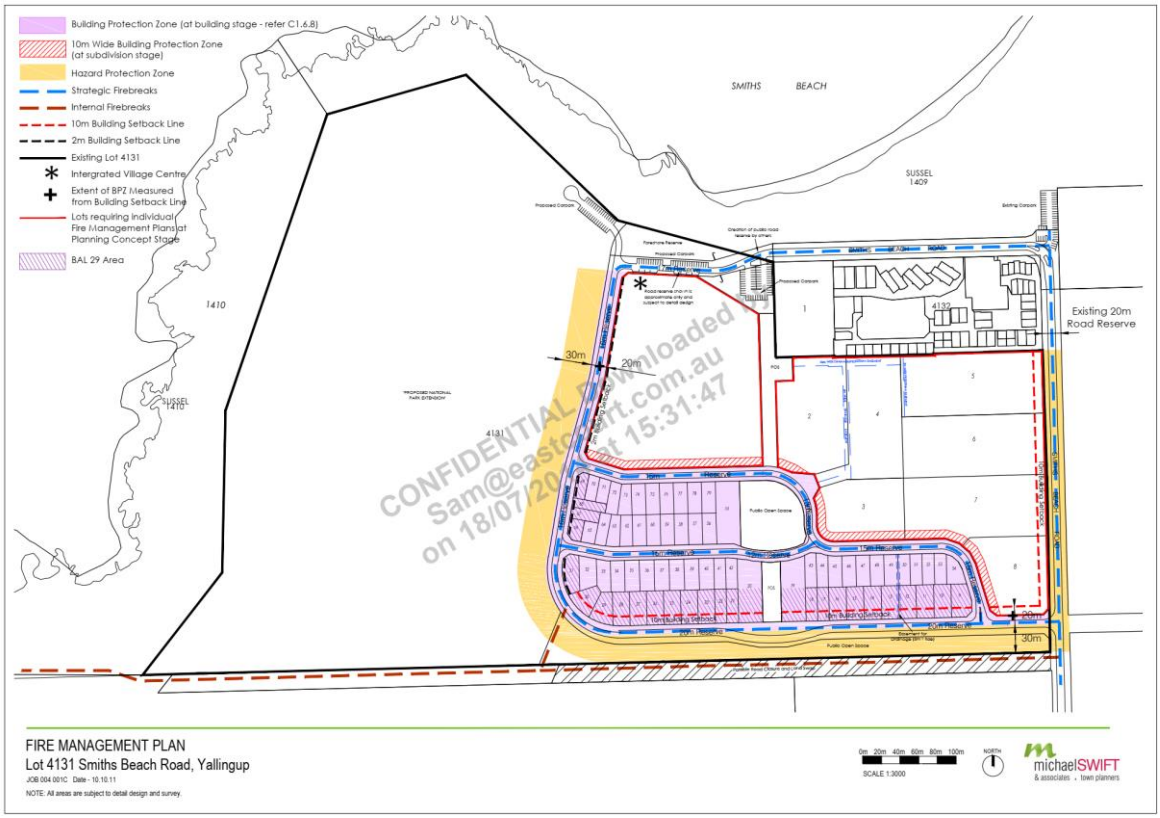
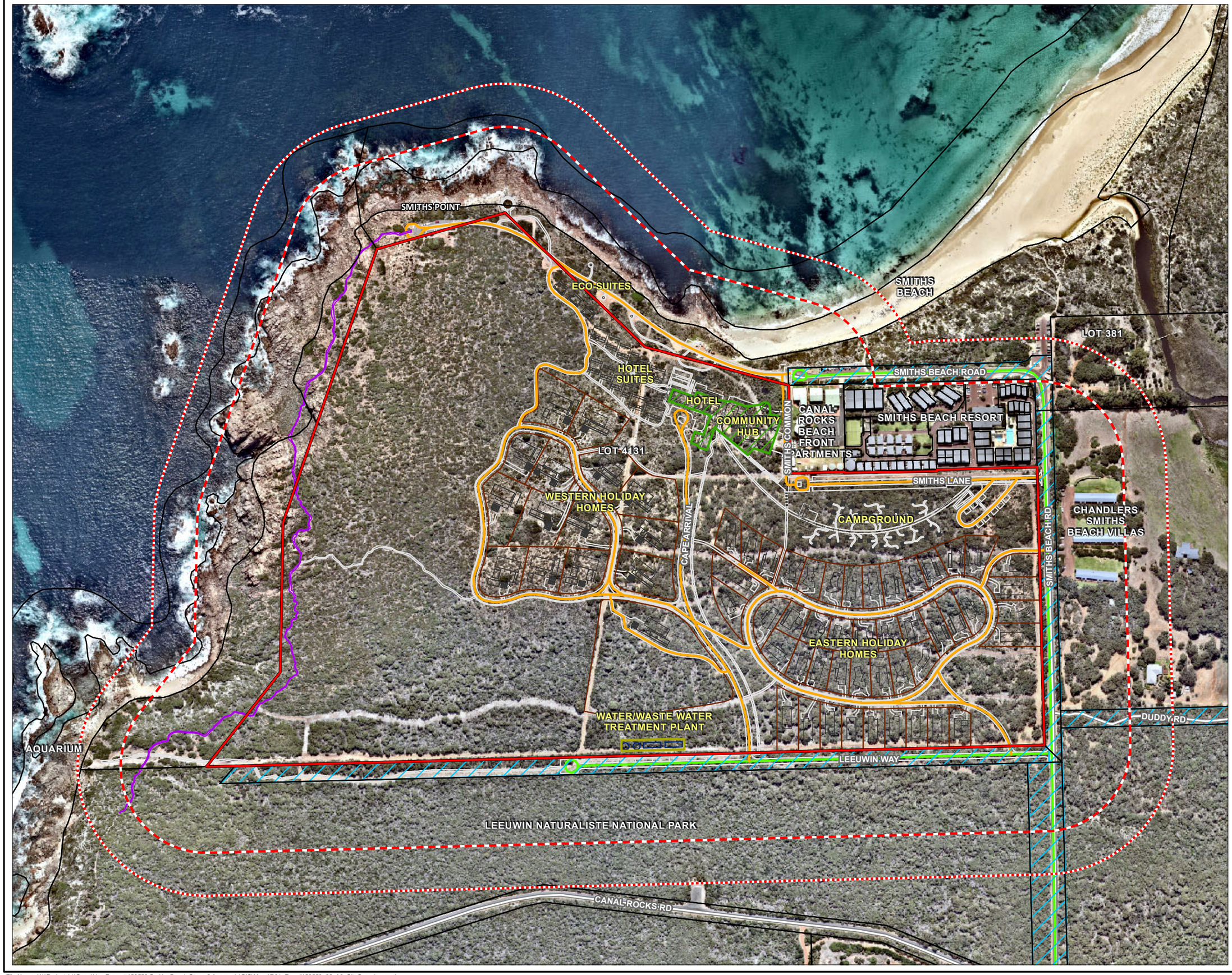


Plate 2: Bushfire Management Measures from previously approved FMP

LEGEND

1. Cape to Cape Track
2. Hotel Arrival
3. Restaurant
4. Universal Beach Access
5. Yarning Circle
6. Cape to Cape Welcome Centre
7. Surf Life Saving Club
8. Café & General Store
9. Smiths Lane Public Parking
10. Campground Facilities
11. Service Infrastructure

Figure 1: Proposed development layout



Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Community bushfire refuge
- Road reserve
- Cape to Cape walking track
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Private driveway
- Public roads
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Roads (MRWA)

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Job No: 59550	
Client: Smiths 2014 Pty Ltd	
Version: A	Date: 06-Dec-2021
Drawn By: IA	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

SITE OVERVIEW

FIGURE 2

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Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

2. Project area and proposed development

The project area is situated in the City of Busselton which is in the south-west of Western Australia, approximately 220 km south of Perth (CoB, 2019). There are two major towns in the City, namely Busselton and Dunsborough on Geographe Bay, with several smaller centres including Yallingup.

South of the City of Busselton is the Shire of Augusta-Margaret River (SAMR), approximately 18 km south of the project area, and has the major towns of Margaret River, Cowaramup and Augusta with several smaller settlements including Gracetown.

The south-west of Western Australia is an international tourist destination due to its highly valued visual landscape qualities, global biodiversity hotspots, and iconic tourist destinations. Tourism is especially popular in the summer months, because of the more moderate temperatures compared to Perth which promotes outdoor activities, as well as the overlap with school holidays.

2.1 Project area and immediate surrounds

This section outlines the characteristics of the existing project area and immediate surrounds.

2.1.1 Location and land use

The project area covers an area of 40.53 ha and is located within the City of Busselton (CoB), Western Australia, approximately 23 km west of Busselton CBD. The proposed development extends over the following lots, which is depicted in Figure 2:

- Lot 4131 Smiths Beach Road on Deposited Plan 61991 (also called Sussex Location 413)
    - Currently undeveloped and largely uncleared, other than firebreaks, internal tracks and small areas for beekeeping
- Public Road reserve to the south of Lot 4131, upon which the ”Leeuwin Way” public road is proposed.
    - Currently undeveloped but partially cleared, presumably for the LNNP firebreak.
- Unallocated Crown Land (Sussex Location 1409) to the north of Lot 4131, which will contain the foreshore reserve.
    - Currently contains a sealed road (with several informal carparks) to the west of the gazetted Smiths Beach Road, which permits access to the northern point of the peninsula.
    - Also includes the coastal dunes to the south and east of Smith Beach, including the existing Smiths Beach carpark containing 65 existing carparks, an ablutions block and several boardwalks to access the beach.
    - Contains the only vehicular access point to Smiths Beach itself, via an existing ramp with a locked gate to prevent use by the public.
    - Contains a small section of the Cape-to-Cape walking track.

Surrounding the proposed development is the following land:

- Unallocated Crown Land (V Crown Land) to the west, north and north-east including.
    - The non-vegetated land along the coast, surrounding the project area
    - The Cape-to-Cape walking track which heads north to Yallingup and south to Wyadup Bay
    - The popular Aquarium swimming destination to the south-east of the project area
- Lot 1 (Strata Lots 1 to 21), 97 Smiths Beach Road to the north/north-east.

- Contains the existing Canal Rocks Beachfront Apartments (CRBA)

- Lot 4132 (Strata Lots 1 to 52), 67 Smiths Beach Road to the north/north-east.
  - Contains the existing Smiths Beach Resort (SBR)
- Lot 85, 50 Smiths Beach Road.
  - Contains the existing Chandlers Beach Villas (CBV), grazed agricultural land and areas of remnant vegetation
- Lot 381, 68 Smiths Beach Road to the north-east.
  - Contains an existing residential property with small orchards and remnant vegetation in the eastern portion of the lot.
- Public Road reserves.
  - Smiths Beach Road to the north, north-east and east (existing sealed public road.
  - Duddy Road reserve to the south-east (undeveloped with informal unsealed)
  - Canal Rocks Road to the south (existing sealed public road
- Crown Reserve R8428 forming part of Leeuwin-Naturaliste National Park (LNNP).
  - Lot 301 to the north-east and Lot 302 to the south and south-east.
  - Contains primarily undisturbed native vegetation within the national park.
  - Also contains Canal Rocks carpark and boat ramp, both of which are accessed by only Canal Rocks Road.

Approximately ten other lots exist between the project area and Caves Road, along Canal Rocks Road, which appears to currently being used for a range of residential and/or holiday home, commercial and agricultural purposes.

2.1.2 Land tenure

As outlined above, there are a variety of land uses, and therefore land tenures and management arrangements for land within and surrounding the project area, which is summarised below:

- **Smiths 2014 (the Proponent)**
  - Lot 4131 Smiths Beach Road
- **City of Busselton**
  - Smiths Beach, Canal Rocks Road and Duddy Road public road reserves
- **DBCA (management order)**
  - Leeuwin-Naturaliste National Park (Lots 301 and 302, Crown Reserve R8428)
- **State of WA (WAPC)**
  - Unallocated Crown Land
- **Private landowner/s**
  - Canal Rocks Beachfront Apartments (97 Smiths Beach Road)
  - Smiths Beach Resort (67 Smiths Beach Road)
  - Commercial olive operation (68 Smiths Beach Road)

2.1.3 Existing vehicular access

The primary vehicular access to the local area is via Caves Road, which extends north to Yallingup and Dunsborough and south to Gracetown, Cowaramup and Margaret River. Access inland from Caves Road to Bussell Highway is possible along Wildwood Road.

Given the legacy public road network, there is only public access route from Caves Road to the site, which is via Canal Rocks Road and Smiths Beach Road. From the Caves Road turnoff, the travel distance to the development is approximately 1.75 km (to the new "Cape Arrival" entrance road to development on the south-east boundary) and 2.5 km (to Cape-to-Cape Welcome Centre via Smiths Beach Road).

Canal Rocks Road extends further west to the Canal Rock Road carpark, with a total travel distance of 3.4 km from Caves Road.

From the intersection of Canal Rocks Road and Caves Road, the following travel options exist:

- North on Caves Road to Yallingup (4.5 km), Dunsborough (12 km) or Busselton (33 km).
- South on Caves Road to Gracetown (28 km), Cowaramup (26 km) or Margaret River (40 km).
- East on Wildwood Road (approx. 350m south of Caves Road) to Busselton (33 km).

Figure 3 summarises the regional access network to and from the project area, including approximate travel times during normal conditions, obtained from Google Maps.

All existing public roads (Caves Road, Canal Rocks Road and Smiths Beach Road) are all fully paved to a width of approximately six metres with narrow gravel shoulders. All existing access routes are suitable for two-way traffic. Smith Beach Road terminates within the public road reserve with a turnaround facility that is approximately 17 m wide, while Canal Rocks Road terminates at the carpark which has a loop road sufficient to enable vehicle turnaround.

An existing driveway extends along the foreshore from the Smith Beach Road cul-de-sac, to the cul-de-sac carpark at Smiths Point on the peninsula, and also provides direct beach access via an existing locked gate to the north of the proposed development. This existing driveway is actually within Unallocated Crown Land and is not part of the formal Smiths Beach public road reserve.

The popular Aquarium swimming destination is located south-west of the project area, which is currently accessed via hiking along the Cape-to-Cape track from the Kathleen's Seat carpark on Canal Rocks Road. The hike in is along a rocky part of the track and takes about 30min one-way. Informal 4WD vehicular access is also possible along the southern boundary of the project area, which is currently used by the public, albeit through a locked gate.

2.1.4 Existing services infrastructure

Given the project area is currently undeveloped, there are no existing services within the site. Information on the existing services to the area is provided in the project Engineering Report (Stantec, 2021), with a summary outlined below:

- There is currently no existing Water Corporation water supply infrastructure to the project area or adjacent properties.
- Power supply to the project area and surrounds is via:
    - The main above-ground power supply is along Caves Road and reticulated from the south of Canal Rocks Road to the site, along the western side of Smiths Beach Road and terminating just to the south-east of the existing Smiths Beach Resort.
    - The above ground power is a 22 kV high voltage main on timber poles.

- Above-ground power terminates at a pole adjacent to Smiths Beach Resort, and appears to be below-ground from this terminating pole.
- The project area does not appear to have a current Western Power connection.

- There are no existing sewer or gas services to or within the project area.

Mobile phone coverage to the project area is already strong from various network suppliers (see Plate 3 and Plate 4).

Plate 3: Telstra existing 4G mobile coverage

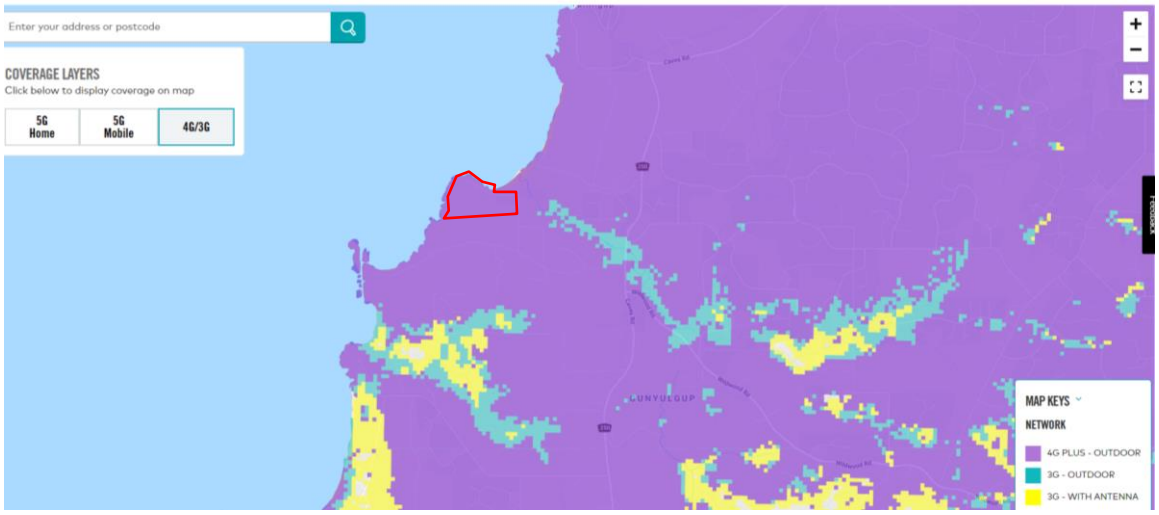


Plate 4: Optus existing 4G and 3G mobile coverage

2.1.5 Local firefighting resources

Below is a high-level summary of the bushfire fighting resources in the local area, including distance and travel time to project area:

Career Fire and Rescue

- Bunbury Career Fire and Rescue (85.9 km by road and 67 min travel time.

Volunteer Fire and Rescue

- Yallingup Rural Volunteer Bush Fire Brigade (11.2 km by road and 15 min travel time.
- Yallingup Coastal Volunteer Bush Fire Brigade (7.0 km by road and 8 min travel time.
- Dunsborough Volunteer Bush Fire Brigade (13.3 km by road and 13 min travel time.
- Cowaramup Volunteer Fire Brigade (28.4 km by road and 25 min travel time.
- Busselton Volunteer Fire and Rescue Service (36.6 km by road and 34 min travel time.
- Margaret River Volunteer Fire and Rescue Service (38.4 km by road and 34 min travel time.

Volunteer Bush Fire Services

- Metricup Volunteer Bush Fire Brigade (13.7 km by road and 20 min travel time.
- Gracetown Volunteer Fire Brigade (29.4 km by road and 25 min travel time.

There are other rural volunteer bush fire brigades further afield, including at Walcliffe, Rosa Brook and Witchcliffe.

Most brigades appear the have several fire appliances, comprising a combination of Light Tankers (e.g. Landcruiser), 2WD and 4WD bushfire fighting appliances. The larger appliances are approximately 3 m wide by 8 m long, and typically have a 2000 – 3000 L tank capacity with various pumps, hoses and other emergency equipment.

Given the location, trained firefighting personnel at most stations are mostly volunteers, and while there will be a mixture of experience, there is likely to be significant local bushfire fighting experience within these brigades.

The existing firewater supplies in the local area that Strategen-JBS&G are aware of, include:

- Existing water tanks and fire booster connections at Canal Rock Beachfront Apartments and Smiths Beach Resort.
    - The exact static firewater capacity is unknown, however there are substantial existing tanks installed along the southern boundary (see Plate 5) which appear to be the largest existing firefighting water supplies near the project area.
- Existing and proposed firewater tanks at Injidup (understood to be up to 350 kL.
- Existing firewater tanks at Yallingup Coastal fire station (approx. 130 kL) and Yallingup Rural fire station.
- Additional supply from various existing tanks within surrounding residential properties.

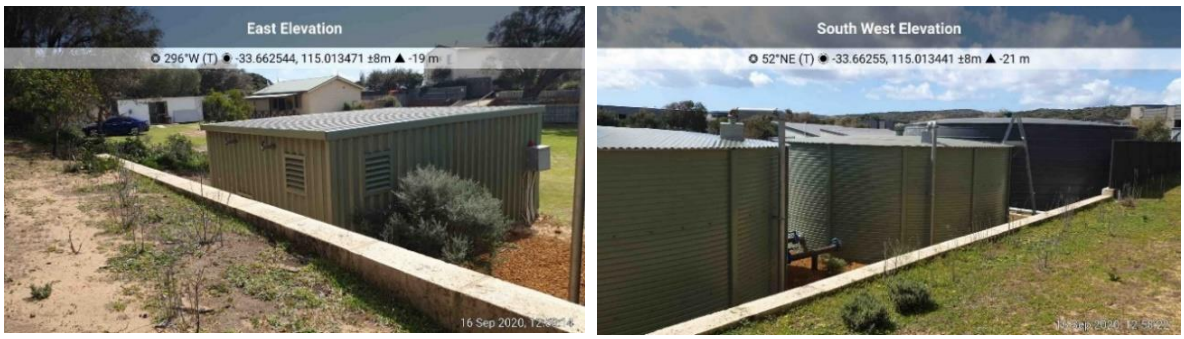
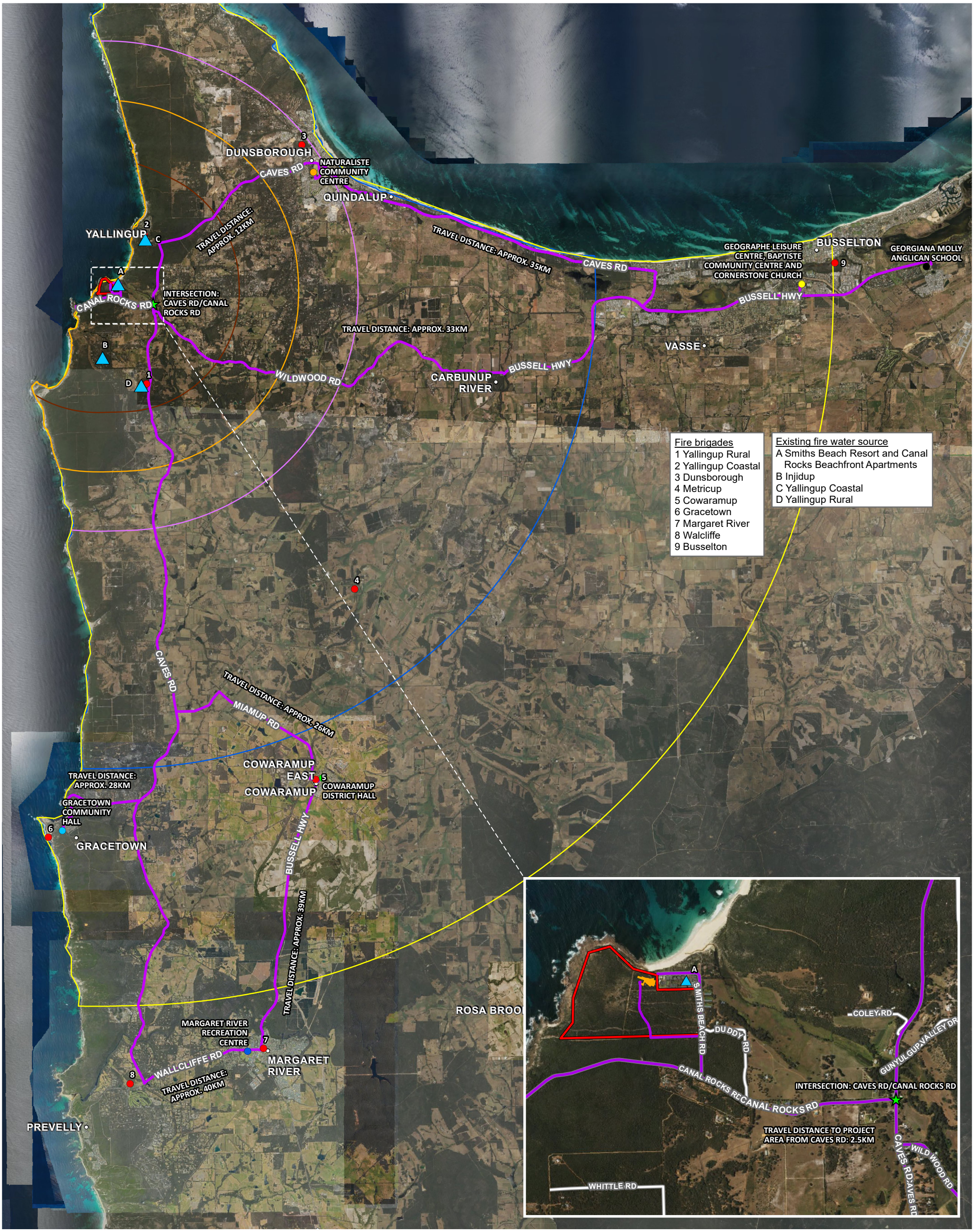


Plate 5: Existing water tanks at adjacent developments



Legend

- Project area (Lot 4131)
- 5km zone from project area
- 7.5km zone from project area
- 10km zone from project area
- 20km zone from project area
- 30km zone from project area
- Onsite community bushfire refuge
- Regional access network
- Fire brigade
- Existing fire water
- Intersection: Caves Rd/Canal Rocks Rd
- Location

Offsite locations

- Cowaramup District Hall
- Geographe Leisure Centre, Baptiste Community Centre and Cornerstone Church
- Georgiana Molly Anglican School
- Gracetown Community Hall
- Margaret River Recreation Centre
- Naturaliste Community Centre

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0 4,200 metres

Job No: 59550		Scale 1:150,000 at A3	
Client: Smiths 2014 Pty Ltd		Coord. Sys. GDA 1994 MGA Zone 50	
Drawn By: jcrute	Checked By: CT	Version: A	Date: 12-Nov-2021

Lot 4131 Smiths Beach Road Yallingup WA 6282

REGIONAL ACCESS NETWORK AND FIREFIGHTING CAPABILITY

FIGURE: 3

Document Path: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_03_A3_RegionalAccessNetwork.mxd

Image Reference: SLIP Public Services Locate 2019-2021.

2.2 Proposed development

The Proposal is to develop a new mixed-use tourist node and holiday home development, within the project area adjacent to Smiths Beach. The vision is to create a sensitive coastal village deeply rooted in place and culture, that delivers a sustainable village that providing tourism, community and economic benefits, while showcasing the iconic location and landscape.

The proposed development is to consist of the following elements:

- Community Hub
    - Cape-to-Cape Welcome Centre
        - Provide a central hub for Cape-to-Cape administration and walkers
    - Surf Life Saving Club
        - Facility for local surf lifesaving club
    - Café and General Store/Bakery building
        - Café for informal dining and a general store and bakery for produce for guests, home owners and the public
    - Reception Hall
- Tourist Development providing accommodation and dining experiences for guests and the public, which will consist of the following:
    - New hotel facility, with 24/7 onsite staffing, including
        - Hotel public areas building including arrival lobby, retaurant, lounge, bar, communal and back-of-house facilities, and external facilities (pool, outside terrace)
        - Wellness Centre comprising the spa and gym buildings
        - 59 hotel rooms across 12 hotel suite buildings, divided into the Northern and Southern wings
        - 6 hotel rooms across 3 hotel eco-suite buildings
        - Below-ground carpark (beneath two hotel suite buildings in the Southern wing)
    - New campground (within a separate lot) including
        - 36 tent platforms (5m x 5m low level platforms to enable tent erection)
        - Campground Hub building with campsite amenities including toilets and showers; laundry and kitchen facilities, communal lounge spaces, wood fires and BBQ areas
        - Amenities block/maintenance shed building
- New holiday home precinct consisting of:
    - 61 holiday homes located either side of “Cape Arrival”, the new main entrance road in two precincts
        - 15 Western holiday homes
        - 46 Eastern holiday homes
    - The holiday home owners will have the option of using the holiday homes to form part of hotel accommodation pool for short-term rentals
- Foreshore Reserve development including:
    - Rehabilitation and revegetation of the conservation areas within the reserve
    - Landscaping of vegetation along the front of the proposed hotel communal building, hotel suites and eco-suites

- Constructing new lookouts and path or boardwalk access through the foreshore
- Replacing the existing beach ramp with a new universal beach access ramp

- New servicing infrastructure throughout the development including:
  - Water infrastructure including new Water Treatment Plant building/s and tanks located on the southern boundary
  - Electrical supply infrastructure including above-ground transformers
  - Telecommunications and site communications infrastructure
  - Gas supply infrastructure including LPG bullet and bottles
  - Sewer infrastructure
- New internal road network and associated carparking for the hotel, campground, holiday homes and communal areas
- New "Leeuwin Way" public road to the Water Treatment Plant/Wastewater Treatment Plant and public carpark (which is noted is outside the DA area)
- Refurbished driveway along the Foreshore Reserve to Smiths Point
- Pathways and boardwalks suitable for pedestrians and golf buggies
- Undeveloped portion of the project area to be ceded to the National Park

2.2.1 Proposed land uses

The Proposal seeks to provide a combination of tourism accommodation offerings, in addition to a range of commercial and community facilities that will contribute to the tourism activities for the locality.

2.2.1.1 Short-term tourism accommodation

A variety of short-term tourism accommodation offerings are proposed as part of the development including:

- At the hotel within the hotel suites and eco-suites
- At the campground with tent platforms for guests to erect their own tents
- use of the holiday homes for short-term accommodation.

The popularity of home-sharing/short term rental options, such as Airbnb, has changed the holiday accommodation landscape in recent times, both for guests and for homeowners. There is now a more blurred line between home and holidays, with holiday homes capable of forming both functions. The unregulated nature of the short-term rental market, the amenity impacts, and over tourism of residential areas, means that the future of short-term accommodation is changing and one that the planning system is evolving to respond to.

The Proposal seeks to optimise the benefits of short-term rentals by creating a diversity in accommodation types and sizes, all under the control of a central management framework of the Community Corporation, to support landowners and make a contribution to the short-term rental market.

All short-term accommodation, including holiday homes returned to the "short-stay rental pool", will be managed through the central management framework provided by the hotel and through the Community Corporation management system.

2.2.1.2 Holiday home uses

The holiday homes will be available for short stay accommodation, controlled by the Community Corporation and managed by the hotel, and can also by used by the owner for holiday accommodation or extended length of stay.

2.2.1.3 Community, recreation and infrastructure

Based on the current approved Structure Plan for the site, any proponent for the site has an obligation to provide $1m towards a 200m^2 community facility. This Proposal involves a more expansive offering that includes the design and delivery of community infrastructure such as a 766m^2 Surf Life Saving Club facility.

The key elements included in the Proposal's Community Hub land uses include:

- Surf Life Saving Club.
- Cafe, General Store/Bakery, Reception Hall.
- Cape-to-Cape Welcome Centre.
- Hire Shop.
- Improved access to Smiths Beach, including a new beach universal access ramp, and to Smiths Point, with additional public parking.
- Outdoor showers and public amenities.
- Foreshore infrastructure and facilities.

Given the location close to the iconic Cape to Cape walking track, the opportunity has been taken to create a "Cape to Cape Welcome Centre" facility to establish a curated and innovative centre for this attraction.

Smiths Beach is another key drawcard of the local area, and one that already results in significant visitation during the summer months. It has been identified that there is a lack of infrastructure for surf lifesaving personnel and in response to this, a Surf Lifesaving Club (SLSC) is proposed as part of the development. This will provide sufficient space to enable the storage of emergency lifesaving equipment and boats onsite, with the proposed universal access ramp to the beach itself, improving the ability to respond to beach-related emergencies. The construction of the SLSC infrastructure will likely grow the membership which would enable increased beach patrols throughout the season, while also storing emergency rescue vehicles and equipment onsite which will reduce the turnout time and enable rescue teams to be far more effective.

The foreshore is to be redeveloped through the refurbishment of the existing driveway to Smiths Point, creation of formal carparking, and addition of boardwalks and pathways to access various vantage points. The public will still have both vehicular and pedestrian access to the entire reserve.

2.2.2 Anticipated occupant load and characteristics

The City of Busselton has approximately 40,000 people residing in the local government area, however the impact of tourism on the population numbers, especially in the summer months, can be significant. Approximately 88% of visitors are from Western Australia, with 7% from interstate and the remaining 5% from overseas, so while considered an international destination, there remains a strong local flavour to the visitation. The warmer, summer months, especially during school holidays, represent the time of year when tourism is at its peak, which also coincides with peak bushfire risk. The significant increase in visitor numbers during summertime, could also result in greater congestion on main roads.

Occupants using the proposed development are expected to be staff (hotel/campground), holiday home owners, guests (staying overnight in the hotel, campground, holiday homes) and visitors using the various facilities, but not staying overnight.

A summary of anticipated peak occupant load for the proposed development is provided in Table 2. The occupant numbers breakdown for the proposed development outlines the expected guests in the short stay tourist accommodation and the holiday home precincts. The community facilities are

the expected numbers of visitors for dining and recreation purposes, outside of those accounted for as part of the accommodation. This constitutes approximately 50% of the available public carparking within the project area, at Smiths Beach and along the foreshore, which is aligned with assumptions from the project Transport Impact Assessment (Cardno, 2021). The occupant load is primarily being used for the calculation of the community bushfire refuge area, and the assumed split of onsite and offsite occupants is not consequential, as all people are to be accommodated in the refuge anyway.

Also summarised in Table 2, is the estimated peak occupant load for people outside the development in the local area, that are further than 200 m from the Caves Road intersection:

- Existing tourism accommodation at Smith Beach Resort, Canal Rocks Apartments and Chandlers Smiths Beach Villas.
    - The occupant loads for these have been derived from a review of the number of apartment/villa and allocations of expected guests and staff
- Public visitors to Smith Beach using the existing carpark, proposed new street parking along Smiths Beach Road and the foreshore driveway.
    - It is assumed 50% of these public visitors will use the development, however the remaining 50% have been accounted for as part of the surrounding community.
- Visitors to the Aquarium and Canal Rocks coastal locations.
    - These are assumed to be entirely public visitors not staying at the proposed development

Table 2: Estimated peak occupant load

Use	Quantity	Occupant Rate	Development Occupants
Proposed Development			
Hotel (65 rooms @ 2ppl per room)	65 rooms	2	130
Campground (36 sites @4ppl per site)	36 sites	4[1]	144
Holiday homes (61 lots @ 4ppl per dwelling)	61 homes	4[1]	244
Staff	67 people	-	67
Community Facilities - Cape-to-Cape Welcome Centre, SLSC, Café & General Store/Bakery, Restaurant, Reception Hall (public visitors not staying at accommodation)	81 cars[2]	3.5[3]	284
Subtotal (Proposed Development)	**-**	**-**	***869***
Surrounding Community			
Canal Rocks Apartments	5 Apts (2ppl), 2-Bd Apt (4ppl), 3-Bd Apt (6ppl) + 10 staff		84
Smiths Beach Resort	9 Apts (2ppl), 3-Bd Apt + 21 Beach Shacks (4ppl), 6 Garden Villas (5ppl), 3-Bd Apt + 9 Ocean Villas (6ppl), 4-Bd (8ppl) + 35 staff		313
Chandlers Smiths Beach Villas	16 villas (4ppl) + 15 staff		79
Smiths Beach	81 cars[2]	3.5[3]	284**
Canal Rocks	95 cars[4]	3.5[3]	333
Kathleen's Seat (Aquarium visitors)	10 cars[4]	3.5[3]	35
Surrounding houses (outside development)	10 houses	4[1]	40
Subtotal (Surrounding Community)	**-**	**-**	***1168***
Total (Proposed Development and Surrounding Community)			**2037**

[1] The 2016 Census indicates WA has an average of 2.6 people per household (ABS 2020). The assumption of 4 people per holiday home accounts for greater occupancy during summer, as an average across the holiday home precinct, although some homes will be empty while others may contain greater than 4 people.

[2] Assuming full occupancy of hotel, campground and full onsite staff, of the total 330 car bays around the site, 168 will be used by people at the accommodation and staff, leaving 162 bays remaining for public use. In line with the TIA, it is assumed 50% of people using the remaining bays will be visiting the resort with the remainder only visiting the beach or other attractions outside this development.

[3] In line with the TIA, it has been conservatively assumed that there will be 3.5 public visitors per vehicle, which is greater than the average occupancy rate of 2.6 that would be considered typical for these tourism land uses.

[4] Based on estimated number of cars possible in carparks with minor overflow.

Table 3 summarises the occupant characteristics anticipated at the proposed development. Given the development will be available for use by all parts of the community, it is expected that the characteristics of guests, holiday home owners and visitors will be typical of the general population. All staff will typically be able bodied adults who will typically commute from nearby towns, although several staff will remain working onsite overnight, as part of the 24/7 hotel management.

Table 3: Occupant Characteristics

Occupant Characteristic Descriptors		Project Description
Gender	• Male • Female	Both male and female.
Age		Occupants could be a variety of ages including elderly and young children. It would be expected that adults would be around to assist young children or the elderly in a bushfire event.
State	• Awake / asleep • Intoxicated / sober • Unconscious / fully conscious	Occupants may be in a variety of states; however, all staff and most guests, home owners and visitors would typically be expected to be awake and conscious during the day when bushfire is most likely to impact the facility. It is likely some occupants (other than staff) may be intoxicated during the day, especially during peak holiday times.
Physical attributes	• Mobility • Speed of travel • Hearing ability • Visual ability	All staff and most guests, home owners and visitors are typically expected to be mobile and able to evacuate rapidly, however physical attributes of some visitors could vary given the potential age profile and it should be expected some may have physical impairments.
Mental attributes	• Level of understanding • Potential emergency behaviour • Ability to take and implement decisions independently	The mental attributes of occupants could vary given the potential age profile. There is potential for mentally impaired visitors within the facility however it is anticipated they would be accompanied by an adult at all times. All staff and most guests, home owners and visitors are expected to understand that an emergency is taking place through visual, auditory and olfactory senses.
Level of assistance required	• Requires full assistance / requires some assistance / does not require assistance	The majority of staff, guests, home owners and visitors will not require assistance with evacuation. If occupants do require assistance, such as the physically challenged, this is typically expected to be provided by adults or other physically able occupants. Additionally, assistance is expected to be provided to foreign tourists by English speaking staff or visitors.
Emergency training	• Trained / untrained • Warden / occupant	All staff will have some level of emergency training related to bushfire at the site, especially the nominated ERT. It is expected staff and most home owners will be familiar with the BEMP for the development, and the ERT will have some training in the use of the communication systems, and fire hose reels for initial firefighting. Most guests and visitors are not expected to have specific emergency training. It is expected that staff would notify guests and visitors of a bushfire and they would comply with instructions once advised of a bushfire.
Activity at outbreak of fire	• Awake / Asleep	Staff and most guests, home owners and visitors are expected to be awake and conscious during the day when bushfire is most likely to impact the development. Staff and most home owners would be familiar with the site layout and evacuation routes and would be expected to assist guests and visitors to evacuate. Able bodied staff, guests, home owners and visitors would be able to assist any disabled or

Occupant Characteristic Descriptors		Project Description
		mentally impaired visitors, or any young children, to evacuate the facility.

Guest and visitors to the development, and even the Smiths Beach and Canal Rocks, may have limited knowledge of the local area, the vehicular egress routes, and the response actions to take in a bushfire emergency or the location of potential safer places.

The City notes that absentee landowners (non-permanent residents) are prevalent throughout this area (CoB, 2019), which is supported by anecdotal evidence in adjoining Yallingup and Eagle Bay where the majority of homes are used by owners for short stay accommodation or for personal use as a second dwelling for holiday home purposes, rather than as a primary residence.The potential challenge presented by these owners, is that they may not fully appreciate or be as engaged, in managing the risk to their property, as that of a permanent resident in the community. This is often related to a lack of familiarity or awareness regarding their statutory requirements and also good practices in order to adequately prepare a property for bushfire season. Notwithstanding, any lack of site preparation for bushfire, especially vegetation management, likely increases the risk of bushfire to the landowner but also to adjacent landowners. For this Proposal, this risk is managed by the presence of the Community Corporation and onsite, 24 hour hotel management.

2.2.3 Proposed buildings

Buildings within the development will include:

- Community hub building.
- Hotel public areas building.
- Spa building with green roof.
- Gym building with green roof.
- Hotel suite buildings (12No.)
- Hotel Eco-suite buildings (3No.)
- Hotel below-ground carpark.
- Campground hub building.
- Campground amenity block and maintenance building.
- Holiday homes and garages and/or carports (61No.)
- Water Treatment Plant and Wastewater Treatment Plant buildings/sheds/containers.

A community bushfire refuge building will be created using the proposed Community Hub, hotel public areas, Spa and Gym buildings.

All buildings are to be constructed in accordance with bushfire construction requirements of this BMP.

2.2.4 Proposed services

The proposed services for the development are mostly outlined in the project Engineering Report (Stantec, 2021), with a high-level summary provided in following sub-sections. The services detailed are those specifically required to address bushfire regulatory compliance, enhancing the overall resilience to bushfire and to respond to bushfire emergencies. This BMP details further specific design, construction and maintenance measures for some services to improve resilience to bushfire, which is outlined in Section 6.

2.2.4.1 Water supply and firefighting water

Given there are no Water Corporation water supply assets to the project area, the Proponent intends to enter in an agreement with Water Corporation for the supply of potable water to the proposed development. Configuration of the potable water supply is likely to be by the following:

- Extending a Water Corporation offsite water main to the project area, via below-ground pipework, to automatically fill onsite balance tank/s.
- Installation of at least one balance tank and a Water Treatment Plant (WTP), which will house pumps and treatment equipment (in sheds or containers) to deliver the onsite potable water supply. While still under investigation, the intent is that Water Corporation will take ownership of the proposed WTP following its construction.
    - This WTP infrastructure, co-located with the proposed Wastewater Treatment Plant (WWTP), are adjacent to the new public road along the southern boundary.
    - The balance tank/s will accommodate the potable water supply requirements of the development, however 100 kL is to be added to this capacity specifically for bushfire fighting purposes, with minimum overall capacity of 200 kL.
    - Fire hydrant/s connected to the town main water supply, will be installed in this location to provide coverage of the WTP/WWTP.
    - Below-ground water supply pipework will be reticulated throughout the development to serve the holiday home and tourism precincts with street hydrants in the holiday home areas, with a separate connection provided to the campground.
- In addition to the potable water supply infrastructure detailed above, the following fire water systems are also proposed:
    - An additional 50 kL dedicated bushfire fighting tank is to be located at the WTP, solely for suction by bushfire fighting appliances.
    - Dedicated onsite fire hydrant and fire hose reel systems for the hotel precinct, complete with firewater storage tanks, pumpset and booster connection, likely within the Community Hub back-of-house, and achieving the following.
        - 50 kL is to be added to the firewater tanks for bushfire fighting purposes, with minimum overall capacity of 225 kL.
        - Fire hydrant and hose reel coverage is to be provided to the hotel and community hub buildings
        - External fire hose reel coverage is to be extended to the onsite refuge building
        - Additional hydrant is to be provided adjacent to the fire driveway and at the hotel arrival driveway turnaround
- Standalone fire hose reel system to provide coverage to the campground.

The proposed firewater services are depicted on Figure 4, including the location of the WTP.

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Below ground water main and street hydrant
- Fire hydrant and hose reel coverage as required by NCC and other relevant standards
- Internal fire hydrant and hose reel coverage and external fire hose reel coverage
- Standalone fire hose reel system and coverage to campground
- WTP/WWTP
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Roads (MRWA)
- 50kL standalone bushfire water tank
- Balance tank/s with additional 100kL for bushfire fighting
- Dedicated fire hydrant and fire hose reel system infrastructure (fire tanks, pumps, booster) for Hotel and Community Hub - minimum 225kL tanks
- External fire hydrant connection to water main
- External fire hydrant from Hotel/Hub hydrant system

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Job No: 59550	
Client: Smiths 2014 Pty Ltd	
Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

PROPOSED FIREWATER SERVICES PLAN

FIGURE 4

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_04_A3_FirewaterPlan.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

2.2.4.2 Power supply

Power supply is expected to be extended to the development via Western Power above-ground high voltage power cabling, to an onsite connection point consisting of a transformer and main switchboard. Power supply will be reticulated throughout the development from the connection point, via below-ground power cabling with several above-ground transformers.

The system design is to include a power network tie-in point/s to enable generators to be easily connected to the site power network, to temporarily restore power should it be disrupted.

In addition to the main power supply, the onsite refuge building is to have a dedicated generator to provide backup power supply. This generator is to be located within the back-of-house of the community building which forms part of the refuge building.

2.2.4.3 Gas supply

On-site Liquified Petroleum Gas (LPG) is likely for several parts of the development:

- A central LPG bullet located in the back-of-house of the community building, connected to the required fixtures in this building by reticulated pipework.
- Local LPG bottles at holiday homes.

2.2.4.4 Telecommunications and onsite communications systems

Given existing mobile phone coverage to the area is strong, it is expected to be a preferred method of emergency communication, however it is acknowledged coverage can be unreliable in emergencies due to volume of usage and infrastructure impact by bushfire.

The National Broadband Network (NBN) is expected to be extended to the project area, via a below-ground fixed line service, either with NBN or by securing a connection to Telstra infrastructure in Smiths Beach Road. This service which would enable ethernet and Wifi connections for internet access, and VOIP phone communications.

The following is also to be provided as part of the development:

- A public address and/or fire occupant warning system, to enable emergency warning to all parts of the community hub and hotel public area buildings while also providing external warning to the campground. The system head-end is to be in the hotel arrival/offices, to enable the onsite Emergency Response Team to communicate with all occupants in the community bushfire refuge.
- An SMS messaging alert service is to be established to enable the ERT to send text messages to all staff, home owners (and any registered guests and visitors) during a bushfire emergency.
- At least one satellite telephone to enable the Chief Fire Warden to liaise with offsite emergency services and onsite occupants.
- Sufficient two-way handheld radios/walkie talkies and mobile loudspeakers are to be provided for ERT use during a bushfire emergency.
- Promote that all home owners have battery powered radios for emergency use and internet access for VOIP and the hotel webpage.
- Establish noticeboards at the locations nominated in Section 2.4 of the BEMP, to enable posting of bushfire forecast information.

To enable rapid dissemination of forecast and emergency bushfire advice, the Proponent shall make provision on the hotel website to specifically display this information.

2.2.4.5 Sewer/Wastewater

Although still subject to ongoing review, it is anticipated that the sewer service will utilise:

- Onsite treatment and disposal within each lot of the Eastern Holiday homes and selected Western Holiday Homes
- Onsite treatment and disposal within the Campground lot
- A secondary treatment plant to serve the Hotel, Community Hub and selected Western Holiday homes with disposal of the treated effluent within open space. This will involve reticulated sewer from these buildings to a pumping station which will pump the sewer to the proposed Wastewater Treatment Plant (WWTP) that is to be co-located with the WTP.

2.2.4.6 Landscaping Reticulation System

Parts of the project area are to have landscaping watered with an onsite reticulation system. Reticulation of landscaping surrounding the refuge building, and of the "green roofs" and production garden, is necessary to ensure wetting during a bushfire emergency. Further detail on this system is in Section 6.7, with all infrastructure protected from bushfire impact.

2.2.5 Proposed vehicular access

2.2.5.1 Vehicular Access

The only new public road proposed as part of the development, is "Leeuwin Way" within the existing public road reserve located south of Lot 4131. This road will be extended to the WTP/WWTP and public parking, and will be provided with a compliant turnaround facility. Whilst this dead-end public road will comply with all construction specifications of the Guidelines, given the overall length, it will exceed the 200 m maximum length permitted for cul-de-sac roads, which is unavoidable due to the legacy single public road access from Caves Road.

All other roads proposed as part of this development are within the Lot 4131 or UCL along the northern foreshore and are not designated as public roads, although most can be used by the public. The primary access to the site will be via the new "Leeuwin Way" public road and main "Cape Arrival" entrance driveway, with access to the campground via "Smiths Lane", a driveway connected directly to Smith Beach Road.

The internal driveways providing access to the campground and holiday home precincts will comply with the private driveway specifications of the Guidelines, however given the scale of the project, the intent is to ensure 6m width throughout most of the development to permit two-way traffic flow, in particular in an emergency.

There are two internal driveways within the holiday home precincts that are for emergency purposes only and will be access controlled with lockable, removable bollards to be unlocked by hotel staff in a bushfire emergency. These are to enable occupants and firefighters to traverse the development to Smiths Beach Road, without using the central access driveway and "Leeuwin Way" road, to limit exposure to the southern bushfire hazard.

There will be an internal driveway provided solely for fire appliance to travel from the Western holiday homes, through to the foreshore reserve driveway and back to Smiths Beach Road. This driveway will also be access controlled with lockable, removable bollards to prevent everyday use, with vehicular access along the foreshore reserve driveway to be open to the public.

An access-controlled driveway "Smiths Common" will also connect the turnaround on from "Smiths Lane". the main campground driveway, with the Smiths Beach Road turning circle, to form a loop road for emergency situations. This controlled access point from the campground, will also enable hotel management to permit deliveries to the community and hotel buildings, via the back-of-house loading dock.

Vehicular access within the Foreshore Reserve is to be provided for the public, by refurbishing the existing driveway and turnaround at Smiths Point, and adding formal carparking at various locations. Access to Smiths Beach itself is to be provided by a new universal beach access ramp directly north of the development, to replace the existing ramp and will enable nominated Surf Club personnel or emergency services to use for vehicular access to the beach, if required.

The proposed vehicular access is depicted on Figure 5.

As part of the Proposal, the at total of 330 car bays are expected to be available for guest and public use (Cardno, 2021):

- 197 car bays (onsite parking at hotel, campground, shared parking and public parking on southern boundary.
- 133 car bays (offsite parking at existing Smiths Beach carpark, along Smiths Beach Road and the foreshore driveway.

2.2.5.2 Buggy and Pedestrian Access

A series of buggy boardwalks and pedestrian boardwalks and paths are to enable movement throughout the proposed development and also to Smiths Beach. Pedestrian access is also to be provided to the Cape-to-Cape track from the Western holiday home precinct, and also to the Aquarium from the ”Leeuwin Way” cul-de-sac.

2.2.6 Community title scheme and proposed precinct management control

A community scheme is a new form of land tenure in WA, although it has existed in NSW, Qld and South Australia for over 20 years, that enables the subdivision of a single parcel of freehold land into multiple schemes, called community titles schemes. These community schemes have been introduced to WA via the *Community Titles Act 2018*, and provides greater opportunity for the creation and management of developments which include a mix of both land schemes and building schemes within the same community scheme. This approach also allows for co-ordinated management control, flexible governance and sharing of infrastructure via the Community Scheme and by-laws.

The proposed community scheme for the development is to include precinct management control by the Community Corporation, via the Community Scheme which will include overall management control over the following:

- Bushfire.
    - Ongoing management and auditing of the vegetation modification and landscaping requirements in accordance with the standards detailed in this BMP. This may also extend to areas within adjacent road reserves in consultation with the City.
    - Maintenance, testing and auditing of the community bushfire refuge
    - Maintenance, testing and auditing of bushfire construction, firewater systems, communication systems, essential infrastructure and vehicular access requirements against the requirements of this BMP
    - Overseeing application of the relevant aspects of the CoB firebreak notice.
    - Implementing the BEMP, including establishment of the Emergency Response Team, and any ongoing requirements to ensure successful implementation in a bushfire scenario. The ERT is expected to be comprised primarily of hotel staff, however some holiday home owners would also be ERT members.
- Other Vegetation Controls.
    - Vegetation rehabilitation and restoration requirements; and

- Use of native species only

- Design Outcomes.
  - e.g. enforced design criteria for each holiday home
- Infrastructure.
  - e.g. management and maintenance of vehicle and pedestrian paths, service infrastructure (eg. ATUs)
- Sustainability.
  - e.g. consolidated waste management and centralised energy management (solar/battery)
- Fauna Protection.
  - pet restrictions (e.g. no cats).

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Emergency driveway (occupants and Fire Services)
- Internal fire appliance driveway
- Private driveway
- Existing public roads
- New public road
- WTP/WWTP Fence
- Indicative WTP/WWTP infrastructure
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Roads (MRWA)
- Access control
- Lockable, removable bollards

stratagen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A | Date: 06-Dec-2021

Drawn By: ianandagode | Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

PROPOSED VEHICULAR ACCESS PLAN

FIGURE 5

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_05_A3_VehicularAccessPlan.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

3. Bushfire regulatory framework and application

Given the bushfire designation of the project area, the Proposal is required to be assessed against the requirements of *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) and the *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines) as part of the planning assessment, with the National Construction Code (NCC) dictating the construction standards for buildings in bushfire prone areas. The requirements of both of SPP 3.7 and the Guidelines, with relevant guidance, are summarised below, with an outline of their application to this Proposal provided as a compliance pathway.

Additional detailed information regarding SPP 3.7, the Guidelines and other bushfire regulatory and guidance information, is provided in Appendix B.

3.1 SPP 3.7 and the Guidelines

Given the project area is designated as bushfire prone, it is necessary to address the considerations of SPP 3.7 in an orderly and methodical approach to ensure appropriate consideration of relevant bushfire hazards and to review the appropriateness of proposed bushfire mitigation measure.

The structure of SPP 3.7 and Guidelines is broadly as follows:

- SPP 3.7 Policy Intent.
  - defines the overall in aim of SPP 3.7
- SPP 3.7 Policy Objectives.
  - defines the basis for how the SPP 3.7 Policy Measures and Bushfire Protection Criteria from the Guidelines, can achieve the Policy Intent
  - applies to all proposals
- SPP 3.7 Policy Measures.
  - applies to relevant planning proposal types
  - requires the assessment of the application against the four Bushfire Protection Criteria of the Guidelines
- Bushfire Protection Criteria from the Guidelines.
  - divided into four Elements (Elements 1 to 4)
  - compliance is achieved either via directly meeting the Acceptable Solutions for each Element **or** via the Performance Principle-Based Solutions for the relevant Element.

A BMP accompanying a planning application usually shows that a proposal can comply with the relevant SPP 3.7 Policy Measures and the prescriptive Acceptable Solutions for each of the four Bushfire Protection Criteria from the Guidelines. Acceptable Solutions represent a single design approach to comply with each of the Bushfire Protection Criteria Elements, and need to be applicable to a variety of potential situations, and as such are not tailored to specific site conditions, anticipated bushfire behaviour, proposed development or occupant characteristics etc. They are a broad tool with which to manage bushfire risk, but sometimes don't lend themselves to balancing competing interests or resolving legacy scenarios. Where the Acceptable Solutions cannot be complied with, or where it is inappropriate to do so, an alternative pathway is possible through the use of 'Performance-Principal Based Solutions' (PPBS's) which can provide some flexibility required to propose alternative design approaches to comply with the Bushfire Protection Criteria.

While the use of Acceptable Solutions and PPBS's typically provide a range of options to comply with the Guidelines, there are instances where full compliance using either is not possible. Examples of this include where there is:

- single public road access to a site exceeding 200 m as can occur in more remote sites or legacy road networks, and/or.
- a requirement to locate proposed development in areas of BAL-40/FZ due to inability or lack of desire to manage the surrounding bushfire hazard to achieve BAL-29 or lower. This can occur because the hazard is outside an applicants' control, or as in the case of tourism land uses, the impact on the natural landscape would be too great to accept.

The inability of these scenarios to comply with the Bushfire Protection Criteria of the Guidelines, is due to the presumption against permitting intensification of land use where there is extended single public road access or in areas of BAL-40/FZ, which is reflected in the wording of the Intent and Performance Principles of the relevant Elements. The only mechanism available in SPP 3.7 to deviate from Guidelines on these matters, is provided in Policy Measure 6.7 to enable siting of development in areas of BAL-40/FZ, provided the proposal is considered either 'minor development' (in residential built-out areas on small lots) or 'unavoidable development' (development representing exceptional circumstances, where no alternative location exists). If a development is not assessed as either of these two development types, SPP 3.7 doesn't currently permit buildings to be in BAL-40/FZ, nor does SPP 3.7 provide the same mechanism to deviate from the vehicular access provisions of the Guidelines i.e. extended single public road access.

3.1.1 Tourism Land Use Position Statement

During the early application of SPP 3.7 and the Guidelines, it became apparent that many proposed tourism land uses had significant challenges demonstrating compliance with SPP 3.7 and the Guidelines because they were often in remote locations with only a single public road access that was non-compliant with the Guidelines (that they couldn't resolve), and/or didn't want to modify the natural landscape the development sought to showcase, to the levels required to achieve BAL-29 or lower. The wording of the Intents and Performance Principles of Elements 1, 2 or 3 didn't permit these deviations from the Acceptable Solutions to be addressed using a PPBS.

In response to these scenarios, the *Position Statement: Tourism land uses within bushfire prone areas* (the Tourism Land Use Position Statement) was developed to provide a policy position for tourism land uses in bushfire prone areas, where achieving full compliance with SPP3.7 or the Guidelines may not be possible, typically due to extended single road access or siting of development in BAL-40/FZ. Application of the Tourism Land Use Position Statement is relevant for *"tourism day uses such as art gallery, brewery, exhibition centre, hotel, reception centre restaurant/cafe, small bar, tavern and wineries",* and for the most part the uses planned as part of the Tourist Development and Community Hub. The Position Statement also notes its applicability to *"short-term accommodation provided either continuously or from time to time, with no guest accommodated for more than three months in any 12 month period"*. The Position Statement notes that "*Tourism land uses are considered vulnerable land uses under SPP 3.7 and the preparation of a BMP and EEP should also be undertaken in accordance with the Guidelines for vulnerable land use.*

The stated intent of the Tourism Land Use Position Statement is to:

> *'…maintain primacy for the protection of life but also recognises that the protection of property or infrastructure may be secondary to the social and economic development of a region. If human safety can be satisfied, the asset may be considered 'replaceable' and its bushfire construction level determined to the degree necessary."*

The policy objectives include:

- *Maintain primacy for the protection of life but also recognise preservation of property or infrastructure may be secondary to the social and economic development of a region.*
- *Provide bushfire protection relevant to the characteristics of the tourism land use*

- *Provide bushfire risk management measures that mitigate the identified risks*
- *Achieve a balance between bushfire risk management measures, environmental protection, biodiversity management and landscape amenity"*

Importantly the Tourism Land Use Position Statement acknowledges that different land uses demonstrate different characteristics and may require difference levels of protection. Reasons for this might include:

- The presence of a resident/manager on site, thereby improving the potential for informed emergency evacuation decisions;
- Construction under AS3959 may be impractical
- Whether the land uses involve overnight stays

To achieve the stated intent, especially maintaining primacy of life, the Tourism Land Use Position Statement suggests a variety of contingency measures a proposal should consider such as early evacuation, onsite refuge (building or open space) and pre-emptive closure of the facility.

The application of the Tourism Land Use Position Statement is either via direct compliance with the Policy Measures (Acceptable Solutions) in the Position Statement, or via use of a bushfire risk assessment, when compliance with the prescriptive Position Statement Policy Measures can't be achieved, to demonstrate bushfire risk can be mitigated to tolerable levels and comply with the Position Statement Policy Objectives.

3.1.2 Bunnings Group Limited v The Metro North West JDAP [2019] WASAT 121

Interpretations of policy and associated guidance material is often reviewed by the Western Australian State Administrative Tribunal (WASAT; the Tribunal) as part of specific cases. The determinations from these cases serve to clarify appropriate interpretation and application of policy, which in turn, may inform decision-making.

A recent case, *Bunnings Group Limited and Residing Member of The Metro North West Joint Development Assessment Panel [2019] WASAT 121*, required considerable deliberation regarding a proposal that deviated from the Acceptable Solutions of the Guidelines and the application of Policy Measure 6.7 of SPP 3.7, and the determinations can be used to inform the application of SPP 3.7 and the Guidelines in these circumstances.

While it is acknowledged that this Proposal differs from the specifics of the Bunnings site, Strategen-JBS&G considers the principles of the determinations from WASAT 121 applicable to the assessment of this BMP as follows:

- The Proposal needs to demonstrate compliance with the SPP 3.7 Policy Intent and Policy Objectives with a focus on the following critical elements.
    - Implementation of effective, risk-based land use planning and development. A comprehensive risk assessment would be considered fundamental to outlining the hazard, assessing the risk and proposing treatments to reduce the residual risk to tolerable levels.
    - Preservation of life is paramount in conjunction with reduction in the impact of bushfire on property and infrastructure
    - SPP 3.7 does not require that there be no increase at all in the threat of bushfire to people property or infrastructure. Avoiding intensification of land use is not considered the only approach, and would deviate from the Policy Intent and Objective 5.2.
- Any application proposing departures from SPP 3.7 and the Guidelines should.

- Not be undertaken lightly, and therefore needs to demonstrate *'good reason'* and *'exceptional circumstances'*
- Have due regard to the history of the site, and
- Consider the net benefit in terms of reducing bushfire risk

It is noted that the Tribunal emphasised and concurred with the following principle ***'I do not think it can be accepted that, simply because a proposal contemplates a solution that is not contemplated by the Guidelines the Tribunal cannot approve that proposal. To accept that proposition would amount to inflexibly applying policy.'*** [Cl 147]

- Use of either the Acceptable Solutions or the Performance Principles, or a combination, is appropriate to demonstrate how the Intent of each element of the Bushfire Protection Criteria of the Guidelines can be satisfied.
- Discretionary building construction is enforceable as a condition of development.

3.1.3 Compliance Comments

As outlined above, the existing bushfire regulatory framework requires that proposed development demonstrates compliance with the following:

- Each of the Bushfire Protection Criteria of the Guidelines including.
  - Locating development in BAL-40/FZ
  - Providing compliant vehicular access to the project area
- SPP 3.7 Policy Measure 6.7 to justify siting of development in BAL-40/FZ, provided it is considered 'minor' or 'unavoidable.
  - **Note: Policy Measure 6.7 is not being used for this development Proposal, but is being quoted to demonstrate an existing compliance pathway in SPP 3.7 permitting deviation from the Guidelines which is important for justifying residential development with a single access road. No development will be located in BAL-40/FZ as part of this development.**
- Tourism Land Use Position Statement to justify deviations from the Guidelines, provided it is a tourism land use and those deviations directly comply with the Position Statement Policy Measures or a bushfire risk assessment is used.

Based on the above, where compliance cannot be demonstrated with the Bushfire Protection Criteria of the Guidelines using an Acceptable Solution or PPBS, only 'minor' or 'unavoidable' developments or tourism land uses can propose deviations either via SPP 3.7 Policy Measure 6.7 (for siting in BAL-40/FZ) or through application of the Tourism Land Use Position Statement (for siting in BAL-40/FZ, for single vehicular access routes or tailored water supplies).

There is a presumption in the SPP 3.7 Policy Measures and the Guidelines against development with only a single access road being permitted in designated bushfire prone areas, given there is no formal compliance pathway to allow this. The guidance from the Tribunal in WASAT 121 states that alternative solutions to those nominated in the Guidelines can be considered and approved, provided it can be demonstrated there is good reason (exceptional circumstances), regard for the history of the site and net benefit in terms of reducing bushfire risk. In many ways this replicates the existing pathway open for to enable siting in BAL-40/FZ (also a deviation from the Guidelines) using 'unavoidable' development, which requires demonstration that there is good cause for the deviation, a robust bushfire risk management strategy, and an overall benefit without significant burden to the greater community.

Furthermore, the Tribunal highlighted that the Policy Intent of SPP 3.7 is to ***'implement effective, risk-based land use planning and development*** *to preserve life and reduce the impact of bushfire on property and infrastructure*'. The use of risk-based assessment is possible for tourism land uses through the Tourism Land Use Position Statement, where the use of a bushfire risk assessment can be undertaken to demonstrate appropriate residual risk reduction and compliance with the core principles of the Tourism Land Use Position Statement Policy Objectives, which essentially align with the SPP 3.7 Policy Intent and Policy Objectives. Other than this, there is currently no provision detailed in SPP 3.7 or the Guidelines for a comprehensive risk assessment to form part of a planning application for land uses other than tourism. Given the requirement to deviate from the SPP 3.7 Policy Measures and the Guidelines to propose the single road access to the holiday homes (in extended length stay capacity), it is proposed compliance is demonstrated directly to the SPP 3.7 Policy Intent using a comprehensive risk assessment, similar to the process in the Tourism Land Use Position Statement.

3.2 Proposed Deviations from the Guidelines and Compliance Pathway

The proposed development aims to comply with the prescriptive Acceptable Solutions for each of the Bushfire Protection Criteria (Elements 1 to 4) of the Guidelines where practical, however several key deviations from the Acceptable Solutions are required as follows:

- Element 2 – Siting and Design of Development
    - Performance-based landscaping treatments are being proposed which deviate from Acceptable Solution A2.1, that prioritise vegetation retention, especially mature trees, to better achieve environmental and visual amenity objectives, while managing bushfire risk to the development.
- Element 3 - Vehicular access
    - The legacy 2 km long dead-end public road to the project area, exceeds the 200 m maximum length permitted for a dead-end road to a which travel is possible to two different destinations, deviates from Acceptable Solutions A3.1 and A3.3.
    - The proposed new ”Leeuwin Way” public road exceeds the maximum length for a dead-end road and non-compliant with Acceptable Solutions 3.1 and A3.3, however this also can not be avoided due to the legacy road network.
    - Several turnarounds with proposed private driveways and a single battle-axe leg deviate from Acceptable Solutions A3.4 and A3.5.
- Element 4 - Water
    - Bushfire water supply to the holiday home area is via street hydrants connected to a town main supply, however given the location of the WTP in close proximity to the development, this is not necessarily a “standard” water authority main as anticipated by Acceptable Solution A4.1, and the overall water supply strategy is not strictly compliant with Acceptable Solutions A4.1 or A4.2, but uses a combination of both with the Tourism Land Use Position Statement.

The deviations to Elements 2 and 4 for the bespoke vegetation management treatments and the use of various water supplies to provide onsite bushfire fighting water supply, are to be addressed using PPBS’s demonstrating compliance with the Intent and Performance Principle of the relevant Element, using input from the Tourism Land Use Position Statement Policy Measures and SPP 3.7 Policy Objectives where required. Similarly, a PPBS will be used to justify the turnaround deviations, demonstrating compliance with the Element 3 Intent and Performance Principle.

While there is only single public road access to the project area, it could be argued that the proposed community bushfire refuge represents a suitable destination and that compliance is achieved with

A3.1 on this basis, however it is considered prudent to explore the compliance of the Proposal more holistically and assume this arrangement is not considered to be fully compliant with Element 3. Given the development is predominately a tourism land use, the application of the Tourism Land Use Position Statement is considered appropriate to justify the single public access road to the project area, using a bushfire risk assessment to demonstrate residual risk can be managed to appropriate levels, and that is complies with the Tourism Land Use Position Statement Policy Objectives.

It is acknowledged that the holiday houses can be used interchangeably for short-stay tourism accommodation but also for longer stays by the landowner, and that while the Tourism Land Use Position Statement provides a compliance pathway for the single access road for tourism uses, the potential for landowners to have extended length stay is not specifically applicable to this. As outlined in Section 3.1.3, deviation from the SPP 3.7 Policy Measures and the Guidelines, can be considered where there is good reason (exceptional circumstances), there has been regard for the history of the site and there is net benefit in terms of reducing bushfire risk to the community. On this basis, the following is noted about the potential extended length stay use of the holiday homes:

- The entire precinct is identified as a Tourism Node and zoned for Tourism purposes.
- The site has previously been identified and approved for tourism and residential development, and the existing single public road access can't be resolved by the Proponent.
- Whilst the proposal comprises holiday homes, and there is the potential for these homes to be used for extended length of stay, anecdotal evidence in adjoining Yallingup and Eagle Bay suggests that the majority of homes are used for short stay accommodation interchangeably with personal use as a second dwelling for holiday home purposes, rather than as a primary residence.

  Given the likely interchangeable use of the holiday homes, it is expected that many holiday home owners may display characteristics more aligned with vulnerable occupants (e.g. tourists) who require assistance to appropriately respond to a bushfire emergency. Additionally, home owners are less likely to remain to defend property from bushfire, and will be advised not to as per the BEMP, although it is noted that should they choose to defend, the community bushfire refuge provides a nearby place of safety for sheltering.
- A coordinated and holistic approach to bushfire management is proposed. The Community Corporation will implement the BMP and BEMP for the entire precinct. Visitors and holiday home owners will be required to comply with the management requirements and conditions of the BMP which will be enshrined within the Community bylaws.
- There are significant environmental and visual amenity considerations that require a holistic vegetation modification strategy to appropriately balance with bushfire risk management, rather than blanket application of the APZ standards across the site.
- This development will provide benefit to the existing local community by:
  - Establishing the community bushfire refuge that can be used by occupants in the local area including the public, and avoid use of Smiths Beach or Canal Rocks for open space refuge.
  - Shields Smiths Beach Resort and Canal Rocks Beachfront Apartments from direct bushfire impact from the south, where they are currently highly exposed.
  - The project BEMP promotes the sharing of bushfire status information with adjacent accommodations and nearby public areas, to encourage early evacuation when safe to do so, or relocation to the bushfire refuge if offsite egress is unsafe.

Based on the above, although the holiday homes can be used for extended length stays, the interchangeable use with short-term accommodation is not consistent with a "typical" standalone residential development, and is considered to represent unique and exceptional circumstances that have been a consistent part of the planning history of the site, which also offers net benefit in terms

of reducing bushfire risk to the community. On this basis, it is considered there is justification to deviate from SPP 3.7 Policy Measures and the Guidelines regarding single road access to the holiday homes, where the residual bushfire risk can be appropriately reduced.

3.3 Compliance Pathway Summary

Based on the information detailed in previous sections, Strategen-JBS&G consider the following is an appropriate compliance pathway upon which to prepare and assess the bushfire risk management for this proposal:

- Prepare the BMP in accordance with the requirements of SPP 3.7 and the Guidelines for a DA submission for a vulnerable land use in a designated bushfire prone area.
- Incorporate a bushfire risk assessment that develops and details the proposed bushfire risk management strategy for the entire development (i.e. for both tourism and holiday homes.
    - The risk assessment will comply with the requirements of the Tourism Land Use Position Statement and other relevant guidance, to outline the hazards and evaluate the risk, in order to produce a bushfire risk management strategy consisting of treatment measures and their ongoing monitoring and auditing
- Use of the resultant bushfire risk management strategy and measures to underpin the compliance assessment with the following.
    - SPP3.7 Policy Intent
    - SPP 3.7 Policy Objectives 5.1, 5.2, 5.3 and 5.4
    - SPP 3.7 Policy Measures 6.2, 6.5, 6.6 and 6.11
        - The application of other Policy Measures (e.g. 6.8 and 6.9) will be by the decision-maker or others.
    - The four Bushfire Protection Criteria of the Guidelines, where possible, using a combination of Acceptable Solutions and Performance Principle-Based Solutions
        - The Performance Principle-Based Solutions are to be assessed directly against the Intent and Performance Principle of the relevant Element/s of the Guidelines, where compliance is possible
- Where compliance can't be achieved with Element 3 in the Guidelines for the tourism land uses (i.e. single road access to development), the BMP will justify the deviation:
    - against the Policy Measures of the Tourism Land Use Position Statement, where compliance is possible, and where not, use the bushfire risk assessment to demonstrate compliance with the Tourism Land Use Position Statement Policy Objectives and that residual risk is appropriately reduced.
- Where compliance can't be achieved with Element 3 in the Guidelines for the holiday homes (i.e. single road access to holiday homes), the BMP will justify the deviation as follows:
    - Why there is *'good reason'* and *'exceptional circumstances'*
    - That due regard to the history of the site has been considered
    - The net benefit in terms of reducing bushfire risk to the community
    - Using the bushfire risk assessment to demonstrate compliance with the SPP 3.7 Policy Intent and Policy Objectives and that residual risk is appropriately reduced.

- Develop a Bushfire Emergency Management Plan (BEMP) to detail emergency management measures for all occupants in a bushfire emergency.
    - The BEMP will satisfy Policy Measure 6.6.1 of SPP 3.7, regarding vulnerable land uses in areas of BAL-29 or lower.

Compliance with the above requirements is detailed in Section 7.

Additionally, in recognition of the iconic tourism location, the existing vehicular access network and the inherent bushfire risk to the development and existing local community, the overarching objectives are to deliver the following:

- a sensitive and sustainable coastal village that reflects and reinforces the local character, environment and ancient culture, that seeks to focus on retention, rehabilitation and, where possible, revegetation, to preserve environmental values and manage visual impact.
- a multi-faceted development with tourism, community, recreational and holiday home uses to develop economic, social and cultural opportunities to benefit the local community and the south-west region of Western Australia
- a bushfire resilient community, that supported by a holistic and sustainable bushfire risk management strategy, that is comparatively self-contained in a bushfire emergency.

4. Environmental considerations

On a regional level, the Leeuwin-Naturaliste sub-region forms a part of a biodiversity 'hotspot', with the pre-European vegetation throughout the region, especially along the Leeuwin-Naturalist Ridge, largely consisting of low forest, woodland and shrubland communities such as banksia, peppermint and paperbark, however there are isolated plots of tall forest with karri and tuart species. Tracts of cropped land occurs across much of the coastal plains associated with clearing of native vegetation due to historical agriculture, although much of the native vegetation retention occurs in the Leeuwin-Naturaliste Ridge where agriculture has not been as widespread.

The project area currently contains environmental assets in the form of native remnant vegetation both within the project area, the foreshore reserve and the southern public road reserve. Section 4.1 below provides a summary of the existing native vegetation within and adjacent to the project area, in addition to a review of other environmental constraints on development. Section 4.2 provides a broad overview of vegetation modification proposed as part of the development, including revegetation, landscaping and indigenous vegetation management.

4.1 Native vegetation

An Environmental Assessment Report (EAR) prepared for the development by Strategen-JBS&G (2021) provides the most recent environmental assessment.

The project area is located within the Southern Jarrah Forest IBRA subregion (JF2) (Strategen-JBS&G 2021b), while pre-European vegetation shows the following vegetation associations in the site:

- 'Chapman 37' over the majority of the site, which is described as 'shrublands, teatree thicket' (Beard et al. 2013)
- 'Chapman 990' in very small areas in the eastern and western portions of the site, which is described as 'low forest: peppermint (Agonis flexuosa) (Beard et al. 2013)
- 'Chapman 1180' in the south-eastern and north-western portions of the site, which is described as 'shrublands, Calothamnus quadrifidus and Hakea trifurcata' (Beard et al. 2013)

Emerge (2019) undertook a detailed flora and vegetation survey in August 2018 and found a total of 13 native vegetation types within the project area. A description and the area of each plant community within the site is provided in Table 4.

Table 4: Vegetation types within the project area

Vegetation types	Description
AfPe	Low open forest *Agonis flexuosa* over fernland *Pteridium esculentum* subsp. *esculentum* over open herbland mixed non-native species such as **Lysimachia arvensis* and **Asparagus asparagoides*
AhHe	Shrubland *Allocasuarina humilis* over low sparse herbland over low sparse grassland *Austrostipa mollis* and *Rytidosperma occidentale* over low open rushland *Hypolaena exsulca*
AsDc	Shrubland *Acacia saligna* and *Dodonaea certocarpa* over low herbland *Trachymene Pilosa* over low sparse grassland *Rytidosperma occidentale*
AsHh	Shrubland *Acacia saligna* over low open shrubland *Hibbertia hypericoides* over grassland non-native species such as Vulpia bromoides
BaMrXp	Low open forest *Banksia attenuate* and occasional *Agonis flexuosa* over open shrubland *Macrozamia riedlei* and *Xanthorrhoea preissii* over open mixed herbland
CcHh	Low forest *Corymbia calophylla* over open shrubland *Xanthorrheoa preissii* and over low shrubland *Hibbertia hypericoides* over sparse low herbland *Scaevola calliptera*
DciDcL	Shrubland *Darwinia citriodora* and *Dodonaea ceratocarpa* over low sedgeland *Lepidosperma* spp. over low open grassland of native and non-native species over low open herbland *Crassula* spp.
KcSg	Closed shrubland *Kunzea ciliata* and *Spyridium globulosum* over low open shrubland *Eutaxia myrtifolia* over sparse sedgeland over low sparse herbland

Vegetation types	Description
KcDcPp	Low open shrubland *Kunzea ciliata* and *Darwinia citriodora* over low sparse herbland *Stypandra glauca* over low sparse grassland *Poa poiformis* on granite
MhGl	Low woodland to low open forest *Melaleuca huegelii, M. lanceolata* and *Guichenotia ledifolia* over tall open shrubland *Hakea oleifolia* over shrubland *Hibbertia cuneiformis* over low open herbland *Stylidium adnatum*
MlDr	Low closed forest *Melaleuca lanceolata* over sparse shrubland *Melaleuca systena* and *Spyridium globulosum* over low open herbland *Dianella revoluta* var. *revoluta* over low open sedgeland *Lepidosperma* spp. (understorey absent in areas of dense canopy cover)
MlKc	Closed shrubland *Melaleuca lanceolata* and *Kunzea ciliata* over occasional grasses and herbs
NfCcXp	Low open forest *Nuytsia floribunda* and *Corymbia calophylla* over open shrubland *Xanthorrhoea preissii* over low open mixed herbland over low open grassland native and non-native species
Non-native vegetation	Heavily disturbed areas comprising tracks and non-native vegetation with occasional native plants

The survey results also determined the following regarding vegetation condition:

- the most intact native vegetation was in the western areas of the site, containing vegetation types **KcDcPp**, **KcSg**, **MhGl**, **MlK**, and **MlDr** mapped as being in an 'excellent' condition.
- vegetation in the central portion of the site contained vegetation types **AsDc, NfCcXp** and **AhHe**, is in a 'very good' and 'very good – good' condition.
- vegetation in the eastern portions of the site including **MhGl** and **CcHh** were mapped as being in 'excellent' and 'very good' condition due to intact vegetation structure low disturbance. The majority of vegetation within this area of the site contain vegetation types **AfPe**, **DciDcL**, and **CcHh**, mapped in a 'very good- good' condition.
- Remaining areas in the site were mapped as being in 'completely degraded' condition and consist primarily of bare areas of ground with scattered native and non-native vegetation.

A review of the available environmental information and search of publicly available environmental data relating to the project area has been undertaken and is summarised in Table 5, with the relevant environmental constraints identified depicted on Figure 6.

Table 5: Summary of environmental values

Environmental value	Not mapped as occurring within or adjacent to the project area	Mapped as occurring within or adjacent to the project area		Description
		Within	Adjacent	
Environmentally Sensitive Area			✓*	No Environmentally Sensitive Area (ESA) occurs within the project area, however has been identified immediately to the north, west and south of the project area. The proposed foreshore reserve and Aquarium Road and lookout will extend into ESA's.
Swan Bioplan Regionally Significant Natural Area	✓			The project area and surrounds are not designated as a Swan Bioplan Regionally Significant Natural Area.
Ecological linkages		✓	✓	A regional ecological linkage (no. 86) runs through the eastern portion of the project area, connecting vegetation present within the Leeuwin-Naturaliste National Park to the northeast and south of the site.
Wetlands	✓			No surface wetlands have been identified within the project area or directly adjacent. The nearest mapped

Environmental value	Not mapped as occurring within or adjacent to the project area	Mapped as occurring within or adjacent to the project area		Description
		Within	Adjacent	
				site is a Palusplain wetland located approximately 1 km to the east of the project area adjacent to Gunyulup Brook
Waterways			✓	There are no creeks, rivers or other waterways that occur within the project area. Gunyulgup Brook is a small surface waterway located approximately 200-300 m to the east of the project area, which discharges in Geographe Bay to the north-east of the Smiths Beach carpark.
Threatened Ecological Communities listed under the EPBC Act	✓			No Threatened Ecological Communities were found within the project area. Two Priority Ecological Community (PEC) were recorded within the western portion of the site: • Vegetation type **KcSg** meets the State listed 'low shrublands on acidic grey-brown sands' PEC (P2). This PEC extends over approximately 9.25 ha of the project area. • Vegetation types **KcDcPp** and **MIkc** meet the State listed '*Melaleuca lanceolata* forests, Leeuwin Naturaliste Ridge' PEC (P2). This PEC extends over approximately 4.05 ha of the project area
Threatened and priority flora		✓	✓	One priority 4 (P4) species, Banksia sessilis var. cordata, was recorded within the project area. No other threatened or priority flora species were recorded within the project area, and no locally or regionally significant flora species were recorded within the project area.
Fauna habitat listed under the EPBC Act		✓	✓	Six species of conservation significance were recorded within the project area during site survey, with three of these listed under EPBC Act: • Western ringtail possum (Critically Endangered) • Carnaby's black cockatoo (Endangered) • Baudin's black cockatoo (Endangered) A whimbrel (Migratory) was recorded on a shoreline approximately 40 m north of the project area.
Threatened and priority fauna		✓	✓	Six species of conservation significance were recorded within the project area during site survey: • Western ringtail possum (Critically Endangered) • Carnaby's black cockatoo (Endangered) • Baudin's black cockatoo (Endangered) • Coastal Plains Skink (Priority 3) • Quenda (Priority 4) • Wambenger brush-tailed phascogale.
Bush Forever Site	✓			No Bush Forever Sites are identified within or adjacent to the project area.
DBCA managed lands and waters (includes legislated lands and waters			✓	No DBCA managed land and waters were identified within the project area. The nearest DBCA managed land is Leeuwin-Naturaliste National Park (Crown Reserve R8428) located to the south, south-east and north-east of the

Environmental value	Not mapped as occurring within or adjacent to the project area	Mapped as occurring within or adjacent to the project area		Description
		Within	Adjacent	
and lands of interest)				project area. To the north and west of the project area is Ngari Capes Marine Park. No DBCA lands of interest were identified within or adjacent to the project area.
Conservation covenants	✓			Strategen-JBS&G is not aware of any conservation covenants burdening the project area.
Crown Reserves			✓	Crown Reserve R8428, which forms part of Leeuwin-Naturaliste National Park (LNNP), is located to the south and south-east (Lot 301) and to the north-east (Lot 302)
Aboriginal Heritage		✓	✓	There is an Aboriginal Heritage site identified within the project area (Place ID: 15080). Additionally, there is another Aboriginal Heritage Site to the west of the project area (Place ID: 15081).

✓* - Whilst not within the project area (i.e. Lot 4131), the establishment of the foreshore reserve and/or proposed Aquarium Road may extend into this area.

Any environmental impacts resulting from implementation of the Proposal, such as clearing of native vegetation, will need to be addressed under relevant standard State and Federal environmental assessment and approval process, such as a native vegetation clearing permit under the *Environmental Protection Act 1986* and if relevant, referral under the *Environment Protection and Biodiversity Conservation Act 1999*.

4.2 Proposed vegetation retention, rehabilitation, and modification

The proposed onsite landscaping and revegetation is depicted on the post-development vegetation plan on Figure 8 and on the Landscaping Masterplan provided in Appendix C. The main elements from a vegetation modification perspective include:

- Areas of native vegetation retention and rehabilitation
  - Land to be ceded and incorporated into Leeuwin Naturaliste National Park within the western and south-western portion of the project area.
  - Foreshore Reserve to the north of the project area (with some minor clearing to accommodate proposed infrastructure although the focus is on reuse of existing cleared areas with retention and rehabilitation)
  - Three (3) Public Open Space (POS) areas within the project area
- Area of vegetation modification and landscaping
  - Land within the proposed community hub, tourist development and holiday home precincts including buildings, roads, pathways, Asset Protection Zones and onsite managed landscaping. This will also include landscaping of the existing internal firebreaks within the project area.
  - Around the Water Treatment Plant/Wastewater Treatment Plant
  - Along the “Leeuwin Way” public road

- Portions of the existing Smiths Beach Road verge

Besides the above, this Proposal is also seeking to eventually incorporate indigenous vegetation management approaches into the ongoing management of the onsite vegetation, with a view to achieving fuel load reduction in various areas, but undertaken with as little environmental impact as possible. This is explored further in Section 4.3 and Appendix D.

The proposed vegetation retention, rehabilitation, and modification associated with the development is outlined in the sections below, with further detail in Section 6.2.

4.2.1 Native vegetation – rehabilitation and retention

There are two main areas associated with the development where vegetation is proposed to be retained, and where required revegetated, to maintain and enhance environmental values.

4.2.1.1 National Park

The first of these areas is the land in the western and south-western portion of the project area that has been identified as a Priority Ecological Community (PEC), associated with low shrublands (**KcSg**) and *Melaleuca lanceolata* forests (**KcDcPp** and **MIkc**). Given the environmental importance of this PEC, the proposed development seeks to avoid extending into this where possible, with the majority of the PEC to be ceded to Leeuwin Naturaliste National Park to ensure its ongoing protection.

Following ceding of this land to the National Park, it is expected ongoing management will be conducted by DBCA.

4.2.1.2 Foreshore Reserve

A Foreshore Reserve has been nominated along the northern interface of the proposed development with Smiths Beach. Vegetation within the Foreshore Reserve will be retained where practical, with existing cleared areas generally revegetated. There will be non-vegetated elements within the reserve largely associated with the existing road but also minor clearing associated with the proposed pedestrian boardwalks and the replacement of the boat ramp. Additionally, some managed landscaping associated with APZ and APZ-Modified areas will be required adjacent to the community bushfire refuge and northern buildings, to reduce bushfire risk.

A Foreshore Management Plan (FMP; Strategen-JBSG, 2021c) has been prepared to support planning and environmental assessment processes. The FMP define how the development will interface with existing the Smiths Beach foreshore, including identifying opportunities to improve environmental, pedestrian movement and vehicular movement outcomes.

4.2.1.3 Public Open Space

Three POS areas have been proposed within the development, in locations that represent opportunities to keep native vegetation on the fringes of the main development. The retained vegetation will be primarily scrub and shrubland vegetation with smaller pockets of forest in the two southern POS areas.

All three POS's will interface with nominated APZs to protect adjacent habitable development, in particular the central southern POS which contains the WTP/WWTP. Other than the implementation of the APZs, the only modification is required in these POS area will be revegetation of previously cleared land, which is to be consistent with existing adjacent shrubland, scrub and forest vegetation.

The three POS areas are considered potential locations for future indigenous vegetation management practices, to reduce fuel loads as much as possible without significant environmental impact.

Legend

- Project area (Lot 4131)

Wetlands (Leeuwin layer)
- Paluslope
- Palusplain

Legislated lands and waters (DBCA)
- National Park
- Other Reserves
- Strategen PEC boundary
- Forest red tailed Back Cockatoo quality habitat
- Western Ringtail Possum primary breeding and foraging habitat

Aboriginal heritage places (DAA-001)
- Registered site
- Other heritage place
- Gunyulgup Brook
- Roads (MRWA)

strategen JBS&G

0 580 metres

Lot 4131 Smiths Beach Road Yallingup WA 6282

ENVIRONMENTAL CONSTRAINTS

Job No: 59550		Scale 1:20,000 at A3	
Client: Smiths 2014 Pty Ltd		Coord. Sys. GDA 1994 MGA Zone 50	
Drawn By: jcrute	Checked By: CT	Version: A	Date: 12-Nov-2021

FIGURE: 6

Document Path: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_06_A3_EnviroConstraints.mxd
Image Reference: SLIP Public Services Locate 2019-2021.

4.2.2 Vegetation modification and landscaping

The proposed landscaping treatments for the development are summarised below, and have a clear focus on balancing vegetation modification for bushfire risk management purposes, whilst optimising vegetation retention for environmental and visual amenity objectives:

- Asset Protection Zones (compliant with the APZ standards)
  - Surrounding the community bushfire refuge perimeter
  - The perimeter APZ around the habitable building extent
  - The APZ around the WTP/WWTP
- A modified Asset Protection Zone (APZ-Modified), within the perimeter APZ, throughout the holiday home and hotel precincts.
  - The APZ-Modified treatment will implemented around the hotel suites and eco-suites, including along the northern foreshore interface in lieu of a compliant APZ, to enable some retention of the existing shrub vegetation.
- Low threat vegetation throughout the remainder of the development
  - Parkland managed landscaping treatment in the campground, prioritising retention of trees and overstorey, to provide an immersive natural experience for campers and retain fauna habitat.
  - Parkland managed landscaping treatment along the proposed park spine lining the "Cape Arrival" main entrance road to the site, prioritising retention of trees and overstorey where it exists.
  - Low threat landscaping within the development, outside the treatments nominated above and along the "Leeuwin Way" public road reserve (outside the APZs).

Further detail of the vegetation modification and landscaping treatments is in Section 6.2 of the BMP. Ongoing maintenance and auditing will be the responsibility of Community Corporation.

4.3 Indigenous vegetation management -proposed future treatment

There is clear evidence that the Australian indigenous people have historically managed the land to actively open up country, to ensure the natural resources so critical to their survival remain balanced. The potential future use of traditional Nyoongar vegetation management practices to maintain balance within the environment, are being considered for several areas within, and adjacent to, the project area.

Following meetings with Nyoongar elders to discuss various potential traditional techniques that could be implemented, it was agreed that use of a targeted thinning of understorey vegetation would likely produce the significant fuel reduction benefits, whilst limiting impact on environmental values or fauna habitat and managing bushfire risk. The vegetation thinning is conducted using mechanical means, and collected and burned in small piles in accordance with Nyoongar traditional methods, using a mixture of ground Balga flower stem and banksia flowers. Burning typically occurs in Djeran (late Autumn or early winter), and potentially throughout Makuru and early Djilba (late winter and early Spring), provided conditions are benign.

It was clear from the meetings there could be substantial benefits with this approach, however further study is required to assess the amount and effectiveness of the fuel load reduction, the level of impact on the environment and the safety measures associated or required with the traditional practices. A preliminary trial program is being proposed, to implement these traditional techniques in small plots within the project area to research their effectiveness and safety. This also presents an opportunity to review the level of alignment between Nyoongar practices and modern-day fire

management outcomes, in order to fully assess their potential application to this project, but also hopefully how they might be integrated to the wider community, where balancing bushfire risk management and environmental values is a key concern.

Subject to outcomes of the trial program, several areas have been identified where the application of Nyoongar traditional practices may be suitable to reduce fuel loads without significant environmental impact, including the following:

- Onsite POS areas
- Southern interface of the development including within the National Park
- Smiths Beach Road and “Leeuwin Way” road reserves (outside nominated APZs)
- Foreshore Reserve

While the Nyoongar traditional practices require further investigation, there may be many benefits including the following:

- Vegetation management can be via mechanical collection with any burning conducted in small piles under moist and benign conditions, limiting chance of fire escape.
- Potential to significantly reduce fuel loads but with targeted retention of native species and habitat, to have limit adverse environmental impact.
- Opportunity for the Nyoongar people to begin exploring their role as joint land managers of the Leeuwin Naturaliste National Park with DBCA, under the Indigenous Land Use Agreement (ILUA))

Whilst the above doesn’t form part of the management measures within this BMP at this stage, it represents an exciting opportunity for the project. The proposed indigenous vegetation management approach, the preliminary trial program and the potential application is explored in greater detail in Appendix D.

5. Bushfire assessment results

5.1 Scope and methods of assessment

This BMP includes a detailed assessment of the bushfire hazard to the project area, in order to assess the localised bushfire risk to future development within, and next to, the project area.

A broader scale regional hazard assessment has also been carried out over the surrounding 30 km in Appendix J, in order to assess the wider bushfire risk to inform the bushfire risk assessment.

5.1.1 Bushfire Attack Level contour assessment

A Bushfire Attack Level (BAL) contour assessment produces an expression of radiant heat flux at a specific distance from unmanaged vegetation, which is affected by the relative effective slope and the steepness of that slope, where downslope relative to the position of the receiver. BAL contour assessments are required at the subdivision or development application stage of planning, to determine the level of bushfire risk associated with a particular site, or location within the site through the designation of BAL ratings.

A BAL contour assessment has been carried out to the habitable buildings within the project area, to demonstrate that the level of bushfire attack to the future development is acceptable and to assist in the development of site-specific bushfire management strategies, such as appropriate location of habitable development and refuge areas and building construction standards.

Method 2 BAL analysis has been utilised to model the potential bushfire impacts on the proposed refuges to meet the requirements of the *ABCB Design and Construction of Community Bushfire Refuges Handbook* (ABCB, 2014). It has also been used to model the bushfire impacts from plots with effective slope greater than 20°, and also the narrow vegetation plots along the northern foreshore reserve, where flame width is expected to be narrow.

5.2 Assessment inputs

5.2.1 Fire Danger Index (FDI)

A Fire Danger Index of 80 (FDI-80) will be adopted for the BAL contour analysis on the basis that is the state adopted FDI for the Western Australia.

An Extreme Value Analysis (EVA) (Douglas, G. et al, 2014) was performed on calculated historical FFDI data from Cape Naturaliste weather station in Appendix K. The analysis shows that use of FDI 80 is conservative given the calculated peak FDI in the past 18 years is 39.5, with a 1 in 200-year recurrence producing a calculated FDI of 49.1. It is considered highly unlikely that the local FDI would exceed state-adopted FDI-80 as a worst-case scenario, even with future climate change impacts.

5.2.2 Vegetation classification

Strategen-JBS&G assessed classified vegetation and exclusions within the 150 m assessment area through on-ground verification was initially conducted on 16 September 2020 in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* ([AS 3959]; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016). During the design phase, the site has been revisited and rephotographed on 21 December 2020 and 3 May 2021, where the vegetation classifications remain as per original inspection.

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix E. A light detection and ranging (LIDAR) survey was conducted to determine the height of the vegetation throughout the project area, and this survey data (see Appendix F) has been used to guide the vegetation classifications. The vegetation types determined by Emerge (2019), have also been used to guide the vegetation classification, although some vegetation types can be found in more than one classification due to vegetation height.

Pre-development vegetation classifications within 150 m of the project area are summarised on Table 6 and displayed in Figure 7. The following summarises the vegetation classifications:

- Class A Forest
  - Occurs in the following onsite vegetation types: **AfPe, BaMrXp** and **MhGl**
  - Multi-tiered vegetation profile with peppermint, stunted jarrah & marri trees exceeding 6 m height, likely associated with deeper soils of a local depression.
  - A localised plot of forest within the eastern part of the project area, and extending slightly south into Leeuwin Naturaliste National Park. A small plot is also located to the north-east of the project area in a nearby private land holding.
  - Strategen-JBS&G note that while the vegetation that has been classified as forest in this assessment exceeds 6 m in height, the height appears to be 6 - 8 m and the fuel loads would be less than the 35 t/ha assigned to forest by the AS 3959 BAL modelling inputs. On this basis, the use of the forest classification is considered conservative, with the bushfire behaviour more likely to align with scrub vegetation.
- Class D Scrub
  - Occurs in the following onsite vegetation types: **BaMrXp, CcHh, MhGl, MlDr, KcSg, AhHe, AsHh, DclDcl, NfCcXp** and **non-native vegetation**.
  - Vegetation between 2-6m high at maturity
  - Mostly associated with the Banksia dominated communities
  - Primarily within the central portion of the project area but also extending south and east throughout vegetation within Leeuwin Naturaliste National Park.
- Class C shrubland
  - Occurs in the following onsite vegetation types: **AhHe, AsDc, AsHh, DclDcl, KcSg, KcDcPp, MlKc** and **non-native vegetation.**
  - Occurs to the north of the project area as coastal dune vegetation between the proposed development and Smiths Beach. Vegetation in this area is typically 0.5 to 1 m high, salt tolerant, coastal species which typically display low flammability characteristics and would be unlikely to support steady state bushfire behaviour. It is considered that it would be very difficult to ignite a fire in this coastal dune vegetation, which is also not reflective of the 15 t/ha fuel load assigned to shrubland vegetation by the AS 3959 BAL modelling inputs. Based on the above, it is considered that it is conservative to model the BAL impact from this vegetation as a shrubland classification.
  - Occurs along the north-western and western part of the project area and extending to the coast, typically with similar vegetation types to the coastal dunes, however the general height does increase to 1 to 2 m, with isolated trees exceeding 2 m.
- Class G grassland
  - Primarily located to the east of Smiths Beach Road, where historical clearing and grazing has resulted in significant tracts of grassland which extend to Caves Road and beyond.

Currently small portions of the project area and adjacent 150 m assessment area can be excluded from classification, including:

- existing non-vegetated areas devoid of vegetation including buildings, roads, footpaths and firebreaks, water bodies, beach excluded under Clause 2.2.3.2 (e)
- existing low threat vegetation including managed gardens/road verges, irrigated turf, street trees with managed understorey and non-flammable coastal succulent species excluded under Clause 2.2.3.2 (f).
- There are currently three internal firebreaks within the project area (see Photo 7n in Appendix E for an example) that have been cleared. These have been excluded under Clause 2.2.3.2 (f), however these are to be revegetated or relandscaped, depending on location, and this is reflected in the post-development vegetation classifications.

The vegetation modifications to the above, resulting in the post-development vegetation classification and exclusions are outlined below and summarised in Table 7:

- proposed on-site clearing to construct buildings, roads, pedestrian paths and boardwalks
- proposed on-site vegetation modification to implement proposed APZs (perimeter, refuge and WTP), APZ-Modified and low threat vegetation within the main development
- proposed clearing to construct the ”Leeuwin Way” road and managed road reserve
- proposed vegetation modification of Smiths Beach Road reserve
- proposed revegetation within the Foreshore Reserve, National Park and POS areas
- ongoing management of APZs, APZ-Modified and low threat vegetation within the project area

5.2.3 Effective slope

The project area has two major landform components:

- In the eastern part of the project area, land rises gently away from the Smiths Beach to the southern part of the site.
- in the western part of the project area, a ridgeline runs in a north-west direction, and descends to the coast steeply on to the west and more gently to the east.

Within the project area the maximum elevation occurs on the southern boundary at 58 m AHD and descends to the sea-level at the coast to the west and north of the development. Land to the south continues to ascend in elevation to a local high point at 144 m AHD to the south of Canal Rocks Road. To the east of the project area, land descends gently to Gunyulgup Brook, which itself descends to the coast and discharges at Smiths Beach.

Effective slope is the slope beneath unmanaged vegetation (classified vegetation), used to define expected bushfire behaviour and required APZ separation distances. Strategen-JBS&G assessed effective slope under classified vegetation within the 150 m assessment area through on-ground verification on 16 September 2020 in accordance with AS 3959. Results were cross-referenced with surveyed contour data provided for the site, and are depicted in Table 6 and Figure 7.

Given the coastal location of the proposed development, site observations were that land is sloping from local high points in the south, descending to the north before flattening near the foreshore and finally descending again to the ocean. The slope of land within and adjacent to the project area, is typically between 0° to 8°. Coastal dune vegetation to the north of the project area, exhibits greater slope of up to 15°, with land to the south-west exhibiting slopes of up to 25°.

Based on the above, the effective slopes (beneath unmanaged vegetation) range from flat/upslope to downslope 0-5° and downslope 5-10°, with discrete plots having downslope 15° (Plot 3) and downslope 25° (Plots 11 and 14) adjacent to the coast.

5.2.4 Summary of inputs

5.2.4.1 Pre-development inputs

A summary of the assessed pre-development classified vegetation, exclusions and effective slope that currently exist within the project area and adjacent 150 m are listed in Table 6. This information has been used to prepare a pre-development vegetation classification and effective slope map (Figure 7).

Table 6: Summary of pre-development vegetation classifications/exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class C Shrubland	Downslope 8°	Coastal dune vegetation north of the project area
2	Class C Shrubland	Downslope >0–5°	Coastal dune vegetation to north-west and west of project area
3	Class C Shrubland	Downslope 15°	Coastal dune vegetation to north-east of project area
4	Class C Shrubland	Flat/upslope (0°)	Coastal dune vegetation to north-east of project area
5	Class D Scrub	Flat/upslope (0°)	Scrub vegetation to north-east of project area in existing small drainage swale
6	Class D Scrub	Flat/upslope (0°)	Scrub vegetation in the central and eastern parts of the project area and to the south within Leeuwin-Naturaliste National Park
7	Class A Forest	Flat/upslope (0°)	Forest vegetation in the eastern part of the project area and to the south within Leeuwin-Naturaliste National Park
8	Class C Shrubland	Flat/upslope (0°)	Shrubland vegetation in several small plots within the project area
9	Class C Shrubland	Downslope >0–5°	Shrubland vegetation in a small plot within the south-western part of the project area
10	Class C Shrubland	Downslope >5–10°	Shrubland vegetation in several small plots within the south-western part of the project area and extending slightly outside the project area
11	Class C Shrubland	Downslope 25°	Shrubland vegetation in a small plot along the steep coast, outside the south-western project area boundary and extending slightly into the project area
12	Class D Scrub	Downslope >0–5°	Scrub vegetation in several small plots within the south-western part of the project area
13	Class D Scrub	Downslope >5–10°	Scrub vegetation in several small plots within the south-western part of the project area and extending outside the project area
14	Class D Scrub	Downslope 25°	Scrub vegetation in a small plot along the steep coast, outside the south-western project area boundary and extending slightly into the project area
15	Class D Scrub	Downslope >0–5°	Scrub vegetation in several small plots to the east of the project area in nearby land holdings to the east of Smiths Beach Road
16	Class D Scrub	Downslope >5–10°	Scrub vegetation in several small plots to the east of the project area in nearby land holdings to the east of Smiths Beach Road
17	Class G Grassland	Flat/upslope (0°)	Grassland vegetation in nearby land holdings to the east of Smiths Beach Road

Vegetation plot	Vegetation classification	Effective slope	Comments
18	Class G Grassland	Downslope >0–5°	Grassland vegetation in nearby land holdings to the east of Smiths Beach Road
19	Class G Grassland	Downslope >5–10°	Grassland vegetation in nearby land holdings to the east of Smiths Beach Road
20	Class A Forest	Downslope >0–5°	Forest vegetation in nearby land holdings to the north-east of Smiths Beach Road
21	Class A Forest	Downslope >5–10°	Forest vegetation in nearby land holdings to the north-east of Smiths Beach Road
22	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing non-vegetated areas (i.e. footpaths, buildings, private driveways, carparks, beach, firebreaks, water body) and low threat vegetation (i.e. street trees with managed understorey, managed lawn).

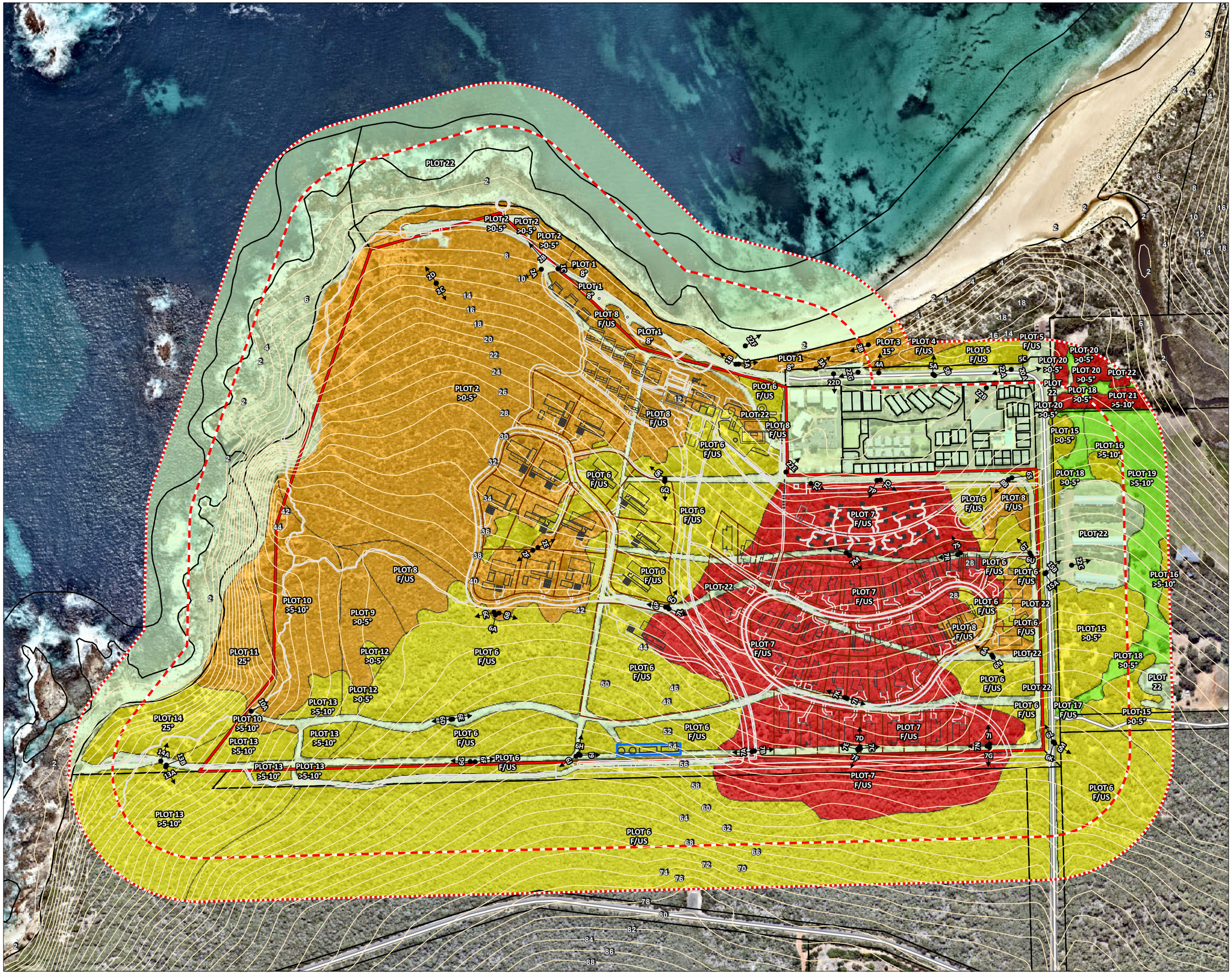
5.2.4.2 Post-development inputs

A summary of the expected post-development classified vegetation/exclusions and effective slope within the project area and adjacent 150 m are listed in Table 7. These vegetation classifications are based on proposed vegetation modifications outlined in Sections 4.2, 5.2.2 and 6.2, and the Landscaping Report.

This information has been used to prepare a post-development vegetation classification and effective slope maps (Figure 8), with mapbooks in Appendix G providing greater detail of the completed vegetation and BAL outcomes.

Table 7: Summary of post-development vegetation classifications/exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class C Shrubland	Downslope 8°	As per Table 6 Areas of proposed revegetation have been specifically identified and add to adjacent plots
2	Class C Shrubland	Downslope >0–5°	
3	Class C Shrubland	Downslope 15°	
4	Class C Shrubland	Flat/upslope (0°)	
5	Class D Scrub	Flat/upslope (0°)	
6	Class D Scrub	Flat/upslope (0°)	
7	Class A Forest	Flat/upslope (0°)	
8	Class C Shrubland	Flat/upslope (0°)	
9	Class C Shrubland	Downslope >0–5°	
10	Class C Shrubland	Downslope >5–10°	
11	Class C Shrubland	Downslope 25°	
12	Class D Scrub	Downslope >0–5°	
13	Class D Scrub	Downslope >5–10°	
14	Class D Scrub	Downslope 25°	
15	Class D Scrub	Downslope >0–5°	
16	Class D Scrub	Downslope >5–10°	
17	Class G Grassland	Flat/upslope (0°)	
18	Class G Grassland	Downslope >0–5°	
19	Class G Grassland	Downslope >5–10°	
20	Class A Forest	Downslope >0–5°	
21	Class A Forest	Downslope >5–10°	
22	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	
23	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Area to be modified to a non-vegetated or low threat state through removal of existing unmanaged vegetation and implementation of APZs, APZ-Modified and other proposed low threat vegetation as part of the development.



Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary

Vegetation classification

- Class A Forest
- Class C Shrubland
- Class D Scrub
- Class G Grassland
- Clause 2.2.3.2 (e) & (f)

- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Photo point directions
- Topographic contours (mAHD)
- Roads (MRWA)

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Job No: 59550	
Client: Smiths 2014 Pty Ltd	
Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

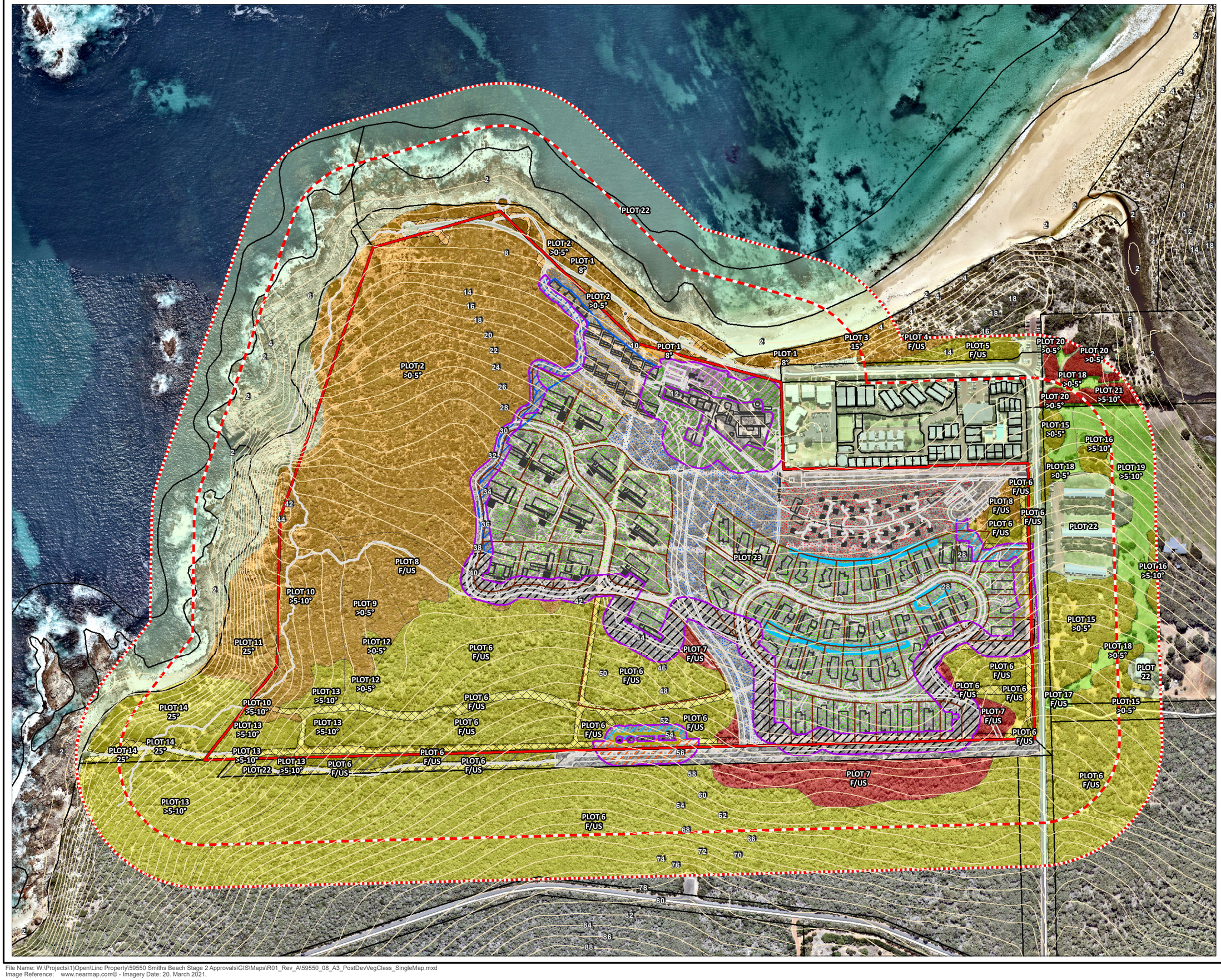
Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

PRE-DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

FIGURE 7

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_07_A3_PreDevVegClassSlope.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.



Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Road reserve

APZs (width in m)

- 10
- 13
- 15
- 25
- 25.8
- 27
- 31.9
- Overall APZ extent
- APZ (Modified) - Hotel/Suites
- APZ (Modified) - Holiday Homes
- Additional APZ
- Low Threat Vegetation – Park Spine
- Low Threat Vegetation – Campground
- Revegetation
- Areas of increased tree retention

Vegetation classification

- Class A Forest
- Class C Shrubland
- Class D Scrub
- Class G Grassland
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Tourism and holiday home building extent
- Topographic contours (mAHD)
- Roads (MRWA)

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 30-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

POST DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

FIGURE 8

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_08_A3_PostDevVegClass_SingleMap.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

5.3 Assessment outputs

5.3.1 Bushfire Attack Level (BAL) contour assessment

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed future development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts.

The BAL contours are based on the post-development vegetation class and effective slope observed at the time of inspection and consideration of the proposed vegetation modifications outlined in Sections 4.2, 5.2.2 and 6.2.

Strategen-JBS&G has undertaken a BAL contour assessment in accordance with Method 1 and 2 of AS 3959 for the project area, which is depicted in Figure 9, with mapbooks providing greater detail in Appendix G.

5.3.1.1 Method 1 analysis

The Method 1 procedure (as outlined in AS 3959) was used to calculate the BALs for all plots except for Plots 1, 3, 11 and 14. The Method 1 modelling incorporates the following factors:

- state-adopted FDI 80 rating
- vegetation class
- effective slope
- distance maintained between proposed development areas and the classified vegetation.

5.3.1.2 Method 2 analysis

The Method 2 procedure was used to model Plots 1 and 3 to represent the specific effective slope and narrow flame width, and also Plots 11 and 14 to reflect the effective slope greater than 20°. The Method 2 calculations using FLAMESOL for all four plots are included in Appendix H.

Plot 1 (Class C shrubland, downslope 8°, flame width of 45 m)

- models the BAL impact associated with site specific effective slope and narrow flame width
- vegetation classification of Class C shrubland
- the width of the plot varies from 22 m to 42 m wide (see Plate 6). Given the narrow width, it has been assumed the worst-case scenario is steady state bushfire spread travelling laterally along the coastline. On this basis, a flame width of 45 m has been used for the calculation.
- An effective slope of downslope 8° has been used for the calculation, which is the effective slope from the coastline directly to the development. Given the bushfire is assumed to spread laterally along the coastline, it would be more accurate to use a shallower effective slope, however the most onerous slope has been used.
- all other inputs are default.

Plot 3 (Class C shrubland, downslope 15°, flame width of 25 m)

- models the BAL impact associated with site specific effective slope and narrow flame width
- vegetation classification of Class C shrubland

- the width of Plot 3 lens out as it approached the northern interface but has a maximum width of 22 m at this location (see Plate 6). Similar to Plot 1, it has been assumed the worst-case scenario is steady state bushfire spread travelling laterally along the coastline. On this basis, a flame width of 25 m has been used for the calculation.
- An effective slope of downslope 15° has been used for the calculation, which is the effective slope from the coastline directly to the development.
- all other inputs are default.

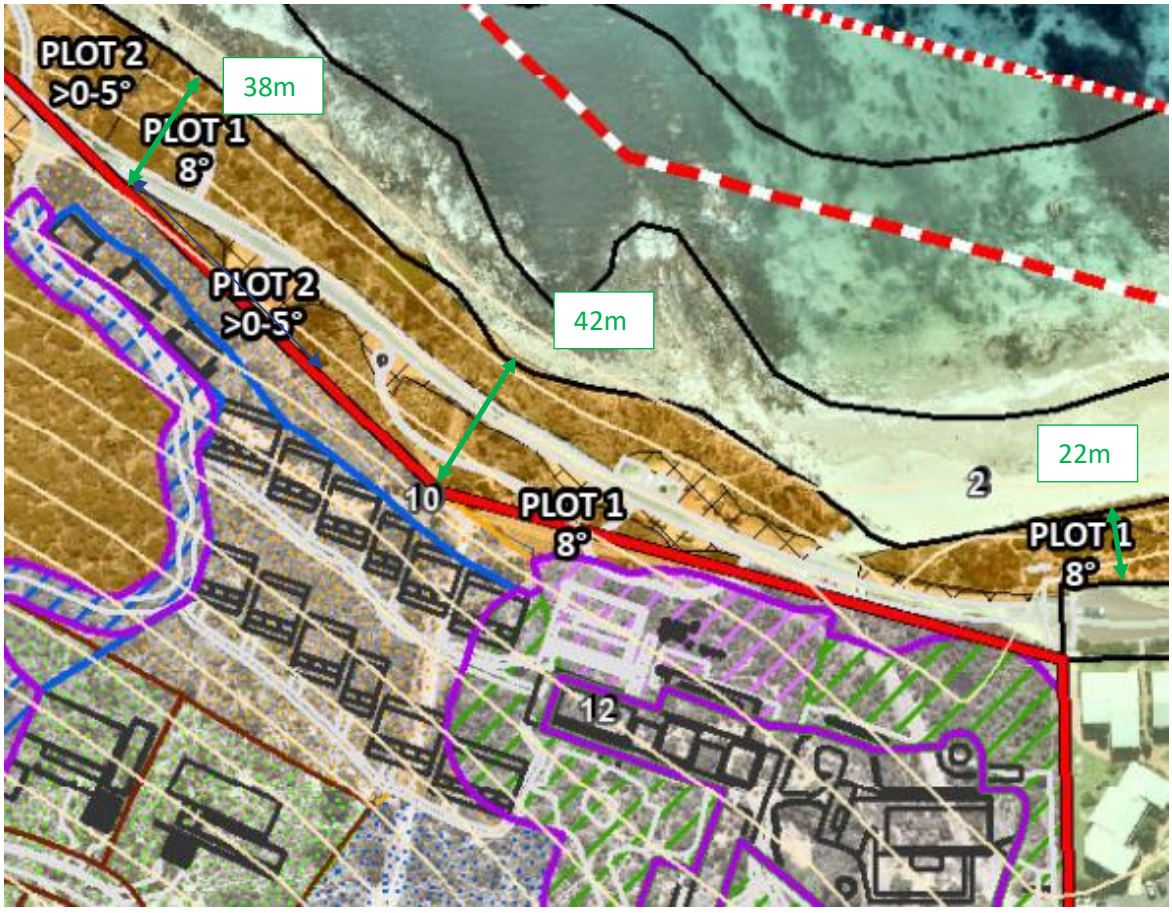


Plate 6: Plots widths for Plots 1 and 3

Plot 11 (Class C shrubland, downslope 25°)

- models the BAL impact from the steep slopes on Plot 11 greater than 20°.
- vegetation classification of Class C shrubland
- effective slope of downslope 25°
- all other inputs are default.

Plot 14 (Class D scrub, downslope 25°)

- models the BAL impact from the steep slopes on Plot 14 greater than 20°.
- vegetation classification of Class D scrub
- effective slope of downslope 25°
- all other inputs are default.

Community Bushfire Refuge

Method 2 analysis has also been utilised to model the post-development bushfire impact on the proposed community bushfire refuge.

The Tourism Land Use Position Statement provides guidance for the construction of community bushfire refuges and defaults to the construction requirements of the ABCB *Design and Construction of Community Bushfire Refuges Handbook* (2014). This document sets out that flame temperature used to calculate bushfire intensity for community bushfire refuges is to be modelled at 1200 K as opposed to the standard 1090 K. In addition, the Tourism Land Use Position Statement requires that community bushfire refuges are in areas subject to a maximum of 10 kW/m^2.

The vegetation classifications and effective slope relevant to the proposed refuge building are consistent with the post-development classifications summarised in Table 7 and depicted in Figure 8. The Method 2 calculations for the refuge are as follows:

North-east, southern and south-western interfaces

- vegetation classification of Class C shrubland
- the width of Plot 1 constricts as it approaches the northern interface, where it has a maximum width of 22 m at this location (see Plate 6). On this basis, a flame width of 25 m has been used for the calculation.
- An effective slope of downslope 8° has been used for the calculation, which is the effective slope from the coastline directly to the development. This is conservative given bushfire spread will be laterally along the beach, and effective slope will probably be shallower.
- Flame temperature is 1200 K
- all other inputs are default.
- Given the land within the project area to the south and west is to be low threat vegetation, this APZ is to be used for these interfaces as well.
- ***Calculated APZ width to achieve 10 kW/m^2 is 25.8 m***

North-western interface

- vegetation classification of Class C shrubland
- the width of Plot 1 varies from 38 m to 42 m wide in this direction (see Plate 6). On this basis, a flame width of 45 m has been used for the calculation.
- An effective slope of downslope 8° has been used for the calculation, which is the effective slope from the coastline directly to the development. This is conservative given bushfire spread will be laterally along the beach, and effective slope will probably be shallower.
- Flame temperature is 1200 K
- all other inputs are default.
- ***Calculated APZ width to achieve 10 kW/m^2 is 31.9 m***

Full details of the Method 2 calculation outputs using FLAMESOL are provided in Appendix I.

5.3.1.3 BAL contour assessment

The results of the BAL contour assessment following completion of the development is detailed in Table 8 and illustrated in Figure 9. Table 9 lists the BAL applicable to each building or element within

the proposed development. The highest BAL applicable to the proposed buildings any time during development is BAL-29 or less.

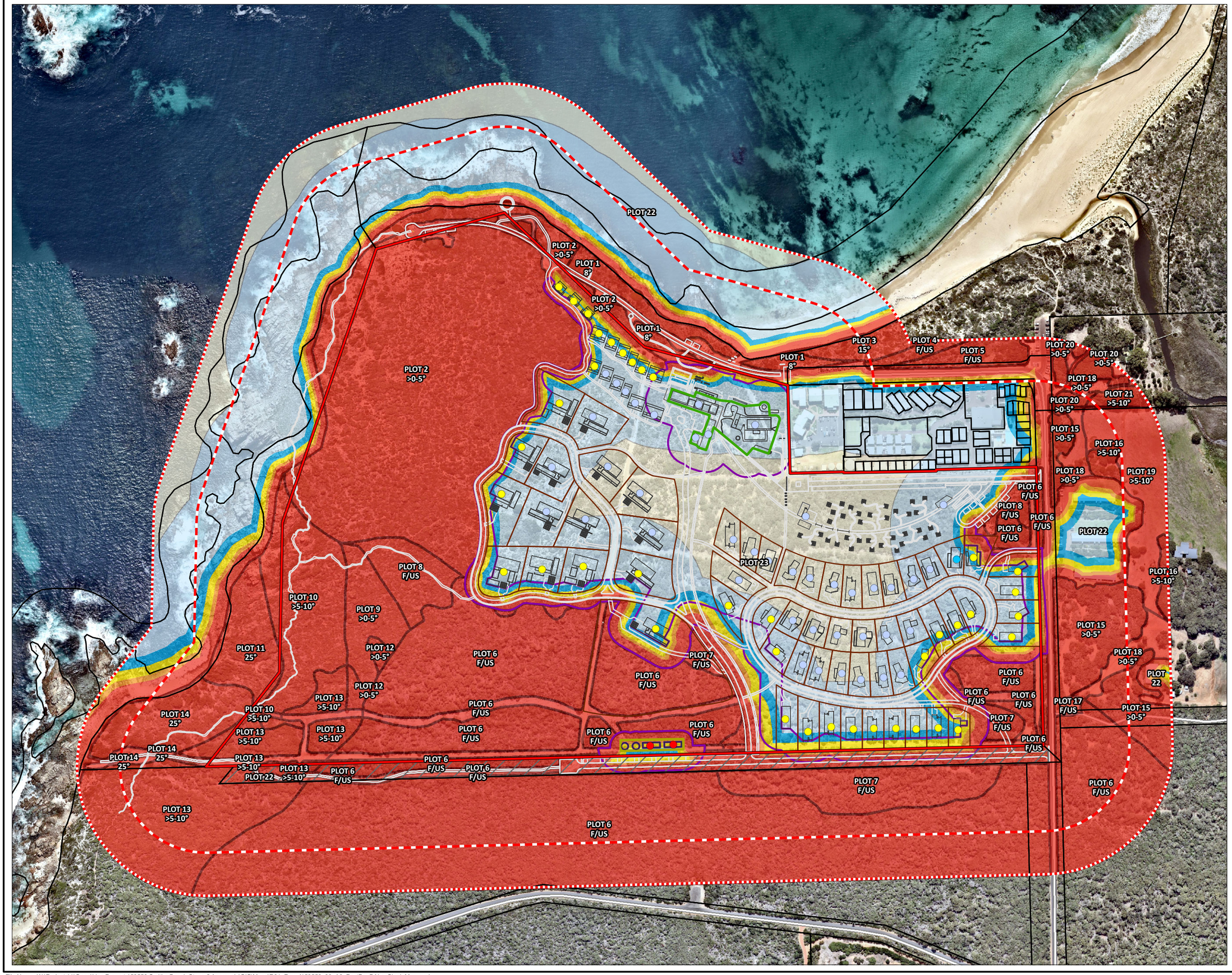
Table 8: BAL contour assessment results

	Method 1 and 2 BAL determination				
Plot	**Vegetation classification / exclusion**	**Effective slope**	**AS 3959 Method**	**Separation distance**	**Highest BAL**
1	Class C Shrubland	Downslope 8°	Method 2	11 m	BAL–29
2	Class C Shrubland	Downslope >0–5°	Method 1	10 m	BAL–29
3	Class C Shrubland	Downslope 15°	Method 2	65m	BAL–12.5
4	Class C Shrubland	Flat/upslope (0°)	Method 1	>100 m	BAL–Low
5	Class D Scrub	Flat/upslope (0°)	Method 1	>100 m	BAL–Low
6	Class D Scrub	Flat/upslope (0°)	Method 1	13 m	BAL–29
7	Class A Forest	Flat/upslope (0°)	Method 1	25 m	BAL–29
8	Class C Shrubland	Flat/upslope (0°)	Method 1	13 m	BAL–29
9	Class C Shrubland	Downslope >0–5°	Method 1	>100 m	BAL–Low
10	Class C Shrubland	Downslope >5–10°	Method 1	>100 m	BAL–Low
11	Class C Shrubland	Downslope 25°	Method 2	>100 m	BAL–Low
12	Class D Scrub	Downslope >0–5°	Method 1	>100 m	BAL–Low
13	Class D Scrub	Downslope >5–10°	Method 1	>100 m	BAL–Low
14	Class D Scrub	Downslope 25°	Method 2	>100 m	BAL–Low
15	Class D Scrub	Downslope >0–5°	Method 1	25 m	BAL–19
16	Class D Scrub	Downslope >5–10°	Method 1	>100 m	BAL–Low
17	Class G Grassland	Flat/upslope (0°)	Method 1	>50 m	BAL–Low
18	Class G Grassland	Downslope >0–5°	Method 1	>50 m	BAL–Low
19	Class G Grassland	Downslope >5–10°	Method 1	>50 m	BAL–Low
20	Class A Forest	Downslope >0–5°	Method 1	>100 m	BAL–Low
21	Class A Forest	Downslope >5–10°	Method 1	>100 m	BAL–Low
22	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A
23	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A

Table 9: BAL applicable to each building/structure/asset

Building / element	Initial BAL	APZ	Revised BAL
Community Bushfire Refuge - Community Hub Building and Hotel Building (also includes Cape-to-Cape Welcome Centre although not part of the refuge)	BAL–FZ	25.8m to 31.9m wide APZ around refuge (to achieve 10 kW/m^2) with non-vegetated elements and managed APZ, APZ-Modified and low threat vegetation throughout the development	BAL-12.5 (radiant heat flux actually 10 kW/m^2 @ 1200 k)
Hotel Villas and Suites	BAL–FZ	10m to 11m wide APZ with non-vegetated elements and managed APZ, APZ-Modified and low threat vegetation throughout the development	BAL-29 to BAL-12.5
Campground - Communal Facilities	BAL–FZ	Non-vegetated elements and managed APZ, APZ-Modified and low threat vegetation throughout the development	BAL–Low
Campground - Amenities	BAL–FZ	Non-vegetated elements and managed APZ, APZ-Modified and low threat vegetation throughout the development	BAL–12.5
Campground – Tent Platforms	BAL–FZ	Non-vegetated elements and managed APZ, APZ-Modified and low threat vegetation throughout the development	BAL-12.5 to BAL-Low
Western Holiday homes	BAL–FZ	10m to 25m wide APZ with non-vegetated elements and managed APZ, APZ-Modified and low threat vegetation throughout the development	BAL-29 to BAL-Low
Eastern Holiday homes	BAL–FZ	13m to 25m wide APZ outside the habitable building extent. Non-vegetated elements and managed APZ, APZ-Modified and low threat vegetation throughout the development	BAL-29 to BAL-Low

Building / element	Initial BAL	APZ	Revised BAL
Water Treatment Plant, Wastewater Treatment Plant and balance tanks	BAL–FZ	13m to 27 m wide APZ	BAL-12.5 from south BAL-29 from north



Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Road reserve
- Refuge
- Overall APZ extent
- Classified vegetation

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Roads (MRWA)

BAL building construction

- BAL 40
- BAL 29
- BAL 19
- BAL 12.5

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Job No: 59550	
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Version: A	Date: 30-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

BAL CONTOUR MAP

FIGURE 9

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Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

6. Bushfire risk management strategy and measures

The basis for the bushfire risk management strategy needs to consider a variety of requirements including compliance with the various planning and building instruments (SPP 3.7, the Guidelines, National Construction Code), local bushfire policy and firebreak notices in addition to core principles of bushfire risk management. The NSW *Planning for Bush Fire Protection* (NSW RFS 2019) provides a useful summary of the various bushfire protection measures (see Plate 7) that can be implemented, to varying degrees depending on the site, location and anticipated bushfire behaviour, to minimise bushfire impact on the proposed development.

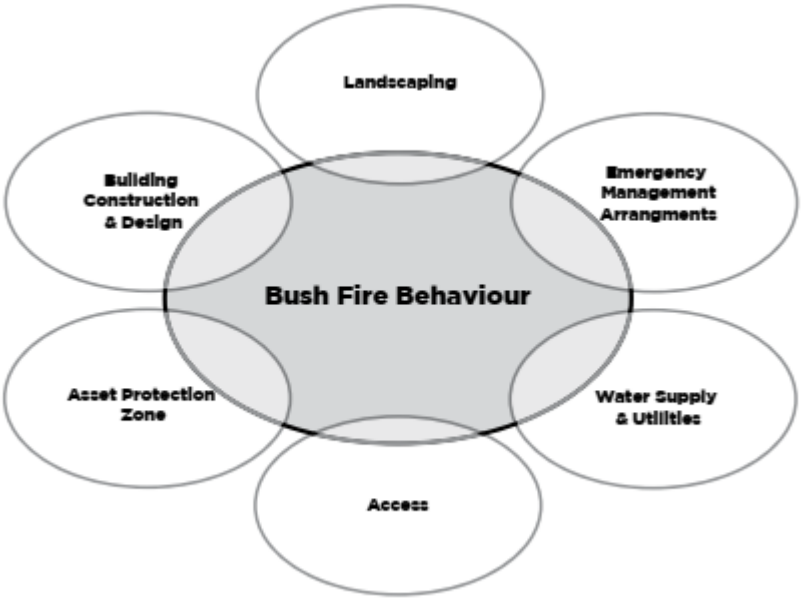


Plate 7: Bushfire Protection Measures in combination (NSW RFS 2019)

Given the proposed deviations from the SPP 3.7 and the Guidelines, in accordance with the proposed compliance pathway detailed in Section 3 a risk-based assessment is to be conducted to demonstrate compliance with the SPP 3.7 Policy Intent and Objectives, as well as the Tourism Land Use Position Statement Policy Objectives. The bushfire risk assessment process and outcomes have been provided in Appendix J, including assessment of the hazard and risks to the proposed development, and demonstration that sufficient measures have been employed to appropriately reduce the residual risk. An analysis of the FFDI also accompanies the bushfire risk assessment, and this is detailed in Appendix K.

Based on review of the existing bushfire risk controls, the bushfire compliance obligations associated with application of the Guidelines and Tourism Land Use Position Statement, and the iterative process of the bushfire risk assessment, the following bushfire risk management strategy has been developed for the proposal, using the suite of measures in Plate 7, to reduce risk to tolerable levels and produce a development suitably resilient to anticipated bushfire impact:

- Establish a community bushfire refuge building for last-resort onsite shelter-in-place is suitably sized for the expected peak occupant load of the development and the local area.
- Undertake appropriate vegetation modification, and ongoing management, using a variety of landscaping treatment to ensure all habitable buildings are located in areas of

BAL-29 or lower, limits the potential for bushfire ignition, growth and spread throughout the development, and achieves balance with environmental and visual amenity objectives.

- Given that there is only a single public road to the site, establish an internal vehicular access network that enables to occupants to conduct offsite evacuation prior to bushfire impact, while enabling fire appliances to move around the site in a bushfire emergency.
- Establish a secure and reliable bushfire fighting water supply for the development using a combination of town main reticulated supply, onsite dedicated fire hydrant and hose reel system/s and static firewater tanks. Protection of bushfire water supplies, and the town main supply, from bushfire impact is to be a focus of the design.
- Protect essential infrastructure from bushfire impact, as much as practical, including power supply, telecommunications, gas supply, sewer (wastewater) and key landscaping reticulation systems.
- Ensure all buildings, not considered a tolerable loss, are constructed to a sufficient BAL rating to withstand the anticipated bushfire impact, with no building to have construction rating of less than BAL-12.5 to provide resilience to ember attack, the most common cause of building loss in bushfires
- Develop a bushfire emergency management plan, which establishes the emergency management arrangements and procedures to ensure the safety of occupants within the development and the local area, during a bushfire emergency. The primary response action is to be early offsite evacuation, however, if this is unsafe to conduct or if traffic congestion prevents this timely egress, then the response action is to be changed to onsite shelter-in-place at the community bushfire refuge
- Develop an appropriate implementation and ongoing maintenance and auditing program, enforceable under the Community Corporation, to ensure the management measures are established correctly and are effective for the life of the development

The overall bushfire management strategy for the proposed development requires the implementation of specific bushfire management measures, to demonstrate compliance with the relevant planning instruments and to reduce the residual risk of bushfire impact on the development, to an appropriate level. These management measures are detailed in the sections below, and where possible, these measures have been depicted in Figure 11.

6.1 Community Bushfire Refuge

Due to the single access, an on-site community bushfire refuge facility will need to be established for last-resort shelter-in-place by occupants, when off-site evacuation is not possible.

The proposed community refuge buildings are to comprise the following as depicted on Figure 10:

- the Hotel public area building/s including:
  - Ground Floor restaurant and back-of-house areas
  - Level 1 hotel arrival lobby and office, lounge, bar, meeting rooms and kitchen
  - Level 1 gym and spa buildings
- Community Hub building
  - Lower Ground café, general store/bakery, SLSC, boat shed and back-of-house areas
  - Ground Floor reception hall, AR studio and meeting room and back-of-house areas

The hotel arrival and office provide an appropriate location for an ERT command centre, complete with the necessary communications infrastructure and reticulation controls. Two first aid posts have been nominated at the First Aid room in the Community Hub, with another proposed at the Spa, given the access to beds at the Treatment Rooms. During a bushfire event, the management of the emergency is expected to be conducted by the ERT (comprising mainly hotel employees) in accordance with the project BEMP.

The proposed bushfire refuge buildings are to have sufficient floor area and volume to house the expected peak occupant load of **2037 people** (detailed on Table 2) in accordance with the *ABCB Design and Construction of Community Bushfire Refuges Handbook (2014)*, for the 869 proposed occupants and the 1168 existing occupants to surrounding development and land uses.

The overall capacity of the refuge building/s has been divided as follows, with the Command Centre and Primary refuge areas expected to have sufficient floor area and volume for the anticipated peak occupant load, and the overflow/surge providing additional space if required:

- **Command Centre** **100 people**
    - 76.5 m^2 usable internal area @ 0.75 m^2/per person
- **Primary refuge area** **1940 people**
    - 1420 m^2 usable internal area @ 0.75 m^2/per person,
    - additional 40 staff/occupants in two kitchens for food preparation
    - additional 8 people in First Aid
- **Overflow/Surge areas** **up to 600 people**
    - 446.25 m^2 usable internal area @ 0.75 m^2/per person,
    - additional 10 staff/occupants in one kitchen for food preparation

The occupant-area allocations above are a guide only, with the ERT able to spread occupants throughout the refuge as best suits the emergency, noting that a lesser number of people in the Command Centre may be desirable to enable effective management of the emergency.

The refuge is to comply with the Tourism Land Use Position Statement, including the following (***noting the inclusion of a BPAD Level 3 bushfire practitioner on several actions***):

- The following design and maintenance requirements will apply:
    - *The proposed bushfire refuge shall be designed by a qualified fire engineer and BPAD Level 3 bushfire practitioner in accordance with the ABCB Design and Construction of Community Bushfire Refuges Handbook (2014).*
    - *A final inspection of the proposed bushfire refuge shall be undertaken by a qualified fire engineer and BPAD Level 3 bushfire practitioner. The fire engineer and bushfire consultant shall provide certification that the works have been completed in accordance with the requirements of the ABCB Design and Construction of Community Bushfire Refuges Handbook (2014) and the approved design.*
    - *A bushfire refuge management plan shall be prepared by a qualified fire engineer and BPAD Level 3 bushfire practitioner, to detail the maintenance requirements and annual test requirements for operation compliance.*
    - *A suitably qualified and experienced* fire *engineer and/or BPAD Level 3 bushfire practitioner shall undertake annual audit and testing, in accordance with bushfire*

refuge management plan, and provide a compliance certificate to the local government, at least one month prior to fire season commencing.

- Be located in an area of BAL-10 (10 kW/m^2 at 1200 K) in accordance with the *ABCB Design and Construction of Community Bushfire Refuges Handbook (2014).*

To ensure the refuge is in BAL-10, the refuge buildings will be surrounded by an APZ wide sufficiently wide to achieve 10 kW/m^2 (at 1200 K) on the external walls. APZ width has been calculated using Method 2 calculation (see Section 5.3.1.2) and varies from 25.8m to 31.9m wide.

The most relevant requirements from ABCB Design and Construction of Community Bushfire Refuges Handbook (2014) to be incorporated into the refuge design include, but aren't limited to:

- 10m separation to adjacent building, substantial structure or carparking areas (fire rated construction can be used in lieu of separation)
- 1.5m non-combustible pathway around perimeter of building
- 0.75 m^2 per person; 1.2 m^3 per person
- Interior temp of 45 °C (max) or Modified Discomfort Index of 39 °C for duration of 60min
- sufficient natural ventilation or mechanical air-handling system
- structural design as per BCA (for Importance Level 3) including impact and wind loads
- Easily identifiable external and internal signage
- fire hose reel coverage around perimeter of refuge building for distance of 10m. FHR to have non-combustible tank and pump with backup power
- sanitary facilities to BCA
- emergency power supply for power, lighting, airconditioning, firefighting equipment. Include generator and diesel fuel
- Provision of drinking water and medical supplies with access to food.

Besides the specific construction requirements of the *ABCB Design and Construction of Community Bushfire Refuges Handbook (2014)*, the proposed refuge buildings will also be required to comply with the AS 3959 BAL-12.5 construction standards.

A reticulation system will be provided to the proposed green roofs, production garden and landscaping surrounding the refuge as part of PPBS 1 in Section 7.5.1. The specifications of this system are detailed in Section 6.7. The vegetation within the refuge APZ and on the green roofs and in the production garden, are to comply with the requirements of Section 6.2.1.2.

The Community Corporation is to ensure that all annual auditing and testing for the refuge is conducted each year, and that any defects are rectified prior to bushfire season.

6.2 Vegetation Modification, Management, and Revegetation

It is a key objective that the vegetation modification requirements for bushfire risk management purposes, are balanced with vegetation preservation where it has environmental and visual amenity value.

The proposed onsite revegetation and modification is outlined below (especially in Table 10), as well as the project Landscaping Report, which includes landscaping masterplan in Appendix C. The key elements from a vegetation modification perspective include:

- Areas of native vegetation retention and rehabilitation

- Land to be ceded and incorporated into Leeuwin Naturaliste National Park within the western and south-western portion of the project area.
- Foreshore Reserve to the north of the project area which is mostly to be revegetated
- Three (3) Public Open Space (POS) areas within the project area.

- Area of vegetation modification and landscaping
  - Land within the proposed tourism and holiday home precincts including buildings, roads, pathways, Asset Protection Zones and onsite low threat landscaping. This will also include replanting within the existing internal cleared firebreaks within the project area.
  - The Water Treatment Plant and public road
  - Portions of the existing Smiths Beach Road verge, adjacent to the project area

The onsite vegetation modification will fall into three main categories:

- Asset Protection Zones at key interfaces and around critical infrastructure, where vegetation modification is vital to protect buildings from bushfire, especially key infrastructure, and also to limit bushfire penetration into the development.
- A modified Asset Protection Zone (APZ-Modified) zone, typically within the perimeter APZ, throughout the holiday home and hotel precincts. The focus in this area is to modify vegetation to limit bushfire behaviour to enable the bushfire construction to resist the fire, while also providing a better balance of environmental and visual amenity objectives with bushfire risk management. This is to be accomplished by modifying some aspects of the APZ standards as part of a Performance Principle-Based Solution (PPBS).
- Low threat vegetation throughout the remainder of the development where not adjacent to buildings, aims to limit the ability for bushfire to spread and grow within the development, whilst prioritising structured tree and shrub retention.

The vegetation modification treatments are summarised in Table 10 and the overall landscaping strategy has been detailed as part of a Performance Principle-Based Solution (PPBS), namely PPBS 1 in Section 7.5.1. The implementation, ongoing maintenance and auditing of the various landscaping treatments is outlined in Section 6.2.6.

In addition to the above, this proposal is also seeking to eventually incorporate indigenous vegetation management approaches into the ongoing management of the onsite vegetation, to provide a targeted fuel load reduction method which carries a lighter environmental impact. This approach is still under review and will require further studies to confirm the effectiveness and parameters, to enable its implementation. This is discussed further in Appendix D.

6.2.1 Asset Protection Zones (APZs)

Compliant APZs are to be established and maintained around the following, to ensure sufficient separation from any post-development vegetation:

- the perimeter of the habitable building extent within the project area
  - the only exception is along northern interface, where the interface between the hotel suites/eco-suites and the Foreshore Reserve will be to the APZ-Modified standard
- the onsite community bushfire refuge building
- the Water Treatment Plant, balance tank/s, Wastewater Treatment Plant and the bushfire water tank

All APZs outlined above are to be established in the positions nominated on Figure 11, and are to comply with the technical specifications of the bushfire Guidelines as per Appendix L, other than the production garden and green roofs which are to comply with the specifications detailed in Section 6.2.1.2.

6.2.1.1 Perimeter APZ around habitable building extent

A perimeter APZ will be extended around the habitable building extent of the development, along direct interfaces with unmanaged vegetation (see Figure 8).

The only deviation from this approach is along the northern interface of the hotel suites and eco-suites with the unmanaged vegetation in the Foreshore Reserve, which will comply with an APZ Modified standard, rather than fully compliant APZ. The reason for this deviation is to better balance vegetation retention and visual amenity objectives with the limited bushfire risk from this direction, and this is addressed as part of PPBS 1, as is a discussion regarding the rationale for the perimeter APZ widths.

Additionally, the portion of the perimeter APZ on the "Leeuwin Way" road verge and the Smiths Beach Road verge are to be configured as windbreaks, consisting of a single row of trees (underpruned to >2m above ground level) and underplanted with low understorey (<0.3 m high), high moisture content vegetation, mulch or non-combustible material. No shrub species shall be permitted beneath the trees. The windbreak trees need to be in the road verges, further than 15 m from proposed buildings, with no other trees within the holiday home lots within 5 m of the windbreak or 6 m of the buildings.

The perimeter APZ has been sized as follows:

- Along the eastern and western interfaces to achieve BAL-29 widths
  - APZ to the west is 10 m wide
  - APZ width to the east is 13 m wide
- The APZ width along the southern, south-western and south-eastern interfaces is increased to a minimum of 25 m width to respond to the landscape-scale bushfire risk from Leeuwin Naturaliste National Park.
- Where applicable, the width has been extended to roads where it makes logical sense, rather than terminating at an arbitrary location

6.2.1.2 Community bushfire refuge APZ and landscaping

In order to achieve 10 kW/m^2 at 1200 K at the external walls, the nominated onsite refuge buildings will be surrounded by a sufficiently wide APZ to attain BAL-10. To rationalise the APZ width around refuge, Method 2 calculations have been used to more accurately model the BAL impact associated with the northern foreshore, especially the narrow head fire widths (see Section 5.3.1.2). The resultant APZ widths are:

- 25.8 m wide APZ from the north, south and south-west of the refuge, and to the lot boundary to the east.
- 31.9 m APZ from the north-western of the refuge.

The refuge APZs are nominated on Figure 11 and need to comply with the technical specifications of the bushfire Guidelines as per Appendix L, other than the production garden as outlined below. The use of high moisture content vegetation (e.g. succulents) for the green roofs and creation of the production garden within the refuge APZ, have been discussed further in PPBS 1 in Section 7.5.1.

The proposed production garden to the south-west of the Community Hub building, will contain a series of planter beds with cultivated herbs, fruits and vegetables, that align with the low threat vegetation definition in AS 3959 Clause 2.2.3.2 (f). It is appropriate in this location provided the following standards apply to the production garden:

- Planter beds and any shade structures are to be non-combustible construction
- Each planter bed is surrounded by a non-combustible path extending no less than 1 m from the planter base.
- No plants are to exceed 1.5 m height at maturity
- The gardens are to be regularly maintained during bushfire season to remove dead vegetation and any combustible materials
- Reticulation system outlined in Section 6.7, is to be installed at the production garden, so it can be activated in a bushfire scenario.

The parts of the Community Hub, Spa and Gym roofs within the nominated APZ that are proposed to have a 'green roofs', shall comply with the following standards:

- All vegetation is to be high moisture content vegetation species (< 0.3 m height), and shall be planted no closer than 1.0 m to any external building walls
- The roofs are to be regularly maintained during bushfire season to remove dead vegetation, or that which is not high moisture content, that is >100 mm
- All other roofing material is to be non-combustible
- Reticulation system outlined in Section 6.7, is to be installed at the production garden, so it can be activated in a bushfire scenario.

6.2.1.3 WTP, Balance tank/s, WWTP and bushfire tank APZ

To protect this critical water supply infrastructure, an APZ compliant with the technical specifications of the Guidelines, will be establish around the perimeter of the WTP, WWTP and tank enclosure:

- A 27 m wide APZ will be created to the south-west, south and south-east of the enclosure to achieve BAL-12.5 from these directions.
- A 13 m wide APZ is to be created to the north of the enclosure, given the limited fire run and likelihood of bushfires approaching from this direction.

6.2.2 APZ – Modified

The APZ-Modified specifications detailed in Table 10, aim to provide more flexibility to enable vegetation retention throughout the development (outside the APZs nominated above) as outlined below:

- Within the Eastern and Western holiday home areas, including internal road verges
- Coastal landscaping treatments surrounding, and between the hotel suite wings and eco-suites.

The APZ-Modified standards aim to align with the overall intent of the APZ standards, but includes deviations relating to tree and shrub coverage and separation, the creation of "shrub islands" and use of high moisture content vegetation adjacent to buildings. The justification for the deviations is detailed in PPBS 1 in Section 7.5.1.

6.2.2.1 APZ – Modified (Holiday homes)

The APZ-Modified landscaping within the Eastern and Western Holiday homes nominated on Figure 11, is to comply with APZ standards as per Appendix L, unless otherwise stated in Table 10.

Nominated areas of increased tree retention are nominated within the holiday home precincts because these locations are away from direct interfaces, where targeted tree retention of up to 40% canopy cover is proposed, provided trees are underpruned and the understorey is highly managed.

Of particular importance is the retention of the existing *Moodjar* (Nuytsia or WA Christmas Tree) around the Western Holiday homes, which has cultural significance to the local Nyoongar people. The *Moodjar* is a hemi-parasite, and although it can sustain itself, it also attaches itself to the roots of a host plant to gain nutrients through the sap. While preservation of the host plant may not kill the *Moodjar*, it is ideal to retain both plants where possible. Several prominent existing *Moodjar* (Nuytsia or WA Christmas Tree) are to be retained within the Western Holiday homes, especially in a grove in the south-west, and this is to be achieved through the following landscaping approach:

- Identify the four or five best examples of the *Moodjar* in the grove (further than 6 m from proposed buildings), and where possible, identify the host plant for each one.
- Within the grove, isolate the *Moodjar* and the host plant, and underplant low groundcovers <0.3 m high.
- The remaining shrub vegetation in the grove is broken up into small plots <5 m^2 and <10% cover and separated from trees, shrubs and buildings in accordance with the shrub specification in Table 10.

The landscaping within the lots close to the buildings is considered to be similar to cultivated gardens, which have a consistent management regime to regularly reduce fuel loads through removal of dead vegetation and weeds, and pruning. These gardens will often be irrigated with treated wastewater at the rear of lots, in addition to any additional watering from landowners.

Notwithstanding, the Community Corporation will be required to audit all onsite landscaping prior to bushfire season, and conduct spot checks throughout the season.

6.2.2.2 APZ – Modified (Hotel Suites/Eco-Suites)

Most of the vegetation around the proposed hotel is less than 2 m high, with most being less than 1 m high, while there is a lack of any existing trees greater than 5 m. On this basis, the APZ-Modified landscaping around the hotel suites and eco-suites as nominated on Figure 11, is to use a similar philosophy to that outlined for the APZ-Modified (Holiday homes) but with greater focus on shrub retention. This treatment is to comply with APZ standards as per Appendix L, unless stated in Table 10.

Along the northern interface with the foreshore, the APZ-Modified (Hotel Suites/Eco-suites) treatment is being implemented in lieu of a fully compliant APZ, to enable greater low shrub retention within "shrub islands" of up to 50 m^2. Method 2 calculations have also been used to reduce the width of the managed APZ-Modified landscaping from the hotel suites and eco-suites to the unmanaged vegetation in the Foreshore Reserve, to better reflect the lesser risk associated with the narrow flame width (and fire runs) from Plot 1 (see Method 2 calculation in Section 5.3.1.2). The APZ-Modified (Hotel Suites) width along the north is to be no less than 11 m wide. Further detail and justification for this approach is provided PPBS 1 in Section 7.5.1.

6.2.3 Low Threat Vegetation

As shown on Figure 11, the remainder of the development area, outside the APZs and the APZ-Modified areas, is to be altered to low threat vegetation using the following strategies:

- Parkland managed landscaping treatment in the campground, prioritising retention of trees and overstorey, to provide an immersive natural experience for campers and retain Western Ringtail Possum habitat.

- Parkland managed landscaping treatment along the proposed park spine lining the "Cape Arrival" main entrance road to the site, prioritising retention of trees and overstorey.
- Low threat landscaping of all other spaces
    - within the project area, but outside the campground and park spine, including areas such as the "Smiths Lane" and campground loop road road verges and entry garden, that are outside any other landscaping zone.
    - outside the project area, primarily in public road reserves

The basis for this tailored landscaping treatment is retention of tree canopy, while strictly managing ground and mid-storey fuels, concepts which are detailed and justified in PPBS 1 in Section 7.5.1.

6.2.3.1 Low Threat Vegetation (Campground)

Low threat vegetation in the campground seeks to prioritise tree retention on the basis there is little to no understorey or mid-level fuels, with isolated "shrub islands" permitting some retention of low shrub vegetation. The rationale for the proposed landscaping strategy is discussed and justified in PPBS 1 in Section 7.5.1.

The low threat landscaping in the campground is to comply with the specifications stated in Table 10.

Given the two proposed buildings are considered to be surrounded by low threat vegetation, there is no formal requirement for an APZ, however the landscaping surrounding them is to comply with the following:

- No trees within 3 m of the buildings, underpruned to 2 m above ground level and with no branches overhanging or touching the buildings
- Only non-combustible elements or managed gardens within 3 m of the buildings.

6.2.3.2 Low Threat Vegetation (Park Spine)

Landscaping in the Park Spine, where outside the APZ, will be similar to that in the campground, albeit there will be less tree retention possible in this zone and no shrubs beneath trees. The perimeter APZ passes through the Park Spine, and provides a significant break in tree canopy continuity. There are several drainage swales also proposed through the park spine which also have vegetation specifications.

The landscaping approach in the Park Spine (outside of the proposed APZs) is to comply with the specifications stated in Table 10. Landscaping within the APZ running through the Park Spine, is to comply with the APZ standards from the bushfire Guidelines as per Appendix L.

6.2.3.3 Low Threat Vegetation (Other Spaces)

Any other proposed low threat vegetation areas outside the nominated Campground and Park Spine zones, both inside and outside the project area, is to comply with the requirements of AS 3959 Clause 2.2.3.2 (f). Within the project area, this is expected to primarily in the "Smiths Lane" and campground loop road road verges and entry garden. Outside the project area, this will primarily be the "Leeuwin Way" public road verges that are not APZs.

The proposed verge between "Smiths Lane" and the rear of the existing Canal Rock Beachfront Apartments/Smiths Beach Resort, will require a tailored treatment to provide screening to these existing resorts, whilst also ensuring it is low threat vegetation. This verge is to be landscaped as a windbreak, which are excludable under AS 3959 Clause 2.2.3.2 (f), with a single row of trees

complete with minimal understorey planting consisting of low groundcovers (<0.3 m high), high moisture content vegetation, mulch or non-combustible material . The campground entry statement garden within the loop carpark road, is to comprise cultivated and managed gardens. This garden will be constrained by retaining walls and the driveway loop road.

Landscaping of the "Leeuwin Way" public road verge, outside of the APZs, is to be consistent with AS 3959 Clause 2.2.3.2 (f).

6.2.4 Offsite road verge fuel management

Outside the project area and Foreshore Reserve, any surrounding road verges that have been excluded as low threat are to continue to be managed to ensure the understorey and surface fuels remain in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. This is expected to be as follows:

- Smiths Beach Road around the existing Smiths Beach Resort and Canal Rocks Beachfront Apartment
    - Ongoing road verge management is the responsibility of the City, or the adjacent landowner, as per current practices.
- Smiths Beach Road, directly adjacent to the project area, and the "Leeuwin Way" public road
    - Ongoing management of APZs and low threat vegetation on the road verges is the responsibility of the Community Corporation, in consultation with the City.

Table 10: Vegetation Modification Treatments

Zone	Trees	Shrubs	Groundcovers/Grass/Fine Fuel Loads	Other Comments
APZ				

Community Bushfire Refuge	***All trees (existing and proposed)***
	• Vegetation Height
	  ○ >5m in height
	• Canopy cover and separation
	  ○ <15% canopy cover
	  ○ Canopy separation to >5m apart
	• Tree Branches
	  ○ Remove lower branches >2m above ground level or surface vegetation
	  ○ No branches touching or overhanging buildings
	• Underplanting
	  ○ Groundcovers (<0.5m high) permitted beneath tree
	  ○ No shrub species beneath tree
	• Tree Position
	  ○ Trunk >6m from all elevations of building
		All shrub vegetation
		• Vegetation Height
		  ○ 0.5m – 5m height
		• Vegetation Cover
		  ○ Clumps <5m^2 in area
		• Vegetation Position
		  ○ Not located beneath trees
		  ○ To be >3m from building
		  ○ To be >10m from exposed window or door
		  ○ Clumps to be to be >10m from each other
		• No shrub islands permitted in APZs
			Groundcovers
			• Vegetation Height
			  ○ <0.5m in height
			• Vegetation Position
			  ○ Can be planted beneath trees but must be maintained to remove dead vegetation
			  ○ Groundcovers >100mm must be:
			  – >2m of building
			  – >3m from windows or doors
			  ○ Very low groundcovers (<100mm) permitted adjacent to the building
			Grasses
			• Grass to be maintained to <100mm
			• Permitted adjacent to the building provided regularly maintained
			Fine Fuel Loads
			• Refers to combustible dead vegetation matter less than 6 mm in thickness
			• To be reduced to and maintained at an average of 2 t/ha.
				Production Garden
				• Planter beds and any shade structures are to be non-combustible construction
				• Each planter bed is surrounded by a non-combustible path extending no less than 1 m from the planter base.
				• No plants are to exceed 1.5 m height at maturity
				• The gardens are to be regularly maintained during bushfire season to remove dead vegetation and any combustible materials
				• Reticulation system to be installed at the production garden, so it can be activated in a bushfire scenario.
				Green Roof (Community Hub, Spa, Gym)
				• All vegetation is to be high moisture, low flammability planting (<0.3 m height)
				• Must be >1.0 m to any external building walls
				• roofs are to be regularly maintained during bushfire season to remove dead vegetation, or that which is not high moisture content, that is >100 mm
				• All other roofing material is to be non-combustible
				• Reticulation system to be installed over green roofs, so it can be activated in a bushfire scenario.

Perimeter APZ				***APZ along northern side of*** "Leeuwin Way" ***road verge and west of Smiths Beach Road verge*** • Landscaped as a windbreak (excludable under AS 3959 Clause 2.2.3.2 (f)), consisting of a single row of trees complete with low understorey planting. • The lower branches of trees are to be >2m above ground level or surface vegetation • Underplanting is to be low groundcovers (<0.3m high), high moisture content vegetation, mulch or non-combustible material. No shrub species permitted beneath trees • windbreak trees need to be within the road verges, further than 15 m from proposed buildings, with no other trees within the holiday home lots within 5 m of the windbreak or 6 m of the buildings.
WTP/WWTP				
APZ Modified				

APZ-Modified (Holiday Homes)	***All trees (other than nominated areas of increased retention)***
	• Vegetation Height
	  ○ Approx. > 4m (provided can be successfully modified)
	• Canopy cover and separation
	  ○ <20% canopy cover
	  ○ Canopy separation to >5m apart
	• Tree Branches
	  ○ Remove lower branches >2m above ground level or surface vegetation
	  ○ No branches overhanging or touching buildings
	• Underplanting
	  ○ Groundcovers (<0.5m high), high moisture content vegetation (e.g. succulents) or mulch
	  ○ No shrub species beneath tree
	• Tree Position
	  ○ Trunk >6m from all elevations of building
		• Overall shrub planting in this zone is not to exceed 10% of the overall vegetated area in addition to meeting the specifications below.
		All shrub vegetation
		• Vegetation Height
		  ○ 0.5m – 5m height
		• Vegetation Cover
		  ○ Clumps <5m^2 in area
		• Vegetation Position
		  ○ Not located beneath trees
		  ○ To be >3m from building
		  ○ **Shrubs between 0.5 m to 3 m must be 3 times the mature height from exposed doors and windows, or other shrubs,** as follows:
		  – 0.5 m - ≤1.0 m height need ≥3m separation.
		  – ≥1.5 m height need ≥4.5m separation.
			Groundcovers
			• Vegetation Height
			  ○ <0.5m in height
			• Vegetation Position
			  ○ Can be planted beneath trees but must be maintained to remove dead vegetation
			  ○ Groundcovers >100mm must be:
			  – >2m of building
			  – >3m from windows or doors
			  ○ Very low groundcovers (<100mm) permitted adjacent to the building
			Grasses and High moisture content vegetation
			• Grass to be maintained to <100mm
			• The inclusion of high moisture, low flammability species (< 0.3 m height) to be treated as grasses provided they
				Nominated WA Christmas Tree (Western Holiday Homes)
				• Retain the WA Christmas Trees and their host plant, with host plant to be reduced in size as much as possible to retain a healthy plant.
				• Trees to be >6m from buildings
				• If possible, remove lower branches <2m above ground level or surface vegetation on both plants.
				• Underplant both the Christmas Tree and host plant with low groundcovers (<300mm), high moisture content vegetation, mulch or non-combustible material

Zone	Trees	Shrubs	Groundcovers/Grass/Fine Fuel Loads	Other Comments

	Nominated areas of increased tree retention
	• Following deviations to above specifications apply to areas of nominated tree retention only
	  ○ Trees to be >6m from buildings
	  ○ Trees permitted up to 40% foliage cover
	  ○ Canopies are to be thinned to remove dead branches and other material
	  ○ Remove lower branches >2m above ground level or surface vegetation
	  ○ Underplanting by low groundcovers (<0.3m high), high moisture content vegetation, mulch or non-combustible material. No shrub underplanting permitted
		– ≥2.0 m height need ≥6m separation.
		– ≥3.0 m height need ≥9m separation.
		– between 3.5 m to 5 m height need ≥10m separation
		• No shrub islands permitted in Holiday Home precincts without specific review and authorisation by BPAD Level 3 Bushfire Practitioner.
			are maintained regularly through bushfire season to remove dead material.
			• No restriction on separation from buildings provided regularly maintained
			Fine Fuel Loads
			• Refers to combustible dead vegetation matter less than 6 mm in thickness
			• To be reduced to and maintained at an average of 2 t/ha.
			Nominated areas of increased tree retention
			• Following deviations to above specifications apply to areas of nominated tree retention only
			  ○ Underplanting by low groundcovers (<0.3m high), high moisture content vegetation, mulch or non-combustible material. No shrub underplanting	

APZ-Modified (Hotel Suites/Eco-Suites)	***All trees (existing and proposed)***
	• Vegetation Height
	  ○ Approx. > 4m (provided can be successfully modified)
	• Canopy cover and separation
	  ○ <15% canopy cover
	  ○ To be spaced 5 m apart
	  ○ To be thinned to remove dead branches
	• Tree Branches
	  ○ Remove lower branches >2m above ground level or surface vegetation
	  ○ No branches overhanging or touching buildings
	• Underplanting
	  ○ Low groundcovers (<0.3m high), high moisture content vegetation, mulch or non-combustible material
	  ○ No shrub species beneath trees
	• Tree Position
	  ○ Trunk >6m from all elevations of building
	  ○ Trunk further than 6 m from any shrub islands
		All shrub vegetation (other than shrub islands)
		• Vegetation Height
		  ○ 0.5m – 5m height
		• Vegetation Cover
		  ○ Clumps <5m² in area
		  ○ Cover is to be <10% of overall vegetated area (excluding shrub islands)
		• Vegetation Position
		  ○ Not located beneath trees
		  ○ to be >3m from building
		  ○ **Shrubs between 0.5 m to 3 m must be 3 times the mature height from exposed doors and windows or other shrubs,** as follows:
		  – 0.5 m - ≤1.0 m height need ≥3m separation.
		  – ≥1.5 m height need ≥4.5m separation.
		  – ≥2.0 m height need ≥6m separation.
		  – ≥3.0 m height need ≥9m separation.
		Shrub islands (5- 50 m²)
		• Only permitted to the north of the suites/eco-suites to the foreshore, and between the suites, as depicted on the Landscaping Report (Foreshore Reserve Plan; Hotel Plan)
		• Islands to be <50 m² in area
		• Only include vegetation ≤2 m high
		• Must be >6m from other shrub islands or trees.
		• To be isolated from surrounding vegetation (other than trees which must be 6 m away) by at least 1.5 m wide perimeter of very low groundcovers (<0.1m high), high moisture content vegetation, mulch or non-combustible material.
		• Separation from buildings is to comply with the following:
		  ○ 0.5 m - ≤1.0 m height need ≥3m separation.
		  ○ ≥1.5 m height need ≥4.5m separation.
		  ○ ≥2.0 m height need ≥6m separation.
		• The number of shrub islands is to align with that depicted in the Landscaping Report.
			Groundcovers
			• Vegetation Height
			  ○ <0.5m in height
			  ○ Low groundcovers (<300mm) required beneath areas of trees with canopy cover <15%.
			  ○ Very low groundcovers (<100 mm) can be within 1.5m of shrub island
			• Vegetation Position
			  ○ Can be planted beneath trees but must be maintained to remove dead vegetation
			  ○ Groundcovers >100mm must be:
			  – >2m of building
			  – >3m from windows or doors
			  ○ Very low groundcovers (<100mm) permitted adjacent to the building and around shrub islands
			Grasses and High moisture content vegetation
			• Grass to be maintained to <100mm
			• The inclusion of high moisture, low flammability species (< 0.3 m height) to be treated as grasses provided they are maintained regularly through bushfire season to remove dead material.
			• No restriction on separation from buildings or shrub islands, provided regularly maintained
			Fine Fuel Loads
			• Refers to combustible dead vegetation matter less than 6 mm in thickness
			• To be reduced to and maintained at an average of 2 t/ha.	

Low Threat Vegetation				

Campground	***All trees (existing and proposed)***
	• Vegetation Height
	  ○ Approx. > 4m (provided can be successfully modified)
	• Canopy cover and separation
	  ○ 40% foliage cover (maximum)
	  ○ Canopies are to be thinned to remove dead branches and other material
		• Overall shrub planting in this zone is not to exceed 5% of the overall vegetated area in addition to meeting the specifications below.
		All shrub vegetation (other than shrub islands)
		• Must be single plants that are 1.5 m - < 2m height
		• Must be <5 m² in area
			Groundcovers
			• Vegetation Height and Location
			  ○ <0.5m in height
			  ○ Low groundcovers (<300mm) required beneath areas of trees with canopy cover >15%.
			  ○ Very low groundcovers (<100 mm) can be within 1.5m of shrub island
				Campground Buildings
				• there is no formal requirement for an APZ around these buildings
				• landscaping surrounding them is to comply with the following:
				  ○ No trees within 3 m of the buildings,

Zone	Trees	Shrubs	Groundcovers/Grass/Fine Fuel Loads	Other Comments
	○ Trees are to be grouped intermittently to avoid continuous canopy throughout the entire area, by creating 5m gaps between canopies of group of trees • Tree Branches ○ Remove lower branches >2m above ground level or surface vegetation ○ No branches overhanging or touching buildings • Underplanting ○ Low groundcovers (<0.3m high), high moisture content vegetation or mulch in areas with canopy cover >15% ○ No shrub species ○ Some isolated shrub islands • Tree Position ○ Trunks >3 m from campground buildings	• Must be clear of tree canopies and achieve the following: ○ > 3 m from tent platforms or boardwalks ○ > 6 m from shrub islands or other shrubs ***Shrub islands*** • Shrub islands are permitted beneath trees • To contain species <1.5 m high • Island must have 1.5 m wide perimeter of very low groundcovers (<100 mm), high moisture content vegetation (<300mm), mulch or non-vegetated materials. • Must be <30 m^2 in area • Must achieve the following separation ○ > 10 m from any other shrub island and campground buildings ○ >3 m of any tent platform • The total number of shrub islands must be similar to that depicted on the Landscaping Report (Campground Plan)	• Otherwise to comply with the APZ standards ***Grasses and High moisture content vegetation*** • Grass to comply with the APZ standards • The inclusion of high moisture, low flammability species (< 0.3 m height) to be treated as grasses provided they are maintained regularly through bushfire season to remove dead material. • Both can be located within 1.5m of shrub island ***Fine Fuel Loads*** • Refers to combustible dead vegetation matter less than 6 mm in thickness • To be reduced to and maintained at an average of 2 t/ha.	○ Remove lower branches <2m above ground level or surface vegetation ○ No branches overhanging or touching buildings ○ Only non-combustible elements or managed gardens permitted within 3 m of the buildings.
Park Spine	***All trees (existing and proposed)*** • Vegetation Height ○ Approx. > 4m (provided can be successfully modified) • Canopy cover and separation ○ 40% foliage cover (maximum) ○ Canopies are to be thinned to remove dead branches and other material ○ Trees are to be grouped intermittently to avoid continuous canopy throughout the entire area, by creating 5m gaps between canopies of group of trees • Tree Branches ○ Remove lower branches >2m above ground level or surface vegetation ○ No branches overhanging or touching buildings • Underplanting ○ Low groundcovers (<0.3m high), high moisture content vegetation or mulch in areas with canopy cover >15% ○ No shrub species or shrub islands • Tree Position ○ Trunks >6 m from buildings	• Overall shrub planting in this zone is not to exceed 10% of the overall vegetated area in addition to meeting the specifications below. ***All shrub vegetation (other than shrub islands)*** • Must be single plants that are 1.5 m - < 2m height • Must be <5 m^2 in area • Must be clear of tree canopies and achieve the following: ○ > 6 m from shrub islands or other shrubs ***Shrub islands*** • Shrub islands are not permitted beneath trees • To contain species <3 m high (primarily retained grass trees) • Island must have 1.5 m wide perimeter of very low groundcovers (<100 mm), high moisture content vegetation (<300mm), mulch or non-vegetated materials. • Must be <30 m^2 in area • Must achieve the following separation ○ > 10 m from any other shrub island or buildings • The total number of shrub islands must be similar to that depicted on the Landscaping Report (Park Spine Plan)	***Groundcovers*** • Vegetation Height and Location ○ <0.5m in height ○ Low groundcovers (<300mm) required beneath areas of trees with canopy cover >15%. ○ Very low groundcovers (<100 mm) can be within 1.5m of shrub island • Otherwise to comply with the APZ standards ***Grasses and High moisture content vegetation*** • Grass to comply with the APZ standards • The inclusion of high moisture, low flammability species (< 0.3 m height) to be treated as grasses provided they are maintained regularly through bushfire season to remove dead material. • Both can be located near shrub islands ***Fine Fuel Loads*** • Refers to combustible dead vegetation matter less than 6 mm in thickness • To be reduced to and maintained at an average of 2 t/ha.	***Drainage swales*** • to largely be non-vegetated rock-lined, with any vegetation <1 m high, • to be regularly maintained to remove dead vegetation. ***APZ within Park Spine*** • The area of nominated APZ within the Park Spine is to comply fully with the APZ standards.
All other areas nominated as low threat vegetation	• Within the project area, this is expected to primarily in the "Smiths Lane" and campground loop road verges and entry garden, while outside the project area, this will primarily be the "Leeuwin Way" road verges that are not APZs. • To comply with the requirements of AS 3959 Clause 2.2.3.2 (f) and to be regularly managed to maintain standard, remove dead plant material ***Internal road verge (south of existing Canal Rock Beachfront Apartments/Smiths Beach Resort)*** • Landscaped as a windbreak (excludable under AS 3959 Clause 2.2.3.2 (f)), consisting of a single row of trees complete with low understorey planting. ***Campground entry statement garden*** • To consist of managed gardens, incorporating existing vegetation where possible, arranged in isolated plots surrounded by planting of lawn, very low groundcovers (<100mm high), high moisture content vegetation, mulch or non-combustible material. • The garden is to be constrained between retaining walls and the driveway road. • The broad arrangement must be similar to that depicted on the Landscaping Report (Campground Plan) "Leeuwin Way" ***public road (outside nominated APZ)*** • Managed verge consistent with AS 3959 Clause 2.2.3.2 (f).			

6.2.5 Revegetation

Outside of the APZs and low threat vegetation, several areas of revegetation are proposed within the project area as shown on Figure 8, with the requirements detailed below. Revegetation refers to areas of unmanaged post-development vegetation, and where replanting is proposed within the managed part of the development, it will need to comply with the standards of that area e.g. APZ standards, APZ-Modified, low threat vegetation or tailored landscaping treatments outlined in the previous section.

6.2.5.1 National Park

The western portion of the project area to be ceded to Leeuwin Naturaliste National Park will have minimal development, limited to the creation of new paths and boardwalks.

There is an existing cleared internal firebreak which will accommodate some of the proposed paths and boardwalks, however there will be revegetation of the balance of the firebreak not being used for the path to provide a more natural experience. The revegetation of this land is to be consistent with the adjacent shrubland and scrub vegetation structure as per AS 3959. All vegetation is to be less than 6 m height at maturity and the species are to be consistent with those currently adjacent.

The revegetation is to be conducted by the Proponent, with ongoing management expected to be conducted by DBCA.

6.2.5.2 Foreshore Reserve

The Foreshore Reserve along the northern extent of the proposed development and Smiths Beach will largely be retained, where outside APZ-Modified areas, with existing cleared areas to be revegetated. A Foreshore Management Plan (Strategen-JBSG, 2021c) has been prepared to support planning and environmental assessment processes. The FMP defines how the development will interface with existing the Smiths Beach foreshore, including identifying opportunities to improve environmental, pedestrian movement and vehicular movement outcomes.

The revegetation of the Foreshore Reserve is to be consistent with the adjacent shrubland vegetation, and is generally not to exceed the height of the surrounding species, which is <2 m high.

6.2.5.3 Public Open Space

The three POS areas proposed within the development, will largely retain native shrubland, scrub, and forest vegetation which exists on the fringes of the main development.

Cleared areas from existing internal firebreaks occur within the proposed POS areas, and where located outside the nominated APZ, APZ-Modified and low threat vegetation areas, these are to be revegetated consistent with the adjacent shrubland and scrub vegetation structure as per AS 3959, with minor plots of forest vegetation along the southern boundary (see Figure 8). Revegetation is to contain species similar with those currently existing in the POS, and comply with the following:

- Shrubland species: to be <2 m mature height
- Scrub species: to be <6 m mature height
- Forest species: no restriction

6.2.6 Vegetation modification implementation, ongoing maintenance and auditing

Implementation of all APZ, APZ-Modified and low threat vegetation landscaping treatments, will be undertaken by the Proponent, with ongoing maintenance and auditing the responsibility of the Community Corporation.

The representation of the various landscaping treatments in the Landscaping Report accompanying the DA, are based on a higher-level information on the existing vegetation structure that is currently available. While this is considered sufficient to demonstrate the overall vegetation modification

concepts being proposed, given the importance of vegetation location and size to its retention potential from a bushfire risk management perspective, especially for trees near future buildings, it is acknowledged that further work needs to be conducted to refine the landscaping plans to further illustrate how the treatments can be satisfactorily implemented to ensure a balanced outcome with environmental and visual amenity objectives. On this basis, the following approach is proposed:

- The BMP and Landscaping Report are used to depict the vegetation modification concepts to obtain conditional development approval, with the following condition recommended for the development application approval (subject to decision-maker wording):
- Prior to commencement of works, the Proponent shall prepare a Vegetation Management Plan outlining management strategies for existing and proposed vegetation, to the satisfaction of the Western Australian Planning Commission.
- Prior to commencement of works, the proponent shall prepare landscaping and revegetation plans to the satisfaction of the Western Australian Planning Commission. The landscaping and revegetation plans are to outline existing vegetation to be retained and new vegetation to be planted. The landscaping and revegetation plans are to be consistent with the Vegetation Management Plan, the requirements of the Bushfire Management Plan and the recommendations of the Visual Landscaping Amenity report to the satisfaction of the Western Australian Planning Commission.
- Landscaping and revegetation works shall be initially implemented in accordance with the landscaping and revegetation plans and thereafter maintained in accordance with the Vegetation Management Plan.

  The Vegetation Management Plan (VMP) would be expected to address matters such as:

  - Baseline Vegetation Studies
    - Initial tree survey
    - Detailed survey
  - Land Clearing
    - Construction plan and schedule
    - Annual plan and schedule
    - Clearing methodology
  - Rehabilitation management plan
  - Bushfire management
  - Monitoring
  - Reporting and Review
  - Vegetation management plan documentation
  - Training and Awareness
  - Responsibilities
    - Construction Manager
    - Project Manager
    - Community Corporation

- Operators, holiday home owners

An expected output of the VMP would be detailed landscaping plans, guided by information obtained from further vegetation studies, depicting the landscaping treatments required to implement the requirements of the BMP and the visual amenity report.

- To be included in the VMP, following the clearing and construction works, the detailed landscaping plans are to be updated to become an "as-constructed" landscaping plan, reflecting the final tree and vegetation locations and specifications across the site.

  The "as-constructed" landscaping plan will be used as the basis for the ongoing maintenance and auditing that needs to be conducted and overseen by the Community Corporation.

  - The ongoing maintenance will need to be conducted year-round, with a focus on compliance prior to the commencement of, and during, bushfire season
  - An audit of the landscaping treatments is to be conducted by a BPAD Level 3 practitioner to occur prior to bushfire season, ideally with that required for other aspects of the development (refuge, access, water supply etc). A compliance certificate is to be provided to the local government prior to bushfire season commencing.

While the landscaping treatments are largely contained within the project area, they do extend onto the new "Leeuwin Way" public road reserve, and into the western extent of Smiths Beach Road reserve. Where this occurs, the required treatment/s is to be implemented and maintained by the Community Corporation in consultation with the City of Busselton, with the Community Corporation responsible for auditing onsite landscaping prior to bushfire season as detailed above.

6.3 Vehicular Access

A new vehicular access network is proposed throughout the main development which will be created using private driveways within the project area, and connecting to the existing Smith Beach Road at several locations and the new "Leeuwin Way" road. While most of this internal road network will be used by home owners, guests and visitors, there are several roads that are primarily for emergency services use, namely two roads interconnecting the holiday home precincts and out to Smiths Beach Road, as well as a perimeter access road for fire services only from the Western Holiday homes to the foreshore reserve driveway.

The internal road network is to comply with the following:

- Given the site constraints, these internal driveways will comply with the spatial layout requirements of the private driveway standards of the Guidelines (see Appendix M) such as maximum length, turnarounds etc.
- Given the public use of the proposed roads, the actual construction specification will comply the technical specifications for public road as per the Guidelines, especially the minimum width will be 6 m wide to accommodate two fire appliances (4 m wide sealed surface with 1 m wide shoulders either side).
- Vehicular access within the Foreshore Reserve is to be provided for the public, by refurbishing the existing driveway and turnaround at Smiths Point, and adding formal carparking along its length. Given this isn't a public road, this is to comply with the private driveway standards, including provision of passing bays every 200 m and compliant turning head.
- The two internal driveways within the holiday home precincts for emergency purposes only, to enable occupants and firefighters to traverse the development to Smiths Beach Road,

without using the central access driveway and “Leeuwin Way” road, limiting exposure to the southern bushfire hazard. These driveways will comply with the private driveway specification, although they must be a minimum of 6 m wide, and will be access controlled with lockable, removable bollards to prevent everyday use. The lockable bollard on the eastern driveway, is to be located >12.5 m east of the private driveway to Lot E16 (see Plate 17).

- The internal driveway provided solely for fire appliance access along the western interface of the development, enables fire appliances to travel from the Western Precinct, to the foreshore reserve driveway and to Smiths Beach Road. These driveways are also to be access controlled with lockable, removable bollards to prevent everyday use by home owners or the public. The bollard near the foreshore reserve driveway is to be setback 12.5 m to the south (see Plate 18). This fire appliance driveway to comply with the technical specifications for private driveways as per the Guidelines (see Appendix M), complete with passing bay to enable appliances to pass each other. The vegetation is relatively low in this area, generally ensuring clear lines of sight for elevated appliances.
- An access-controlled driveway will also be provided along "Smiths Common” to connect the :Smiths Lane” turnaround with the Smiths Beach Road turning circle, to form a loop road for emergency situations. This controlled access point from the campground, will also enable hotel management to permit deliveries to the community and hotel buildings, via the back-of-house loading dock.
- Keys for all access control bollards will be available to the ERT and local fire brigade, to enable them to be unlocked in a bushfire emergency.

Besides the onsite internal access network, a new public road (“Leeuwin Way”) is to be constructed to the WTP/WWTP and public carparking within the existing gazetted road reserve from Smiths Beach Road along the southern boundary of the project area. The new road will comply with the following:

- technical specifications of a cul-de-sac from the Guidelines (see Appendix M):
    - this will be a dead-end road, terminating just past the WTP and will have a compliant turnaround
    - the only deviation being it will exceed to 200 m length permitted for a dead-end public road

Access to Smiths Beach itself is to be provided by a new beach access ramp directly north of the development, to replace the existing ramp. This will enable nominated Surf Club personnel or emergency services to use for vehicular access to the beach, if required.

Creating a vehicular access network that fully complies with the Acceptable Solutions of the Guidelines is not achievable for the development, primarily due to the legacy 2 km long dead-end public road access to the project area. On this basis, the vehicular access to and within the site is subject to justification as part of a Performance Principle-Based Solution (PPBS), namely PPBS 2 in Section 7.5.2.

6.4 The construction of the access network will be by the Proponent. The Community Corporation shall engage a BPAD Level 3 bushfire practitioner to conduct audit of the roads and internal driveways to ensure that compliance with standards in this BMP. A compliance report is to be issued to the local government, and any noted defects are to be rectified as soon as practical and preferably prior to bushfire season.Bushfire Construction Requirements

Bushfire construction provisions of the National Construction Code (NCC) require that Class 1, 2, 3 and associated Class 10a buildings comply with the bushfire specific construction requirements of

AS 3959, in accordance with the assessed BAL. Whilst this applies directly to most of the building onsite, there are a few buildings that would not be trigger compliance with AS 3959 through the NCC. On this basis, given the bushfire risk to the site, this BMP will require that all buildings comply with the AS 3959 bushfire construction standards as detailed below.

The construction of buildings is expected to be by either the Proponent or private landowners, and shall comply with the BAL ratings dictated in this BMP. The Community Corporation shall engage a BPAD Level 3 bushfire practitioner to conduct annual spot checking of the buildings to ensure that compliance with the constructed BAL rating is maintained for the life of the building. A compliance report is to be issued to the local government, and any noted defects are to be rectified as soon as practical and preferably prior to bushfire season. The community refuge buildings are to be audited in accordance with Section 6.1.

6.4.1 Holiday homes (Western and Eastern precincts)

Based on BAL contours depicted in Figure 9, the following bushfire construction requirements apply to the holiday homes:

- All perimeter dwellings will be constructed to BAL-29, regardless of the assessed BAL rating
- All dwellings located away from the perimeter (i.e. those in BAL-12.5 or BAL-LOW) will be required to adopt a minimum BAL-12.5 construction standard

6.4.2 Hotel buildings

All hotel villas (i.e. Class 2 or 3) are to be constructed to the assessed BAL rating, but if located in an area of BAL-Low, shall comply with the AS 3959 BAL-12.5 construction standard.

6.4.3 Campground

The tent platforms will be sited in areas of BAL-12.5 or BAL-Low, however the guest tents are unlikely to comply with any BAL construction standard. The guest tents are considered a tolerable loss, with the focus to be on guest life safety which will be ensured through early notification to guests and priority safe offsite evacuation or relocation to the onsite bushfire refuge.

The following bushfire construction standards apply to the campground:

- The tent platforms are to comply with the AS 3959 BAL-12.5 construction standard, to ensure a level of bushfire resilience and avoid contributing to the fuel load.
- The common building, which will be in BAL-Low, will be required to comply with the AS 3959 BAL-12.5 construction standard.
- The amenities block and maintenance shed will be in BAL-12.5, and will be required to comply with the AS 3959 BAL-12.5 construction standard.

6.4.4 Infrastructure buildings and structures

The WTP building houses the water treatment and booster pumps for the onsite water system. The adjacent balance tanks and standalone bushfire water tank are critical to the firewater supply for the site. They are to comply with the following construction standards:

- The WTP and WWTP buildings/sheds/containers are to be constructed to an AS 3959 BAL-40 standard and any other measures detailed in Section 6.5.1 to increase resilience to bushfire.
- The water balance tanks, WWTP tanks and standalone bushfire water tank are to be steel construction with any critical exposed accessories to be non-combustible materials

Above-ground electrical transformers are to be of non-combustible construction comply with the requirements detailed in Section 6.6.1.

6.4.5 Onsite community bushfire refuge building

As outlined in Section 6.1, the nominated refuge building will be in BAL-10 and will comply with the following construction requirements:

- the BAL-12.5 construction requirements of AS 3959,
- any additional requirements required to comply with the *Design and Construction of Community Bushfire Refuges Handbook* (ABCB 2014).

6.5 Water supply (including bushfire fighting supply)

The bushfire fighting water supply will consist of a combination of:

- The Water Treatment Plant complete with reticulated potable water supply pipework and street hydrants throughout the development
    - A dedicated bushfire water tank will also be provided at the WTP/WWTP enclosure
- Dedicated onsite fire hydrant and fire hose reel systems
    - Fire hydrant and hose reel system to the Hotel precinct, complete with firewater storage tanks, pumpset and booster connection
- Standalone fire hose reel system to the campground

The water supply should comply with the relevant technical specifications from the Guidelines, reproduced in Appendix N, in addition to any specific requirements detailed below in the BMP.

The overall firewater design philosophy has been detailed as part of a Performance Principle-Based Solution (PPBS), namely PPBS 3 in Section 7.5.3, to address the WTP not being a typical water supply authority system due to location, and the use of multiple systems to provide firewater supply to the development.

6.5.1 Water Treatment Plant, balance tank/s and bushfire water tank

The Water Treatment Plant is critical to maintain firewater supply to the development and is required to include the following:

- The balance tank/s will be sized to accommodate the potable and bushfire water supply requirements of the development as follows:
    - a minimum of 100 kL is to be added to this capacity for bushfire fighting purposes, with minimum overall capacity of 200 kL.
    - balance tank/s are to be configured to ensure that the 100 kL bushfire water reserve is not consumed, or that the relevant personnel are alerted to prevent overuse of the reserve.
    - fire hydrant coverage is to be provided to the WTP, with no less than one hydrant at this location, to enable attending fire appliances to access the water in the balance tank/s via the WTP.
- An additional 50 kL dedicated bushfire fighting tank is to be located at the WTP, solely for suction by bushfire fighting appliances.
    - Suction connections from the bushfire water tank are to be constructed adjacent to a suitable hardstand or road, clear of carparking bays.

- The WTP, balance tanks and WWTP are exposed to bushfire impact, especially from the south, as such protection of this infrastructure is critical. This is to be achieved by:
    - Implementing an APZ around the WTP and WWTP infrastructure, especially a significant southern 27 m wide APZ to achieve BAL-12.5.
    - Construction of all WTP and WWTP infrastructure to the following standards:
        - buildings, sheds or containers are to comply with BAL-40 as per AS 3959 with the focus on non-combustible construction with sealing and screening of penetrations or openings
        - External infrastructure (i.e. not housed in a BAL-40 building e.g. tanks, external pumps etc), is to be constructed of non-combustible material, or enclosed, shielded, sealed or screened using a non-combustible material.
    - Construction of the balance tank/s and standalone bushfire fighting tank is to from steel with no exposed plastic pipework, valving or critical accessories.
    - The tanks and WTP buildings are to be surrounded by a non-combustible fence, no less than 2.1m high, to provide a level of shielding to low level equipment, and provide a barrier to bushfire spread into the enclosure.
- This system is expected to continue to operate during a bushfire emergency. The pumps for the reticulated potable water main are to be configured:
    - Have sufficient redundancy (e.g. duty/standby arrangement) to enable operation should power be lost to the WTP or in the event of pump failure
    - have sufficient duty for firefighting purposes, especially from street hydrants in the holiday home precincts.

6.5.2 Holiday home reticulated town main and street hydrants

The water supply pipework throughout the two holiday home precincts is to be designed and constructed in accordance with the principles of Water Corporation's No.63 Water reticulation Standard as much as practical for a development of this nature. All water supply pipework is to be below ground, in order to protect from bushfire impact.

The development shall comply with the requirements for hydrants in particular spacing and coverage. As a minimum, the following shall be achieved *'…the maximum distance between a hydrant and the rear of a building envelope, (or in the absence of a building envelope the rear of the lot) shall be 120m'.*

All street hydrants shall be below-ground sluice valve types (or similar approved) and shall be clearly marked to ensure visible and accessible to attending fire brigades.

6.5.3 Dedicated fire hydrant and hose reel system (hotel and community hub buildings)

The hotel and community hub buildings are to be protected by the dedicated onsite fire hydrant and hose system installed in the hotel precinct.

The firewater capacity is to be sized in accordance with the relevant Australian Standard, but shall be no less than 225 kL overall capacity including 50 kL for bushfire fighting purposes.

- Suitable suction connections for bushfire fighting appliances are to be constructed adjacent to a suitable hardstand or road, clear of carparking bays.
- Provide an additional fire hydrant adjacent to the fire access road in the western part of the site, and also at the hotel arrival turning head, as nominated on Figure 4.

6.5.4 Firewater for community bushfire refuge building

Internal fire hydrant and fire hose coverage is to be provided from the system outlined in Section 6.5.3.

External perimeter fire hose reel coverage to achieve coverage of the perimeter of refuge building for distance of 10m, is to be provided in accordance with *ABCB Design and Construction of Community Bushfire Refuges Handbook.*

6.5.5 Campground

Provide a standalone fire hose reel system for the campground, with the design and coverage to comply with the Caravan Parks and Camping Ground Regulations and AS 2441. As a minimum, coverage shall be provided around the perimeter of both buildings and to each of the proposed tent platforms.

6.5.6 Construction and ongoing management

The Proponent intends to enter into an agreement with Water Corporation for the potable water supply to the proposed development. On this basis, it is assumed construction of the WTP infrastructure, including incoming water supply pipework, will be by the Proponent and Water Corporation as negotiated. The ongoing management will be by the Community Corporation and Water Corporation, as negotiated.

The construction of the potable and fire water systems, including fire hydrant and fire hose reel systems, is expected to be by the Proponent prior to development occupation. Ongoing maintenance of these systems, including tank filling, will be the responsibility of the Community Corporation. A statement of compliance of the firewater systems is to be issued to the local government prior to bushfire season to ensure readiness.

6.6 Protection of Essential infrastructure

It is considered a key element of the strategy to protect essential infrastructure, where within the Proponents control, to ensure this can operate during the bushfire and following passing of the front, or at least be rapidly reinstated. The following measures are critical to ensure the various infrastructure and services are protected from potential bushfire impact. Protection of the water supply and bushfire fighting water supply is addressed in Section 6.5, which also protects the WWTP.

6.6.1 The construction of essential infrastructure will be by the Proponent. The Community Corporation shall ensure a statement of compliance of the essential infrastructure systems is issued to the local government prior to bushfire season to ensure readiness, and any noted defects are to be rectified as soon as practical and preferably prior to bushfire season.Power Supply

Tishe existing above-ground high voltage power supply to the areais expected to be extended to an onsite connection point, consisting of a transformer and main switchboard. From the connection point, power will be reticulated throughout the development via below-ground power cabling with several above-ground transformers.

It is a requirement of this BMP that the following be implemented in the power supply network:

- Onsite power supply is reticulated through below-ground cabling to reduce likelihood of power disruption by bushfire and limits chance of ignition.
- Above-ground transformers
    - are to be positioned within the development to avoid siting near unmanaged vegetation, wherever possible.

- If located near managed vegetation within the development, transformers are to comply with the relevant separation requirements derived the National Construction Code, AS 2067 and any relevant Western Power design guidance.
- If they are exposed to unmanaged vegetation, or there is any concern about potential bushfire impact on the transformer, then the transformers must have suitably sized APZs to limit potential for bushfire impact or have a 2hr fire rated enclosure.
- Are to be non-combustible construction with any openings to combustible materials or critical elements (circuitry etc) to be screened from ember attack

- To overcome the likelihood for power loss during and after a bushfire, due to the existing regional above-ground power infrastructure, the power system design is to include network tie-in points to enable temporary generators (e.g. containerised types) to be easily connected to the site power network following a bushfire emergency to temporarily restore power if required.

Besides the main power supply, the onsite community bushfire refuge building is to have a dedicated generator to provide backup power supply, in accordance with the *Design and Construction of Community Bushfire Refuges Handbook (ABCB 2014*). This generator is to be located within the back-of-house of the refuge building, to protect it from bushfire impact, but also to enable its operation from a place of safety.

6.6.2 Telecommunications and site communications systems

Communication systems will be critical to enable the onsite Emergency Response Team to relay status and actions to occupants during a bushfire in order to manage the emergency and the recovery, as well as communicate with offsite emergency services.

While existing mobile phone coverage to the area is already strong from various network suppliers, and it is expected to be a preferred method of communication in an emergency given the widespread nature of their use, coverage could be unreliable in a bushfire emergency due to volume of usage and bushfire impact on infrastructure. On that basis, this BMP requires the following to be conducted regarding communication systems, in order to support the implementation of the BEMP:

- Internet service is to be provided throughout the hotel buildings, the community hub and to all holiday home buildings, to enable ethernet and Wi-Fi connections. This service which will allow access to all web-based information and also enable VOIP phone communications.
- Make provision on the hotel website for bushfire forecast and emergency update information. All staff and guests are to be made aware of this function as part of induction or check-in.
- Provide a public address and/or fire occupant warning system, complete with internal speakers and external sirens to enable emergency warning to all parts of the community hub and hotel public area buildings while also providing external warning to the external parts of the hotel and the campground.
  - The head-end of the system is to be installed in the hotel arrival/offices to enable the onsite Emergency Response Team to communicate with all occupants in the community bushfire refuge.
  - This system is to be designed with suitable battery backup to enable its operation in a bushfire emergency.
- An onsite SMS messaging alert service is to be established to enable the ERT to send text messages to all staff, home owners (and guests and visitors) during a bushfire emergency

- At least one satellite telephone is to be procured to enable the Chief Fire Warden to liaise with offsite emergency services, and onsite occupants if required.
- Sufficient two-way handheld radios/walkie talkies and mobile loudspeakers are to be provided for ERT use during a bushfire emergency
- Promote that all home owners have VOIP capability and battery powered radios for emergency use
- Establish noticeboards at the locations nominated in Section 2.4 of the BEMP, to enable posting of bushfire forecast information.

6.6.3 Gas Supply

Gas supply is primarily a potential risk during a bushfire, especially above ground LPG bottles which can explode in a bushfire. The following requirements are to apply to the proposed gas supplies for the development:

- The hotel/community hub LPG bullet, pipework and valving
    - Bullet is to be in the back-of-house or in a location shielded from bushfire impact
    - any gas piping and valving exposed to potential bushfire impact is to be below ground, constructed of non-combustible materials or otherwise shielded from bushfire impact
- The holiday home LPG bottles proposed at each dwelling are to comply with following:
    - be located further than 6m from flammable material
    - be secured to wall or support using non-combustible restraint,
    - have metal piping and fittings with the safety release valve oriented away from the building and access/egress routes.

6.6.4 Sewer (Wastewater) Services

The sewer systems for the Eastern holiday homes and Campground are expected to be below-ground onsite treatment systems, which will be protected from bushfire impact. The system serving the Hotel, Community Hub and Western Holiday homes, will include a below-ground pumped service to the proposed Wastewater Treatment Plant (WWTP) co-located with the WTP. The WWTP infrastructure is exposed to potential bushfire impact, similar to the WTP.

Whilst sewer infrastructure is not necessarily critical from bushfire emergency perspective, this infrastructure requires protection to enable rapid reinstatement in the recovery phase as this could cause parts of the development being unusable for periods of time.

For the sewer systems in the Eastern holiday homes and Campground, it is recommended that any exposed part of the treatment systems, that could prevent rapid recovery, is either below-ground or constructed of non-combustible material to provide resilience to bushfire.

The WWTP will require the same level of protection as the WTP infrastructure, and the measures proposed for the WTP in Section 6.5.1 for construction of buildings/sheds/enclosures, tanks and external infrastructure, will need to apply to the WWTP infrastructure to ensure adequate resilience to bushfire impact.

6.7 Landscaping Reticulation System

A bespoke reticulation system is to the provided to the proposed green roofs, production garden and landscaping surrounding the refuge, to address the potential risks associated with having vegetation adjacent to the onsite refuge building. The following requirements apply to the reticulation system/s to the refuge landscaping:

- The design of the reticulation system is to

- Have sufficient secure and protected water supply to enable no less than 2-hour continuous operation. The preference is for there to be two separate water supplies to remove a single point of failure (e.g. two tank supplies). The required water should be additional to any other existing supply requirements, to ensure it is available in a bushfire emergency.
- Have a suitably sized and protected pumps to deliver design pressure and flow to the reticulation system. The preference is for dual pumps to remove a single point of failure. Pumps are to be housed in a location that is protected from bushfire impact, including embers and smoke (if naturally aspirated).
- Sprinkler design is to be such that there is significant overlapping coverage to accommodate windy conditions
- The system around the refuge landscaping, gardens and roof, are to be on independent zone/s that can be activated individually from the refuge, ideally at the hotel arrival/offices to enable the onsite Emergency Response Team to control during an emergency.

- The reticulation system sprinklers, pipework and valving are to be protected from bushfire impact, as much as practical.
  - Any pipework and valving is to be below-ground as much as possible, but if above-ground or exposed, it shall be metal or shielded by non-combustible construction.
  - All sprinklers are to be metal
- The system is to be run weekly during bushfire season and fully tested each year prior to bushfire season.

The Community Corporation shall ensure a statement of compliance of the landscaping reticulation system around the refuge is issued to the local government prior to bushfire season to ensure readiness.

6.8 Bushfire Emergency Management Plan (Entire Development)

The proposed development constitutes a vulnerable land use, with a site-specific bushfire emergency management plan (BEMP) has been produced for the proposed development to address the requirements of Policy Measure 6.7. The BEMP documents the emergency management arrangements and procedures for ensuring safety of occupants during a bushfire emergency. The overall bushfire emergency management strategy makes allowance for the following occupants who are outside the development but would still be impacted by the legacy access non-compliance:

- occupants in adjacent tourism accommodations,
- visitors to Smiths Beach and Canal Rocks and the Aquarium,
- local residents on Canal Rocks Road but outside the development, and
- Cape-to-Cape walkers

The BEMP includes the following arrangements and procedures for ensuring safety of occupants during a bushfire emergency:

- Clearly detail the required roles and responsibilities and emergency contacts including:
  - the Emergency Management Team who will be responsible for the development, documentation, review and revision of the BEMP to enable its use in a bushfire emergency
  - the Emergency Response Team who are the group of people responsible for directing and controlling the implementation of the BEMP in a bushfire emergency. This is expected to be primarily hotel management and staff, potentially with some holiday home owners.

- Monitoring of forecast Fire Danger Ratings and Total Fire Bans for the next day to guide pre-emptive actions on days with predicted heightened bushfire behaviour
    - Detail restricted actions on days when a Total Fire Ban is declared
    - Detail pre-emptive actions on days based on the forecast Fire Danger Ratings or if a Total Fire Ban is declared including:
        - nominated staff alerting on-site occupants of the increased bushfire risk
        - additional rostering of staff if required
        - conducting daily preparations and preparing the bushfire refuge
- Ongoing monitoring of bushfire conditions by nominated staff during bushfire season and if the Fire Danger Rating is elevated, to enable early warning to all guests, visitors and staff utilising the proposed communication systems.
    - Situational monitoring is to include reviewing the Emergency WA website, any other relevant sources, including visual signs
- Detail the activities to be undertaken by the ERT, other staff and other occupants at different levels upon becoming aware of a bushfire emergency including the following scenarios:
    - Based on the bushfire emergency warning level of 'Advice', Watch and Act' or 'Emergency Warning' alert being issued by an emergency services authority.
    - Depending on the location of the bushfire from within 30 km of the project area
    - During the period immediately after a bushfire has impacted on the site (known as the 'Recovery Phase').
- The emergency response actions are to include:
    - Early and continued contact with the authorised Emergency Services or DFES representative (where possible).
    - Early notification of all occupants using the proposed communication strategy, to provide warning of a bushfire scenario and response information.
    - Promotion of pre-emptive and early safe offsite evacuation to preferred off-site location/s (depending on bushfire scenario) only if roads are safe to travel and uncongested, and preferably with consultation and agreement with authorised Emergency Services or DFES representative (where possible).
        - Procedures detailed for early offsite evacuation to preferred off-site location
    - Procedures for last resort shelter at the onsite community bushfire refuge, if offsite evacuation is not safe to undertake, or traffic is too congested
    - Promote the priority offsite evacuation, or relocation to the bushfire refuge, of:
        - guests staying in campground accommodation
        - guests and home owners along parts of the facility likely to be impacted by bushfire first
        - any vulnerable occupants (elderly, respiratory problems, sick/injured)
        - who have no other evacuation or sheltering options
        - Areas of the Cape-to-Cape track near the development and easily accessible to resort staff

- Notify Smiths Beach, Canal Rocks and Aquarium visitors, Cape-to-Cape track walkers and adjacent developments (CRBFA, SBR, CSBV) of the bushfire emergency, the recommended response action and that refuge can be sought at the bushfire refuge if required. Any advice provided to the people who are ***not occupants of this development is courtesy for their information only, and these people are still to make their own response decision.*** Staff are not considered responsible for people not at the development.

- Include ongoing activities to be conducted to ensure an adequate level of bushfire preparedness including:
  - Ongoing compliance with BMP
  - Preparation of community bushfire refuge
  - Regular review of the BEEP
  - ERT and staff training and exercises
  - Engagement with adjacent accommodation facilities, local residential landowners and local fire brigade.
  - Incorporates community and development awareness and education strategy

Provide a robust site communication strategy to ensure onsite Emergency Response Team can notify occupants (including guests, visitors, home owners and staff etc) of a bushfire emergency and enable them to manage the emergency.

- The communication systems are expected to include a combination of:
  - Mobile phone communication potentially in combination with SMS messaging services
  - Web-based notification (intranet, webpages etc) using fixed wireless internet
  - Onsite notification systems (e.g. public address and/or fire occupant warning) through the hotel buildings and campground
  - Mobile loudspeakers
- Include communication with adjacent developments (CRBFA, SBR, CSBV) and residential landowners (if possible).
- Management of any open fires i.e. what days and what conditions.

Ensuring the BEMP is implemented is the responsibility of the Community Corporation, including establishing the EMT and ERT, undertaking all ongoing review, training and exercises, and ensuring readiness to manage a bushfire emergency including preparedness of the bushfire refuge. It is a requirement of the BMP that the Community Corporation and hotel management (who will form the EMT and ERT) review the BEMP in consultation with a Level 3 BPAD practitioner, to update and tailor the BEMP to the final development, occupants and facility management.

6.9 Community Corporation responsibilities

Establish the Community Corporation, and ensure they are understand their responsibilities regarding the following bushfire risk management measures:

- Review and implement the project BEMP prior to occupancy, and conducting all ongoing review, training and exercises, and ensuring development preparedness to manage a bushfire emergency.
- Ongoing management, auditing and enforcement of onsite landscaping including APZs and areas of APZ-Modified and low threat vegetation

- Ongoing maintenance ,and annual auditing and testing for the refuge is conducted each year prior to bushfire season.
- Ongoing maintenance, and auditing of the hotel, campground and Water Treatment Plant buildings, other than the refuge buildings, for bushfire construction compliance each year prior to bushfire season.
- Spot check of holiday home buildings for bushfire construction compliance each year prior to bushfire season.
- Spot check of holiday home, hotel, campground and Water Treatment Plant buildings, other than the refuge buildings, each year prior to bushfire season.
- Ongoing maintenance, and auditing of internal vehicular access routes each year, including all bollards to ensure they can be easily unlocked and removed, prior to bushfire season.
- Ongoing maintenance, and annual auditing and testing of all fire hydrant and hose reel systems, and fire water tanks, each year prior to bushfire season
- Ongoing maintenance, and annual auditing and testing of all communications system, each year prior to bushfire season
- Ongoing maintenance, and annual auditing and testing of all other essential infrastructure systems detailed in the BMP, each year prior to bushfire season
- Enforce the application of the CoB firebreak notice throughout the development, in particular burning times and use of open fires

The Community Corporation is to have appropriate authority to audit bushfire related compliance throughout the entire site, and where defects are identified, be able to enforce their rectification prior to bushfire season, or as soon as possible. They shall allow to engage a BPAD Level 3 bushfire practitioner, accompanied by a fire engineer as required, to conduct the audit of the community bushfire refuge, onsite landscaping treatments (using "as-constructed" landscaping plans in the VMP), building construction, internal vehicular access routes (including access-control), water supply and wet fire systems, essential infrastructure, and communication systems each year prior to bushfire season. A compliance report is to be issued to the City of Busselton, and where defects are identified, enforce their rectification.

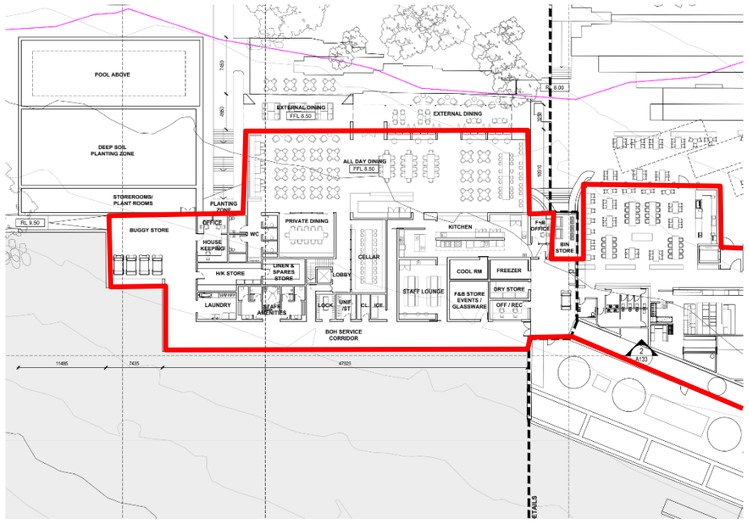
6.10 BAL compliance and/or BAL assessment report

A BAL compliance and/or BAL assessment report may be prepared at the discretion of the decision-maker following completion of construction works and prior to issue of certificate of occupancy to validate and confirm the accuracy of the BAL contour assessment; or demonstrate any change in the assessed BAL or other management measures documented in this BMP, which may occur as a result of changes in building location, vegetation class or bushfire management approach.

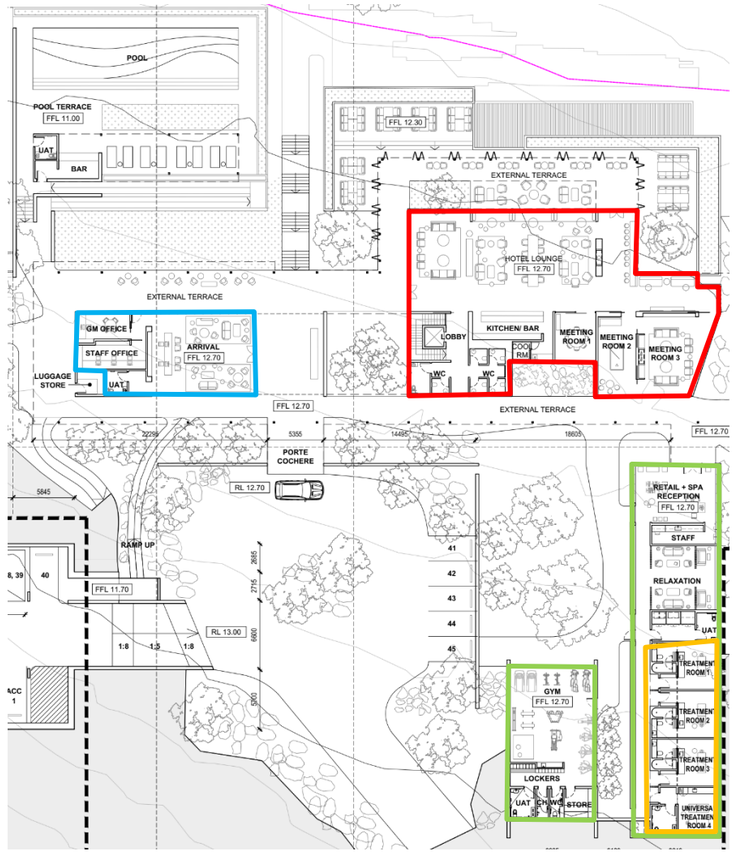
It is noted that regardless of the assessed BAL rating, all buildings are to be constructed in accordance with the minimum BAL ratings stated in Section 6.4 of the BMP.

6.11 Compliance with annual firebreak notice

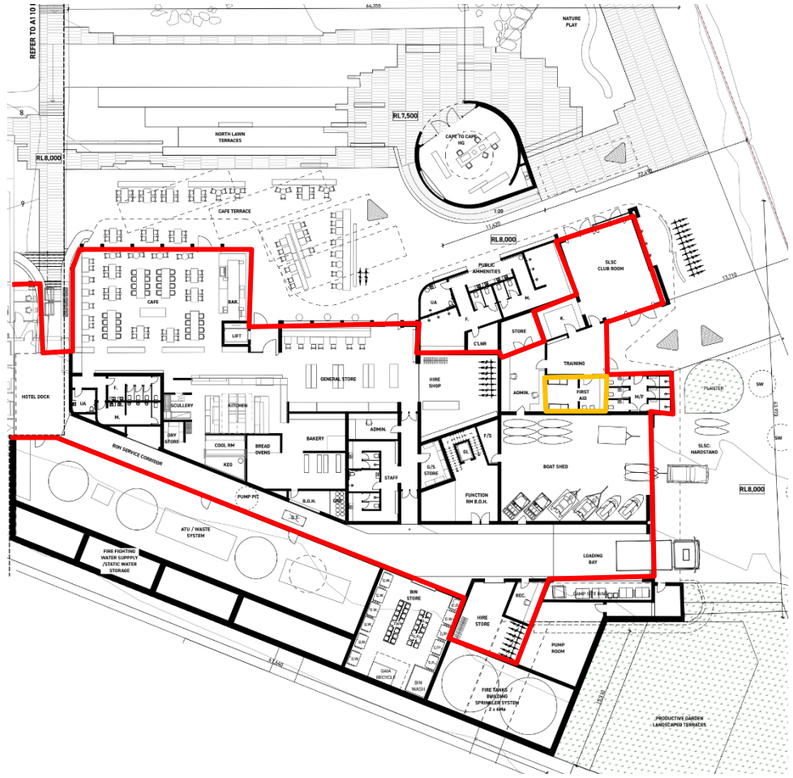
The Community Corporation and landowners are to comply with the City of Busselton annual firebreak notice (refer to Appendix O), unless altered under this BMP, including any approved variations (should they exist).



Hotel - Ground Floor

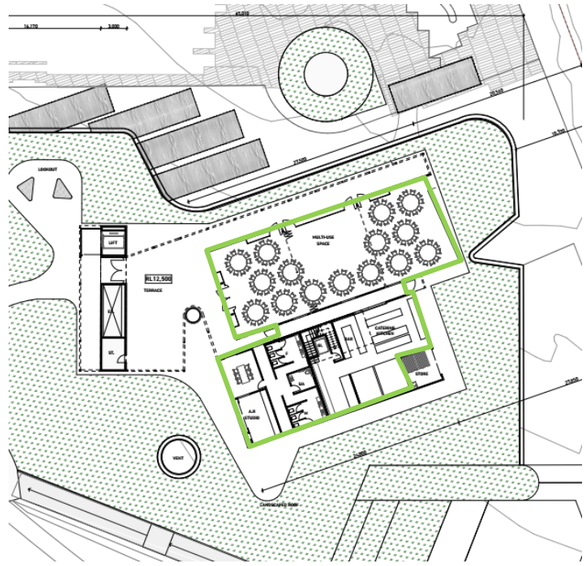


Hotel - Level 1



Community Hub – Ground Floor

- Refuge - Command Centre
- Refuge – Primary
- Refuge – Overflow/Surge
- Refuge – First Aid Post



Community Hub – Level 1

Figure 10: Community Bushfire Refuge areas

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Overall APZ extent

APZs (width in m)

- 10
- 13
- 15
- 25
- 25.8
- 27
- 31.9
- APZ (Modified) - Hotel/Suites
- APZ (Modified) - Holiday Homes
- Additional APZ
- Low Threat Vegetation – Park Spine
- Low Threat Vegetation – Campground
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Emergency driveway (occupants and Fire Services)
- Internal fire appliance driveway
- Private driveway
- Existing public roads
- New public road
- WTP/WWTP Fence
- Indicative WTP/WWTP infrastructure
- Roads (MRWA)

BAL building construction

- BAL 40
- BAL 29
- BAL 19
- BAL 12.5

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 30-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

BUSHFIRE MANAGEMENT MEASURES – VEGETATION MANAGEMENT AND BUILDING CONSTRUCTION

FIGURE 11

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_11_A3_BF_Measures.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

7. Compliance Assessment

The compliance pathway was discussed in Section 3, and summarised in Section 3.3, with the proposal needing to demonstrate compliance with SPP 3.7 Policy Intent and Policy Objectives, and where possible with the relevant Policy Measures and Bushfire Protection Criteria of the Guidelines (using a combination of Acceptable Solutions and Performance Principle-Based Solutions). Given compliance is not able to be achieved with Element 3 of the Guidelines, assessment against the Tourism Land Use Position Statement is also required for tourism land uses, while the holiday homes (which can be used for extended length stays) will also require additional justification against principles detailed by the Tribunal.

7.1 Assessment against Policy Intent, Policy Objectives and Policy Measures of SPP 3.7

Table 11 provides a compliance assessment against the Policy Intent and Objectives of SPP 3.7.

Table 11: Compliance with the Policy Intent, Policy Objectives and Policy Measures of SPP 3.7

Policy Intent/Objective		Development Response
Policy Intent		
	This policy intends to implement effective, risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure.	• Given the Policy Intent refers to use of *"…risk-based land use planning and development…"* to demonstrate life is preserved and impact on property and infrastructure reduced, a bushfire risk assessment has been conducted in Appendix J of this BMP, in accordance with the methodology provided in the Tourism Land Use Position Statement, and other guidance. • The residual bushfire risk to the development (see Table 33), following implementation the bushfire risk management strategy and suite of management measures proposed in Section 6, demonstrates that despite a second public road not being able to be provided to the project area (a deviation from the Guidelines), that life is able to be preserved primarily through the provision of the bushfire refuge supported by the project BEMP, and that bushfire impact to proposed property and infrastructure can be reduced to acceptable or tolerable levels. • Compliance with the Policy Intent has also been demonstrated using a combination of the SPP 3.7 Policy Objectives, relevant SPP 3.7 Policy Measures and Bushfire Protection Criteria from the Guidelines, and the Tourism Land Use Position Statement Policy Objectives.
Policy Objectives		
5.1	Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.	• As clarified by the Tribunal, the intent is not to require there be no increase at all in the threat of bushfire, but to comply with the Policy Intent by preserving life and reducing impact on property and infrastructure. • There are no high-risk land uses proposed as part of the proposal, and the proposed revegetation is relatively minor along the foreshore and infill of some existing cleared internal firebreaks, that will not increase bushfire behaviour or threat to people, property or infrastructure over the existing hazard. • The implementation of the bushfire risk management strategy and suite of management measures, ensures that the risk has been appropriately reduced. The provision of the bushfire refuge supported by the project BEMP, in conjunction with all other proposed measures, ensure the legacy single public road access doesn't pose a risk to life safety, especially if offsite evacuation is unsafe to undertake, or traffic is too congested.
5.2	Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.	• The bushfire risk to the development has been assessed, and reduced to an appropriate level, as part of the bushfire risk assessment conducted in Appendix J of this BMP, as well as assessed against the compliance requirements of the Guidelines and the Tourism Land Use Position Statement. • The residual bushfire risk to the development (see Table 33), following implementation the bushfire risk management strategy and suite of management measures proposed in Section 6, demonstrates that despite a second public road not being able to be provided to the project area (a deviation from the Guidelines), that life is able to be preserved primarily through the provision of the bushfire refuge supported by the project BEMP, and that bushfire impact to proposed property and infrastructure can be reduced to acceptable or tolerable levels. • Upon implementation of the proposed vegetation modification strategy, all habitable development will be located in BAL-29 or less, with sufficient protection established to the essential infrastructure and a secure and available bushfire fighting water supply provided. • In addition to the reduction in residual risk demonstrated by the bushfire risk assessment, compliance is also established with the relevant SPP 3.7 Policy Measures and Bushfire Protection Criteria from the Guidelines, and the Tourism Land Use Position Statement Policy Objectives.
5.3	Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.	• The BMP complies with Policy Measures 6.2 and 6.5 as outlined below, other than the deviation from Element 3 of the Guidelines resulting in deviation from Policy Measure 6.5 (c). • The BMP has assessed the bushfire risk to the development, and demonstrated that the residual risk can be appropriately reduced. • The BMP contains a summary of the bushfire risk management strategy and suite of management measures required in Section 6, with a detailed implementation and ongoing maintenance and auditing plan in Section 8.

5.4	Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.	• The following has been incorporated into the proposed management measures, to balance bushfire risk management with environmental and visual amenity objectives:
		  ○ Implementing onsite vegetation management to achieve BAL-29 construction, to minimise APZ widths where possible
		  ○ Ensuring the stringent APZ standards are only implemented on key interfaces with unmanaged vegetation around the perimeter of the development and critical infrastructure
		  ○ Adopting bespoke APZ-Modified and low threat vegetation landscaping treatments, within the perimeter APZs, to enable the following.
		  – Retention of trees, as much as possible, for Western Ringtail Possum and Black Cockatoo habitat, and to meet visual amenity objectives
		  – Create isolated shrub islands, to retain discrete and isolated plots of mid-storey vegetation for fauna habitat in campground and park spine

Policy Intent/Objective		Development Response
		– Rationalising of the shrub spacings, based on mature height, and seeking to retain additional shrub cover ○ The development avoids the adjacent PEC, which will largely be left intact ○ Revegetation of portions of the foreshore and targeted retention of established coastal shrubs in APZ-Modified (Hotel) precinct. • The proposed landscaping design process is to include the creation of detailed landscaping plans (in the Vegetation Management Plan), informed by the results of a detailed vegetation survey/s to be conducted as a condition of development approval, which will depict exactly what trees are to be retained and removed as part of the proposed landscaping treatments. Following the clearing and construction works, the detailed landscaping plans are to be updated to become an "as-constructed" landscaping plan, reflecting the final tree and vegetation locations and specifications across the site, and these will be used as the basis for the ongoing maintenance and auditing that needs to be conducted and overseen by the Community Corporation. • The environmental and visual amenity reporting that accompanies this application, demonstrate in further detail how their objectives are achieved using the landscaping treatments proposed. • The bushfire risk assessment conducted in Appendix J of this BMP, demonstrates that following implementation the bushfire risk management strategy and suite of management measures proposed in Section 6, including implementation of the proposed landscaping, residual risk can be reduced to acceptable or tolerable levels. • Climate change can impact bushfire weather patterns over time, which can impact on the appropriateness of various bushfire mitigation measures, should the FFDI be underestimated. The FFDI analysis, conducted using BoM data from the Cape Naturaliste weather station, produces a FFDI of 49.1 for a 1:200 return period, which is considerably lower than the state-adopted FDI 80 used to size the APZs as part of this proposal. It is considered there is sufficient safety factor to ensure it is highly unlikely that long-range climate change would result in an FFDI exceeding 80 at the proposed development.
Policy Measures		
6.2	**Strategic planning proposals, subdivision and development applications** a) Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures. b) Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a) applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5 c) This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.	• Upon completion of the development, the proposed landscaping treatments will ensure all habitable development will be located in BAL-29 or less • Compliance has been demonstrated with Policy Measure 6.5 for the proposed development as detailed below, other than the deviation from Element 3 of the Guidelines resulting in deviation from Policy Measure 6.5 (c).
6.5	**Information to accompany development applications** Any development application to which policy measure 6.2 applies is to be accompanied by the following information in accordance with the Guidelines: a) (i) a BAL assessment. BAL assessments should be prepared by an accredited Level 1 BAL Assessor or a Bushfire Planning Practitioner unless otherwise exempted in the Guidelines; or (ii) a BAL Contour Map that has been prepared for an approved subdivision clearly showing the indicative acceptable BAL rating across the subject site, in accordance with the Guidelines. BAL Contour Maps should be prepared by an accredited Bushfire Planning Practitioner b) the identification of any bushfire hazard issues arising from the BAL Contour Map or the BAL assessment; and c) an assessment against the bushfire protection criteria requirements contained within the Guidelines demonstrating compliance within the boundary of the development site This information can be provided in the form of a Bushfire Management Plan or an amended Bushfire Management Plan where one has been previously endorsed.	• A BAL contour map for the development is provided on Figure 9, which shows all habitable development can be located in BAL-29 or lower • The bushfire hazard issues have been identified as part of the bushfire risk assessment, in Appendix J of this BMP • The assessment against the bushfire protection criteria of the Guidelines is contained within Table 12. ○ Compliance has been demonstrated with the Intent and Performance Principles of each element, other than Element 3, using a combination of Acceptable Solutions and/or Performance Principle-Based Solutions ○ The deviation from Element 3 is due to the legacy single public road to the site, and rather than achieving full compliance with Element 3, it has been demonstrated the proposed bushfire risk management strategy complies with SPP 3.7 Policy Intent, Policy Objectives and the Tourism Land Use Position Statement Policy Objectives. ○ Most management measures are contained within the project area, with some management extending into the "Leeuwin Way" road reserve, the western side of Smiths Beach Road reserve and within the Foreshore Reserve, which are all being included as part of the development • This BMP provides all the above information.
6.6	**Vulnerable or high-risk land uses** 6.6.1 In areas where BAL-12.5 to BAL-29 applies Subdivision and development applications for vulnerable or high-risk land uses in areas between BAL-12.5 to BAL-29 will not be supported unless they are accompanied by a Bushfire Management Plan jointly endorsed by the relevant local government and the State authority for emergency services. Subdivision applications should make provision for emergency evacuation. Development applications should include an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards.	• Given the tourism land use, and likely public visitation, people at the development are likely to be unfamiliar with the site and not necessarily able to appropriately respond to bushfire without assistance. On this basis, the development is assessed as a 'vulnerable land use'. • A Bushfire Emergency Management Plan (BEMP) accompanies this BMP, which details the preparedness, awareness, pre-emptive, response and recovery actions that are required to successfully respond to a bushfire emergency in the area. • The BEMP proposes pre-emptive and early offsite evacuation be conducted, if safe to do so, and onsite shelter-in-place within the designated community bushfire refuge be undertaken as a last resort action, when offsite evacuation is not safe.
6.8	**6.8 Advice of State/relevant authority/s for emergency services to be sought**	• Given the nature of the project It is expected that that this application will be referred to DFES, as the relevant emergency services agency, for comment as part of the Development Assessment Forum in addition to consultation prior to the formal lodgement of the application. • It is noted that while their advice required to be considered, their approval is not required to endorse the proposal in accordance with SPP 3.7.

Policy Intent/Objective		Development Response
	The advice of the State/relevant authority/s responsible for emergency services is to be sought and considered in the preparation and determination of all strategic planning proposals , subdivision and development applications where: a) compliance with these policy measures is unlikely to be achieved; and/or b) additional/alternative measures are proposed; and/or the application contains unavoidable development, or vulnerable or high-risk land uses	
6.9	**Advice of State/relevant agencies/ authorities for environmental protection to be sought** To ensure landscape amenity, environmental protection and biodiversity conservation values are taken into account; the decision-maker is to seek the advice of the State/relevant agencies/authorities responsible for biodiversity conservation management and environmental protection when making decisions on strategic planning proposals, subdivision and development applications where: a) the clearing of vegetation within environmentally sensitive areas protected under State or Federal legislation is proposed; and/or b) substantial clearing of locally significant native vegetation is proposed; and/or development abuts vegetated land managed by that authority.	• Given the nature of the project, it is assumed the proposal will be referred to the appropriate environmental agencies for review and advice • The decision to refer or the level at which to consider the referral advice, is considered to be at the discretion of the decision-maker
6.11	**Precautionary principle** Where a landowner/proponent has not satisfactorily demonstrated that the relevant policy measures have been addressed, responsible decision-makers should[1] apply the precautionary principle to all strategic planning proposals, subdivision and development applications in designated bushfire prone areas. For example, if a landowner/proponent cannot satisfy the performance principles of the relevant policy measures through either the application of the acceptable solutions outlined in the Guidelines, or through the alternative solutions endorsed by the WAPC and State authority/relevant authority responsible for emergency services, the application may not be approved. [1] In this context, "should" is to be read as a strong recommendation. In relation to strategic planning proposals, subdivisions and development applications, this policy also recognises that each site is to be assessed on merit and that the determination of an application may involve the use of discretion in planning decision-making to support innovative bushfire risk management solutions.	• The Tribunal has clarified the application of Precautionary Principle, and considered that there must be sufficient uncertainty that "the potential for **significant adverse impacts** can be adequately reduced" before the use of the Precautionary Principle could be considered. • The use of a bushfire risk assessment is a useful tool in demonstrating that there is no potential for significant adverse impacts, which can be achieved by showing the residual risk can be appropriately managed, in particular preservation of life • The bushfire risk assessment conducted in Appendix J of this BMP, demonstrates that following implementation the bushfire risk management strategy and suite of management measures proposed in Section 6, including implementation of the proposed landscaping, residual risk can be reduced to acceptable or tolerable levels. • It is not considered there is any reasonable basis for applying Precautionary Principle to this proposal, given there is sufficient certainty that any significant adverse impacts can be adequately reduced.

7.2 Compliance against the Bushfire Protection Criteria of the Guidelines

In response to the requirements of SPP 3.7 and the Guidelines, bushfire management measures have been devised for the proposed development in accordance with Guideline acceptable solutions, where possible, to meet compliance with bushfire protection criteria. Where compliance with the Acceptable Solutions has not be achieved, a Performance Principle-Based Solution demonstrated compliance with the Intent of the Element, primarily underpinned by the bushfire risk assessment conducted in Section Appendix J of this BMP, including the development of the holistic bushfire risk management strategy as summarised in Section 6. A 'combined assessment' is provided in Table 12 to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

Table 12: Compliance with the bushfire protection criteria of the Guidelines

Bushfire protection criteria				**Development response**		
Element	**Intent**	**Performance Principle**	**Acceptable solutions**	**Method of compliance**	**Proposed bushfire management measures**	**Compliance Comment**
Element 1: Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.	Performance Principle P1 Development location The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low, or a BAL-29 or below, and the risk can be managed. For unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of the Department of Fire and Emergency Services and the decision-maker.	A1.1 Development location The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below.	**Acceptable Solution**	• The BAL contour maps (see Figure 9) demonstrate that following the implementation of the APZs, APZ-Modified and low threat vegetation treatments, all habitable buildings associated with the proposed development will be subject to a BAL rating of BAL–29 or lower. • It is noted that areas of BAL-40/FZ will remain within the project area following completion of development, primarily within the land ceded to the National Park. In accordance with guidance provided by the WAPC Element 1 & 2 Position Statement, this is considered permissible where the developable land does not generally contain areas of BAL-40/FZ. The risk from the post-development areas of BAL-40/FZ is demonstrated to be adequately managed by the development within the bushfire risk assessment and the PPBS's.	• Compliance is able to be achieved with Acceptable Solution A1.1 • Compliance of the Intent and Performance Principle of Element 1 is achieved through compliance with Acceptable Solution A1.1

Element 2: Siting and design of development	To ensure that the siting and design of development minimises the level of bushfire impact.	Performance Principle P2
		The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. That it incorporates a defendable space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.
			A2.1 Asset Protection Zone (APZ)
			Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:
			Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL–29) in all circumstances.
			Location: the APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes)
			Management: the APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' (see Guidelines Schedule 1).
				Acceptable Solution and Performance Principle-Based Solution 1	• On completion of proposed development, following the implementation of the nominated APZs, APZ-Modified and low threat vegetation treatments, will ensure all habitable buildings are located in BAL-29 or lower.
					• The APZs nominated in Section 6.2.1 include the following
					  ○ A variable width 10 m to 25 m wide APZ around the perimeter of the habitable building extent of the development
					  – The only exception is the northern interface between the hotel suites and eco-suites and the unmanaged vegetation in the Foreshore Reserve, which will be landscaped to an APZ-Modified standard. This is justified in PPBS 1 in Section 7.5.1.
					  ○ A variable width 25.8 m to 31.9 m wide APZ around the community bushfire refuge buildings
					  ○ A variable width 13 m to 27 m wide APZ around the WTP and tank enclosure
					• All APZs are to comply with Schedule 1 of the Guidelines (refer to Appendix L), and maintained perpetuity in accordance with Schedule 1.
					  ○ The only deviation from the APZ standards are the proposed green roofs and the production garden, which is justified in PPBS 1 in Section 7.5.1.
					• Outside the nominated APZs, all vegetation within the perimeter APZ is to be modified to either APZ-Modified or low threat vegetation in perpetuity, in accordance with Sections 6.2.2 and 6.2.3 of the BMP and the Landscaping Report. While the APZ-Modified treatment proposed around buildings, will largely align with the APZ standards, several deviations are proposed, and these has been justified in PPBS 1 in Section 7.5.1. The reason for the bespoke landscaping treatments is to provide a more balanced approach to managing bushfire risk, with environmental and visual amenity objectives.
					• The APZs for the bushfire refuge and much of the perimeter APZ are within the project area, however parts of the perimeter and WTP/WWTP APZ's does extend to adjacent lots and onto road reserves. Similarly, the APZ-
						• Compliance is not fully achieved with Acceptable Solution A2.1 with deviations proposed with the APZ standards and vegetation management for holiday homes extending onto neighbouring lots.
						• Compliance of the Intent and Performance Principle of Element 2 is achieved through compliance with Acceptable Solution A2.1 and PPBS 1 (see Section 7.5.1), which addresses and justifies the deviations from the Acceptable Solutions.

Bushfire protection criteria				Development response		
Element	**Intent**	**Performance Principle**	**Acceptable solutions**	**Method of compliance**	**Proposed bushfire management measures**	**Compliance Comment**
					Modified and low threat vegetation landscaping required to ensure buildings are located in BAL-29 or lower, often occurs on adjacent lots, especially in the holiday home areas. This has also been addressed within in PPBS 1 in Section 7.5.1. • The establishment of the landscaping treatments will be by the Proponent, with the responsibility for the ongoing management and auditing of all onsite vegetation to rest with the Community Corporation. The design, implementation, maintenance and auditing is to be conducted in accordance with the process in Section 6.2.6, with consultation with the City where proposed modification and maintenance occurs on road reserves (Smiths Beach Road and "Leeuwin Way" road) • Enforcement of the BMP, and the required onsite vegetation management, is via the City of Busselton firebreak notice, whose powers are conferred from Section 33 of the Bushfires Act 1954, which requires compliance with approved BMP's.	
Element 3: Vehicular access	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.	<u>Performance Principle P3</u> The internal layout, design and construction of public and private vehicular access and egress in the subdivision / development allow emergency and other vehicles to move through it safely and easily.	<u>A3.1 Two access routes</u> Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.	**Tourism Land Use Position Statement; Bushfire Risk Assessment**	• Compliance with Acceptable Solution A3.1 is unable to be achieved for the proposed development due to the existing public road network to the project area being a legacy dead-end road terminating at Smiths Beach. The construction of a second public road, from the project area to Caves Road, is not achievable by the Proponent. • A PPBS is not possible to demonstrate compliance with Element 3 Intent or Performance Principle, due to the legacy single road. • The bushfire risk assessment conducted in Appendix J of this BMP, shows that following implementation the bushfire risk management strategy and suite of management measures proposed in Section 6, that despite a second public road not being able to be provided to the project area (a deviation from the Guidelines), that life is able to be preserved primarily through the provision of the bushfire refuge supported by the project BEMP, and that bushfire impact to proposed property and infrastructure can be reduced to acceptable or tolerable levels.	• Compliance is largely achieved with A3.2, A3.4 and A3.5, however minor deviations are required with A3.4 and A3.5 associated with turnarounds. • Full compliance is not achievable with A3.1 and A3.3 due to the legacy single public road to the site. • Compliance is achieved by meeting the Intent of Element 3 (including use of Acceptable Solutions) as much as practical and where this is not possible, ○ using PPBS 2 (see Section 7.5.2) to address the turnarounds for A3.4 and A3.5 ○ for tourism land uses, assessment against the Tourism Land Use Position Statement, including use of a bushfire risk assessment to demonstrate compliance with the Tourism Land Use Position Statement Policy Objectives and that residual risk is appropriately reduced. ○ for holiday homes, which have the capacity to be used for extended length stays,where application of the Tourism Land Use Position Statement is not appropriate, a bushfire risk assessment is used to demonstrate compliance with the SPP 3.7 Policy Intent and Policy Objectives, with justification for the deviation from SPP 3.7 and the Guidelines provided in Section 7.4.
			<u>A3.2 Public road</u> A public road is to meet the requirements in Table 2, Column 1.	**Acceptable Solution**	• The only new public road proposed as part of the proposal, is the "Leeuwin Way" road, which will be assessed against A3.3. • The existing public roads in the local area (Caves Road, Canal Rock Road and Smiths Beach Road) appear to comply with the technical specifications for public roads from the Guidelines (see Appendix M)	
			<u>A3.3 Cul-de-sac (including a dead-end-road)</u> A cul-de-sac and/or a dead-end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), detailed requirements will need to be achieved (refer to the Guidelines for detailed cul-de-sac requirements).	**Acceptable Solution; Tourism Land Use Position Statement; Bushfire Risk Assessment**	• The new "Leeuwin Way" road will be a new 550 m long cul-de-sac road, created as part of the proposal. • This road will comply with the technical specifications for cul-de-sac roads from the Guidelines (see Appendix M), other than the overall length will exceed the 200 m permitted for a cul-de-sac road. • While the length of the "Leeuwin Way" public road is 550 m from Smiths Beach Road, the dead-end length is reduced to 200 m from the "Cape Arrival" entrance road to the development. • Given the legacy road network, and the location of the National Park (including the portion to be ceded), there is no reasonable way to reduce the length of the dead-end leg. • While compliance is mostly achieved with Acceptable Solution A3.3, the length of road means that full compliance is not possible with A3.3, and similar to A3.1, compliance is not able to be demonstrated using a PPBS.	
			<u>A3.4 Battle-axe</u> Battle-axe access leg's should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will	**Acceptable Solution and Performance Principle-Based Solution 2**	• A single battle-axe lot is proposed in the Western Holiday homes, with a battle-axe access leg that is 40 m long, similar to urban holiday home areas moreso than typical rural battle-axe legs.	

Bushfire protection criteria				Development response		
Element	**Intent**	**Performance Principle**	**Acceptable solutions**	**Method of compliance**	**Proposed bushfire management measures**	**Compliance Comment**
			need to be achieved (refer to the Guidelines for detailed battle-axe requirements).		• The leg is less than 600 m in length permitted by A3.4, and will be at least 6 m wide and constructed to the relevant technical requirements of the Guidelines (see Appendix M). • While there is a presumption against battle-axe legs in bushfire prone areas as they can be blocked by falling trees or debris, however given the location in an area of managed low threat vegetation, with minimal potential obstructions along the leg, it is considered that there is little risk associated with the battle-axe leg, over a private driveway in this case. • Given the access leg is less than 200 m there is no need for a passing bay and as the access leg is only 40 m long, it is not considered that a turn-around area is necessary given the fire appliances will likely attend the fire from the driveway. • While compliance is mostly achieved with Acceptable Solution A3.4, the lack of turnaround, means that full compliance is not possible with A3.4, and this has been addressed via PPBS 2 (see Section 7.5.2).	
			A3.5 Private driveway longer than 50 m A private driveway is to meet detailed requirements (refer to the Guidelines for detailed private driveway requirements).	**Acceptable Solution and Performance Principle-Based Solution 2**	• Almost all roads within the project area serve buildings further than 50 m from a public road, so will need to comply with the private driveway technical requirements of the Guidelines (see Appendix M) • Given the public use of the proposed roads, the actual construction will comply the technical specifications for public road as per the Guidelines, especially the minimum trafficable width will be 6 m wide to accommodate two fire appliances, other than the fire access driveway and the foreshore reserve driveway. • Further detail on the proposed internal driveway network, including access-controlled emergency and fire appliance driveways, is detailed in Section 6.3. • While compliance is mostly achieved with Acceptable Solution A3.5, several turnarounds are performance-based, meaning that full compliance is not possible with A3.5, and this has been addressed via PPBS 2 (see Section 7.5.2).	
			A3.6 Emergency access way An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet detailed requirements (refer to the Guidelines for detailed EAW requirements).	**Not Applicable**	• The proposed development does not require Emergency Access Ways (EAWs) to provide through access between public roads. This will be achieved using proposed onsite private driveways.	
			A3.7 Fire service access routes (perimeter roads) Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for firefighting purposes. Fire service access routes are to meet detailed requirements (refer to the Guidelines for detailed fire service access route requirements).	**Not Applicable**	• The proposed development does not require fire service access routes (FSARs) to achieve access within and around the perimeter of the project area. This will be achieved using existing and new public roads and proposed onsite private driveways.	
			A3.8 Firebreak width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum	**Acceptable Solution**	• Given the nature of the development, and that the undeveloped portion of the project area is to be ceded to the National Park, full compliance with	

Bushfire protection criteria				Development response		
Element	**Intent**	**Performance Principle**	**Acceptable solutions**	**Method of compliance**	**Proposed bushfire management measures**	**Compliance Comment**
			width of three metres or to the level as prescribed in the local firebreak notice issued by the local government.		the technical specifications of the City of Busselton firebreak notice is not considered appropriate. • Onsite vegetation management will be conducted in accordance with the measures proposed in Section 6.2 of this BMP, although it is noted that the perimeter APZ on the southern interface will be increased to 25 m to align with the firebreak notice and address potential landscape-scale bushfire risk. The decision to deviate from the APZ requirements of the firebreak notice, was to enable slight flexibility in the landscaping approach to better balance bushfire risk management objectives with those of environmental and visual amenity. • Perimeter access is provided around the development, through the proposed public and private road network. It is not considered that additional perimeter firebreaks are necessary within the land to be ceded to the National Park. • It is noted the current City of Busselton firebreak notice permits an approved BMP to deviate from the vegetation management requirements of the firebreak notice. • Enforcement of the BMP, and the required onsite vegetation management, is via the City of Busselton firebreak notice, whose powers are conferred from Section 33 of the Bushfires Act 1954, which requires compliance with approved BMP's.	
Element 4: Water	To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	<u>Performance Principle P4</u> The subdivision, development or land use is provided with a permanent and secure water supply that is sufficient for firefighting purposes.	<u>A4.1 Reticulated areas</u> The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.	**Acceptable Solution and Performance Principle-Based Solution 3**	• The proposed configuration of the water supply and bushfire fighting water supply is detailed in Sections 2.2.4.1 and 6.5 and will consist of the following: ○ Below-ground water pipework and in-ground street hydrants throughout the two holiday home precincts, fed from the Water Treatment Plant (with additional 100 kL bushfire water added to the balance tank/s with minimum overall tank capacity of 200 kL.) ○ A dedicated 50 kL bushfire fighting water tank at the Water Treatment Plant ○ A dedicated onsite fire hydrant and fire hose reel system for the hotel and community hub building, complete with additional 50 kL bushfire water capacity but shall be no less than 225 kL overall capacity ○ External perimeter fire hose reel coverage is to the community refuge building, in addition to internal hydrant and fire hose reel coverage. ○ Standalone fire hose reel system for the campground • The intent to enter into an agreement with Water Corporation for the potable water supply to the proposed development, however given the WTP location, compliance with A4.1 needs to be considered in detail as the potential for infrastructure to be impacted by bushfire, is not what is anticipated for a standard reticulated town main water supply as per A4.1. • PPBS 3, in Section 7.5.3, details the overall firewater design philosophy in order to demonstrate the proposed systems comply with the Element 4 Intent and with Performance Principle 4. This is considered appropriate given the holiday home street hydrants are not necessarily being connected to a typical water supply authority system, and the use of multiple systems (WTP, static tanks and street hydrants) to provide firewater supply to the development achieved via a combination of A4.1 and A4.2. • Compliance throughout the hotel and community hub will also be detailed in Performance Principle-Based Solution 3 (see Section 7.5.3), and will be focused on compliance with A4.2, using the dedicated fire hydrant and fire hose reel systems, underpinned by sizing concepts from the Tourism Land Use Position Statement.	• Compliance is achieved by meeting the Intent of Element 4 which will be demonstrated by PPBS 3 (see Section 7.5.3), including use of Acceptable Solutions as much as practical and concepts from the Tourism Land Use Position Statement.
			<u>A4.2 Non-reticulated areas</u> Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet detailed requirements (refer to the Guidelines for detailed requirements for non-reticulated areas).	**Acceptable Solution; Performance Principle-Based Solution 3; Tourism Land Use Position Statement**		

7.3 Assessment against Position Statement: Tourism land uses within bushfire prone areas

Table 13 and Table 14 provides a summary of the policy objectives and policy measures of the Position Statement, along with a summary of the requirements of the land use specific bushfire protection measures applicable to the proposed development. A response has been provided to each of the policy measures and objectives to demonstrating how the tourism land uses within the proposed development complies with the Position Statement

Table 13: Assessment against policy objectives and measures of Position Statement: Tourism land uses within bushfire prone areas

Policy Objectives		Development response
Policy Objectives	**PO 1: maintain primacy for the protection of life, but also recognise preservation of property or infrastructure may be secondary to the social and economic development of a region**	• Despite a second public road not being able to be provided to the project area (a deviation from the Guidelines), the bushfire risk assessment conducted in Appendix J demonstrates that following implementation the bushfire risk management strategy and suite of management measures proposed in Section 6, that life is able to be preserved, and that bushfire impact to proposed property and infrastructure can be reduced to appropriate levels. • The management measures incorporated into the development design aimed to preserve life are as follows: ○ Establishing a community bushfire refuge to enable onsite shelter-in-place, should offsite evacuation be unsafe, to avoid occupants becoming trapped on the single road, or any road, to an offsite place of safety ○ The provision of the refuge is supported by the project BEMP, which clearly guide emergency management during a bushfire emergency by onsite ERT, including promoting early offsite evacuation where safe to conduct, or sheltering in the bushfire refuge where offsite egress is not possible to undertake. ○ Provision of sufficient onsite vehicular access to enable safe movement through the development, especially by firefighters • While the Policy Objective indicates that property and infrastructure protection might be considered as a secondary objective, in this instance given the potential for isolation by the legacy single road access, the approach has been to ensure all property and infrastructure is appropriately protected.
	PO 2: Provide bushfire protection relevant to the characteristics of the tourism land use.	• The characteristics of the entire development, including the tourism land uses and the proposed occupants, are reviewed in Section 2.2 and within the bushfire risk assessment in Appendix J. • The bushfire risk management strategy and suite of management measures proposed in Section 6, have been developed on the outcomes of the review of the bushfire hazard and the tourism (and holiday home) characteristics within the development, in addition to achieving compliance with the relevant Elements from the Guidelines and Tourism Land Use Position Statement Policy Measures, where possible. • The development will be used for tourism throughout the entire year, and the proposed measures would be expected to be effective for the entire year, in particular during bushfire season. • The community bushfire refuge is considered to be a key measure to address the single public road access, but also to protect vulnerable occupants and those not adequately protected by resilient construction such as those in the campground (where tents will not withstand ember attack).
	PO 3: provide bushfire risk management measures that mitigate the identified risks	• The bushfire hazards to the proposed development are identified within in Section 5 and within the bushfire risk assessment in Appendix J, in addition to the bushfire risk, the legacy single public road access to the site, is also a risk and a deviation from the Guidelines. • The bushfire risk management strategy and suite of management measures proposed in Section 6, have been developed on the outcomes of the review of the bushfire hazard and the associated risk to the development, in addition to achieving compliance with the relevant Elements from the Guidelines and Tourism Land Use Position Statement Policy Measures, where possible. • The main risks identified and addressed are: ○ the potential for landscape-scale bushfire behaviour from the southern directions, where there is long fire runs with continuous vegetation that has a direct interface with development, which is mitigated through provision of extended APZs ○ single public road access to the site addressed through the overall strategy of creating bushfire resilience in the development, with the bushfire refuge and project BEMP forming key parts of preserving life safety. • The risk assessment demonstrates that following implementation the proposed strategy and management measures, the residual risk to the proposed development is reduced to be acceptable (or tolerable) as depicted within Table 33. • Section 8 details how the management measures will be initially implemented into the development, and the ongoing management, testing and auditing responsibilities. • The bushfire risk to the proposed development has been carefully considered as part of the nomination of bushfire risk management measures.
	PO 4: Achieve a balance between bushfire risk management measures, environmental protection and biodiversity management and landscape amenity.	• Achieving a balance between bushfire risk management and environmental values and visual amenity has been a key objective of the proposed development. • The landscaping treatments proposed throughout the development to achieve this balance have been detailed in Section 6.2, with implementation and ongoing maintenance and auditing outlined in Section 8 • The proposed treatments represent a deviation from Element 2 of the Guidelines, and have been justified as part of PPBS 1 in Section 7.5.1, which details the rationale for the proposed vegetation modification approach. • The environmental and visual amenity reporting that accompanies this application, demonstrate in further detail how their objectives are achieved using the landscaping treatments proposed.

Table 14: Assessment against policy measures of Position Statement: Tourism land uses within bushfire prone areas for Short Term Accommodation

Policy Measures		Development response
Performance Principle	**Acceptable Solution (Policy Measure)*** *** where the Acceptable Solution can't be achieved, a bushfire risk assessment is to be used to demonstrate the use of alternative contingencies reduce risk to appropriate levels**	
Other vulnerable or short-term accommodation and vulnerable day uses		
Siting and design To provide suitable building design, construction and sufficient space to ensure radiant heat levels do not exceed critical limits for emergency services personnel undertaking operations, including supporting or evacuating occupants	1.1 In accordance with Element 2: Siting and Design of Development A2.1 Asset Protection Zone, contained within the Guidelines for Planning in Bushfire Prone Areas. 1.2 Where a building is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 10kW/m2 (with an assumed flame temperature of 1200K); or where an open space area is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 2kW/m2 (with an assumed flame temperature of 1200K). 1.3 Buildings identified as suitable for on-site shelter shall be designed and constructed in accordance with National Construction Code and the ABCB Community Shelter Handbook.	• The proposed vegetation modification for the development is detailed in Section 4.2 and 6.2. • Compliance has been achieved with Element 2 of the Guidelines using a combination of Acceptable Solutions and Performance Principle-Based Solution 1 (see Section 7.5.1), to ensure that the level of bushfire impact on the development is minimised. • **Compliance with 1.1** ○ the development has a vegetation modification approach that doesn't strictly apply with the APZ standards in all instances. This has been addressed using PPBS 1 • **Compliance with 1.2 and 1.3** ○ A community bushfire refuge is proposed at the development. The APZ has been sized to achieve 10 kW/m^2 at a flame temperature of 1200 K (see Section 5.3.1.2) ○ The refuge will be design and constructed in accordance with the National Construction Code and the ABCB Community Bushfire Refuge Handbook
2. Vehicular access To provide a safe operational access for emergency services personnel in suppressing a bushfire, while residents and visitors are accessing or egressing the site	2.1 The provision of one access route can be considered where: • the proposal is within a residential built-out area; or • the access route abuts moderate or low threat vegetation, and •where it is demonstrated that secondary access (including an emergency access way) cannot be achieved, and • the access route is not travelling back towards or through the hazard. 2.2 Access routes should achieve the requirements of Table 6 in the Guidelines for Planning in Bushfire Prone Areas. 2.3 Private driveways longer than 50 metres require: • passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres); • Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house; and • An all-weather surface (i.e. compacted gravel, limestone or sealed)	• The proposed vehicular access for the development is detailed in Sections 2.2.5 and 6.3. • Compliance has largely been achieved with Element 3 of the Guidelines using a combination of Acceptable Solutions and Performance Principle-Based Solution 2 (see Section 7.5.2), to ensure vehicular access and egress within the development permits emergency and other vehicles to move through it safely and easily. The Intent of Element 3 is not able to be met due to the legacy single public road to the site. • **Compliance with 2.1** ○ The development has a single access route but doesn't comply with any of the permitted considerations ○ Given a second public road not being able to be provided to the project area, the bushfire risk assessment conducted in Appendix J demonstrates that following implementation the suite of management measures proposed in Section 6, that life is able to be preserved, and that residual risk to proposed property and infrastructure can be reduced to appropriate levels (see Table 33). • **Compliance with 2.2** ○ The access routes will comply with Table 6 in the Guidelines with most internal roads within the development to also be 6 m wide. • **Compliance with 2.3** ○ Where required, passing bays, turnaround areas and all-weather surfaces are to be provided required by the Guidelines. ○ All surfaces will be all-weather. ○ Several driveway turnarounds are performance-based, meaning that full compliance is not possible with A3.5, and this has been addressed via PPBS 2 (see Section 7.5.2).
3. Provision of water The provision of a permanent and secure water supply that is sufficient for firefighting purposes	3.1 The development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and the local government; or 3.2 Provision of a static water supply for firefighting purposes on the lot that has an effective capacity of 10,000 litres per building/structure in addition to any requirements for potable water; or 3.3 Provision of a minimum 50,000 litre static water supply for firefighting purposes per 25 buildings/structures, to the satisfaction of the local government; and 3.4 Dedicated water supplies shall be non-combustible (or suitably shielded) and located such that fire services can readily gain access to appropriate fittings and connect fire fighting vehicles to dedicated water supplies in a safe manner.	• The proposed configuration of the water supply and bushfire fighting water supply for the development is detailed in Sections 2.2.4.1 and 6.5. • Compliance has been achieved with Element 4 of the Guidelines as demonstrated in Performance Principle-Based Solution 3 (see Section 7.5.3), including use of Acceptable Solutions A4.1 and 4.2 as much as practical, to ensure a permanent, secure bushfire fighting water supply is provided, that is sufficient to enable people, property and infrastructure to be defended from bushfire. • **Compliance with 3.1** ○ As outlined in PPBS 3, this approach is largely used for the potable and firewater supply to the holiday home precincts, with additional bushfire risk treatment measures incorporated into the protection of the WTP/WWTP infrastructure. • **Compliance with 3.2** ○ As outlined in PPBS 3, this approach has been used to calculate the firewater capacity required for the hotel and campground • **Compliance with 3.3** ○ As outlined in PPBS 3, this approach has been used to calculate the firewater capacity required for the holiday homes areas • **Compliance with 3.4** ○ The balance tank/s and dedicated bushfire water tank at the WTP are to be steel and otherwise protected from bushfire impact in accordance with Section 6.5. ○ The proposed suction connections are to be suitable for bushfire fighting appliances. All street hydrants and onsite hydrants are considered suitable for bushfire appliance use.
Caravan Park (including campground)		
Siting and design To provide suitable building design, construction and sufficient space to ensure radiant heat levels	1.1 Siting and design to reduce levels of radiant heat, smoke and ember attack. • Consideration should be given to the provision of an APZ to achieve 29kW/m2 around the campground facilities, which may include the office, manager's residence, camp kitchen and shower/laundry.	• The proposed vegetation modification for the development is detailed in Section 4.2 and 6.2. • Compliance has been achieved with Element 2 of the Guidelines using a combination of Acceptable Solutions and Performance Principle-Based Solution 1 (see Section 7.5.1), to ensure that the level of bushfire impact on the development is minimised.

Policy Measures		Development response
do not exceed critical limits for emergency services personnel undertaking operations, including supporting or evacuating occupants	• Consideration should be given to clustering of camp sites and securing an APZ around the entire development or providing an APZ to separate the site from the potential adjoining hazard. • Where there is no bushfire construction standard (i.e. tents and caravans and some eco tents) and the loss of these structures is identified in a risk assessment as a 'tolerable' risk, then no APZ is required and subject to a risk assessment, these structures may be located in areas of BAL-40 or BAL-FZ. 1.2 Where a building is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 10kW/m2 (with an assumed flame temperature of 1200K); or where an open space area is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 2kW/m2 (with an assumed flame temperature of 1200K). 1.3 Buildings identified as suitable for on-site shelter shall be designed and constructed in accordance with National Construction Code and the ABCB Community Shelter Handbook	• **Compliance with 1.1** ○ The proposed campground is located some distance from anticipated bushfire interfaces, and will be primarily impacted by ember attack ○ The low threat vegetation within the campground is to be strictly controlled to balance bushfire risk management and environmental value, especially habitat ○ Other than two buildings, which have vegetation modification controls outlined in this BMP, the remainder of to the campground will consist of platforms to enable guests to erect their own tents. The guest tents will have limited to no resilience to bushfire impact, and are considered a tolerable loss. • **Compliance with 1.2 and 1.3** ○ A community bushfire refuge is proposed at the development. The APZ has been sized to achieve 10 kW/m^2 at a flame temperature of 1200 K (see Section 5.3.1.2) ○ The refuge will be design and constructed in accordance with the National Construction Code and the ABCB Community Bushfire Refuge Handbook
2. Vehicular access To provide a safe operational access for emergency services personnel in suppressing a bushfire, while residents and visitors are accessing or egressing the site	2.1 Caravan parks located in residential built-out areas should provide one access route which connects to the public road network, and provides safe access and egress. 2.2 Caravan parks located outside of residential built-out areas -where vehicular access in two different directions to two different destinations cannot be provided, the BMP should identify the risks and propose bushfire management measures to reduce this risk, which may include on-site shelter and or closure. 2.3 All roads should be through roads. Dead end roads are not recommended but if unavoidable, or they are existing, they should be no more than 200 metres. 2.4 Access routes should achieve the requirements of Table 6 in the Guidelines for Planning in Bushfire Prone Areas.	• The proposed vehicular access for the development is detailed in Sections 2.2.5 and 6.3, with access to the campground lot available off Smiths Beach Road • Egress from the campground is only to be undertaken if conditions on the local public road network are safe to do so, otherwise occupants will be relocating to the onsite refuge on foot. • **Compliance with 2.1** ○ The campground is not located in a residential built-out area • **Compliance with 2.2** ○ The campground is outside a residential built-out area and has accessed by a single public road. ○ Given a second public road not being able to be provided to the project area, the bushfire risk assessment conducted in Appendix J demonstrates that following implementation the suite of management measures proposed in Section 6, including an onsite bushfire refuge, that life is able to be preserved, and that residual risk to proposed property and infrastructure can be reduced to appropriate levels. • **Compliance with 2.3** ○ "Smiths Lane, the main campground access driveway, is dead-end road, approximately 300 m in length, with a turning head. This driveway connects to "Smiths Common"and has an access-controlled entry which can be opened in a bushfire emergency to permit travel to the Smiths Beach Road cul-de-sac. ○ There is a local loop road on/off the main access driveway, that accesses the main campground carpark. • **Compliance with 2.4** ○ The access routes will comply with Table 6 in the Guidelines with most internal roads within the development to also be 6 m wide.
3. Provision of water To provide an adequate supply of water for firefighting purposes to reflect the intended response to a bushfire event, by emergency services and/or the owner/ occupier	3.1 The development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and the local government; or 3.2 Where the intention is to actively defend property and infrastructure, provision of a minimum 10,000 litre static water supply for firefighting purposes per building/structure, in addition to any requirements for potable water; or 3.3 Where the intention is to actively defend property and infrastructure, provision of a minimum 50,000 litre static water supply for firefighting purposes per 25 buildings/structures, to the satisfaction of the local government; and 3.4 Dedicated water supplies shall be non-combustible (or suitably shielded) and located such that fire services can readily gain access to appropriate fittings and connect firefighting vehicles to dedicated water supplies in a safe manner.	• Refer to comments for Policy Measure 3 in *'Other vulnerable or short-term accommodation and vulnerable day uses'* above • Fire hose reel coverage is to be provided throughout the campground in addition to the static firewater tanks at the hotel as part of the dedicated fire hydrant and hose reel system • **Compliance with 3.1** ○ the development will be in an area with a reticulated water supply, however elements of this approach have been used • **Compliance with 3.2** ○ As outlined in PPBS 3, this approach has been used to calculate the firewater capacity required for the hotel and campground • **Compliance with 3.3** ○ Not applicable to the campground • **Compliance with 3.4** ○ The balance tank/s and dedicated bushfire water tank at the WTP are to be steel and otherwise protected from bushfire impact in accordance with Section 6.5.

7.4 Justification for deviation from SPP 3.7 and the Guidelines

As outlined in Section 3.1, following the determinations by WASAT, the Tribunal identified that where deviations from the provisions of SPP 3.7 and the Guidelines are proposed, these should not be undertaken lightly and significant justification against several criteria was required. The assessment against the nominated criteria has been conducted for the proposal in Table 15, primarily for the extended stay use of the holiday homes, to warrant the deviation from SPP 3.7 Policy Measures and Element 3 of Guidelines for this development.

Table 15: Assessment against Tribunal criteria for deviations from SPP 3.7 and the Guidelines

Criteria	Justification
Why there is *'good reason'* and *'exceptional circumstances'*	• The existing single public road access to the project area is a legacy planning issue, with a second public access road back to Caves Road not able to be provided by the Proponent. • The site is an iconic coastal location, that has previously been identified and approved for tourism and residential development. • The existing Structure Plan is supported by a Fire Management Plan prepared and approved prior to the Western Australia bushfire planning legislation reforms in 2015. This represents an opportunity to review and improve on the existing risk mitigation strategy in light of current practices, by presenting a more holistic approach to bushfire risk management that seeks to better resolve the legacy vehicular access non-compliance. • While there is potential for holiday homes to be used for extended length stay uses, they would also not be considered "typical" standalone residential subdivision or development, with some landowners being absentee owners who may still display characteristics more aligned with vulnerable occupants requiring assistance to appropriately respond to a bushfire emergency. • There are significant environmental and visual amenity considerations at the site that create specific challenges when balancing with the vegetation modifications required for bushfire risk management
Has due regard to the history of the site has been considered	• As mentioned above, the site is an iconic coastal location that has previously been identified and approved for tourism and holiday home development. There is an opportunity with the proposed development to improve the design and better address bushfire risk to the site, and to surrounding development and occupants, especially potential impacts on life safety associated with the single road access. • This proposal is broadly aligned with the principles previously established as part of the existing planning approval, but seeks to address the issues associated with the significantly denser and more visible development, the lack of foreshore offering and poorly defined tourism vision. • The environmental values and visual amenity of the site, and the impact by the proposed development, has historically been a significant consideration. The proposal of a less dense development, in conjunction with the bespoke landscaping treatments being proposed, permits the retention of significantly more onsite vegetation which is considered a key aim of the development.
What is the net benefit in terms of reducing bushfire risk to the community	• A significant benefit is the opportunity to create a bushfire resilient development, that addresses the legacy single public road access to the site by establishing a community bushfire refuge that can provide a place of safety for last resort shelter-in-place when egress to offsite locations is not safe to undertake. ○ The refuge is preferable to open space refuge on Smiths Beach, which has insufficient separation from unmanaged vegetation to achieve 2 kW/m^2, is exposed to the weather, has no shelter, water or food and limited access to toilet facilities. • The holistic vegetation modification strategy for the entire development, and the Foreshore Reserve more appropriately balances bushfire risk management

Criteria	Justification
	with environmental and visual amenity impacts, rather than blanket application of the APZ standards across the site. • Provides permanent and secure bushfire water supplies that assist the fire suppression operations by providing various potential water sources, mostly accessible from locations protected from bushfire impact in the managed landscaping within the development. • Development of a bushfire emergency management strategy that focuses on review of forecast bushfire weather, monitoring local bushfire activity and having a clear plan for safe offsite evacuation, or if required, last resort shelter-in-place at the refuge. • This development will benefit the existing local community through: ○ Establishing the community bushfire refuge to be suitably sized for occupants in adjacent land uses (resorts, residential, beach users etc) that will also be trapped by the legacy single road ○ Shielding some existing adjacent resorts from bushfires in some directions, whilst also creating a place of relative safety for them to evacuate to, rather than Smiths Beach, should they wish to. ○ The project BEMP promotes the relaying of bushfire status information with adjacent accommodations and nearby public areas, to raise their level of awareness of local bushfire events and seek to encourage early evacuation of these developments and areas when safe to do so, or relocation to the bushfire refuge if egress offsite is not possible.

With the justification in Table 15 to for deviation from SPP 3.7 Policy Measures and Element 3 of Guidelines, the bushfire risk assessment conducted in Appendix J of this BMP, has been used to demonstrate the proposal complies with SPP 3.7 Policy Intent and Policy Objectives.

7.5 Performance Principle-Based Solutions

As outlined in Section 3.1, Acceptable Solutions are not tailored to specific site conditions, bushfire behaviour or the proposed development, which often represent a broad-brush approach to managing bushfire risk, and are not always best placed to balance competing interests or resolving legacy scenarios. Performance Principle-Based Solutions (PPBS) are compliance solutions that can be utilised, in lieu of full compliance with the Acceptable Solutions, to enable flexible and innovative approaches to be considered, while still appropriately managing bushfire risk. The Guidelines outline the following critical elements of PPBS:

- a statement of the extent to which the proposed principle-based solution(s) conforms with, or deviates from the acceptable solution(s)
- evidence to support how the use of a material, form of construction or design achieves the performance principle(s)
- verification methods that determines whether a principle-based solution(s) complies with the relevant performance principle(s).

There are three main areas where the proposal deviates from the Acceptable Solutions of the Guidelines:

- Element 2 – Siting and Design of Development
  - Performance-based landscaping treatments are being proposed which deviate from Acceptable Solution A2.1, that prioritise vegetation retention, especially mature trees, to better achieve environmental and visual amenity objectives, while managing bushfire risk to the development.
- Element 3 - Vehicular access

- The legacy 2 km long dead-end public road to the project area, exceeds the 200 m maximum length permitted for a dead-end road to a which travel is possible to two different destinations, deviates from Acceptable Solutions A3.1 and A3.3.
- The proposed new "Leeuwin Way" public road exceeds the maximum length for a dead-end road and non-compliant with Acceptable Solutions 3.1 and A3.3, however this also can not be avoided due to the legacy road network.
- A single battle-axe leg has insufficient space to implement a compliant turnaround at the house to comply with Acceptable Solution A3.4
- several private driveway turnarounds deviate from Acceptable Solution A3.5.

- Element 4 - Water
  - Bushfire water supply to the holiday home area is via street hydrants connected to a town main supply, however given the location of the WTP in close proximity to the development, this is not necessarily a "standard" water authority main as anticipated by Acceptable Solution A4.1, and the overall water supply strategy is not strictly compliant with Acceptable Solutions A4.1 or A4.2, but uses a combination of both with the Tourism Land Use Position Statement.

The deviations to Elements 2 and 4 are to be addressed using PPBS's to demonstrate compliance with the Intent and Performance Principle of the relevant Element, using input from the Tourism Land Use Position Statement Policy Measures where required. Similarly, a PPBS will justify the turnaround deviations, demonstrating compliance with the Element 3 Intent and Performance Principle. The deviation from A3.1 and A3.3 due to the legacy single public road access to the project area can't be addressed using a PPBS, and is addressed using a bushfire risk assessment to demonstrate residual risk can be managed to appropriate levels, and that is complies with SPP 3.7 Policy Intent and Policy Objectives, and the Tourism Land Use Position Statement Policy Objectives.

7.5.1 PPBS 1: Asset Protection Zones and onsite vegetation management

As outlined in Section 6.2, a combination of vegetation landscaping treatments (APZs, APZ-Modified and low threat vegetation) are proposed throughout the development, rather than blanket use of the APZ standards nominated in the Guidelines to manage bushfire risk, which comes with a significant adverse impact on vegetation retention. Strict application of the APZ standards is appropriate in some locations to manage bushfire risk, especially along direct interfaces with significant unmanaged vegetation, where bushfire behaviour requires arresting to limit impact on buildings. They also provide a level of protection to environmentally significant areas, by slowing fire spread from any ignition within the development, buying time for suppression before environmental damage occurs. However, in other situations where buildings are further from direct interface with the bushfire hazard, blanket application of the APZ standards can represent an overreaction to bushfire risk and result in unnecessary environment and visual impact.

In order to more appropriately balance environmental value and visual amenity outcomes with bushfire risk, and to enhance the nature-based experience of the development, several non-deviations with Acceptable Solution A2.1 are required, including:

- The northern interface from the hotel suites and eco-suites to the unmanaged vegetation in the Foreshore Reserve, will not be a compliant APZ, but will be established to an APZ-Modified (Hotel) standard consisting primarily of isolated "shrub islands" to enable retention of existing low shrub vegetation
- Fully compliant APZs are not located around the perimeter of all buildings in the development, with the Eastern and Western holiday home precincts to have an APZ-Modified (Holiday homes) standard, and around the hotel buildings, an APZ-Modified

(Hotel) standard is proposed, as outlined in this BMP. While the APZ-Modified standards seek to align with the principles of the APZ standards, it will include the following deviations:

  - permitting greater tree overstorey exceeding 15% canopy cover, where further than 6 m from the building, and where located away from main bushfire hazard interfaces provided understorey vegetation is limited to low groundcovers.
  - allowing vegetation shorter than 5 m to be considered trees, provided they can be successfully modified to a tree specification
  - rationalising the separation requirements for shrub vegetation from buildings and other shrubs, based on shrub vegetation height
  - permitting a slight increase in shrub cover in the APZs of up to 10%.
  - use of "shrub islands" for isolated plots of mid-storey vegetation, to retain habitat and visual screening, primarily around the hotel buildings rather than the holiday homes.
  - permitting high moisture content vegetation (e.g. succulents) that may exceed 100 mm in height adjacent to buildings, provided they are regularly managed

- Having green roofs and production garden within the refuge APZ, which will contain well-hydrated vegetation, but may deviate from APZ standards depending on vegetation height.
- Having low threat vegetation landscaping treatments (outside APZ and APZ-Modified zones) which prioritise tree retention while providing targeted mid-storey vegetation retention. While this is not technically a deviation from the APZ standards, it has been included in this PPBS as an opportunity to detail the logic behind the approach.
- Having APZ and APZ-Modified areas required for building protection, extending onto adjacent lot/s and road reserves

The deviations from the APZ technical specifications largely occur around proposed buildings in the Eastern and Western holiday home precincts, and the hotel suites and eco-suites, and outside the nominated APZs for the project. The low threat vegetation is located around the campground and the park spine, typically with no direct interface with proposed buildings, other than the campground buildings.

7.5.1.1 Summary of Element 2

PPBS 1 focuses on the compliance of the proposed vegetation modification with Element 2 of the Guidelines, as well as guidance from the Tourism Land Use Position Statement (see Table 16).

Table 16: Element 2 – Intent, Performance Principles and Acceptable Solutions (Guidelines and Tourism Land Use Position Statement)

Element 2 – Siting and design of development	
Intent	To ensure that the siting and design of development minimises the level of bushfire impact.
Performance Principle P2	The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. That it incorporates a defendable space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.

Relevant acceptable solution/s	
A2.1 Asset Protection Zone (APZ)	Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements: **Width**: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL–29) in all circumstances. **Location:** the APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes) **Management:** the APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' (see Guidelines Schedule 1).
Tourism Land Use Position Statement: Siting and Design	
Performance Principle 1 (Other vulnerable short-term accommodation; Caravan and Campground)	To provide suitable building design, construction and sufficient space to ensure radiant heat levels do not exceed critical limits for emergency services personnel undertaking operations, including supporting or evacuating occupants
Relevant acceptable solution/s (from Tourism Land Use Position Statement)	
Other vulnerable short-term accommodation	1.1 In accordance with Element 2: Siting and Design of Development A2.1 Asset Projection Zone, contained within the Guidelines for Planning in Bushfire Prone Areas. 1.2 Where a building is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 10kW/m² (with an assumed flame temperature of 1200K); or where an open space area is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 2kW/m² (with an assumed flame temperature of 1200K). 1.3 Buildings identified as suitable for on-site shelter shall be designed and constructed in accordance with National Construction Code and the ABCB Community Shelter Handbook.
Caravan and Campground	1.1 Siting and design to reduce levels of radiant heat, smoke and ember attack. • Consideration should be given to the provision of an APZ to achieve 29kW/m² around the campground facilities, which may include the office, manager's residence, camp kitchen and shower/laundry. • Consideration should be given to clustering of camp sites and securing an APZ around the entire development or providing an APZ to separate the site from the potential adjoining hazard. • Where there is no bushfire construction standard (i.e. tents and caravans and some eco tents) and the loss of these structures is identified in a risk assessment as a 'tolerable' risk, then no APZ is required and subject to a risk assessment, these structures may be located in areas of BAL-40 or BAL-FZ. 1.2 Where a building is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 10kW/m² (with an assumed flame temperature of 1200K); or where an open space area is to function as an on-site shelter, there must be sufficient separation distance from the predominant bushfire prone vegetation to avoid exposure to a radiant heat flux exceeding 2kW/m² (with an assumed flame temperature of 1200K). 1.3 Buildings identified as suitable for on-site shelter shall be designed and constructed in accordance with National Construction Code and the ABCB Community Shelter Handbook

7.5.1.2 Proposed deviations from the Acceptable Solution/s

The proposed deviations from Acceptable Solution A2.1 include the following:

- The APZ-Modified standards are not fully compliant with Schedule 1 'Standards for Asset Protection Zones', specified in the Guidelines.
- The APZ-Modified standard is used for the interfacing APZ to the north of the hotel suites and eco-suites, in lieu of a fully compliant APZ.
- The inclusion of managed vegetation, that may not strictly comply with the APZ standards, within the refuge APZ, in the form of high moisture content vegetation on the green roof and managed vegetation in the production garden (depending on vegetation height).
- The APZ and APZ-Modified areas, extend across neighbouring holiday home lots, onto the campground lot, as well as onto adjacent road reserves, namely Smiths Beach Road and the "Leeuwin Way" road. As these areas are not fully accommodated within the project area boundary, or the holiday home lots, compliance is not fully achieved with A2.1.

7.5.1.3 Potential risks associated with the proposed deviations

The design of lots, building envelope and associated APZs (sizing and location), is critical to ensuring sufficient separation can be provided between buildings and unmanaged vegetation, to reduce potential bushfire impact to BAL-29 or lower, and enable the building construction to withstand the bushfire.

The creation and enforcement of low fuel zones around these buildings or structures, through the use of APZ's and low threat vegetation, is an important mechanism to achieving this separation from bushfire prone vegetation, to protect the building, its occupants (who may shelter within the building), and attending firefighters (who may shelter from bushfire impact).

The potential risks associated with deviations from A2.1 include the following:

- Modifications to the APZ specifications could be insufficient to prevent bushfire penetration into the development or sufficiently reduce limit bushfire impact onto buildings, to enable the construction measures to adequately protect the building from bushfire attack mechanisms (embers, radiant heat, direct flame).
- Where an APZ or managed low threat vegetation required for one building on the subject lot extends onto an adjacent lot, it could create an additional burden for the neighbouring landowner/s and there is a risk that if this doesn't occur, buildings on the subject lot might become located in areas of BAL-40 or BAL-FZ and with no ability to rectify or enforce.

7.5.1.4 Performance Principle-Based Solution

To comply with the Intent of Element 2 and Performance Principle 2 from the Guidelines, the proposed vegetation modification and management, in conjunction with building location and design, must be demonstrated to do the following to minimise the bushfire risk to people, property and infrastructure:

- minimise the level of bushfire impact
- be appropriate to the level of bushfire threat that applies to the site
- incorporates a defendable space
- significantly reduces the heat intensities at the building surface, including compliance with AS 3959 if appropriate-

The Performance Principle from the Tourism Land Use Position Statement is similar, requiring the following:

- provides suitable building design, construction and sufficient space to ensure radiant heat levels do not exceed critical limits for emergency services personnel undertaking operations, including supporting or evacuating occupants

SPP 3.7 Policy Objective 5.4 also provides important guidance by requiring that *"…an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity…"* is also achieved.

The APZ specifications from the Guidelines represent the standard vegetation specification to minimise bushfire risk to development across a range of scenarios, however, their blanket application may not always appropriately balance the above considerations. The principles behind the Western Australian APZ standards are to create a reduced, and discontinuous, fuel load across the nominated area, and to ensure sufficient vegetation separation from buildings. However, when reviewed against APZ standards in other Australian states, there are alternative specifications that could be considered to provide a lighter impact while still balancing bushfire risk, environmental and visual amenity as per Policy Objective 5.4. Key considerations of this PPBS is consideration of ways to implement APZs that also allow the targeted retention of tree canopy cover and native shrub vegetation, especially where it is of value as habitat, but structured in such a fashion that it appropriately reduces bushfire risk to people and property.

While this PPBS proposes deviations from the standard APZ specifications, it is acknowledged that it is important for decision-makers to not only take a cautionary view, but it is equally important for them to take a holistic perspective as well. Given the location and history of the development, this requires them to consider environmental and visual amenity concerns equally with bushfire risk mitigation as part of the planning approval process, which is made significantly more difficult given the conflict between the current APZ standards with environmental and visual amenity objectives.

Principles of Landscaping for Bushfire Protection

Building damage and destruction during bushfires is associated with a variety of factors, including proximity to unmanaged vegetation, design of development, the construction standards of buildings and bushfire weather. Building loss is largely related to ember attack, either directly entering the building, or igniting spot fires near the buildings, especially the vulnerable parts such as windows, doors etc. Radiant heat can also contribute through direct impact on the building materials especially glazing, and through ignition of nearby flammable materials which can cause direct flame impingement on the building. Wind is also another factor in building loss, through the transport of embers and driving them onto and into the building, as well as directly impacting the building such as breaking glazing and distortion or destruction of building elements such as roofs.

The CFA publication *Landscaping for Bushfire* (CFA, 2011) indicates that vegetation around the building can specifically contribute to it damage or destruction through the following:

- providing a continual fuel path to the building, permitting fire spread and direct flame contact
- acting as ladder fuel from the ground into tree canopies, increasing the intensity of the fire.
- where substantial fuel is too close to the building, producing radiant heat that may ignite the house or cause glazing to break, allowing ember ingress
- dropping limbs or tree branches onto the building

Equally, it also details that well-designed landscaping treatments around buildings can help protect them by:

- reducing the amount of radiant heat received by a house

- reducing the chance of direct flame contact on a house
- reducing wind speed around a house
- deflecting and filtering embers
- reducing flammable landscaping materials within the defendable space.

It is important to recognise that while well-designed landscaping treatments are an important aspect in protecting buildings by reducing bushfire impact, they are part of an overarching strategy that works with other management measures such as :

- building construction and maintenance
- having appropriate water supply and road access
- bushfire preparedness and emergency management strategies

Based on the mechanisms of building loss, and the impact poorly planned landscaping treatments could have on contributing to this, it is important to have guiding principles to best guide landscaping design around buildings. *Landscaping for Bushfire* (CFA, 2011) promotes the following principles to minimise bushfire attack on buildings, deriving concepts developed by Ramsay and Rudolph (2003) in their publication *Landscape and Building Design for Bushfire Areas*:

Create defendable space

- Establish an area immediately around a building where vegetation is modified and managed, to reduce impact of radiant heat impingement and direct flame contact on the building, to complement the level of bushfire construction and give it the best chance of survival, as well as support firefighting activities.
- Recommends use of an inner zone and an outer zone to create a graduated fuel load profile as follows:
    - The inner zone is the area immediately around the building, where vegetation requires significant modification and management including:
        - Minimal fuel loads with all leaves and vegetation debris are to be regularly removed and grass mown
        - Tree canopy cover of <15%, canopy separation of 2 metres and branches must not overhang or touch the building.
        - Shrubs should not be planted under trees.
        - Avoid placing plants >100mm in height at maturity directly in front of a window or other glass feature.
- The outer zone is the area between the inner zone and unmanaged vegetation, with a more moderate level of vegetation management to substantially decrease the ground fuel and restrict the fuels available to an approaching bushfire including:
    - Grass must kept to <100mm in height and leaf and other debris mowed, slashed or mulched.
    - Shrubs and trees should not form a continuous canopy.
    - Trees may touch each other with an overall canopy cover of <30% at maturity, with branches below 2 metres from ground level removed and few shrubs in the understorey.

- Shrubs should be in clumps no greater than 10 m^2, which are separated from each other by at least 10 metres.

Break up fuel continuity

- An effective way to reduce or prevent bushfire spread is to avoid continuous fuel loads and create separation between plants, or groups of plants, to disrupt spread and growth toward the building but also vertically through the fuel profile into tree canopies. The discontinuous fuel load also makes the landscaping more resistant to ignition, spread and growth, from ember attack.
- Potential techniques that can reduce fuel continuity include:
  - Locating shrubs or other flammable objects away from trees, to avoid creating a ladder fuel that can support bushfire in the canopies.
  - Pruning tree branches to a minimum of 2 m above the ground to increase the vertical separation between fuel at ground level and the tree canopy.
  - Clumping shrubs and trees so they do not form a continuous canopy and are separated by areas of low fuel.
  - Using gravel paths, non-flammable mulch and mown grass to provide separation and areas of low fuel between plant groupings and garden beds.

Remove flammable objects from around the house

- The intention is to prevent flame contact on the building by ensuring the area immediately around the perimeter is clear of flammable objects that could ignite and directly impact the building, especially vulnerable parts such as windows, doors, decks etc.
- There are several things that can be done to support this design principle:
  - Locate non-flammable surfaces (such as paths, driveways and paved areas) against the building, where possible
  - Remove flammable objects from around the building including sheds, outdoor furniture, barbeques, gas bottles, wood piles etc.
  - Ensure trees are planted so they do not touch or overhang the building
  - Maintain grass by keeping mown

Carefully select, locate and maintain trees

- Trees can be useful during a bushfire to achieve the following, provided they are selected carefully, properly maintained and located a safe distance from the building
  - reduce wind speed
  - filter embers and
  - absorb radiant heat
- Some recommended measures to achieve this principle include:
  - Separate tree canopies by at least 2 m.
  - Canopies should cover less than 15% of the inner zone and 30% of the outer zone.
  - Prune branches to a minimum of 2 m above the ground increasing the vertical separation between fuel at ground level and the canopy.

- Locate trees at a safe distance from building.
- Do not plant trees near shrubs, as shrubs can carry fire into tree canopies.
- Periodically remove dead leaves, bark and branches as well as leaf litter from underneath trees around the building.

- The creation of rows of trees, or retention of established trees, to provide a windbreak can be effective in trapping embers and other flying debris, and limiting the wind impact on buildings.
  - The intent is to slow the wind, rather than block wind, to enable capture of embers, without creating excessive turbulence on both sides of the windbreak which can affect bushfire behaviour.
  - Other windbreak considerations are that:
    - there needs to be adequate separation between a building and the windbreak, to ensure that there is limited radiant heat impact and no direct flame impingement, should the windbreak be ignited.
    - The understorey should be managed vegetation to limit ground fuels.
    - routine maintenance must be carried out to remove leaf litter and other dead plant material from underneath the windbreak, and to trim the trees.

While the above represents the design principles recommended by the CFA (2011) and Ramsay (2003), there are other aspects which require consideration:

Plant selection

- While there are a variety of elements which impact plant selection, ideally where vegetation is being added as part of the landscaping treatment, in the NSW *Standards for Asset Protection Zones* (NSW RFS 2005) it is suggested that where possible, they are less flammable and have the following features:
  - high moisture content
  - high levels of salt
  - low volatile oil content of leaves
  - smooth barks without “ribbons” hanging from branches or trunks; and
  - dense crown and elevated branches.
- While the amount, type (flammability) and arrangement of vegetation can affect how well a bushfire can spread landscaping, CFA (2011) notes there are no fire-proof plants, with almost all vegetation able to ignite and burn in extreme fire weather.
- Low succulent plants are examples of plants that are generally low in height and have very low flammability due to high moisture content in leaf and stem and low litter carrying.
- CFA (2011) specifically note that the arrangement of vegetation, rather than the flammability of individual plants, has a greater impact on how a bushfire will spread.

Soil erosion

- While the removal of fuel is necessary to reduce a bush fire hazard, consideration also needs to be given to soil stability, particularly on sloping areas, with soil erosion

potentially resulting in loss of topsoil and nutrients in addition to reduction in soil structure and stability (NSW RFS 2005; DFES 2020).

- NSW RFS (2005) note that groundcovers can greatly improve soil stability and does not add a significant bushfire hazard, and recommend that a ground cover of at least 75% is required to prevent soil erosion, however this will respond to the local conditions. DFES (2020) also recommend that a protective ground cover is kept on the soil surface to reduce risk of soil erosion.

Ongoing maintenance

- All vegetation will continue to develop throughout time, growing, shedding and dying. Ongoing maintenance of landscaping around buildings will be required to the managed vegetation minimises bushfire impact, as per its original design, for the life of the building. These maintenance actions should include:
    - Removal of any fine, dead material and weeds, that might accumulate in and around plants and the building.
    - Pruning trees with low-hanging branches, providing separation of at least 2 metres above the ground.
    - Removing and replacing plants that die or become diseased.
    - Keeping plants well hydrated through watering and mulch, especially during bushfire season.
    - Removing other flammable objects from within the defendable space.

Canopy fires

Given the prioritisation of tree retention, another important consideration for this project is the potential for canopy fires through managed landscaping. *Landscaping for Bushfire* (CFA, 2011) notes that fire is rarely sustained in the tree canopy, unless there is a fire burning in the plants or leaf litter under the tree. The recently released *Guide for applying the Bush Fire Risk Treatment Standards* (DFES, 2020), also refers to the processes of tree and crown pruning and crown thinning, reducing understorey fuel loads and canopy clearance to restrict fire spread to, and throughout, the tree canopy layer.

In exploring canopy fires, it is important to understand bushfire behaviour, which can be reviewed from the current bushfire modelling. AS 3959 uses various empirical models to derive the radiant heat flux and resultant construction standards for buildings in bushfire prone areas. The model considered important in this case is the Noble et al (1980) model used for forest and woodland vegetation classifications, which uses a two layered fuel load classification where fuel loads are simplified back to understorey and total fuel density (Penney 2020).

Plate 8 depicts a breakdown of the total fuel load by strata, including the separation of understorey fuel load (surface, near-surface and elevated fuels) and canopy fuels (bark and canopy):

- Canopy fuels: leaves and fine twigs in the upper layer of trees in forest or woodland,
- Elevated fuels: the 2–3m high scrub, and juvenile understory plants but also includes the canopy of trees less than 4m high, when there is no identifiable separation between the canopy and lower shrubs.
- Near-surface fuels: primarily low level grasses and low shrubs, that may be continuous ground coverage or be more sporadic.

- Surface fuel: includes leaves, twigs, and bark on the ground, which usually contributes the greatest to fuel quantity and includes the partly decomposed fuel (duff) on the soil surface.
- Bark fuel: is the flammable bark on tree trunks and upper branches.

Penney (2020) notes that the rate of spread and intensity of a bushfire front, depends on the fuel available for consumption in the active flaming front. This is represented in the empirical models of AS 3959 through consideration of available fuels, more specifically understorey fuel load (i.e. fuel load beneath canopy, also known as ladder fuels) and total fuel load (understorey and canopy/overstorey). AS 3959 specifically states that rate of spread for forest/woodland fires shall be determined using understorey fuel load, with flame heights based on total fuel loads (i.e. combined understorey and canopy/overstorey). AS 3959 also notes that rate of spread through scrub, shrubland and grassland are based only on total fuel loads, as there is no distinction between understorey and canoy/overstorey fuel loads. This implies fuel load structure is considered critical to the fuel available for consumption during a bushfire (i.e. fine fuels), and that these are located in the understorey fuel strata, with the modelling requiring understorey fuel load to drive the rate of spread, with the canopy fuels by themselves not significantly contributing to the bushfire behaviour. The importance of the understorey fuel load influence on rate of spread, is also represented in the Project Vesta dry eucalypt model of Gould et al. (2007), where the model proposes use of surface and near-surface fuel scores as inputs in forest vegetation, rather than total fuel loads.

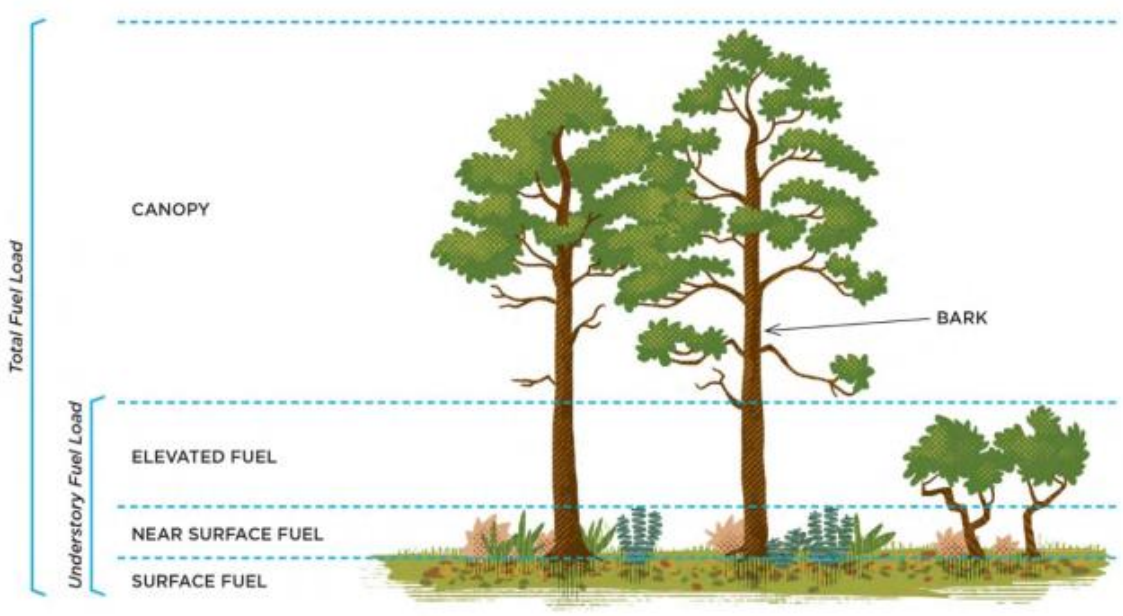


Plate 8: Fuel load by strata (Penney 2020)

For the reasoning detailed above, independent canopy fires are relatively rare, and typically occur during intense bushfires, where there are significant understorey fuel loads to support steady-state bushfire. While canopy fires can burn in advance of the surface fire below, the loss of significant understorey fuels beneath eventually removes the support for this behaviour, and the canopy fire cannot be sustained. This comment relates to fully developed canopy fires, and doesn't mean there won't be ignitions of bark, leaves, twigs and branches in the canopy layer during a bushfire, especially from ember attack, however without understorey fuel loads, fully developed bushfire spread is not possible and would be expected to extinguish.

In summary:

- Canopy fires can be limited by restricting understorey fuels required to enable fire spread into the upper strata. Understorey fuel management is considered significantly more important than the resultant canopy density or separation, which lessens the importance of tree removal.
- While independent canopy fire through areas with highly managed understorey fuels is not considered likely with unmanaged trees, ensuring clear separation between the ground level and the underneath of the canopy layer is important to ensure even small fires cannot rise into the tree crowns.
- The strict management of the understorey fuels and trees is required going forward, to ensure that significant ladder fuels are not permitted to return beneath trees, and to ensure clear separation is maintained beneath the canopy and the ground level below.

Asset Protection Zone Standards Review

Vegetation modification and management, using the principles detailed above, can significantly increase the building resilience to bushfire by reducing the expected behaviour and intensity, especially when done in combination with appropriately enhanced building construction. This is reflected in the planning systems in most states in Australia, through the requirement to establish Asset Protection Zones around buildings in bushfire prone areas, thereby creating sufficient separation from the bushfire hazard through the management of vegetation within the APZ.

In Western Australia, the APZ standards are contained in the Guidelines (reproduced in Appendix L), however additional guidance is included in the Explanatory Note E2.1 from the Guidelines relating to APZs including:

- it should have sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29).
- should include defendable space, which is an area adjoining the asset, within which firefighting operations can be undertaken to defend the structure.
    - Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions.
    - The width of the defendable space depends on the space which is available on the property, but as a minimum should be 3 metres.
- The APZ should be:
    - contained solely within the boundaries of the lot on which the building is situated, except where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity.
    - may include public roads, waterways, footpaths, buildings, rocky outcrops, maintained parkland and cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.
- It is the responsibility of the landowner/proponent to maintain their APZ in accordance with Schedule 1 ‘Standards for Asset Protection Zones’.
    - It is further recommended that maintenance of APZs is addressed through the local government firebreak notice, issued under s33 of the Bushfires Act 1954, and preferably included in a Bushfire Management Plan specifically as a how-to guide for the landowner.

Plate 9 below is also from Explanatory Note E2.1 from the Guidelines, and depicts how the APZ is to be designed for the interfacing bushfire hazard, with a reduction to the 3 m minimum defendable space, where there is no bushfire hazard.

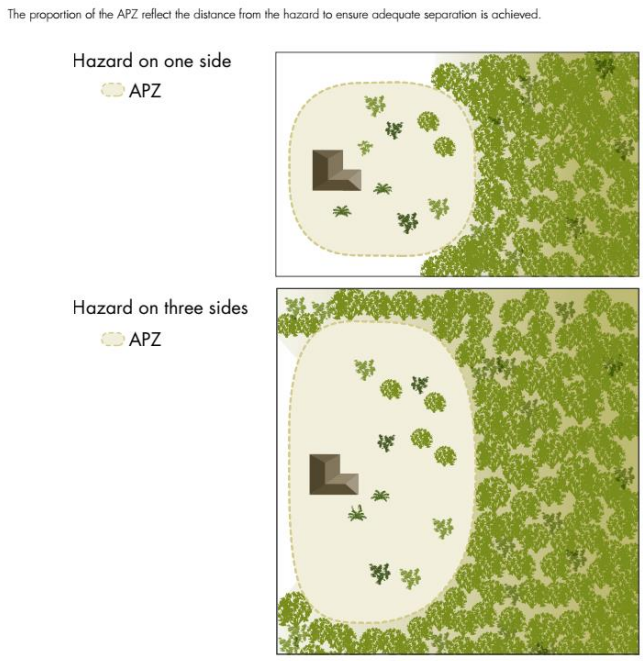


Plate 9: Design of Asset Protection Zone (from bushfire Guidelines)

Most other Australian states also have APZ standards which have been broadly summarised below in Table 17. While there is alignment with the landscaping principles detailed previously, especially reduction of fuel load and fuel discontinuity close to buildings, it can be seen there is no definitive standard, with each state adopting slightly different specifications to protect buildings.

Table 17: Summary of APZ Standards from various Australian States

State	Trees	Shrubs	Groundcovers/Grass
WA	• >5m in height • Trunk >6m from all elevations of building • Branches not touching or overhanging building • Lower branches >2m above ground level or surface vegetation • <15% canopy cover • Canopy separation to >5m apart	• 0.5m – 5m height • Not located beneath trees • >3m from building • >10m from exposed window or door • Clumps <5m^2 in area • Clumps to be to be >10m from each other	• <0.5m in height • Can be planted beneath trees but must be maintained to remove dead vegetation • <100mm if <2m of building • <100mm if <3m from windows or doors • Grass to be maintained to <100mm • Combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
NSW	***Inner Protection Area (IPA)*** • Canopy cover <15% • Canopy separation to be 2m-5m • Should not touch or overhang the building • Lower branches >2m above ground level • Preference to smooth barked and evergreen trees	***Inner Protection Area (IPA)*** • Create large discontinuities or gaps in vegetation • Should not be located beneath trees • Should not form >10% groundcover • Clumps of shrubs to be separated from exposed doors	***Inner Protection Area (IPA)*** • Should be kept to <100mm • Leaves and debris to be removed ***Outer Protection Area (OPA)*** • Should be kept to <100mm • Leaves and debris to be removed

State	Trees	Shrubs	Groundcovers/Grass
	Outer Protection Area (OPA) • Canopy cover <30% • Canopy separation to be 2m-5m	and windows by distance of twice the shrub height ***Outer Protection Area (OPA)*** • Shrubs should not form a continuous canopy • Should not form >20% groundcover	
TAS	• Pruning low-hanging tree branches (<2m from the ground) to provide vertical separation between fuel layers • Pruning larger trees to maintain horizontal separation between canopies	• Thinning out understory vegetation to provide horizontal separation between fuels • Use of low-flammability species for landscaping purposes where appropriate	• Maintaining grass at less than a 100mm height Removing of fallen limbs, sticks, leaf and bark litter • Use of low-flammability species for landscaping purposes where appropriate
VIC	• Trees must not overhang or touch any elements of the building. • The canopy of trees must be separated by at least 5m • There must be a clearance of at least 2 metres between the lowest tree branches and ground level.	• Plants greater than 10 centimetres in height must not be placed within 3m of a window or glass feature of the building. • Shrubs must not be located under the canopy of trees • Individual and clumps of shrubs must not exceed 5 m^2 in area and must be separated by at least 5 metres.	• Grass must be short cropped and maintained during the declared fire danger period. • All leaves and vegetation debris must be removed at regular intervals during the declared fire danger period. • Plants greater than 10 centimetres in height must not be placed within 3m of a window or glass feature of the building.
SA	• Tree canopies within the A-zone should be separated by at least 2m • Keep the lower branches on mature trees pruned to a minimum of 2 m above the ground • tree branches overhanging the roof should be removed or trimmed to at least 2 m clear of the roof	• Manage understorey plants in the A-zone so that the leaf area of the vegetation is not vertically or horizontally continuous. A disconnected 'clumping' of shrubs is more desirable than even connected coverage. Separate shrubs and trees to minimise vertical fuel 'ladders'. • Dead shrubs/understorey plants within the A-zone should be removed • No heath or shrub understorey species are to be within 2 m of the asset to be protected	• Grasses within the A-zone should be reduced to an average height of 10 cm • Dead shrubs/understorey plants within the A-zone should be removed • Available fine fuels (fuel particles less than 6 mm in diameter – such as leaves, twigs, and small sticks up to pencil size) within an A-zone are to be reduced and maintained so that fine fuel levels in surface, shrub, and canopy are significantly reduced and continuity (spread across the area) interrupted

Based on review of Table 17, the following comments are provided regarding the different standards:

- ***Tree and shrub heights are not specified***
  - Other than WA, most other states don't specify at what height vegetation must be considered a tree or shrub
- ***Tree canopy cover and separation***
  - Other than WA and NSW, tree canopy cover is not restricted to 15%, and in NSW, this is only a requirement in the IPA, increasing to 30% in the OPA.
  - Underpruning the lower branches of trees to 2 m above ground level is a common requirement.

- Tree trunk location is not specified in most states, however avoidance of branches touching or overhanging the building is a common requirement.
- Breaking up tree canopy continuity is common to all states, however separation requirements range between 2m and 5m.

- ***Shrub coverage***
  - While WA requires <5% shrub coverage (5 m^2 with 10 m separation in all directions), other states are adopting 10% - 25% shrub cover, typically in clumps.
- ***Shrub positioning***
  - Most states require shrubs to not be beneath trees and to be a minimum >2-3 m from buildings, especially the vulnerable elements.
  - NSW provides further guidance stating clumps must be a distance of twice the shrub height from vulnerable elements.
  - All states require lateral discontinuity throughout the shrub layer, however only Victoria specifies that clumps of shrubs should be 5 m apart. Most other states provide more generic statements of expectation without specific distances.
- ***Use of two zones as part of the APZ***
  - This approach has been adopted by NSW in the *Planning for Bush Fire Protection* (NSW RFS 2019) where the use of Inner and Outer Protection Areas (IPA and OPA) in forest vegetation is incorporated into their APZ structure to present a graduated approach to reducing fuel loads, with the OPA permitting greater tree canopy cover and shrub coverage than the IPA.
  - DFES (2020) have also recommended this graduated approach, although the vegetation specification is different, the concept is consistent in that vegetation management to reduce bushfire behaviour can be less onerous further from the building, provided it is accompanied by more stringent standards adjacent to the building.

Based on the above, in certain respects WA's APZ standards could be considered the most onerous of any states, especially regarding tree and shrub cover and separation. Given the APZ standards need to be applied across a variety of different scenarios, this is specification has merit in areas of elevated bushfire behaviour, especially close to buildings and structures, however the comparison does highlight that flexibility exists using concepts from other states with how to achieve the core principles for landscaping in bushfire prone areas.

Low Threat Vegetation

In addition to APZs, the low threat vegetation exclusion from AS 3959 can be used for guidance, which is vegetation that is not considered to support sufficient bushfire behaviour to produce a BAL impact and not require enhanced building construction response. Low threat vegetation is defined in AS 3959 Clause 2.2.3.2 (f) as follows:

> *Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (e.g. playing areas, fairways), maintained public reserves and parklands, sporting fields, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.*
>
> *Notes:*

1. *Minimal fuel condition means there is insufficient fuel available to significiantly increase the severity of bushfire attack (recognisable as shorth-cropped grass for example, to a nominal height of 100mm)*
2. *A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of trees.*

This definition relates to the following landscaping concepts:

- Vegetation that is considered to be low threat due to:
  - having low flammability,
  - high moisture content
  - low available fuel loads to significantly increase severity of bushfire attack
- Vegetation structure and continuity is an important factor
  - Orchards, windbreaks, nurseries, nature strips and public reserves and parklands are all examples of vegetation with significant numbers of trees, however they typically have very limited understorey fuels and well managed
- Well hydrated, living vegetation structures can also be considered low threat
  - Orchards, commercial nurseries, market gardens are all examples where there remain significant fuel loads, however regular watering ensures they have low flammability and are resilient to supporting fully-developed bushfire behaviour.

Much of the above low threat vegetation classifications would not be considered to strictly comply with the APZ standards, however they can be excluded from classification as it is considered they would not support steady state bushfire behaviour. While care does need to be taken when applying this exclusion to ensure fuel loads are appropriately located and separated, it does highlight that compliance with the APZ standards is not the only way to reduce bushfire behaviour to levels the building construction can withstand.

Proposed landscaping strategy

Managing bushfire risk to the development is an important consideration of the overall landscaping strategy, however it is not the only consideration, with environmental values and visual amenity also critical elements of the design. Embedding the development within the existing natural landscape is an important aspect of the design, and this requires the retention of as much native vegetation as practical to achieve. The retention of trees within the development is important, which are required for fauna habitat and visual screening of various parts of the development. On this basis, the objectives of the landscaping design from a bushfire perspective include the following:

- Retention of native vegetation as much as practical:
  - Priority retention of native trees as they provide important habitat for various native fauna including Western Ringtail Possum and Black Cockatoos
  - Retention, or creation, of pockets of native shrubs for native fauna habitat, including Western Ringtail Possum, and provide midstorey visual elements
  - To ensure the development fits in with native landscape, and visually fragments the development
  - To minimise ongoing management over non-native vegetation

- Manage onsite soil erosion, which might arise as an issue if ground is left completely bare, through retention of groundcovers (where possible) or re-establishment where required.

To achieve the above, a combination of landscaping treatments are proposed throughout the development, as detailed in Section 6.2 and summarised on Table 10. This approach has been proposed to achieve the objectives outlined above, in order to best balance all objectives of the development, not just bushfire risk management.

The onsite vegetation modification will fall into the three main categories:

- Asset Protection Zones at key interfaces and around critical infrastructure, where significant vegetation modification is required to arrest bushfire behaviour in order to protect buildings and key infrastructure, where directly exposed to bushfire impact. The APZ also reduces the likelihood of fire within the development spreading to external environmental assets.

  Vegetation in this zone will be in accordance with the APZ standards and will include the following areas:

  - the perimeter of the habitable building extent within the project area,
    - the only exception is along northern interface, where the interface between the hotel suites/eco-suites and the Foreshore Reserve will be to the APZ-Modified standard
  - the onsite community bushfire refuge building
    - the only potential exceptions are the green roofs and production garden, depending on final vegetation height.
  - the WTP, WWTP, balance tank/s and the bushfire water tank
- An Asset Protection Zone (APZ-Modified) zone throughout the holiday home and hotel precincts near buildings, typically within the perimeter APZ and away from direct interface with unmanaged vegetation, where the landscaping needs to resist significant growth and spread, rather than arrest the fire. Vegetation in this zone will align with the concepts of the APZ standards, but with modification of some aspects to better balance bushfire risk with vegetation retention.
  - Will be utilised along the northern interface of the hotel suites and eco-suites, in lieu of the APZ standards.
- Low threat vegetation throughout the remainder of the development, typically not adjacent to buildings
  - In the Campground where tree retention will be prioritised with some isolated understorey “shrub islands”
  - In the Park Spine where a combination of tree retention and isolated “shrub islands” will be utilised
  - Any other parts of the development to be modified to a low threat standard as per AS 3959 Clause 2.2.3.2 (f) using managed gardens, verge trees etc

The overarching vegetation modification strategy, has been to limit the areas where strict compliance with the APZ standards is required to those locations where the habitable development has a direct interface with unmanaged vegetation where bushfires require arresting. Throughout the remainder of the development, bespoke landscaping treatments are proposed, that largely align with the APZ standards where around buildings, and in areas further from buildings, using tailored

low threat vegetation treatments promoting overstorey retention with highly managed understorey vegetation, to ensure that the fuel loads are limited and fuel structure is fragmented. Given the scale of the development, much of the development is not located adjacent to unmanaged vegetation interfaces, and these treatments are to ensure bushfire growth and spread from ember attack is not promoted, rather than arresting the approaching bushfire.

Further detail and justification are provided below for each of the individual landscaping zones.

Perimeter APZ

The perimeter APZ recognises that these direct interfaces between development and unmanaged vegetation require more substantial vegetation modification to reduce bushfire impact as it approaches the perimeter buildings, to provide the building construction with the greatest chance of withstanding the bushfire impact. This is represented in E2.1 of the Guidelines (see Plate 9) where the APZ is at its maximum width when facing the bushfire hazard, however this is reduced to 3 m wide defendable space where the building is not directly facing the hazard (i.e. a non-vegetated or managed landscape). For this proposal, the bushfire hazard is deemed to be around the perimeter of the habitable development, on the basis vegetation within the development can be modified to a managed landscape.

The main landscape-scale bushfire risk to the development is along the southern boundary where there is direct interface with continuous fuel loads in the National Park. The direct interfaces to the west, north and east are not considered as likely to be impacted by elevated bushfire behaviour due to shorter fire runs, discontinuous fuel profile or lesser chance of bushfires approaching from those directions, as discussed in Appendix J. On this basis, the APZs have been sized as follows:

- Along the eastern and western interfaces, the APZ is limited to BAL-29 widths in accordance with AS 3959 Method 1, which is considered to adequately address the bushfire risk while minimising environmental impact associated with their implementation.
    - APZ to the west is 10 m wide
    - APZ width to the east is 13 m wide
- The APZ width is increased to a minimum of 25 m width along the southern, south-western and south-eastern interfaces to respond to the potential for landscape-scale bushfire risk from Leeuwin Naturaliste National Park.
- The APZ to the north of the hotel suites and eco-suites will not fully comply with the APZ standards and is addressed in the APZ-Modified (Hotel) section below

The rationale for the southern APZ is as follows:

- In order to comply with Method 1 from AS 3959 for FDI 80, the minimum required APZ widths from buildings along the southern interface to achieve BAL-29 would be:
    - 13 m (to Class D scrub on upslope)
    - 21 m (to Class A forest on upslope).
- A Method 2 calculation for Class A forest on an upslope at FDI 50 (as per 1:200 FDI calculation for the site), shows the minimum separation to achieve BAL-29 is 15.5 m (see Appendix P for FLAMESOL calculation), which is considerably less than the distance for FDI 80.
- The calculated flame length from the forest and scrub vegetation are as follows (see Appendix P):
    - Class A forest (flat/upslope): 19.8 m (at FDI 80) and 13.95 m (at FDI 50)

- Class D scrub (flat/upslope): 11.62 m (all FDI)

The calculated separation distance (at FDI 50) and flame lengths are all still within the AS 3959 APZ widths required to achieve BAL-29, and it has been demonstrated that the Method 1 separation distances are conservative in this location for the local FDI. Additionally, the Method 2 calculations makes no allowance for the 8° upslope toward the site which would significantly reduce the rate of spread (i.e. fire spreading downhill more slowly), which would further reduce the required BAL-29 setbacks and flame length. However, given the potential for elevated bushfire behaviour due to the long fire runs, the southern APZ width is to be increased to 25 m wide to provide additional conservatism, which aligns with the recommended APZ widths in the current City of Busselton firebreak notice (see Appendix O). This is considered to provide a sufficient margin of safety in light of the anticipated bushfire behaviour at this location including ensuring buildings are not subject to elevated radiant heat or direct flame contact from the main head fire.

The portions of the perimeter APZ that extend onto the "Leeuwin Way" road verge and the Smiths Beach Road verge are to be configured as windbreaks, consisting of a single row of trees complete with low understorey planting. This treatment is proposed along the road, to provide an entry statement with a level of visual screening for the homes. While not technically compliant with the APZ standards, this tree arrangement is excludable low threat vegetation under AS 3959 Clause 2.2.3.2 (f), and once the trees mature, they will assist with filtering some ember attack on the homes.

Community bushfire refuge APZ and landscaping

Landscaping around the community bushfire refuge will comply with the APZ standards, however the proposed green roofs, and the proposed production garden to the south-west of the Community Hub building, represent potential deviations depending on final vegetation height, which has been explored below.

The sizing of the refuge APZ has been calculated to achieve 10 kW/m^2 at 1200 K at the external walls of the nominated onsite refuge buildings. Given the refuge is largely exposed to the narrow foreshore reserve to the north and managed landscaping within the development and adjacent developments, in order to rationalise the APZ width, Method 2 calculations (see Section 5.3.1.2) have been used to more accurately model the BAL impact. The modelling reflects the narrow head fire widths in the northern foreshore from the north and the north-west, and low threat vegetation in the southerly directions.

The resultant APZ widths for the bushfire refuge are:

- 25.8 m wide APZ from the north, south and south-west of the refuge, and to the lot boundary to the east.
- 31.9 m APZ from the north-west of the refuge.

Upon completion of development, the closest unmanaged vegetation south of the refuge, will be over 200 m away, and any real-life bushfire impact on the refuge will be from ember attack only (i.e. no radiant heat impact). On this basis it could be contended that an APZ is not required to reduce radiant heat or direct flame on the refuge provide landscaping is managed, however given the criticality of the refuge, this is not considered appropriate, and for ease of implementation, the southern refuge APZ has been sized to align with that of the APZ to the north (25.8 m wide). By comparison, if this southern refuge elevation did interface with unmanaged scrub and forest vegetation, the APZ width required to achieve 10 kW/m^2 at 1200 K would be 44.1 m to 63.2 m respectively. The proposed APZ width compares favourably to this, given the nearest unmanaged scrub and forest is over 200 m away from the refuge.

The community bushfire refuge APZs are nominated on Figure 11 and need to comply with the technical specifications of the bushfire Guidelines as per Appendix L, other than the production garden and the use of high moisture content planting on the Community Hub roof, depending on the final height of this vegetation.

The proposed production garden straddles the southern portion of the Community Hub roof structure (see Plate 10) and landscaping to the rear of that building, located over the Ground Floor but still exposed to Level 1 building envelope. This garden is to be cultivated garden containing a series of planter beds with well-hydrated herbs, fruits and vegetables, however depending on final vegetation heights, strict interpretation is that these could be considered to deviate from the APZ standards. The garden planters are expected to have a shade structure and to be reticulated on a regular basis during the summer months, to protect and water the plants. Each of the planters will be surrounded by paths, lawn and high moisture content vegetation outside of the paths.

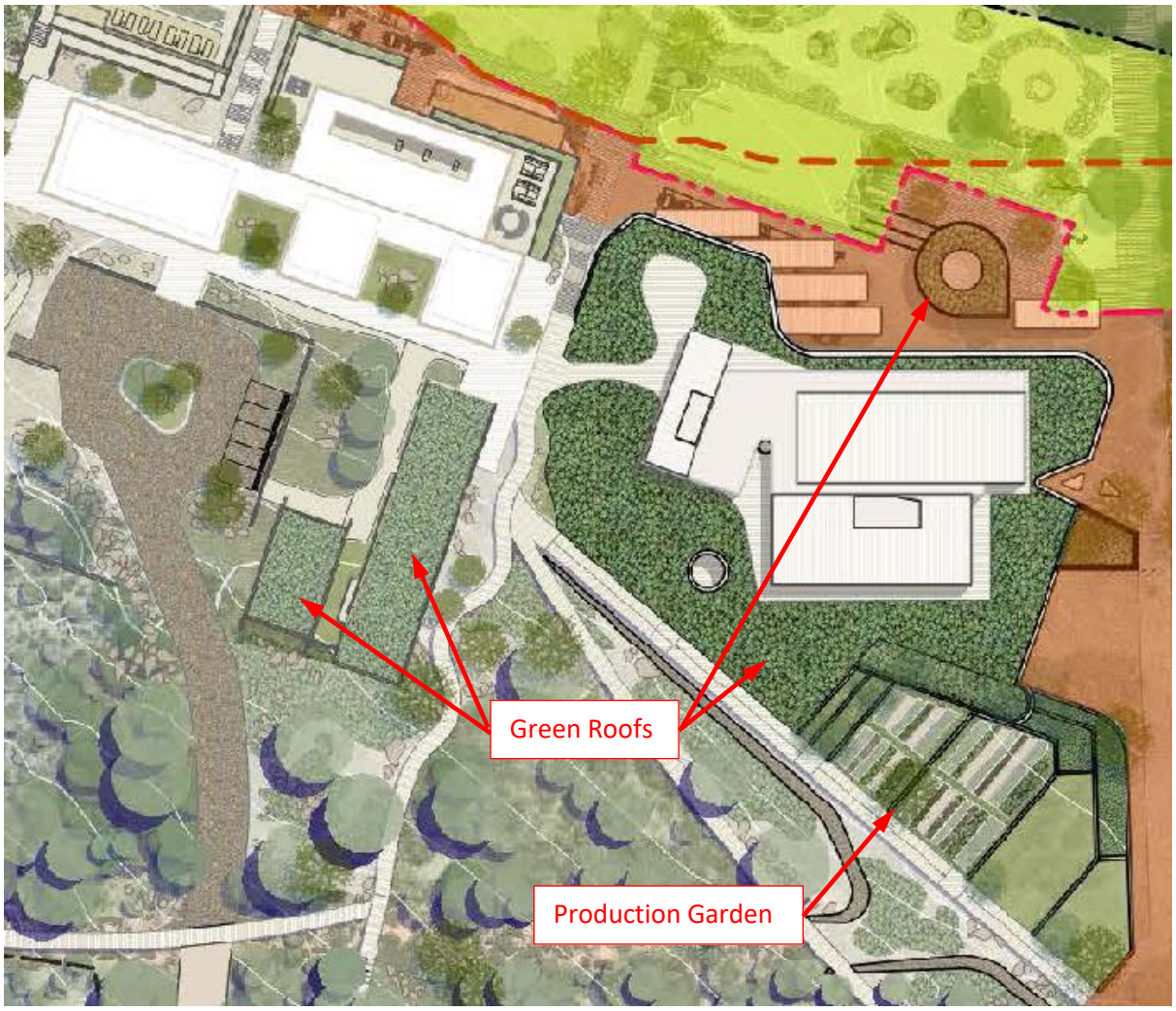


Plate 10: Planter beds and green roof on Community Hub, Spa and Gm buildings

While the proposed production garden aligns with the low threat vegetation definition in AS 3959 Clause 2.2.3.2 (f) as a cultivated garden (or even nursery), it is appropriate given the location, that the following additional specifications are applied to limit potential ignition, growth or any significant bushfire behaviour:

- Planter beds and any shade structures are to be non-combustible construction
- Each planter bed is surrounded by a non-combustible path or surface, extending no less than 1 m from the planter base.
- No plants are to exceed 1.5 m height at maturity
- The gardens are to be regularly maintained during bushfire season to remove dead vegetation and any combustible materials
- Reticulation system outlined in Section 6.7, is to be installed at the production garden, so it can be activated in a bushfire scenario.

Regarding the use of high moisture content vegetation for the green roofs (e.g succulents), in accordance with the APZ standards, only groundcovers or grass managed to less than 100 mm in height are permitted within 2 m of buildings or within 3 m of windows or doors, provided they are properly maintained and all dead plant material is removed. High moisture content vegetation is proposed in various locations around the refuge, including over the Community Hub, Spa and Gym building roofs. It is the intent to comply with the requirement for vegetation close to buildings to be <100 mm high as much as practical, however some of these high moisture content species may exceed the 100 mm maximum height limit, and would represent a deviation from the APZ standards. The risk with this is that the vegetation with greater height would represent an increase in available fuel load and may not be as easily managed, potentially increasing the chance of having a significant fire adjacent to the building. This is not considered to be the same risk for high moisture content vegetation, which have an inherent resistance to ignition and spread over other groundcovers.

The landscaping approach for the project is to embed the development in the landscape, with the use of lawn next to buildings not generally considered appropriate for this project given the coastal location, while also requiring significant water consumption to maintain. Using high moisture content vegetation adjacent to buildings is an approach the *Landscaping for Bushfire* (CFA,2011) proposes, provided they are regularly maintained, and on the basis they have very low flammability. Based on this, the use of high moisture content, low flammability species is considered acceptable, provided they are regularly maintained to remove dead material, with focus on using endemic species where appropriate. Given the importance of the bushfire refuge to the overall bushfire risk management strategy, the 'green roofs will comply with the following standards:

- All vegetation is to be high moisture content, low flammability species (< 0.3 m height), and shall be planted no closer than 1.0 m to any external building walls
- The roofs are to be regularly maintained during bushfire season to remove dead vegetation, or that which is not high moisture content, that are >100 mm
- All other roofing material is to be non-combustible
- Reticulation system outlined in Section 6.7, is to be installed at the production garden, so it can be activated in a bushfire scenario.

WTP/WWTP APZ

The design of the development has required the location of the water supply infrastructure in the southern part of the site, and given this provides crucial water supply including firefighting water in the holiday home precincts, an APZ compliant with the technical specifications of the bushfire Guidelines, will be established around the perimeter of the WTP, WWTP and tank enclosure as follows:

- A 27 m wide APZ will be created to the south-west, south and south-east of the enclosure to achieve BAL-12.5.

- A 13 m wide APZ is to be created to the north of the enclosure, to achieve BAL-29

The basis for the APZ widths and justification are detailed in PPBS 3 in Section 7.5.3, where the discussion incorporates the variety of other measures being employed to protect this infrastructure.

APZ – Modified

While the APZ's nominated in Section 6.2.1 will comply with the APZ standards to provide an appropriate treatment along direct interfaces with unmanaged vegetation, the APZ-Modified specifications detailed in Sections 6.2.2, seek to provide more flexibility for vegetation retention to enable better balancing of environmental and visual amenity objectives with bushfire risk management. This approach is to be used throughout the development (outside the APZs nominated above) in areas adjacent to buildings within both holiday home precincts and around the hotel suites including along the northern interface with the Foreshore Reserve. Inside the perimeter APZ, much of the vegetation modification could be required to comply with the less onerous low threat vegetation requirements from AS 3959, however given the risk profile of the development and the legacy access non-compliance, having a tailored landscaping strategy is considered more appropriate to manage bushfire risk in perpetuity.

The basis of the landscaping treatments for APZ-Modified aim to align with the overall principles of the APZ standards, but will include the following deviations:

- Including vegetation shorter than 5 m being trees, provided they can be successfully modified to a tree specification i.e. underpruned to 2 m.
- permitting greater tree overstorey of up to 20% canopy cover, where located further than 6 m from the building
- permitting greater tree overstorey of up to 40% canopy cover in nominated areas only, provided they are located away from main bushfire hazard interfaces, further than 6 m from buildings, and understorey vegetation is limited to low groundcovers.
- rationalise the separation requirements for shrub vegetation from buildings and other clumps of shrubs, based on shrub height.
- permitting slight increase in shrub coverage to 10%.
- permitting use of shrub "islands" in APZ-Modified (Hotel) zone only
- permitting managed high moisture content vegetation exceeding 100 mm in height adjacent to buildings.

The proposed deviations nominated above are considered appropriate given the following:

- The APZ-Modified standards are proposed in areas where there is no direct interface between buildings and unmanaged vegetation (other than northern interface with Foreshore Reserve). On this basis, rather than needing to arrest approaching bushfire spread at the interface, this landscaping treatment seeks to provide resistance to growth and spread from ember attack, to aid bushfire construction.
- To achieve this, the objective is to use the core principles of landscaping in bushfire prone areas of:
    - Limiting available fuel loads to limit bushfire intensity
    - Creating lateral and vertical discontinuity to limit bushfire spread and potential for canopy fires
    - Providing defendable space for firefighters

Each of the different vegetation groups is addressed separately below, with the broad premise to seek guidance from APZ standards in other states, to guide the manner in which the modifications are made to the WA APZ standards for this project for the APZ-Modified standard.

Tree Specification Modifications

The proposed alterations to tree vegetation specifications from the APZ standards are as follows:

- Permitting vegetation shorter than 5 m to be included as trees, especially retention, provided they can be successfully modified to a tree specification i.e. underpruned to 2 m.
- permitting greater tree overstorey up to 20% canopy cover throughout the APZ-Modified zone
- permitting greater tree overstorey up to 40% canopy cover in nominated areas, provided understorey vegetation is limited to low groundcovers.

Regarding tree height, the WA APZ standards state trees are to be >5m in height, and while this provides a useful guide to the approximate height at which vegetation should be considered a tree, it is also noted that no other state specifies tree heights. The approach in the APZ-Modified standards is to largely comply with the WA APZ approach, however where vegetation is less than 5 m high, provided it can be successfully sited 6 m from buildings, underpruned to 2 m above ground level, trimmed from touching or overhanging the building and separated from adjacent shrub and trees, and done so without risking tree health, it is not considered this presents any additional risk to trees greater than 5 m height. The key element is considered to be the removal of the understorey vegetation, to limit chance of ignition but also to avoid elevated radiant heat from this lower-level vegetation on the building at the height of the vulnerable elements (e.g. glazing, openings etc). This modification will ensure greater flexibility to retain native trees as part of the project, rather than clearing and replanting.

Canopy cover is another important aspect of managing bushfire behaviour, but is also important in balancing tree retention for environmental and visual amenity objectives. The APZ-Modified standards are only being proposed away from key interfaces (other than the northern hotel suites where there are no existing trees), where the bushfire behaviour will have been largely arrested by the perimeter APZs which will have 15% canopy cover as per the APZ standards. Most other states don't specifically nominate a percentage canopy cover, however there is a requirement for tree canopies to be laterally separated by 2 – 5m, which could permit canopy percentages greater than 15%. It is noted that 15% is adopted in the NSW APZ standards within the IPA zone (NSW RFS 2019), however in forest vegetation an OPA zone can be implemented outside the IPA, where an increase to 30% canopy is permitted. While the OPA permits greater canopy retention further from the building, it is adjacent to the bushfire hazard, and is intended to reduce bushfire behaviour before reaching the IPA, with a reduced environmental impact. Tree trunk location is not specified in most states within APZs, however avoidance of branches touching or overhanging the building is a common requirement, therefore the 6 m separation provides a reasonable guide although this would still depend on tree height. It is also noted that several low threat vegetation treatments in AS 3959 Clause 2.2.3.2 (f), promote tree retention provided that there is little to no understorey or mid-level fuels (e.g. managed parklands, orchards and windbreaks).

The risk with modifying the tree canopy coverage is that if the trees aren't appropriately separated, bushfire penetration could continue into the development as a canopy fire. As discussed previously, this risk is highly related to the management of understorey fuels, to limit understorey vegetation that supports bushfire behaviour and spread, rather than just reducing canopy cover and increasing separation.

For this project, it is considered appropriate to limit tree canopy cover to 15% at the key interfaces with unmanaged vegetation (i.e. APZs) where bushfires will require arresting, especially along the high-risk southern interface, in keeping with the APZ standards. This requirement will be increased slightly to 20% for the APZ-Modified standard, and recognises the large scale of the development and that the APZ-Modified zone has no direct interface with unmanaged vegetation.

It is proposed that the canopy cover be increased to 40% in nominated locations in the holiday homes precinct, away from the bushfire hazard. In these areas of increased canopy coverage, it will not be possible to have separation between individual trees, and it is proposed that any vegetation beneath these trees is to be species that are low groundcovers that are less than 0.3m high, with the trees underpruned to 2 m above ground level and the canopy thinned to remove dead vegetation and prevent overhanging or touching buildings. This approach will ensure trees are appropriately separated from buildings and from the bushfire hazard, will not support significant bushfire behaviour to overwhelm building construction, or present an increased risk to attending firefighters.

Shrub Specification Modifications

Regarding vegetation separation distances under the WA APZ standards, the following is permitted:

- Trees (>5 m high) can be within 6 m of the building, albeit underpruned to 2 m
- Shrubs (0.5 m to <5 m high) must be 3 m from building but 10 m from exposed doors or windows.
- Groundcovers (<0.5 m high) can be within 2 m of a building, but 3 m from doors or windows if greater than 100 mm

While the above requirements for trees and groundcovers are considered appropriate, the blanket requirement for all shrubs, regardless of height between 0.5 – 5 m, to be 10 m from exposed doors or windows (which would occur on most building elevations), doesn't align with the other categories especially when considering trees can be within 6 m albeit without mid-storey vegetation, and groundcovers up to 0.5m can be as close as 3 m from vulnerable elements.

Furthermore, in accordance with WA APZ standards, shrubs must also achieve the following:

- Planted in clumps less than 5 m^2 in area
- Clumps are to be separated from other shrub clumps and any windows and doors by at least 10 m (which represent approximately 5% shrub vegetation permitted in an APZ)
- Not permitted to be planted beneath trees

While the intent of the WA APZ standards is clearly to achieve lateral separation with other vegetation and the building, it is onerous compared to other states, based on the following:

- Shrub heights are not specified
- Shrub coverage is either not specified, or is:
    - up to 10% in IPA and increasing to 20% in OPA in NSW,
    - up to 25% in Victoria
- Shrub locations are as follows:
    - Most states require shrubs are not beneath trees and are a minimum >2-3 m from buildings, especially the vulnerable elements
    - NSW provides further guidance stating *"clumps of shrubs should be separated from exposed windows or doors by a distance of at least twice the height of the vegetation"*

- All states require lateral discontinuity throughout the shrub layer, however only Victoria specifies that clumps of shrubs should be 5 m apart, with most other states provide more generic statements of expectation.

Based on the above review, there is scope to slightly reframe the APZ standards, where away from the main bushfire hazard, to retain the principles of reducing fuel loads and breaking up continuity, but in a more targeted manner for the site, rather than blanket application of the APZ standards.

The key deviation proposed from the APZ standards for shrub vegetation, is the breakdown of the separation distances for various shrub heights, to enable smaller shrubs to be located closer to the building and vulnerable elements. To achieve this, it is proposed that the concept of separation being a factor of the mature shrub height, is adopted from the NSW *Planning for Bush Fire Protection* APZ standard, where separation is twice the mature shrub height. Given this concept is new for WA, the BMP recommends the separation distances for shrub vegetation within the APZ-Modified zone is three times the mature shrub height from buildings as outlined below, to ensure a margin of safety:

- Shrubs between 0.5 m to 3 m must be 3 times the mature height from exposed doors and windows and other shrubs as follows:
  - 0.5 m - ≤1.0 m mature height can be ≥3m from exposed windows/doors.
  - ≥1.5 m mature height can be ≥4.5m from exposed windows/doors.
  - ≥2.0 m mature height can be ≥6m from exposed windows/doors.
  - ≥3.0 m mature height can be ≥9m from exposed windows/doors.
- Shrubs between 3.5 m to 5 m in height must be ≥10m from exposed windows/doors
- No shrub can be within 3m of building or positioned directly underneath trees

The specific requirements for shrubs in each APZ-Modified zone are detailed in Section 6.2.2.

In addition to the rationalisation of the shrub separation distances from buildings, the following deviations are also proposed:

- Clumps of shrubs (other than specified "shrub islands") continue to adhere to a maximum area of 5 m^2,
- The separation distance between shrub clumps shall also comply with the three times the mature shrub height rule detailed above.
- The overall shrub coverage in the Holiday Homes zone is permitted to be up to 10%, with coverage in the Hotel Suites zone to be greater as part of a tailored approach.
- The separation between "shrub islands" greater than 5 m^2 (detailed below) is at least 6 m, but will also depend on height of vegetation being retained in the island.

This proposed marginal increase in shrub coverage and reduction in separation is contingent on the maximum height of the shrub vegetation being restricted to avoid any significant behaviour that may come from vegetation that is on the upper end of the shrub height range. The reduction in separation distances between clumps is consistent with the Victorian approach, albeit they have no height specification, while the limit of 10% cover is consistent with NSW APZ standards for the IPA. Other than where "shrub islands" are proposed around the Hotel, the maximum shrub clump size in APZ-Modified zone remains at 5 m^2, which is consistent with Victorian standards. Shrubs still can't be located beneath trees in APZ-Modified zones.

The concept of "shrub islands" is proposed in several locations around the site, mostly in the low threat vegetation areas in the campground and park spine, but also in the APZ-Modified (Hotel Suites) zone. This landscaping treatment is not strictly proposed in the APZ standards, but is an

extension of the 5 m^2 clumps that are permitted, while also utilising the principles of reducing fuel loads while breaking up the vegetation continuity in the managed areas around buildings. Conceptually, it also aligns with the AS 3959 Clauses 2.2.3.2 (b), (c) and (d), which are exclusions based on geometric isolation of unmanaged vegetation, although these "islands" will be fully managed.

The "shrub islands" are to be limited in overall size/area, have height restrictions, be kept defined distances from buildings, trees and nearby shrub islands and established with a border of very low groundcovers (<100 mm), high moisture content vegetation (<300mm), mulch or non-vegetated materials to limit any significant fire spread from the island. These principles are consistent with managing fuel loads while breaking shrub continuity across the zone, while also recognising the reduced risk associated with retaining the shrub islands the APZ-Modified areas which are located away from main bushfire interface to the south. These shrub islands will only be permitted around the hotel suites and eco-suites, with the specific requirements detailed in Section 6.2.2 and Table 10.

Groundcover and Grass Specification Modification (High moisture content vegetation)

The WA APZ standards for groundcovers and grass are that if they are <100 mm they can be located adjacent to the building provided they are regularly maintained, with any vegetation >100 mm - <500 mm to be 2 m from buildings and 3 m from doors/windows. As discussed previously for the green roofs in the refuge APZ, high moisture content vegetation species may exceed the 100 mm maximum height limit which would represent a deviation from the APZ standards, however the use of vegetation <0.3 m in height as a landscaping treatment adjacent to buildings is considered appropriate, provided they have high moisture content, are low flammability, and they are regularly maintained to remove dead plant material. While additional measures have been employed for the refuge green roofs for a margin of safety due to its criticality to the bushfire risk management strategy, primarily the provision of reticulation coverage, the use of high moisture content vegetation in the APZ-Modified zones can be more reflective of standard APZ application i.e. without reticulation. On this basis, the following is considered acceptable specifications for use of high moisture content vegetation in the APZ-Modified zones, to manage bushfire risk:

- planting of species (< 0.3 m height) adjacent to buildings provided they are high moisture content, low flammability species.
- No other vegetation that is >100 mm in height is permitted within 2 m of the building or 3 m of window or doors.
- They are to be maintained regularly through bushfire season to remove all dead plant material and any other vegetation that is >100 mm

APZ – Modified (Holiday Homes)

The APZ-Modified (Holiday Home) treatment within the Eastern and Western holiday home precincts nominated on Figure 11, is to comply with the specifications detailed in Section 6.2.2.1 and Table 10. This is to involve implementing the tree, shrub and high moisture content vegetation rationalisations outlined previously, or otherwise complying with the APZ standards from the Guidelines.

The only deviation from these APZ-Modified (Holiday Home) standards, is an area of existing *Moodjar* (Nuytsia or WA Christmas Tree) that are to be retained near several Western holiday homes, give the cultural significance this vegetation has to the local Nyoongar people. The retention of this vegetation is to be achieved on the following basis:

- Identify the four or five best examples of the *Moodjar* in the grove (further than 6 m from proposed buildings), and where possible, identify the host plant for each one.

- Within the grove, isolate the *Moodjar* and the host plant, and underplant low groundcovers <0.3 m high.
- The remaining shrub vegetation in the grove is broken up into small plots <5 m^2 and <10% cover and separated from trees, shrubs and buildings in accordance with the shrub specification in Table 10.

The landscaping within the lots close to the buildings is considered to be managed gardens consistent with low threat vegetation definition, which will have a consistent management regime to regularly reduce fuel loads through removal of dead vegetation and weeds, and pruning. The gardens in the Eastern precinct will often be irrigated with treated wastewater at the rear of lots, in addition to any additional watering from landowners. Notwithstanding, the Community Corporation will be required to audit all onsite landscaping prior to bushfire season, and conduct spots checks throughout the season.

APZ – Modified (Hotel)

While the holiday home precincts contain significant amounts of mature trees, especially the Eastern precinct, almost all vegetation around the proposed hotel is less than 2 m high with much being less than 1 m high, with no existing trees greater than 5 m (see Plate 11 to Plate 13). On this basis, while the APZ-Modified landscaping approach around the hotel suites and eco-suites, as nominated on Figure 11 and summarised on Table 10, with a key objective being the retention of shrubs around the hotel buildings as follows:

- Shrubs (0.5 m to <5 m height)
    - No shrub can be within 3m of building or beneath trees
    - Where configures as clumps <5 m^2, shrubs are to comply with the same requirements as APZ-Modified (Holiday Homes), including separation distances based on height.
    - Shrub "islands" are permitted to the north of the suites/eco-suites to the foreshore, and between the suites, provided they comply with the following:
        - Only include vegetation ≤2 m high and be less than 50 m^2 in size,
        - they are >6m from other shrub "islands" or trees.
        - must be isolated from surrounding vegetation (other than trees which must be 6 m away) by at least 1.5 m wide perimeter very low groundcovers (<0.1m high), high moisture content vegetation, mulch or non-combustible material.
        - Separation from buildings for shrubs between 0.5 m to 2 m must be 3 times the mature height from exposed doors and windows
        - number of shrub islands is to broadly align with that depicted in the Landscaping Report

The APZ-Modified standard is being used along the northern interface with the Foreshore Reserve, in lieu of strict compliance with the APZ standards, to use a landscaping strategy that better retains existing low shrub vegetation, while also managing the bushfire risk by disrupting fuel loads. There is only a narrow fire run from Smiths Beach, to proposed hotel suites and eco-suite buildings, which would cause fire fronts much narrower than 100 m impacting proposed development. The Method 2 calculations detailed in Section 5.3.1.2 reflect the lesser risk associated with the narrow flame width (and fire runs) from Plot 1, and produce a resultant required separation distance of 11 m to achieve BAL-29.

Plate 11: From existing carbays, looking west

Plate 12: From existing foreshore driveway, looking east to north of eco-suites

Plate 13: From adjacent to central firebreak looking west to hotel suite location and APZ-Modified

Given the limited bushfire risk that exists from this northern and north-western interface, and the significant removal of shrub vegetation required to achieve the WA APZ standards, it is proposed that the APZ-Modified (Hotel) standard is implemented to enable retention of as much of the low shrub vegetation as practical. This is to be achieved through the creation of "shrub islands", enabling targeted retention of low shrub vegetation. This concept has been depicted in Plate 14.

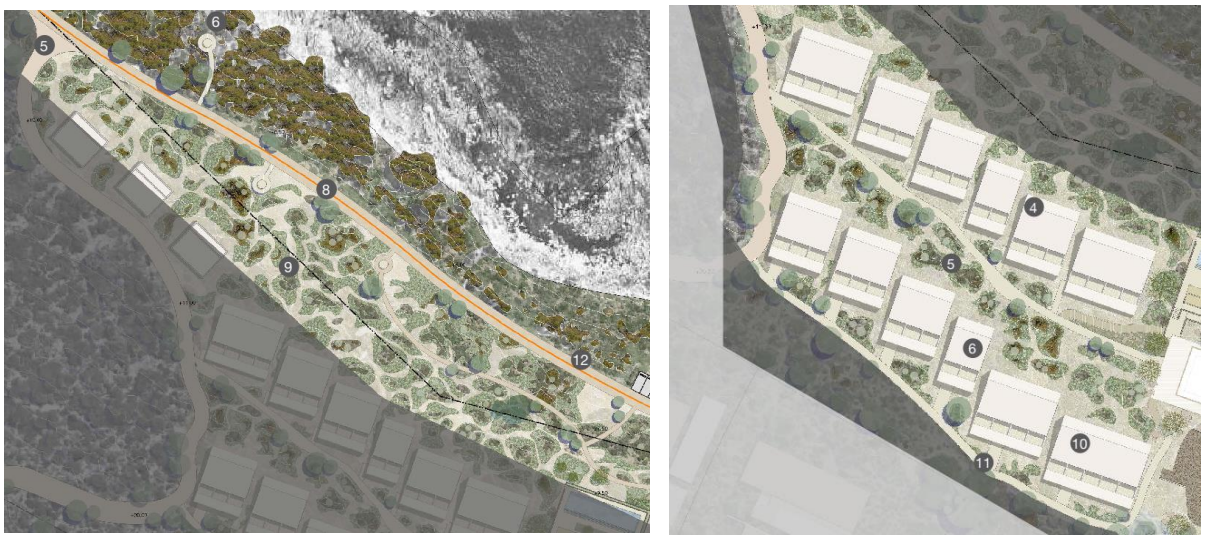


Plate 14: Fragmented vegetation in APZ-Modified (Hotel)

The shrub "islands" must also be located away from other islands or any trees by at least 6 m, and are to be separated from surrounding vegetation including other shrub islands by at least 1.5 m wide perimeter very low groundcovers (<0.1m high), high moisture content vegetation, mulch or non-combustible material. They The isolation of the "islands" from each other and any proposed trees, creates sufficient separation to limit the ability for fire spread throughout the zone hopping across the islands. Separation of islands from buildings is again based on twice the mature shrub height, and will not be within 3 m of the building, and ensures radiant heat impact on the building is suitably reduced.

Given the “islands” are to contain only low shrub vegetation (<2 m high but often <1 m), it is considered a maximum area of 50 m^2 per “island” is appropriate, especially when considered in conjunction with the isolation of the “islands”, the narrow fire runs which are fragmented by foreshore driveway and other paths, the limited likelihood for bushfire from the north-west, the shielding from fire approaching from the south, the BAL construction of all hotel buildings and that people will not be sheltering in these buildings in a bushfire emergency having evacuated offsite or relocated to the refuge. While it is acknowledged it is not a standard approach, given there will be no risk to life safety, and very limited risk to buildings, the use of shrub “islands” is appropriate to manage the risk to both in this location.

Low Threat Vegetation

Within the main development area, the areas outside of nominated APZ and APZ-Modified landscaping, are to be modified to low threat vegetation as shown on Figure 11. As outlined previously, in accordance with AS 3959 vegetation can be low threat due to various factors, including flammability, moisture content, fuel load, management and geometrical isolation. Vegetation assessed as being low threat, is excluded from classification and is considered to have no BAL impact on buildings. While vegetation compliant with the APZ standards is considered to be low threat, this is not the only way to configure low threat vegetation, as outlined in AS 3959.

For this development, the proposed areas of low threat vegetation are not adjacent to any habitable buildings, other than the two campground buildings, and the tent platforms, all of which are considered a tolerable loss in a bushfire. There are two main zones of low threat vegetation; namely in the campground and along the park spine, with several other minor areas located along the “Leeuwin Way” road reserve (outside nominated APZs) and along the “Smiths Lane” and campground loop road verges and entry garden.

Similar to APZ and APZ-Modified treatments, establishment of all low threat vegetation will be by the Proponent, with ongoing management the responsibility of the Community Corporation which will audit onsite landscaping prior to bushfire season, and conduct spots checks throughout the season.

Low Threat Vegetation (Campground)

The campground is centrally located within the development, and has only a minor interface with unmanaged vegetation within the small plot of POS to the east, albeit separated by an APZ. Given the main ignition risk within the campground during a bushfire will be from ember attack, the objective within this area is to create a landscaping treatment that is resilient to growth and spread from spotting, whilst also maintaining fauna habitat and pathways and creating an immersive natural experience for campers.

The extent of this zone is nominated on Figure 11, and is to comply with the specifications detailed in Section 6.2.3.1 and Table 10, which involves implementing the tree and shrub rationalisations outlined previously, or otherwise complying with the APZ standards from the Guidelines.

One of the specifications is permitting tree canopy cover of up to 40% in this zone. The retention of trees is only permitted where the understorey is to be low groundcovers and significantly managed, and the trees underpruned with canopy thinned to remove any dead material. While there will be very limited understorey, from a fauna habitat perspective, there is a requirement to retain small amounts of shrub. The philosophy of “shrub islands” has been reused in the campground, to create small plots (<30 m^2)of low shrubs (<1.5 m high) that are separated from other shrubs “islands” or shrub clumps, as well as tent platforms, with non-vegetated construction or high moisture content vegetation or mulch to limit fire growth and spread.

There are several low threat vegetation treatments detailed in AS 3959 Clause 2.2.3.2 (f), that promote tree retention, provided that there is little to no understorey or mid-level fuels, such as

managed parklands, orchards and windbreaks. Additionally, the OPA zone permitted in forest vegetation in NSW, is allowed to retain up to 30% tree canopy with 20% shrub understorey, and this is within the portion of the APZ directly connected to unmanaged bushfire prone vegetation. As previously discussed, the management of the understorey fuel loads in conjunction with the underpruning of trees, creates the lateral and vertical separation required to prevent fully developed bushfire spreading through the fuel profile or support of canopy fires.

Based on the above, the specification of 40% tree canopy cover in the campground is considered appropriate given the isolation of this area from any direct interface with unmanaged vegetation, with separation to the small POS area to the east, to be provided by the nominated APZ and the managed landscaping in the campground loop road. The resultant bushfire impact on the campground is expected to be entirely from ember attack, and the increased retention of managed trees is not considered a significant risk, provided the understorey is well structured and managed to limit fire growth. Notwithstanding, the trees are to be grouped intermittently, with a 5 m gap in canopy, to create some discontinuity in the canopy.

Given the two proposed buildings and the tent platforms are surrounded by managed low threat vegetation, with the campground isolated from any significant unmanaged vegetation, and the design objective to create the immersive nature-based experience, there is no formal requirement for APZs in this area, and minimal separation is provided between the proposed buildings and tent platforms and the surrounding low threat vegetation. This separation is to consist of ensuring trees are not within 3 m of the buildings, with lower branches pruned, with a perimeter of non-combustible elements or managed gardens only permitted within 3 m of the buildings.

It is noted balancing bushfire risk with environmental concerns is a key objective, and while the campground infrastructure would be considered a tolerable loss in a bushfire, in particular the tent platforms, this is not a desirable outcome and when the high level of vegetation management is considered in conjunction with the BAL-12.5 construction requirements and fire hose reel coverage in the campground, the bushfire impact will be limited and loss of the buildings is not likely. From a life safety perspective, given the lack of bushfire resilience of the tents, it is a requirement of the BEMP that all campground occupants are either safely evacuated offsite, or relocated to the bushfire refuge, as a priority measure in a bushfire emergency, so life will be preserved.

Low Threat Vegetation (Park Spine)

Landscaping in the Park Spine, where outside the APZ, will be similar to the low threat landscaping methodology adopted for the campground, albeit with less tree retention due to lack of existing trees in various parts of the spine. The extent of this zone is nominated on Figure 11, and is to comply with the specifications detailed in Section 6.2.3.2 and Table 10, which involves implementing the tree and shrub rationalisations, or otherwise complying with the APZ standards from the Guidelines.

As mentioned in the discussion regarding canopy fires, while bushfire behaviour and canopy fires cannot be supported following the removal and ongoing management of the understorey fuels, given the direct connection of the park spine with unmanaged vegetation, unlike the isolated campground, there is potential for canopy fires burning in advance of the surface fire below to enter the park spine. To create a circuit breaker, the perimeter APZ has been intentionally extended through the park spine to create a substantial break in fuel load continuity and prevent fully developed bushfire spread further north in the spine. The location of this APZ through the park coincides with the location of the emergency access route, connecting the “Cape Arrival” main entrance road to the Eastern holiday homes, a route attending fire appliances may use in a bushfire. Landscaping within this portion APZ running through the Park Spine, is to comply with the APZ standards from the bushfire Guidelines as per Appendix L.

Shrub “islands” within the park spine will be permitted to have species <3 m high, given the separation from buildings, b will also require the perimeter treatments required around “islands” in the campground and hotel zones. The shrub “islands” must also not be located beneath any trees, and must be at least 10m from buildings or other shrub islands. Given the park spine landscaping always has either APZ or APZ-Modified treatments separating it from buildings, the targeted use of shrub “islands” is not considered to pose a risk to life or increase the risk to property, but better balances bushfire risk management with environmental and visual objectives.

Managed landscaping in adjacent lots

The buildings throughout both holiday home precincts are sufficiently close to each other, especially in the Eastern holiday homes, such that vegetation management for APZs, APZ-Modified and low threat vegetation is required in adjacent lots, road reserves or the campground, to achieve the BAL ratings for buildings. The risk with this is that should a neighbouring lot not adequately manage the vegetation to the required specification, this could cause an increased BAL impact on a building, creating a potential risk that construction could fail in a bushfire which could trap occupants or require they evacuate, or present an elevated risk for attending firefighters. Notwithstanding, the Explanatory Notes E2.1 in the Guidelines do note that while the APZ (or in this case the managed landscaping) should be contained within the boundaries of the lot on which the building is located, it can extend to adjacent lot/s where they will also have managed landscaping, in perpetuity, including public roads, footpaths, buildings, maintained parkland and cultivated gardens in an urban context etc. In Western Australia, this has historically required a mechanism to ensure enforceability.

The resolution to this potential risk is that the establishment of APZs, APZ-Modified and low threat vegetation will be implemented by the Proponent prior to issuing titles. The responsibility for the ongoing management, auditing and enforcement of all onsite vegetation will rest with the Community Corporation. Some landowners will likely create and manage some gardens around their buildings if they desire, however this will need to comply with the BMP and the Landscaping Report. Notwithstanding, there will be a requirement for the Community Corporation to audit the level of compliance of the onsite managed vegetation with the BMP and the Landscaping Report prior to bushfire season, with regular spots checks to be conducted throughout the season. This audit will need to be checked by a Level 3 bushfire practitioner and submitted to the City of Busselton. Enforcement of the BMP, and the required onsite vegetation management, is via the City of Busselton firebreak notice, whose powers are conferred from Section 33 of the Bushfires Act 1954, which requires compliance with approved BMP’s.

Compliance summary

Compliance with Element 2 of the Guidelines and the Tourism Land Use Position Statement requires demonstration of the following

- level of bushfire impact has been minimised, appropriate to the level of bushfire threat
- significantly reduce the heat intensities at the building surface
- suitable building design, construction and sufficient space is provided to ensure radiant heat levels do not exceed critical limits for emergency services personnel undertaking operations

In conjunction, Policy Objective 5.4 of SPP 3.7 seeks to *“achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity…”*.

The proposed APZ treatment around the perimeter of the development, and the bushfire refuge and WTP/WWTP, will arrest expected bushfire behaviour to appropriate levels, with all sufficient separation for all development to be in BAL-29 or less, with additional seperation provided for the following reasons:

- To achieve 10 kW/m^2 (at 1200 K) at the community bushfire refuge
- To achieve BAL-12.5 from the southern interface of the WTP/WWTP
- APZ of no less than 25 m wide to be provided to the southern interface to address any potential for landscape-scale bushfire behaviour

Within the development, the APZ-Modified treatments are proposed around the holiday home and hotel buildings, to restrict the potential for fully-developed bushfire behaviour near the buildings, to ensure the nominated BAL ratings are achieved and appropriate, but also to ensure sufficient defendable space for firefighting operations by minimising fuel loads and vegetation height. The low threat vegetation treatments are not proposed to be adjacent to any buildings, other than the campground buildings, however are still highly managed landscaping that minimises available understorey fuels and creates discontinuity to limit fire spread.

In addition to the proposed landscaping treatments, building construction is also specified to ensure:

- Sufficient resilience to ember attack and local spot fires
    - Voluntary minimum BAL-12.5 construction standard for all buildings, regardless of building class or whether in BAL-Low
- Increased APZ widths doesn't result in lesser BAL construction
    - At the WTP/WWTP where construction is to comply with BAL-40 specifications
    - Along the southern APZ, where perimeter buildings need to achieve BAL-29

While blanket application of the APZ standards is typically implemented, it comes with a significant clearing requirement and environmental impact. The use of bespoke landscaping treatments outside the nominated APZs has been part of the strategy to better balance bushfire risk management with environmental and visual amenity objectives, especially the strategic retention of trees, and where possible, shrub understorey. Building construction at exposed interfaces is BAL-29, to enable the minimisation of APZs as much as possible, commensurate with bushfire risk.

The creation of the community bushfire refuge, provides all occupants with a place of safety to shelter onsite, should offsite evacuation not be safe or possible, and while protection of the buildings is important part of the strategy, it is also noted that occupants are not expected to remain in the campground, hotel or holiday homes in a bushfire, so their survival is not directly linked to life safety for this project. This reduces the burden on attending firefighters to conduct search and rescue operations throughout the development, and should ensure sufficient vehicular access and defendable space, unhindered by occupants, to conduct any suppression operations.

While the locations of the proposed holiday homes results in landscaping burdens on adjacent lots, this is to be controlled via the Community Corporation being responsible for the ongoing compliance of all onsite landscaping with the BMP and the Landscaping Report.

Based on the above, the proposal clearly:

- Responds to the level of bushfire threat that applies to the site through the proposed landscaping treatments, and oversized southern APZ
- Minimises the BAL impact to a compliant BAL-29 or lower, and the bushfire impact to levels that the bushfire construction can withstand
- Will contain buildings that need to incorporate compliant building construction in accordance with this BMP and the National Construction Code (either AS 3959 or NASH standards)

- Incorporates sufficient defendable space for firefighting operations by using low height landscaping treatments and paths around the buildings
- Strikes an appropriate balance between bushfire risk management and environmental value and visual amenity objectives through structured tree and shrub retention.

On this basis, compliance with the Element 2 Intent, Performance Principle P2 and the Tourism Land Use Position Statement has been clearly established, whilst also complying with Policy Objective 5.4.

7.5.2 PPBS 2: Vehicular Access

The existing public road access to the project area, via Canal Rocks Road and Smiths Beach Road, is essentially a long dead-end road with no alternative second public road to Caves Road. This arrangement creates several unresolvable non-compliances, in addition to various deviations proposed as part of the access design, which are addressed using a combination of Acceptable Solutions, the Tourism Land Use Position Statement, the bushfire risk assessment and this PPBS.

The Element 3 deviations being addressed by this PPBS, are all related to turnaround for private driveways and battle-axe legs, with the non-compliances on the public road network addressed via the Position Statement and bushfire risk assessment.

7.5.2.1 Summary of Element 3

PPBS 2 focuses on the compliance of the proposed vehicular access with Element 3 of the Guidelines, but also considers guidance from the Tourism Land Use Position Statement. Information relating to both is provided below in Table 18.

Table 18: Element 3 – Intent, Performance Principles and Acceptable Solutions (Guidelines and Tourism Land Use PS)

Element 3 – Vehicular Access	
Intent	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.
Performance Principle P3	The internal layout, design and construction of public and private vehicular access and egress in the subdivision / development allow emergency and other vehicles to move through it safely and easily.
Relevant acceptable solution/s	
A3.1 Two access routes	Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.
A3.3 Cul-de-sac (including a dead-end-road)	A cul-de-sac and/or a dead-end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), detailed requirements will need to be achieved (refer to the Guidelines for detailed cul-de-sac requirements).
A3.4 Battle-axe	Battle-axe access leg's should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will need to be achieved (refer to the Guidelines for detailed battle-axe requirements).
Tourism Land Use Position Statement: Water	
Performance Principle 2 (Other vulnerable short-term accommodation; Caravan and Campground)	To provide a safe operational access for emergency services personnel in suppressing a bushfire, while residents and visitors are accessing or egressing the site

Relevant acceptable solution/s (from Tourism Land Use Position Statement)	
Other vulnerable short-term accommodation	2.1 The provision of one access route can be considered where: • the proposal is within a residential built-out area; or • the access route abuts moderate or low threat vegetation, and • where it is demonstrated that secondary access (including an emergency access way) cannot be achieved, and • the access route is not travelling back towards or through the hazard. 2.2 Access routes should achieve the requirements of Table 6 in the Guidelines for Planning in Bushfire Prone Areas. 2.3 Private driveways longer than 50 metres require: • passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres); • Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house; and • An all-weather surface (i.e. compacted gravel, limestone or sealed)
Caravan and Campground	2.1 Caravan parks located in residential built-out areas should provide one access route which connects to the public road network, and provides safe access and egress. 2.2 Caravan parks located outside of residential built-out areas -where vehicular access in two different directions to two different destinations cannot be provided, the BMP should identify the risks and propose bushfire management measures to reduce this risk, which may include on-site shelter and or closure. 2.3 All roads should be through roads. Dead end roads are not recommended but if unavoidable, or they are existing, they should be no more than 200 metres. 2.4 Access routes should achieve the requirements of Table 6 in the Guidelines for Planning in Bushfire Prone Areas.

7.5.2.2 Proposed deviations from the Acceptable Solution/s

The legacy 2 km long dead-end public road access to the project area, means that creating a compliant vehicular access network is not achievable for the development due to the following unavoidable deviations from the Acceptable Solutions:

- single access to the site which is non-compliant with Acceptable Solutions A3.1 and A3.3
- the proposed “Leeuwin Way” public road will exceed the maximum length for a dead-end road and is non-compliant with Acceptable Solution A3.3.

Additionally, the following deviations from the Acceptable Solutions are also required to be addressed:

- a single battle-axe lot is proposed on the development, is able to implement a compliant turnaround at the house to achieve compliance with Acceptable Solution A3.4.
- several private driveway turnarounds deviate from Acceptable Solution A3.5.

7.5.2.3 Potential risks associated with the proposed deviations

The risks associated with the proposed deviations are:

- The single public access route to the project area, means occupants and firefighters have to travel relatively long distances on a road with no alternative, in order to reach a place of relative safety. This increases the chance of occupants or firefighters not being able to leave or access the development, or become trapped on the road in a bushfire.
- The additional travel distance means they could be exposed to untenable conditions for a longer time than considered tolerable.

- The single access route could also create traffic congestion, which presents a challenge for attending fire appliances attempting to conduct their operations while occupants are evacuating.
- With the deviations from the turnaround requirements for the battle-axe leg and private driveways, the risk is that an occupant or fire appliance could travel down the leg or road, and not be able to turn around to retreat.

7.5.2.4 Performance Principle-Based Solution

To comply with the Intent of Element 3 and Performance Principle 3 from the Guidelines, the vehicular access network must be demonstrated to be:

- available and safe during a bushfire event
- vehicular access and egress in the development allows vehicles to move through it safely and easily at all times

The Performance Principle from the Tourism Land Use Position Statement is similar, requiring:

- safe operational access for emergency services personnel in suppressing a bushfire, while residents and visitors are accessing or egressing the site

As outlined above, access to the site is via the single public road, however within the development, vehicular access is provided by various internal driveways that will comply with the private driveway standards, but will also be 6 m wide to enable fire appliances to pass each other in a bushfire emergency. The configuration of the internal road network is such that occupants have access to Smiths Beach Road via the two exits, as well as the additional emergency exit from the Eastern Holiday homes. A fire access driveway is also provided to enable fire appliances to move from the Western Holiday homes, to the foreshore reserve driveway, which in conjunction with the other proposed roads, provides fire appliances with full perimeter access around the development in a bushfire emergency.

Based on the above, there is sufficient access for occupants and fire appliances to move through the development in a bushfire event, mostly through areas of managed landscaping limiting bushfire impact to BAL-12.5 or BAL-Low inside the perimeter roads. Notwithstanding, occupants within the development are only to be evacuating offsite if there is sufficient time to conduct safe evacuation, which will be well ahead of any bushfire impact to the site, which reduces the likelihood of significant fire appliance activity onsite competing with evacuating traffic. Should the bushfire be close to the development such that sheltering onsite is required, occupants are to relocate to the community bushfire refuge on foot, rather than by vehicle, which limits any internal traffic congestion. The only traffic within the development when sheltering-in-place, other than fire appliances, should be vehicles travelling from Canal Rocks or surrounding residential outside the development, although it is expected this will occur ahead of bushfire impact.

The addition of the non-compliant “Leeuwin Way” cul-de-sac to the WTP/WWTP, essentially represents a minor extension to the existing non-compliant public road access to the site. While it creates another non-compliance, the travel distance from the cul-de-sac head to the “Cape Arrival” entrance road to the hotel is 200 m and there is a point of choice available at this location, with one of those leading to a place of relative safety at the onsite refuge.

Single public road to site and non-compliant cul-de-sac road

While compliance with the Acceptable Solutions of Element 3 are largely achieved by the proposed development, the provision of a second public road to the site cannot be achieved by the Proponent, therefore full compliance is not able to be demonstrated with Element 3 including the proposed new cul-de-sac road. In accordance with the SPP 3.7 Policy Intent and the Tourism Land Use Position

Statement, this has been addressed using the bushfire risk assessment to demonstrate the proposed risk management strategy reduce risk to tolerable levels. The focus is on preservation of life, and the basis for this is the provision of the onsite community bushfire refuge, to avoid the requirement for offsite evacuation by occupants should conditions be unsafe for travel, including traffic congestion or bushfire impact on the regional public road network. The bushfire risk assessment is detailed in Section Appendix J, including the holistic bushfire risk management strategy requiring the suite of management measures proposed in Section 6. The residual risk of the development, following implementation the proposed strategy and management measures, is demonstrated to be acceptable (or tolerable), based on the assessment in Table 33. Further discussion regarding compliance is provided in Sections 7.1, 7.2 and 7.3.

Battle-axe leg and internal road turnarounds

The other deviations is the lack of a turning area at the battle-axe leg at a single lot in the Western holiday homes, as well as a private driveway in the Eastern holiday homes, as well the use of tailored turnarounds at two other locations within the development.

It is acknowledged that the internal driveway road network within the development essentially functions as a public road, in that they provide access for all occupants (home owners, guests and public) during normal operation, and emergency services when required. While only required to comply with the private driveway standards, these internal roads will be 6 m wide and also contain street hydrants, which further aligns with public road intent. The internal driveway network throughout the development provides interconnected loops through the holiday home precincts, with several dead-end roads provided with local turnaround facilities (e.g. on “Cape Arrival” at the hotel, on “Smiths Lane”, the campground loop road), all which enable occupant vehicles and fire appliances to either loop or turnaround.

The proposed battle-axe leg is depicted in Plate 15, which is less than 600 m and will be at least 6 m wide and constructed to the relevant technical requirements of the Guidelines (see Appendix N). Compliance with A3.4 also requires compliance with the private driveway standards, and the explanatory note E3.4 also indicates a need for turnaround at the house site although A3.5 requires this only when the home is further than 50 m from a public road.

Plate 15: Battle-axe leg in Western holiday homes

The home served by the battle-axe leg is 40 m from the internal road network (orange lines on Plate 15), which is considered to function as a public road. Given the leg is less than 50 m long, a turn-around area is unnecessary given the short length for the appliance to reverse from the house, with the preference that the appliance remain at the internal road rather than travel down the driveway to the house. This is clarified in Explanatory Note E3.5 of the Guidelines, which states that “*…fire*

appliances typically operate from the street frontage however where the distance exceeds 50 metres, then fire appliances will need to gain access along the driveway in order to defend the property during a bushfire. Where house sites are more than 50 metres from a public road, access to individual houses and turnaround areas should be available for both conventional two wheel drive vehicles of residents and type 3.4 fire appliances". While E3.5 refers to the relationship between house sites and the street or public road, as noted previously, at this development the internal driveway network around the holiday homes functions as a public road on the basis it provides access for public and emergency services, but also contains the street hydrant system for firefighting. On this basis, the provision of a turnaround is not considered to be required for this battle-axe leg given the distance from the "street frontage" is less than 50 m, and the battle-axe leg is relatively straight, and should pose no barrier to appliance reversal if required.

Besides the battle-axe leg, three deviations from the private driveway turnaround requirements have been identified, which are addressed individually below. The typical turnaround configurations and dimensions permitted on private driveways are depicted in E3.5 (see Plate 16).

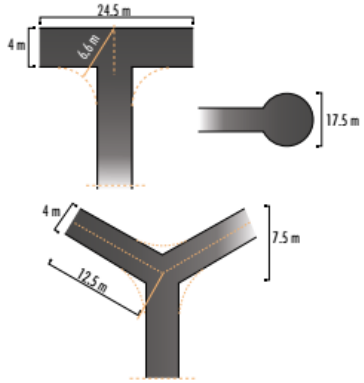


Plate 16: Turning facilities for private driveways

The proposed emergency driveway from the Eastern holiday homes to Smiths Beach Road (see Plate 17), includes an unlocked section of driveway approximately 60 m long, providing access to three homes, and a 35 m long access-controlled section (with locked bollards) to restrict everyday through traffic and for emergency use only. Normal use of this road is primarily by the occupants of the three homes access from that road, while in a bushfire emergency, it is a requirement of the BEMP that these access bollards are unlocked and removed to enable through access to Smiths Beach Road. Fire brigade are expected to be provided keys for these lockable bollards to enable them to remove them. Given fire brigade can remove the bollards, any requirement to turnaround on this road will mainly be from light vehicles used by homeowners and guests. Here, the access bollard has been positioned 12.5 m from the driveway to lot E16, to enable a vehicle to pull into that driveway and reverse to the bollard, and go back to the main loop road. This turning arrangement aligns with that for a hammerhead configuration as per Plate 16. During a bushfire emergency, offsite evacuation is only to be conducted if sufficient time to do so, in which case there should be very limited opportunity for occupants to need to turnaround on this driveway with any imminent danger.

Plate 17: Internal driveway from Eastern holiday home precinct to Smiths Beach Road

The second turnaround is for fire appliances using the foreshore driveway and the fire appliance driveway from the Western holiday home precinct (see Plate 18), which has an overall travel distance is approximately 600 m. To comply with A3.5, a turnaround is required every 500 m, although this could be considered a loop road arrangement back to Smiths Road, and therefore compliant. Notwithstanding, a hammerhead arrangement is provided by the proposed road network to enable a fire appliance to turnaround at the junction, should it be required. A fire appliance travelling on the fire access driveway from the Western holiday homes will be able to conduct a three-point turn at the foreshore driveway, to head back up the access driveway. Similarly, a fire appliance travelling along the foreshore driveway will be able to nose into the fire access driveway and reverse back onto the foreshore road, to complete a three-point turn. It is a requirement of the BEMP that these access bollards are unlocked and removed early in a bushfire emergency, however fire brigade are expected to have keys for these lockable bollards, so can remove them as well to avoid any obstruction to turning around. To avoid any issue, the bollard will be setback 12.5 m from the foreshore driveway, to enable turnaround even if the bollard is in place, primarily by staff, guests or public visitors.

While both roads (foreshore driveway and fire appliance driveway) are 4 m wide, they will be widened to 6 m for at least 20 m every 200 m, to enable passing along this road. It is also noted that both roads are only expected to be used by emergency services during a bushfire emergency.

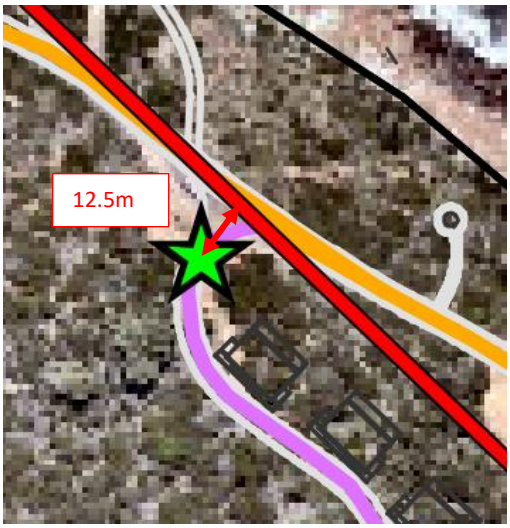


Plate 18: Fire appliance driveway from Western holiday home precinct to foreshore driveway

The final deviation is a proposed driveway in the Eastern holiday homes (see Plate 19). This straight road is 50 m long from the loop road to the south-east, and provides access to four lots. Explanatory note E3.5 outlines that appliances can work from the street frontage, provided the distance to the house is less than 50 m. Given the furthest house is 70 m from the loop road intersection, a fire appliance would only need to travel 20-30 m along the driveway road to be within 50 m of all houses. The driveway is straight, so there should be no impediments to a short reverse along this road. Additionally, turnaround would be possible using the driveway of lot E4, where a three-point turn could be conducted in a hammerhead arrangement.

Plate 19: Internal driveway within Eastern holiday home precinct

7.5.2.5 Compliance summary

As previously detailed in this BMP and in this PPBS:

- the internal driveway network created as part of this development provides multiple routes to access Smiths Beach Road for offsite evacuation, while also providing perimeter access for fire appliances.
- the proposed driveway network is mostly 6 m wide, which is sufficiently wide to enable fire appliances and occupant vehicles to use simultaneously, with only the fire access driveway and foreshore driveway in the north and north-east to be configured as 4 m wide private driveways with passing bays.
- the intent is that occupant evacuation is conducted well ahead of any bushfire impact at the site, such that fire appliances would need to have relatively uninhibited use of the road network when the bushfire impacts the site. Occupant relocation to the onsite refuge is to be conducted early and predominately on foot, to limit onsite traffic.
- There are sufficient access routes surrounded by onsite managed landscaping, to enable fire appliances to move safely through the development, and to water supplies, in areas relatively protected from bushfire impact.
- Should the single public roads to the site, namely Caves Road and Smiths Beach Road, be obstructed by bushfire, there is a protected onsite bushfire refuge to enable occupants to

safely shelter from bushfire, until the road can be reopened. This onsite refuge is suitably sized to enable the local community to also shelter onsite.

- having a small battle-axe leg without a turnaround at the building is not considered to present a firefighting challenge, given the short leg proposed and the proximity to firefighting water in the nearby road.
- the three turnaround deviations from the private driveway standards, will useable by attending fire brigade given they have keys to bollards and the configuration still permits turnaround using a three-point turn or a short reverse. For all other vehicles, there is sufficient space to enable a three point turnaround for smaller vehicles or reversing if required.

Based on the above, the vehicular access network within the development is deemed to be available and safe to use during a bushfire event, with vehicles able to move through it safely and easily. Occupant vehicles will only need to use the roads if there is sufficient time for offsite evacuation, otherwise travel will largely be by foot to the refuge. Fire appliances will have safe operational access, with sufficient space to move around and through development, generally in areas protected from bushfire impact, with safe access to water supplies. Full compliance with Intent of Element 3 is not possible given the legacy public road network, which still presents a risk that access to the site could be obstructed once the bushfire is close to the site. The bushfire risk assessment conducted in accordance with the Tourism Land Use Position Statement, demonstrates life can be preserved with the provision of a community bushfire refuge for safe onsite shelter-in-place, should offsite evacuation not be possible, and the residual risks to property and infrastructure can be reduced to appropriate levels.

On this basis, compliance with a combination of the Intent of Element 3 and Performance Principle P3 (where possible) and the Tourism Land Use Position Statement and the SPP 3.7 Policy Intent and Objectives, has been clearly established.

7.5.3 PPBS 3: Bushfire fighting water supply

The bushfire fighting water supply to the development is to consist of:

- Below-ground water pipework and in-ground street hydrants throughout the two holiday home precincts, fed from the Water Treatment Plant
    - The balance tank/s will have a minimum of 100 kL capacity for bushfire fighting purposes, with minimum overall tank capacity of 200 kL.
- A dedicated 50 kL bushfire fighting water tank at the Water Treatment Plant
- A dedicated onsite fire hydrant and fire hose reel system for the hotel and community hub building
    - The firewater tanks are to be sized in accordance with the relevant Australian Standard, but shall be no less than 225 kL overall capacity, including 50 kL for bushfire fighting purposes.
- External perimeter fire hose reel coverage is to the community refuge building, in addition to internal hydrant and fire hose reel coverage.
- Standalone fire hose reel system for the campground

While the proposed water supply largely complies with A4.1 and A4.2, given the street hydrants to the holiday home precincts are not connected to what would be considered a “standard” water supply authority system, and the use of multiple systems to provide firewater supply to the

development, it has been decided that using a PPBS to demonstrate the overall compliance of the firewater design is appropriate.

7.5.3.1 Summary of Element 4 and Tourism Land Use Position Statement (Water)

PPBS 3 focuses on the compliance of the proposed bushfire fighting water supply with Element 4 of the Guidelines, but also considers guidance from the Tourism Land Use Position Statement. Information relating to both is provided below in Table 19.

Table 19: Element 4 – Intent, Performance Principles and Acceptable Solutions (Guidelines and Tourism Land Use PS)

Guidelines: Element 4 - Water	
Intent	To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.
Performance Principle P4	The subdivision, development or land use is provided with a permanent and secure water supply that is sufficient for firefighting purposes.
Relevant Acceptable Solution/s	
A4.1 Reticulated areas	The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services
A4.2 Non-reticulated areas	Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet the following requirements: • Volume: minimum 50,000 litres per tank; • Ratio of tanks to lots: minimum one tank per 25 lots (or part thereof); • Tank location: no more than two kilometres to the further most house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turnaround time at legal road speeds; • Hardstand and turn-around areas suitable for a type 3.4 fire appliance (i.e. kerb to kerb 17.5 metres) are provided within three metres of each water tank; and • Water tanks and associated facilities are vested in the relevant local government.
Tourism Land Use Position Statement: Water	
Performance Principle 3 (Other vulnerable short-term accommodation)	The provision of a permanent and secure water supply that is sufficient for firefighting purposes
Performance Principle 3 (Caravan and Campground)	To provide an adequate supply of water for firefighting purposes to reflect the intended response to a bushfire event, by emergency services and/or the owner/ occupier
Relevant acceptable solution/s (from Tourism Land Use Position Statement)	
Other vulnerable short-term accommodation	3.1 The development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and the local government; or 3.2 Provision of a static water supply for firefighting purposes on the lot that has an effective capacity of 10,000 litres per building/structure in addition to any requirements for potable water; or 3.3 Provision of a minimum 50,000 litre static water supply for firefighting purposes per 25 buildings/structures, to the satisfaction of the local government; and 3.4 Dedicated water supplies shall be non-combustible (or suitably shielded) and located such that fire services can readily gain access to appropriate fittings and connect fire fighting vehicles to dedicated water supplies in a safe manner.

Guidelines: Element 4 - Water	
Caravan and Campground	3.1 The development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and the local government; or 3.2 Where the intention is to actively defend property and infrastructure, provision of a minimum 10,000 litre static water supply for firefighting purposes per building/structure, in addition to any requirements for potable water; or 3.3 Where the intention is to actively defend property and infrastructure, provision of a minimum 50,000 litre static water supply for firefighting purposes per 25 buildings/structures, to the satisfaction of the local government; and 3.4 Dedicated water supplies shall be non-combustible (or suitably shielded) and located such that fire services can readily gain access to appropriate fittings and connect firefighting vehicles to dedicated water supplies in a safe manner.

7.5.3.2 Proposed deviations from the Acceptable Solution/s

The proposed deviations primarily relate to the firewater supply for the holiday home precinct and the WTP, where the proposed street hydrant system is not connected to what is typically considered to be a "standard" water authority main. The town main systems are usually supplied from significant infrastructure often more distant from the development, whereas this system has localised infrastructure that would be expected to be impacted by the bushfire threatening the development. While it is expected that the proposed WTP infrastructure will comply with Water Corporation specifications and it could be argued that there is no deviation, it is considered appropriate to address the security of the water supply.

Additionally, it is noted that both A4.1 and A4.2 are being used to provide the water supply to the holiday home precinct and the WTP, and the rationale of this is also addressed within this PPBS. The firewater supply to the hotel precinct and campground is considered to comply with A4.2 and the Tourism Land Use Position Statement, however the opportunity is being taken to include discussion about these in this PPBS.

7.5.3.3 Potential risks associated with the proposed deviations

The risk associated with the deviations noted above are:

- water supply to the balance tank/s and WTP, may be lost if the Water Corporation main to the site is damaged or destroyed by bushfire, resulting in lack of water to the street and WTP hydrants. This lack of water via the town main supply, could also occur to the site due to increased use of the water supply by the surrounding landowners or fire appliances in the local area, essentially robbing the WTP of infill water.
- there is no minimum water storage capacity detailed for a reticulated water authority main. If the incoming town main is destroyed, there is a risk that there may be insufficient water to defend the development in a bushfire.
- if the balance tank/s or WTP are damaged or destroyed by bushfire, there would be loss of water to the street and WTP hydrants

7.5.3.4 Performance Principle-Based Solution

The proposed configuration of the water supply and bushfire fighting water supply is detailed in Sections 2.2.4.1 and6.5.

In order to comply with the Intent of Element 4 and Performance Principle 4 from the Guidelines, the water supply must be demonstrated to be:

- Permanent, secure and available to enable people, property and infrastructure to be defended from bushfire

- Sufficient for firefighting purposes

The Performance Principle from the Tourism Land Use Position Statement essentially supports these requirements, with the following additional guidance specifically relating to Caravan and Campgrounds:

- Provide an adequate supply of water for firefighting purposes to reflect the intended response to a bushfire event, by emergency services and/or the owner/ occupier

The above compliance requirements are to be demonstrated below, and while the focus is on the holiday home precinct and the WTP, a holistic approach is taken to the entire development in addressing compliance for this PPBS.

Firewater supply capacity

An important aspect of designing the proposed firewater supply is providing sufficient onsite storage capacity to ensure that people and property can be defended from bushfire. Given the multiple land uses across the site, the following approaches have been used:

- ***Holiday home precincts and WTP/WWTP area***
    - A4.1 from the Guidelines doesn't specify a minimum storage capacity for a water authority main
    - Guidance has been sought from A4.2 and the Tourism Land Use Position Statement (Other vulnerable short-term accommodation), which requires 50 kL per 25 lots
    - Total number of buildings is 65
        - 61 holiday homes
        - 3-4 WTP and WWTP buildings/sheds/containers
    - On this basis, 150 kL of water storage is required for the holiday homes and WTP/WWTP for bushfire fighting purposes
    - This is to be provided as follows:
        - 100 kL bushfire fighting reserve in the WTP balance tank/s, although it is noted these tank/s will have a minimum overall capacity of no less than 200 kL.
        - 50 kL standalone bushfire fighting tank at the WTP/WWTP area
- ***Hotel Precinct and Campground***
    - Guidance has been sought from A4.2 and the Tourism Land Use Position Statement (Other vulnerable short-term accommodation; Caravan and Camping)
        - Either 50 kL per 25 lots or 10 kL per building/structure can be used
    - The total number of buildings is 22
        - 15 hotel suites and eco-suites
        - 3 Hotel buildings including hotel public areas building, spa and gym buildings
        - The Community Hub building
        - The Cape-to-Cape Welcome Centre building
        - 2 buildings in the campground, with the tent platforms considered a tolerable loss

- On this basis, 220 kL of water storage is required for the hotel and campground for bushfire fighting purposes, if the 10 kL per building is applied. This is considerable more than the 50 kL that could be provided given there are less than 25 buildings.
- This is to be provided as part of the overall storage capacity in the dedicated fire hydrant and hose reel system, which shall have no less than 225 kL of water storage, including 50 kL added for bushfire fighting purposes.
- The campground is also to have a standalone fire hose reel system.

Based on the above, there will be at least 375 kL of firefighting water supply permanently stored onsite at all times. An additional 100 kL (minimum) will likely be available in the WTP balance tank/s for potable water supply, however this will be accessible through the WTP hydrants and holiday home street hydrants, if required. It is also noted that the above discounts any authority main infill that may be available during the bushfire. While this can't be relied upon, if infill is still available during firefighting operations, there will be ongoing refill of the balance tank/s, which extends the capacity.

System design

A risk to the proposed potable and firewater supply is the potential for damage or destruction of the incoming Water Corporation main by bushfire in the local area, which would essentially stop water flow to the WTP, and the holiday homes in a bushfire emergency. Similarly, increased use of water by any landowners or fire services along the Water Corporation main route to the site, will also rob the WTP and the development of water supply. While the potential for loss of water supply through destruction of infrastructure or from increased use can occur in 'standard' water authority main services, given they usually have above-ground infrastructure (e.g. tanks, pump stations etc) and do also suffer from lack of water in bushfire emergencies, this development would be more susceptible given the location at the end of the proposed main supply pipe.

To address this risk, the WTP is to have suitably sized balance tank/s to store sufficient water for potable and firewater requirements (see above), should the incoming water authority main be impacted. The 100 kL stored for bushfire fighting purposes in the balance tank/s, will be supplemented by another 100 kL (minimum) for potable supply, which would be available from the WTP and street hydrants, although it is expected there would likely be some draw down on the potable capacity due to normal use. Should the incoming main be destroyed or robbed of flow, the onsite balance tank/s ensures sufficient water is held onsite to supply the street hydrant network. Additionally, the minimum storage for the authority main system (i.e. the WTP) has been addressed using guidance from A4.2 and the Tourism Land Use Position Statement, noting that part of the storage is provided in the standalone bushfire fighting tank next to the WTP. This approach ensures there is redundancy should there be any issues with the WTP system.

Another risk is the potential for damage or destruction of the WTP and/or balance tank/s by bushfire, which would cause loss of supply to the WTP hydrants and street hydrants. The protection of this infrastructure is critical, not only for securing the firewater supply but also from a recovery perspective to ensure the potable water supply is available during and following the bushfire. The measures to be implemented to protect the WTP and balance tank/s (and WWTP) are detailed in Section 6.5.1 and include the following:

- Implementing an APZ around the WTP and WWTP infrastructure, especially a significant southern 27 m wide APZ to achieve BAL-12.5.
- Construction of all WTP and WWTP infrastructure to the following standards:

- buildings, sheds or containers are to comply with BAL-40 as per AS 3959 with the focus on non-combustible construction with sealing and screening of penetrations or openings
- External infrastructure (i.e. not housed in a BAL-40 building e.g. tanks, external pumps etc), is to be constructed of non-combustible material, or enclosed, shielded, sealed or screened using a non-combustible material.

- Construction of the balance tank/s and standalone bushfire fighting tank is to from steel with no exposed plastic pipework, valving or critical accessories.
- The tanks and WTP buildings are to be surrounded by a non-combustible fence, no less than 2.1m high, to provide a level of shielding to low level equipment, and provide a barrier to bushfire spread into the enclosure.

The protection of the buildings and tanks is primarily based on creating sufficient separation, from the main direction of bushfire approach from the south, to achieve 12.5 kW/m^2 or less, and supplementing that separation with enhanced construction and low-level shielding. AS 3959 references 13 kW/m^2 as being the radiant heat flux capable of piloted ignition of cotton fabric (see Plate 22) and that BAL-12.5 is primarily associated with ember attack and relatively minor radiant heat (see Plate 23). The proposed 27 m APZ width ensures that BAL-12.5 (Method 1 separation from Class D scrub on flat/upslope) is achieved from the south, south-west and south-east. Using Method 1 BAL assessment is considered appropriate for this infrastructure given the additional measures proposed to protect the WTP, especially enhanced construction. While there will be only BAL-12.5 from the southerly directions, there will be a BAL-29 impact from the northerly directions, although the fire runs are very short and wouldn't produce the landscape scale bushfires possible from the south.

The construction of the non-combustible 2.1 m high fence around the enclosure serves several purposes. One is to provide a physical barrier to the fire front, while also providing some shielding especially to any equipment at ground level. This is not to be relied upon to stop the fire nor for complete shielding, but will assist with the APZ separation by further reducing radiant heat impact and ember ingress.

The construction of the buildings/sheds/enclosures to a BAL-40 standard recognises the criticality of this infrastructure, and seeks to provide enhanced construction standard over and above the minimum requirements.

Regarding the construction of the tanks, in 2007 the Bushfire CRC in collaboration with CSIRO and Bluescope Steel (Blanchi et al, 2007), conducted experiments on the performance of steel and polyethylene tanks in various simulated bushfire conditions, to provide further guidance on their failure modes and increasing their resilience in bushfires. A series of gas burners were used to simulate bushfire pre-radiation (up to 30 kW/m^2) and full flame immersion, with leaf litter ignited to simulate minor combustible fuel loads next to the tank. Some key outcomes of the experiments are:

- Steel tanks are much more resilient to bushfire impact than polyethylene, especially flame immersion, but also leaf litter accumulation, and they also don't soften and swell with increase heat.
- Flame immersion of steel tanks can still result in minor leaks, and should be avoided if possible
- The recommendation was for clearance of 30 m between polyethylene tanks and forest fuels

It is a requirement of this BMP that the tanks are steel and that there is no exposed plastic to avoid water loss because of pipework destruction. The 27 m wide APZ essentially provides the separation

recommended for the much more vulnerable polyethylene tanks, especially when considered with the low-level shielding provided by the fence. Based on the above, it is considered that the proposed tanks are appropriately protected from bushfire impact.

To ensure the water system continues to operate during a bushfire emergency, the BMP also specifies that the pumps for the reticulated potable water main are to be configured to:

- have sufficient redundancy (e.g. duty/standby arrangement) to enable operation, should power be lost to the WTP or in the event of pump failure
- have sufficient duty for firefighting purposes, especially from street hydrants in the holiday home precincts.

Besides protection of the WTP, all water supply pipework reticulated throughout the development to serve the holiday home and tourism precincts, is to be below-ground pipework, which ensures it is protected from bushfire. Similarly street hydrants in the holiday home precincts are also to be below-ground to protect from bushfires but also from physical damage.

7.5.3.5 Compliance summary

The following measures demonstrate compliance with the Intent of Element 4 and Performance Principle 4 from the Guidelines:

- ***Permanent, secure and available to enable people, property and infrastructure to be defended from bushfire***
    - Several firewater supplies are proposed;
        - authority potable water system, including the WTP, balance tank/s and the reticulated town main and street hydrants.
        - a standalone bushfire water tank at the WTP location
        - the dedicated fire hydrant and hose reel system at the community hub.

    All the above water sources are permanent fire water supplies, that aren't easily removable or relocatable.

    - There are various suitably sized tanks storing fire water to ensure that any loss of infill from the authority water main doesn't compromise the onsite firewater supply. This is considered suitable to ensure surety of supply.
    - Regarding availability of firewater supply
        - The WTP will be continually operational as it is required to provide potable water supply to the development, with appropriate redundancies to ensure this occurs. Any malfunction with the potable water supply is expected to be noticed quickly by home owners, with rectifications implemented quickly to restore supply. This will ensure the availability of the water supply and could be considered a better outcome than a purely standalone firewater supply, which is tested regularly, but not continually. Notwithstanding, there is a 100 kL reserve in the balance tank/s that can be accessed through WTP hydrants or holiday home street hydrants
        - The standalone bushfire tank will always be available for use
        - The fire hydrant and hose reel system is only for use in fire emergencies

    Based on the above, it is expected that the firewater supplies will be available for use at all time, especially during bushfire season.

- ***Sufficient for firefighting purposes***
    - The systems proposed to provide firewater supply to the development are considered sufficient for firefighting purposes on the following basis:
        - Suitably sized firewater supplies located permanently onsite
        - Access to these water supplies can from multiple locations including the street hydrants in the holiday home precincts, hydrants at the WTP, suction connections from the bushfire tank, suction connections from the booster cabinet at the Community Hub building and external hydrants around the hotel. This provides a level of flexibility to refill their appliances, rather than all at a single location, and each of these locations is adjacent to proposed roads or driveways where appliances can either turnaround (e.g. turning head) or continue travelling and loop back into the road network.
        - Most of the hydrants and suction connections are locations away from the main bushfire front, within areas of managed vegetation, providing firefighters some protection from bushfire impact while refilling or firefighting. The exception is the bushfire tank at the WTP, however this is expected to be used when the fire is still away from the development, and provides a refill point along the southern interface.
- ***Adequate supply of water for firefighting purposes to reflect the intended response to a bushfire event, by emergency services and/or the owner/ occupier (Campground only)***
    - This is requirement from the Tourism Land Use Position Statement
    - The intended response is to relocate all occupants from the campground as soon as possible in a bushfire emergency. Their tents will have limited resilience to bushfire and the tents and tent platforms are considered a tolerable loss.
    - The campground will be in an area of managed low threat vegetation, as such it is not expected that there will be significant bushfire behaviour in this part of the development.
    - On this basis, protection of the two campground buildings is considered the only concern in a bushfire. Sufficient water has been allocated to the dedicated fire hydrant system to enable bushfire protection of these buildings, if required.
    - A standalone fire hose reel system is to provide coverage throughout the campground, especially the tent platforms and building perimeters, to enable a rapid response to any onsite ignition associated with campers, however this could also be used in a bushfire emergency to address any minor spot fires within the managed low threat vegetation.

While outside the specific compliance requirements of the Guidelines and Tourism Land Use Position Statement, in addition to the internal fire hydrant and fire hose coverage is to be provided to the hotel and community hub buildings as outlined in Section 6.5.3, the external perimeter fire hose reel coverage to achieve coverage of the perimeter of refuge building for distance of 10 m, is to be provided in accordance with *ABCB Design and Construction of Community Bushfire Refuges Handbook.* An additional 50 kL has been added to the firewater storage requirements of the hydrant system to address this requirement.

Based on the above, the proposal clearly provides a permanent, secure bushfire fighting water supply, that is sufficient to enable people, property and infrastructure as part of the proposed development, to be defended from bushfire. It is noted that the existing firewater supply at the

adjacent resorts also provides additional water supply for protection of those assets (not at this development), however in combination, there is considered to be a significant static water supply for bushfire fighting in the local area.

On this basis, compliance with the Intent of Element 4 and Performance Principle P4 has been clearly established.

8. Implementation Plan, Monitoring and Review

Implementation of the BMP applies to the Proponent, the Community Corporation, future hotel facility manager, future landowners and the City to ensure bushfire management measures are appropriately adopted and implemented on an ongoing basis. A bushfire responsibilities table is provided in Table 20 to drive implementation of all bushfire management works associated with this BMP.

Table 20: Responsibilities for implementation and management of the bushfire measures

Measure No.	Implementation action
1. Decision-maker– as part of development approval	
1A	Include the following condition as part of the development application approval (subject to decision-maker wording), as outlined in Section 6.2.6 of the BMP: 1. Prior to commencement of works, the proponent shall prepare a Vegetation Management Plan outlining management strategies for existing and proposed vegetation, to the satisfaction of the Western Australian Planning Commission. 2. Prior to commencement of works, the proponent shall prepare landscaping and revegetation plans to the satisfaction of the Western Australian Planning Commission. The landscaping and revegetation plans are to outline existing vegetation to be retained and new vegetation to be planted. The landscaping and revegetation plans are to be consistent with the Vegetation Management Plan, the requirements of the Bushfire Management Plan and the recommendations of the Visual Landscaping Amenity report to the satisfaction of the Western Australian Planning Commission. 3. Landscaping and revegetation works shall be initially implemented in accordance with the landscaping and revegetation plans and thereafter maintained in accordance with the Vegetation Management Plan.
2. Proponent – prior to removal of any onsite vegetation	
2A	Prepare Vegetation Management Plan, including the detailed landscaping plan/s, as required by the development approval condition (see 1A above, and Section 6.2.6 of the BMP), including undertaking all necessary vegetation surveys to inform the preparation of the plan/s.
3. Proponent – prior to titles	
3A	Establish the following APZs within the project area to the dimensions and standards stated in Section 6.2.1 of the BMP: • Around the perimeter of the community refuge buildings • Around the perimeter of the Water Treatment Plant • Around the perimeter of the habitable building extent All APZs are to comply with the standards from the Guidelines reproduced in Appendix L.
3B	Establish the following APZ-Modified areas within the project area to the dimensions and standards stated in the BMP: • APZ – Modified (Holiday homes) including areas of increased tree retention • APZ – Modified (Hotel) including shrub islands All APZ-Modified areas are to comply with the standards outlined in Section 6.2.2 of this BMP, and any relevant specifications from the Guidelines reproduced in Appendix L where not altered by BMP.
3C	Establish the following low threat vegetation areas within the project area to the dimensions and standards stated in the BMP: • Campground (see Section 6.2.3.1 for specifications) • Park Spine (see Section 6.2.3.2 for specifications) • Any other areas excluded from classification, not within the Park Spine or Campground All low threat vegetation areas are to comply with the standards outlined in Section 6.2.3 of this BMP, or where not prescribed in the BMP, comply with AS 3959 Clause 2.2.3.2 (f)
3D	Establish any APZs or low threat vegetation within adjacent Smiths Beach Road and the new "Leeuwin Way" road reserves, in consultation with the City, as stated in Section 6.2.1 of the BMP
4. Proponent – prior to occupation of buildings	
4A	Design and construct the nominated onsite community bushfire refuge buildings as detailed in Section 6.1 of the BMP and as follows:

Measure No.	Implementation action
	• The proposed bushfire refuge shall be designed by a qualified fire engineer and BPAD Level 3 bushfire practitioner in accordance with the *ABCB Design and Construction of Community Bushfire Refuges Handbook (2014).* • Refuge construction shall comply with the AS 3959 BAL-12.5 construction standards • A bushfire refuge management plan shall be prepared by a qualified fire engineer and BPAD Level 3 bushfire practitioner, to detail the maintenance requirements and annual test requirements for operation compliance. • A final inspection of the proposed bushfire refuge shall be undertaken by a qualified fire engineer and BPAD Level 3 bushfire practitioner. The fire engineer and bushfire consultant shall provide certification that the works have been completed in accordance with the requirements of the *ABCB Design and Construction of Community Bushfire Refuges Handbook (2014)* and the approved design. The refuge shall be suitably sized to accommodate 2037 occupants in accordance with the Handbook.
4B	Design and construct a bespoke landscaping reticulation system to the green roofs over part of the refuge, as well as the production garden and landscaping surrounding the refuge, in accordance with Section 6.7 of this BMP.
4C	Implement all proposed revegetation as outlined in Section 6.2.5 of the BMP, including in the: • National Park • Foreshore Reserve • Public Open Spaces All revegetation is to comply with the standards detailed in Section 6.2.5 of the BMP.
4D	Construct the proposed roads within the project area in accordance with Section 6.3 of the BMP and the Development Plan including: • All internal driveways to comply with the private driveway standards of the Guidelines, but with width of 6 m • An access-controlled driveway ("Smiths Common") between the turnaround on "Smiths Lane", the main campground driveway, with the Smiths Beach Road turning circle • two emergency access roads between the two holiday home precincts and Smiths Beach Road, complete with lockable and removable bollards, The lockable bollard on the eastern driveway, is to be located >12.5 m east of the private driveway to Lot E16. • a fire access driveway from the Western Holiday homes to the Foreshore Reserve driveway, complete with lockable and removable bollards. The bollard near the Foreshore Reserve driveway is to be setback 12.5 m to the south. Ensure keys for all access control bollards will be available to the ERT and local fire brigade
4E	Construct a new public road within the existing gazetted road reserve from Smiths Beach Road to the proposed Water Treatment Plant in accordance with the technical specifications for a cul-de-sac from the Guidelines, including turnaround facility.
4F	Construct a driveway along the Foreshore Reserve in accordance with the private driveway standards of the Guidelines, complete with compliant passing bays and turnaround facility.
4G	Implement the following bushfire water requirements at the Water Treatment Plant (and Wastewater Treatment Plant) in accordance with Section 6.5.1 of the BMP: • Install a standalone 50 kL bushfire water tank, and associated hardstand and suction connections • Provide an additional 100 kL to the proposed WTP balance tank/s for bushfire fighting purposes and configure the balance tank/s to ensure the bushfire water is not consumed, or that the relevant personnel are alerted to the overuse. Minimum overall capacity of the balance tank/s is to be no less than 200 kL • Install fire hydrant/s at the WTP to enable fire hydrant coverage of this facility • Ensure all WTP, WWTP and the bushfire water tanks are steel construction with no exposed plastic pipework, valving or critical accessories.
4H	Install below-ground water supply pipework from the WTP to both holiday home areas, complete with in-ground street hydrants, in accordance with Section 6.5.2 of the BMP.
4I	Install a dedicated fire hydrant and hose reel system to the hotel public area and community hub buildings and hotel precinct in accordance with the NCC, complete with firewater storage tanks. Additionally, in accordance with Section 6.5.2 of the BMP:

Measure No.	Implementation action
	• Ensure the firewater tank capacity is no less than 225 kL overall capacity, including 50 kL for bushfire fighting purposes • Provide an additional fire hydrant next to the fire access road in the western part of the site Provide suitable suction connections for bushfire fighting appliances
4J	Establish the following for the onsite community bushfire refuge buildings as per Section 6.5.4 of the BMP: • Provide internal fire hydrant and hose reel coverage of the refuge • Provide external perimeter fire hose reel coverage of the refuge to a distance of 10 m
4K	Provide a standalone fire hose reel system with coverage to the campground to be provided as outlined in Section 6.5.5 in the BMP.
4L	If required by the decision-maker, conduct an individual BAL assessment prior to issuing of building permits. Regardless of the assessed BAL rating, all buildings are to be constructed in accordance with the minimum BAL ratings stated in Section 6.4 of the BMP.
4M	All hotel and campground buildings, and the tent platforms, are to adopt the bushfire construction requirements of AS 3959 for the assessed BAL rating, unless located in an area of BAL-Low, when the BAL-12.5 standard shall be adopted as outlined in Section 6.4 in this BMP.
4N	The following construction measures are to be adopted for the Water Treatment Plant and Wastewater Treatment Plant in accordance with Section 6.4.4 and 6.5.1 of the BMP: • The WTP and WWTP buildings/sheds/containers are to be constructed to an AS 3959 BAL-40 standard • External infrastructure not housed in a BAL-40 building, is to be constructed of non-combustible material, or enclosed, shielded, sealed or screened using a non-combustible material. • The water balance tanks, WWTP tanks and standalone bushfire water tank are to be steel construction with any critical exposed accessories to be non-combustible materials • The tanks and WTP and WWTP infrastructure are to be surrounded by a non-combustible fence no less than 2.1m high
4O	The following construction measures are also to be adopted for key infrastructure in accordance with Section 6.4.4 of the BMP: • Above-ground electrical transformers are to be of non-combustible construction and screened against ember attack in accordance with AS 3959 BAL-12.5 construction standard. • Above-ground elements of the telecommunications services within the project area are to be non-combustible (or appropriately shielded from radiant heat).
4P	Power supply design and construction is to comply with the measures outlined in Section 6.6.1 of the BMP including: • Cabling within the project area is to be below-ground • Locate above-ground transformers away from unmanaged vegetation or implement APZ. Ensure transformers comply with construction requirements • Establish tie-in points to enable restoration of power following bushfire emergency • Provide suitably sized backup generator to community bushfire refuge
4Q	Telecommunications and site communication systems are to comply with Section 6.6.2 of the BMP including the following: • Internet service throughout the hotel buildings, the community hub and to all holiday home buildings to enable ethernet and Wi-Fi connections. ○ Ensure the development website has a separate section for bushfire forecast and emergency update information that can be updated by the ERT. • Provide a public address and/or fire occupant warning system, complete with external sirens to enable emergency warning to all parts of the hotel, community hub and the campground. • An onsite SMS messaging alert service is to be established to enable the ERT to send text messages to all staff, home owners (and guests and visitors) during a bushfire emergency • At least one satellite telephone for the Chie Fire Warden • Sufficient two-way handheld radios/walkie talkies and mobile loudspeakers for the ERT use • Promote that all home owners have battery powered radios for emergency use • Establish noticeboards at the locations nominated in Section 2.4 of the BEMP

Measure No.	Implementation action
4R	Ensure any gas supply systems are configured to comply with Section 6.6.3 of the BMP including: • Location and shielding of hotel LPG bullet from bushfire impact • Positioning, orientation and securing of holiday home LPG bottles
4S	Ensure the sewer system complies with Section 6.6.4 of the BMP, relating to system design and protection of any critical elements from bushfire impact, including the WWTP.
4T	Liaise with the Community Corporation to ensure the project Bushfire Emergency Management Plan is fully reviewed and implemented prior to occupation of any buildings.
4U	Establish the Community Corporation, and ensure they understand their responsibilities for ongoing management, auditing, defects rectification and enforcement as outlined in Section 6.9 of the BMP.
4V	Comply with the City of Busselton annual firebreak notice issued under s33 of the Bush Fires Act 1954, unless otherwise addressed in this BMP.
5. Community Corporation – prior to occupation of buildings	
5A	Review the BEMP, in consultation with a Level 3 BPAD practitioner, to update and tailor the BEMP to the final development, occupants and facility management. Implement all requirements of the project Bushfire Emergency Management Plan including: • Establishing the Emergency Management and Emergency Response Teams • Establishing the command centre in the hub and ensuring all communication systems are available • Implementing all preparation and monitoring actions • Ensuring the ERT is properly trained and ready to implement shutdown procedures as well as Offsite Evacuation and Onsite Shelter-in-place actions The BEMP review and implementation should be conducted in liaison with the Proponent, hotel management, the City of Busselton and adjacent accommodation resorts.
6. Future holiday home landowner – prior to occupation of buildings	
6A	If required by the Shire, individual BAL assessment prior to issuing of building permits. Regardless of the assessed BAL rating, all buildings are to be constructed in accordance with the minimum BAL ratings stated in Section 6.4 of the BMP.
6B	All holiday home buildings are to adopt the bushfire construction requirements of AS 3959 for the assessed BAL rating, unless outlined otherwise in Section 6.4 in this BMP.
6C	Establish any APZ-Modified landscaping within the lot to the dimensions and standards stated in Section 6.2.2 of the BMP and any relevant specifications from the Guidelines reproduced in Appendix L where not altered by BMP. This is to be done in consultation with the Community Corporation.
6D	Ensure that the household has a battery powered radios for emergency use as recommended in Section 6.6.2 of the BMP.
7. Community Corporation – ongoing	
7A	Maintain the nominated onsite community bushfire refuge buildings including: • Annual audit and testing by a suitably qualified and experienced fire engineer and/or BPAD Level 3 bushfire practitioner, in accordance with bushfire refuge management plan, shall include the lodgement of a compliance certification to the local government at least one month prior to the start of the bushfire season Ensure ongoing compliance with AS 3959 BAL-12.5 construction standards
7B	Maintain and regularly test the reticulation system to the refuge green roofs, production garden and landscaping surrounding the refuge in accordance with Section 6.7 of this BMP.
7C	Ongoing management of all the following landscaping areas, in accordance with Section 6.2 of the BMP: • APZs • APZ – Modified areas • Low threat vegetation Where on holiday home lots, this is to be conducted in conjunction with landowners. Auditing of the landscaping treatments is to be conducted by a BPAD Level 3 practitioner to occur prior to bushfire season as outlined in Section 6.2.6, with a compliance certificate is to be provided to the local government prior to bushfire season commencing. Ongoing enforcement is to also be by the Community Corporation.

Measure No.	Implementation action
7D	Maintain the APZs and low threat vegetation on Smiths Beach Road and the "Leeuwin Way" road in accordance with Section 6.2.4 of the BMP, in consultation with the City
7E	Conduct ongoing maintenance, and auditing of internal vehicular access routes each year, including all bollards to ensure they can be easily unlocked and removed, to the standards stated in the BMP.
7F	Conduct ongoing maintenance, and annual auditing and testing of all fire hydrant and hose reel systems, and fire water tanks, to the standards stated in the BMP.
7G	Ongoing maintenance, and auditing of the hotel, campground and Water Treatment Plant buildings, other than the refuge buildings, for bushfire construction compliance in accordance with Section 6.4 of the BMP.
7H	Spot check of holiday home buildings for bushfire construction compliance in accordance with Section 6.4 of the BMP.
7I	Conduct ongoing maintenance, and annual auditing and testing of all communications system, each year prior to bushfire season
7J	Conduct ongoing maintenance, and annual auditing and testing of all other essential infrastructure systems detailed in the BMP, each year prior to bushfire season
7K	Enforce the application of the CoB firebreak notice throughout the development, in particular burning times and use of open fires
7L	Ongoing review and implementation of the project Bushfire Emergency Management Plan, including any required actions relating to: • Conducting awareness and pre-emptive procedures, especially during bushfire season • Undertaking all bushfire preparedness tasks • Conducting ongoing training and exercises. • Ongoing review and amendment of BEMP
7M	Engage a BPAD Level 3 bushfire practitioner, accompanied by a fire engineer as required, to conduct the audit of the community bushfire refuge, onsite landscaping treatments (using "as-constructed" landscaping plans in the VMP), building construction, internal vehicular access routes (including access-control), water supply and wet fire systems, essential infrastructure, and communication systems each year prior to bushfire season. A compliance report is to be issued to the City of Busselton, and where defects are identified, enforce their rectification.
8. Future holiday home landowner – ongoing	
8A	Ongoing management of all landscaping within the lot, to APZ and APZ-Modified standards detailed in the BMP, as required for the specific lot.
8B	Maintain all dwelling in the holiday home areas in accordance with the AS 3959 bushfire construction requirements implemented in accordance with Section 6.4 of the BMP.
8C	Comply with the relevant requirements of the CoB annual firebreak notice issued under s33 of the Bush Fires Act 1954.
9. Local government – ongoing	
9A	Maintain any existing excluded areas of Smiths Beach Road reserve in a low threat state to achieve exclusion Clause 2.2.3.2 (f) of AS 3959.
9B	Take receipt of any compliance documentation from the Community Corporation relating to the ongoing auditing of the following: • Community bushfire refuge • Onsite landscaping treatments • Vehicular access • Water supply, bushfire water and essential infrastructure protection • Building construction compliance

9. Limitations

Scope of services

This report ("the report") has been prepared by Strategen-JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen-JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen-JBS&G has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen-JBS&G has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen-JBS&G has also not attempted to determine whether any material matter has been omitted from the data. Strategen-JBS&G will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen-JBS&G. The making of any assumption does not imply that Strategen-JBS&G has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen-JBS&G disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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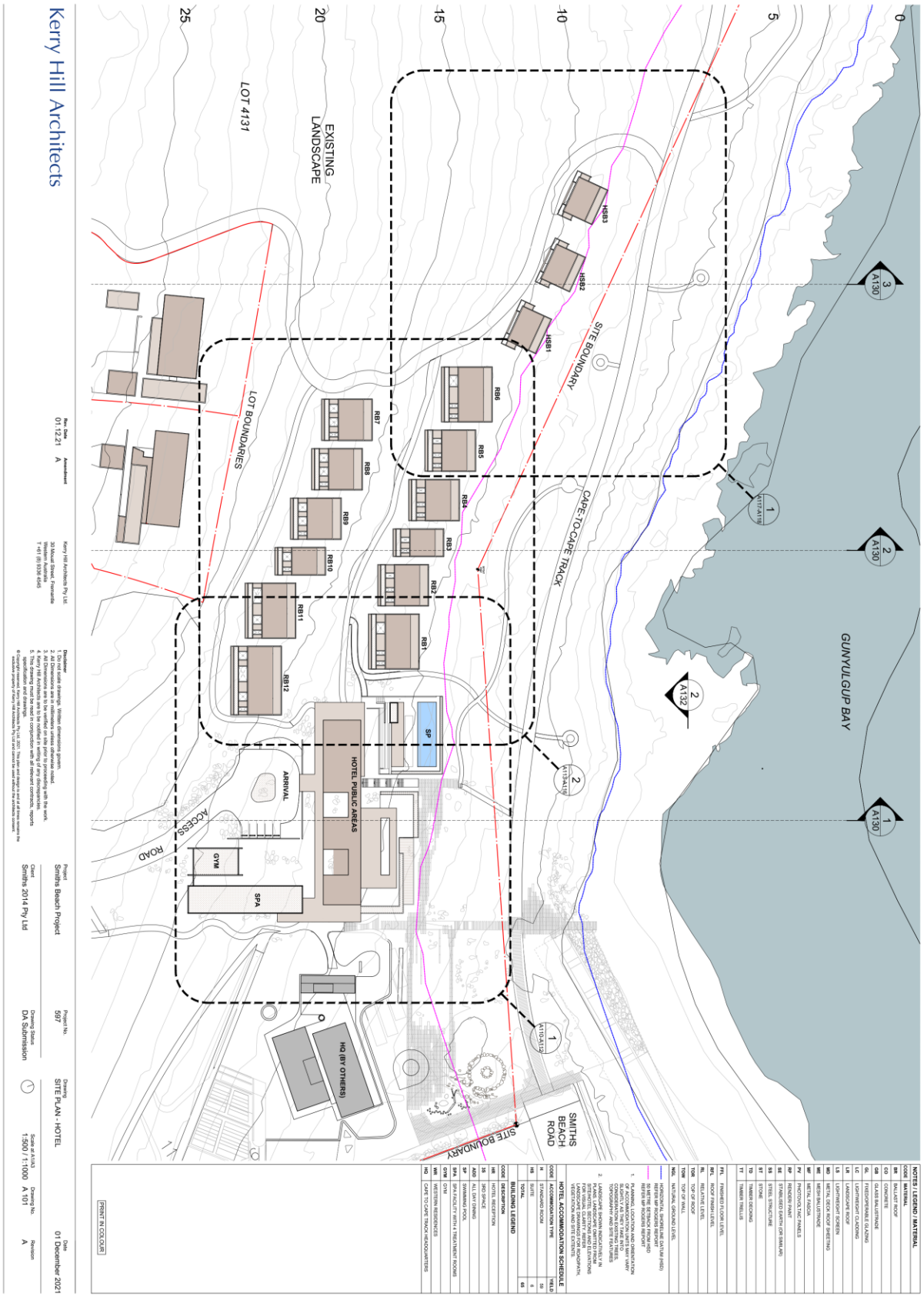
Appendix A Development Plans



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2. All dimensions are to be verified on site prior to proceeding with the work.
3. All Dimensions are in mm unless noted otherwise.
4. Kerry Hill Architects are to be notified in writing of any discrepancies.
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Project
Smiths Beach Project
Client
Smiths 2014 Pty Ltd
Project No.
597
Drawing Status
DA Submission
Drawing
SITE PLAN - WESTERN ACCOMMODATION
Date
01 December 2021
Scale at A1/A3
1:750 / 1:1500
Drawing No.
A 102
Revision
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NOTES / LEGEND / MATERIAL
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BR BALLAST ROOF
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GB GLASS BALUSTRADE
GL GLASS LOUVRES
LC LIGHTWEIGHT CLADDING
LR LANDSCAPE ROOF
LS LIGHTWEIGHT SCREEN
MB MESH BALUSTRADE
MR METAL ROOF SHEETING
MF METAL FASCIA
PV PHOTOVOLTAIC PANELS
RP RENDERED PARAPET
SS STAINLESS STEEL
ST STEEL STRUCTURE
TD TIMBER DECKING
TT TIMBER TRELLIS
FFL FINISHED FLOOR LEVEL
RFL ROOF FINISH LEVEL
RL RELATIVE LEVEL
TOW TOP OF WALL
TOW TOP OF WALL
NGL NATURAL GROUND LEVEL
HORIZONTAL SHORELINE DATUM (HSD) REFER MP ROGERS REPORT
SITE BOUNDARY REFER MP ROGERS REPORT
1. PLANNING, LOCATION AND ORIENTATION OF BUILDINGS ARE INDICATIVE ONLY AND MAY VARY SLIGHTLY AS THEY ARE INTERPRETED TO SUIT SITE TOPOGRAPHY AND SITE FEATURES
2. LANDSCAPE SHOWN INDICATIVELY IN PLAN ONLY. REFER LANDSCAPE SECTIONS AND ELEVATIONS FOR FURTHER INFORMATION
REFER LANDSCAPE DRAWINGS FOR ROADPATH, VEGETATION AND SITE EXTENTS
WESTERN RESIDENCES FFL SCHEDULE
LOT NUMBER ACCOMMODATION TYPE FFL
1 A +31.35
2 A +33.20
3 A +28.70
4 B +28.70
5 A +33.25
6 B +33.10
7 B +31.85
8 C +31.75
9 A +27.90
10 C +28.05
11 B +28.05
12 B +28.05
13 B +28.40
14 B +34.75
15 B +40.00
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TYPE A A121
TYPE B A121
APPROXIMATE A170 ZONE
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WR.B
WR.C
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LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
LOT 13
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EASTERN RESIDENCES (BY OTHERS)
SITE BOUNDARY
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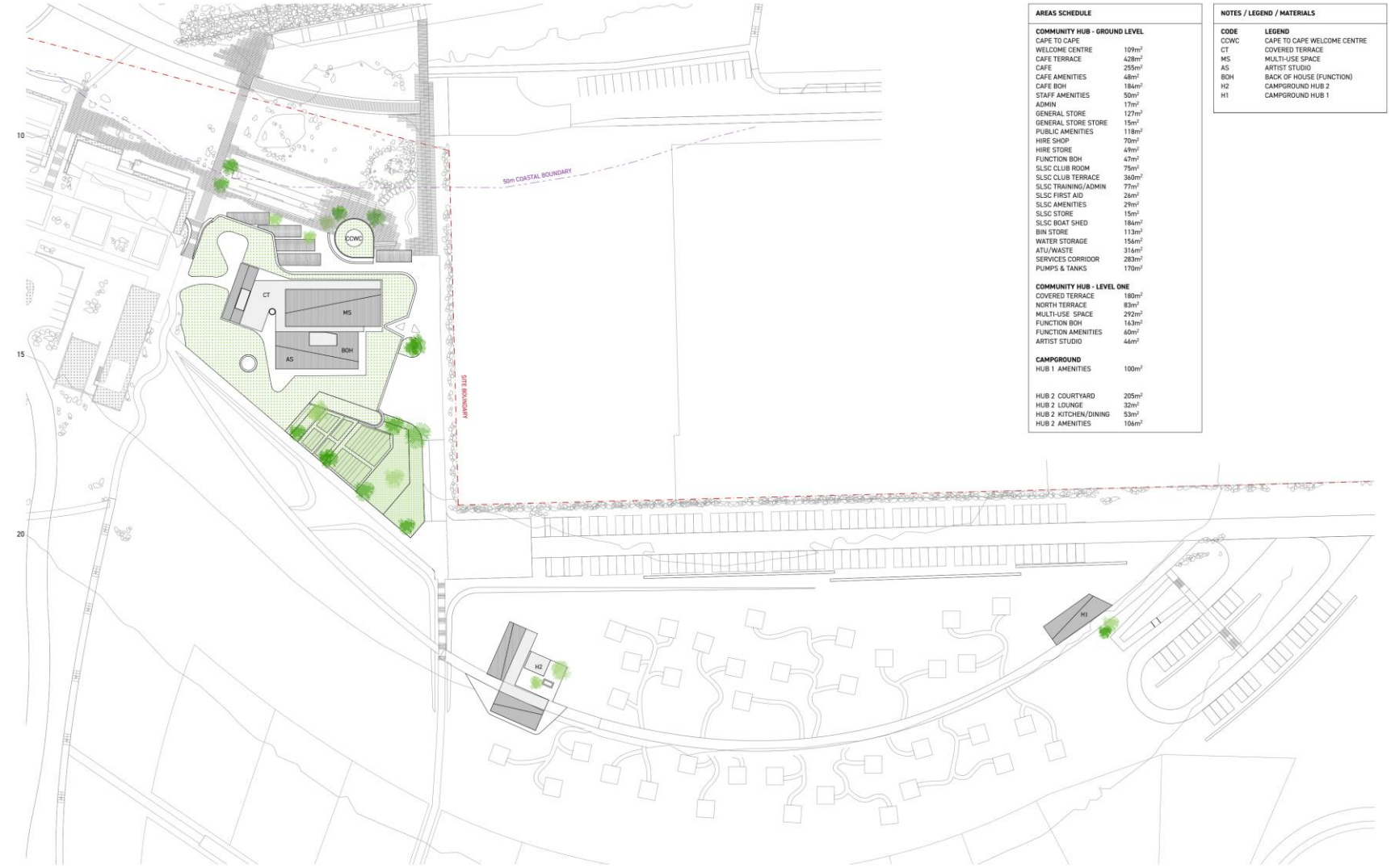
3 A130
40
35
30
25



AREAS SCHEDULE

COMMUNITY HUB - GROUND LEVEL	
CAPE TO CAPE	
WELCOME CENTRE	109m²
CAFE TERRACE	428m²
CAFE	255m²
CAFE AMENITIES	48m²
CAFE BOH	184m²
STAFF AMENITIES	50m²
ADMIN	17m²
GENERAL STORE	127m²
GENERAL STORE STORE	15m²
PUBLIC AMENITIES	118m²
HIRE SHOP	70m²
HIRE STORE	49m²
FUNCTION BOH	47m²
SLSC CLUB ROOM	75m²
SLSC CLUB TERRACE	360m²
SLSC TRAINING/ADMIN	77m²
SLSC FIRST AID	26m²
SLSC AMENITIES	29m²
SLSC STORE	15m²
SLSC BOAT SHED	184m²
BIN STORE	113m²
WATER STORAGE	156m²
ATU/WASTE	316m²
SERVICES CORRIDOR	283m²
PUMPS & TANKS	170m²
COMMUNITY HUB - LEVEL ONE	
COVERED TERRACE	180m²
NORTH TERRACE	83m²
MULTI-USE SPACE	292m²
FUNCTION BOH	163m²
FUNCTION AMENITIES	60m²
ARTIST STUDIO	46m²
CAMPGROUND	
HUB 1 AMENITIES	100m²
HUB 2 COURTYARD	205m²
HUB 2 LOUNGE	32m²
HUB 2 KITCHEN/DINING	53m²
HUB 2 AMENITIES	106m²

NOTES / LEGEND / MATERIALS

CODE	LEGEND
CCWC	CAPE TO CAPE WELCOME CENTRE
CT	COVERED TERRACE
MS	MULTI-USE SPACE
AS	ARTIST STUDIO
BOH	BACK OF HOUSE (FUNCTION)
H2	CAMPGROUND HUB 2
H1	CAMPGROUND HUB 1

SITE PLAN - COMMUNITY HUB & CAMPGROUND

1:500

NOTES
CHECK ALL SITE LEVELS AND EXISTING DIMENSIONS PRIOR TO PREPARATION OF SHOP DRAWINGS, FABRICATION OR INSTALLATION. REPORT ANY DISCREPANCIES TO SPACEAGENCY. DO NOT SCALE OF DRAWINGS.

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REVISIONS IN CURRENT ISSUE

Rev	Description	Date
A	DA SUBMISSION	1/12/21

DA SUBMISSION

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e STUDIO@SPACEAGENCY.COM.AU

PROJECT: SMITHS BEACH PROJECT, YALLINGUP WA
PROJECT NUMBER: 2010
CLIENT: SMITHS 2014 PTY. LTD.
DRAWING: SITE PLAN - COMMUNITY HUB & CAMPGROUND
DRAWING NUMBER: A 201
DATE: 1/12/21
DRAWN: TB
REVIEWED: TB
SCALE: 1:500 @A1
REVISION: A

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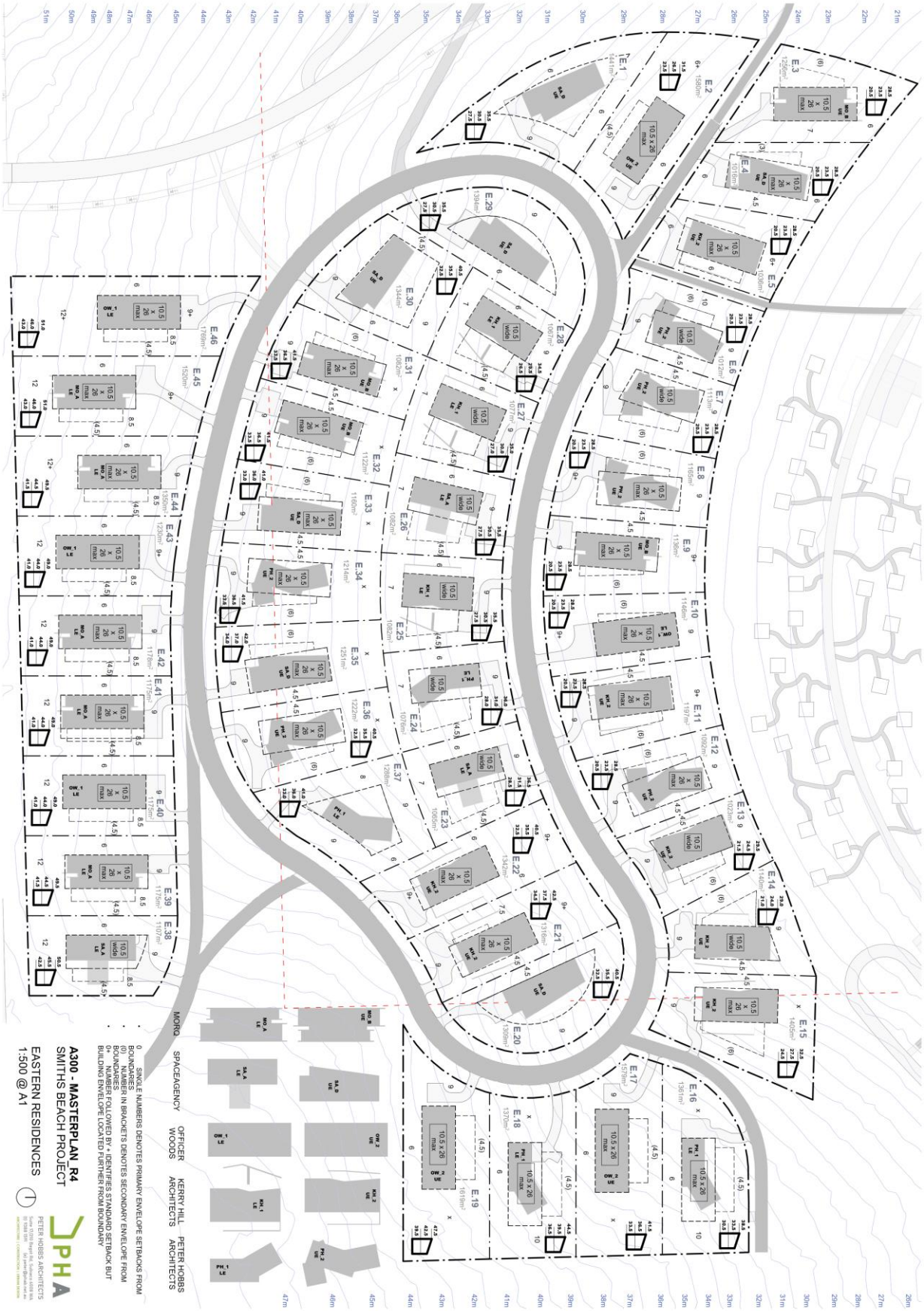

A300 - MASTERPLAN_R4
SMITHS BEACH PROJECT
EASTERN RESIDENCES
1:500 @ A1
PETER HOBBS ARCHITECTS
KERRY HILL ARCHITECTS
OFFICER WOODS
SPACEAGENCY
MORG
(0) SINGLE NUMBERS DENOTES PRIMARY ENVELOPE SETBACKS FROM BOUNDARIES
(0) NUMBER IN BRACKETS DENOTES SECONDARY ENVELOPE FROM BOUNDARIES
0+ NUMBER FOLLOWED BY + IDENTIFIES STANDARD SETBACK BUT BUILDING ENVELOPE LOCATED FURTHER FROM BOUNDARY

Appendix B Bushfire Regulatory Guidance

A summary of the relevant bushfire planning instruments and guidance has been summarised in Table 21, with further information detailed in the following sections, where considered relevant to this project.

SPP 3.7 and the Guidelines

The structure of SPP 3.7 and Guidelines is broadly as follows:

- SPP 3.7 Policy Intent
  - defines the overall in aim of SPP 3.7
- SPP 3.7 Policy Objectives
  - defines the basis for how the SPP 3.7 Policy Measures and Bushfire Protection Criteria from the Guidelines, can achieve the Policy Intent
  - applies to all proposals
- SPP 3.7 Policy Measures
  - applies to relevant planning proposal types
  - requires the assessment of the application against the four Bushfire Protection Criteria of the Guidelines
- Bushfire Protection Criteria from the Guidelines
  - Divided into four Elements
  - compliance is achieved either via directly meeting the Acceptable Solutions for each Element **or** via the Performance Principle-Based Solutions for the relevant Element.

Bunnings Group Limited v The Metro North West JDAP [2019] WASAT 121

Bunnings Group Limited and Residing Member of The Metro North West Joint Development Assessment Panel [2019] WASAT 121, relates to a proposed extension of an existing Bunnings store in Balcatta, into an area of BAL-40/FZ. While not necessarily similar to this proposal, the case required considerable deliberation regarding a proposal that deviated from SPP 3.7 and the Guidelines, which can be used to inform the application of both in these circumstances.

Below is a summary of some pertinent Tribunal reasoning and decisions from that case, which it is felt is important to understand ahead the review of SPP 3.7 and the Guidelines:

- The Tribunal highlighted that the Policy Intent of SPP 3.7 is to **implement effective, risk-based land use planning** and development to preserve life and **reduce the impact of bushfire on property and infrastructure'.** [Cl 123]
- The Tribunal clarified that Policy Objective 5.2 of SPP 3.7 seeks to ***'reduce vulnerability to bushfire*** *through the identification and* ***consideration of bushfire risks*** *in decision-making at all stages of the planning and development process'*. [Cl 124]
- The above is clarified in Cl 147, where the Tribunal reiterates that *'SPP 3.7 does not require that there be no increase at all in the threat of bushfire to people property or infrastructure'*, but as outlined in the Policy Intent, the aim of SPP 3.7 is to *'implement effective, risk-based land use planning and development to preserve life and* ***reduce the impact of bushfire on property and infrastructure'****.*

Table 21: Bushfire instruments and guidance

Instrument	Heading	Objectives
State Planning Policy SPP 3.7: Planning in bushfire prone areas (SPP 3.7)	**Policy Intent**	• *This policy intends to implement effective, risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure.*
	Policy Objectives	• ***Objective 5.1:*** *Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.* • ***Objective 5.2*** *Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.* • ***Objective 5.3:*** *Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.* • ***Objective 5.4:*** *Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.*
	Policy Measure	***6.2 Strategic planning proposals, subdivision and development applications*** *a) Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.* *b) Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a) applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5* *c) This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.*
	Policy Measure	***6.5 Information to accompany development applications*** *Any development application to which policy measure 6.2 applies is to be accompanied by the following information in accordance with the Guidelines:* *a) (i) a BAL assessment. BAL assessments should be prepared by an accredited Level 1 BAL Assessor or a Bushfire Planning Practitioner unless otherwise exempted in the Guidelines; or* *(ii) a BAL Contour Map that has been prepared for an approved subdivision clearly showing the indicative acceptable BAL rating across the subject site, in accordance with the Guidelines. BAL Contour Maps should be prepared by an accredited Bushfire Planning Practitioner* *b) the identification of any bushfire hazard issues arising from the BAL Contour Map or the BAL assessment; and*

Instrument	Heading	Objectives
		c) an assessment against the bushfire protection criteria requirements contained within the Guidelines demonstrating compliance within the boundary of the development site *This information can be provided in the form of a Bushfire Management Plan or an amended Bushfire Management Plan where one has been previously endorsed.*
	Policy Measure	***6.6 Vulnerable or high-risk land uses*** *6.6.1 In areas where BAL-12.5 to BAL-29 applies* *Subdivision and development applications for vulnerable or high-risk land uses in areas between BAL-12.5 to BAL-29 will not be supported unless they are accompanied by a Bushfire Management Plan jointly endorsed by the relevant local government and the State authority for emergency services. Subdivision applications should make provision for emergency evacuation. Development applications should include an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards.*
	Policy Measure	***6.8 Advice of State/relevant authority/s for emergency services to be sought*** *The advice of the State/relevant authority/s responsible for emergency services is to be sought and considered in the preparation and determination of all strategic planning proposals , subdivision and development applications where:* *a) compliance with these policy measures is unlikely to be achieved; and/or* *b) additional/alternative measures are proposed; and/or* *c) the application contains unavoidable development, or vulnerable or high-risk land uses*
	Policy Measure	***6.9 Advice of State/relevant agencies/ authorities for environmental protection to be sought*** *To ensure landscape amenity, environmental protection and biodiversity conservation values are taken into account; the decision-maker is to seek the advice of the State/relevant agencies/authorities responsible for biodiversity conservation management and environmental protection when making decisions on strategic planning proposals, subdivision and development applications where:* *a) the clearing of vegetation within environmentally sensitive areas protected under State or Federal legislation is proposed; and/or* *b) substantial clearing of locally significant native vegetation is proposed; and/or* *c) development abuts vegetated land managed by that authority.*
	Policy Measure	***6.11 Precautionary principle*** *Where a landowner/proponent has not satisfactorily demonstrated that the relevant policy measures have been addressed, responsible decision-makers should[1] apply the precautionary principle to all strategic planning proposals, subdivision and development applications in designated bushfire prone areas. For example, if a landowner/proponent cannot satisfy the performance principles of the relevant policy measures through either the application of the acceptable solutions outlined in the Guidelines, or through the alternative solutions endorsed by the WAPC and State authority/relevant authority responsible for emergency services, the application may not be approved.*

Instrument	Heading	Objectives
		[1] *In this context, "should" is to be read as a strong recommendation. In relation to strategic planning proposals, subdivisions and development applications, this policy also recognises that each site is to be assessed on merit and that the determination of an application may involve the use of discretion in planning decision-making to support innovative bushfire risk management solutions.*
Guidelines for Planning in Bushfire Prone Areas (the Guidelines)	**Elements**	***Element 1: Location*** ***Element 2: Siting and Design of Development*** ***Element 3: Vehicular Access*** ***Element 4: Water***

	Sections	• ***Section 5.4:*** *Development Applications in Bushfire Prone Areas*
		• ***Section 5.5:*** *Proposing a Vulnerable Land Use in a Bushfire Prone Areas*
		  ○ ***Section 5.5.1:*** *Developing a Bushfire Emergency Evacuation Plan*
		• ***Section 2.3:*** *Bushfire Risk Management and Environmental Conservation*
		• ***Section 2.4:*** *Climate Change Impact*
		• ***Section 2.5:*** *Discretionary Decision-Making and the Precautionary Principle*
		• ***Section 4.5:*** *Bushfire Protection Criteria*
		  ○ ***Section 4.5.2:*** *How to Apply the Criteria*
		  ○ ***Section 4.5.2.1:*** *Acceptable Solutions*
		  ○ ***Section 4.5.2.2:*** *Performance Principle-Based Solutions*

Position Statement: Planning in Bushfire Prone Areas: Demonstrating Element 1 and Element 2 (Element 1 & 2 Position Statement)	**Element 1 & 2 Position Statement**	• Guidance regarding application of Element 1 and 2 will be sought from Position Statement: Planning in bushfire prone areas: Demonstrating Element 1 and Element 2
Position Statement: Tourism land uses in bushfire prone areas (Tourism Land Use Position Statement)	**Policy Intent**	• *The intent of this position statement is to provide guidance for tourism land uses within bushfire prone areas. The position statement maintains primacy for the protection of life but also recognises that the protection of property or infrastructure may be secondary to the social and economic development of a region.* • *If human safety can be satisfied, the asset may be considered 'replaceable' and its bushfire construction level determined to the degree necessary.*
	Policy Objectives	• *Maintain primacy for the protection of life, but also recognise preservation of property or infrastructure may be secondary to the social and economic development of a region.* • *Provide bushfire protection relevant to the characteristics of the tourism land use.*

Instrument	Heading	Objectives
		• *Provide bushfire risk management measures that mitigate the identified risks.* • *Achieve a balance between bushfire risk management measures, environmental protection, biodiversity management and landscape amenity.*
	Policy Measures	• Policy Measure 5.1 Tourism Land Uses for Other Vulnerable Uses/Vulnerable Day Uses; Caravan Parks (for the campground)
National Construction Code (NCC)	**Performance Requirements (Bushfire)**	• P2.7.5 (for Class 1 and associated Class 10a) • GP5.1 (for Class 2, 3 or associated Class 10a)
AS 3959-2018 Construction of buildings in bushfire prone areas (AS 3959)	**Construction Requirements (for assessed BAL rating)**	• BAL-12.5: Chapters 3 and 5 • BAL-19: Chapters 3 and 6 • BAL-29: Chapters 3 and 7 • BAL-40: Chapters 3 and 8 • BAL-FZ: Chapters 3 and 9
ABCB Design and Construction of Community Refuges		• Provides the performance criteria and acceptance criteria relating to the design and construction of a community bushfire refuge
Additional Guidance		
Bushfire related WA State Administrative Tribunal Cases	• *Bunnings Group Limited and Residing Member of The Metro North West Joint Development Assessment Panel* [2019] WASAT 121 (WASAT Bunnings) • *Harmanis Holdings No. 2 Pty Ltd and Western Australian Planning Commission* [2019] WASAT 43 (WASAT Harmanis)	
Strategic Planning	• State Planning Policy 6.1 Leeuwin-Naturaliste Ridge • Leeuwin-Naturaliste Sub-regional Strategy	
City of Busselton Planning	• City of Busselton Local Planning Scheme No.21 • City of Busselton Bushfire Risk Management Plan • City of Busselton Local Emergency Management Arrangement • City of Busselton Local Evacuation Plan • City of Busselton Emergency Management Recovery Plan • Capes Zone Response (with Shire of Augusta Margaret River)	
State Emergency Management Policies, Plans, Procedures and Guidelines	• State Emergency Management Policy • State Emergency Management Plan • State Hazard Plan Fire • State Emergency Public Information Plan • State Emergency Management Procedure	

- The Tribunal concluded that while that proposed development did not comply with several provisions of SPP 3.7 and the Guidelines, to avoid intensification of land use ***'would clearly infringe'*** the SPP 3.7 Policy Intent and Policy Objective 5.2. [Cl 141].
- The Tribunal considers that for a proposal to comply with SPP 3.7, the Intent of each element of the Bushfire Protection Criteria of the Guidelines needs to be satisfied, and that compliance can be satisfied by **use of either the Acceptable Solutions or the Performance Principles** [Cl 147]
    - The Tribunal emphasise the following from another WASAT case in Cl 147 '***I do not think it can be accepted that, simply because a proposal contemplates a solution that is not contemplated by the Guidelines the Tribunal cannot approve that proposal. To accept that proposition would amount to inflexibly applying policy.'***
- Where proposing departures from SPP 3.7, the Tribunal noted that the following matters require consideration:
    - Departure from the policy should be undertaken cautiously and only when a *'good reason to depart exists'* [Cl 147]
    - Whether the proposal is considered *'exceptional circumstances'* [Cl 129], which it further defines as *'circumstances which are out of the ordinary course, unusual, special or uncommon and therefore constitute exceptional circumstances*. [Cl 130]. Further guidance regarding this term is provided as follows '*exceptional circumstances includes a combination of factors which, when viewed together, may reasonably be seen as producing a situation which is out of the ordinary course, unusual, special or uncommon.* [Cl1 29]
    - decision-maker has 'due regard' to the '*history of the site where the development is to be located'* [Cl 131]
    - that *review of the history of the site and the potential net benefit in terms of reducing bushfire risk are relevant considerations to be weighed in coming to the correct and preferable decision'* [Cl 133].
- The Tribunal specifically noted that neither SPP 3.7 nor the Guidelines require a *'comprehensive risk assessment'* as part of documentation to accompany a planning application [Cl 118]. Additionally, DFES personnel noted that a *'comprehensive risk assessment'* was required to assess the bushfire risk to the community. This is relevant when considering how best to demonstrate compliance with the SPP 3.7, when the Policy Intent specifically states it is to ***'implement effective, risk-based*** *land use planning and development…*', especially with complicated proposals.
- The Tribunal also specifically reviewed the enforceability of construction methods as a condition of development and concluded that through the *Local Planning Scheme Regulations* and the National Construction Code, there were provision to support and enforce discretionary application of bushfire construction requirements.

It is noted that the Tribunal presented comments relating to the application of precautionary principle, and these have been detailed below.

SPP 3.7 Policy Intent and Policy Objectives

Compliance with SPP 3.7 Policy Intent and Policy Objective 5.1, 5.2 and 5.3 are considered to have been clarified by the Tribunal above. Further information is provided in Section 3 (Bushfire in Western Australia) of SPP 3.7 which notes the following:

Bushfire threat can never be completely eliminated and landowners should recognise the need for management measures when assuming a level of voluntary personal risk through choosing to live in bushfire prone areas.

Reducing vulnerability to bushfire is the collective responsibility of State and local government, landowners, industry and the community. It requires ongoing commitment and diligence to a range of management measures such as the appropriate location and design of development; managing potential fuel loads; implementing bushfire management plans; providing emergency services; increasing awareness of the potential risk through education; and ensuring emergency evacuation plans are in place. Such measures, in conjunction with planning policy and building controls, have the effect of increasing community resilience to bushfire.

Key elements from the above are that there is recognition in SPP 3,7 that residual bushfire risk can't be fully eliminated, and that there is a ***shared responsibility*** with a variety of stakeholders to achieve this. On this basis, it is important to recognise that while the mitigation of bushfire risk for the proposal largely rests with the Proponent, not all aspects are within their control, nor their responsibility, but can be considered key aspects of the risk reduction strategy.

Policy Objective 5.4 introduces the following considerations:

- Appropriate balance between bushfire risk management measures and:
  - biodiversity conservation values,
  - environmental protection and biodiversity management, and
  - landscape amenity,
- The potential impacts of climate change

Environmental Values

Section 2.3 of the Guidelines provides further guidance regarding the interplay between bushfire risk management and environmental, biodiversity and conservation values. It notes that creating development in bushfire prone areas can result in loss of native vegetation through clearing associated with the development including bushfire management measures such as implementation of APZs.

The balancing of native vegetation removal to achieve bushfire risk management aims with biodiversity conservation principles and relevant Federal and State legislation, must be achieved. SPP 3.7 Policy Measure 6.9 aligns with Policy Objective 5.4, and requires the decision-maker to seek the advice of relevant agencies/authorities responsible for biodiversity conservation management and environmental protection to ensure such values are considered as part of the determination of development applications.

Climate Change

Section 2.4 of the Guidelines provides further rationale regarding the potential impacts of climate change by stating that '*Significant likely impact of climate change for the State include the increased risk of bushfires and drought and decreased average rainfall in south-west Western Australia.'*

Regarding climate change, bushfire behaviour can be impacted by local weather which in turn is affected by longer term climate change. The increase of temperature and decrease in rainfall, could result in increased risk from bushfire, as well as increased occurrence. Climate change impact on anticipated bushfire behaviour, if any, will need to be analysed and incorporated into the bushfire risk management strategy.

SPP 3.7 Policy Measures

There are various Policy Measures that are applicable to the proposal including:

- SPP 3.7 Policy Measures 6.2 and 6.5 relating to development applications
- SPP3.7 Policy Measure 6.6 for development applications with a vulnerable land use
- SPP3.7 Policy Measure 6.8 for development applications where emergency services advice is to be sought
- SPP3.7 Policy Measure 6.9 for development applications where relevant agencies/authorities for environmental protection are to be sought
- SPP3.7 Policy Measure 6.11 regarding application of precautionary principle

Application of Policy Measures 6.2, 6.5, 6.6 and 6.9 are considered to have been clarified above or relatively straightforward. Further discussion about the others is provided below.

Policy Measure 6.8 (Relevant emergency services referral)

Policy Measure 6.8 requires that advice of the State/relevant authority /s responsible for emergency services is ***'sought and considered'*** in the preparation and determination of development applications where:

- Compliance with the Policy Measures is unlikely to be achieved
- Additional/alternative measures are proposed
- The application contains vulnerable land uses

Policy Measure 6.11 (Precautionary Principle)

The application of Policy Measure 6.11 can require consideration on complicated proposals, where compliance is not straightforward. Further guidance is provided in Section 2.5 of the Guidelines.

The application of SPP 3.7 Clause 6.11 was reviewed and discussed in *Bunnings Group Limited and Residing Member of The Metro North West Joint Development Assessment Panel [2019] WASAT 121* (WASAT Bunnings), where the Tribunal made the following comments in [145] and [146]:

> *An aspect of this circumspection arises from the precautionary principle set out in cl 6.11 of SPP 3.7. It is however noted that cl 6.11 suggests that proposals which are unable to satisfy the performance principles of the relevant policy measures* ***may*** *not be approved. (Emphasis added) In addition the footnote to this clause 'recognises that each site is to be assessed on merit and that the determination of an application may involve the use of discretion'. [145]*
>
> *The definition of 'precautionary principle' in SPP 3.7 reads as follows:*
>
> > *The presumption against approving further strategic planning proposals, subdivision and development applications or intensification of land uses, where there is a* ***lack of certainty that the potential for significant adverse impacts can be adequately reduced*** *or managed in the opinion of the decision-maker. [146]*

The Tribunal considered that there must be sufficient uncertainty that "the potential for **significant adverse impacts** can be adequately reduced" before the use of the Precautionary Principle could be considered.

Bushfire Protection Criteria of the Guidelines

The Guidelines provide supporting information guiding the application of SPP 3.7, to help determine appropriate land use planning in bushfire prone areas, including the necessary bushfire protection measures to be incorporated into development.

The Guidelines provide a performance-based system of assessing bushfire risk management measures contained within the bushfire protection criteria which are divided into four Elements:

- Element 1 - Location
- Element 2 - Siting and design of development
- Element 3 - Vehicular access, and
- Element 4 - Water.

Compliance with the bushfire protection criteria can be achieved either by meeting the prescriptive 'Acceptable Solutions' for each Element, or the through the use of 'Performance-Principal Based Solutions (PPBS's) where the Acceptable Solutions cannot be complied with, or where it is inappropriate to do so. It is important to note that Acceptable Solutions represent a single design approach to complying with the Bushfire Protection Criteria, which are often blanket requirements seeking to address a variety of potential situations. The Acceptable Solutions are not tailored to specific site conditions, anticipated bushfire behaviour including likelihood, proposed development or occupant characteristics etc, and often represent a blunt tool with which to manage bushfire risk, especially where balancing of competing interests or resolving legacy scenarios is required. In these instances, the use of PPBS's can provide the flexibility required to propose alternative design approaches to comply with the Bushfire Protection Criteria, while still appropriately balancing bushfire risk with other considerations.

Tourism Land Use Position Statement

The *Position Statement: Tourism land uses within bushfire prone areas* (the Tourism Land Use Position Statement) provides the policy position for short stay tourism land uses located in bushfire prone areas, where achieving full compliance with SPP3.7 or the Guidelines may not be possible, typically due to siting of development in BAL-40/FZ or non-compliant vehicular access.

The stated intent of the Tourism Land Use Position Statement is:

> *'…to provide guidance for tourism land uses within bushfire prone areas. The position statement maintains primacy for the protection of life but also recognises that the protection of property or infrastructure may be secondary to the social and economic development of a region. If human safety can be satisfied, the asset may be considered 'replaceable' and its bushfire construction level determined to the degree necessary."*

The policy objectives stated in the Tourism Land Use Position Statement are as follows:

- *maintain primacy for the protection of life, but also recognise preservation of property or infrastructure may be secondary to the social and economic development of a region*
- *provide bushfire protection relevant to the characteristics of the tourism land use*
- *provide bushfire risk management measures that mitigate the identified risks*
- *achieve a balance between bushfire risk management measures, environmental protection, biodiversity management and landscape amenity.*

A key element associated with the application of the Tourism Land Use Position Statement, is the use of a bushfire risk assessment to demonstrate bushfire risk can be mitigated to tolerable levels

when compliance with the Position Statement Policy Measures can't be achieved. The Tourism Land Use Position Statement outlines the following key elements for a risk assessment:

- *consideration of the broader landscape and the risk of a landscape scale fire*
- *determines the likelihood or probability of a landscape scale bushfire event (based on a quantitative analysis of historical data)*
- *determines the consequences of a bushfire event, such as loss of life and/ or loss of infrastructure (based on historic data and/or modelling)*
- *evaluates the risk*
- *proposes risk treatment measures to reduce the risk to an acceptable level (such as provision of access routes, on-site shelter, early evacuation and APZs), and*
- *identifies an appropriate process for ongoing monitoring and review of risk management for the life of the development*

The Tourism Land Use Position Statement notes that different land uses have different characteristics, and that may require different levels of protection, and the reasons for setting measures specific to tourism land uses include:

- *the presence of a resident/manager on site, thereby improving the potential for informed emergency evacuation decisions*
- *construction under Australian Standard (AS) 3959 may be impractical (that is, tents and caravans) or the dwelling may already exist and not constructed in accordance with AS 3959 remoteness of the site, including proximity to emergency services*
- *whether the land use involves overnight stay.*

The Tourism Land Use Position Statement suggests a variety of contingency measures that may be used such as early evacuation, provision of suitable refuge and pre-emptive closure.

National Construction Code and AS 3959

The National Construction Code (NCC), published by the Australian Building Codes Board, is a uniform set of technical provisions for the design and construction of buildings throughout Australia. The NCC is a performance-based code which contains the Performance Requirements to establish a minimum set of requirements which define quality and safety criteria. It also references the Australian Standards that set out specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they are intended to.

New Class 1, 2, 3 and 10a buildings (i.e. accommodation buildings) located in bushfire prone areas are required to comply with bushfire specific provisions of the NCC, namely Part G5 of Volume One and Part 3.7.4 of Volume Two. Compliance AS 3959 or the *NASH standard* (for steel framed construction) provide the basis for compliance using the Deemed-to-Satisfy (DTS) pathway. Performance Solutions can use the Bushfire Verification Method to demonstrate compliance with the bushfire Performance Requirements, amongst other approaches.

AS 3959 details the methodology used to assess bushfire risk to buildings in the form of the Bushfire Attack Level (BAL) assessment. AS 3959 also contains a series of building construction standards, categorised by the different BAL ratings.

Additional Guidance

In addition to the application of SPP 3.7 and the Guidelines, there exists other guidance relating to the location as detailed below.

State Planning Policy 6.1 Leeuwin-Naturaliste Ridge

State Planning Policy 6.1 Leeuwin-Naturaliste Ridge (SPP 6.1) guides development along the ridge, and specifically identifies Smiths Beach as a nominated Tourist Node which:

- will reinforce the primary tourism function of the site
- needs to protect the visual amenity and environmental values of the area
- will not compromise the landscape values of the area and requires and appropriate landscape management strategies
- requires an acceptable bushfire protection strategy

Additionally, it states that residential development will be permitted on Sussex Location 413 (west of Smiths Beach Road) but will be secondary to the predominant tourist function.

Leeuwin-Naturaliste Sub-regional Strategy

The Leeuwin-Naturaliste Sub-regional Strategy (the SR Strategy) provides guidance to assist local governments implement State strategic priorities, and to inform local planning strategies and schemes so that robust planning decisions are being made. The SR Strategy identifies Smith's Beach as a Tourist Node and specifically states the following:

> *Smiths Beach is a tourist node located three kilometres south of Yallingup townsite. It currently incorporates a tourist resort, and short-stay villas and apartments.*
>
> *SPP6.1 provides for primarily short-stay tourist accommodation and a lesser area of residential development. Further subdivision and development opportunities of approximately 35 hectares are subject to the Smiths Beach Structure Plan (2011) which provides for additional tourism and residential uses in accordance with SPP6.1. Notwithstanding the opportunities provided by SPP6.1, the prospect of residential or unrestricted length-of-stay component is significantly constrained by bushfire risk criteria.*

The SR Strategy notes that there are constraints relating to bushfire risk, especially where permanent residences are concerned. The SR Strategy does specifically refer to bushfire risk management, and primarily states that there is a significant bushfire risk to the subject area and that more detailed bushfire assessments will need to be undertaken the planning stages and that the State and local government, industry and the community will need to work collaboratively to reduce the risk to these vulnerable areas.

City of Busselton Local Planning Scheme No.21

The City of Busselton Local Planning Scheme No. 21 (LPS 21) seeks to set out the City's planning aims and guide land use and development. LPS 21 requires that developments located with designated bushfire prone areas are required to construct dwellings in accordance with AS 3959.

The project area (Sussex Location 413) is specifically referenced in LPS 21, where is notes the tourism zoning of the site with an additional use applied over portion of the tourism zoning in respect of permissibility of residential land uses subject to relevant controls, and the need to incorporate the retention of vegetation, whenever possible, into the design, in order to protect visual amenity and environmental values of the land.

City of Busselton Local Planning Policy No.4.2 (Bushfire)

The Local Planning Policy No. 4.2 (LPS 4.2) has been adopted as guidance for assessment of strategic planning proposals and subdivision or development applications where bushfire issues require consideration. The purpose of LPS 4.2 is to provide clarity regarding the assessment of applications within designated bushfire prone areas, but also to ensure consideration of, and an

appropriate balance between, bushfire risk, building and land management costs, and visual and environmental impact, in the assessment of these applications.

Section 4 of LPS 4.2 outlines what the City's expectations are for development applications in designated bushfire prone areas, including that all bushfire related plans are endorsed by an Appropriately Accredited Professional and that APZ width shouldn't exceed 25 m, unless there is sufficient justification regarding environmental and visual amenity impact.

City of Busselton Firebreak Notice

Under Section 33 of the BF Act, an annual notice is to be prepared by all local governments throughout Western Australia detailing compliance requirements for individual landowners and regulatory components for local governments. Compliance requirements relate to prohibited and restricted burning periods for individual local government areas and specified instructions for individual landowners for the construction of firebreaks and implementation of fuel hazard reduction works.

The current annual notice for the City of Busselton is contained in Appendix O, and details the following:

- Dates of prohibited burning and restricted burning periods
- Guidance on when fires can be lit in the open (e.g camping or cooking fires, fire pits or other open-air fires) including:
    - Not to be conducted on days with Fire Danger Rating of Very High or above
    - Have a 3m wide non-vegetated zone around the perimeter of the entire fire or fire pit
    - Have a person in attendance at all times until the fire is completely extinguished by application of water or earth
- Bushfire hazard mitigation requirements vary according to the zoning of land and parcel size and including firebreaks
- installation and maintenance of Building Protection Zones (BPZs; similar to APZs), which is a modified area of reduced fuel immediately surrounding a building.
- Noting that where the land has an approved FMP (BMP), compliance must be achieved in accordance with the FMP. The FMP may vary the above BPZ requirements.

Clause E4 of the firebreak notice provides power for compliance with Fire Management Plans (now known as Bushfire Management Plans) which requires the following:

- *A notification, pursuant to the Transfer of Land Act 1893 (as amended) may be placed on the Certificate(s) of Title of the land for medium to long term fire management to reduce the occurrence and minimise the impact of uncontrolled bush fires, thereby reducing the threat to life, property and the environment.*
- *The landowner must comply with the FMP.*
- *Building in bush fire prone areas, new dwellings and other forms of accommodation, as well as additions to existing buildings are to be constructed in accordance within Australian Standard 3959-2009.*
- *In designated bush fire prone areas, the minimum BPZ in all cases shall be 25 metres.*

It is noted that the current firebreak notice requires a 25 m BPZ, however as it permits variation of the BPZ by an approved FMP (BMP), this is considered to be flexible where sufficient justification is provided.

Capes Zone Response

The Capes Zone response is a rapid, automated, aggressive and coordinated interagency response to bushfire in the Capes area of the south-west, that essentially extends over the City of Busselton and the Shire of Augusta Margaret River. This bushfire response strategy is in recognition that both the timely detection of fire and the application of an aggressive initial attack during the early stages of fire development, is required in this area to address the increased bushfire risk to people and property that exists in the Capes area due to significant areas carrying high fuel loadings which are often associated with poor access arrangements for bushfire fighting appliances.

The Capes area is divided into special response zones designated as I-Zone (interface) and O-Zone (outer zone) as shown on Plate 20.

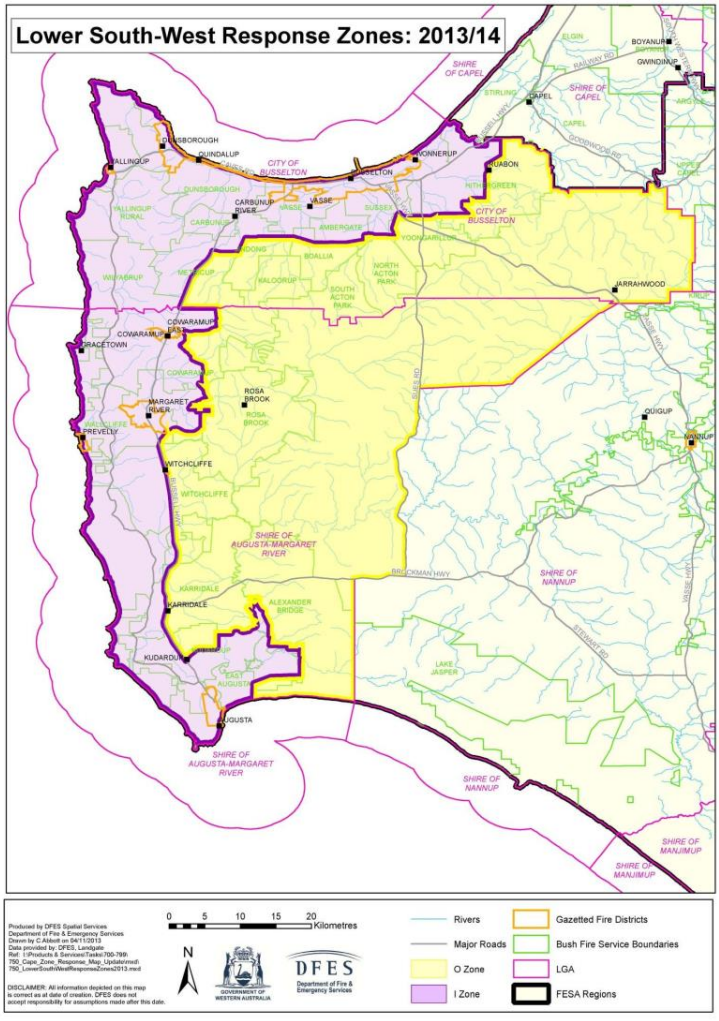


Plate 20: Capes response zones

The response protocols for the two zones operate for the entire Prohibited Burning Period, which is indicatively 1st December to 31st March between 8am and 6pm, however the operational periods can be adjusted by agreement between the agencies.

The response protocols are based on the two zones, but include automatic multi-agency turnout of a variety of ground and aerial appliances, in conjunction with early assessment of the emergency, and clear command and control procedures to promote rapid management of the incident.

Appendix C Landscaping Masterplan

Appendix D Indigenous vegetation management

The central theme for the vision of this project is to create a sensitive coastal village guided by landscape and the natural assets of the site, that is deeply rooted in place and culture. The focus is on minimising disturbance to the high value vegetation and having a light ecological footprint, one that respects the site and its flora and fauna, and takes a leading sustainable approach to all design and materials. A key component is also having a strong Indigenous involvement in the creation of the village, through a focus on land management practices, and the overall approach to landscape and tourism experiences.

Given the location of the development, environmental values and visual amenity are key considerations and Smiths 2014 are seeking to rationalise the vegetation management strategy for the site, and where practical, incorporate traditional Nyoongar vegetation and fire management practices into the contemporary bushfire management strategies, to form a holistic land management approach. These practices will establish foundation for future employment opportunities relative to ongoing vegetation and fire management.

Cultural Strategy and Working Group

A Cultural Strategy has been developed to incorporate indigenous and local culture into the project beginning with its vision and culminating with the creation of sustainable employment opportunities and more broadly with the supply chain in the region.

A Cultural Working Group of local Nyoongar Traditional Owners has been formed to provide ongoing input into the project vision and Cultural Strategy, design and future operations. David Collard (Wardong) has been engaged as the Indigenous Consultant to facilitate the Indigenous stakeholder engagement and lead the Cultural Working Group.

Traditional indigenous knowledge regarding vegetation and bushfire management and revegetation strategies, are all key areas on which the Cultural Strategy will focus.

Overall Site Vegetation Management Strategy

A key mitigation measure to manage the bushfire risk to the proposed development is vegetation modification, and its ongoing management, to reduce available fuel loads and fragment vegetation continuity, in order limit the potential bushfire intensity and behaviour approaching the habitable development. As part of this development, the proposed vegetation modification for the development will be in line with modern-day standards for the creation of APZ, APZ-Modified and low threat vegetation treatments around the site, as detailed in Sections 4.2 and 6.2. The use of tradition Nyoongar management techniques are seen as an opportunity for future application, subject to approval, which may also present a chance to revisit aspects of the current modification and management strategy.

Nyoongar Traditional Vegetation and Fire Management

The traditional owners of the project area are the Nyoongar people, who occupied land from Bunbury to Augusta to Nannup, and are both forest and saltwater people who live in unity with the environment. They maintain a deep spiritual and physical connection to country and water through *Kaartdijin* (knowledge), songs, stories, spirituality and Dreaming. The Nyoongar people lived on country within the project area as evidenced by the two Registered Aboriginal Heritage sites, relying on the food and water resources with their practices evolved to care and protect the land to ensure continual resources for the next generations.

In Nyoongar culture, their relationship with the land is seen as reciprocal *"if we care for the land and take care of its needs, it will in turn take care of us"*. Nyoongar people feel that given they have tens of thousands of years of experience of the land, their views and ways of managing it should be heard.

Six Seasons of Nyoongar People

An important aspect of Nyoongar culture and land and fire management are the Six Seasons which are governed by what is happening in the natural landscape, rather than by dates on a calendar. Each season has spiritual significance, based on plant and animal growth seasons and the preservation of country. These seasons are particularly important in guiding when fire should be used in the landscape.

The Nyoongar people divide the year into the Six Seasons as shown on Plate 21, which also indicates the months when these seasons typically occur:

- **Birak** – first summer (Dec-Jan), dry and hot
- **Bunuru** – second summer (Feb-Mar) hottest part of the year
- **Djeran** – autumn (Apr-May) – cooler weather begins
- **Makuru** – winter (Jun-Jul) – coldest and wettest season
- **Djilba** – first spring (Aug-Sep) – mix of wet days with increasing clear, cold nights, pleasant days
- **Kambarang** – second spring (Oct-Nov) – longer dry periods

Plate 21: Six Seasons of Nyoongar People

Traditional Nyoongar vegetation and fire management practices

The Nyoongar people use fire to alter the landscape for their own needs, and to manage the land. Their use of fire is informed by their *Kaartdijin* (knowledge) and customs, and involves a variety of techniques developed over tens of thousands of years through a shared and reciprocal connection with country.

A series of site meetings have been conducted with a group of Nyoongar Traditional Owners to hear some of the cultural knowledge and relevant stories regarding *Karla* (fire) management.

The information below has been written in collaboration with Nyoongar Traditional Owners and this knowledge of Country lies with the Elders and remains their property.

Below is a summary of the key learnings from these meetings:

- The Nyoongar people read the land and can see when the land is out of balance and plant diversity has been altered.
    - Within the project area, the understorey vegetation (dead and alive), is considerably thicker than it would have been under their management of country, where previously understorey vegetation would have been sparser making walking through it relatively easy, where currently it is almost impassable.
    - There is significantly more non-native species in amongst the native flora.
- They have several methods of fire management available to care for country:
    - Burning practices where fire is applied directly to the land as 'cool fire', like modern day prescribed burning practices, however on a smaller scale and with less heat. This practice is typically undertaken in forest or woodland environments which has large trees, and seeks to clear undergrowth to enable access for people and animals, promote plant diversity, all whilst protecting the mature trees. The use of 'cool fire' is complicated and requires a detailed knowledge of the land, environment and the seasons.
    - Circle/patch burns where dead and non-native vegetation within a 6m radius is scrapped into a central location and burnt. Dead material is also pulled down from up to 2m above ground level, with all living native vegetation is retained. The central piles are then burnt off, and the ash is often used seeded to promote new growth.
- The time for burning is guided by the seasons (i.e. the weather) which produces plant changes which indicate the time for fire:
    - Typically commences in Djeran, the cooler season after the first rains fall but before it gets too wet (approximately around April /May). Burning would not begin until after the second rainfall.
    - Some burning practices (e.g. localised circle/patch burns) can still be conducted in Makuru (June/July) and even in Djilba (August/September), however this depends on rainfall and wind.
    - Wind conditions are highly important to guide when burning can be conducted, with little to no wind required, ensuring the fire remains cool and manageable, but also keeps smoke at the burn site.
    - Preference is also to conduct burning under light drizzle where possible, which ensures cool burning but also smoke suppression
- The following plant and fauna species are of specific importance to the Nyoongar people particularly in application of fire to country are detailed below:
    - Balga (Grass tree)
        - Is considered the fire plant as the flower stick is used to create a torch using native creeper wrapped around the leaves and then lighting the dead leaves
        - A species that is sensitive to frequent fires. They are often burnt individually every 3-5 years, after removal of dead vegetation

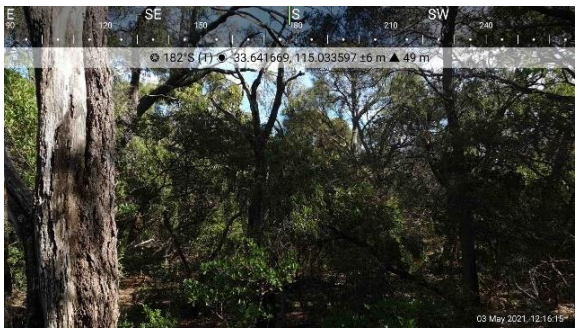
- *Bulyalla* (Banksia grandis)
  - Important connection with Nyoongar people and their nomadic ways with the banksia flower stick or cones able to be used as a fire stick given they can smoulder for long periods of time
  - This species is highly respected, and the branches are only touched softly using the branches of other trees, notably the balga stick.
- *Moodjar* (Nuytsia or WA Christmas Tree)
  - The Nyoongar people regards this as a protected tree and is incorporated into rituals and is forbidden from being destroyed.

- The Nyoongar people welcome the opportunity to re-establish their connection to country within the project area, in particular vegetation management through the use of *Karla* (fire), which fulfils their cultural obligations of looking after country.

Examples and Case Studies

During the site meetings with Nyoongar Traditional Owners, they kindly showed an area where they are currently implementing traditional circle/patch burns within forest vegetation, by raking up dead vegetation in a 6m circle, and burning this material in small piles.

Below are photos of examples of unmanaged vegetation, prior to circle/patch burning by the Nyoongar people



Below are photos of vegetation managed by circle/patch burning by the Nyoongar people (note these areas were cleared and burned 1 year ago). Note the pile of dead vegetation in one photo which is ready for burning and also previous burn patches.

There is clear reduction in fuel load resulting from this traditional practice, while the targeted vegetation retention also reduces the environmental impact associated with modern practices such as the APZ standards. It is noted that while there was some accumulation of leaf litter over the year since the original clearing and burning, the litter layer was relatively thin, and there was limited accumulation of dead material. The canopy cover remained unchanged from the unmanaged structure.

Preliminary Trial Period (Pilot Project)

Incorporating the targeted traditional vegetation management practices of the Nyoongar people into the current modern fire management approaches, represents a unique opportunity to manage the landscape to prevent loss of life and property, and also protecting plants, wildlife and natural beauty.

Following discussion of the potential traditional vegetation management practices that could be implemented, it was agreed the most appropriate one for this development would be the use of circle/patch burning as follows:

- Conduct targeted, manual clearing of non-native species and dead understorey vegetation, including removal of dead branches, to "pole height" which is 2m above ground level
- Collected vegetation from a small area (approximately 6m diameter) is brought together in small piles which are then burnt off under the following conditions:
    - Burning occurs in Djeran (late Autumn or early winter), preferably after the second rainfall, could continue into Makuru and early Djilba, provided conditions are benign
    - Preference is to undertake the burning when there is a light drizzle and little to no wind in order to suppress smoke and ensure a controlled fire
    - Use traditional Nyoongar methods to ignite the small pile burn offs,
    - Frequency between 3-4 times per week preferably between 8am-1pm.

This approach is preferred to applying 'cool fire' to the landscape, especially given the more continuous coastal vegetation profile, which makes the control of burning in the landscape much more difficult and potentially dangerous around people and property.

It was agreed with the Traditional Owners that these small burn-off piles should be conducted with a fire trailer present (trailer with water tank and fire hose reel) as an additional risk management measure to ensure fire could not escape into the landscape.

The proposed application of the Nyoongar traditional practices as part of the vegetation management strategy for the development, are reliant upon having a clear understanding of the effectiveness, safety and impact of these practices. One of the unfortunate results of European settlement, has been cultural dispossession resulting in dilution of these traditional ways from lack of opportunity to implement them. The lack of recent implementation has resulted in a lack of knowledge throughout the Nyoongar people, with only the Elders retaining the understanding of these practices.

With the lack of widespread use of these practices, a preliminary trial (pilot project) is proposed to assess the methodology and outcomes of the traditional practices. It is expected there would be trials conducted within the project area, preferably in the various bushfire vegetation classifications, and monitored over a period of time, to assess the impact on fuel loads, environmental retention and visual amenity. It is anticipated that these traditional practices would be compared against areas where modern-day vegetation modification (e.g. APZs) was applied, to enable a gap analysis to be conducted and the outcomes used to inform further study and/or application areas (subject to approval). It is considered that the trial will need to include the following:

- Fuel load assessments prior to, and following each burn, and regularly throughout the trial period to determine the level of fuel load reduction

- Flora and fauna assessments prior to, and following each burn to ascertain the level of environmental impact or improvement
- Photography prior to, following each vegetation management period, and regularly throughout the trial period to provide a record of the landscape modification
- Assessment of the burning methodology including how the piles are created (size, clearances etc), the type and presence of firefighting equipment, the fire ignition process (how, who, when), the monitoring process (who, how long etc) and how and when the piles are extinguished and ongoing monitoring.

The details of the preliminary trial will need to be agreed together with key stakeholders through consultation to ensure a good communication plan is developed that will encourage strong community relations across all levels of government and all volunteer and non-voluntary sectors. This approach is to ensure the development of a local working group to share the responsibility of the Nyoongar and modern day (non-Aboriginal) fire management.

Potential Areas of Application

Given the vegetation management areas outlined previously, several areas have been identified within the project area where the application of Nyoongar traditional practices may be suitable to reduce fuel loads, however this will be significantly guided by the outcomes of the pilot program. These are depicted on Figure 12, and include:

- Onsite POS areas
- Southern interface of the development including within the National Park
- Smiths Beach Road and "Leeuwin Way" road reserves (outside nominated APZs)
- Foreshore Reserve

Summary

Bushfires can threaten people, property, infrastructure and the environment, as such it is a key aim of this project, that the development is resilient to bushfire, whilst achieving balance with environmental objectives and limiting the impact on visual amenity.

It is acknowledged that the cultural connection with country that exists for the Nyoongar people is important for both the Nyoongar people and the health of the land. Whilst the Nyoongar are unsure of how their traditional practices can be utilised in modern-day fire management, this is reciprocal, with a greater understanding of indigenous techniques required to fully assess their potential application. A preliminary trial is proposed, to evaluate the alignment between Nyoongar and modern-day fire management outcomes, as well as assess environmental and safety. This comparison will allow for the assessment of the appropriateness of the Nyoongar traditional methods for use in current asset protection, and if required, how it can be adjusted to meet these modern objectives.

The benefits the Nyoongar people offer the project are considered to be substantial, primarily with the knowledge they can provide regarding sustainable vegetation management and use of fire in the landscape, to create and manage a healthy ecosystem. This knowledge could also be considered in strategies to manage all the natural resources of the south west, including bushfire risk management.

Incorporating this ancient knowledge, whilst finding synergies with modern methods, will require some investigation and will undoubtedly strengthen as both the Nyoongar and non-Aboriginal methods become better understood to both parties. This represents an exciting opportunity to learn from each other, whilst examining different ways to manage the landscape, including

bushfire risk, with the aim of developing the most optimal management approach for the project area.

The proposed Nyoongar traditional vegetation management practices have several specific benefits including:

- Vegetation management is primarily mechanical collection with any burning conducted in small piles under moist and benign conditions. This is preferable to conducting any controlled or prescribed burning in this landscape and is aligned with current winter burning off practices conducted in most rural lots.
- Circle/patch burning of the block will maintain the DNA of the country and will continue to support the various rich flora and fauna of the area through targeted retention of native species with ongoing removal of weeds.
- Reduce and manage fuel loads locally around the proposed development, whilst prioritising retention of living native vegetation.
- Opportunity to explore their role as joint land managers of the Leeuwin Naturaliste National Park with DBCA, under the Indigenous Land Use Agreement (ILUA))
- Access to Nyoongar bushfoods and bush medicine
- The ongoing maintenance of existing sacred sites in complying with the Aboriginal Heritage Act and Traditional Owner responsibilities under Native Title

The benefits associated with the project for the Nyoongar community are numerous , with some summarised below:

- the project represents an opportunity to be inclusive of the Nyoongar people and establish strategies to improve cultural protection and awareness through the delivery of cultural tourism activities.
- provides a chance to address the unemployment of Indigenous youth within the region.
- allows the inclusion of cultural burning and the re-vegetation of native species that will improve the area futureproofing the ecological capacity.
- improve the Nyoongar culture through education programs being provided in partnership with the Smiths project, that will see Nyoongar bushfoods and bush medicine being promoted.
- improve the relationship between the Nyoongar and the non-Aboriginal community through the creation of employment and training the benefits will see an increase in Indigenous participation within the region. These opportunities create roll-on effects for the Nyoongar community and increase the general community's awareness of their country.
- enables the Nyoongar people to protect and enhance their culture through the tourism opportunities but also to allow them to fulfil their cultural obligations for care of country.

Smiths 2014, Strategen-JBS&G, and the project team, thank the Nyoongar people for sharing their knowledge with us, and understand that this knowledge of Country lies with the Nyoongar Traditional Owners and remains their property.

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Road reserve
- Refuge
- Overall APZ extent

Indigenous vegetation management

- Reduced fuel buffer along southern interface
- Management of Foreshore reserve
- Management of Smiths Beach road reserve
- Management of onsite POS
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Roads (MRWA)

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:4,000 at A3

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

POTENTIAL AREAS OF INDIGENOUS MANAGEMENT

FIGURE 12

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_12_A3_IndigenousManagement.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

Appendix E Vegetation plot photos and descriptions

Photo ID: 1a

Photo ID: 1b

Photo ID: 1c

Plot number		Plot 1
Vegetation classification	**Pre-development**	Class C Shrubland
	Post-development	Class C Shrubland
Description / justification		Shrub vegetation less than 2 m high at maturity

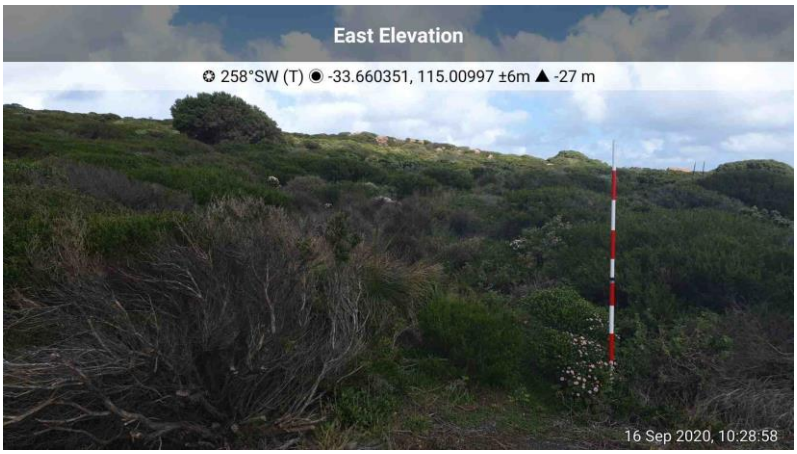


Photo ID: 2a

Photo ID: 2b

Photo ID: 2c

Plot number		Plot 2
Vegetation classification	**Pre-development**	Class C Shrubland
	Post-development	Class C Shrubland
Description / justification		Shrub vegetation less than 2 m high at maturity

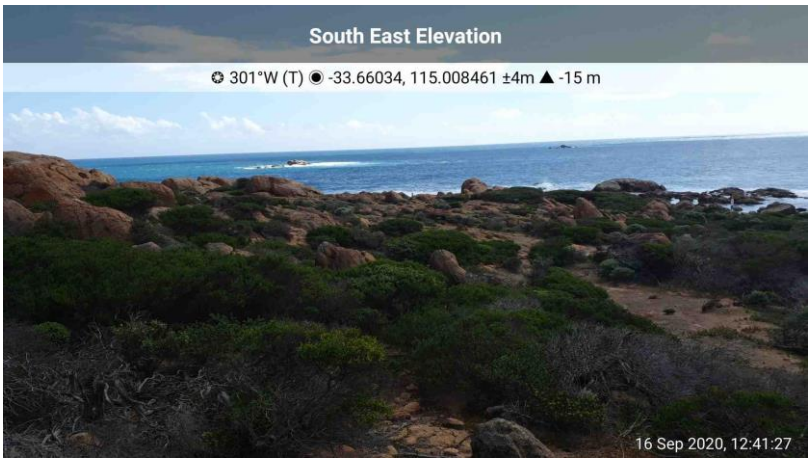


Photo ID: 2d

Photo ID: 2e

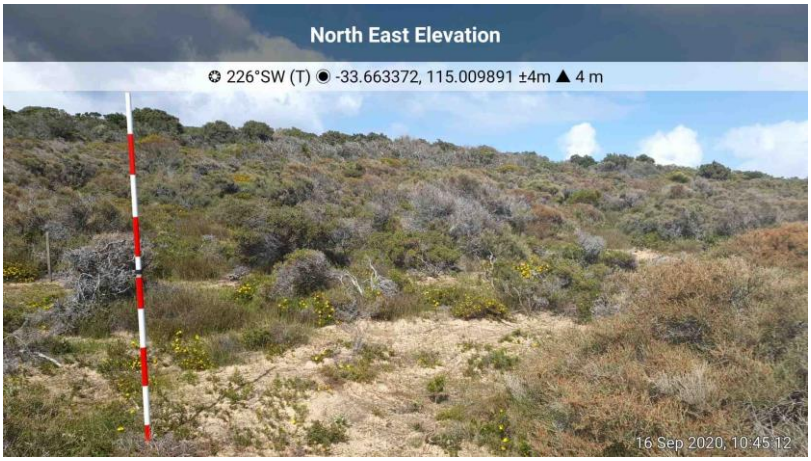


Photo ID: 2f

Plot number		Plot 2
Vegetation classification	**Pre-development**	Class C Shrubland
	Post-development	Class C Shrubland
Description / justification		Shrub vegetation less than 2 m high at maturity

Photo ID: 3a

Photo ID: 3b

Plot number		Plot 3
Vegetation classification	**Pre-development**	Class C Shrubland
	Post-development	Class C Shrubland
Description / justification		Shrub vegetation less than 2 m high at maturity

Photo ID: 4a

Plot number		Plot 4
Vegetation classification	**Pre-development**	Class C Shrubland
	Post-development	Class C Shrubland
Description / justification		Shrub vegetation less than 2 m high at maturity

Photo ID: 5a

Photo ID: 5b

Photo ID: 5c

Plot number		Plot 5
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 6a

Photo ID: 6b

Photo ID: 6c

Photo ID: 6d

Photo ID: 6e

Photo ID: 6f

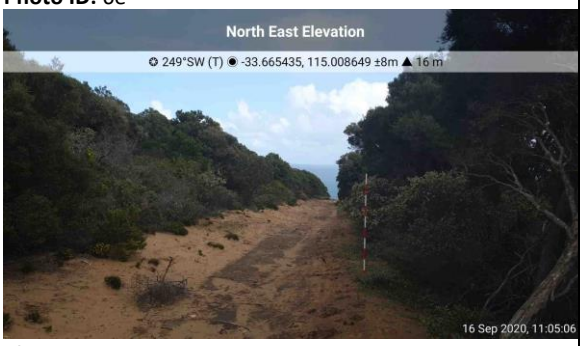


Photo ID: 6g

Photo ID: 6h

Plot number		Plot 6
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 6i

Photo ID: 6j

Photo ID: 6k

Photo ID: 6l

Photo ID: 6m

Photo ID: 6n

Photo ID: 6o

Photo ID: 6p

Plot number		Plot 6
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

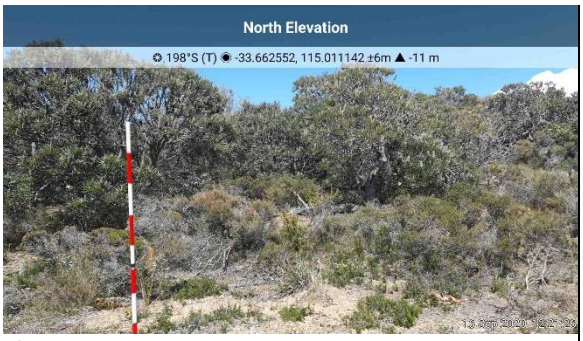


Photo ID: 6q

Photo ID: 6r

Photo ID: 6s

Photo ID: 6t

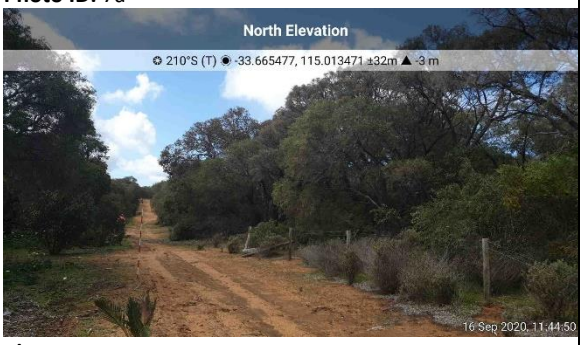
Photo ID: 6u

Photo ID: 6v

Plot number		Plot 6
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 7a

Photo ID: 7b



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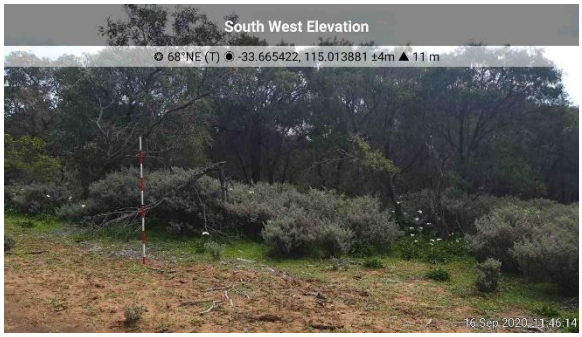


Photo ID: 7d

Photo ID: 7e

Photo ID: 7f

Photo ID: 7g

Photo ID: 7h

Plot number		Plot 7
Vegetation classification	**Pre-development**	Class A Forest
	Post-development	Class A Forest
Description / justification		Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

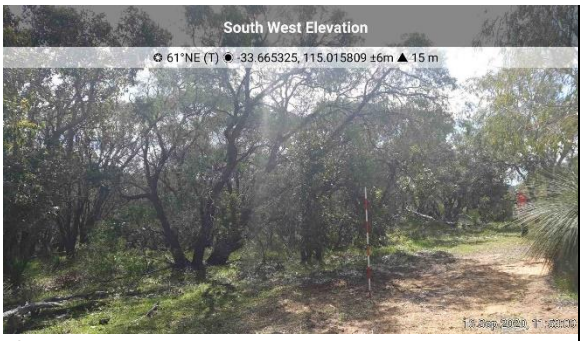


Photo ID: 7i

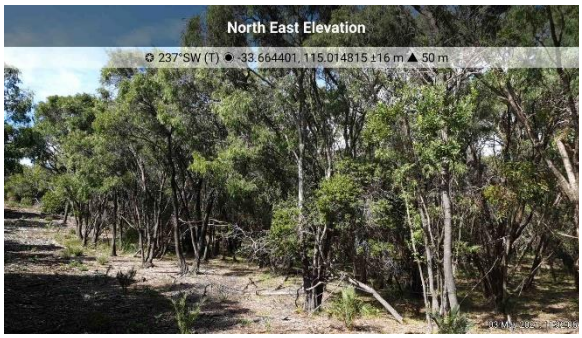


Photo ID: 7j

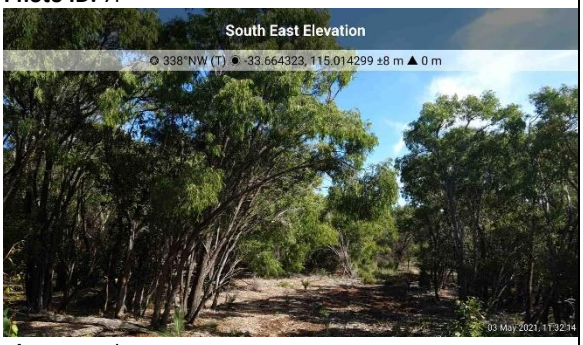


Photo ID: 7k

Photo ID: 7l

Photo ID: 7m

Photo ID: 7n

Photo ID: 7o

Photo ID: 7p

Plot number		Plot 7
Vegetation classification	**Pre-development**	Class A Forest
	Post-development	Class A Forest
Description / justification		Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 7q

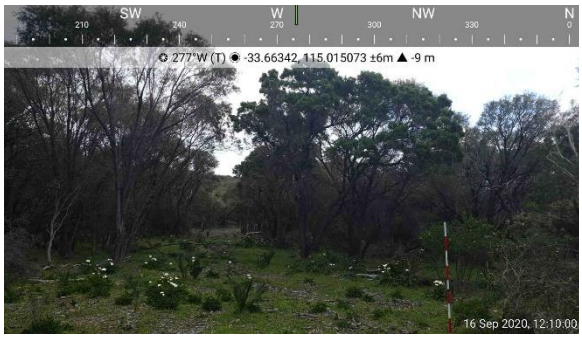


Photo ID: 7r

Photo ID: 7s

Plot number		Plot 7
Vegetation classification	**Pre-development**	Class A Forest
	Post-development	Class A Forest
Description / justification		Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 8a

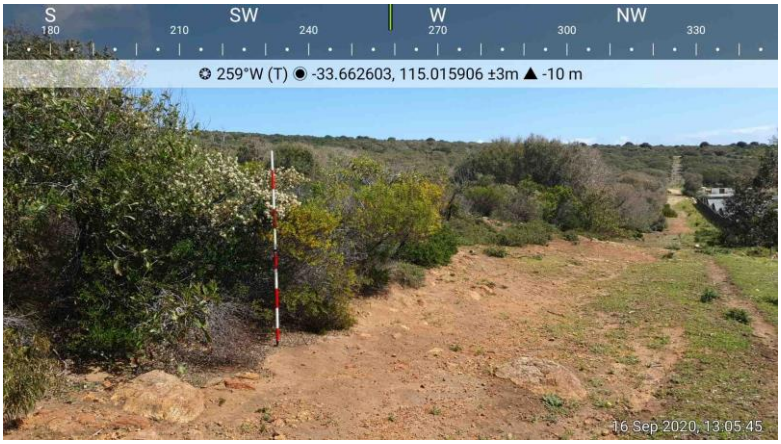


Photo ID: 8b

Plot number		Plot 8
Vegetation classification	**Pre-development**	Class C Shrubland
	Post-development	Class C Shrubland
Description / justification		Shrub vegetation less than 2 m high at maturity

Photo ID: 4a

Plot number		Plot 10
Vegetation classification	**Pre-development**	Class C Shrubland
	Post-development	Class C Shrubland
Description / justification		Shrub vegetation less than 2 m high at maturity

Photo ID: 13a

Photo ID: 13b

Plot number		Plot 13
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 14a

Plot number		Plot 14
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 15a

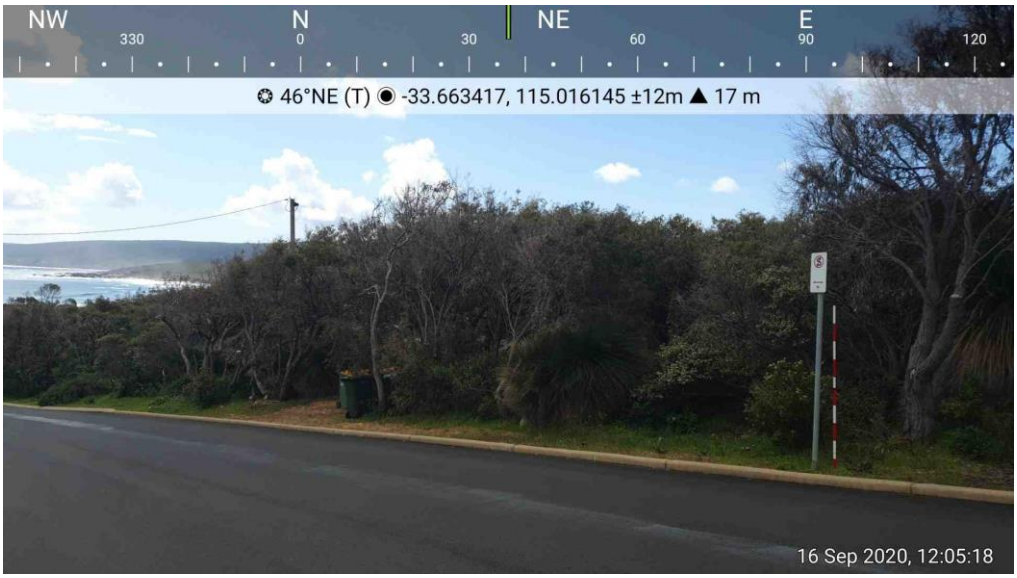


Photo ID: 15b

Plot number		Plot 15
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 20a

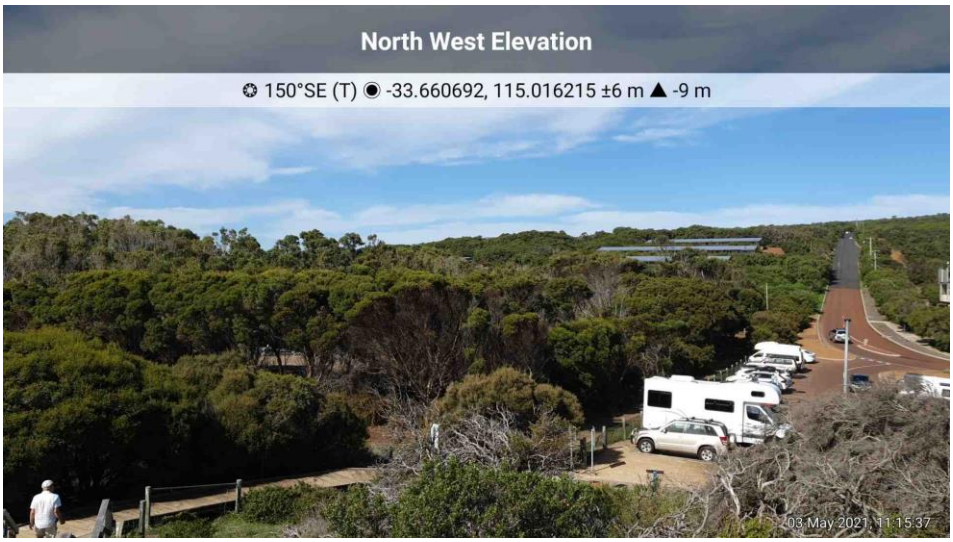


Photo ID: 20b

Plot number		Plot 13
Vegetation classification	**Pre-development**	Class D Scrub
	Post-development	Class D Scrub
Description / justification		Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 22a

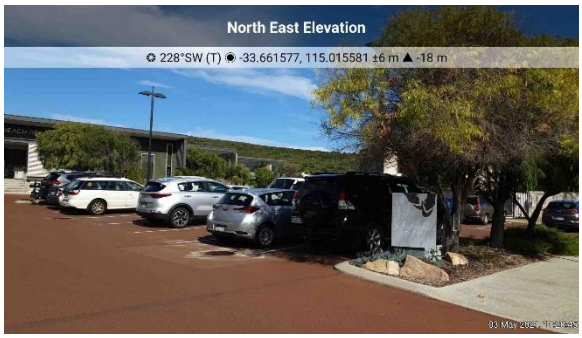


Photo ID: 22b

Photo ID: 22c

Photo ID: 22d

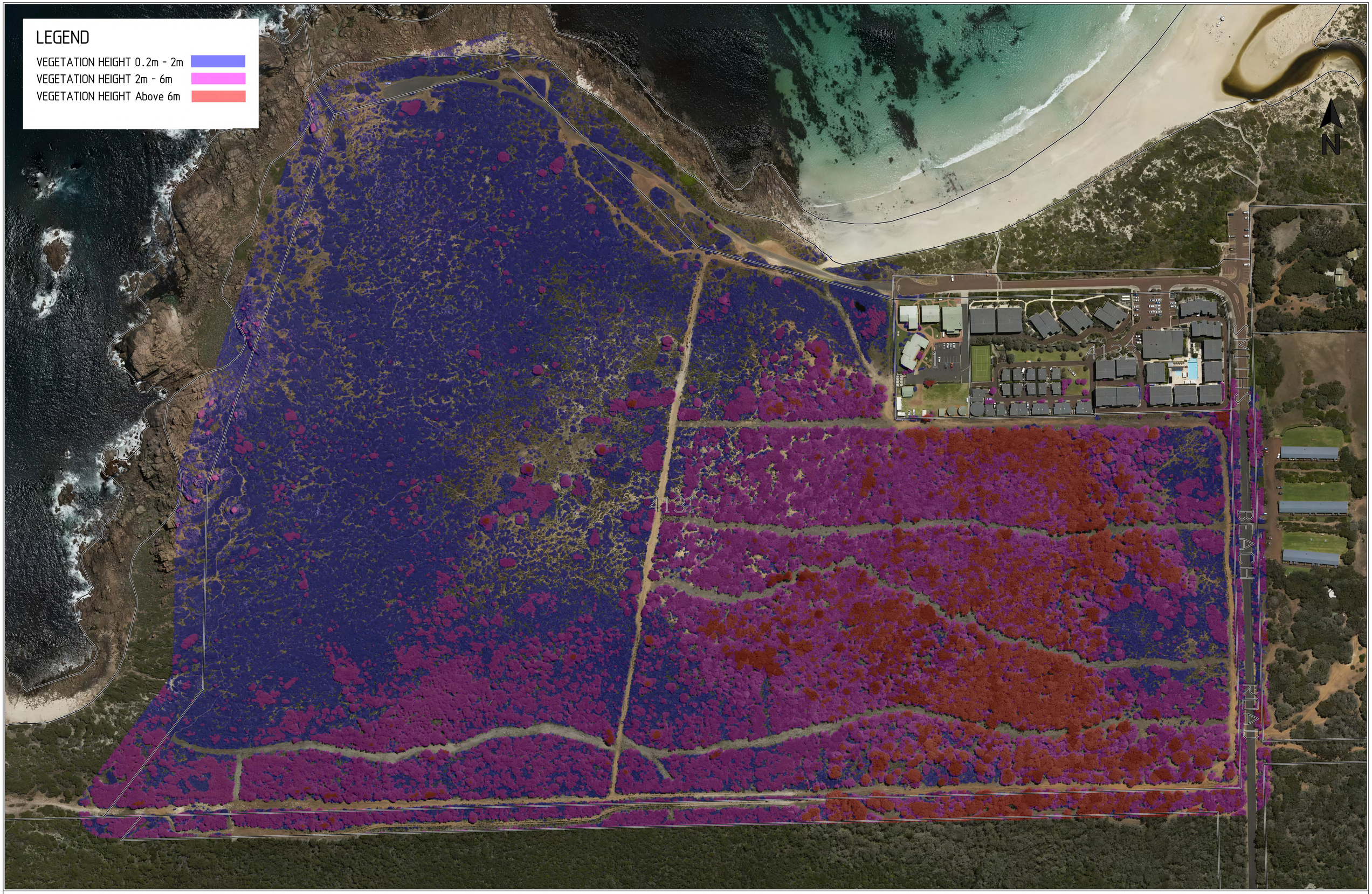
Photo ID: 22e

Photo ID: 22f

Photo ID: 22g

Plot number		Plot 22
Vegetation classification	**Pre-development**	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
	Post-development	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification		Low threat cultivated gardens and maintained lawns within surrounding properties and non-vegetated areas including roads, footpaths, driveways and building footprints

Appendix F LIDAR Survey Data



MNG
McMullen Nolan Group Pty Ltd
Level 1, 2 Sabre Crescent
Jandakot, W.A. 6164
PO Box 3526, Success
W.A. 6964, Australia
Offices in Broome, Bunbury, Kununurra, Newman, Onslow, Port Hedland
Tel: (08) 6436 1599
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info@mngsurvey.com.au
www.mngsurvey.com.au
ABN 90 009 363 311
ISO 9001 Quality Management
AS/NZS 4801:2001 Health and Safety Management
PS 565311 OSH 591267

*THIS PLAN IS COMPILED FROM A VARIETY OF DATA SOURCES. REFER TO THE METADATA PANEL FOR FURTHER INFORMATION. THE CONTENTS OF THIS PLAN ARE CURRENT AND CORRECT AS OF THE DATE DRAWN. ALL PERSONS WISHING TO UTILISE THIS DATA SHOULD SATISFY THEMSELVES OF THE CURRENCY AND ACCURACY OF THE DATA SUPPLIED FROM THIRD PARTIES.

SCALE 1 : 1 000 @ A0

20 0 80

ALL DISTANCES ARE IN METRES

ORTHOPHOTO PLAN - LOT 4131 SMITHS BEACH ROAD

VEGETATION CLASSIFICATION

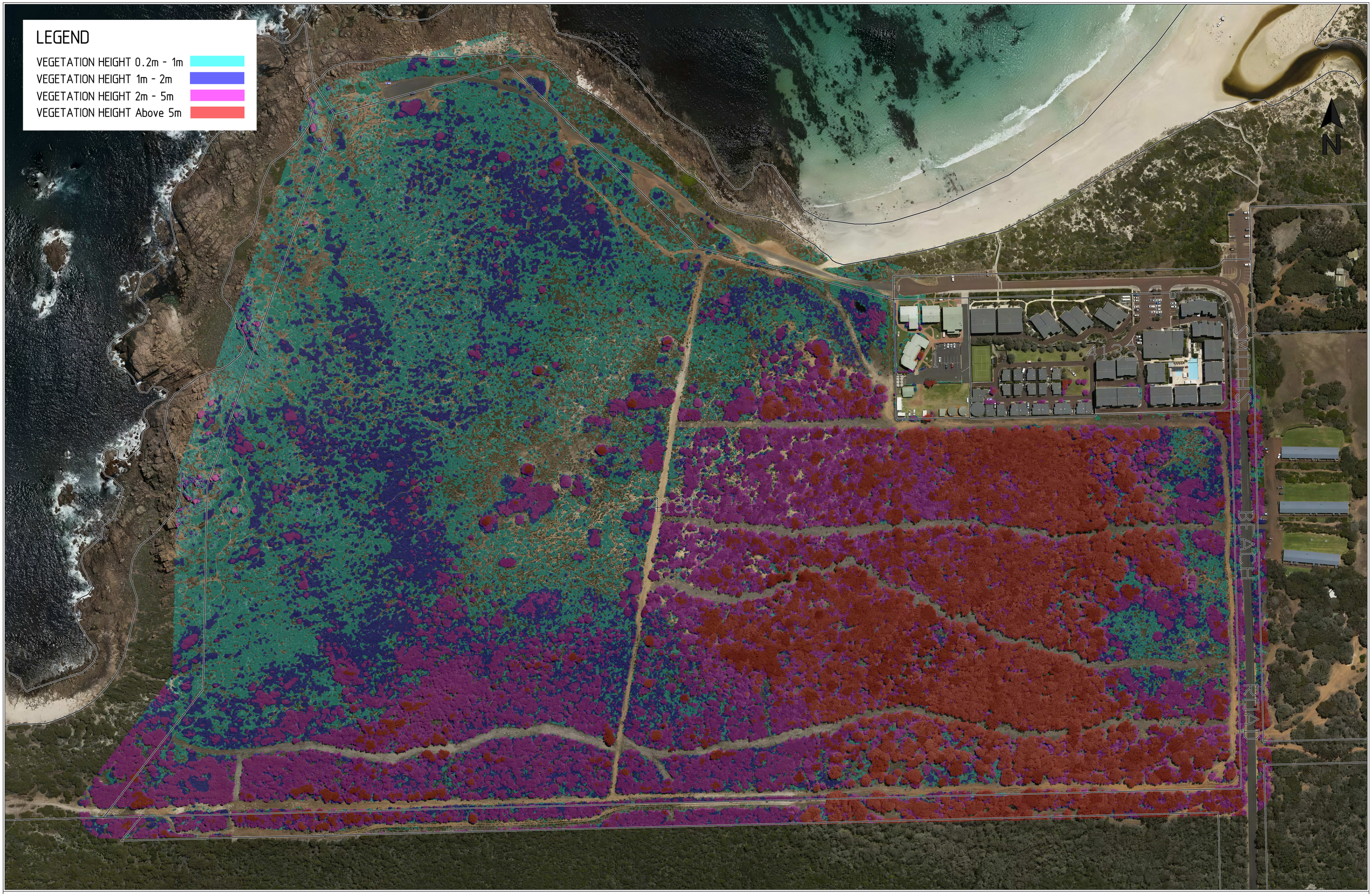
SOURCE DATA	SOURCE	DATE	SCALE	EXPECTED ACCURACY*
AERIAL PHOTOGRAPHY	MNG	NOV 2019	10cm	+/- 0.2m
CADASTRAL DATA	LANDGATE	NOV 2019	N/A	+/- 0.25m
TOPOGRAPHY	MNG	NOV 2019	N/A	+/- 0.05m

PROJECT MANAGER: NIGEL SIMPSON
IMAGERY FILE NAME: 100136om-005a
PROJECTION: MGA ZONE: 50
CONTOUR INTERVAL: N/A

DATE: 12/03/21 DRAWN: OVP CHECK: CJL

100136-OPM-008-A

Job Number | Type | Plan Number | Version



ORTHOPHOTO PLAN - LOT 4131 SMITHS BEACH ROAD

ASSET PROTECTION ZONE CLASSIFICATION

MNG.

McMullen Nolan Group Pty Ltd
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Jandakot, W. A. 6164
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ABN: 90 009 363 311

ISO 9001 Quality Management
AS/NZS 4801:2001 Occupational Health and Safety Management

PS 565311 OSH 591267

*THIS PLAN IS COMPILED FROM A VARIETY OF DATA SOURCES. REFER TO THE METADATA PANEL FOR FURTHER INFORMATION. THE CONTENTS OF THIS PLAN ARE CURRENT AND CORRECT AS OF THE DATE DRAWN. ALL PERSONS WISHING TO UTILISE THIS DATA SHOULD SATISFY THEMSELVES OF THE CURRENCY AND ACCURACY OF THE DATA SUPPLIED FROM THIRD PARTIES.

SCALE 1 : 1 000 @ A0

20 0 80

ALL DISTANCES ARE IN METRES

SOURCE DATA	SOURCE	DATE	SCALE	EXPECTED ACCURACY*
AERIAL PHOTOGRAPHY	MNG	NOV 2019	10cm	+/- 0.2m
CADASTRAL DATA	LANDGATE	NOV 2019	N/A	+/- 0.25m
TOPOGRAPHY	MNG	NOV 2019	N/A	+/- 0.05m

PROJECT MANAGER: NIGEL SIMPSON
IMAGERY FILE NAME: 100136om-005a
PROJECTION: MGA ZONE: 50
CONTOUR INTERVAL: N/A

DATE: 12/03/21 DRAWN: OVP CHECK: CJL

100136 - OPM - 009 - A
Job Number | Type | Plan Number | Version

Appendix G Mapbooks

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Road reserve
- Overall APZ extent

APZs (width in m)

- 10
- 13
- 15
- 25
- 25.8
- 27
- 31.9
- APZ (Modified) - Hotel/Suites
- APZ (Modified) - Holiday Homes
- Additional APZ
- Low Threat Vegetation – Park Spine
- Low Threat Vegetation – Campground
- Revegetation

Vegetation classification

- Class C Shrubland
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Tourism and holiday home building extent
- Topographic contours (mAHD)
- Roads (MRWA)

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

POST DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

Appendix: G 1 - Page 1 of 4

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG01_A3_MB_PostDevVegClass.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Road reserve
- Overall APZ extent

APZs (width in m)

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- 13
- 15
- 25
- 25.8
- 27
- 31.9
- APZ (Modified) - Hotel/Suites
- APZ (Modified) - Holiday Homes
- Additional APZ
- Low Threat Vegetation – Park Spine
- Low Threat Vegetation – Campground
- Revegetation

Vegetation classification

- Class A Forest
- Class C Shrubland
- Class D Scrub
- Class G Grassland
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Tourism and holiday home building extent
- Topographic contours (mAHD)
- Roads (MRWA)

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

POST DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

Appendix: G 1 - Page 2 of 4

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG01_A3_MB_PostDevVegClass.mxd
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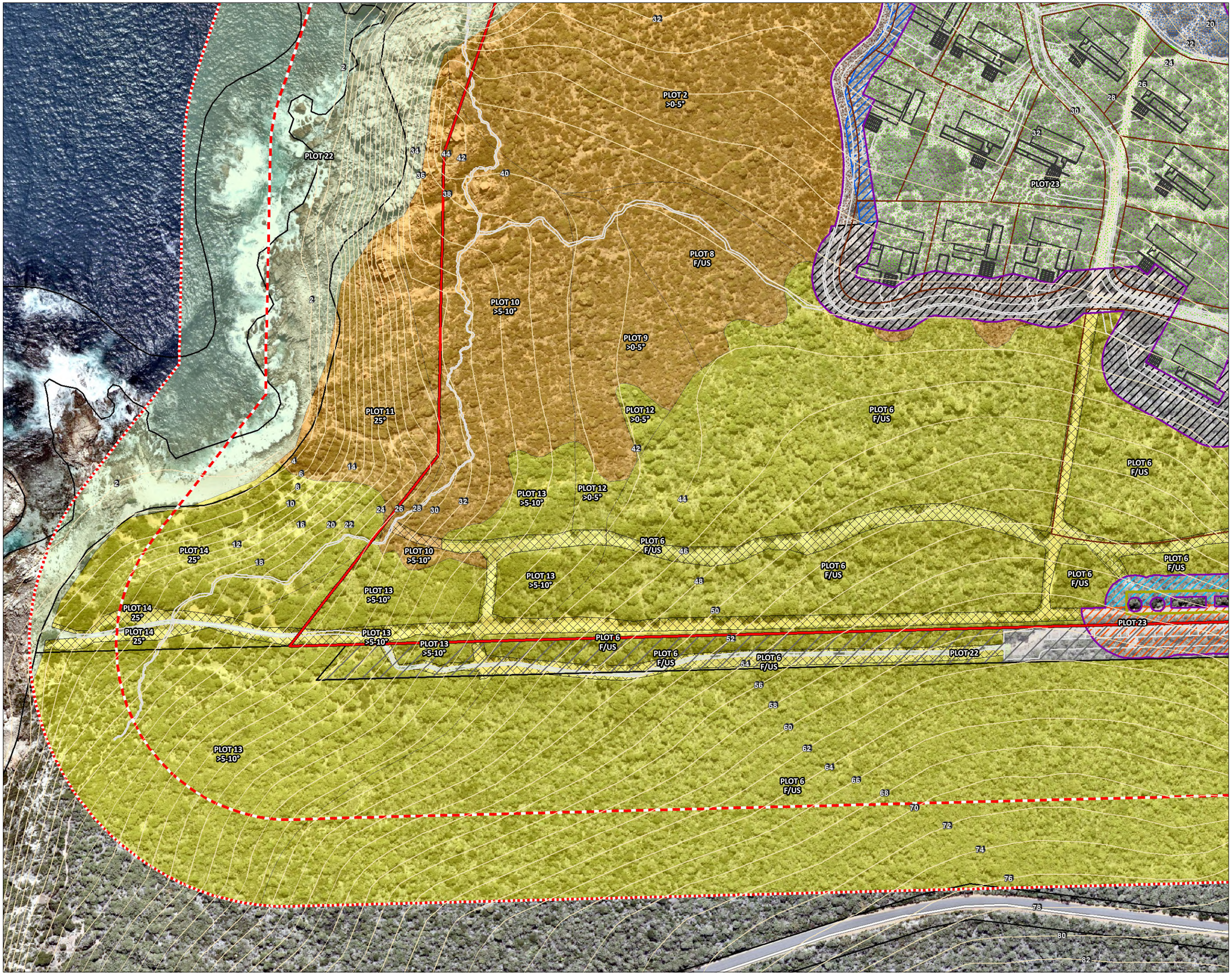

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Road reserve
- Overall APZ extent

APZs (width in m)

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- 27
- 31.9
- APZ (Modified) - Hotel/Suites
- APZ (Modified) - Holiday Homes
- Additional APZ
- Low Threat Vegetation – Park Spine
- Low Threat Vegetation – Campground
- Revegetation

Vegetation classification

- Class C Shrubland
- Class D Scrub
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Tourism and holiday home building extent
- Topographic contours (mAHD)
- Roads (MRWA)

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

POST DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG01_A3_MB_PostDevVegClass.mxd
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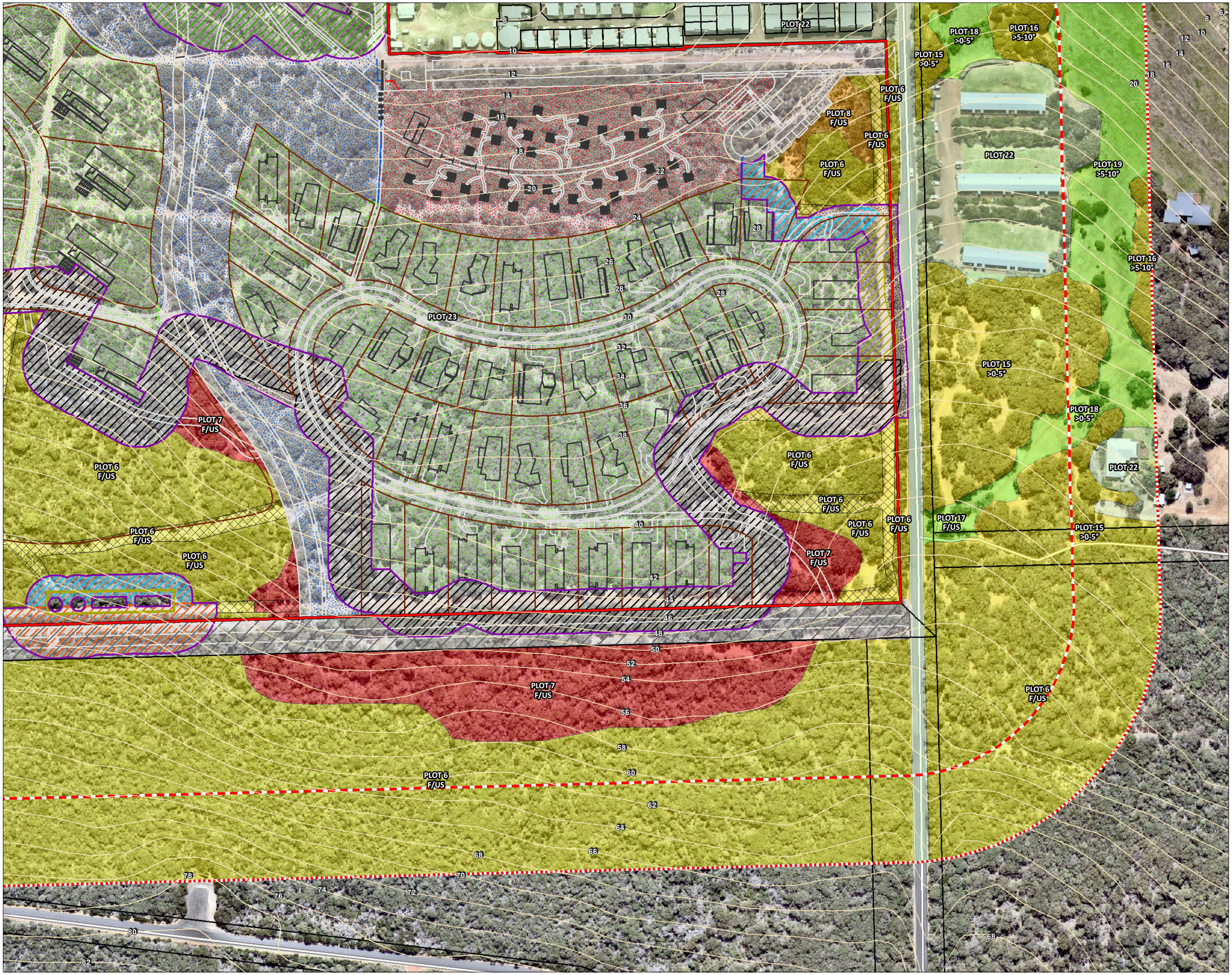

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Road reserve
- Overall APZ extent

APZs (width in m)

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- 15
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- 25.8
- 27
- 31.9
- APZ (Modified) - Hotel/Suites
- APZ (Modified) - Holiday Homes
- Additional APZ
- Low Threat Vegetation – Park Spine
- Low Threat Vegetation – Campground
- Revegetation

Vegetation classification

- Class A Forest
- Class C Shrubland
- Class D Scrub
- Class G Grassland
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement
- Indicative WTP/WWTP infrastructure
- WTP/WWTP Fence
- Tourism and holiday home building extent
- Topographic contours (mAHD)
- Roads (MRWA)

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

POST DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

Appendix: G 1 - Page 4 of 4

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG01_A3_MB_PostDevVegClass.mxd
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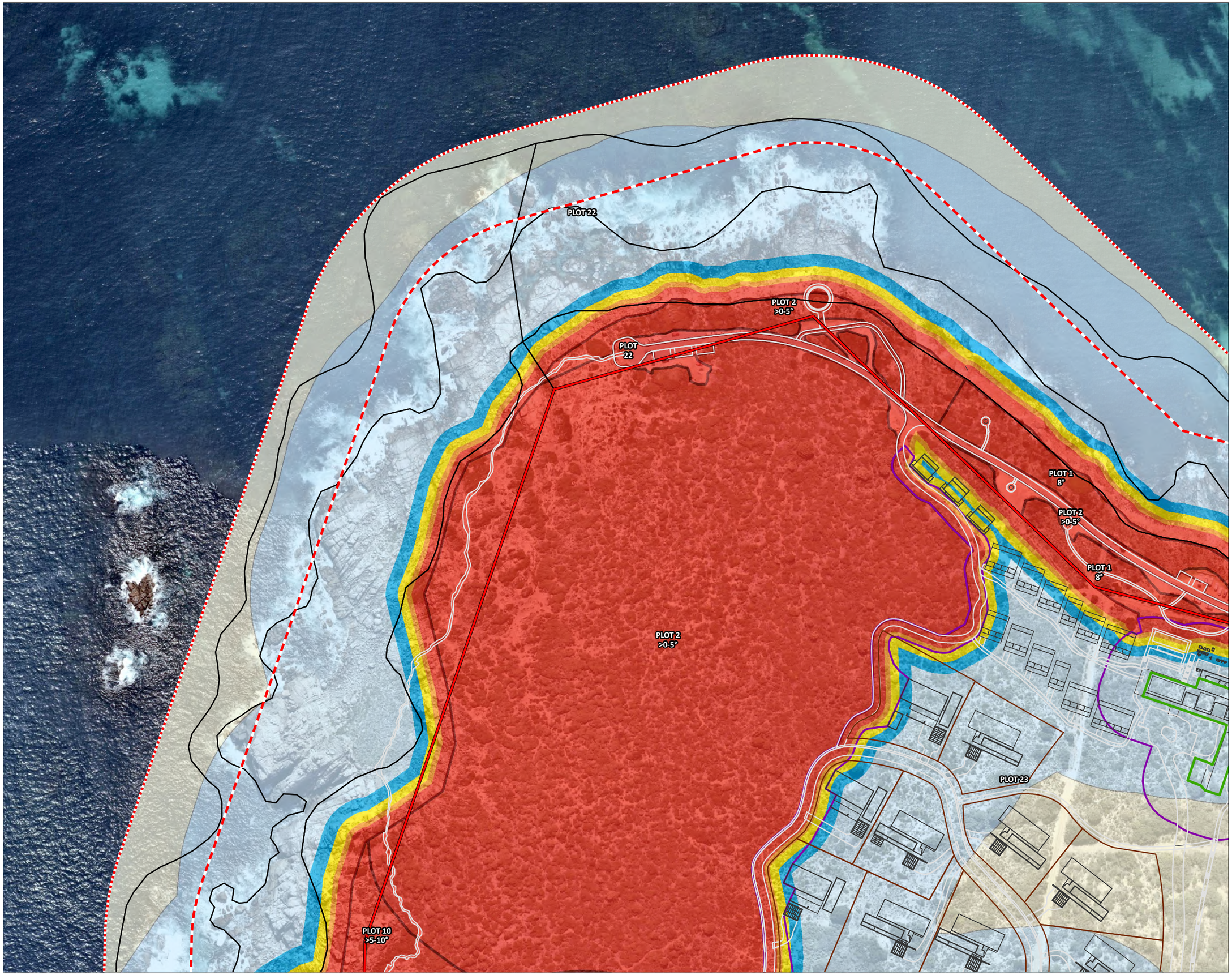

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Overall APZ extent
- Classified vegetation

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

BAL CONTOUR MAP

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG02_A3_MB_PostDevBALs.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

PLOT 2
>0-5°
PLOT 1
8°
PLOT 1
8°
PLOT 3
15°
PLOT 4
F/US
PLOT 5
F/US
PLOT 1
8°
PLOT 22
PLOT 20
>0-5°
PLOT 20
>0-5°
PLOT 18
>0-5°
PLOT 20
>0-5°
PLOT 21
>5-10°
PLOT 23
PLOT 15
>0-5°
PLOT 18
>0-5°
PLOT 16
>5-10°
PLOT 19
>5-10°
PLOT 8
F/US
PLOT 6
F/US
PLOT 6
F/US
PLOT 22

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Refuge
- Overall APZ extent
- Classified vegetation

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low
- Roads (MRWA)
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

BAL CONTOUR MAP

Appendix: G 2 - Page 2 of 4

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG02_A3_MB_PostDevBALs.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Road reserve
- Overall APZ extent
- Classified vegetation

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low
- Indicative water infrastructure
- WTP Extent
- Roads (MRWA)
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement

strategen JBS&G

Job No: 59550

Client: Smiths 2014 Pty Ltd

Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

BAL CONTOUR MAP

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG02_A3_MB_PostDevBALs.mxd
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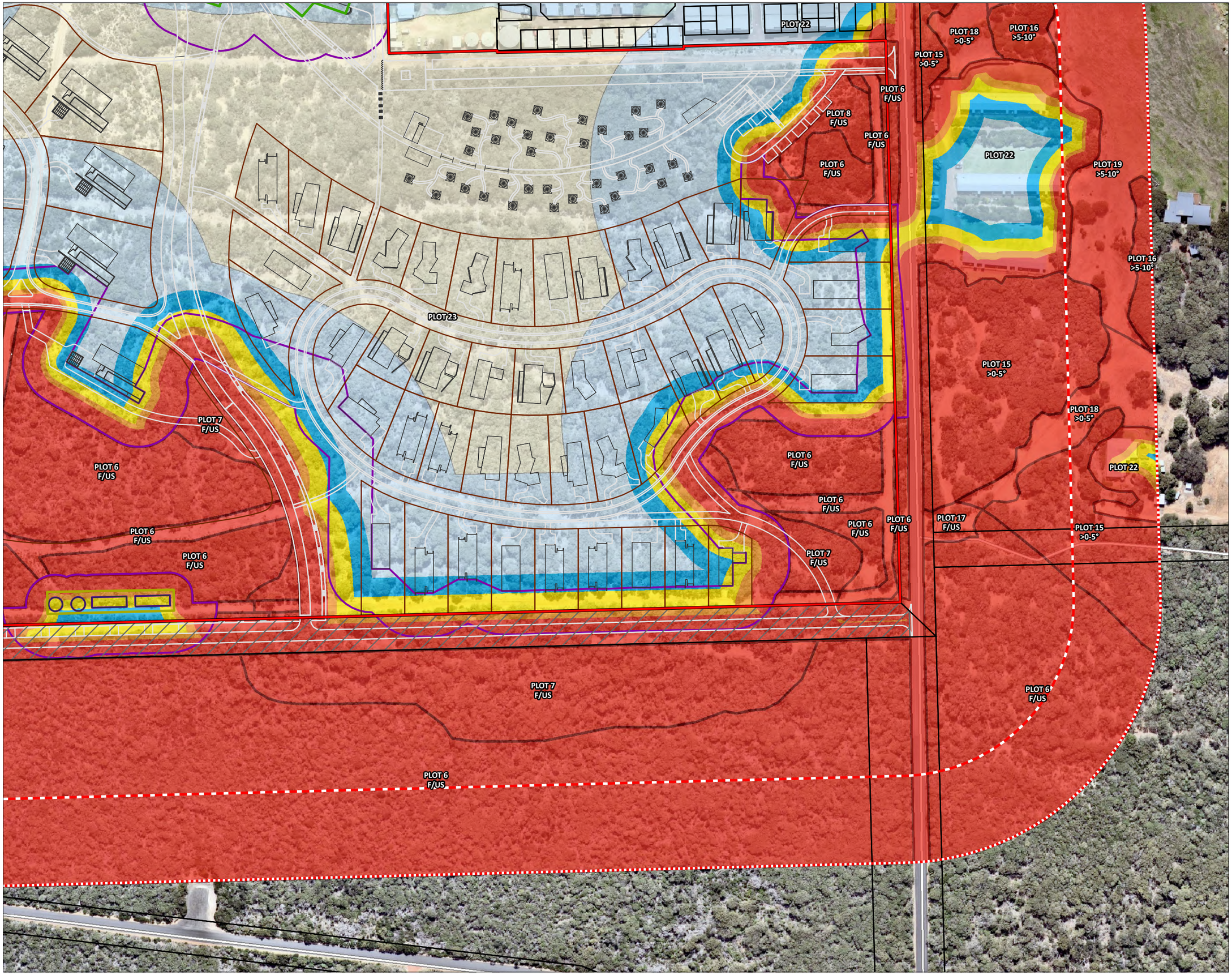


Legend

- Project area (Lot 4131)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Road reserve
- Refuge
- Overall APZ extent
- Classified vegetation

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low
- Indicative water infrastructure
- WTP Extent
- Roads (MRWA)
- Proposed buildings
- Proposed lot boundaries
- Proposed roads/tracks/pavement

strategen JBS&G

Job No: 59550	
Client: Smiths 2014 Pty Ltd	
Version: A	Date: 12-Nov-2021
Drawn By: jcrute	Checked By: CT

Scale 1:2,000 at A3

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 4131 Smiths Beach Road Yallingup WA 6282

BAL CONTOUR MAP

Appendix: G 2 - Page 4 of 4

File Name: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_AppG02_A3_MB_PostDevBALs.mxd
Image Reference: www.nearmap.com© - Imagery Date: 20. March 2021.

Appendix H Method 2 calculation (Plots 1, 3, 11 and 14)

Calculated September 9, 2021, 10:46 pm (MDc v.4.9)

Smiths Beach - Plot 1

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.97 km/h
Vegetation classification	Shrubland	Flame length	9.970000000000001 m
Understorey fuel load	15 t/ha	Flame angle	53 °, 62 °, 68 °, 72 °, 74 ° & 81 °
Total fuel load	15 t/ha	Elevation of receiver	3.98 m, 4.4 m, 4.62 m, 4.74 m, 4.79 m & 4.92 m
Vegetation height	m	Fire intensity	38,568 kW/m
Effective slope	8 °	Transmissivity	0.881, 0.868, 0.85, 0.831, 0.821 & 0.762
Site slope	0 °	Viewfactor	0.5898, 0.4387, 0.2927, 0.1969, 0.16 & 0.043
Flame width	45 m	Minimum distance to < 40 kW/m²	8.300000000000001 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	11 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	15.7 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	21.5 m
		Minimum distance to < 10 kW/m²	24.9 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Calculated September 9, 2021, 10:48 pm (MDc v.4.9)

Smiths Beach - Plot 3

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	8.06 km/h
Vegetation classification	Shrubland	Flame length	12.45 m
Understorey fuel load	15 t/ha	Flame angle	47 °, 53 °, 59 °, 63 °, 65 ° & 76 °
Total fuel load	15 t/ha	Elevation of receiver	4.55 m, 4.97 m, 5.33 m, 5.55 m, 5.64 m & 6.04 m
Vegetation height	m	Fire intensity	62,517 kW/m
Effective slope	15 °	Transmissivity	0.88, 0.867, 0.851, 0.836, 0.827 & 0.773
Site slope	0 °	Viewfactor	0.5959, 0.4354, 0.2916, 0.1955, 0.1581 & 0.0423
Flame width	25 m	Minimum distance to < 40 kW/m²	9.9 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	12.6 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	16.5 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	21.1 m
		Minimum distance to < 10 kW/m²	23.8 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Calculated September 9, 2021, 10:49 pm (MDc v.4.9)

Smiths Beach - Plot 11

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	16.08 km/h
Vegetation classification	Shrubland	Flame length	17.11 m
Understorey fuel load	15 t/ha	Flame angle	52 °, 62 °, 70 °, 74 °, 75 ° & 82 °
Total fuel load	15 t/ha	Elevation of receiver	6.74 m, 7.55 m, 8.039999999999999 m, 8.220000000000001 m, 8.26 m & 8.470000000000001 m
Vegetation height	m	Fire intensity	124,641 kW/m
Effective slope	25 °	Transmissivity	0.868, 0.847, 0.819, 0.793, 0.78 & 0.721
Site slope	0 °	Viewfactor	0.605, 0.45, 0.3045, 0.2068, 0.1679 & 0.0454
Flame width	100 m	Minimum distance to < 40 kW/m²	14 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	18.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	27 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	37.5 m
		Minimum distance to < 10 kW/m²	44.1 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Calculated September 9, 2021, 10:50 pm (MDc v.4.9)

Smiths Beach - Plot 14

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	23.38 km/h
Vegetation classification	Scrub	Flame length	25.71 m
Understorey fuel load	25 t/ha	Flame angle	51 °, 60 °, 66 °, 70 °, 72 ° & 80 °
Total fuel load	25 t/ha	Elevation of receiver	9.99 m, 11.13 m, 11.74 m, 12.08 m, 12.22 m & 12.66 m
Vegetation height	m	Fire intensity	302,043 kW/m
Effective slope	25 °	Transmissivity	0.854, 0.828, 0.799, 0.773, 0.761 & 0.706
Site slope	0 °	Viewfactor	0.613, 0.4591, 0.312, 0.2122, 0.1725 & 0.0464
Flame width	100 m	Minimum distance to < 40 kW/m²	20.8 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	27.2 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	37.8 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	50.6 m
		Minimum distance to < 10 kW/m²	58.4 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Appendix I Method 2 calculation (Community Bushfire Refuge)

Calculated July 2, 2021, 4:33 pm (MDc v.4.9)

Plot 1 - Class C FW25m

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.97 km/h
Vegetation classification	Shrubland	Flame length	9.970000000000001 m
Understorey fuel load	15 t/ha	Flame angle	58 °, 62 °, 66 °, 69 °, 71 ° & 79 °
Total fuel load	15 t/ha	Elevation of receiver	4.23 m, 4.4 m, 4.55 m, 4.65 m, 4.71 m & 4.89 m
Vegetation height	m	Fire intensity	38,568 kW/m
Effective slope	8 °	Transmissivity	0.876, 0.865, 0.85, 0.836, 0.827 & 0.776
Site slope	0 °	Viewfactor	0.407, 0.2975, 0.1994, 0.1337, 0.1074 & 0.0287
Flame width	25 m	Minimum distance to < 40 kW/m²	11 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	13.8 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	17.9 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	22.8 m
		Minimum distance to < 10 kW/m²	25.8 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Calculated June 17, 2021, 6:24 pm (MDc v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.97 km/h
Vegetation classification	Shrubland	Flame length	9.970000000000001 m
Understorey fuel load	15 t/ha	Flame angle	63 °, 68 °, 72 °, 75 °, 76 ° & 82 °
Total fuel load	15 t/ha	Elevation of receiver	4.44 m, 4.62 m, 4.74 m, 4.81 m, 4.83 m & 4.93 m
Vegetation height	m	Fire intensity	38,568 kW/m
Effective slope	8 °	Transmissivity	0.872, 0.858, 0.84, 0.822, 0.8120000000000001 & 0.758
Site slope	0 °	Viewfactor	0.4102, 0.3019, 0.202, 0.1359, 0.1097 & 0.0294
Flame width	45 m	Minimum distance to < 40 kW/m²	11.7 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	15.3 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	21.1 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	27.8 m
		Minimum distance to < 10 kW/m²	31.9 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Appendix J Bushfire Risk Assessment

The Tourism Land Use Position Statement recommends that any bushfire risk assessment is undertaken in accordance with the guidance detailed in that document, and needs to outline what the hazard and risks to the proposed development are, and to demonstrate that sufficient measures have been employed to appropriately reduce the residual risk.

Risk Assessment Methodology and Guidance

In order to develop a risk assessment methodology that is appropriate for assessing bushfire impact on developments of this scale, the following resources have been used to provide guidance:

- **Tourism Land Use Position Statement and Draft Risk Assessment Approach**
  - recommends the following should be included in a risk assessment:
    - *consideration of the broader landscape and the risk of a landscape scale fire*
    - *determines the likelihood or probability of a landscape scale bushfire event (based on a quantitative analysis of historical data)*
    - *determines the consequences of a bushfire event, such as loss of life and/ or loss of infrastructure (based on historic data and/or modelling)*
    - *evaluates the risk*
    - *proposes risk treatment measures to reduce the risk to an acceptable level (such as provision of access routes, on-site shelter, early evacuation and APZs), and*
    - *identifies an appropriate process for ongoing monitoring and review of risk management for the life of the development*
- **AS ISO 31000 and NERAG**
  - Tourism Land Use Position Statement refers to these documents
  - *AS ISO 31000:2018 Risk Management–Principles and Guidelines* (SA 2018) provides an internationally recognised approach to risk management,
  - The National Emergency Risk Assessment Guidelines (NERAG 2020) has been developed to deliver a nationally consistent approach to assessing emergency risks by tailoring AS ISO 31000 concepts to emergency risk management.
    - While NERAG aims to be scalable for all development sizes, it is not readily adoptable for smaller developments of this nature.
- **Draft Risk Assessment Approach for Tourism Developments**
  - Developed by Department of Planning, Lands and Heritage (DPLH) to aid the application of AS ISO 31000 and NERAG
  - Proposes the use of semi-quantitative methodology with a scoring methodology to propose and assess acceptability of treatment options and residual risk.
- **Coastal Hazard Risk Management and Adaptation Planning Guidelines (for SPP2.6)**
  - SPP 2.6 Coastal Planning Policy (2013), requires a risk management approach for this natural hazard, and provides a framework for risk management planning for risks arising from coastal hazards.

- In 2020, DPLH released further guidance on how to conduct the coastal hazard risk assessment in the form the Coastal Hazard Risk Management and Adaptation Planning (CHRMAP) Guidelines.

Bushfire risk assessment process

Based on the above guidance, a risk assessment process has been developed that incorporates elements of NERAG, the Tourism Land Use Position Statement and various other guidance documents, to enable a bushfire specific assessment of risk for developments of this scale. This is summarised in Table 22 below. The risk analysis tools and acceptance criteria for the risk assessment are detailed in later sections, which enables the analysis of risk to determine if it is considered acceptable, tolerable or intolerable.

Table 22: Bushfire Risk Assessment Process

Risk Assessment Stage	Stage Methodology
Establish Context	• Define the risk assessment approach, methodology and risk criteria (levels of tolerability) • Establishing context is critical to risk assessment process as it is the base upon which the risk assessment is reviewed • Ideally conducted in collaboration with relevant stakeholders (where possible) • Identify broad objectives of the risk assessment • Identify relevant stakeholders • Identify site characteristics e.g. broader landscape considerations, local vegetation, buildings and other assets, local population (occupants, residents, visitors, staff) • Identify existing risk treatments
Risk Identification	• Identify whether there is potential for bushfire impact on people (including during evacuation) and/or proposed assets • Identify assets to be protected, especially those for life safety, high-risk or critical infrastructure • Review potential bushfire scenarios to identify the design bushfires to be assessed, including the nature of the bushfire hazard (vegetation, topography, fire weather including wind, fire history, access/egress routes, ember impact and smoke effects) • Undertake any required hazard mapping • Formulate a high-level understanding of the inherent risk from the bushfire hazard to the assets, and vice versa.
Risk Analysis	• Analysis of possible consequences to people and assets, and the likelihood that those consequences may occur, to calculate the inherent risk level, including any existing controls that modify that risk • This information is critical to determine the comparative levels of risk, the development of treatment options and to help decide priorities for risk treatment. • Following analysis of inherent risk to people and assets, use the identified controls to calculate the residual (treated) risk level based on modified consequence and likelihood
Risk Evaluation	• Compare the calculated inherent risk ratings with the risk criteria, to enable the identification of those risks that require treatment • Following development of the proposed controls, demonstrate that the residual (treated) risk is acceptable and use the outcome of the above risk evaluation to prioritise risk treatments in order to address the highest priority risks and ensure the impact of resources is optimised
Risk Treatment	• Identify and select potential risk controls that could be employed to minimise risk levels to people and assets • Evaluate the selected risk controls to determine whether they reduce the risk levels to acceptable levels in accordance with the risk criteria. This process is iterative and may require various review of proposed controls to find a treatment strategy that ensures risk is managed to tolerable levels • Summarise the selected risk controls, and demonstrate the suitability and effectiveness of these risk treatment options
Implementation Plan, Monitoring and Review	• Provide a summary of the selected risk controls to be incorporated into the development, including any technical specifications • Summarise any ongoing monitoring requirements to ensure the proposed risk controls remain functional and otherwise fit-for-purpose for the life of the development

Risk Assessment Stage	Stage Methodology
	• Propose any ongoing review requirements relating to the risk levels of the development, the continued appropriateness of the risk controls, the nature of the bushfire hazard and any changes to the development, assets or people

Establish the Context

Establishing context is important to developing an understanding of the external and internal parameters to be considered when managing risk and setting the scope and criteria for the risk management process.

Risk Assessment Objectives

The objectives of the BMP, and this bushfire risk assessment, are detailed in Section 3 of this BMP and include:

- Demonstrating compliance with the relevant parts of SPP 3.7, the Guidelines and the Tourism Land Use Position Statement, including the application of Performance Principle-Based Solutions
- Demonstrating that the proposed management measures appropriately reduce residual risk with a focus on prioritising life safety, and the development is considered resilient to bushfire impact while also addressing the legacy single road access to the site and the retention of native vegetation to preserve environmental and visual amenity values

Stakeholders

Table 23 below identifies some of the stakeholders associated with this project.

Table 23: Stakeholders

Category	Stakeholder
Proponent	Smith Beach 2014
Local Government	City of Busselton
Relevant State Government Agencies	Western Australian Planning Commission (WAPC) Department of Planning, Lands and Heritage (DPLH)
Fire Brigade	Department of Fire and Emergency Services (DFES)
Relevant Land Management Agencies	Department of Biodiversity, Conservation and Attractions (DBCA)
Bushfire Consultant	Strategen – JBS&G
Services Consultant	Stantec
Traffic Consultant	Cardno
Environmental Consultant	Strategen – JBS&G
Landscaping Consultant	McGregor Coxall

Proposed Development and Site Characteristics

Descriptions of the existing site characteristics and proposed development have been provided in detail in previous sections of this BMP including:

- **Section 2**
  - Details the existing characteristics of the local region and the project area including existing land uses, vehicular access network, local population/demographics and local firefighting resources.
  - Outlines the elements included in the proposed development including land uses, buildings, services, access arrangements occupant load and characteristics and the proposed community title scheme and precinct management

- **Section 4**
    - Outlines the existing environmental constraints within and adjacent to the project area
    - Details the vegetation modification (clearing, revegetation and landscaping) and ongoing management proposed as part of the proposal

Existing Risk Controls

In order to undertake the bushfire risk assessment, it is important to understand the existing risk controls already in place to mitigate bushfire impact on the development as detailed below:

- Planning, Development and Building Controls and Guidance (further detail in Appendix B)
    - State Planning Policy 6.1: Leeuwin-Naturaliste Ridge
    - Leeuwin-Naturaliste Sub-regional Strategy
    - City of Busselton Local Planning Scheme No.21
    - State Planning Policy 3.7: Planning in bushfire prone areas
    - Guidelines for Planning in Bushfire Prone Areas (the Guidelines) and associated Position Statement
    - National Construction Code
    - AS 3959-2018 Construction of buildings in bushfire prone areas
- Bushfire and Emergency Management (further information below)
    - State Emergency Management Policy, Plan, Procedure and Guidelines
    - State Hazard Plan Fire
    - City of Busselton Bushfire Risk Management Plan
    - City of Busselton Local Emergency Management Arrangement (LEMA)
    - City of Busselton Local Evacuation Plan
    - City of Busselton Firebreak Notice
    - Capes Zone Response
- Emergency forecasting and alert systems such as
    - the forecast Fire Danger Rating and Total Fire Ban systems,
    - the emergency warning system (Advice, Watch and Act, Emergency Warning and All-Clear) which is utilised for a variety of emergencies including bushfires.
- Well maintained public road network
- Public education initiatives to promote greater understanding of bushfire preparedness and response.
- Arson prevention programs

Emergency Management Arrangements

The State Emergency Management Committee (SEMC), under powers conferred by the *Emergency Management Act 2005* (EM Act), prepares the State Emergency Management (EM) Policy, supported by a suite of documents (e.g. EM Plan, State Hazard Plan – Fire, various

Guidelines etc), which outline the strategic framework for emergency management and documents the all-hazards arrangements. In accordance with the EM Act, a public authority that is given a role and responsibilities under a State EM Policy, it is to comply with the EM Policy.

Amongst other things, the State EM Policy, Plans, and other supporting documents, are used as the basis for the coordination and management of a multi-agency response to an emergency including:

- The roles and responsibilities of State and Local Government agencies
- Control and coordination during incidents and emergencies
- Emergency public information
- Community evacuation planning including the designation of evacuation centres
- The management of traffic during an emergency response
- The provision of support services, including health and welfare services.

The State Hazard Plan for Fire, which supports the State EM Plan, details emergency management arrangements for bushfire emergencies within WA, including identifying emergency management arrangements between stakeholders, to ensure an adequate and effective response to and recovery from fire emergencies.

An important aspect of emergency management during a bushfire is community evacuation and traffic management. The Controlling Agency/Hazard Management Agency (HMA) are responsible for the decision to evacuate the community during an emergency, which includes assessing the bushfire threat and other considerations, and making an informed decision regarding the success of evacuation.

City of Busselton

In accordance with EM Act, the City of Busselton established a Local Emergency Management Committee (LEMC) to oversee, plan and test the Local Emergency Management Arrangements (LEMA), which are established to address all emergencies, but typically contains special considerations for various hazards such as bushfire during the bushfire season.

The LEMC has developed the LEMA which defines the following:

- the City's policies strategies and priorities for emergency management
- the roles and responsibilities of public authorities and other persons including:
    - Controlling Agency
        - the agency nominated to control the response activities to a specified type of emergency
    - Hazard Management Agency (HMA)
        - A public authority or other person who is responsible for emergency management, for the prescribed hazard (is often the same as Controlling Agency when incident becomes an emergency).
    - Incident Controller (IC)
        - person/s responsible for the overall control of an incident, including leading the IMT, within a defined incident area;
        - in consultation with all relevant agencies, ensures effective strategies for evacuation are implemented (including traffic management) and the

accuracy of the emergency public information including approving of release and terminating its broadcast

- the provisions about the coordination of emergency operations and activities relating to emergency management
- relevant matters about emergency management in the City as prescribed by *Emergency Management Regulations 2006*

The LEMA also provides guidance on a variety of other emergency management elements including the following:

- Incident Levels
  - To ensure all agencies involved have a common understanding of the potential and/or actual severity of the incident incidents (Level 1, Level 2, Level 3 incidents).
- Public Information
  - Communication in an emergency will be developed that is specific to the situation and will inform the communication response.
  - Internal and external communication will be informed by the overall response strategy for the emergency, is to be in alignment with advice from the HMA or Controlling Agency.
- Evacuation
  - Evacuation of people from an area affected by an emergency, is one of the strategies for protective action that may be employed to protect lives.
  - The overall responsibility for a community evacuation rests with the Controlling Agency, which includes the risk assessment and decision making that evacuating a community represents the best option available for community safety.
  - Further information is provided in the City of Busselton Local Evacuation Plan
- Welfare Centres
  - The City has four (4) primary and two (2) secondary welfare centres.
  - Welfare activities are the responsibility of the Department of Communities (DC), who will coordinate resources and undertake functions, together with partnering agencies.
- Register, Find, Reunite
  - When people are evacuated or displaced, one of the responsibilities of the DC is to record who has been displaced onto a State or National Register, allowing relatives or friends to locate each other.
- Recovery
  - Required to enable and support community sustainability during and after a disaster.
  - This is addressed in the City of Busselton Emergency Management Recovery Plan

The City of Busselton is also part of the Cape Zone Response (with DFES, DPAW and SAMR), which is a multi-agency arrangement to minimise significant loss of life and damage to property from bushfires, by initiating automatic, rapid and coordinated response upon notification. This provides quick fire-ground intelligence, upon which to base emergency management decision-making, ideally in the early stages of the bushfire.

Risk Identification

Potential for Bushfire Impact

As outlined in Section 1.3, as the project area is wholly located within a designated bushfire prone area, it triggers assessment for bushfire impact under SPP 3.7 and the Guidelines. In addition to this policy position, the presence of significant tracts of unmanaged vegetation within 100 m of the southern interface of the project area, as well as along the main egress routes, means there is potential for bushfire impact on the proposed development, or evacuating occupants and attending fire appliances, during a bushfire event. Further review of the assets and infrastructure that might be impacted by bushfire and a detailed summary of the bushfire hazard and design bushfire scenarios, provided later in the assessment.

Asset Identification

The proposed development, including the relevant assets, have been outlined in Section 2.2. The primary asset to be preserved is the lives of all occupants within the development including staff, home owners, guests and visitors. The following building assets and infrastructure that require protection from bushfire impact, which in turn is instrumental in protection people, are as follows:

- Community hub building
- Hotel public area building
- Spa building
- Gym building
- Hotel suite buildings
- Hotel Eco-suite buildings
- Hotel below-ground carpark
- Holiday homes and garages and/or carports
- Water Treatment Plant and Wastewater Treatment Plant building/shed/enclosures and balance tanks
- Onsite power, water, communications, gas and sewer infrastructure

The onsite community bushfire refuge building is to be established using the communal hub, the hotel public area, spa and gym buildings, to provide sufficient space to accommodate the peak occupant load from this development and the surrounding land uses. The protection of the refuge is critical to ensuring the safety of all occupants.

The protection of the campground facilities, including the tent platforms, communal hub building, and amenity block and maintenance building is not considered critical from a life safety perspective, as occupants in the campground will be relocated as a priority emergency management action. Whilst the protection of these buildings and structures is not necessarily a primary focus, the campground should be designed to avoid creating an additional hazard in a bushfire event.

Although not part of this development, this proposal also views the existing assets in the surrounding area as relevant assets that require consideration as part of this assessment. Whilst protection of the physical assets is not possible, considering the bushfire impact on the occupants that currently use the existing tourism and accommodation offerings, is an important part of the bushfire risk assessment. These existing assets, and associated occupants, includes the following:

- Existing tourism accommodations
    - Canal Rocks Beachfront Apartments
    - Smiths Beach Resort
    - Chandlers Beach Villas
- Visitors using the existing beaches
    - Smiths Beach
    - Canal Rocks carpark and boat ramp
    - Kathleen's Seat and Aquarium swimming destination
- Existing local residential and commercial operations near the proposed development
- Cape-to-Cape walkers in the local area.

It is noted that there is no requirement for occupants of adjacent or nearby development to use the proposed bushfire refuge, however creating sufficient space for them to shelter is considered appropriate in this instance. It is noted that most of the existing land uses would also meet the criteria of vulnerable land use, due to short-stay accommodation and/or public visitation.

Hazard Identification

The Royal Commission into the 2009 Victorian Bushfires (VBRC 2010) outlined that:

> *Bushfires obtain their energy from fuel and their speed and direction from the weather, topography, and the fire itself. These factors affect fire behaviour, including the rate of spread, flame height and angle, persistence in the area, and the way firebrands travel. The only element that can be controlled by humans is the management of fuel*

Overview of heat transfer and bushfire attack mechanisms

Heat, resulting from the combustion process, can be transferred by three main mechanisms:

- Radiation (radiant heat)
- Conduction
- Convection

Bushfire attack upon people and property is typically via the following mechanisms, resulting from a combination of the above heat transfer mechanisms:

- Direct flame impingement
- Radiant heat flux
- Ember attack
- Wind
- Smoke

Direct flame impingement

Direct flame contact refers to flame impingement on the building or infrastructure, from burning vegetation or other fuels associated with the bushfire.

Radiant heat flux

Radiant heat flux, which is measured in kW/m^2, is a mechanism of heat transfer between the radiating bushfire and the receiving entity (person, building etc), and is the is proportional to

distance from the fire. Radiative heat transfer is a significant mechanism in the spread of bushfire, especially the pre-heating of unburnt fuels ahead of the flame front.

Radiant heat attack on a building, from a bushfire, can result in failure of glazing elements as well as preheating other building materials to permit piloted ignition by embers (Ramsay & Rudolph, 2003). Radiant heat exposure remains one of the primary causes of fatalities in bushfire events, and can also impact on the safety of firefighters and their ability to conduct operations.

Duration of exposure is also important which is typically expected to last for several minutes, continued burning of trees, logs and adjacent structures can result in longer term radiant heat exposure. Plate 22 provides a summary of the radiant heat flux, and timeframes, for various impacts including pain to humans. Plate 23 summarises the relationship between radiant heat flux and the construction BAL ratings that apply to building construction in bushfire prone area.

Phenomena	kW/m^2
Pain to humans after 10 s to 20 s	4
Pain to humans after 3 s	10
Ignition of cotton fabric after a long time (piloted) (see Note 2)	13
Ignition of timber after a long time 13 (piloted) (see Note 2)	13
Ignition of cotton fabric after a long time (non-piloted) (see Note 3)	25
Ignition of timber after a long time (non-piloted) (see Note 3)	25
Ignition of gaberdine fabric after a long time (non-piloted) (see Note 3)	27
Ignition of black drill fabric after a long time (non-piloted) (see Note 3)	38
Ignition of cotton fabric after 5 s (non-piloted) (see Note 3)	42
Ignition of timber in 20 s (non-piloted) (see Note 3)	45
Ignition of timber in 10 s (non-piloted) (see Note 3)	55

NOTES:

1 Source AS 1530.4—2005.

2 Introduction of a small flame to initiate ignition.

3 Flame not introduced to initiate ignition.

Plate 22: Radiant heat intensities for various phenomena (AS 3959)

Ember attack

Embers are small particles of burning material (brands are typically larger burning material), that can be carried in large quantities by prevailing and convective winds. If the embers are still alight when they land among fine fuels (e.g. grass and leaf litter), they could potentially ignite these fuels, in particular if fanned by the wind. Strong fire-driven wind can also drive embers into buildings, which can result in internal ignition, if the building is not protected against ember attack.

Ember attack often occurs ahead of the fire front, and depending on surrounding vegetation, can continue to impact buildings after the front has passed. Embers can travel extended distances from the fire front, although their density decreases with distance from the fire, and can ignite fine combustible fuels ahead of the fire front.

Wind

The BCA Verification Method (ABCB, 2019) notes that *"severe bushfires are commonly accompanied by high winds due to the prevailing weather conditions and localised high winds can be induced by the fire, potentially 'opening the buildings up' prior to the passage of the fire front by dislodging roof tiles and breaking windows, increasing susceptibility to ember/flying brand attack".*

The high winds essentially transport the high density of embers whilst also creating the gaps in the external building envelope to permit ember ingress. Reducing wind impact and speed around buildings, using natural features and trees, can be effective ways to achieve this.

Smoke

The impact of smoke on buildings is typically minimal, but it can present a significant factor where occupants are vulnerable (e.g. aged, children, disabled, sick, injured) or to those that are susceptible to respiratory disorders where smoke can create difficulty with breathing and potentially death. Where buildings or other man-made materials are being consumed by fire, it also becomes more likely that smoke can be toxic.

Another impact that smoke can have is on the ability and speed at which evacuation can be conducted. Thick smoke can reduce visibility to very limited levels, which prevents vehicular egress or firefighter access from being undertaken quickly or safely.

BAL	**DESCRIPTION** (Source: AS 3959-2009, Appendix G)
BAL–LOW	The risk is considered to be VERY LOW. There is insufficient risk to warrant any specific construction requirements but there is still some risk.
BAL–12.5	The risk is considered to be LOW. There is a risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5kW/m^2.
BAL–19	The risk is considered to be MODERATE. There is a risk of ember attack and burning debris ignited by wind-borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19kW/m^2.
BAL–29	The risk is considered to be HIGH. There is an increased risk of ember attack and burning debris ignited by wind-borne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29kW/m^2.
BAL–40	The risk is considered to be VERY HIGH. There is a much increased risk of ember attack and burning debris ignited by wind-borne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40kW/m^2.
BAL–Flame Zone (FZ)	The risk is considered to be EXTREME. There is an extremely high risk of ember attack and burning debris ignited by wind-borne embers, and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40kW/m^2.

Plate 23: BAL descriptions, predicted levels of exposure and thresholds (WAPC 2015)

Influences on Bushfire Behaviour

Bushfire behaviour can be impacted by a variety of factors, typically operating in concert, most notably:

- Fuel
  - significant factor impacting bushfire behaviour, in particular in terms of intensity, rate of spread and flame height
  - fuel load is a measure of quantity of fuel available for burning
  - Fuel size, structure and moisture content all tend to impact on the availability of the fuel load present to be ignited and consumed in a bushfire and spotting potential
- Weather
  - Factors include temperature, relative humidity, rainfall, wind, climate change
  - Significant influence on bushfire behaviour as it impacts soil and fuel moisture, atmospheric moisture (i.e. humidity) and preheating of fuels (i.e. air temperature), which all influences fuel availability. Elevated air temperatures and reduced relative humidity, especially for extended timeframes, is typically more conducive for more extreme fire weather.
  - Short-term weather during a bushfire, is part of a longer term and larger scale climatic regime that indirectly influences bushfire behaviour.
  - Forest Fire Danger Index (FFDI), a non-dimensional index that represents the weather variables, is a widely used method to represent bushfire weather and is also used as a basis for developing, assessing and implementing land use policies and building construction standards, in addition to providing community warnings such as informing the forecast Fire Danger Ratings (see Plate 24).
- Topography (e.g. slope, aspect, landform)
  - the slope beneath vegetation (known as effective slope), can have a marked impact on bushfire behaviour, in particular rate of spread and fire intensity.
  - As a general rule, the rate of bushfire spread doubles for every 10 degrees of upslope and slows by half for every 10 degrees of downslope, also affecting flame length and intensity accordingly.

All the above influencing factors operate collectively to impact all aspects of bushfire behaviour, including ignition, growth, spread and intensity. Fuel and topography are typically assessed using visual or desktop assessment methods, however the analysis of bushfire weather, which can have significant affect on bushfire behaviour, is more difficult given the variability over time.

FIRE DANGER RATING	
Category	Fire Danger Index
CATASTROPHIC (CODE RED)	100 +
EXTREME	75 – 99
SEVERE	50 – 74
VERY HIGH	25 - 49
HIGH	12 – 24
LOW – MODERATE	0 - 11

Plate 24: Fire Danger Ratings (with Fire Danger Index ranges)

Landscape-scale bushfire

Bushfire behaviour is typically modelled for the different fuel (vegetation) configurations, using various of fuel, topographical and weather characteristics to provide an estimation of the anticipated bushfire behaviour and intensity. The vegetation types produce different bushfire behaviour outputs (rate of spread, fire intensity, flame height, radiant heat flux etc), depending on the conditions, given the variation in fuel characteristics and the impact of weather on these vegetation groups. The outputs of this bushfire behaviour modelling are used to inform the various management measures required to mitigate the bushfire risk to acceptable levels. This modelling assumes various upper limit inputs to ensure an acceptable safety factor in the calculations.

Whilst these models are appropriate for most bushfire scenarios, on days of unusually dangerous bushfire weather where there are extended fire runs through continuous vegetation structures, especially through forest vegetation, the anticipated bushfire behaviour may exceed the calculated model outputs, in turn lessening the effectiveness of the mitigation measures.

Sources of ignition

The City of Busselton BRMP Plan (CoB 2019) provides a summary of a DFES report identifying the main bushfire ignition types within the City. The yearly ignition totals range from 51 to 87, with an average of approximately 69 fires occurring per year between 2014 and 2019.

The most common ignition causes are Burn off fires (26.2%), Suspicious/Deliberate (24.7%), Unreported/Undetermined (18%) and Power lines (7.5%), with the remainder forming <5% of ignition causes.

Bushfire penetration into urban areas

Bushfire intrusion into urban or developed areas, can result in house or building loss often associated with retention of significant fuels within the developed area, capable of being ignited by direct flame or radiant heat impact or ember attack. Ignition of the onsite fuels can result in fire spread to houses, which if left unprotected, can result in building-to-building fire spread. Additionally, unprotected buildings can also be directly ignited by the various bushfire attack mechanisms.

The following measures can be highly effective in minimising bushfire penetration into urban or developed areas:

- Implementation of bushfire construction standards to increase resilience to ember attack and anticipated radiant heat impact
- Vegetation management within proposed lots, and storage of on-site flammable materials, to limit fire spread to buildings
- Vegetation management and fragmentation throughout public spaces, to reduce likelihood of bushfire ignition, and to prevent contiguous fuel loads to limit opportunity for significant bushfire growth, spread and intensity
- Ensure sufficient separation between buildings, in particular residential houses at higher risk interfaces, as well as from any unmanaged vegetation to limit potential for building ignition

Building Loss

The bushfire attack mechanisms of flame impingement, radiant heat, embers, wind and smoke, all work in concert to test a buildings resilience to withstand bushfire impact.

Blanchi et al (2006) outlines that the majority of building loss (approximately 80 – 90%) is associated with ember attack, either solely or in combination with radiant heat impact. Fewer buildings are lost purely to radiant heat or direct flame contact alone, without significant ember involvement, likely only 10 – 20%.

Using AS 3959, the extent of bushfire impact is assumed to be 100 m from bushfire prone vegetation, primarily based on the extent of significant ember attack. The BCA Bushfire Verification Method references Chen and McAneney (2010), whose research into building destruction from various major bushfires highlights the relationship between separation distance from bushland and building loss as follows:

- 60^{th} -65^{th} percentile of building loss occurs within 30 m of bushland
- 83^{rd} – 87^{th} percentile of building loss occurs within 100 m of bushland
- 95^{th} percentile of building loss occurs within 150 m of bushland and
- all building loss ceases outside 700 m separation from bushland.

Historically buildings haven't been required to comply with current bushfire construction requirements, and therefore are unlikely to have had the same resilience to bushfire impact as many modern-day buildings. However, it does provide an insight to the potential extent of impact a bushfire can have and it also highlights the lessening ember density, and likelihood of building loss, with increasing distance from the bushfire front.

Review of the relationship between bushfire weather severity and historical building loss, in particular through use of FFDI, can also provide some insight as to what conditions are likely to promote bushfires capable of destroying buildings. In the review of historical building loss with FFDI documented in Blanchi et al (2010), it is noted that there is a relationship between the two and the approximately 92% of all building loss occurs when FFDI>50 and almost 98% building loss when FFDI>45. Additionally, they also note that increase in FFDI also increases the bushfire intensity which can increase the vulnerability of buildings and inhibit the bushfire suppression response. Whilst bushfires can occur on days with FFDI<45, it is clear that additional vigilance and preparedness is required for days with FFDI exceeding 45. It should also be considered that significant building loss has occurred in WA on days with FFDI<40, including the Margaret River and Yarloop bushfires.

Bushfire Fatalities

The aspects of bushfire attack that affect human safety include:

- Burns from direct flame contact and radiant heat from the bushfire front or other ignited materials
- Convective heat carried from the bushfire front resulting in heat stress or lung damage
- Injuries from airborne particles
- Smoke inhalation can be hazardous to those with respiratory sensitivity

Bushfire risk to life safety is best understood through examination of historical bushfire-related life loss research. CSIRO, in conjunction with the Bushfire Corporative Research Centre (BCRC), undertook a comprehensive study in 2012 into both life and house loss associated with 260 bushfire events between 1901 and 2011, over which period a total of 825 known fatalities occurred (Blanchi et al. 2012). Important findings of this research are as follows:

- Fire weather and proximity to forest are strong indicators defining the potential for fatalities:
    - 50% of all recorded facilities occurring on days exceeding FFDI 100 (i.e. infrequent but high magnitude events). On these days, most fatalities occur when the FFDI is at its peak, between 3 pm and 9 pm.
    - A significant number of fatalities are associated with afternoon wind changes which alter the direction of the fire front and produce a sudden escalation in fire intensity and rate of spread over a wide distance. If the change is not anticipated by the general community, and these situations can lead to people becoming trapped in a rapidly changing scenario.
    - 78% of all fatalities occur within 30 m of forest, with 85% within 100m
- The most common activities associated with fatalities
    - 30.3% undertaking late evacuation (mostly trapped on roads by fallen trees, becoming bogged or running off the road due to poor visibility), with victims likely to have had time to evacuate earlier but instead had chosen to stay longer.
    - 24.8% sheltering inside a structure
    - 22.4% defending a property outside
- There is a strong correlation between fatalities and house/building loss, such that house loss is a reasonably good predictor of potential or life loss.
    - Building survival is significantly reduced where the FFDI exceeds 100, which in turn, means potential for fatalities is significantly increased in these conditions.
    - Early evacuation or provision of a safer place would be the preferred responses in these conditions.

For a local context, using data and analysis published by Risk Frontiers (2015), the following insight can be provided regarding bushfire fatalities in Western Australia:

- 31 bushfire related fatalities have occurred in WA since 1900 (including 2 fatalities in Yarloop not included in Risk Frontiers data).

- Approximately 50% of the fatalities were men defending property or firefighting, moreso prior to 1997
- Since 1997, many fatalities (often women) have occurred in vehicles, either taken by surprise or conducting late evacuation.

Risk Frontiers (2015) also provide a comparison to fatalities in Western Australia related to other natural events, and highlight that deaths since 1900 related to lightning (37), flood (49), heatwave (61) and cyclones (447 although 290 are from events in early 1900's) still exceed those of bushfire. It does highlight that while bushfire fatalities are tragic, they are still relatively rare in this state. Notwithstanding, ignorance is not acceptable either, and Black Saturday remains an example of where unpreparedness and complacence can result in high death tolls.

Hazard Analysis

Design Bushfire Identification

In order to assess the performance of the proposed development to bushfire impact, we much first determine the bushfire scenarios considered the most likely to occur and with the most potential to impact life and property, known as design bushfires. One way to determine the design bushfire/s is to identify the suite of potential bushfire scenarios, analyse their anticipated likelihood and potential consequence, and select those considered to be worst case scenarios.

In order to assess the various potential bushfire scenarios, it is considered important to understand the following local factors to determine the design bushfire/s:

- Bushfire history
- Local and regional hazard (vegetation and topography)
- Bushfire weather
    - Local weather conditions during bushfire season
    - Generalised Extreme Value (GEV) analysis of the FDI
- Bushfire runs
- Anticipated impact on development

Bushfire history

The NSW *Planning for Bush Fire Protection* (NSW RFS 2019) observes that bushfire history can be an important consideration during the planning of a development. Locations with significant fire history may require further analysis, especially when considering suitability of development, infrastructure for firefighting operation and evacuation, and ongoing land management practices.

Bushfire history provides insight to past bushfire events under historical fire weather conditions, and it offers some indication of potential future bushfire risk to a proposed development, however, it should be referenced with some caution as it doesn't necessarily correlate that future development will be subject to the same events. The intensification of land use, in particular the introduction of people, can result in increased likelihood of bushfire ignition but also increases the level of surveillance which decreases time to emergency services notification. The construction of development also typically results in an increase firefighting infrastructure and resources, in which case, attending brigades often have greater access to fire water supplies and may result in fire appliances turning out more quickly.

Local Bushfire history

A review of the publicly available bushfire history datasets (DBCA and Firewatch), reveal historically there have been very few significant bushfires in the local area, certainly in

comparison to remainder of the greater south-west region. Figure 13 depicts the historical DBCA record of bushfires in the local region, with Plate 25 providing screenshots from Firewatch. While the data from DBCA and Firewatch may not be a complete record of all bushfire events, it does depict that few significant bushfires occur around the project area, with many of the recorded fires associated with prescribed burning, however there have been a couple of significant bushfires in the area including:

- In 1993 immediately north of Yallingup townsite (2.8 km from the project area) which burnt out approximately 146ha
- In 1993 south of Injidup (5.8 km from the project area) which burnt out approximately 158ha.

Bushfires in the within 1-2 km of the project area have occurred on a regular basis, however they have tended to be restricted to 2 ha-7 ha in area, with the fire history suggesting larger bushfires are possible but not frequent.

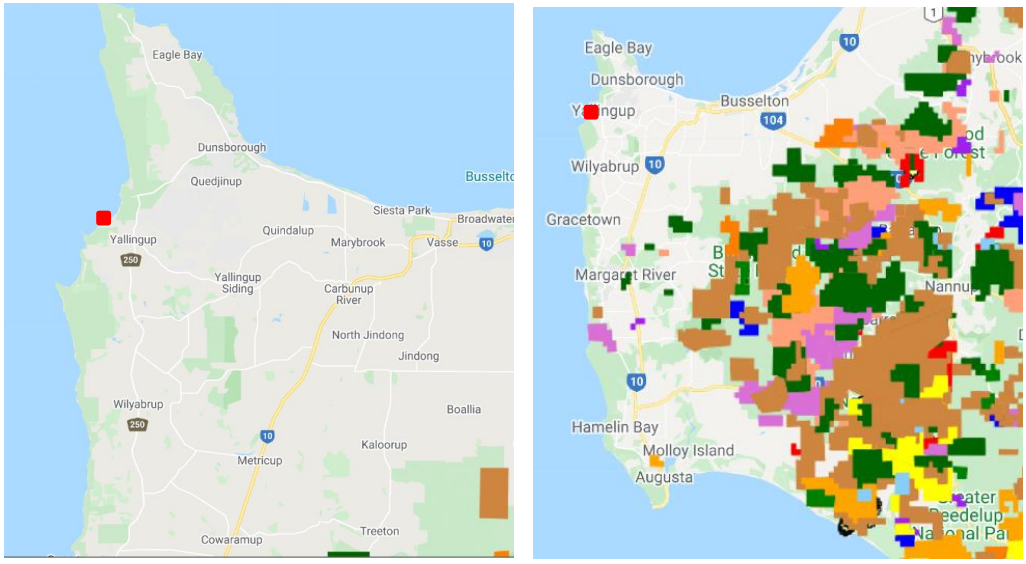
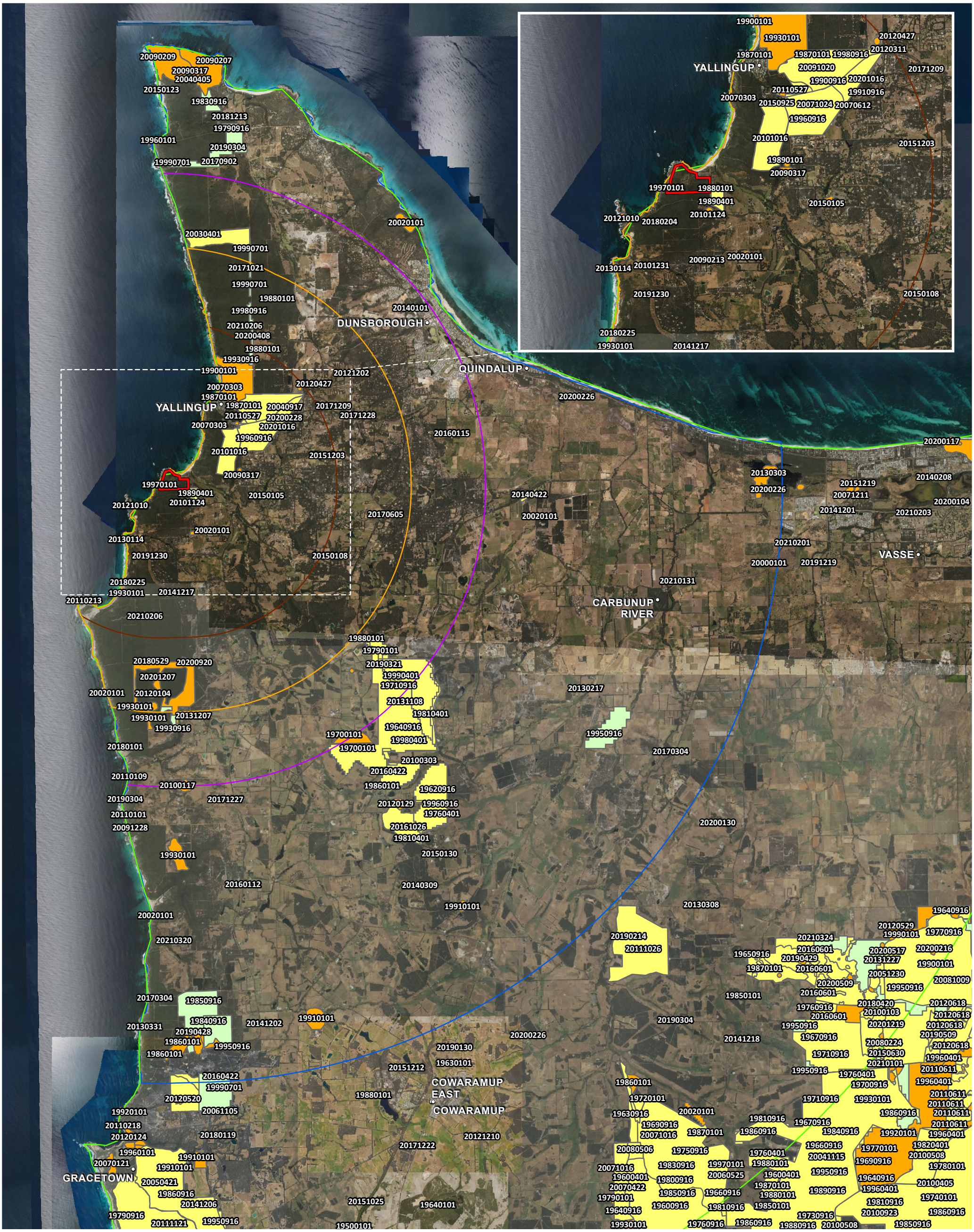


Plate 25: Firewatch historical bushfire extent (Firewatch 2021)

In addition to the bushfire history above, there were two recent bushfires in February 2021, one near Yallingup and the other near Injidup. Both these fires were reported late in the day, and were suspicious and potentially deliberately lit given they were only 11 km apart. The Yallingup fire was moving in a south-westerly direction before it began raining and both fires were fortunately brought under control that evening. In this bushfire emergency, Smiths Beach was subject to a 'Watch and Act' bushfire warning and if it wasn't for the change of weather conditions, would likely have been in an 'Emergency Warning' alert level.

The other significant bushfire that has occurred in the local region, is the Margaret River bushfire from 2011, an event that was a major driver for the establishment of the current WA bushfire framework and presumably the Cape Zone Response. Further detail is provided on this below.

The review of bushfire history indicates that while there is not a very strong history of major bushfire events in the coastal locations near the project area. Notwithstanding, there does appear to be regular ignitions in the local area which in combination with contiguous unmanaged fuel loads and restricted fire appliance access, can create opportunity for major bushfires, such as Prevelly in 2011.



Legend

- Project area (Lot 4131)
- 5km zone from project area
- 7.5km zone from project area
- 10km zone from project area
- 20km zone from project area
- 30km zone from project area

Fire history (DBCA) and date burnt

- Prescribed burn
- Wildfire/Bushfire
- Unknown (historic fire event)
- Location

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0 3,400 metres

Job No: 59550		Scale 1:120,000 at A3	
Client: Smiths 2014 Pty Ltd		Coord. Sys. GDA 1994 MGA Zone 50	
Drawn By: jcrute	Checked By: CT	Version: A	Date: 12-Nov-2021

Lot 4131 Smiths Beach Road Yallingup WA 6282

FIRE HISTORY

FIGURE: 13

Document Path: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_13_A3_FireHistory.mxd

Image Reference: SLIP Public Services Locate 2019-2021.

2011 Margaret River (Ellenbrook-Prevelly) Bushfires Review

The Margaret River bushfires occurred on the morning of 23rd November 2011 when the Department of Environment and Conservation (DEC) lost control of a prescribed fuel reduction burn at Ellenbrook (BS520) and the flare-up of another burn at Prevelly (BS255). The resultant bushfires destroyed 32 homes, nine chalets and four sheds and burnt out more than 3,400 hectares of land. These fires were subject of the Margaret River Bushfire Special Inquiry released in early 2012 (Keelty, 2012), with another review conducted by DFES (formerly FESA) primarily reviewing building loss (DFES, 2012). Noetic Solutions also conducted a Post Incident Analysis with a focus on the response to the bushfires (Noetic 2012).

The Bushfires

The BS255 prescribed burn at Prevelly was ignited on 20th November 2011, with the Ellenbrook prescribed burn ignited on 21st November. The Ellenbrook burn was being conducted on land within Leeuwin Naturaliste National Park, approximately 1 km south of Gracetown and 13 km north of Margaret River townsite, with the Prevelly burn located near the Prevelly settlement.

The Special Inquiry (Keelty, 2012) noted that there was no single element that caused the Margaret River Bushfires, but rather *"…a series of judgments by DEC that, with the benefit of hindsight, proved sub-optimal in the circumstances".* A communication mistake regarding a warning from a spotter pilot (on 22nd November), a lack of overnight resources at BS520 and delay in deploying firefighting resources back to the burn site on the 23rd November, all enabled sufficient time for the BS520 fire to reignite and grow and spread unchecked. By midday on the 23rd, the bushfire behavior from the escaped Ellenbrook fire was fully-developed and was spreading at approximately 3 km/hr in a south-easterly direction, with spotting of up to 2 km ahead of the fire front. Over the next day and half, the fire continued running south, through Margaret River mouth, Prevelly and Gnarabup and continuing to Redgate, where it was contained late on the 24th November after having travelled a total of approximately 20 km. The overall bushfire extent depicted on Figure 14.

The Special Inquiry noted that the observed wind speeds of 37 km/hr were greater than forecast winds of 27 km/hr during the morning of 23 November 2011, although it was noted gusts of up to 61 km/h also occurred. The direction of the winds was also from north in the morning, before swinging to the north-east in the afternoon. The air temperature was 31 degrees, and the relative humidity was 22%, and the calculated FDI on the 23rd November was FDI 38 (DFES, 2012).

Building Loss

DFES produced a detailed report regarding building loss in the bushfires that was post-event surveys within the fire-affected and adjacent areas. DFES identified that a total of 39 homes destroyed, 26 homes damaged in the survey area. This represented the second single biggest house loss in Western Australia to a single bushfire event (DFES, 2012).

The key findings from this report are as follows:

- The construction standard of the home and the separation from the vegetation are critical components in determining its ability to successfully withstand the impact from a bushfire. When combined, inadequacies with these two measures will contribute to significant loss and damage within the fire-affected zone.
- There was significant damage and destruction as a consequence of the large number of embers that attacked the buildings and the fuel load adjacent to the buildings, and that the standard distance of 100 metres was inadequate for the complete protection of homes from embers. Separation by >100 m from the unmanaged

vegetation edge, as specified by AS 3959, is no guarantee that a building will not be damaged or destroyed by ember attack.

- Most of the homes that suffered direct flame contact or radiant heat damage as a consequence of the bushfire, did so because they did not have the appropriate Building Protection Zone (BPZ; similar to Asset Protection Zone), which is also important to protect attending firefighters.
- As the area was not formally designated as bushfire prone, almost all buildings in the fire affected areas where not constructed to comply with the bushfire construction standards of AS 3959 for the assessed BAL rating. Ensuring that a building has increased construction standard to at least the level of ember protection (BAL – 12.5), will facilitate greater survivability of that home.

Concluding Comments

Much of the Special Inquiry and other post-incident reporting following the Margaret River bushfires is targeted at the risk management processes associated with prescribed burning and the response actions, however some important lessons do come out of review of these reports, that can be applied to this risk assessment:

- The continuous fuel loads in the coastal locations and the lack of access can support significant bushfires but also negatively impact the firefighting effort, and on that basis, it is considered that the Margaret River bushfire scenario could occur again. The vegetation and topography is similar to that around Smiths Beach, thus the bushfire behaviour would be expected to be similar.
- The Ellenbrook bushfire appears to have peak rate of spread of up to 3 km/hr, as was the case around midday on 23rd November, although it is noted this speed was not sustained for the whole event as weather conditions changes and as the fire moved through different vegetation types. Spotting was noted as being up to 2 km in ahead of the fire.
- The calculated FDI of 38, while at the higher range expected in the south-west, would suggest a controllable range for bushfires, and less than the FDI's associated with significant building loss. It has highlighted that the fire ground may have conditions that vary from the observations at nearby weather stations, on account of the variable topography and vegetation, and an ability to create localised extreme bushfire conditions.
- The DFES report highlights that protecting development from all forms of bushfire attack, especially ember attack, is critical to building resilience. To achieve this both building construction and vegetation management are vital. The protection of buildings from ember attack should be considered further than 100 m from the fire front.
- The Margaret River bushfires didn't occur during the peak of summer when visitation to the area is at its peak. If this were to occur, occupant numbers could be significantly greater, which could create evacuation challenges, especially due to tourist numbers.

Legend

- Project area (Lot 4131)
- 5km zone from project area
- 7.5km zone from project area
- 10km zone from project area
- 20km zone from project area
- 30km zone from project area
- Outline of the fire that occurred on 23 & 24 Nov 2011
- Location

strategen JBS&G

0 4,600 metres

Lot 4131 Smiths Beach Road
Yallingup WA 6282

FIRE HISTORY BUSHFIRES
MARGARET RIVER

Job No: 59550		Scale 1:165,000 at A3	
Client: Smiths 2014 Pty Ltd		Coord. Sys. GDA 1994 MGA Zone 50	
Drawn By: jcrute	Checked By: CT	Version: A	Date: 12-Nov-2021

FIGURE: 14

Document Path: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_14_A3_FireHistory_MRiver.mxd
Image Reference: SLIP Public Services Locate 2019-2021.

Regional Hazard Assessment

A detailed review of the existing vegetation and topography within the project area and the immediate surrounds, is detailed in the BAL assessment in Section 5.2. In addition to this local assessment, a regional hazard assessment has been provided to depict broader bushfire risk profile to the proposed development and the public road access network that will be used to facilitate occupant egress and emergency services access to the site. The assessment, similar conceptually to the Landscape Assessment from the Victorian Bushfire Management Overlay (DELWP 2017), depicts the broad vegetation structures, using AS 3959 as a basis, whilst also showing likely bushfire wind directions and anticipated bushfire runs to the development.

In order to produce the regional hazard assessment map, the following GIS data sets were overlain on the latest available aerial imagery:

- **DPIRD-005: Native Vegetation Extent (remnant vegetation in WA)**
- **DBCA-047: Vegetation Complexes – southwest forest region of WA**
- **DBCA-046: Vegetation Complexes – Swan Coastal Plain**

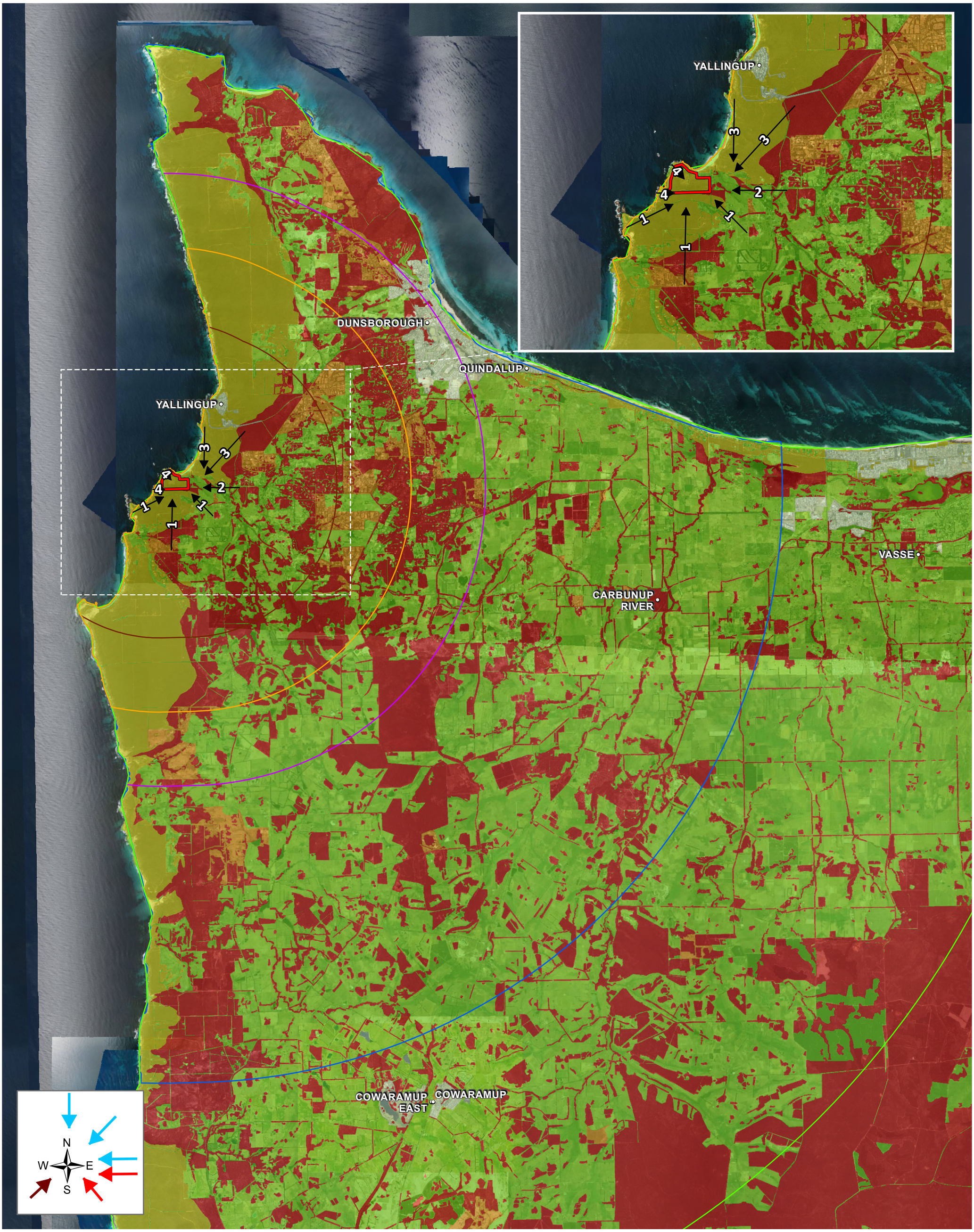
The combination of above information was supplemented by spot checking using Google Maps Streetview, to produce the regional hazard assessment map. Existing urban centres at Dunsborough, Yallingup, Vasse/Busselton, Cowaramup and Gracetown, where identified as 'Development'

Regarding vegetation classifications, other than along the coast, all remnant vegetation was assumed to be Class A forest, with the only distinction made for 'fragmented forest', where the forest vegetation is fragmented by cleared land (typically grazed agricultural land). Along the coast, vegetation complex descriptions that aligned with shrubland or scrub descriptions were assigned that combined classification. It is noted that this vegetation is likely to be consistent north-south along the coast, however, similar to vegetation within the project area, there is more variability moving inland as the vegetation transitions into the forest fuels. On this basis, it is acknowledged that there will be stunted forest vegetation within the eastern portions of this shrubland/scrub classification, however it is also expected it will still be largely similar bushfire behaviour to a fully-developed scrub bushfire, given the general lack of tall trees.

All land previously cleared and not part of urban centres or classified as forest, fragmented forest or shrubland/scrub, was assigned a grassland classification.

Strategen-JBS&G acknowledge that the regional mapping is coarse and indicative, but considers it sufficient to depict broader bushfire risk profile to inform discussion on impacts on proposed development and the public road access network.

The resultant regional hazard assessment map, using the methodology outlined above, is depicted on Figure 15.



Legend

- Project area (Lot 4131)
- 5km zone from project area
- 7.5km zone from project area
- 10km zone from project area
- 20km zone from project area
- 30km zone from project area

Vegetation class

- Development
- Forest
- Forest (fragmented)
- Grassland
- Shrubland/Scrub

Wind direction

- Predominant high FDI
- Prevailing summer afternoon
- Prevailing summer morning
- Design bushfire scenario
- Location

strategen JBS&G

0 3,400 metres

Job No: 59550		Scale 1:120,000 at A3	
Client: Smiths 2014 Pty Ltd		Coord. Sys. GDA 1994 MGA Zone 50	
Drawn By: jcrute	Checked By: CT	Version: A	Date: 12-Nov-2021

Lot 4131 Smiths Beach Road Yallingup WA 6282

REGIONAL LANDSCAPE HAZARD ASSESSMENT

FIGURE: 15

Document Path: W:\Projects\1)Open\Linc Property\59550 Smiths Beach Stage 2 Approvals\GIS\Maps\R01_Rev_A\59550_15_A3_LandscapeAssessment.mxd

Image Reference: SLIP Public Services Locate 2019-2021.

Bushfire weather analysis

Given the Mediterranean climate of the local region, the proposed development is likely to experience peak bushfire weather during the hot and dry summer months from December to March, when maximum daily temperatures, low relative humidity and minimal rainfall is expected.

Bushfire behaviour is significantly impacted by fire weather, and one method of representing this is through the use of Forest Fire Danger Index (FFDI). FFDI is defined by AS 3959 as *"the chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression…"*.

FFDI is a non-dimensional index which is derived from the weather variables of temperature, relative humidity and wind speed, with the availability of fuel for combustion obtained through the use of drought factor based on rainfall and evaporation.

Bushfires, and FFDI, can be influenced by unusual weather conditions, which poses a challenge in determining the expected recurring scenarios for a location using its site-specific weather data. Acquiring accurate data to calculate the FFDI, and undertaking robust analysis of the calculated index, is important to ensure that an appropriate bushfire scenario is modelled as much as practical, to ensure appropriate responses and mitigation measures to protect life and property assets while balancing of environmental and biodiversity objectives.

In order to calculate the FFDI for this project area, a dataset was required from a nearby location to enable this to be undertaken. The current national historical fire weather dataset available from BoM, which includes FFDI calculation for analysis, has only Perth Airport and Albany as the nearest locations, both which are over 200 km from the project area. To address the lack of FFDI data, an FFDI analysis has been conducted using raw hourly weather data and the calculated ground moisture data from BoM from the Cape Naturaliste weather station (Number 9519) located less than 14 km north of the project area and collected over the past 21 years.

The methodology relied upon calculating the FFDI on an hourly basis, and then selecting the highest daily FFDI for use in the analysis. Following the calculation of the peak daily FFDI, a Generalised Extreme Value (GEV) analysis was undertaken and the resultant distribution fitted with a best-fit regression curve. This enables extrapolation of the data to establish the annual exceedance probability (AEP) of FFDI for application to bushfire events (Douglas et al 2014). The GEV analysis is summarised in Appendix K.

Forest Fire Danger Index (FFDI) calculation and analysis

Table 24 shows the FFDI results, for various recurrence periods, from the GEV analysis. A 1:50-year bushfire weather event is considered appropriate recurrence period for residential houses, with high recurrence periods such as 1:200-year used for buildings with higher occupant loads or vulnerable occupants, such as bushfire refuges.

Table 24: FFDI for various recurrence period for Cape Naturaliste (9519)

Recurrence	FFDI
1	32.3
20	41.8
25	42.5
50	44.7
100	46.9
200	49.1
500	52.0

FDI 80 has been adopted in Western Australia as the acceptable bushfire weather threshold to use for land use planning and building construction purposes. When compared to the recurrence rates calculated for Cape Naturaliste in Table 24, represent a 44% decrease for a 1:50-year event, a 38.5% decrease for a 1:200-year event and a 35% decrease for a 1:500-year event.

Additionally, it is also noted that in the past 21 years at Cape Naturaliste weather station that no days exceeded FFDI 45 which is historically when 98% of building loss occurs (Blanchi et al 2010), however the Margaret River bushfires also show how building loss can still occur when the FFDI is less than 45, especially if development is inadequately prepared.

An outcome of this analysis is that the highest FFDI tends to occur between mid-December and mid/late-March (see Table 37 in Appendix K). This aligns reasonably well with the current City of Busselton firebreak notice that prohibits burning from 1 December to 28 February but restricts burning for approximately 1.5 to 2 months either side of the prohibited burning period, presumably to react to the bushfire weather that year. However, vigilance outside this period is required as there is evidence for elevated bushfire weather outside this season.

The predominant winds during the designated bushfire season are from the east and south-east in the morning, and predominantly from the south-west in the afternoon. Review of the wind directions that occur in conjunction with the 21 highest FFDI days, we find the following:

- 38% of the highest FFDI coincide with winds from the N and NE
- 38% of the highest FFDI coincide with winds from the E
- 14% of the highest FFDI coincide with winds from the SW, S and SE
- 10% of the highest FFDI coincide with winds from the NW and W

This indicates that while the prevailing winds may be useful in predicting bushfire travel direction, there is a definite trend for peak bushfire weather to be associated with winds from the north, north-east and east, which are not necessarily aligned with prevailing summer winds.

In addition to the wind direction, attention must also be paid to the likelihood for sudden change in wind direction resulting in changes in bushfire spread and escalation in bushfire behaviour, which is often associated with fatalities.

Wind speed is another important factor in bushfire behaviour and based on the review of historical BoM wind roses the following can be determined:

- Summer morning winds are typically from the east, south-east, south or south-west and average 25-28 km/hr but can average over 40 km/hr
- Summer afternoon winds from the south-west and south are slightly stronger with an average speed of 30-32 km/hr and often average over 40 km/hr.

Review of the wind speeds associated with the 21 highest FFDI days reveals that the wind speed tends to be between 16 km/hr and 37 km/hr, and this is supported by the observations during the 2011 Margaret River bushfires of average wind speeds of 37 km/hr. While the wind speed is not excessively high during the bushfires, it is noted wind gusts of up to 61 km/hr were also observed.

FFDI impact on Shrubland and Scrub Vegetation

The bushfire risk assessment utilises the probability of bushfire weather occurring, and resultant behaviour, to inform design elements such as APZ widths and corresponding building construction performance.

Some vegetation within and adjacent to the project area is shrubland or scrub vegetation, as per the AS 3959 classifications, which uses Catchpole et al (1998) to model rate of bushfire spread

using wind speed and vegetation height inputs, rather than FDI as is the case for forest, woodland and grassland vegetation (GFDI for grassland). Due to this, any change in FDI doesn't result in a change in bushfire behaviour in these shrubland and scrub vegetation types, and therefore has no impact on APZ widths. This is reflected in Tables 2.4 to 2.7 from AS 3959, where each table corresponds to a different FDI (FDI 40, 50, 80 and 100), however review of all shrubland and scrub vegetation classifications in these tables, shows that is no change on APZ width with change in FDI.

Given the APZ widths for FDI 100 are the same as for FDI 50, it could be assumed that there is sufficient safety factor for all potential bushfire weather built into these separation distances, in that these distances are deemed suitable for FDI 100+ (Catastrophic FDR), which is not expected in the south-west of Western Australia, where the FDI near this location for a 1:200-year recurrence is FDI 49.1. Notwithstanding, the Margaret River Bushfires did highlight that even elevated FDI days for the region, but relatively low in comparison to other parts of the state, scrub bushfire behaviour can still result in uncontrollable fires, especially when on long fire runs and driven by localised effects.

The most critical interface where bushfire through scrub vegetation could significantly impact the development, is along the southern interface where a 25 m wide APZ is proposed. As outlined above, the required separation distance for Class D scrub (on flat/upslope) is 13 m, regardless of FDI, with the rate of spread of 4.16 km/hr. Back calculating the required rate of spread required to achieve BAL-29 at 25 m separation, the rate of spread required is greater than 18 km/hr (using default inputs). Given the peak rate of spread observed at the Margaret River bushfires was 3 km/hr through similar vegetation. Review against other rate of spread models from CSIRO *A Guide to Rate of Fire Spread Models for Australian Vegetation* (Cruz et al 2015), such as Anderson et al model, indicates such high rates of spreads through scrub vegetation are not considered achievable.

Another approach to review the appropriateness of the proposed 25 m APZ width to achieve BAL-29 or lower in scrub, is to review the separation distances against those for Class A forest on flat/upslope at various FDI's to achieve BAL-29:

- Class A (Flat/Upslope) at FDI 80: 21 m
- Class A (Flat/Upslope) at FDI 50: 16 m

Separation from Class A forest is greater than that for Class D scrub, given the greater fuel loads and flame height, however even if the bushfire behaviour did achieve comparable levels to forest in this instance, the 25 m APZ still represents a separation distance greater than required for either FDI.

In summary, while the calculated FDI for shrubland and scrub vegetation is unchanged for the various FDI's, the use of the Method 1 and 2 APZ widths for the western, northern and eastern interfaces is considered appropriate given the fire runs and fuel loads in these directions. Along the south, a 25 m wide APZ is proposed, and when compared to the Method 1 APZ widths for Class A forest vegetation, there is still a significant safety margin to achieve BAL-29.

Climate change

The bushfire Guidelines note that climate change in Western Australia over the last century have included rise in average temperatures and decreased in annual rainfall. The State of the Climate 2020 (BoM, 2020) climate review has projected that continued warming and a decrease in cool season rainfall, amongst other climate change impacts, will likely produce longer fire seasons with an increase in number of dangerous fire weather days.

Climate change can impact bushfire weather patterns over time, which can impact on the appropriateness of various bushfire mitigation measures, should the FFDI be underestimated. Douglas and He (2019) propose the use of a moving GEV window to review and account for the variation of FFDI for various return periods, primarily using a stepped 20-year window.

The GEV analysis conducted for the Cape Naturaliste weather station was undertaken using 21 years' worth of data, limited by the change in weather station location at that time. As such, there is insufficient data to reasonably implement the moving GEV window analysis approach, to assess whether there has been any significant deviation throughout the past 40-50 years. However, given the BAL contour assessment has been conducted using the state-adopted FDI 80, and that the GEV analysis is indicating FFDI at Cape Naturaliste is 49.1 for a 1:200 return period, it is considered there is sufficient safety factor to ensure it is highly unlikely that long-range climate change would result in an FFDI exceeding 80 at the proposed development. On this basis, the sizing of proposed APZ's using FDI 80 is considered appropriate to the anticipated bushfire behaviour when factoring in climate change.

Vehicular Access and Evacuation Assessment

A summary of the existing vehicular access network is provided in Section 2.1.3, with the proposed road network to be established as part of this development detailed in Sections 2.2.5 and 6.3.

The vehicular access network is critical in a bushfire emergency and typically has three main functions:

- To enable safe offsite evacuation of the occupants of the development and the local community, ideally in the opposite direction to the approaching fire
- Provide access for attending firefighting appliances, and also enable their evacuation if required
- Support the recovery function of the development and local area, by enabling access to the project area so it can return to normal operation after the fire's passing.

The arrangement, design, condition and bushfire resilience of the road network is important to achieve all of these functions. The arrangement of the road network dictates the destination and points of choice, a road user will have. Long dead-end roads, provide few options if the bushfire impact the road. The condition of the road impacts on the ability of the road to permit users to use the road, including the capacity and speed of travel. A resilient road network is one where the risk of being obstructed is limited, which improves its ability to remain available for use before the fire for evacuation and firefighter access, but also following the passing of the fire front to enable recovery operations and limit isolation from external assistance. The most likely obstructions would typically include trees and powerlines falling onto the road, but could also include traffic congestion.

Offsite Vehicular Egress

Avoiding potential exposure of occupants to bushfire by removing them from the path of the bushfire using offsite evacuation, should always be considered an important tool in managing a bushfire emergency.

Early evacuation is typically considered the best and safest option, provided egress is conducted with minimal difficulty away from the bushfire, before roads become congested or compromised by smoke and well in advance of the bushfire (including ember attack). Provided this can be achieved, offsite evacuation would be considered safe to conduct, however once conditions deteriorate, offsite evacuation becomes unsafe to commence or continue, and the safer option would be to shelter-in-place in an onsite refuge, suitably designed to withstand bushfire impact.

It is important to acknowledge that vehicles are not designed to drive through bushfires and do not offer effective protection to occupants from bushfire impact, in particular radiant heat flux exceeding 10 kW/m^2. Potential risks include:

- smoke obscuring visibility resulting in collision/crashes from other traffic or fire services or running off the road
- entrapment resulting from traffic congestion, collision/crashes, obstructions (tree's, powerlines and poles) or car failure

As outlined previously, a significant cause of fatalities in bushfires are those undertaking late evacuation (30.3%) for the reasons outlined above. The most effective approach to minimise this risk to occupants is to cease use of the impacted roads prior to, and during, bushfire impact. Where the road network presents multiple egress options, it may still be possible to use another route to safely evacuate to a safer location, however if there is only a single access road, the ability to find another suitable refuge will be critical. It is important to note that depending on the size and location, a bushfire may still be able to impact multiple evacuation routes simultaneously, therefore having multiple egress routes doesn't necessarily result in a safer outcome if they can be obstructed by a single bushfire event.

Conducting safe evacuation of occupants is therefore a complex process that is influenced by the location, characteristics and behaviour of the bushfire, the number of occupants as well as the availability and arrangement of the access network. On this basis, the following factors are considered vital to conducting safe offsite evacuation:

- undertake offsite evacuation as early as possible, and even pre-emptively, to maximise the time that the road network is considered safe and available
- Only undertake offsite evacuation when the road network is when it is safe to use, and unimpacted by bushfire (smoke, embers, fire front) and relatively uncongested
- When the use of the road network, or a specific route, becomes marginal due to bushfire impact and/or traffic congestion, then an alternative approach needs to be implemented. This would typically be use of an alternative egress route, to another destination, or onsite shelter-in-place, if a suitable refuge exists to protect occupants from bushfire impact.

Determining when evacuation can be safely undertaken requires analysis to compare the time it takes occupants to safely evacuate to an offsite destination (known as Required Safe Egress Time [RSET]), with the time available for safe evacuation which is represented by the time it takes for a bushfire to reach the road network and/or the development, from the time it ignites (known as Available Safe Egress Time [ASET]).

The accurate modelling of RSET is difficult to do, because of the complexity associated with modelling the various scenarios that could occur (obstructions, traffic congestion, smoke effects), coupled with the lack of specific research regarding travel speeds of vehicles under bushfire conditions. Additionally, modelling the ASET is associated with a lack of certainty about when or where an ignition may occur, the direction and rate of spread, the extent of ember attack and smoke impact on visibility. Notwithstanding, both can provide useful guidance on expected timeframes for fire impact and evacuation.

Firefighting operations

Fire brigades are another user of the road network in a bushfire emergency. Their operations consist of a variety of tasks using a variety of appliances, from heavy pumpers to 4WD appliance to smaller light tankers, and may include rapid and slow-moving vehicles, as well as stationary vehicles with personnel deployed around them. Ensuring sufficient width for these appliances, as

well as the public, to pass on the road network, is an important consideration with the design of the road network.

Given the size of the larger appliances, and the width of most roads, it would typically be a struggle for firefighting operations to be conducted while permitting public road users to still pass, especially if visibility is compromised by smoke. It is important to understand that fire suppression operations would generally be undertaken while the fire is approaching or impacting the road network, and as established above, this is considered a time when the road would be unsafe for public use. It does reiterate that early evacuation is the safest option for the evacuating occupants, with risk of late evacuation potentially resulting in a search and rescue burden for fire brigade or the additional traffic hindering firefighting movement and operations. The conclusion of evacuation using a compromised access route, and use of an alternative directed away from the bushfire or remaining onsite, should be considered in light of the potential impact to the success of firefighting circulation and suppression operations.

Roads are often closed to prevent access to areas being impacted by bushfire as per the Emergency Management Act and the State Emergency Management Procedures, with the Bushfires Act 1954 also authorising police (WAPOL) or authorised personnel, to close a road to the public. This essentially clears the roads for emergency services use only, enabling fire brigade to conduct their operations unhindered. It is important that the potential for road closures due to bushfire or fire operations are considered as part of the onsite emergency management, and alternative approaches understood.

Traffic Management

Traffic management is taken to be the planning and controlling of the movement of vehicles on the roads with the objective of limiting congestion and promote the unhindered flow of traffic.

Traffic management during a bushfire emergency is the responsibility of the Controlling Agency/Hazard Management Agency (HMA), and requires coordinated planning with the various support agencies to ensure peoples safety, whilst aligning with the overall response and evacuation strategies being deployed for the emergency. For a bushfire the overall control is with DFES, while various other agencies such as WAPOL, MRWA and the City will also be involved with managing traffic. .

On a local level, given the development has a community bushfire refuge, it is expected that the onsite Emergency Response Team manage the local traffic to and from the project area. The objectives will be to manage the movement of traffic from the development during the offsite evacuation process, where safe to conduct, and the flow of traffic to the project area where the onsite bushfire refuge is being used. ERT members and other staff will be used to direct traffic, but also to report traffic conditions and congestion to the ERT, to enable a more informed decision regarding the appropriateness of offsite evacuation. The broad process of the local traffic management will be detailed in the project BEMP.

Evacuation Assessment

As outlined above, evacuation analysis is usually conducted using a comparison of Required Safe Egress Time (RSET) versus Available Safe Egress Time (ASET), to determine whether sufficient time exists for safe evacuation to be completed before the bushfire impacts the road network and makes travel unsafe (i.e. RSET is < ASET). If the RSET is greater than the ASET, then there is a risk of vehicles being impacted by bushfire on the road, which could potentially result in fatalities. The broad concept, and the component parts of RSET, are detailed below in Plate 26.

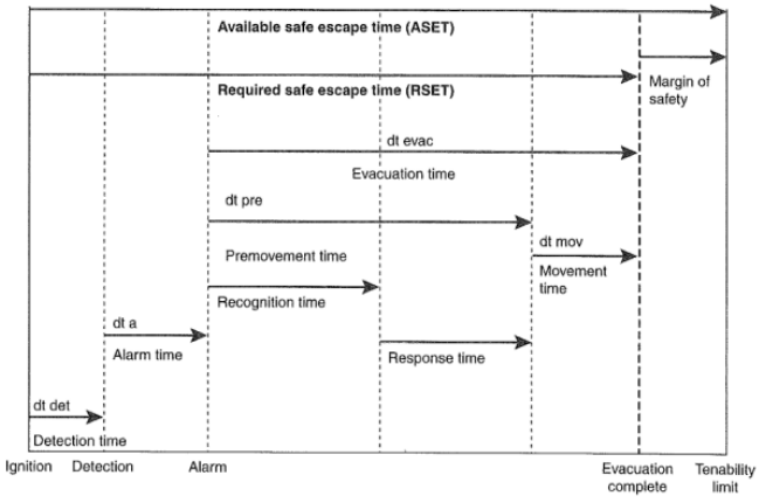


Plate 26: ASET and RSET Components (SFPE 2008)

The ASET is determined through modelling the time from ignition until bushfire impact on the development itself and/or the road network required for egress. The calculation requires knowing the location of ignition, the direction and rate of spread, and the spotting distance, amongst other factors which impact these characteristics (e.g. FDI, vegetation/fuel loads, topography, wind speed and direction etc).

A margin of safety is typically added to both RSET and ASET to allow for uncertainty associated with the input data, the methodology and the unknowns that occur during the actual event. The application of the margin of safety provides a level of comfort regarding the modelling results.

The concept of the ASET v RSET assessment is somewhat difficult to apply to bushfire emergencies, primarily due to the lack of certainty regarding many of the ASET inputs (such as fire location, direction and rate of spread) and the RSET inputs (such as pre-movement time, travel speed and queuing time).

Given there will be an onsite bushfire refuge and it is not necessary for occupants to evacuate to an offsite destination for safety, rather than trying to calculate both ASET and RSET, the evacuation assessment has chosen to provide guidance to the ERT with which to base decisions regarding whether there is sufficient time to conduct offsite evacuation in a bushfire emergency by detailing the following:

- Determining the anticipated Evacuation Time for occupants to reach nominated offsite location/s
- Determining the anticipated bushfire behaviour to provide guidance regarding triggers regarding when offsite evacuation can be considered.

In order to conduct the assessment, some broad understanding of the anticipated vehicle load that may be using the road network is useful. Table 25 provides a summary of the anticipated peak vehicle load based on the number of car bays. While this information is not directly used in the Evacuation Time calculation, it is useful to understand that there will likely be significant traffic attempting to use Smiths Beach Road and Canal Rocks Road, should evacuation of the surrounding land uses occur simultaneously. Staging of the evacuation, and coordination of this, will likely be critical to ensure its success.

Table 25 accounts for 100% occupancy and visitation west of Caves Road, which is conservative due to reasons such as not all residents will be at home, tourists at accommodation may be away, from the area at the time bushfire emergency commences etc. Table 25 doesn't account for vehicles travelling on Caves Road, which may contribute to congestion.

Table 25: Anticipated vehicle load

Location	Anticipated Number of Cars
Smiths Beach Road vehicle load	
Onsite parking - Hotel, Campground, Shared parking and Public parking on southern boundary	197 cars (197 bays)
Holiday homes	122 cars (61 residences @ 2 cars per residence)
Offsite Smiths Beach Parking – existing and proposed new parking along Smith Beach Rd and foreshore driveway, and the existing Smiths Beach carpark	133 cars (133 bays)
Canal Rocks Beachfront Apartments	30 cars (30 bays)
Smiths Beach Resort	100 cars (100 bays)
Chandlers Villas	40 cars (40 bays)
Sub-total (Smiths Beach Road)	***622 cars***
Canal Rocks Road vehicle load	
Canal Rocks	95 cars (95 car bays)
Kathleens Seat	10 cars (at informal carpark)
Surrounding Residential	20 cars (10 residences @ 2 cars per residence)
Sub-total (Canal Rock Road)	***125 cars***
Adjacent to Caves Road vehicle load	
Cape Lavender/Barnwood/Sienna	55 cars (55 car bays)
Surrounding Residential	20 cars (10 residences @ 2 cars per residence)
Sub-total (Canal Rock Road)	***75 cars***
TOTAL	**822 cars**

Evacuation Time Assessment

While the calculation of RSET considers the time from detection until arrival at a place of safety, in this case the Chief Fire Warden will be managing the offsite evacuation of the development, and at the time of making that decision, it is considered that the bushfire will have been detected, the ERT alerted and all occupants notified and awaiting further instruction. On that basis, the Chief Fire Warden is only concerned with how long it will take occupants to reach the nominated offsite location, once they are advised by the ERT to evacuate. This assessment seeks to provide guidance to the ERT regarding the amount of time required for safe evacuation.

There is little bushfire-related research available regarding the inputs required for calculating Evacuation Time, and as such there needs to be a reasonable level of conservatism applied. ***Additionally, the ERT needs to be aware that while this guides their decision-making process, they need to be aware off the bushfire behaviour and traffic condition on the day (as detailed in the BEMP), and alter the development emergency response accordingly.*** Table 26 summarises the inputs used for calculating Evacuation Time.

Table 26: Evacuation Time Inputs

Input	Value
Pre-movement Time	30 minutes
Travel Speed	40 km/hr
Queuing Time	20 mins (for total route)
Margin of Safety	2x Evacuation Time
Travel Distance – Development to Canal Rocks Road	1 km
Travel Distance –Canal Rocks Road to Caves Road	1.5 km
Travel Distance – Caves Rd to Dunsborough	12 km
Travel Distance - Caves Rd to Busselton	33 km
Travel Distance - Caves Rd to Cowaramup	26 km
Travel Distance - Caves Rd to Gracetown	28 km
Travel Distance – Caves Rd to Margaret River	40 km

The inputs in Table 26, represent travel speed of approximately half the permitted maximum road speeds, and given conditions should be relatively good at the time of egress (otherwise it

would be unsafe to conduct), the reduction in speed is expected to be primarily from traffic. A total time allowance of 20 minutes for queuing and traffic congestion has been applied, on the basis that the emergency management procedures require the ERT to monitor and consider traffic congestion, and if it becomes obvious that traffic is too congested, then offsite evacuation of the development is to be temporarily halted or abandoned entirely. It is also recommended that offsite evacuation is conducted pre-emptively and early to avoid traffic as much as possible, and where possible, staged to drip-feed vehicles into the road network rather than all at once.

It is assumed there will be some level of traffic management required along Smiths Beach Road by the onsite ERT to optimise traffic flow. Some level of congestion is expected on Smiths Beach Road due to the number of cars potentially exiting the tourism developments, however it is considered there will be limited delay turning onto Canal Rocks Road, a rolling stop at worst, given the lack of conflicting movements due to limited traffic from the west. At Caves Road, traffic will be moving predominately in one direction away from the fire, so it is unlikely vehicles will need to cross two-way traffic, and will be more of a merging scenario, however it is not possible to estimate the number of vehicles using this route. The expected queuing time during peak time operation to get onto Caves Road, from Smith Beach, would be expected to be up to 2 minutes, however given the elevated vehicle numbers, it is difficult to estimate the overall queuing time. On this basis, the 20 minute queuing allowance is considered sufficient to allow for time for queuing and unexpected delays, especially with the margin of safety of 2.

The pre-movement time is considered conservative, given there will be warning provided to occupants as soon as the ERT are aware of the bushfire, and pre-emptive preparations for offsite evacuation commenced as per the BEMP. If the fire is too close to the development, such that there is little warning which might increase pre-movement time, then it is considered that offsite evacuation would not be conducted anyway.

Table 27: Evacuation Time Results

Destination	Pre-movement Time	Movement Time (Travel and Queuing Time)	Evacuation Time (no Margin of Safety)	Total Evacuation Time (incl. Margin of Safety)	Travel Time on Google
To Dunsborough	30 mins	41.75 min	71.75 min (1.2 hrs)	**143.5 min (2.4 hrs)**	18 min
To Busselton	30 mins	73.25 min	103.25 min (1.7 hrs)	**206.5 min (3.5 hrs)**	31 min
To Cowaramup	30 mins	62.75 min	92.75 min (1.6 hrs)	**185.5 min (3.1 hrs)**	27 min
To Gracetown	30 mins	65.75 min	95.75 min (1.6 hrs)	**191.5 min (3.2 hrs)**	27 min
To Margaret River	30 mins	83.75 min	113.75 min (1.9 hrs)	**227.5 min (3.8 hrs)**	35 min
To Caves Road turnoff	30 mins	18.75 min	48.75 min (0.8 hrs)	**97.5 min (0.6 hrs)**	4 min

Review of the results in Table 27 provide the following guidance:

- Following the order to evacuate, the time it will take occupants to travel from the development and get through the Caves Road intersection, could be as little as 35-40 min (including pre-movement time), however given the amount of traffic would more likely be between 18.75 mins to 97.5 mins, depending on congestion and conditions
- Once through Caves Road intersection, it will take occupants as little as an additional 23 to 46 mins to reach Dunsborough or 44 to 88 mins to Cowaramup, depending on congestion and conditions
- The worst-case RSET is considered to be the longest time it would take the first occupant to reach an offsite location plus the overall time expected for all vehicles to egress

- The evacuation time to reach Cowaramup in the south, is 3.1 hours including the margin of safety
- The estimate time to evacuate a total vehicle load of 822 cars west of Caves Road, assuming a rate of approximately 15 seconds per vehicle (240 per hour), it would be expected to take 3.4 hours for all vehicles to egress on to Caves Road.
- Based on the above, the total RSET for the area west of Caves Road is estimated to be approximately 6.5 hours.

Available Safe Egress Time (ASET) Comments

As outlined above, given the complexity of trying to calculate the ASET for a variety of scenarios, especially when onsite sheltering is still a viable option, the preferred approach is to use the timeframes from the RSET calculation in combination with the anticipated bushfire behaviour, to provide guidance regarding triggers regarding when offsite evacuation can be considered safe to conduct.

The primary consideration is deciding an applicable rate of spread with which to determine the trigger distances. Table 28 summarises the calculated rate of spreads for various AS 3959 vegetation classifications using FLAMESOL, for an effective downslope of 2.5° and for both FDI 80 (current WA FDI) and FDI 50 (as per the 1:200 recurrence calculated in Table 24).

Table 28: AS 3959 Rate of Spread

AS 3959 Vegetation	Effective Slope	Rate of Spread (FDI80, 1200 K)	Rate of Spread (FDI50, 1200 K)
Class A Forest	Downslope 2.5°	2.85 km/hr	1.78 km/hr
Class B Woodland	Downslope 2.5°	1.71 km/hr	1.06 km/hr
Class C Shrubland	Downslope 2.5°	3.4 km/hr	3.4 km/hr
Class D Scrub	Downslope 2.5°	4.95 km/hr	4.95 km/hr
Class G Grassland	Downslope 2.5°	16.99 km/hr*	10.81 km/hr**

* GFDI = 110

** GFDI = 70

In addition to the rate of spreads depicted in Table 28, it is also noted that at the 2011 Margaret River Bushfires, the peak rate of spread was identified as being 3 km/hr, which occurred as the bushfire spread south on the strong northerly wind. Based on the rate of spread information above, the use of 3 km/hr as the expected rate of spread for trigger levels, given this is the actual rate determined from the Margaret River bushfires and that this also aligns with the 3.22 km/hr average of Class A, B, C and D vegetation which would be expected along the coast. It has been highlighted in the BEMP that this is an estimate to be reviewed based on current bushfire conditions on the day.

Evacuation Time Conclusion

Given the estimated number of vehicles to the west of Caves Road potentially seeking to evacuate along Canal Rocks Road and Smiths Beach Road, it is likely that there will be some level of traffic congestion, especially when considering that Caves Road could also be carrying considerable evacuating traffic. The decision to evacuate the development will be dictated to some level by the number of people present in the local area at the time, the ability to reach Caves Road and the volume of traffic using Caves Road, with visitor numbers during bushfire season likely to be highly variable.

A review of the RSET indicates that the worst-case time for evacuating occupants to reach destinations north or south of the development is approximately 3.1 hours (to reach Cowaramup), with a total evacuation time for all expected vehicles of about 6.5 hours. Assuming an average rate of spread of 3 km/hr, this following can be assumed:

- If a bushfire is 19.5 km from the development, there would be sufficient time for full evacuation of the entire development
- If a bushfire is within 9.3 km of the development, there may be insufficient time for vehicles to evacuate, depending on road and traffic conditions

On this basis, the following decision zones are to be included in the BEMP:

- Monitoring Zone
  - Any bushfire >30 km from site (i.e. further than 10 hours away)
- Readiness Zone
  - Any bushfire between 20 km to 30 km from site (i.e. between 6.5 and 10 hours away)
- Response Zone – Offsite Evacuation
  - Any bushfire between 10 km to 20 km from site (i.e. between 3.1 and 6.5 hours away)
- Response Zone – Onsite Shelter-in-place
  - Any bushfire between <10 km from site (i.e. less than 3.1 hours away)

While the following zones will be provided in the BEMP to guide decision-making, the following also needs to be highlighted to the ERT:

- The nominated 3 km/hr rate of spread is an averaged guide, and topography, weather (especially wind speed), vegetation profile etc, will all impact this on the day. Tracking the fire with real-time tools will provide the best indication of actual behaviour and this may impact the time to bushfire impact
- Rate of spread in scrub can be slightly quicker than 3 km/hr and in grassland vegetation can be much quicker up to 10-20 km/hr. This should be monitored, however significant bushfires in grassland don't appear to be common in the bushfire history in the area, and tend be more easily controlled that fires in other vegetation. Grassland bushfire behaviour is most likely if a fire is approaching from the east or south-east.
- **The direction of spread can change rapidly**, and this needs to be considered prior to any evacuation.
- The RSET calculation assumes peak load at the time of the fire, and significant traffic on Caves Road, however it is for guidance and unforeseen traffic congestion can affect the time it takes evacuating occupants to get to an offsite place of safety. This needs to be considered during any decision to conduct offsite evacuation, especially if traffic conditions are poor.
- All decisions to evacuate the development should be conducted in consultation with the Incident Controller or authorised DFES personnel, where possible.
- Staging the offsite evacuation is also a significant consideration, to limit the number of people on the road, and provide time for the ERT to continually re-evaluate the decision to continue offsite evacuation.
- Traffic management will be required to smooth the flow of vehicles. Consider stationing ERT members or staff at the following locations:
  - The "Leeuwin Way" road intersection with Smiths Beach Road

- The "Smiths Lane" intersection with Smiths Beach Road
- The Canal Rocks Road and Smiths Beach Road intersection,
- At the Smiths Beach Road cul-de-sac and existing resorts
- Monitor the Canal Rocks Road and Caves Road intersection for congestion.

Staff should only be sent to these locations only if safe to do so. The expectation is offsite evacuation should not be conducted if it is not safe to send staff to these locations.

- If there is any doubt about the safety of the road network to an offsite location, it will be safer to remain onsite, given the relative safety provided by the community bushfire refuge. A significant number of fatalities in bushfires occur on the roads.
- Congestion on the road network also hinders bushfire fighting operations. Remaining onsite to lessen traffic congestion, will only assist fire brigade in conducting their operations, which is already a significant challenge without the public adding to the burden.
- Any evacuating occupants should be advised that travelling back to the development for onsite refuge is an option, should conditions or road congestion create a risk of being trapped. This is especially the case prior to getting onto Caves Road, where traffic travelling along Canal Rock Road and Smiths Beach Road is likely to be limited.

Design Bushfire Scenario Characteristics

Based on review of vegetation and topography (including regional hazard mapping), FDI, wind directions, length of fire runs and bushfire history presented above, the following five design bushfire scenarios have been identified for assessing likely impact upon proposed development as part of this BMP. The first four scenarios consider external bushfire impacting proposed and existing development, while the fifth scenario considers potential for fire ignition within the site impacting surrounding assets. Table 29 provides a summary of the first four scenarios with further summary in the sections below, while Scenario 5 is detailed entirely below.

Design Bushfire Scenario 1: Bushfire approaching from south-east, south and south-west

Bushfires from the south and south-east have sufficient fire runs and continuous fuel loads that could exhibit landscape-scale bushfire behaviour and potentially exceed AS 3959 bushfire modelling. Winds from the south-east would be expected in summer mornings, however don't seem to occur during peak FFDI very often, nor from the south, however as bushfire ignitions have happened in these directions, it is possible that a bushfire would occur during the life of the development.

Given the potential for elevated bushfire behaviour and potential impact on the proposed and existing development and the vehicular access network, this scenario is considered a significant risk to this development and surrounding existing land uses, if left unmanaged.

The management of the bushfire hazards from this scenario will need to ensure suitably sized APZs to the south-west, south and south-east of the development, to reduce the expected landscape-scale bushfire behaviour. This will be accompanied by a variety of other measures (onsite landscaping, bushfire fighting water supply, BEMP etc), with an onsite community bushfire refuge considered critical to address the legacy single public road access to the site.

Design Bushfire Scenario 2: Bushfire approaching from east.

A bushfire from the east will have sufficient fire runs and fuel loads that they would establish steady state bushfire behaviour aligned with AS 3959 bushfire modelling. While the fuel loads

are continuous, the fragmentation with substantial tracts of grassland is likely to cause the rate of spread to pulse, especially closer to the development along Gunyulgup Brook. Winds from the east would be expected in summer mornings but also have a propensity to occur later in the day during peak FFDI events. Given bushfire ignitions have happened in these directions means it is possible that a bushfire would occur during the life of the development.

Given the potential for elevated bushfire behaviour and impact on the proposed and existing development, and disruption to the vehicular access network, this scenario is considered a significant risk to the development and surrounding land uses.

The management of the bushfire hazard associated with this scenario, will be similar to the measures detailed in Scenario 1, but with appropriately APZs along the eastern interface.

Design Bushfire Scenario 3: Bushfire approaching from north and north-east.

A bushfire from the north and north-east have sufficient fire runs and continuous fuel loads that they are likely to exhibit landscape-scale bushfire behaviour to Gunyulgup Brook that could potentially exceed AS 3959 bushfire modelling. Bushfire behaviour would be expected to lessen with the reduced fuel loads on the south-east side of the Gunyulgup Brook, however will still be fully-developed with elevated radiant heat and ember attack. Winds from the north and north-east occur appear to occur later in the day during peak FFDI events, and may provide an indicator as to when to be vigilant for bushfire activity. Given a significant bushfire has occurred to the north-east, a bushfire should occur during the life of the development.

Given the potential for elevated bushfire behaviour and impact on the proposed and existing development, and disruption to the access network, this scenario is considered a significant risk to the development and surrounding land uses.

The management of the above bushfire hazards is to be achieved using measures similar to previous scenarios but with vegetation modification to the north to reflect the limited fuel load and anticipated bushfire behaviour associated with the foreshore.

Design Bushfire Scenario 4: Bushfire approaching from west and north-west

Based on the above, a fire ignition to the west or north-west of the project area is only likely to produce a local bushfire event with insufficient fire run or fuel loads to produce a landscape-scale bushfire. It is questionable whether ignition in shrubland vegetation to the north-west of the development would even produce a bushfire, however there is more likelihood of local bushfire in the scrub vegetation to the south. Winds from the north-west and west occur rarely during summer or high FFDI days, so even if there was ignition, it is still unlikely the winds would result in fire spread toward the development.

There is considered to be limited likelihood of a bushfire igniting and spreading from the north-west or west, and given the short fire runs, the potential for elevated bushfire behaviour also unlikely. The expected impact on the proposed and existing development, and disruption to the access network, is significantly less than other scenarios, however there is potential for damage and this scenario should not be ignored.

The management of the above bushfire hazards is to be achieved using measures similar to previous scenarios, however APZ widths need only respond to localised bushfire behaviour.

Design Bushfire Scenario 5: Bushfire igniting within the development

The previous scenarios have reviewed the likelihood of bushfire impacting on the proposed development. This scenario reviews the potential risk of the proposed development to increase the likelihood of bushfire.

One potential risk is that of potential ignition sources at the proposed development igniting nearby vegetation, flammable liquids or other combustible items to create a bushfire. A review of historical ignition sources in the City of Busselton reveals that there are few sources that would apply to the development itself. The main ignition risk appears to be from:

- Suspicious/Deliberate (arson)
- Power Lines (power supply system)
- Campfire/Cooking
- Cigarettes

In addition to the ignition sources identified above, the proposed development also introduces other potential hazards such as the onsite hot works or maintenance actions that could ignite a fire.

The management of the above ignition hazards is to be achieved using the following measures:

- Managing onsite vegetation as low threat vegetation and APZs, resulting in managed fuel loads that are well separated, to limit ability of ignition to easily spread and develop into a significant fire before suppression.
- Provide sufficient fire hydrant and fire hose reel coverage to enable rapid suppression of a spot fires.
- Having power supply cabling installed below ground and creating separation between above-ground transformers and unmanaged vegetation, or otherwise provide protection.
- Managing the use of any open fires and ensuring cooking is conducted in kitchens or on BBQ's
- Ensure facility policies address when and how maintenance activities that could result in fire ignition are to be conducted to avoid ignition
- Have ongoing onsite training and community awareness sessions to promote bushfire safety

In addition to the above management measures, it is also acknowledged that the increase in visitation to the site means there will be greater surveillance around the development and an ignition would likely be reported far quicker resulting in a rapid suppression response.

Table 29: Design Bushfire Scenarios 1, 2, 3 and 4

Design Bushfire Scenario	Vegetation, Slope and Fire Runs	Winds and Bushfire History	Bushfire behaviour comments	Impact on the proposed development	Impact on existing development (prior to proposed development)

Scenario 1 Bushfire approaching from south-east, south and south-west	***Vegetation***
	• To the south, relatively continuous shrubland/scrub vegetation within the National Park
	• fragmented forest and grassland around Injidup Natural Spa,
	• To the south-east, continuous scrub and forest within 300-400 m of the project area, then becomes largely grassland with plots of forest.
	Slope
	• On a regional level the effective slope is undulating
	• Near the project area there is a local high point about 400 m south of the project area
	• Bushfires would be descending toward the development.
	Fire runs
	• From the south-west, fire runs are restricted to 1.5 km long due to the coastline
	• From the south and south-east, there are no specific physical barriers and fire runs could be >10 km long.
		Winds
		• Winds from the south-west are common on summer afternoons
		• Winds from the south-east occur during summer mornings
		• Southerly winds are less common.
		• Winds from these directions only occur on 15% of the highest FFDI days.
		Bushfire History
		• Sporadic evidence of bushfires to the south in the local area (<10 fires within 5 km),
		• Most fires are historically restricted to between 2 ha-7 ha in area,
		• Few recorded bushfires within the National Park.
		• Few substantial bushfires occur in grassland to the south-east
			• The rate of spread from the south and south-west is likely to peak at the 3 km/hr due to scrub vegetation,
			• Greater rate of spread of 10-20 km/hr, could occur through grassland vegetation to the south-east during high winds before slowing again in areas of forest and scrub.
			• A bushfire from the south-west likely to produce a local bushfire event due to the limited fire run and coastal fuel loads,
			  ○ could exhibit elevated radiant heat and ember attack.
			• Bushfires from the south and south-east have significant fire runs and continuous fuel loads
			  ○ could exhibit elevated landscape-scale bushfire behaviour, that could potentially exceed AS 3959 bushfire modelling.
			• Given bushfire ignitions have happened these directions means it is possible that a bushfire would occur during the life of the development.
				• Would be expected to directly impact
				  ○ the WTP/WWTP infrastructure and holiday homes on the southern interface, with ember attack within the remainder of the development
				• Would impact the "Leeuwin Way" road and southern perimeter roads of the development
				• When close to the project area, would likely prevent egress from the development along Smiths Beach Road and Canal Rocks Road
					Visitors to the Smiths Beach / Guests at nearby tourism accommodation
					• Exposed to bushfires from this direction with little separation from vegetation.
					• If fire is close to site, could prevent vehicular egress on Smiths Beach Road, Canal Rocks Road or Caves Road,
					• If the resorts have limited bushfire resilience for onsite shelter-in-place, people would be forced to relocate to Smiths Beach for open space refuge,
					  ○ This is not considered appropriate for open space refuge given there is insufficient width to achieve the safe radiant heat flux of 2 kW/m² required for open space refuge, nor is there shelter, food, water or toilets.
					Visitors to the Aquarium and Canal Rocks
					• Exposed to bushfires from these southerly directions.
					• People at the Aquarium might be trapped due to extended walking required to get to Kathleen's Seat carpark and may need to shelter at the Aquarium, where they are exposed to the fire and elements along the coast.
					• If fire is close to site, vehicular egress could be prevented to Caves Road and beyond, forcing relocation to Smiths Beach or Canal Rocks, both of which aren't suitable for open space refuge.
					Occupants in surrounding residential/commercial
					• Could be exposed to bushfires from these directions, and if vehicular egress is prevented, would potentially need to seek refuge at Smiths Beach or Canal Rocks if unsafe to shelter in houses or buildings.
					Regional road network
					• Bushfires would likely impact local road network including Smiths Beach Road, Canal Rocks Road and likely Caves Road from the south.
					• Access by fire appliances may still be possible, but there may be times where this is disrupted or temporarily blocked.

Scenario 2 Bushfire approaching from east.	***Vegetation*** • Combination of scrub and forest vegetation, that is fragmented by grassland, especially along Gunyulgup Brook east of Chandlers Villas. ***Slope*** • On a regional level the effective slope is undulating • Near the project area, Gunyulgup Brook is a local low point about 250 m to the east, • Bushfires would be ascending on a gentle slope toward the development. ***Fire runs*** • Fire runs from the east could be significant length with no permanent barriers to bushfire spread in this direction, as such fire runs could be >10 km long.	***Winds*** • Winds from the east are common on summer mornings and also occur regularly on the highest FFDI days. ***Bushfire History*** • Sporadic evidence of bushfires to the east in the local area (<10 fires within 5 km), • Most fires are historically restricted to between 2 ha-7 ha in area. • Few substantial bushfires occur in grassland to the east	• The rate of spread is likely to peak at the 3 km/hr in scrub vegetation • Greater rate of spread of 10-20 km/hr, could occur through grassland during high winds before slowing again in areas of forest and scrub. • Due significant fire runs and fuel loads ○ could exhibit elevated radiant heat and ember attack. • Given bushfire ignitions have happened these directions means it is possible that a bushfire would occur during the life of the development.	• Would be expected to directly impact the Eastern holiday homes and WTP/WWTP infrastructure, with ember attack within the remainder of the development • Would impact the "Leeuwin Way" road and Smiths Beach Road along the eastern and southern interfaces of the development • When close to the project area, occupant egress from the development along Smiths Beach Road and Canal Rocks Road, would likely be disrupted and temporarily blocked.	***Visitors to the Smiths Beach / Guests at nearby tourism accommodation*** • Exposed to bushfires approaching from the east, which would likely force offsite evacuation or relocation to Smiths Beach for open space refuge ***Visitors to the Aquarium and Canal Rocks*** • Exposed to bushfires from the east with little separation from vegetation. • People at the Aquarium may be trapped due to extended walk to carpark • If fire is close to site, vehicular egress could be prevented to Caves Road and beyond, forcing relocation to Smiths Beach or Canal Rocks, both of which aren't suitable for open space refuge ***Occupants in surrounding residential/commercial*** • Could also be exposed to bushfires from the east, and if vehicular egress is prevented, would potentially need to seek refuge at Smiths Beach or Canal Rocks if unsafe to shelter in houses or buildings. ***Regional road network*** • Bushfires would likely impact local road network including Smiths Beach Road, Canal Rocks Road and likely Caves Road both south and north of the intersection, which would likely prevent evacuation or potentially trap people in cars along the route. • Fire brigade access would likely be disrupted with and could be temporarily blocked preventing further access to the development and local area.
Scenario 3 Bushfire approaching from north and north-east	***Vegetation*** • Primarily continuous shrubland/scrub and forest fuel loads in the National Park • Close to the project area, the vegetation is fragmented by grassland along Gunyulgup Brook ***Slope***	***Winds*** • Winds from the north and north-east are not common during the summer months, however they do occur regularly on the highest FFDI days. • A bushfire to the north-east could be pushed toward the site by north-easterly wind changes.	• The rate of spread is likely to peak at the 3 km/hr in shrubland and scrub vegetation, with a local acceleration in nearby grassland lining Gunyulgup Brook. • Due to significant fire runs and continuous fuel loads	• Would be expected to directly impact the Eastern holiday homes and Hotel, with ember attack within the remainder of the development • Would impact the Smiths Beach Road along the northern and eastern interface of the development	***Visitors to the Smiths Beach / Guests at nearby tourism accommodation*** • Exposed to bushfires approaching from these directions, which would likely force offsite evacuation or relocation to Smiths Beach for open space refuge ***Visitors to the Aquarium and Canal Rocks*** • Exposed to bushfires with little separation from vegetation, although there is not vegetation to the north or north-east of Canal Rocks • People at the Aquarium may be trapped due to extended walk to carpark

Design Bushfire Scenario	Vegetation, Slope and Fire Runs	Winds and Bushfire History	Bushfire behaviour comments	Impact on the proposed development	Impact on existing development (prior to proposed development)
	• On a regional level the effective slope is undulating • Near the project area, Gunyulgup Brook is a local low point to the north-east • Bushfires are ascending on a gentle slope toward the development. ***Fire runs*** • Fire runs from the north and north-east could be significant length with no permanent barriers to bushfire spread in this direction, other than Yallingup townsite which is unlikely to stop a fire, as such fire runs could be >10 km long.	***Bushfire History*** • Sporadic evidence of bushfires to the north-east in the local area (<10 fires within 5 km), • A significant bushfire occurred in 1993 north of Yallingup townsite demonstrates significant bushfire can occur in this location.	○ could exhibit elevated landscape-scale bushfire behaviour, that could potentially exceed AS 3959 bushfire modelling. ○ Fragmentation of the fuel load across Gunyulgup Brook and narrowing of the coastal vegetation along the foreshore would likely reduce the bushfire behaviour before it reached the development. • Given a significant bushfire has occurred to the north-east, a bushfire should occur during the life of the development.	• When close to the project area, occupant egress from the development along Smiths Beach Road and Canal Rocks Road, would likely be disrupted and temporarily blocked.	• If fire is close to site, vehicular egress could be prevented to Caves Road and beyond, forcing relocation to Canal Rocks, which isn't suitable for open space refuge ***Occupants in surrounding residential/commercial*** • Could also be exposed to bushfires from the north and north-east, and if vehicular egress is prevented, would potentially need to seek refuge at Smiths Beach or Canal Rocks if unsafe to shelter in houses or buildings. ***Regional road network*** • Bushfires to from the north and north-east that are sufficiently far from the area, may enable egress via Canal Rocks Road and south on Caves Rd, however significant ember attack ahead of the bushfire would be expected to impact evacuation routes ahead of the main bushfire front. • As the bushfire reaches the area it would impact local road network including Canal Rocks Road and Caves Road, which would likely prevent evacuation or potentially trap people in cars along the route. • Fire brigade access would likely be achieved to the area if the bushfire is sufficiently far enough away from the area, however as it gets closer it would disrupt and eventually temporarily block Caves Road and Canal Rock Roads, preventing fire appliance access to the development and local area.
Scenario 4 Bushfire approaching from west and north-west	***Vegetation*** • Low coastal shrubland in the northern areas, typically less than 0.5 to 1.5 m high, and transitioning to scrub vegetation along the southern portion of the project areas • Vegetation along the northern interface is only a narrow plot, no greater than 42 m wide. ***Slope*** • Effective slope is a steep downslope along the coast to the west, however closer to the proposed development, the slope transitions to either a gentle downslope or flat/upslope ***Fire runs*** • Fire runs are short and range from 100 m (from north-west) to 400 m (from west).	***Winds*** • Winds from a north-west or westerly direction are not common during summer or on high FFDI days. • Any wind changes associated with a bushfire spreading in this direction would likely push the fire away from the development and toward the coast or south into Leeuwin Naturaliste National Park ***Bushfire History*** • There is little evidence of bushfires from this direction in the local area, other than a 0.5ha bushfire in 1997 that occurred just north of the Aquarium	• Peak rate of spread through the shrubland and scrub vegetation would be 3 km/hr, however given the short fire runs and limited fuel loads, this peak rate is unlikely to occur. • Fire ignition would be close to development, and if not extinguished quickly, it would likely be a relatively small local fire given there is insufficient fire run or fuel loads to produce a significant bushfire. • Given the lack of bushfires igniting in these directions, and the winds not being associated with summer or high FFDI days, a bushfire is unlikely to occur from the north-west or west during the life of the development.	• Would be expected to directly impact the Hotel and Western holiday homes, with limited impact, if any, from ember attack into the remainder of the development • Could impact the Western holiday home perimeter road and the "Leeuwin Way" road and Smiths Beach Road, likely to the south of the development • If the bushfire is close to the project area, especially to the south, occupant egress from the development along Smiths Beach Road and Canal Rocks Road, could be disrupted and temporarily blocked.	***Visitors to the Smiths Beach / Guests at nearby tourism accommodation*** • Exposed to bushfires approaching from these directions, however may not reach sufficient size to force offsite evacuation or relocation to Smiths Beach • Could prevent egress on Smiths Beach Road and Canal Rocks Road. ***Visitors to the Aquarium and Canal Rocks*** • Unlikely to be direct impact on occupants due to winds pushing the bushfire away from these locations, • People at the Aquarium might be caught walking to their cars • People would be required to seek refuge in their cars in Canal Rocks carpark, at Kathleen's Seat or along Canal Rocks Road • Vehicular egress would likely be prevented to along Canal Rocks Road and Smiths Beach Road ***Occupants in surrounding residential/commercial*** • Could also be exposed to bushfires from the west and north-west, but may be able to still egress out to Caves Road. • If vehicular egress is prevented, they may be unable to seek refuge at Smiths Beach or Canal Rocks, and may need to shelter within houses or buildings. ***Regional road network*** • Bushfires approaching from the west or north-west would be expected to impact Smiths Beach Road, Canal Rocks Road and/or Caves Road, which would likely prevent evacuation or potentially trap people in cars along the route. Early evacuation may be possible, but given the limited fire runs, the bushfire could reach the roads quickly. • Fire brigade access would likely be disrupted with and could be temporarily blocked preventing access to the development and local area.

Risk Analysis

This risk assessment has detailed the existing site, the proposed development and the anticipated bushfire hazard to the project area and also existing land uses in the surrounding area. It has noted that there are various existing risk controls already in place that seek to reduce the risk of bushfire impact on existing land uses, including visitors to the area. The Capes Zone Response is an example of the recognition of the risk to existing residents and visitors from bushfire, and the reaction from State and Local Government and the various agencies.

Summary of bushfire hazard issues

Despite the existing bushfire risk management controls, there remains several key bushfire compliance and hazard issues that apply to the proposed development, and existing land uses in the local area including:

- The legacy 2 km long dead-end public road access to the project area which is not able to be resolved by the Proponent. It is noted this is non-compliant with Acceptable Solutions A3.1 and A3.3 from the Guidelines.
    - This increases the distance and time occupants and fire services must travel on a public road, where there exists no alternative options to travel in other directions to another suitable destination. This increases the potential for occupants and fire services to be trapped on the road network, and also the chance of fatalities.
    - This non-compliance applies to occupants at the proposed development and to residents, visitors and guests of the existing land uses in the local area.
- The proposed new "Leeuwin Way" public road exceeds 200 m in length from a point of choice to two different destinations, which exceeds the maximum length permitted for a dead-end road in accordance with Acceptable Solution A3.3 from the Guidelines. This is unavoidable due to the legacy road network.
- The contiguous vegetation over long fire runs to the south and south-east within the National Park, could potentially generate landscape-scale bushfire conditions that directly impact with the proposed development, and existing land uses. This behaviour is also possible from the north and north-east, however there is not considered to be the same interface with contiguous vegetation on this side of the development.
    - landscape-scale bushfires could exceed the bushfire behaviour modelling used to inform the various management measures required to mitigate the bushfire risk to acceptable levels, and additional measures may be required.
- There is potential for bushfires to impact various key infrastructure including electrical supply, mobile phone, and water networks.
- The proposed development will result in additional occupants (holiday home owners, guests, visitors) in the local area, many who may be unfamiliar with their surroundings or what actions to undertake in a bushfire emergency.
- The existing land uses adjacent to, and near, the proposed development are also subject to the legacy access issue, and are likely to have limited construction resilience to bushfire making offsite evacuation vital to survival.

Key bushfire opportunities

The following opportunities have been identified to resolve the bushfire hazards nominated above, and assist mitigating risk to existing land uses and their occupants:

- Establish a community bushfire refuge that is able to provide a place of relative safety for occupants at the development should offsite evacuation not be possible during a bushfire emergency, in addition to those occupants in nearby development.
    - This provides a preferable location to the current option of open space refuge on Smiths Beach, which isn't large enough to achieve 2 kW/m^2, is exposed to the weather and has no shelter, water, food or toilet facilities. This represents a meaningful opportunity to reduce the significant legacy risk associated with the local area
    - This is only to be for last resort shelter-in-place, when the road network to offsite locations is not safe for use or is congested.
- Provide a holistic vegetation modification strategy for the entire development, and the Foreshore Reserve, that clearly defines the proposed treatments which appropriately bushfire risk management especially along the southern interface, but also balances environmental and visual amenity objectives.
- Develop a bushfire emergency management strategy that focuses on preparedness, awareness and response actions including having a clear plan for managing the safe offsite evacuation of occupants, or if required, onsite shelter-in-place at the community bushfire refuge.
    - This can be relayed to the adjacent accommodations, to raise their level of awareness of local bushfire events and potentially encourages early evacuation of these developments or relocation to the bushfire refuge.
- Create a development that is resilient to bushfire which would provide shielding protection to adjacent resorts for bushfires in some directions, whilst also creating a place of relative safety for them to evacuate to, rather than Smiths Beach.

Proposed Bushfire Risk Management Strategy

The bushfire risk management strategy and measures for the proposed development, are detailed in Section 6 and include addressing the following:

- Community Bushfire Refuge
- Vegetation Modification and Management
- Water supply (including bushfire fighting supply)
- Essential infrastructure
- Bushfire Construction Requirements
- Bushfire Emergency Management (including preparedness and response actions)
- Implementation, Maintenance, Auditing and Enforcement

Likelihood and Consequence

Likelihood

The likelihood is the probability of bushfire hazards impacting on people and/or assets, or the function that assets have in protecting human life. The likelihood rating system is outlined in Table 30, and utilises primarily likelihood descriptions, supplemented by the assessment of fire weather probability (i.e. GEV analysis of FFDI), in order to adopt the most appropriate likelihood classification for each scenario/asset mix.

Table 30: Likelihood rating system

Likelihood rating	Description	Probability of fire weather (design fire events)
Almost certain	• It is likely that the hazard will impact the asset during the timeframe • High level of recorded incidents and/or strong anecdotal evidence; and/or • Strong likelihood that event will recur; and/or • Great opportunity, reason or means to occur	• 1 in 20 yr (5% AEP)
Likely	• It is moderately likely that the hazard will impact the asset during the timeframe • Regular recorded incidents and moderate anecdotal evidence and/or • Considerable opportunity, reason or means to occur	• 1 in 50 yr (2% AEP)
Possible	• It is likely as not that the hazard will impact the asset during the timeframe • Few recorded incidents and limited anecdotal evidence; and/or • Some opportunity, reason or means to occur.	• 1 in 100 yr (1% AEP)
Unlikely	• It is moderately unlikely that the hazard will impact the asset during the timeframe • Infrequent, random recorded incidents and very little anecdotal evidence; and/or • Limited opportunity, reason or means to occur.	• 1 in 200 yr (0.5% AEP)
Rare	• It is unlikely that the hazard will impact the asset during the timeframe • No recorded incidents and almost no anecdotal evidence; and/or • Would only occur under exceptional circumstances	• 1 in 500 yr (0.2% AEP)

AEP – Annual Exceedance Probability

Consequence

Consequence is the impact of a bushfire on people and assets, including surrounding infrastructure, and the function that assets have in protecting human life. The consequence rating system is outlined in Table 31, developed as a synthesis of various guidance material, and uses a qualitative system divided over five categories, enable accurate assessment of consequence.

Table 31: Consequence rating system

Consequence rating	Life Safety (People)	Buildings, Assets, Infrastructure	Social	Environmental	Economic and Administration
Catastrophic	• Likely there would be multiple cases of fatalities • Extensive number of severe injuries or disabilities. • Significant hospitalisation. • Extensive displacement of persons for extended duration. • Extensive resources required for personal support.	• Destruction and damage to majority or all development, property, plant and equipment (>75% as a guide) • Long-term failure of significant infrastructure and service delivery affecting all parts of the facility. • Development would be non-operational and unable to function without significant support • Long term reconstruction and rebuild required using extensive external resources.	• Large long-term or permanent loss of services, employment, wellbeing, finances or culture (e.g. > 75% of community affected), • Widespread and permanent loss of objects of identified cultural significance • Permanent cancellation of a major culturally important community activity • No suitable alternative sites exist. • Social connectedness is irreparably broken (community ceases to function effectively, breaks down and disperses in its entirety)	• Irreversible damage to local environmental asset/s, especially those recognised at the national level, that would compromise its viability • Very limited opportunity for rehabilitation • No alternate habitats exist and no offset opportunity	• Decline of economic activity, and/or • Extensive loss of asset value • Economic impacts are for a significant period of time with substantial financial assistance required to recover. • Facility is unable to deliver the core functions
Major	• Isolated cases of fatalities. • Multiple cases of serious injuries or disabilities • Some hospitalisations. • Large number of persons displaced for moderate duration • Significant resources required for personal support.	• Destruction and damage to significant portion of development or property, plant and equipment (50% - 75% as a guide) • Potential failure or disruption of significant infrastructure and service delivery affecting significant parts of the facility with services unavailable. • Development would be non-operational for a moderate period of time and unable to function without significant support • Major reconstruction and rebuild is required using significant external resources.	• Medium term disruption to services, employment wellbeing, finances or culture (e.g. < 50% of community affected) • Widespread damage or localised permanent loss of objects of identified cultural significance • Temporary cancellation or significant delay to a major culturally important community event • Very limited suitable alternative sites exist. • Social connectedness is significantly broken, (extraordinary external resources required to return the community to functioning effectively, significant permanent dispersal)	• Severe damage to local environmental asset/s, especially those recognised at the local or regional levels, that would compromise its viability • Potential for some rehabilitation, but would require major effort and resources • Few alternate habitats exist with limited offset opportunity	• Decline of economic activity, and/or • Significant loss of asset value • Economic impacts are for a significant period of time with significant financial assistance required to recover • Facility encounters severe reduction in ability to delivery of core functions for a significant period of time
Moderate	• Very isolated (rare) fatalities • Isolated cases of serious injuries or disabilities • Limited hospitalisations required. • Isolated cases of displaced persons who return relatively quickly. • Personal support satisfied through facility arrangements.	• Partial loss or damage caused to development or property, plant and equipment (25% - 50% as a guide) • Potential disruption of significant infrastructure and service delivery affecting parts of the facility. • Parts of the development may be non-operational for a short period of time with the remainder remaining operational in the interim • Partial reconstruction is required to restore full operations with some external resources	• Major short term or minor long-term disruption to services, employment wellbeing, finances or culture (e.g. < 25% of community affected), • Damage or localised widespread damage to objects of identified cultural significance • Delay to a major culturally important community event • Limited suitable alternative sites exist. • Social connectedness is broken (community requires significant external resources to return community to functioning effectively; some permanent dispersal)	• Isolated damage to local environmental asset/s, especially those recognised at the local or regional levels, that would compromise its viability • Potential for rehabilitation, but would require significant effort and resources • Alternate habitats exist representing opportunity for offsets.	• Decline of economic activity, and/or • Moderate loss of asset value • Economic impacts are for a short period of time with additional financial assistance required to recover • Facility encounters significant reduction in ability to delivery of core functions for a short period of time
Minor	• No fatalities. • Very isolated (rare) cases of serious injuries or disabilities • Isolated minor injuries with first aid treatment possibly being required. • Very few to no persons displaced. • Little or no personal support required.	• Localised minor damage caused to development or property, plant and equipment (10% - 25% as a guide). • Isolated cases of short-term disruption to significant infrastructure and service delivery. • Isolated cases of parts of the development being non-operational for very short periods of time with the remainder of the facility functioning as normal with some inconvenience • Minor rectification works required to restore full operations with limited external resources	• Small to medium disruption to services, employment wellbeing, finances or culture (e.g. < 10% of community affected), • Damage to objects of identified cultural significance • Delay to or reduced scope of a culturally important community event • Some alternative sites exist • Social connectedness is damaged (community requires some external resources to return the community to functioning effectively, with no permanent dispersal)	• Minor damage to local environmental asset/s, especially those recognised at the local or regional levels, that would compromise its viability • Rehabilitation to reverse effects is likely, but would require effort and resources • Alternate habitats exist representing opportunity for offsets.	• Decline of economic activity, and/or • Limited loss of asset value • Economic impacts are for a very short period of time with limited if any, financial assistance required to recover • Facility encounters limited reduction in ability to delivery of core functions for a short period of time
Insignificant	• No fatalities. • No cases of serious injuries or disabilities • Very isolated (rare) minor injuries with first aid treatment possibly being required. • No persons displaced. • No personal support required.	• Little to no damage caused to development or property, plant and equipment (<10% as a guide). • Inconsequential or no disruption to significant infrastructure and service delivery. • The facility functioning as normal with minor inconvenience with little or no specific recovery effort required beyond the immediate clean-up. • Little to no rectification works required to restore full operations with limited external resources	• Minimal short-term inconveniences to services, employment, wellbeing, finances or culture (e.g. < 5% of community affected), neighbourhood loss, • Minor damage to objects of identified cultural significance • Minor delay to a culturally important community event • Many suitable alternative sites exist. • Social connectedness is disrupted, (reprioritisation/reallocation of existing resources is required to return the community to functioning effectively, with no permanent dispersal)	• Minimal to no damage to local environmental asset/s, especially those recognised at the local or regional levels, that would compromise its viability • Environmental asset to regenerate without rehabilitation to reverse effects	• Decline of economic activity, and/or • Little to no loss of asset value • Economic impacts are inconsequential with almost no financial assistance required to recover • Facility encounters no reduction in ability to delivery of core functions and is essentially unaffected.

Risk Rating

Risk rating and treatment priorities (risk ranking)

Following determination of likelihood and consequence, the analysis of risk is primarily achieved through the comparison of likelihood and consequence to assess the potential for impact on people or the asset by the hazard.

From a bushfire risk management perspective, this methodology can be useful in determining:

1. The *inherent* bushfire risk (i.e. the initial or untreated level of risk).
2. The *residual* bushfire risk (i.e. the treated level of risk following implementation of risk treatment and mitigation measures).

The risk level matrix in Table 32, identifies the level of risk using the assessed likelihood and consequence for each scenario and asset. This process is used prior to treatment, to determine the inherent bushfire risk of the event and informs the level of mitigation or management response required to reduce the risk to a tolerable or acceptable level.

The risk ratings also provide a treatment priority which determines the order, importance or urgency for risk reduction including the allocation of resources to apply the treatment strategies. Treatment of assets with an extreme risk rating should be addressed before assets with lower risk ratings. A treatment priority of 1A is the highest priority and a treatment priority of 5C is the lowest priority.

Table 32: Risk assessment matrix and treatment priorities (risk ranking)

Likelihood	Consequence rating				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium (5)	High (4)	High (3)	Extreme (2)	Extreme (1)
Likely	Medium (6)	Medium (5)	High (4)	High (3)	Extreme (2)
Possible	Low (7)	Medium (6)	Medium (5)	High (4)	High (3)
Unlikely	Very Low (8)	Low (7)	Medium (6)	Medium (5)	High (4)
Rare	Very Low (9)	Very Low (8)	Low (7)	Medium (6)	Medium (5)

Risk assessment

The risk assessment has been conducted for the following onsite assets:

- Hotel public area buildings and Communal Hub (also forms the Community Bushfire Refuge)
- Hotel Precinct – the hotel suites and eco-suites
- Campground – including the communal building and amenities/maintenance building
- Western Holiday home
- Eastern Holiday home
- Water Treatment Plant (WTP) and Wastewater Treatment Plant (WWTP)

In addition to the onsite assets, the following offsite assets have also been assessed, to assist in the consideration of the benefit of this development to the local community:

- Aquarium – snorkelling area, lookout and carpark
- Canal Rocks – carpark, boating ramp, amenities
- Smiths Beach – beach users that aren't using the proposed development
- Tourism Accom – Canal Rocks Beachfront Apartments and Smiths Beach Resort
- Tourism Accom – Chandlers Villas

- Surrounding Residential/Commercial

The risk assessment for the various existing and proposed assets detailed above, across the five nominated bushfire scenarios is conducted by assessing the likelihood and consequence for each asset/scenario combination and then determining the risk level from the matrix in Table 32. The risk for life (purple text) and property and infrastructure (black text) have also been separated out, to enable the discussion regarding life safety risk to be detached from the bushfire resilience of buildings occupants might typically be using (e.g. holiday homes, hotel, tent sites, offsite accommodation etc), given occupants would be expected to evacuate offsite if safe to do so, or relocate to the bushfire refuge. This enables a more targeted analysis regarding whether the risk assessment demonstrates that life safety is preserved, and whether bushfire impact on property and infrastructure is appropriately reduced as per SPP 3.7 Policy Intent.

The risk assessment is summarised in Table 33, and outlines that the inherent and residual risk asset/scenario mix. The inherent risk for the proposed development represents a situation where buildings, infrastructure and vehicular access are constructed as "normal", with none the bushfire mitigation measures stipulated in the BMP incorporated. The existing bushfire risk controls would be in place, which would be expected to somewhat mitigate the bushfire risk. The inherent risk for existing adjacent and surrounding development reflects the current situation, without this development in place, with the following:

- Assumed existing construction and onsite vegetation management, and proximity of unmanaged vegetation to existing development. This is considered to provide an indicative guide to inherent risk to existing development (and occupants) from a worst credible bushfire, and it is acknowledged this doesn't constitute a detailed assessment of these properties.
- Assumes existing emergency management controls already in place
- Regarding life safety, it is generally assumed people will be aiming to evacuate offsite or be required to seek respite at Smiths Beach or Canal Rocks, if evacuation out of local area isn't possible.

The residual risk reflects the full implementation of the bushfire risk management strategy and measures, including provision of the bushfire refuge, landscaping treatments, bushfire construction requirements, vehicular access, bushfire fighting water supply modifications, protection of infrastructure including water supply, and implementation of the BEMP etc. The residual risk to the existing development is altered by provision of the bushfire refuge for safe shelter, and in some cases, the development shields adjacent facilities from some bushfire impact.

To enable analysis of the risk assessment, an acceptability/tolerability criteria are outlined in Table 34, with further analysis conducted against this criteria in the section below.

Table 33: Bushfire Risk Assessment

Scenario		Control/Treatment (Existing)	Inherent Risk			Control/Treatment (Proposed improvement or new)	Residual Risk		
			Likelihood	*Consequence*	*Risk*		*Likelihood*	*Consequence*	*Risk*
Design Bushfire Scenario 1: Bushfire approaching from south-west, south and south-east									
Proposed Development									
Hotel/Comm Hub/Refuge	Property	Existing emergency management risk controls, assuming no planning or building management measures applied to proposed development, other than the following: • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs	Possible	Major	High (4)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 • implementation, monitoring and review actions in Section 8	Possible	Insignificant	Low (7)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Hotel Precinct	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Campground	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Western Holiday home	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Eastern Holiday home	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
WTP/WWTP	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Existing Offsite Development									
Aquarium	Life	Existing risk controls including: • Planning, Development and Building Controls and Guidance (at the time of construction) • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs Assumes occupants will be able to move to other locations in local area to reduce exposure (likely Smiths Beach or Canal Rocks)	Possible	Catastrophic	High (3)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 implementation, monitoring and review actions in Section 8	Possible	Minor	Medium (6)
Canal Rocks	Life		Possible	Major	High (4)		Possible	Minor	Medium (6)
Smiths Beach	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
CRBA & SBR	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Chandlers	Property		Possible	Catastrophic	High (3)		Possible	Catastrophic	High (3)
	Life		Possible	Major	High (4)		Possible	Minor	Medium (6)
Surrounding Residential/Commercial	Property		Possible	Catastrophic	High (3)		Possible	Catastrophic	High (3)
	Life		Possible	Major	High (4)		Possible	Moderate	Medium (5)

Scenario		Control/Treatment (Existing)	Inherent Risk			Control/Treatment (Proposed improvement or new)	Residual Risk		
			Likelihood	*Consequence*	*Risk*		*Likelihood*	*Consequence*	*Risk*
Design Bushfire Scenario 2: Bushfire approaching from east									
Proposed Development									
Hotel/Comm Hub/Refuge	Property	Existing emergency management risk controls, assuming no planning or building management measures applied to proposed development, other than the following: • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs	Possible	Major	High (4)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 • implementation, monitoring and review actions in Section 8	Possible	Insignificant	Low (7)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Hotel Precinct	Property		Possible	Major	High (4)		Possible	Insignificant	Low (7)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Campground	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Western Holiday home	Property		Possible	Major	High (4)		Possible	Insignificant	Low (7)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Eastern Holiday home	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
WTP/WWTP	Property		Possible	Catastrophic	High (3)		Possible	Minor	Medium (6)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Existing Offsite Development									
Aquarium	Life	Existing risk controls including: • Planning, Development and Building Controls and Guidance (at the time of construction) • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs Assumes occupants will be able to move to other locations in local area to reduce exposure (likely Smiths Beach or Canal Rocks)	Possible	Catastrophic	High (3)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 implementation, monitoring and review actions in Section 8	Possible	Minor	Medium (6)
Canal Rocks	Life		Possible	Major	High (4)		Possible	Minor	Medium (6)
Smiths Beach	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
CRBA & SBR	Property		Possible	Catastrophic	High (3)		Possible	Moderate	Medium (5)
	Life		Possible	Major	High (4)		Possible	Insignificant	Low (7)
Chandlers	Property		Possible	Catastrophic	High (3)		Possible	Catastrophic	High (3)
	Life		Possible	Major	High (4)		Possible	Minor	Medium (6)
Surrounding Residential/Commercial	Property		Possible	Catastrophic	High (3)		Possible	Catastrophic	High (3)
	Life		Possible	Major	High (4)		Possible	Moderate	Medium (5)

Scenario		Control/Treatment (Existing)	Inherent Risk			Control/Treatment (Proposed improvement or new)	Residual Risk		
			Likelihood	*Consequence*	*Risk*		*Likelihood*	*Consequence*	*Risk*
Design Bushfire Scenario 3: Bushfire approaching from north and north-east									
Proposed Development									
Hotel/Comm Hub/Refuge	Property	Existing emergency management risk controls, assuming no planning or building management measures applied to proposed development, other than the following: • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs	Likely	Major	High (3)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 • implementation, monitoring and review actions in Section 8	Likely	Insignificant	Medium (6)
	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
Hotel Precinct	Property		Likely	Major	High (3)		Likely	Minor	Medium (5)
	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
Campground	Property		Likely	Catastrophic	Extreme (2)		Likely	Minor	Medium (5)
	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
Western Holiday home	Property		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
Eastern Holiday home	Property		Likely	Major	High (3)		Likely	Minor	Medium (5)
	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
WTP/WWTP	Property		Likely	Major	High (3)		Likely	Minor	Medium (5)
	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
Existing Offsite Development									
Aquarium	Life	Existing risk controls including: • Planning, Development and Building Controls and Guidance (at the time of construction) • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs Assumes occupants will be able to move to other locations in local area to reduce exposure (likely Smiths Beach or Canal Rocks)	Likely	Catastrophic	Extreme (2)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 implementation, monitoring and review actions in Section 8	Likely	Minor	Medium (5)
Canal Rocks	Life		Likely	Major	High (3)		Likely	Minor	Medium (5)
Smiths Beach	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
CRBA & SBR	Property		Likely	Catastrophic	Extreme (2)		Likely	Moderate	High (4)
	Life		Likely	Major	High (3)		Likely	Minor	Medium (5)
Chandlers	Property		Likely	Catastrophic	Extreme (2)		Likely	Catastrophic	Extreme (2)
	Life		Likely	Major	High (3)		Likely	Insignificant	Medium (6)
Surrounding Residential/Commercial	Property		Likely	Catastrophic	Extreme (2)		Likely	Catastrophic	Extreme (2)
	Life		Likely	Major	High (3)		Likely	Moderate	Medium (5)

Scenario		Control/Treatment (Existing)	Inherent Risk			Control/Treatment (Proposed improvement or new)	Residual Risk		
			Likelihood	*Consequence*	*Risk*		*Likelihood*	*Consequence*	*Risk*
Design Bushfire Scenario 4: Bushfire approaching from west and north-west									
Proposed Development									
Hotel/Comm Hub/Refuge	Property	Existing emergency management risk controls, assuming no planning or building management measures applied to proposed development, other than the following: • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs	Unlikely	Moderate	Medium (6)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 • implementation, monitoring and review actions in Section 8	Unlikely	Insignificant	Very Low (8)
	Life		Unlikely	Moderate	Medium (6)		Unlikely	Insignificant	Very Low (8)
Hotel Precinct	Property		Unlikely	Major	Medium (5)		Unlikely	Minor	Low (7)
	Life		Unlikely	Moderate	Medium (6)		Unlikely	Insignificant	Very Low (8)
Campground	Property		Unlikely	Moderate	Medium (6)		Unlikely	Insignificant	Very Low (8)
	Life		Unlikely	Moderate	Medium (6)		Unlikely	Insignificant	Very Low (8)
Western Holiday home	Property		Unlikely	Major	Medium (5)		Unlikely	Minor	Low (7)
	Life		Unlikely	Moderate	Medium (6)		Unlikely	Insignificant	Very Low (8)
Eastern Holiday home	Property		Unlikely	Major	Medium (5)		Unlikely	Minor	Low (7)
	Life		Unlikely	Moderate	Medium (6)		Unlikely	Insignificant	Very Low (8)
WTP/WWTP	Property		Unlikely	Major	Medium (5)		Unlikely	Minor	Low (7)
	Life		Unlikely	Moderate	Medium (6)		Unlikely	Insignificant	Very Low (8)
Existing Offsite Development									
Aquarium	Life	Existing risk controls including: • Planning, Development and Building Controls and Guidance (at the time of construction) • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs Assumes occupants will be able to move to other locations in local area to reduce exposure (likely Smiths Beach or Canal Rocks)	Unlikely	Moderate	Medium (6)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 implementation, monitoring and review actions in Section 8	Unlikely	Minor	Low (7)
Canal Rocks	Life		Unlikely	Moderate	Medium (6)		Unlikely	Minor	Low (7)
Smiths Beach	Life		Unlikely	Moderate	Medium (6)		Unlikely	Minor	Low (7)
CRBA & SBR	Property		Unlikely	Major	Medium (5)		Unlikely	Minor	Low (7)
	Life		Unlikely	Major	Medium (5)		Unlikely	Insignificant	Very Low (8)
Chandlers	Property		Unlikely	Catastrophic	High (4)		Unlikely	Moderate	Medium (6)
	Life		Unlikely	Major	Medium (5)		Unlikely	Minor	Low (7)
Surrounding Residential/Commercial	Property		Unlikely	Catastrophic	High (4)		Unlikely	Catastrophic	High (4)
	Life		Unlikely	Major	Medium (5)		Unlikely	Moderate	Medium (6)

Scenario		Control/Treatment (Existing)	Inherent Risk			Control/Treatment (Proposed improvement or new)	Residual Risk		
			Likelihood	*Consequence*	*Risk*		*Likelihood*	*Consequence*	*Risk*
Design Bushfire Scenario 5: Bushfire igniting within the development									
Proposed Development									
Hotel/Comm Hub/Refuge	Property	Existing emergency management risk controls, assuming no planning or building management measures applied to proposed development, other than the following: • State and Local Bushfire and Emergency Management • Capes Zone Response • Emergency forecasting and alert systems. • Public education initiatives. • Arson prevention programs	Unlikely	Moderate	Medium (6)	Implementation and ongoing management of the following, in addition to the existing risk controls: • bushfire risk management strategy and measures detailed in Section 6 • implementation, monitoring and review actions in Section 8	Rare	Insignificant	Very Low (9)
	Life		Unlikely	Minor	Low (7)		Rare	Insignificant	Very Low (9)
Hotel Precinct	Property		Unlikely	Moderate	Medium (6)		Rare	Insignificant	Very Low (9)
	Life		Unlikely	Minor	Low (7)		Rare	Insignificant	Very Low (9)
Campground	Property		Possible	Moderate	Medium (5)		Unlikely	Minor	Low (7)
	Life		Possible	Minor	Medium (6)		Unlikely	Insignificant	Very Low (8)
Western Holiday home	Property		Possible	Moderate	Medium (5)		Unlikely	Insignificant	Very Low (8)
	Life		Possible	Minor	Medium (6)		Unlikely	Insignificant	Very Low (8)
Eastern Holiday home	Property		Possible	Moderate	Medium (5)		Unlikely	Insignificant	Very Low (8)
	Life		Possible	Minor	Medium (6)		Unlikely	Insignificant	Very Low (8)
WTP/WWTP	Property		Possible	Moderate	Medium (5)		Rare	Minor	Very Low (8)
	Life		Possible	Minor	Medium (6)		Rare	Insignificant	Very Low (9)

Risk Evaluation

As part of the risk assessment process, the inherent risk has been compared to the risk criteria to determine whether further treatment is required to reduce residual risk to appropriate levels. In order to achieve this, is important to define the risk acceptance criteria, which is detailed in the section below. Following that, the project residual risk is evaluated against the nominated acceptance criteria to demonstrate residual risk to life and property is appropriately managed. While this risk assessment reviews the residual risk against the assessment criteria, the overall development is also assessed against the various regulatory instruments (e.g. SPP 3.7, the Guidelines and the Tourism Land Use Position Statement) in Section 7.

Risk acceptance criteria

The purpose of evaluating risk is to identify which assets require treatment, confirm that the residual risk ratings for each asset are appropriate, and where required, identify treatment priorities (as discussed previously).

The acceptability or tolerability of a risk level can be evaluated using the criteria listed in Table 34. Some risk ratings may be ***acceptable*** without any further treatment (e.g. Very Low risk ratings), some are considered ***tolerable*** where there is a willingness to live with a risk to secure benefits and achieve objectives (e.g. Medium risk ratings). Tolerating a risk does not mean that it is regarded as negligible, or something we may ignore, but rather as something that needs to be kept under review and, where possible, reduced further. Where the risk is ***intolerable***, further measures are required to eliminate or reduce the risk to tolerable or acceptable levels (e.g. Extreme). Determining the acceptability or tolerability of risk allows decisions to be made on whether treatment is required or whether routine controls are sufficient.

Table 34: Risk acceptability/tolerability criteria

Risk rating	Priority	Risk acceptability	Acceptability/Tolerability
Extreme	1, 2	• Further (or immediate) treatment actions, with excellent controls and management measures, is required to eliminate or reduce residual risk to tolerable or acceptable levels	Intolerable
High	3, 4	• Further (or immediate to short-term) treatment actions, with significant controls and management measures, is required to eliminate or reduce residual risk to tolerable or acceptable levels • Tolerate residual risk in rare cases, where sufficient controls or treatment measures are employed to manage relevant aspects of risk (e.g. life safety), but the risk must be monitored regularly.	Intolerable (Tolerable in rare cases)
Medium	5, 6	• Further (or short to medium-term) treatment actions, with adequate controls and management measures, could be implemented to reduce residual risk to acceptable levels, or • Tolerate residual risk, where sufficient controls or treatment measures are employed to manage relevant aspects of risk (e.g. life safety), but the risk must be monitored regularly.	Tolerable
Low	7	• While no further treatment action is typically required, to reduce residual risk to acceptable levels, further (or medium to long-term) treatment actions, with adequate controls and management measures, could be implemented to reduce residual risk if desired, or • Accept residual risk with proposed controls and treatment measures, but the risk must be monitored, or • Tolerate residual risk in rare cases, where sufficient controls or treatment measures are employed to manage relevant aspects of risk (e.g. life safety), but the risk must be monitored regularly.	Acceptable (Tolerable in rare cases)

Risk rating	Priority	Risk acceptability	Acceptability/Tolerability
Very Low	8, 9	• No further treatment action is required, to reduce residual risk to acceptable levels • Accept residual risk with proposed controls and treatment measures, but the risk must be monitored.	Acceptable

Risk Acceptance/Tolerability Analysis

Scenario 1

The inherent risk from a bushfire from the south-west, south or south-east, to both proposed and existing development, is considerable, with consequence typically Catastrophic or Major. Life safety is also a significant risk without the proposed community bushfire refuge, with the only existing refuge options available to occupants being Smiths Beach or Canal Rocks, both of which have insufficient separation to unmanaged vegetation to reduce radiant heat below 2 kW/m^2, are exposed to weather and tides, and have no shelter, food, water and limited toilet access (none away from hazard).

The risk assessment demonstrates that following the construction of the development and implementation of the bushfire risk management measures:

- the risk to life of occupants within the development is reduced to Low, which is considered acceptable as per Table 34, primarily due to the provision of the community bushfire refuge, onsite landscaping treatments and the implementation of the BEMP.
- the anticipated bushfire impact to property and infrastructure is reduced, typical to Low risk but potential for Medium risk to the holiday homes, hotel precinct and WTP/WWTP, where the direct interface may result in localised damage impacts. It is noted that the Western holiday homes and hotel precinct is more exposed to bushfire from the south and south-west, and may actually have a lower risk to fire from the south-east.
- the risk to occupants in existing offsite areas is reduced to Medium or Low due to provision of the refuge and the measures in the BEMP to try and warn occupants in adjacent land uses. The Medium residual risk remains due to potential for lack of bushfire plan for surrounding residential/commercial (although many will likely be prepared) and due potential for minor harm as part of travelling to the refuge.
- The risk to the adjacent SBR and CRBA is reduced due to shielding by the proposed development although not entirely due risk from ember attack, however it is not expected that there will be any significant risk reduction to any other offsite property and infrastructure where they are further from the project area. Chandlers Villas may be partially shielded from bushfires from the south-west, however this was not specifically reflected in the risk assessment given the risk from the south and south-east.

Scenario 2

The risk analysis for bushfire approaching from the east is similar to that from Scenario 1, where there is significant inherent risk to the exposed part of the development (campground, Eastern holiday homes and WTP/WWTP) due to direct interfaces, however this residual risk to property and infrastructure is reduced following implementation of the management measures. The risk to life is managed by the provision of the refuge, onsite landscaping and the BEMP. The inherent risk to existing property is also similar to Scenario 1, with the reduction in residual risk to property from a bushfire from the east less than Scenario 1, given the lesser shielding offered to SBR and CRBA. The improvements to life safety for occupants in adjacent and surrounding development and land uses is considerable improved by the provision of the refuge and the BEMP procedures, with a Low to Medium risk remaining due to travel to the refuge.

Scenario 3

A bushfire from the north and north-east remains the most likely scenario, due to the prevalence of winds from this direction on high FFDI days and the history of significant bushfire historically spreading in this direction. This results in the inherent risk to proposed and existing development and occupants being elevated in this scenario, with risk level being High or Extreme. With the likelihood of this scenario occurring considered Likely, in accordance with the criteria on Table 32 it is not possible to reduce the residual risk below Medium. Given the narrow plot of dune shrubland vegetation along the northern interface, the separation from the hazard provided by adjacent SBR and CRBA, the main impact on the development is likely to be from ember attack rather than any significant direct interface, and the proposed building construction is appropriate to deal with this hazard. As depicted on Table 33, the consequence associated with this scenario is to be Minor to Insignificant, provided all management measures are implemented correctly. While the residual risk remains Medium, given the low consequence, it is considered appropriate for the risk with this scenario to be tolerated in order to secure the overall benefits from the development. This is highlighted by the reduction in residual risk to occupants outside the development, where the risk to life is also reduced to Medium due to Minor or Insignificant consequence ratings.

Scenario 4

The inherent risk associated with bushfire approaching through the limited shrubland and scrub vegetation to the north-west and west of the development, is both unlikely to occur and will only have a localised impact. Close to the project area, the fire runs are shorter with impact on property and infrastructure and fatalities or injury considered less likely to occur, however the potential consequence to surrounding development further afield increases as the fire run increases and the chance for more fully developed bushfire behaviour. With the wind direction pushing the bushfire away from the coast, the risk to occupants at Canal Rock and the Aquarium is also considered lesser than other scenarios, with fire behaviour also not likely to be steady state, however it will potentially prevent their egress away from these locations. Notwithstanding, the impact of bushfire from these directions on the proposed development should not be underestimated.

Following implementation of the management measures, the impact on the proposed property is considered to be limited as demonstrated by the Low and Very Low ratings, with life safety to be protected by all buildings as demonstrated by the Very Low ratings. The proposed development also shield SBR, CRBA and Chandlers from immediate impact from bushfires from this direction, and provide a refuge option for their occupants, if required. Further afield, there is little shielding of surrounding properties, however their occupants will likely have an open egress route to Caves Road if required.

Scenario 5

This scenario relates to onsite ignition, and the potential to impact the proposed development. The inherent risk is defined by the proximity of the various parts of the development to onsite vegetation (unmanaged in the inherent situation), and the likelihood for ignition associated with that area (e.g. BBQ's, cigarettes etc). The lack of managed vegetation onsite when considering the inherent risks means there is some chance for ignition and spread to damage buildings, however it is considered unlikely that there would be any fatalities or injuries from such a fire.

With the onsite landscaping treatments and the required building construction, as well as control of ignition sources required by BEMP, the residual risk from Scenario 5 is significantly reduced, with a lessening in likelihood and consequence occurring, resulting in Low to Very Low risk ratings.

Summary

It has been demonstrated above, that following implementation of the proposed bushfire risk management strategy and mitigation measures, including their ongoing management and auditing:

- The residual risk to life safety within the proposed development has been reduce to acceptable levels (Low or Very Low ratings). The only exception is for Scenario 3, where the likelihood of the bushfire results in a Medium rating, however as the consequences are Minor or Insignificant due to limited direct interface to the hazard, the risk is considered tolerable in order to secure the benefits of the proposed development, especially the refuge.
- The residual risk to proposed buildings and infrastructure is also largely reduced to Low and Very Low, which is considered acceptable, however where buildings are located on direct interfaces there is considered to potential for Minor damage to buildings, and this sometimes results in Medium risk rating. Similar to above, this is primarily driven by the likelihood of the bushfire, and the risk is considered tolerable in order to secure the benefits of the proposed development, especially the refuge.
- the residual risk to occupants in adjacent and surrounding land uses, is largely reduced to acceptable or tolerable levels, primarily due largely to the provision of the refuge, which represents a significant benefit to the community.
- The residual risk to surrounding property and infrastructure is sometimes reduced due to the shielding this development provides, in particular to SBR and CBFA, however there is typically limited improvement due to distance from other existing development.

While having two access routes is always a preferable design outcome, in this case it won't necessarily produce a significantly better bushfire risk management outcome as it is likely that both access routes would be sufficient close, they would both be impacted by a bushfire, still preventing occupant egress even with a compliant road network. This applies to the residents, visitors and guests to existing land uses in the local area. Despite this deviation from the Guidelines, it has been demonstrated that the proposed risk management measures will reduce residual risk to levels which are consider sufficient to preserve life, in particular the provision of the onsite community bushfire refuge in lieu of a second access, with reduction to bushfire impact provided to the proposed buildings and infrastructure through other measures (landscaping treatments, building construction etc), and also some existing adjacent property as well.

Risk Treatment

The proposed risk treatments are detailed in Section 6 of this BMP.

Implementation Plan, Monitoring and Review

The proposed implementation plan and monitoring and review actions are detailed in Section 8 of this BMP.

Appendix K FFDI and GEV Analysis

Bushfire behaviour is significantly affected by fire weather, and one method of representing this is through the use of Forest Fire Danger Index (FFDI). FFDI is a non-dimensional index that represents the weather variables of temperature, relative humidity and wind speed, with the availability of fuel for combustion through the use of drought factor based on rainfall and evaporation.

This method of calculating FFDI utilises hourly weather data, in conjunction with daily ground moisture data, from a local BoM weather station near the project area, to calculate the hourly FFDI and determine the peak daily FFDI. Using this peak daily FFDI, a Generalised Extreme Value (GEV) analysis can be conducted with the historical FFDI, and the resultant distribution fitted with a best-fit regression curve to enable extrapolation to determine recurrence values.

FFDI Calculation

FFDI is calculated using the following equation:

$$FFDI = 2\exp(-0.450+0.987 \ln D - 0.0345H+0.0338T+0.0234V) \quad [1]$$

where:

D is drought factor,

H is relative humidity (%),

V is wind speed (kph) at 10 m reference height and

T is air temperature (°C)

The drought factor is derived from Keetch-Byram Drought Index or KBDI.

Data

Site-specific FFDI information for locations around Western Australia is not readily available. BoM has online maps depicting monthly FFDI averages, number of days exceeding where FFDI >50 and FFDI >90th percentile, based on their own modelling. BoM also have access to a national historical fire weather dataset developed by Lucas (2010), that analysed daily 3pm weather data, in conjunction with daily drought factor, to calculate the FFDI from 1972 to present day. Whilst this dataset is often useful, it is only available for a few locations, and is constrained by the 3pm readings which may not be when peak FFDI occurs, depending on the location.

To address the limitations relating to the national historical fire weather dataset including the lack of a nearby location and the temporal factors in the FFDI calculation, an FFDI analysis has been conducted using raw weather data and the calculated ground moisture data from BoM, to produce a FFDI calculation for the project area that is both as close to the project area as possible, whilst also providing a more accurate calculation of the peak daily FFDI at the locality.

Two data sets were obtained from BoM for the Cape Naturaliste weather station (Number 9519) located less than 14 km north of the project area, and included the following:

- Hourly weather station information
  - hourly air temperature (°C)
  - hourly relative humidity (%)
  - hourly wind speed and direction
  - 10 min and 24 hour rainfall (up to 9:00 am day prior)
- Ground Moisture Module
  - derived KBDI

- derived drought factor

The data set was complete from 20 November 1999 to 9 June 2020 to enable calculation of the hourly FFDI over this 21 year period (270,936 readings). There are some gaps in the data sets, typically relating to missing or obviously incorrect relative humidity data and low drought factor values, however there were also some missing temperature and wind speed values. The following adjustments were made to complete the data set:

- Temperature
  - Where a value was missing, the highest adjacent temperature reading was used (i.e. adjacent earlier or later reading)
- Relative humidity
  - Where a value was missing, the lowest adjacent humidity reading was used (i.e. adjacent earlier or later reading)
  - Where a humidity reading exceeded 100%, it was adjusted back to equal 100%
- Wind Speed
  - Where a value was missing, the highest adjacent wind speed reading was used (i.e. adjacent earlier or later reading)

The above adjustments were made to various parts of the data set, with almost all the adjustments inconsequential, and do not affect the GEV analysis. The only exception was on 27 December 2000, where a RH of 14% was added to the times between 1pm and 7pm, based on reduced RH of 14% at 8pm and also 15% at 11am. This was a particular warm day with temperatures peaking at 35.7°C at 2pm. The resultant peak calculated FFDI on this day was 39.2 at 1pm, which includes the extrapolated 14% RH, however given the surrounding weather information, this appears to be valid. Notwithstanding, the peak FFDI for the day based on the collected BoM information is still 37.2 at 11am, thus the extrapolated RH represents an increase in FFDI of 2.

Outside of the minor adjustments outlined above, it is noted there are significant gaps in the BoM dataset for Cape Naturaliste as follows:

- 2001: Jan 20, 21, 23 and 25-31; Feb 1-21, April 15-30 and May 1 and 2
- 2002: April 23-30; May 1-31; June 1-7, 12 and 13;
- 2016: August 9-18

The gaps total to be 108 days and are generally related to missing or extremely low RH readings, making FFDI calculation impossible. The data most likely to affect the GEV calculation are the 31 days in January and February of 2001, where elevated FFDI are most likely to occur. While it is noted this missing data might affect the analysis, there is only several days where the temperature exceeds 30°C where elevated FFDI might be possible. There appears to be little evidence of the FFDI exceeding 40 at this weather station, with a consistent historical upper limit of FFDI 40.

The data was organised in an Excel spreadsheet to enable the collation of the hourly weather data with the daily drought factor reading, and the peak FDI calculated on an hourly basis. The data was searched for the calculated peak FFDI for each day, where it could be sorted in descending order. These sorted peak daily FFDI values were used for the GEV analysis as detailed below.

GEV Calculation

Using extreme value statistical techniques is common for determining design conditions for other natural events, with an example being in the National Construction Code of Australia where annual exceedance probabilities for extreme events is used to determine the importance level for structural design. Douglas et al (2013) propose the use of GEV analysis, utilising maximum FFDI values derived

from site-specific data, to establish the annual exceedance probability (AEP) of FFDI for application to bushfire events.

Douglas et al (2006) describes the GEV analysis as follows:

> Assume that *M* number of values of a given parameter, *y*, are available for *n* years.
>
> The data points are ranked according to their values in the descending order.
>
> The return period or recurrence *R* for the *m*th ranked data point, *ym*, is then evaluated from:
>
> $R(ym) = (n + 1)/m$ [2]
>
> The so obtained set of *M* data pairs (*ym*, *Rm*) (*m*=1, 2, 3, …, *M*) can be plotted on a log-linear graph.
>
> The resultant curve usually follows a log function of the form:
>
> $y = a\ln R + b$ [3]
>
> where *b* is the intersect with the one year recurrence or return period.
>
> Eq. [3] can be used to extrapolate the return periods beyond the data period.

GEV Analysis

The 21 highest FFDI values for the Cape Naturaliste weather station (see Table 35 and Table 37) were used to conduct the GEV analysis of the recurrence period. These FFDI values were plotted *vs* return period *R*, with a regression line of best-fit determined using the log-linear function as expressed in Eq. [3] (see Plate 27). From the calculated regression, the FFDI can be calculated for the various recurrence periods (see Table 36).

Table 35: Highest FFDI values for Cape Naturaliste (9519) – 20 November 1999 to 9 June 2020

Rank	Recurrence	FFDI	FDR
1	22	39.5	Very High
2	11	39.5	Very High
3	7	39.2	Very High
4	6	39.1	Very High
5	4	39.0	Very High
6	4	37.4	Very High
7	3	36.6	Very High
8	3	35.8	Very High
9	2	35.7	Very High
10	2	35.6	Very High
11	2	34.5	Very High
12	2	33.8	Very High
13	2	33.4	Very High
14	2	33.3	Very High
15	1	33.1	Very High
16	1	32.7	Very High
17	1	32.7	Very High
18	1	32.3	Very High
19	1	32.2	Very High
20	1	32.1	Very High
21	1	32.1	Very High

Fire Danger Rating breakdown

FDR	FDI
Catastrophic	100+
Extreme	75 - 99
Severe	50 - 74
Very High	32 - 49
High	12 - 31
Low - Mod	0 - 11

Plate 27: GEV analysis for Cape Naturaliste (9519) – 20 November 1999 to 9 June 2020

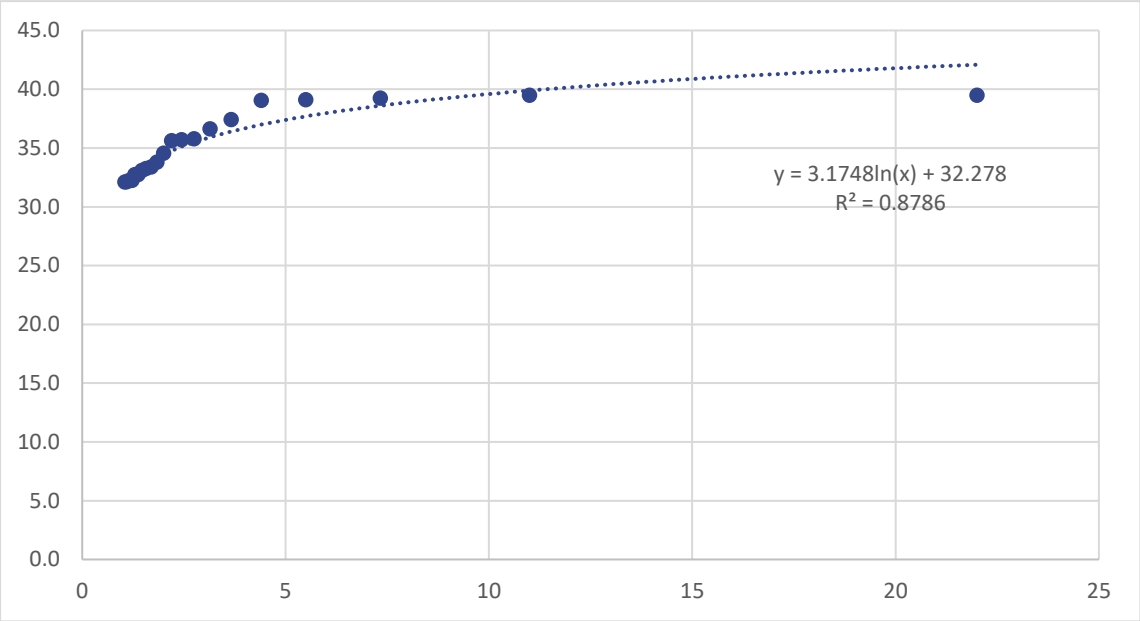


Table 36: FFDI for various recurrence period for Cape Naturaliste (9519)

Recurrence	FFDI
1	32.3
20	41.8
25	42.5
50	44.7
100	46.9
200	49.1
500	52.0

The correlation co-efficient (r^2) is a statistical measure of the strength of the relationship between the relative movements of two variables, and ranges between -1.0 and 1.0, with 1.0 indicating perfect data fit. The r^2 of 0.8786 indicates that there is a high level of confidence with the regression line of best-fit and the data, and that it can be relied upon for the calculation of the recurrence periods.

Conclusion

If the maximum recorded FFDI is used to develop design bushfire, there is a chance that the resultant design fire may either under-represent or over-represent the fire intensity compared to the risk-based reference design fire.

The underlying principle is to use the recurrence of fire weather as measured in FFDI as the planning or design reference. The recurrence is determined by the applying the Generalised Extreme Value Analysis to local historical weather data of limited time period. The resultant distribution is fitted with an appropriate regression curve which allows the extrapolation beyond the available weather data recording period.

The well-established Generalised Extreme Value method has been extended in the current study to the determination of FFDI for design bushfire selection. This method has overcome the shortfalls of other existing methods. It is robust and does not necessarily require extensive period for data collection in order to establish a sound basis for determination of the design bushfire from fire weather data.

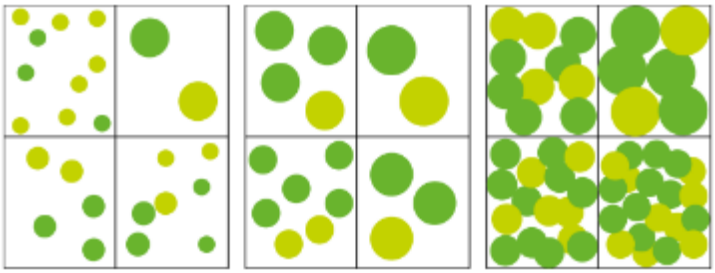
Table 37: Highest FFDI values for Cape Naturaliste (9519) – 20 November 1999 to 9 June 2020

Year	Month	Day	Hour	Minutes	RH (%)	Temp (C)	Wind Spd (m/s)	Wind Spd (km/hr)	Wind Direction (Degrees/Direction)	Rainfall	Drought Factor	Daily Peak FFDI	FDR
2010	1	17	15	00	12	36.3	5.1	18.36	90 / E	0	9.2	**39.5**	Very High
2019	12	14	17	00	20	31.5	10.3	37.08	200 / SSW	0	9.2	**39.5**	Very High
2000	12	27	13	00	14	35.1	6.2	22.32	80 / E	0	9.3	**39.2**	Very High
2007	3	7	15	00	15	33.9	6.2	22.32	40 / NE	0	10	**39.1**	Very High
2000	12	12	16	00	6	28.4	6.2	22.32	160 / SSE	0	8.8	**39.0**	Very High
2016	1	7	17	30	20	35.5	7.2	25.92	110 / ESE	0	9.9	**37.4**	Very High
2005	3	23	13	00	15	33.2	5.7	20.52	40 / NE	0	10	**36.6**	Very High
2013	12	15	14	30	19	31.7	9.3	33.48	200 / SSW	0	8.7	**35.8**	Very High
2015	1	30	13	30	24	35.4	8.2	29.52	100 / E	0	10	**35.7**	Very High
2016	2	8	14	30	16	35.8	5.1	18.36	10 / N	0	9.7	**35.6**	Very High
2004	1	11	13	00	18	35.1	6.2	22.32	80 / E	0	9.4	**34.5**	Very High
2020	2	4	16	00	19	36.4	5.1	18.36	100 / E	0	10	**33.8**	Very High
2007	12	26	13	00	12	35.8	4.1	14.76	50 / NE	0	8.6	**33.4**	Very High
2007	3	6	16	00	16	36.6	3.6	12.96	360 / N	0	10	**33.3**	Very High
2003	2	9	12	00	24	36.9	6.7	24.12	100 / E	0	10	**33.1**	Very High
2005	1	17	16	00	14	32.5	4.6	16.56	340 / NNW	0	9.7	**32.7**	Very High
2005	2	15	16	00	29	35.2	9.3	33.48	90 / E	0	10	**32.7**	Very High
2009	1	16	13	00	16	32.9	5.7	20.52	40 / NE	0	9.2	**32.3**	Very High
2004	3	22	14	00	23	35.1	6.7	24.12	40 / NE	0	10	**32.2**	Very High
2019	12	13	15	00	17	34.1	4.6	16.56	240 / WSW	0	10	**32.1**	Very High
2011	2	22	16	00	14	33.8	4.6	16.56	70 / ENE	0	9.1	**32.1**	Very High

Appendix L APZ standards (Schedule 1; the Guidelines, WAPC 2017)

Schedule 1: Standards for Asset Protection Zones

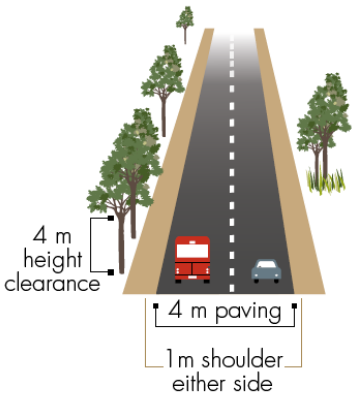
- **Fences:** within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- **Objects:** within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.
- **Fine Fuel load:** combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
- **Trees (> 5 metres in height):** trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy.

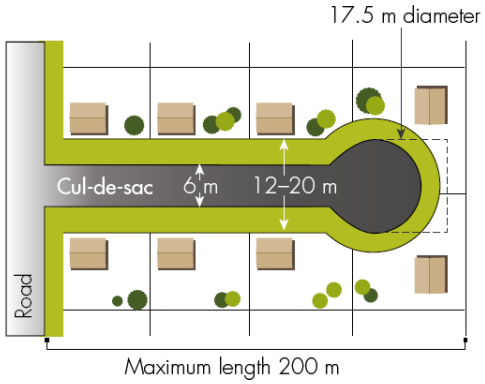


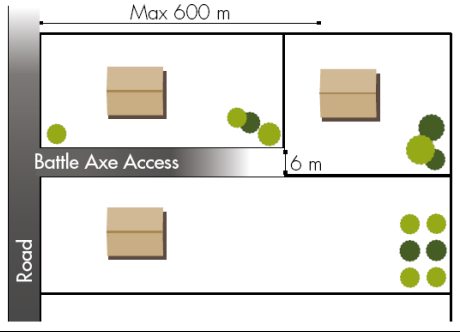
- **Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height):** can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.
- **Grass:** should be managed to maintain a height of 100 millimetres or less.

Appendix M Vehicular access technical standards (the Guidelines, WAPC 2017)

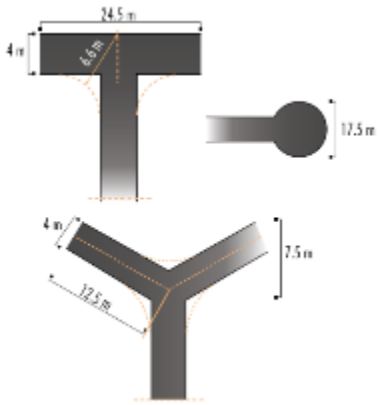
Two access routes	
Acceptable solution A3.1	Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.
Explanatory note E3.1	Two access routes: It is essential that residents and the community, as well as emergency services, have safe access and egress from both the subdivision and individual houses/development. It is the developer's responsibility, as part of the Bushfire Hazard Level assessment, to ensure that subdivision and development design allow for bushfire protection criteria to be met regarding driveways and turnaround areas at house sites. It is also necessary that the public have two safe access options leading to two different destinations that can withstand all weather conditions. This applies to access routes leading into a subdivision, as well as those within a subdivision. This acceptable solution allows for the situation if a vehicular access/egress route to a subdivision or lot becomes blocked during a fire then there is an alternative vehicular access/egress route which provides access to a different destination. Accordingly, road widening in lieu of providing two different access routes should not be supported. All access should be suitable to accommodate type 3.4 fire appliances (i.e. fire trucks with a four-wheel-drive 7-tonne chassis). Two-way access should be provided as a public road; however, where a public road cannot be provided, (this will need to be demonstrated by the proponent providing justification for why this cannot be achieved) an emergency access way may be considered

Public roads	
Acceptable solution A3.2	A public road is to meet the requirements in Table 1, Column 1.
Explanatory note E3.2	Trafficable surface: Widths quoted for access routes refer to the width of the trafficable surface. A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metre wide paving one metre wide constructed road shoulders. In special circumstances, where eight lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of 90 metres may be provided subject to the approval of both the local government and Department of Fire and Emergency Services. Public road design: All roads should allow for two-way traffic to allow conventional two-wheel drive vehicles and fire appliances to travel safely on them. 

Public roads	
Acceptable solution A3.3	A cul-de-sac and/ or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/ or will need to be demonstrated by the proponent), the following requirements are to be achieved: • Requirements in Table 1, Column 2 • Maximum length: 200 metres (if public emergency access is provided between cul-de-sac heads maximum length can be increased to 600 metres provided no more than eight lots are serviced and the emergency access way is no more than 600 metres) • Turn-around area requirements, including a minimum 17.5 metre diameter head.
Explanatory note E3.3	In bushfire prone areas, a cul-de-sac subdivision layout is not favoured because they do not provide access in different directions for residents. In some instances it may be possible to provide an emergency access way between cul-de-sac heads to a maximum distance of 600 metres, so as to achieve two-way access. Such links must be provided as right of ways or public access easements in gross to ensure accessibility to the public and fire services during an emergency. A cul-de-sac in a bushfire prone area is to connect to a public road that allows for travel in two directions in order to address Acceptable Solution A3.1. 

Battle-axe	
Acceptable solution A3.4	Battle-axe access leg should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) all of the following requirements are to be achieved: • Requirements in Table 1, Column 3 • Maximum length: 600 metres • Minimum width: six metres.
Explanatory note E3.4	In bushfire prone areas, lots with battle-axe access legs should be avoided because they often do not provide two-way access and egress for residents and may be easily blocked by falling trees or debris. In some instances, however; it may be appropriate for battle-axe access to be used to overcome specific site constraints. Where used, they should comply with the minimum standards for private driveways. Passing bays should be provided at 200 metre intervals along battle-axe access legs to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres. Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at house sites and at 500 metre intervals along the access leg. 

Battle-axe	

Private driveway longer than 50 metres	
Acceptable solution A3.5	A private driveway is to meet all of the following requirements: • Requirements in Table 1, Column 3 • Required where a house site is more than 50 metres from a public road • Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres) • Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house • Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes • All-weather surface (i.e. compacted gravel, limestone or sealed).
Explanatory note E3.5	For a driveway shorter than 50 metres, fire appliances typically operate from the street frontage however where the distance exceeds 50 metres, then fire appliances will need to gain access along the driveway in order to defend the property during a bushfire. Where house sites are more than 50 metres from a public road, access to individual houses and turnaround areas should be available for both conventional two-wheel drive vehicles of residents and type 3.4 fire appliances. Turn-around areas should be located within 50 metres of a house. Passing bays should be available where driveways are longer than 200 metres and turn-around areas in driveways that are longer than 500 metres. Circular and loop driveway designs may also be considered. These criteria should be addressed through subdivision design. Passing bays should be provided at 200 metre intervals along private driveways to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres. Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at the house sites and at 500 metre intervals along the driveway. 

Technical requirement	1	2	3	4	5
	Public road	Cul-de-sac	Private driveway longer than 50 m	Emergency access way	Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal distance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 m	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5	8.5	8.5	8.5
* Refer to E3.2 Public roads: Trafficable surface					

Appendix N Water technical standards (the Guidelines, WAPC 2017)

Reticulated areas	
Acceptable solution A4.1	The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.
Explanatory note E4.1	Water supply authorities in Western Australia include the Water Corporation, Aqwest and the Busselton Water Board. The Water Corporation's 'No. 63 Water Reticulation Standard' is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities' conditions apply.

Non-reticulated areas	
Acceptable solution A4.2	Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet the following requirements: • Volume: minimum 50,000 litres per tank • Ratio of tanks to lots: minimum one tank per 25 lots (or part thereof) • Tank location: no more than two kilometres to the further most house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turnaround time at legal road speeds • Hardstand and turn-around areas suitable for a type 3.4 fire appliance (i.e. kerb to kerb 17.5 metres) are provided within three metres of each water tank • Water tanks and associated facilities are vested in the relevant local government.
Explanatory note E4.2	A procedure must be in place to ensure that water tanks are maintained at or above the designated capacity, including home tanks on single lots, at all times. This could be in the form of an agreement with the local government and the fire service.

Appendix O City of Busselton Firebreak Notice

PERMITS TO BURN

Permits to Burn are required for the whole of the Restricted Burning Times and can only be obtained from the Fire Control Officer for your area

A list of Fire Control Officers is available on the City's website on the Fire and Emergency Services Information page

Most of our Fire Control Officers are volunteers, make sure you plan ahead if you intend to apply for a permit

A permit must be obtained before any burning takes place and the permit holder must be in possession of the permit throughout the duration of the burn.

The Fire Control Officer will require the following information prior to issuing a permit:

- The address of the property where it is proposed to conduct the burn
- Details of three able bodied persons who will be in attendance at the fire at all times whilst it is alight, including a contact phone number
- What fire-fighting equipment will be on-hand during the burn and confirmation it is in good working order
- Are there firebreaks installed at the property and can a fire appliance get access to the site of the burn
- What are the materials to be burned, are they dry, and what is the size of the proposed burn

The permit holder shall ensure all conditions of the permit, as shown on the permit, are fully complied with

Failure to obtain a permit or failure to fully comply with the conditions of a permit may result in a fine or prosecution

The hardest aspect of fire prevention is explaining to your family why you didn't undertake any!

Actions speak louder than words and actions save lives

GENERAL INFORMATION

Burning of Garden Refuse: pursuant to Section 24G(2) of the *Bush Fires Act 1954*, the burning of garden refuse is prohibited throughout the District during Prohibited Burning Times, and prohibited in Urban areas of the District during Restricted Burning Times

During Restricted Burning Times, a Permit to Burn is required for the burning of garden refuse in Rural Residential or Rural areas

Camping and/or Cooking Fires: pursuant to Section 25(1a) of the *Bush Fires Act 1954*, the lighting of fires in the open for the purpose of camping and/or cooking is prohibited throughout the District during Prohibited Burning Times

Pursuant to Section 25(1)(a) of the *Bush Fires Act 1954*, the lighting of fires in the open for the purpose of camping and/or cooking is prohibited when the Fire Danger Rating for the District is Very High or above without the written approval of the City

Fire Pits, Chimineas, and/or Braziers: pursuant to Section 25 of the *Bush Fires Act 1954*, the lighting of fire pits, Chimineas and/or braziers is prohibited during Prohibited Burning Times, and otherwise prohibited if the Fire Danger Rating for the District is Very High or above

Conditions for the Lighting and Extinguishing of Fires in the Open: when burning garden refuse; or lighting camping and/or cooking fires; or when lighting fire pits, Chimineas and/or braziers the space of ground around the site of the fire, having a radius of at least 3 metres from the site at the centre, is clear of all vegetation and other flammable materials

The person who lit the fire, or a person left in attendance at the fire as the case may be, shall completely extinguish the fire by the application of water and/or earth before that person leaves the site unattended

Further Information: for further fire safety information and resources, including current Fire Danger Ratings visit the Department of Fire and Emergency Services website www.dfes.wa.gov.au

KEY DATES

Dates may change due to seasonal fire conditions in which case details will be published in local newspapers and on the City's website

PROHIBITED BURNING TIME

1 December 2021 to 28 February 2022
(BURNING IN THE OPEN PROHIBITED)

RESTRICTED BURNING TIMES

15 October 2021 to 30 November 2021
and 1 March 2022 to 30 April 2022
(BURNING PERMITS REQUIRED)
(Burning on Public Holidays Prohibited)

COMPLIANCE DATES

Rural Residential / Urban / Industrial Land
Compliance with this Notice must be achieved no later than 15 November 2021 and maintained until 30 April 2022

Rural Land
Compliance with this Notice must be achieved no later than 15 December 2021 and maintained until 30 April 2022

FIREBREAK INSPECTIONS AND RIGHT OF ENTRY

The City will commence its annual firebreak inspection program on 15 November 2021

Rangers are appointed as Bush Fire Control Officers under the provisions of the *Bush Fires Act 1954* (the Act) and carry out annual inspections.

Under the provisions of the Act, Bush Fire Control Officers may in the performance of their duties, enter any land or building including private property

FIREBREAK VARIATIONS

Where there are valid environmental and/or on-ground considerations which prevent full compliance with this Notice, landowners may apply to the City for a variation. A variation must be lodged in writing on a Firebreak and Fuel Hazard Reduction Variation Form which is available on the City's website. Applications for a variation must be submitted by 31 October 2021

City of Busselton
Geographe Bay

FIREBREAK AND FUEL HAZARD REDUCTION NOTICE

2021/2022 BUSH FIRE SEASON

FIRST AND FINAL NOTICE

Bush Fires Act 1954

Take notice that pursuant to Part 3 Division 6 Section 33 of the *Bush Fires Act 1954*, landowner(s) or occupier(s) of land shall construct firebreaks and carry out fire prevention work in accordance with this Notice

Failure to comply with this Notice may result in a fine of up to

$5,000

Should you require assistance or clarification of the requirements of this Notice, please contact the City's Ranger and Emergency Services on 9781 0444

FIREBREAK CATEGORY CODE AND SUMMARY OF REQUIREMENTS

ALL REQUIREMENTS IN THIS NOTICE ARE TO BE MAINTAINED THROUGHOUT THE ENTIRE DURATION OF THE FIRE SEASON

FAILURE TO COMPLY MAY RESULT IN A $5,000 FINE

PLEASE BE ADVISED THAT YOUR PROPERTY MUST COMPLY WITH CATEGORY REQUIREMENTS AS NOTED BY A TICK IN COLUMN A, B, C OR D

CATEGORY	A	B	C	D
It is the land owner's responsibility to identify the category that relates to their property and to ensure the necessary fire prevention works are completed on time. ***Please contact the City if you are unsure of your category.***				
CATEGORY 1 **RURAL** Except plantations and vineyards (for tourist chalets, refer to Estate Fire Management Plan or Individual Fire Management Plan) Sections A, C and D apply to this category.	✓		✓	✓
CATEGORY 2 **URBAN RESIDENTIAL & INDUSTRIAL - COMMERCIAL** Sections A, B, D and E1 Trees, apply to this category. Refer to section E - Interpretation and Additional Requirements (E1 Trees).	✓	✓		✓
CATEGORY 3 & 4 **PLANTATIONS** Fire Management Plan applies	N/A	N/A	N/A	N/A
CATEGORY 5 **PROTEA PLANTATIONS / VINEYARDS** (For tourist chalets, refer to Estate Fire Management Plan or Individual Fire Management Plan) Sections A, B, C and D apply to this category.	✓	✓	✓	✓
CATEGORY 6 **RURAL RESIDENTIAL - LOTS WITH INDIVIDUAL (MINERAL EARTH) BOUNDARY BREAKS** Sections A, B, C and D apply to this category unless the property is subject to Estate Fire Management Plan or Individual Fire Management Plan	✓	✓	✓	✓
CATEGORY 7 **RURAL RESIDENTIAL - LOTS WITH A STRATEGIC FIREBREAK ON ONE OR MORE BOUNDARIES** Sections A, B, C and D apply to this category unless the property is subject to Estate Fire Management Plan or Individual Fire Management Plan	✓	✓	✓	✓
CATEGORY 8 **RURAL RESIDENTIAL - LOTS WITHIN A STRATEGIC FIREBREAK AREA WITH NO STRATEGIC FIREBREAKS ON THE LOT BOUNDARIES** Sections B, C and D apply to this category unless the property is subject to Estate Fire Management Plan or Individual Fire Management Plan		✓	✓	✓

A - Firebreak

– The term firebreak includes a mineral earth firebreak. A mineral earth firebreak means a 3 metre wide area of the owner(s)/occupiers(s) land, cleared and maintained totally clear of all vegetation material (living or dead) so there is only mineral earth left. Any overhanging trees and other vegetation must be pruned to a height of 5 metres above the ground level of a mineral earth firebreak.

Category 1 – Rural: A mineral earth **FIREBREAK** shall be constructed **3 metres** wide, except in pasture or crop areas where a **FIREBREAK** shall be **2 metres** wide. **FIREBREAKS** shall be located adjacent to all external boundaries of the land. Where the land area exceeds 120 hectares, an additional **FIREBREAK** must divide the land into areas of not more than 120 hectares with each part completely surrounded by a **FIREBREAK.**

Category 2 - **Urban Residential and Industrial-Commercial:** Where the area of land exceeds 2024m² (½ acre) a mineral earth **FIREBREAK** shall be constructed and maintained at least **3 metres** wide and within **6 metres** of the inside of all external boundaries of the land. Where the area of land is 2024m² (½ acre) or less, hazardous material must be removed in accordance with section **B - Fuel Reduction (refer to B1).**

Category 5 - Protea Plantations/Vineyards: A mineral earth **FIREBREAK** shall be 3 metres wide. A low fuel area is to be maintained in accordance with section **B - Fuel Reduction (refer to B2).**

Category 6 and 7 - **Rural Residential:** A mineral earth **FIREBREAK** shall be constructed **3 metres** wide. On Category 6 Rural Residential land with pasture or crop, a **FIREBREAK** shall be **2 metres** wide and located within **6 metres** of all external boundaries of the land. For Category 7 Rural Residential land, free access along a Strategic **FIREBREAK** is to be maintained at all times and including across the boundary of a lot, by means of a **3.5 metres wide field gate** in the adjoining lot boundary fence.

B - Fuel Reduction

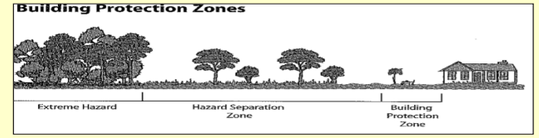
1) **Category 2** - **Urban Residential and Industrial-Commercial:** Where the area of land is 2024m² (½ acre) or less, **ALL HAZARDOUS MATERIAL** must be removed from the whole of the land except living trees. In the area remaining, vegetation is to be maintained to a height of no greater than **10 centimetres**; this includes piles of timber, branches and other vegetation. Trees shall be pruned in accordance with section **E – Interpretation and Additional Requirements (refer to E1).**
2) **Category 5 - Protea Plantations/Vineyards:** A **5 metre** low fuel area is to be maintained between the **3 metre FIREBREAK** and the plantation/vineyard area. In this area, vegetation is to be maintained to a height of no greater than **10 centimetres**; this includes piles of timber, branches and other vegetation.
3) **Category 6, 7 and 8** - **Rural Residential:** Parkland clearing must be carried out in all open paddocks and along the boundary of the property. Clearing means that all dead vegetation and dry grasses (excluding approved crops, pasture areas and living trees/shrubs) including piles of timber and disused materials must be maintained to a height of no greater than **10 centimetres**.

C - Building Protection Zones (BPZ) – This is a modified area of reduced fuel immediately surrounding a building

BPZ's starve the fire by reducing the fuel levels around your house. These requirements are designed to reduce the fire's intensity and minimise the likelihood of flame contact with buildings. The BPZ gives more protection to families should a fire threaten suddenly and they cannot leave. It also provides extra protection for fire fighters and property owners who may decide to stay with their property.

A BPZ shall be provided for buildings in bush fire prone areas. The surroundings of buildings must comply with the following requirements:

1) The BPZ for existing buildings must be at least 20 metres from any external wall of the building unless varied under an approved Fire Management Plan (FMP) in accordance with section **E - Interpretation and Additional Requirements (refer to E4).**
2) The minimum BPZ for buildings constructed after 1 November 2011, in all cases shall be 25 metres.
3) The BPZ must be located within the boundary of the lot that the building is situated on.
4) Hazardous/flammable materials must not exceed the maximum fuel load specified in Point 5 below with grass areas not exceeding a height greater than 10 cm.
5) Fuel loads must be reduced and maintained at 2 tonne per hectare.
6) Isolated trees and shrubs may be retained, however, the first 5 metres around all buildings is to be clear of all hazardous/flammable materials.
7) Reticulated gardens in the BPZ shall be maintained to a height of no greater than 500 millimetres.
8) Wood piles must be at least 10 metres away from habitable dwellings.
9) Trees in the BPZ must comply with section **E - Interpretation and Additional Requirements (refer to E1).**
10) Where the land has an approved FMP, compliance must be achieved in accordance with the FMP. The FMP may vary the above BPZ requirements.
11) A Hazard Separation Zone (HSZ) is also recommended in the absence of a Fire Management Plan. **Section E - Interpretation and Additional Requirements (refer to E3).**



D – Fuel Storage & Haystack Protection Zones

A **3 metre** mineral earth **FIREBREAK** shall be located within **6 metres** of fuel storage tanks, sheds, gas cylinders and haystacks. The mineral earth firebreak shall be maintained so that it is totally clear of all material (living or dead).

E – Interpretation and Additional Requirements

1) **Trees** On **Urban, Industrial, Rural,** and **Rural Residential** land, all tree branches must be removed or pruned to ensure a clear separation of at least **3 metres** back from the eaves of all buildings and **5 metres** above the top of the roof. Branches that may fall on the house must also be removed. In the **BPZ** the following is 'recommended'; the spacing of individual or groups of trees should be 15 metres apart to provide for a 5 metres separation between tree crowns. There is also a requirement of 2.5 metres between trees and power lines so they do not come into contact and start a fire or bring down a power line.
2) **Hazardous and Flammable Materials** means the accumulation of fuel including burn piles (living or dead) such as leaf litter, twigs, trash, bush, dead trees and scrub capable of carrying a running fire, but excludes standing living trees and isolated shrubs. **NOTE**: All remaining vegetation, piles of timber, branches and other living vegetation must be maintained to a height of no greater than 10 centimetres. To measure and determine fuel loads use DFES's *Visual Fuel Load Guide* at http://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/pages/publications.aspx#5 and select *Visual Fuel Load Guide Swan Coastal (Part 1 & 2)*. Surface bush fire fuels should be kept low to the ground.
3) **Hazard Separation Zones (HSZ)** A HSZ is a modified area of reduced fuel load outside of the BPZ and is recommended to assist in reducing the fires intensity when flames are approaching buildings. Both the BPZ and the HSZ are essential strategies for the protection of buildings. A HSZ covers the area 75 metres outside the BPZ.
   The HSZ should be modified to have a maximum fuel load of 6-8 tonne per hectare. This can be implemented by fuel reduction methods such as burning, mowing and slashing to remove the hazard. This should not require the removal of living trees or shrubs. **REMEMBER:** reduce the fuel level of the fire to lower the intensity of the blaze. Further information on fuel loading can be found in the *Visual Fuel Load Guide* available by calling DFES or via their website at www.dfes.wa.gov.au
4) **Fire Management Plan (FMP)** A FMP is a comprehensive plan for the prevention and control of bushfires which may apply to individual land holdings. A notification, pursuant to the Transfer of Land Act 1893 (as amended) may be placed on the Certificate(s) of Title of the land for medium to long term fire management to reduce the occurrence and minimise the impact of uncontrolled bush fires, thereby reducing the threat to life, property and the environment. The land owner must comply with the FMP. **Building in bush fire prone areas**, new dwellings and other forms of accommodation, as well as additions to existing buildings are to be constructed in accordance with in *Australian Standard 3959-2009*. In designated bush fire prone areas, the minimum BPZ in all cases shall be 25 metres. Further information on this and other information relating to fire safety issues can be found on the City's website www.busselton.wa.gov.au

Appendix P Method 2 calculations – Southern Interface Justification

Calculated July 18, 2021, 10:08 am (MDc v.4.9)

Class A Flat FDI80

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.4 km/h
Vegetation classification	Forest	Flame length	19.8 m
Understorey fuel load	25 t/ha	Flame angle	52 °, 61 °, 69 °, 73 °, 74 ° & 81 °
Total fuel load	35 t/ha	Elevation of receiver	7.8 m, 8.65 m, 9.24 m, 9.460000000000001 m, 9.51 m & 9.77 m
Vegetation height	n/a	Fire intensity	43,400 kW/m
Effective slope	0 °	Transmissivity	0.863, 0.841, 0.8110000000000001, 0.786, 0.773 & 0.716
Site slope	0 °	Viewfactor	0.6085, 0.4531, 0.3066, 0.2086, 0.1696 & 0.0458
Flame width	100 m	Minimum distance to < 40 kW/m²	16.1 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	21.5 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	30.6 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	41.9 m
		Minimum distance to < 10 kW/m²	48.9 m

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

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

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Calculated July 18, 2021, 10:08 am (MDc v.4.9)

Class A Flat FDI 50

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	50	Rate of spread	1.5 km/h
Vegetation classification	Forest	Flame length	13.95 m
Understorey fuel load	25 t/ha	Flame angle	53 °, 63 °, 71 °, 75 °, 77 ° & 83 °
Total fuel load	35 t/ha	Elevation of receiver	5.57 m, 6.21 m, 6.59 m, 6.73 m, 6.79 m & 6.92 m
Vegetation height	n/a	Fire intensity	27,125 kW/m
Effective slope	0 °	Transmissivity	0.873, 0.855, 0.83, 0.804, 0.791 & 0.728
Site slope	0 °	Viewfactor	0.6002, 0.444, 0.3009, 0.2042, 0.1657 & 0.045
Flame width	100 m	Minimum distance to < 40 kW/m²	11.5 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	15.5 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	22.6 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	31.9 m
		Minimum distance to < 10 kW/m²	37.9 m

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

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

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Calculated July 18, 2021, 10:09 am (MDc v.4.9)

Class D Flat FDI 80

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.16 km/h
Vegetation classification	Scrub	Flame length	11.62 m
Understorey fuel load	25 t/ha	Flame angle	53 °, 63 °, 72 °, 76 °, 78 ° & 83 °
Total fuel load	25 t/ha	Elevation of receiver	4.64 m, 5.18 m, 5.52 m, 5.64 m, 5.68 m & 5.77 m
Vegetation height	m	Fire intensity	53,815 kW/m
Effective slope	0 °	Transmissivity	0.878, 0.862, 0.838, 0.8139999999999999, 0.8 & 0.735
Site slope	0 °	Viewfactor	0.5988, 0.4419, 0.2962, 0.2016, 0.1638 & 0.0446
Flame width	100 m	Minimum distance to < 40 kW/m²	9.6 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	13 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	19.3 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	27.5 m
		Minimum distance to < 10 kW/m²	32.9 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

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Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
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Rev 1	Linden Wears (BPAD 19809, Level 3)	Darren Walsh	Linden Wears (BPAD 19809, Level 3)		6 December 2021

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